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**Technical code for monitoring of building excavation
engineering**

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1 General

1.0.1 In order to standardize the monitoring work of building foundation pit engineering, ensure the quality of monitoring, provide the basis for information-based construction and optimal design, achieve reliable results, advanced technology, and reasonable economy, ensure the safety of building foundation pits and protect the surrounding environment of foundation pits, formulate this standard.

1.0.2 This standard is applicable to the monitoring of building foundation pits and the surrounding environment. For excavation projects in special soils and erosive environments such as expansive soil, collapsible loess, red clay, permafrost, saline soil, and highly sensitive soft soil, monitoring should be carried out in combination with local engineering experience.

1.0.3 Foundation pit engineering monitoring should comprehensively consider factors such as foundation pit engineering design scheme, geotechnical engineering conditions of the construction site, surrounding environmental conditions, construction scheme, formulate a reasonable monitoring scheme, and carefully organize and implement monitoring.

1.0.4 In addition to complying with this standard, the monitoring of foundation pit engineering shall also comply with the current relevant national standards.

2.0.1 building excavation

In order to carry out the construction of the underground part of the building (structure), the space excavated from the ground is called the foundation pit for short.

2.0.2 surroundings around excavation

In the construction and use phase of building foundation pits, the collective designation of existing buildings (structures), facilities, pipelines, roads, rock and soil bodies, and water systems around the foundation pit that may be affected by the foundation pit or that may affect the foundation pit.

2.0.3 Monitoring of excavation engineering

During the construction and use phase of building foundation pits, regular or continuous inspections, measurements, monitoring and data collection are carried out on the safety status, changing characteristics and development trends of foundation pits and surrounding environments by means and methods such as instrument measurement and on-site inspections, analysis, feedback activities.

2.0.4 rock mass excavation

A foundation pit where the rock is outcropped on the ground or the rock mass is covered with a small amount of soil.

2.0.5 soil-rock combinational excavation

Within the range of excavation depth, the upper part is the soil mass and the lower part is the rock mass. It is necessary to consider the influence of the soil mass on the stability of the supporting structure.

2.0.6 design safety grade of excavation

The safety level of the foundation pit determined by the foundation pit engineering design document.

2.0.7 bracing and retaining structure

In order to ensure the safety of foundation pit excavation and underground structure construction and protect the surrounding environment of the foundation pit, a structural system that supports and reinforces the side walls of the foundation pit includes enclosure walls and support (or anchor) systems.

2.0.8 retaining wall

The vertical structure that bears the earth pressure, water pressure and ground load within a certain range around the foundation pit.

2.0.9 Support bracing

The component or structural system used to bear the load transmitted from the retaining wall in the foundation pit.

2.0.10 monitoring point monitoring point

Observation points that are directly or indirectly set on the monitoring object and can reflect its changing characteristics.

2.0.11 Monitoring frequency frequency of monitoring

The number of observations made to a monitoring point within a certain period of time.

2.0.12 Forewarning value on monitoring

According to the protection requirements of the foundation pit and the surrounding environment, the warning value set for the monitoring items.

3.0.1 The following foundation pits shall be monitored for foundation pit engineering.

- 1 The design safety level of the foundation pit is one or two foundation pits.
- 2 The following foundation pits whose excavation depth is greater than or equal to 5m.
 - 1) Soil foundation pit;
 - 2) Extremely soft rock foundation pit, broken soft rock foundation pit, extremely broken rock mass foundation pit;
 - 3) The upper part is soil, and the lower part is a soil-rock composite foundation pit composed of extremely soft rock, broken soft rock, and extremely broken rock mass.

3 Foundation pits whose excavation depth is less than 5m but with complex geological conditions and surrounding environment

3.0.2 The design documents of foundation pit engineering shall specify the scope of monitoring, monitoring items and arrangement of measuring points, monitoring frequency and monitoring and early warning value.

3.0.3 Before the construction of the foundation pit project, the construction party shall entrust a third party with corresponding capabilities to carry out on-site monitoring of the foundation pit project. The monitoring unit shall prepare a monitoring plan, which shall be approved by the construction party and the designer, and shall be implemented after consultation with relevant management units involved in the surrounding environment of the foundation pit if necessary.

3.0.4 The monitoring work steps should meet the following requirements.

- 1 On-site survey and data collection;

2. Develop a monitoring program;
- 3 Layout and acceptance of reference points, working reference points and monitoring points, calibration of instruments and equipment and calibration of components;
- 4 Implement on-site monitoring;
5. Processing, analysis and information feedback of monitoring data;
- 6 Submit periodic monitoring results and reports;
- 7 After the on-site monitoring work is completed, submit complete monitoring data.

3.0.5 Before the monitoring program is compiled, the entrusting party shall provide the following information.

- 1 Geotechnical investigation report;
- 2 foundation pit support design documents;
- 3 Construction plan or construction organization design of foundation pit engineering;
- 4 Relevant data of each monitoring object in the surrounding environment;
- 5 other required information.

3.0.6 The monitoring unit should include the following main tasks in the stage of on-site survey and data collection.

- 1 Understand the monitoring requirements of the construction party and relevant units;
- 2 Collect and analyze geotechnical engineering investigation, hydrometeorology, surrounding environment, design, construction and other data;
- 3 Understand the design and construction of adjacent projects;
- 4 Through on-site survey, review the relationship between relevant data and on-site conditions, and determine the feasibility of on-site implementation of the proposed monitoring project.

3.0.7 The monitoring program should include the following.

- 1 Project overview;
- 2 Site engineering geology, hydrogeological conditions and environmental conditions around the foundation pit;
- 3 monitoring purpose;
- 4 basis for preparation;
5. Monitoring scope, objects and items;