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Basics of construction: Site survey, Excavation

2016-09-13

The state and the environment of the construction site

Information about the site

- When?
  - At the preliminary analysis phase (project preparation);
  - At the planning phase;
  - At the phase when preparing for realisation (tendering, contracting);
  - At the construction phase.
- Why?
  - To get to know the environment of the planned building;
  - To get to know the circumstances of the building process.

Information about the site

- What? Information about …
  - closer and wider environment (e.g. physical attributes),
  - social environment, economy,
  - legal regulation.
- Which area?
  - The country (or even greater area);
  - The district, the city;
  - The plot and its neighbours, the block;
  - The plot itself;
- Who?

Legal aspects

- Nationwide regulations:
  - Noise protection;
  - Environmental protection;
  - Labour safety, etc.
- Local regulations:
  - Regulating working hours;
  - Dust protection;
  - Permissions for using road and public utilities.

Examined area: the district, the city, the country…

- Suppliers, services
  - Location of suppliers, e.g.: concreting plants, quarries, building material stores
  - Waste management
- Local technologies – low-tech, high-tech - HR

Examined area: the district, the city, the country…

- Built, natural and social environment
  - Surrounding buildings, functions : residential buildings, schools, hospitals, shops, industry, etc.
  - The access to the site: transport, public transport – people, material, equipment;
  - Other construction sites;
  - Weather conditions;
  - Other risks.

Examined area: the neighourhood

- Built and natural environment
  - Adjacent buildings – may cause obstruction, affect access to the site, have to be protected, can be used;
  - Roads, pavements – provide access to the site, load-carrying ability, width;
  - Public utilities: water, electricity, gas, telephone – accessibility, obstacle (pipelines, wires);
  - Other objects: wells, pits, gullies, tunnels, cellars, etc.
  - Vegetation: trees, bushes, crops – may have to be protected;

Examined area: the neighourhood

Examined area: the neighourhood

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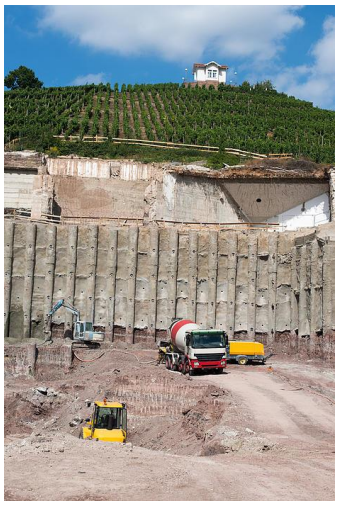
- Power supply / other public utilities
  - Public service availability or generating plant needed
  - Distance to the construction site
  - Authorities responsible for the supplies – need for permission

Examined area: the plot

- Geography of the area
  - Form and area of the plot;
  - The lie of the land (even/slope/cleft)
    - altitude differences, gradients, inclination;
  - Natural water on the plot
    - watercourse, creek, river, pond, lake etc.;
  - Caves, grottos etc..

Examined area: the plot



Examined area: the plot

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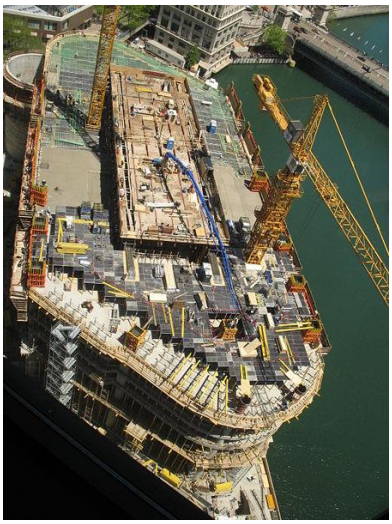

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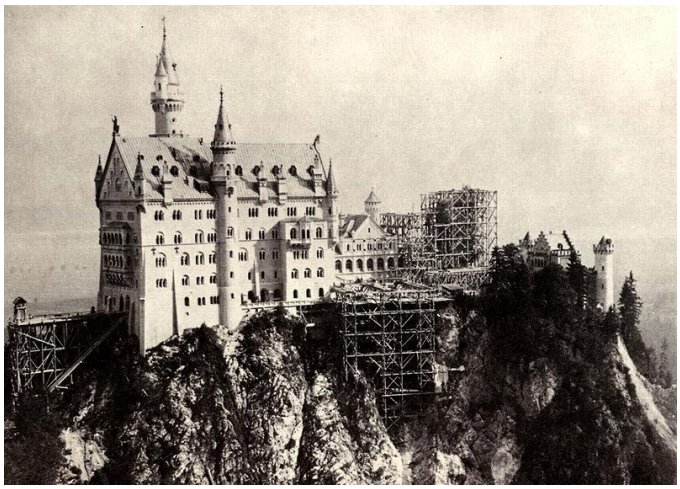
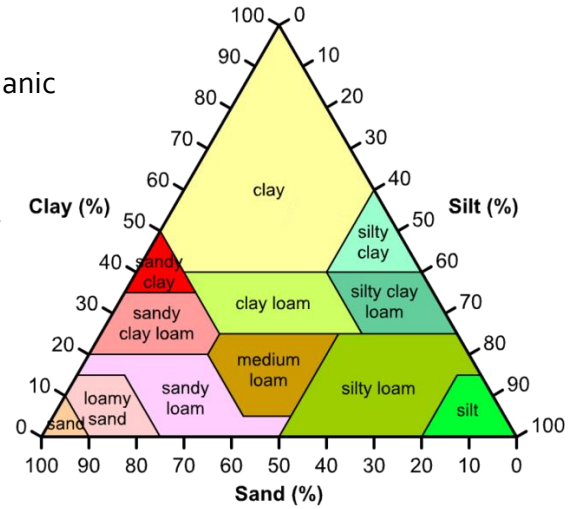


Examined area: the plot

- Soil mechanics
  - Describes the behaviour of soils;
  - Investigation of ground and groundwater conditions:
    - the layers (thickness and position) of different soil types,
    - level and composition of groundwater,
    - underground waterflows.
  - Collecting samples from boreholes and other geophysical techniques;
  - Is a major factor in choosing foundation and earthwork technologies.

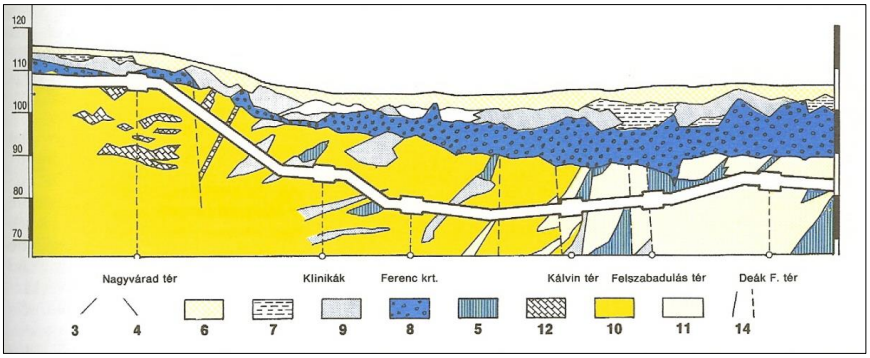
Examined area: the plot

- Soil types:
  - Organic / inorganic
  - Cohesive / loose
  - Clay, silt, sand, gravel, rock, etc.



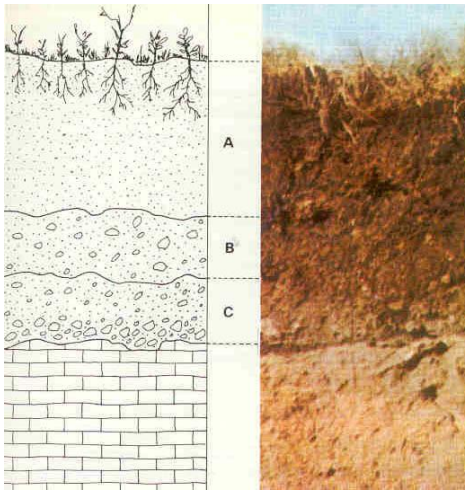
Examined area: the plot

- Soil and rock types



Examined area: the plot

- Soil and rock types



Examined area: the plot

- State of the plot
  - Existing buildings – to retain / to demolish / to use;
  - Roads, pavements – to retain / to demolish / to use;
  - Other objects: wells, pits, gullies, tunnels, cellars, etc.;
  - Archaeological digs / findings;
  - Vegetation: trees, bushes, crops – to retain / to remove;

Examined area: the plot

- Built environment

Examined area: the plot

- Built environment

Examined area: the plot

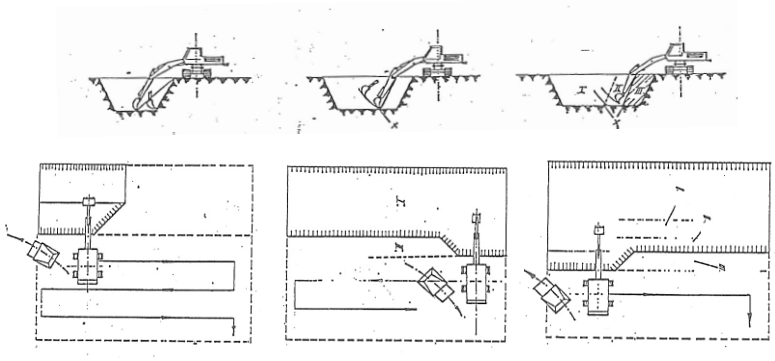
- Archaeological digs / findings

Excavation works

Excavation works

- Why?
  - To build the foundation and the basement levels.
- What?
  - Excavating the working pit or trech;
  - Ensuring the working pit / trench;
  - Removing groundwater;
- How?
  - Depends on the proportions of the pit / trench (area, depth, form);
  - Depends on the ground and groundwater conditions.

Excavation work



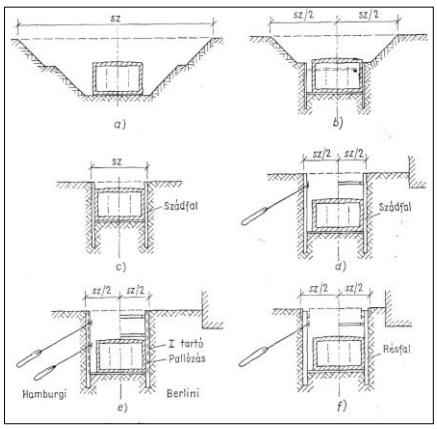
Protection of the working pit

Ground support technologies	Sloped trench	Traditional slope
		Shotcrete
	Steel and timber bracing	Timber shoring
		Soldier piles
	Sheet pile wall	Different materials
	Other walls	Slurry wall
		Pile wall
	Solidifying the soil	Freezing the soil
		Grouting methods

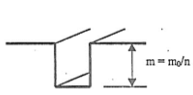
Protection of the working pit

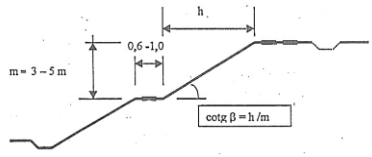
- Ground support
  - Sloped trench (a)
  - Partly sloped (b)
  - Sheet pile wall (c, d)
  - Steel and timber bracing (soldier piles)(e)
  - Slurry-wall (f)
  - Pile wall (f)

  With propping or tie-back

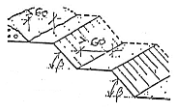


Free-standing excavation walls

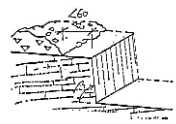




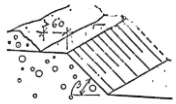
Slope

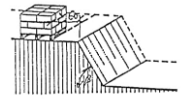


Loose soil

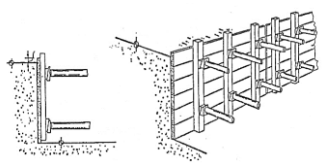


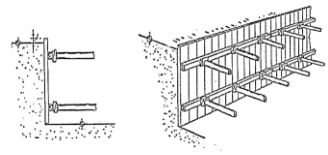
Cohesive soil

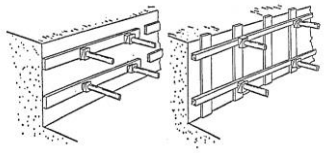


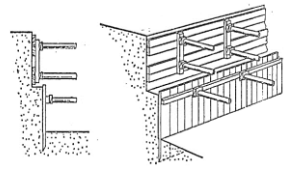


Timber shoring

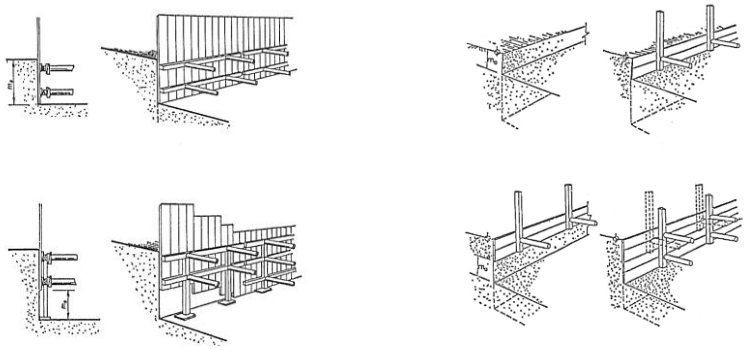




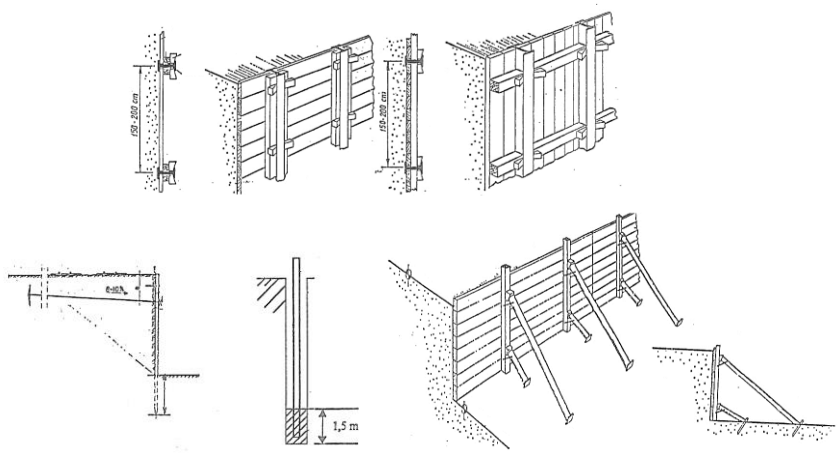




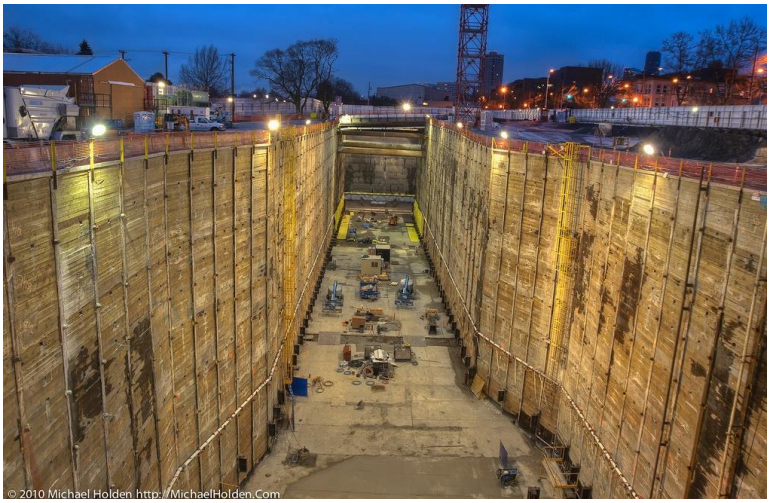
Timber shoring



Steel soldier piles / wall bracing



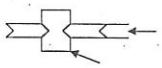
Ensuring the working pit



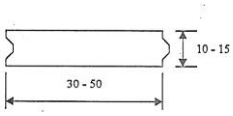
Ensuring the working pit

Sheet pile walls

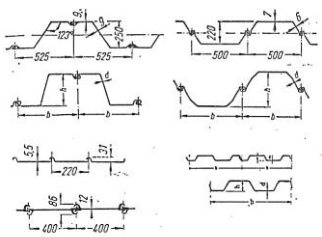
Timber

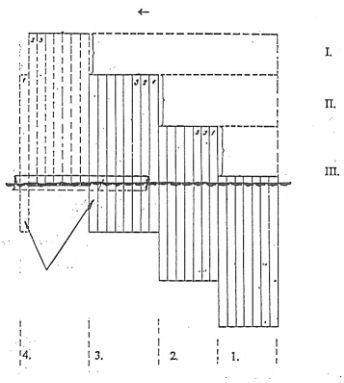


Reinforced concrete

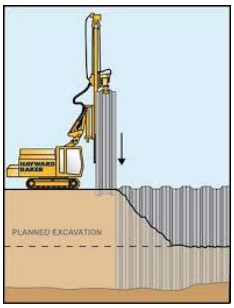


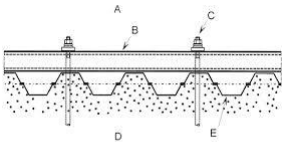
Steel





Sheet pile walls





Protection of the working pit

Protection of the working pit

Protection of the working pit

Removing groundwater

Dewatering (Water removal works)	Drainage
	Sinking groundwater level
	Watertight working pit