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Technical code for building in expansive soil regions

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3 In other cases, it can be calculated according to the expansion and contraction deformation.

1 General

1.0.1 This specification is formulated in order to implement the national technical and economic policies in construction projects in expansive soil areas, to achieve safety and applicability, advanced technology, reasonable economy, and environmental protection.

1.0.2 This code is applicable to survey, design, construction and maintenance management of construction projects in expansive soil areas.

1.0.3 For engineering construction in expansive soil areas, according to the characteristics of expansive soil and engineering requirements, factors such as topographical conditions, climate characteristics, and changes in soil moisture should be considered comprehensively, local experience should be emphasized, and prevention and control measures should be taken according to local conditions.

1.0.4 The survey, design, construction and maintenance management of construction projects in expansive soil areas shall not only comply with this specification, but also comply with relevant current national standards.

2.1.1 expansive soil

The clay component in the soil is mainly composed of hydrophilic minerals, and it is a cohesive soil that has two deformation characteristics of water absorption expansion and water loss shrinkage.

2.1.2 free swelling ratio

After the artificially prepared dry loose soil sample swells and stabilizes in water, the percentage of its volume increase to the original volume.

2.1.3 swelling potential

A measure of the expansion-contraction deformation, or expansion force, that an expansive

soil may produce when environmental conditions change.

2.1.4 swelling ratio

The percentage of the ratio of the height increase value to the original height of the ring-knife soil sample in the consolidation instrument after it is soaked in water and swells under a certain pressure.

2.1.5 swelling force swelling force

The maximum internal stress produced by the water-soaked soil sample in the consolidation instrument when the volume remains constant.

2.1.6 value of swelling deformation

Under a certain pressure, the deformation amount of expansive soil after absorbing water and expanding and stabilizing.

2.1.7 linear shrinkage ratio

The ratio of the height reduction value to the original height of the ring knife soil sample under natural humidity after drying or air-drying.

2.1.8 coefficient of shrinkage coefficient of shrinkage

The vertical linear shrinkage rate of the ring knife soil sample when the water content decreases by 1% in the linear shrinkage stage.

2.1.9 value of shrinkage deformation

The amount of deformation of expansive soil after dehydration shrinkage is stabilized.

2.1.10 value of swelling-shrinkage deformation

The total deformation of expansive soil after water absorption and water loss shrinkage are stabilized.

2.1.11 grade of swelling-shrinkage

The foundation evaluation index of the influence degree of expansion and contraction deformation of expansive soil foundation on low-rise buildings.

2.1.12 Atmospheric influence depth climate influenced layer

Under the influence of natural climate, the effective depth of expansion and contraction deformation of foundation soil caused by factors such as precipitation, evaporation and

temperature.

2.1.13 climate influenced markedly layer

Atmospheric effects are particularly pronounced at depth.

2.2.1 Actions and action effects

Pe - expansive force of soil;

pk-corresponding to the standard combination of load effects, the average pressure value at the bottom of the foundation;

pkmax--the maximum pressure value at the edge of the bottom surface of the foundation when the standard combination of load effects is applied;

Qk-corresponding to the standard combination of load effects, the vertical force acting on the top of the pile under the most unfavorable working conditions;

sc--gradient deformation of foundation;

se - expansion and deformation of foundation soil;

ses - expansion and contraction deformation of foundation soil;

ss-shrinkage and deformation of foundation soil;

nue--Standard value of the maximum expansion and pullout force of the side soil of the pile in the layer with severe atmospheric influence.

2.2.2 Material properties and resistance

fa--modified characteristic value of foundation bearing capacity;

fak - characteristic value of foundation bearing capacity;

qsa - characteristic value of lateral resistance of the pile;

qpa--the end resistance characteristic value of the pile;

omega1--the natural water content of the soil at 1m below the surface;

omegap--the plastic limit water content of soil;

gammam -weighted average weight of the soil above the bottom surface of the foundation;

deltaef --free expansion rate of soil;

deltaep-expansion rate of expansive soil under a certain level of load;

deltas-the vertical line shrinkage of the soil;

lambdas--soil shrinkage coefficient;

psiw-soil moisture coefficient.

2.2.3 Geometric parameters

AP - cross-sectional area of the pile end;

d - foundation embedding depth;

da--atmospheric influence depth;

hi - the calculated thickness of the i-th layer of soil;

h0 - the original height of the soil sample;

hw--the height of the soil sample after soaking in water and swelling under a certain level of load;

l - the distance between the centers of adjacent column foundations of the building;

la--the length of the pile tip entering the layer below the sharp atmospheric influence layer or in the non-expansive soil layer;

lp-horizontal distance from the outer edge of the foundation to the slope shoulder;

up - the circumference of the pile body;

nu0 - the original volume of the soil sample;

nuw-the volume of the soil sample after swelling and stabilizing in water;

zi-calculated depth of the i-th layer of soil;

zen-calculation depth of expansion deformation;

zsn--shrink deformation calculation depth;

beta--The angle of the design slope.

2.2.4 Design parameters and calculation coefficients

psie-experiential coefficient for calculation of expansion and deformation;

psies-experiential coefficient for calculation of expansion and contraction deformation;

psis-experience coefficient for calculation of shrinkage deformation;

lambda--uplift coefficient of pile side soil.

6 Investigate local construction experience, and conduct research and analysis on cracked and damaged buildings.

4.1.3 The preliminary investigation shall determine the expansion and contraction grade of the expansive soil, evaluate the stability and geological conditions of the site, and