Marine Engineering Geotechnical Engineering and Analysis of Its Influencing Factors

Haiyan Cheng[1], Shenghui Jiang[2], Dongdong Zhao[3], Chao Zhang[4], Fansheng Lin[5] and Xiankai Zhu[6]

[1]Qingdao Geological Exploration Institute of China Metallurgical Geology Bureau，Qingdao 266109, China

[2]The Oean University of China, Qingdao 266100, China

[3]Qingdao Geological Exploration Institute of China Metallurgical Geology Bureau，Qingdao 266109, China

[4]Qingdao Geological Exploration Institute of China Metallurgical Geology Bureau，Qingdao 266109, China

[5]Qingdao Geological Exploration Institute of China Metallurgical Geology Bureau，Qingdao 266109, China

[6]Qingdao Geological Exploration Institute of China Metallurgical Geology Bureau，Qingdao 266109, China

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Abstract: With the development of economy, China in recent years in shipbuilding, petrochemical, wharf and other Marine engineering development in the rapid, so the geotechnical engineering investigation of the importance of the rise. Geotechnical engineering investigation refers to the need to identify the various conditions of the engineering site investigated according to the requirements of engineering documents. The activity of preparing survey documents after identifying the geological and environmental conditions of the area. It is convenient to find out the engineering geological conditions and analyze the existing geological problems. The purpose of this paper is to observe the geotechnical engineering investigation and construction of Marine engineering in order to analyze the influencing factors. This paper expounds in detail the preliminary preparation and construction process of geotechnical engineering investigation of Marine engineering, and enumerates the factors affecting the normal offshore drilling and the emergency situation during offshore drilling. At last, the problems in geotechnical engineering investigation of Marine engineering are studied and analyzed, and it is found that the clay expansion rate is maintained at about 40%.

1. Introduction

Marine engineering construction refers to all kinds of new construction, reconstruction and expansion projects mainly aimed at the development, utilization and protection of Marine resources and environment in China. The exploitation and utilization of various Marine petroleum mineral resources with the offshore oil drilling as the main production center; Various submarine oil cable construction projects; Various undersea tunnel construction projects. According to the relevant provisions of the state in the corresponding code of Marine engineering construction in China, the geological investigation of Marine geotechnical engineering must be carried out according to the requirements of capital construction and construction procedures before the basic design and planning of Marine engineering construction is completed. For Marine geotechnical engineering

survey refers to make full use of the water drilling, sampling, in situ test, engineering geophysical exploration, engineering geological mapping and other comprehensive geological survey means to find out the underwater submarine sediment all kinds of chemical composition, structure, physics and fluid mechanics properties and underwater topography and so on, for the Marine engineering main body structure of the proposed site selection and proposed the main structure of building design and construction of comprehensive geological data and provide reliable data, in order to ensure the safety of the construction of ocean engineering.

The geometric dispersion of surface waves provides the characteristics of inferred media properties. Surface wave measurement methods are being developed and their applications include noninvasive characterization of small scale media and large scale seismic geotechnical survey. Despite significant differences in scale, these applications typically utilize surface wave propagation along the boundaries of layered media. * shan Dai discusses the standard steps involved in ground wave measurement. Two application cases are introduced in detail. In a small scale laboratory application case, a nondestructive testing (NDT) method for coating research using laser interferometry is proposed. In large-scale field applications, * shan Dai designed a passive surface wave measurement method based on accelerometer to characterize seismic geotechnical engineering sites. Finally, some Suggestions are put forward for the practical application of surface waves in multi-scale engineering problems [1]. Natural clay is prone to structural damage under external load, especially under dynamic load, its mechanical properties will change. Khalili jamshid studied the mechanical changes of soft soil of Marine sedimentary structure in tianjin under cyclic load. The resonance column test and the post-cyclic monotone test were carried out on the soft soil under different cyclic loads. The results of resonance column test show that with the development of structural damage, the rate of stiffness degradation decreases from fast to slow. The law of strength degradation is similar to that of stiffness degradation. Khalili jamshid analyzed this degradation law from the perspective of structural damage, discussed the stiffness strength ratio of soft soil in the process of damage, and concluded that the degree of stiffness degradation was greater than the degree of strength degradation [2]. A new trend is emerging in engineering geological surveys, in which laboratory analysis is being replaced by field testing, which is more efficient, less costly and less time-consuming. Conventional engineering geological surveys are unable to establish geotechnical parameters through simple core drilling, macroscopic descriptions that are sometimes very subjective, and Roman Bulko establishes geotechnical parameters based on indicative standardized values or archived values from previous geotechnical standards. Roman Bulko's engineering geological survey is reliable by combining laboratory and field tests with indirect test methods. The widespread use of rotary coring drills for obtaining laboratory soil samples from different depths cannot be further improved with continuous assessment of the formation and properties, such as the CPT piezoelectric cone. Core drilling measurements usually use a small number of soil samples, but this leads to a lower subsoil representation and an underestimation of parameters [3].

This paper first gives a basic introduction to the geotechnical engineering investigation of Marine engineering, then specifically explains the geotechnical engineering investigation methods and technical means of Marine engineering, as well as the analysis and evaluation of Marine engineering geotechnical engineering and the preparation of achievement report, finally illustrates the application of geotechnical engineering theory in practice. Through the collation and analysis of the geotechnical engineering theory, we have a clearer understanding and a deeper understanding of the geotechnical engineering theory, so as to better apply the geotechnical engineering investigation theory to the actual engineering, ensure the reasonable progress of the engineering, and promote the engineering to obtain the best economic, social and environmental benefits.

2. Proposed Method

2.1 Marine Engineering Survey

Marine engineering survey is to provide the necessary and reliable seabed topography, seabed

rock and soil and Marine environment characteristics for Marine engineering construction by means of measurement, test, exploration, simulation and analysis[4].

(1) Classification

The investigation of Marine engineering is mainly divided into three branches, which include the survey of Marine engineering, the investigation of Marine near-surface rock and soil, and the investigation of anti-corrosion environment of Marine engineering. The survey of Marine engineering mainly includes the survey of the subsurface topography of the seabed, the lateral scanning of the submarine surface and the analysis of the geological stability of the bottom seabed. The exploration of Marine rock and soil mainly includes the detection of the anti-corrosion structure of the subsea near-surface sedimentary strata, the investigation of the subsea surface sedimentary rock and soil, and the nature of the engineering structure. The investigation of the anti-corrosion environment of Marine engineering mainly includes the detection and investigation of the physical, dynamic and anti-corrosion physical environment. The investigation of Marine physical dynamic environment mainly includes the thermal conductivity of seawater temperature, salinity, sea ice, meteorology, suspended sediment and its flux and sediment. The investigation of Marine dynamic environment includes the calculation of the general dynamic conditions of ocean waves, tides, currents and Marine dynamic extreme conditions. The investigation of Marine corrosion protection physical environment mainly includes chemical corrosion protection elements, fouling organisms and the conductivity of sediments[5-6].

(2) Characteristics

Engineering geological survey has the characteristics of comprehensiveness and high technology. For the environmental geological survey of Marine engineering, it is necessary to master and have professional basic knowledge of Marine engineering science and technology, such as navigation and positioning on the sea, surveying and mapping data collection on the sea, data post-processing, side scan sonar and geomagnetic wave measurement, map processing and compilation. Professional various geotechnical environment geology of Marine equipment mainly include all kinds of digital profiler (especially with multichannel digital seismograph equipment more complex), and various geological sampling and the bottom of the ocean drilling, the floor and various applicable Marine geotechnical physical, mechanical and properties test of the scientific theory and basic knowledge as well as other relevant technical knowledge; It is necessary to have professional equipment for geological investigation and investigation of Marine engineering applicable to the environment, which mainly includes navigation positioning and measurement equipment applicable to the surface and underwater, single-beam multi-beam bathymetric positioning equipment, geomorphologic measurement equipment, magnetic measurement equipment and so on[7-8].

(3) Existing problems

The major technical problems in the Marine engineering and survey industry are mainly due to the lack of a number of Marine survey design and technical personnel with compound talents, advanced Marine survey instruments and automation equipment, and complete Marine survey equipment and ships. Therefore, the Marine engineering and survey industry needs to correctly use the composite Marine and survey instruments and equipment, accurately process and master the data of Marine survey, and provide the Marine engineering designers with scientific and reasonable Marine survey and design schemes and personalized construction schemes[9-10].

3. Experiments

3.1 Experimental Background

Marine engineering investigation in the field of Marine survey and industry not only the special requirements of our prospecting enterprise is equipped with a batch of can have a variety of Marine survey of the same kind of knowledge and the specialized technical personnel, and at the same time also need special enterprise in the field of Marine engineering survey is equipped with a group of can with specialized modern Marine geophysical exploration ships, the earth's oceans physics exploration ship equipment, but because at present our country some of the modern Marine

equipment lags behind that of developed countries, survey and enterprise of Marine technology and equipment is mostly need a large number of introducing foreign technology and equipment, Due to the developed countries in order to better maintain its strategic advantage in the trade and competition of inequality and status and some key technology and equipment for the blockade, which we introduced from abroad the low level of key equipment and high-level technical equipment quantity is less, and even if some of the key equipment is allowed to export or import from abroad to China, may need to pass strict accuracy and reduce the cost of processing, some other high-end equipment from a distance and a lot of development in our country.

3.2 Experimental Design

(1)Test method

In-situ testing and drilling are the most frequently used methods in engineering surveys. In a broad sense, in-situ testing can be divided into two aspects, namely in-situ testing and in-situ testing. It refers to measuring the required physical quantity by using experimental methods at the original location under the premise that the tested object is not disturbed, damaged or slightly disturbed, and then evaluating the performance and state of the tested object. In a narrow sense, it means to measure the relevant physical and mechanical indexes of rock and soil in the natural state through relevant tests, and then analyze them according to relevant theories, and then calculate them according to relevant formulas, and finally judge and evaluate the state and engineering performance of rock and soil through the above process.

(2) Sampling process

At the survey site, the 63.5kg core hammer was released at a height of 76cm, and the number of times the standard penetrator was drilled into 30cm was recorded. The number of times is the number N, which is used to evaluate the engineering properties of the soil. The advantages of standard penetration test are simple operation and wide application. However, it also has defects, for example, it is not applicable to the soil layer with large gravel, and the data obtained from it is more discrete, so the engineering properties of the soil evaluated by it can only be approximate. In the experimental engineering site, the shear wave velocity distribution range of the advance settlement project is 217.1 m/s to 295.2m/s.

(3) Experimental data collection

Table 1. Survey data collection

Soil layer code	Name of the geotechnical	f_{ka} (kPa)	E_S (MPa)	K(MN/m^3)
①	clay	240	10.0	55
②-1	Silty clay	180	8.5	38
②-2	Silty clay with silty soil	230	10.5	53
③-1	Strongly weathered argillaceous sandstone	320	19.0	-
③-2	Moderately weathered argillaceous sandstone	800	Small compressibility	-

4. Discussion

4.1 Analysis of Geotechnical Engineering Investigation and Construction of Marine Engineering

As shown in Figure 1, according to the results of this survey and geotechnical test, the free expansion rate of the clay in the①floor of the proposed site is generally 40%-46%, with weak expansion potential, which belongs to expansive soil. The slope of the site is greater than 5 degrees locally, and the construction site is a slope. The bearing layer of the proposed site belongs to the same geomorphic unit, and the strata are distributed from top to bottom as follows: the thickness of the ② clay layer is 0.80m-12.90m, some places are thin and some places are thick. The mechanical properties of this layer are relatively uniform, but the top slope of the bearing layer in some parts of this layer is more than 10%. This layer is suitable for natural foundation bearing layer. The thickness of layer ③-1 silty clay layer is 0.00m-2.20m. Most of this layer is missing, and the mechanical properties of this layer are relatively uniform. It belongs to the weak underlying layer of layer ②-1. The ③-2 layer of silty clay with silty soil is 1.00m-9.00m thick, thin in some places and thick in others. The mechanical properties of this layer are relatively uniform, and the top slope of the bearing layer in some parts is more than 10%. The ④ strongly weathered argillaceous sandstone layer is 0.50m-4.50m thick, thin in some places and thick in others. The mechanical properties of this layer are relatively uniform, and the top slope of the bedrock surface in some parts is more than 10%. This layer is suitable for prestressed pipe pile end bearing layer. To sum up, the site is comprehensively determined to be an uneven site and a general site for the construction of the project.

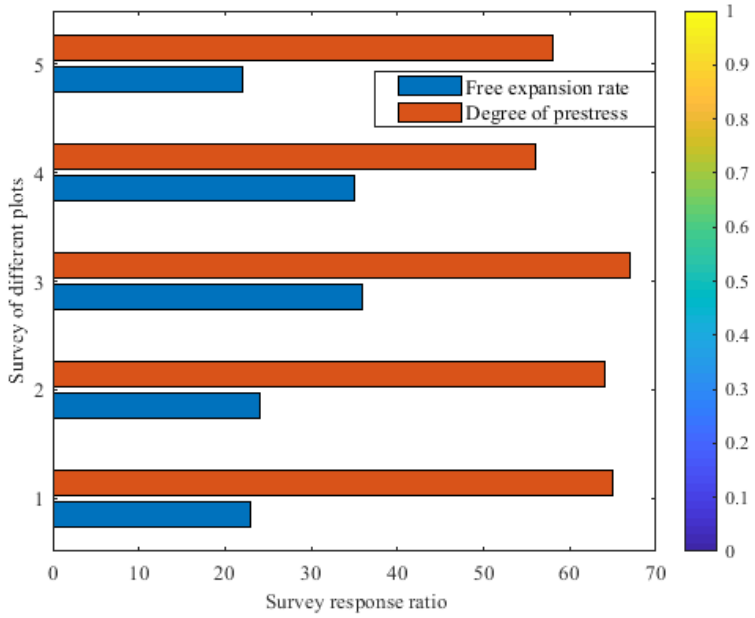

Figure 1. Engineering survey situation distribution

4.2 Suggestions on Influencing Factors of Marine Engineering Geotechnical Engineering Investigation and Construction

Geotechnical engineering is to ensure that construction projects can smoothly carry out the basis and prerequisite, prospecting enterprises should attach great importance to the geotechnical engineering investigation of safety, quality and construction progress of the project, the process of geotechnical engineering investigation in the actual work, the staff should find the problems existing in the work in time and its correction, effectively guarantee the work efficiency and work quality. Work should be combined with local actual situation at the same time take appropriate survey methods, introduce advanced computer technology and application, keep up with The Times

progress, thus to meet the sustainable development of the national economy at the same time, improve the overall level and quality of survey work, to long-term development of construction industry in China.

5. Conclusions

Marine engineering survey industry belongs to the support layer of Marine economy, which is attached to and serves the core industry of Marine economy. The Marine data data obtained by Marine engineering survey basically cover all Marine elements, so it is widely used. This paper expounds the geotechnical engineering investigation theory in detail, and through the field investigation of a geotechnical engineering project of Marine engineering, shushan district of fertilizer city to promote the resettlement project, the theory is combined with the practice, so that engineers and technicians have a better understanding of the geotechnical engineering investigation theory, and the theoretical knowledge is applied to the actual project.

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