Study on Land and Geotechnical Engineering Standard System Construction for Ecological Soil Protection

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Abstract. As a guiding document, land engineering standards play an important role in all aspects of land engineering in China. In view of the needs of land engineering for standard construction, this paper puts forward the basic principles for the construction of land engineering standard system, and adopts the system method, from the standard level (basic, general, professional standards), professional categories (land information and land resources, land engineering, land consolidation project, land use and protection, and professional sequence (synthesis, investigation and evaluation, planning and management, engineering technology, materials and equipment), which provides reference for the industry to formulate long-term planning and annual planning of land engineering standards.

1. Introduction

The technical standard and specification system belongs to the category of standardization, and is managed according to the standardized management regulations. Generally, it is issued by the competent department of the state, which has certain mandatory. It can be divided into several categories, such as "standard", "specification", "regulation". The standard is based on the comprehensive results of scientific and technological and practical experience, and the basic purpose is to obtain the best order and best social benefits. It provides common and reusable rules, guidelines and characteristic documents for activities or their results, and is a unified provision for repetitive things and concepts, which is formulated by consensus and approved and issued by a recognized institution. It can be divided into national standards, industry standards, local standards and enterprise standards. Norms and regulations are the expression of standards and the standards and basis for the industry to abide by together [1].

Land engineering is a new and long-standing discipline, including three secondary disciplines: land resources and land information, land consolidation engineering, land use and protection. The subjects
involved in the technical standard system mainly include the technical standard system of land resources investigation and monitoring (land planning, investigation and evaluation), land resources economical and intensive use, land consolidation and cultivated land protection. In major science and technology projects and major special projects, around the comprehensive investigation and evaluation of land resources, cultivated land protection, economical and intensive use, land consolidation, high standard farmland construction, contaminated land restoration and other fields, the development of technical standards is deployed to form a number of advanced technical standards in land engineering, which can provide technical support for the implementation of land engineering strategy. Therefore, it is particularly important to strengthen the research of land engineering standard system. In view of the lack of domestic research literature on land engineering standard system, this paper attempts to analyze and discuss the demand and system construction of land engineering standard system in China, so as to have a more comprehensive understanding of China's land engineering standard system and provide technical support for the sustainable use of land resources.

2. Current situation and demand analysis of land engineering standard system

2.1. Analysis of current situation of standards
China attaches great importance to standardization work. In 2001, the National Standardization Management Committee was established to strengthen the unified management of standardization. With the joint efforts of all departments and local governments, the standardization industry has developed very rapidly. Up to now, the total number of national standards, industry standards and local standards has reached 100000, basically realizing full coverage of the standard system in the fields of industry, industry, industry, and social undertakings [2]. At the same time, the land and resources standard system has gradually improved. The Ministry of land and resources has successively issued the 5th edition of the land and resources standard system, with the number of standards increasing year by year, and the standard system has been continuously improved. According to the latest catalogue of land and resources standards (2014 Edition), 139 national standards and 124 industrial standards of land and resources industry are included in the system. There are 60 existing technical standards and specifications related to land engineering. Among the 60 land engineering standards, according to the standard level, 7 national standards, 47 industry standards and 6 local standards are divided; According to the standards issued and implemented in the years of implementation, 10 were issued and implemented from 1990 to 2000, 24 were issued and implemented from 2001 to 2010, and 26 were issued and implemented from 2011 to 2014; According to the standard content, 29 items of land resources investigation and monitoring (land planning, investigation and evaluation), 9 items of land resource conservation and intensive utilization, 22 items of land remediation and cultivated land protection are divided [3].

2.2. Standard requirement analysis
In 2016, China's urbanization rate reached 57.35%, which is still in the rapid development stage of urbanization. The demand for land resources for urban construction is increasing. The land expansion mode is still the traditional extensive mode in the past, which leads to slow industrial upgrading and deterioration of ecological environment. Moreover, the desertification of land in China [4], soil erosion [5], soil pollution [6], low arable land and other categories [7], serious land resource damage [8], and huge loss of cultivated land, showing the situation of insufficient land reserve resources [9]. The quality and quantity of land are facing great threat. In addition, at present, China's population is still growing at an average annual rate of about 15 million, and the food supply continues to increase; The land carrying capacity is close to the limit, and the contradiction between the total demand and the total supply of land is sharp and prominent. In the face of increasingly severe land problems, researcher Han Jichang summed up many years of practical experience and put forward the subject of "land engineering" for the first time, which is the process of transforming unused land into usable land or making efficient use of used land, actively coordinating the harmonious development of human land relationship, and integrating the investigation, evaluation, planning, development, remediation, utilization and utilization
of land resources It is a comprehensive discipline to protect various projects, covering the renovation and transformation of agricultural land, construction land, contaminated land and low-standard land. Through engineering measures, it can improve the effective land area, increase the land utilization rate, improve land productivity, ensure social land and food security, and effectively solve the contradiction between land supply and demand [10]. The standard system of land engineering is the foundation of land engineering. However, the existing standards mainly focus on the investigation and monitoring of land resources, and there is a lack of standards in the links of land development, remediation, utilization and protection. It is necessary to further sort out and improve the standard system, so as to promote the development of land engineering industry and ensure the quality of land engineering construction.

3. Construction of technical standard system of land engineering

3.1. Construction principle

3.1.1. The principle of giving priority to structure and highlighting key points. The construction of the standard system is a process of continuous improvement and rolling development. With the determination of the scope of land engineering work and the improvement of work requirements, the system also needs to be constantly revised and improved. Land engineering is not only about land investigation, economical and intensive use, land consolidation and protection, but also covers the consolidation and transformation of agricultural land, construction land, contaminated land and low standard land. When building the land engineering standard system, we must closely contact the needs of practice, start from the perspective of engineering practice, and fully learn from the standard framework of other industries, Constantly adjust and optimize the framework of land engineering standard system. On the basis of establishing the system framework, according to the priority of standards, the standard system should be improved step by step, and some standards should be developed into local professional core standards first, and industrial standards should be promoted. Finally, national standards should be applied to push land engineering to a new stage.

3.1.2. Classification guidance and operability principle. Standard formulation is a systematic project to avoid the repetition, intersection and contradiction between standards. Therefore, standard formulation should have the guiding principle of classification. China has a vast territory, diverse land types and complex regional environment. In the process of formulating the standards, we must consider different land characteristics, carry out land investigation, planning, design, engineering construction and evaluation by classification, and make sure that the level of economic development in a certain period of time is compatible with the level of land engineering. We must not set the standards too low or too high, Ensure the practical operability of the standard.

3.1.3. Principle of comprehensive coverage and moderate foresight. In view of the new situation and new problems that may appear in land engineering, it is proposed from the standard system to comprehensively cover the research content of land engineering, including the demand standards in a certain period of time in the future, to do a good job in technical reserve, and to launch it in time when the conditions are mature, which plays an important role in scientific guidance and technical support. At the same time, the standards with global influence are the basic standards, the standards applicable to some common links are the general standards, and the standards only applicable to a certain professional direction are the professional standards; All levels of standards restrict each other and complement each other, forming a hierarchical structure with complete functions [12].

3.2. Construction of land engineering standard system

The construction of land engineering standard system can be expressed by Hall's three-dimensional structure chart. The plane dimension is the secondary discipline and professional sequence of land engineering, and the vertical dimension is the standard level (basic, general and special).
3.2.1. Professional categories. The discipline of land engineering includes land information and land resources, land consolidation project, land use and protection. Therefore, to construct the standard system from the professional categories, we can start from the following three aspects:

- **Land information and land resources**: through various land resources and land information acquisition methods, all kinds of meaningful data related to land are processed to evaluate the utilization status and potential of land resources and provide basis for the development of land engineering projects. Including land resources survey, cadastral management and measurement, and land engineering big data. We can focus on promoting the development and revision of standards in the fields of land use classification, comprehensive investigation and monitoring of land resources, investigation and monitoring of natural resources, and ecological monitoring and supervision of land quantity and quality.

- **Land consolidation project**: mainly aiming at the land engineering technology, methods and engineering measures in urban land preparation, land reclamation, land consolidation and land development, the research on soil organic reconstruction is carried out to form a series of application-oriented and practical land consolidation supporting technology and method system, so as to comprehensively improve the ecological, social and economic benefits of land use. We can focus on promoting the development and revision of standards in the fields of high standard farmland construction, improvement of farmland quality and productivity, comprehensive land improvement and Reclamation [13].

- **Land use and protection** is an important means to realize land ecological civilization. It includes land economy and culture, land law and policy, land ecology, land planning and evaluation, etc. We will focus on promoting the development and revision of standards for the economical and intensive use of land resources.

3.2.2. Professional sequence. Professional sequence, namely work procedure and work content, is an independent technical process and method formed by decomposing professional activities according to independent work and technical content attached to professional activities. According to the characteristics of land engineering industry and the internal relationship between standard systems, and referring to the construction schemes of other industry standard systems [14,15], the land engineering standard system table is constructed according to the two-dimensional framework of professional sequence and hierarchical structure. The major sequence of land engineering is divided into two levels, the first level is comprehensive, investigation and evaluation, planning and management, engineering technology, materials and equipment.

1. **Synthesis**: standards that are comprehensive and difficult to be classified into other professional sequences, including terminology symbols, file statistics, rights and interests protection, industry management and informatization, etc;
2. **Investigation and evaluation**: the standards of investigation, monitoring and evaluation of land resources;
3. **Planning**: to formulate standards for land engineering project planning, including comprehensive planning and special planning;
4. **Construction and management**: prepare standards in the implementation process of land engineering projects, including engineering construction standards, feasibility study, survey and design, bidding village, construction, supervision, acceptance and post evaluation, etc;
5. **Engineering Technology**: prepare special engineering implementation technical standards, including degradation and unused land remediation technology, contaminated land remediation technology, low standard agricultural land upgrading technology, ecological environment upgrading technology, etc;
6. **Materials and equipment**: prepare standards for materials and equipment used in land engineering.

4. Conclusion
Land engineering standardization is the basis of standardizing land engineering activities and the link of industry, education, research and government. The construction of land engineering standard system is
a very important basic work, and also a complex system engineering, which not only involves multi
disciplines and multi majors, but also is closely related to society and economy. This paper starts from
the needs of land engineering standard system from the current situation of land, according to the
principles of standard system construction, puts forward the key points of standard system construction
from the professional category, and emphatically analyzes the construction of land engineering standard
system from the professional sequence. At present, it is necessary to formulate land engineering
standards from the aspects of synthesis, investigation and evaluation, planning and management,
engineering technology, materials and equipment, As an important standard planning for land
engineering, the construction of land engineering standard system is of great significance to promote the
healthy development of land engineering, improve the level of industry standardization, improve the
quality of land engineering, and realize the sustainable use of land resources.

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