Basics of construction: Site survey, Excavation

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 neighbourhood

- 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 neighbourhood
Examined area: the neighbourhood

- 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
Examined area: the plot
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.

- 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

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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

Loose soil

Cohesive soil

Timber shoring
Timber shoring

Steel soldier piles / wall bracing
Ensuring the working pit
Sheet pile walls

Timber

Reinforced concrete

Steel
Protection of the working pit

Protection of the working pit
Protection of the working pit

Removing groundwater

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