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Analysis of Integrated Model of Geotechnical Engineering Investigation and Design

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Abstract: With the increasing complexity of engineering projects, the traditional geotechnical engineering survey and design mode faces many challenges. In order to improve the efficiency and optimize the quality, the integrated mode of survey and design arises at the historic moment. This model shows significant advantages by breaking down departmental barriers and realizing information sharing and collaborative operation. This paper deeply analyzes the advantages of the integration model in improving work efficiency, optimizing the design scheme and promoting information sharing, and discusses the implementation strategies from three dimensions of organizational structure, technological innovation and talent training. The article points out that the construction of a reasonable organizational structure, increasing investment in science and technology, and paying attention to talent training are the key measures to promote the integration, which provides a useful reference for relevant practitioners.

Keywords: Geotechnical engineering; Integration of survey and design; Advantage analysis; Implementation strategy

Introduction

Geotechnical engineering is the foundation of the construction project, and its quality directly affects the safety and benefit of the project. However, the traditional survey and design mode has problems such as department division and information separation, which often leads to low efficiency and design divorced from reality. In order to solve this problem, the integrated model of geotechnical engineering survey and design has gradually become the focus of the industry. By integrating survey and design resources, strengthening information sharing and process collaboration, this model aims to optimize design, reduce risks and improve benefits. This paper will comprehensively analyze the integration mode of geotechnical engineering survey and design from the perspective of advantage analysis and implementation strategy, to provide new ideas for the development of the industry.

1. Analysis of integrated mode of geotechnical engineering survey and design

1.1 Improve the work efficiency and shorten the project cycle

The integrated mode of survey and design can significantly improve the work efficiency of geotechnical engineering projects. In the traditional mode, survey and design are often conducted in series, and this linear workflow leads to a long project cycle. The integrated mode realizes the parallel operation of survey and design, and the relevant data and results can be shared in real time, greatly reducing the waiting time and repeated work. The investigators directly participate in the design discussion, and the designers go deep into the site to guide the investigation. The two sides can timely communicate and give feedback to speed up the discovery and solution of the problems. This collaborative work method not only improves the efficiency of information transmission, but also identifies and solves potential problems in the early stage of the project, thus significantly shortening the entire project cycle and saving time and cost for the owner^[1].

1.2 Optimize the design scheme and improve the project quality

The integrated mode of geotechnical engineering survey and design helps to optimize the design scheme and improve the engineering quality. In the traditional mode, it is often difficult for designers to fully understand the field situation, which is easy to lead to the disconnection between design and reality. The integrated model provides an opportunity for designers to gain insight into the site. Through the field investigation and close communication with the investigators, the designers can more deeply grasp the site conditions, rock and soil characteristics and other key information, so as to carry out a more scientific and reasonable design. At the same time, the problems found in the investigation process can be fed back to the designers in time to constantly improve the design scheme. This iterative optimization process of "on-site-design- on-site" can effectively improve the design quality, better meet the needs of the project, and then ensure the safety and reliability of the project.

1.3 Promote information sharing and improve the efficiency of resource utilization

The integrated mode of survey and design can promote the information sharing of each link of geotechnical engineering project and significantly improve the efficiency of resource utilization. In the traditional mode, the survey and design departments are often independent, and it is difficult to connect the data and data effectively, resulting in a large number of repeated collection and low-level utilization. The integration mode requires the establishment of a unified data platform, centralized management of information in various stages of survey, design and construction, to realize real-time data sharing and dynamic update of^[2]. This kind of information management method can not only avoid information islands and improve work efficiency, but also promote the coordination between different majors. By optimizing resource allocation and reducing duplication of work, the integration mode can improve the project management level on the whole and create greater value for the project construction.

2. Implementation strategy of the integrated mode of geotechnical engineering survey and design

2.1 Build a reasonable organizational structure and improve the coordination mechanism

To implement the integration of geotechnical engineering survey and design, the primary task is to build a reasonable organizational structure. Under the traditional management mode, the survey and design departments often operate independently, and the barriers between the departments lead to poor information and inefficient cooperation, which seriously restrict the development of the integration work. In order to solve this problem, we must carry out the flat and matrix reform of the organizational structure. We can consider setting up a special project management team to break the boundaries of departments and organically integrate survey, design and other professionals. This mode is conducive to promoting the communication and coordination between departments, improving the efficiency of resource allocation, and forming a working force. Of course, the adjustment of the organizational structure is only the first step, and a sound and scientific coordination mechanism must be established on this basis. First of all, the division of responsibilities of each participant, which should not only give play to their professional advantages, but also establish the idea of "a game of chess" and carry out the work from the overall situation. Secondly, a standard work process should be formulated, through the process reengineering, to achieve the seamless connection of each link, to avoid buck-passing. Again, a regular communication mechanism should be established, such as holding joint meetings to timely study and solve the existing problems and coordinate the resources of all parties. In addition, we can also explore the implementation of the chief engineer responsibility system, give full play to the leading role of technical experts, and strengthen technical control and overall guidance. Only by forming an organization system with clear responsibilities, smooth process and efficient operation, can we provide a solid organizational guarantee for the integration of survey and design^[3].

2.2 Increase investment in science and technology and promote technological innovation

For the integration of survey and design to truly take root, it must also have the strong support of advanced technology. At present, the traditional survey and design means have been increasingly powerless, and it is difficult to meet the increasingly complex engineering needs. In the face of this challenge, we must increase the investment in science and technology, and drive the in-depth development of integration by technological innovation. First of all, we should actively introduce advanced survey equipment, software system, data processing technology at home and abroad, and comprehensively improve the information and intelligence level of survey and design. For example, 3 D laser scanning technology can quickly obtain high-precision landform information; geophysical radar technology can continuously detect underground pipelines, holes, etc.; BIM technology can realize the digital management of the whole engineering life cycle, and greatly improve the design efficiency and quality. The application of these new technologies will surely inject strong impetus into the integration of^[4]. Secondly, original innovation should be encouraged, and more professional and refined technical methods should be developed according to the characteristics of different projects. The complexity and diversity of projects often require innovative solutions according to local conditions, which requires the survey and design personnel to dare to break the routine and dare to explore and innovate. Thirdly, we should make full use of external intellectual resources and strengthen the industry-university-research cooperation with universities and research institutes. Universities and research institutes are important forces in basic research and applied basic research, with rich human resources and scientific research achievements. Through close cooperation with these institutions, integration can provide a steady stream of technological innovation momentum.

2.3 Pay attention to personnel training and improve the quality of the team

The integration of geotechnical engineering survey and design is a complex system engineering, which puts forward higher requirements for employees. On the one hand, the integration requires the survey and design personnel to have a solid professional skills. Whether it is survey or design, all need deep theoretical foundation and rich practical experience. Only proficient in professional knowledge, can accurately judge the geological conditions and optimize the design scheme. On the other hand, integration also requires employees to have a compound thinking and cooperative spirit. Integration has broken the departmental barriers, requiring the survey and design personnel to stand in the

overall height, take into account the needs of all parties, and coordinate to solve various problems. This requires employees not only to have a professional vision, but also to have cross-border thinking and communication skills. In the face of the demand for talents under the new situation, we must attach great importance to talent training and strive to improve the quality of the team. To be specific, first, it is necessary to improve the talent training system, and cultivate a group of applied talents with "solid professional foundation, rich practical experience and excellent comprehensive quality" through school-enterprise cooperation and targeted training. Second, to strengthen on-the-job training, to carry out various forms of technical exchanges and case sharing activities to meet the needs of integration, to help employees update their knowledge structure in time, improve their business level and innovation awareness. Third, we should innovate the incentive mechanism, establish and improve the talent development channels, improve the salary, promotion and other policies, fully mobilize the enthusiasm and creativity of employees, so that all kinds of talents can realize their own value. Only by building a high-quality and professional talent team, can the integration of survey and design be truly take root, steady and far.

3. Conclusion

As a new trend of industry development, the integrated mode of geotechnical engineering survey and design is reshaping the traditional way of working. This model can not only improve efficiency and optimize quality, but also promote resource integration and promote technological innovation. However, it is not easy to achieve integration, which requires systematic changes in the organization, technology, talent and other aspects. In the future, with the improvement of relevant policies and the accumulation of practical experience, the integrated model will certainly play a greater role in the field of geotechnical engineering, and make an important contribution to the improvement of the quality, safety and efficiency of the project. It is believed that through continuous exploration and practice, the integration of geotechnical engineering survey and design will become an important force to promote the high-quality development of the industry.

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