Frontiers Research of Architecture and Engineering

2018 • October

Volume 1 Issue 4 · October 2018 · ISSN 2591-7587 (print) 2591-7595(online)

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1994

Editorial Board

Aim and Scope

Frontiers Research of Architecture and Engineering is an international, scholarly and peer-reviewed journal (print and online) with open access published quarterly in Singapore by Bilingual Publishing Co., an international publisher with a long history and high prestige, founded in 1984. It reports the latest and most innovative research results in all fields of engineering and architecture. It aims to promote the theory and practice of engineering science and architectural management. The Journal welcomes contributions which drive the exchange of ideas and rational discourse between educators and engineering researchers all over the world. A broad outline of the journal covers original research articles, case and technical reports, reviews and papers.

The scope of the papers in this journal includes, but is not limited to:

- Architectural design
- Municipal public facilities construction
- House and civil engineering building
- Green building
- Industrial and mining engineering building
- Municipal engineering
- Railway/road/tunnel/bridge engineering
- Construction and building materials
- Building operations
- Running water conveyance project
- Central heating and central gas supply for building
- Municipal road construction

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Volume 01 Issue 04 • October 2018
ISSN 2591-7587 (Print) 2591-7595 (Online)

Frontiers Research of Architecture and Engineering

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Contents

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Frontiers Research of Architecture and Engineering
http://ojs.bilpublishing.com/index.php/frae

ARTICLE

Analysis on Economical Land Use in the General Drawing Design of Oil Field Stations

Ning Hong*
China Petroleum Group Engineering Construction Co., Ltd. Beijing Design Branch, Beijing, 100085, China

ARTICLE INFO

Article history:
Received: 18 August 2018
Revised: 10 September 2018
Accepted: 18 October 2018
Published Online: 31 October 2018

Keywords:
Oil field stations
General drawing arrangement
Economical land use

ABSTRACT

This paper takes the analysis of economical land use in the design of oil field stations as the research object. Firstly, it elaborates the significance of saving land. Then combined with the "Fire Prevention Code of Petrol Chemical Enterprise Design", the paper analyzes and studies the safety and economical use of the general drawing design of the oil field stations for reference.

1. Introduction

Land resources are the foundation of social and economic development and a basic national policy of China. The development of traditional oil field station construction is often too extensive, and there is a large amount of waste of land resources, which has a serious impact on China's economic development. Therefore, it is necessary to analyze the land saved in the design of the oil field battlefield drawing, so as to realize the land use for the design and construction of the oil field stations, which is of great significance for promoting the full utilization of China's land resources.

2. The Significance of Economical Land Use

Although China has a vast territory, due to its large population base, the per capita land is less and the arable land is less, far behind the world's per capita arable land. Some provinces and municipalities have even fallen below the warning line of 0.8 mu per capita arable lands set by the UN Food and Agriculture Organization. In 2011, China's urbanization coverage exceeded 50% for the first time, which means that China's urban population has surpassed the rural population. With the rapid urbanization of China, it took only 30 years to complete the Western 200 years. But at the same time, we should also see that with the

**Corresponding Author:*
Ning Hong,
China Petroleum Group Engineering Construction Co., Ltd. Beijing Design Branch, CPE Building,
No. 8 *Shangdi Information Road, Haidian District, Beijing,* 100085*, China,*
E-mail: hongning@cpebj.com.

 DOI: https://doi.org/10.30564/frae.v1i4.246

continuous advancement of urbanization, the per capita cultivated land in China is gradually decreasing, and the promotion of some cities is too extensive. The rapid expansion of the "big cake" type of city is based on the massive devouring of rural land, which further aggravates the shortage of land resources in China. Under the above situation, it is imperative to make rational use of land resources and implement economical land use. In response to the above-mentioned problems of land resources, China has also introduced the Law on the Protection of Land Resources, and will cherish it very much, rationally use land and protect cultivated land as a basic national policy of China to effectively protect China's existing land resources.[1]

The general drawing design of oil field stations is an important part of oil field construction and development, and because of the relatively large number of oil field development and construction points, the distribution scope is relatively wide, and there are many divisional and sub-project construction projects. These are all directly related to land use. It is necessary to rationally plan land use in the design of the oil field master plan and strictly implement the basic national policy of China's land resource conservation and protection. On the other hand, in the design of the general drawing of the oil field stations, rational optimization of land use is also very positive, which has a very positive impact on the petrochemical enterprises themselves. The size of the petrochemical enterprises occupies a close relationship with the amount of their own investment. For example, the relevant oil field enterprise oil production equipment and oil tank interval are not combined with actual needs. If the design is too large, the construction volume and floor space operation resources will be greatly increased, resulting in an increase in investment costs.[2] Based on this, it is of great significance to do a good job of designing the general drawing of the oil field station and realizing the land use for conservation, both in terms of implementation of policies at the national level and construction of oil field enterprises.

3. Analysis on Economical Land Use in the General Drawing Design of Oil Field Stations

For the general drawing design of the oil field stations, it is mainly divided into two parts; one part is the layout design, which requires the actual process flow of the oil field to meet the requirements of the actual production process and the safety production and transportation needs. Due to the inflammable and explosive nature of the oil field itself, the layout should be strictly in accordance with the national fire protection regulations, such as the "Fire Prevention Code of Petrol Chemical Enterprise Design" (GB 50160-2008) (hereinafter referred to as "Fire Prevention Code"). In terms of vertical layout, mainly based on the actual production requirements of petroleum companies, combined with the drainage requirements of the corresponding sites, fully consider the conditions of oil field topography, hydrology, geology, etc., while performing the corresponding plane layout, complete the site leveling method selection; determine the site design elevation, layout location, etc.[3] Specifically, when conducting the analysis of the land use for the general plan design of the oil field station, the following aspects should be done:

3.1 Do a Good Job in Scientific and Rational Selection of Oil Field Sites

Firstly, the address of the oil field station should be scientifically and reasonably selected. When selecting a site, first, the normal life of the surrounding residents cannot be affected; second, try not to occupy the cultivated land, such as forests and vegetable gardens; third, it is strictly forbidden to increase the demolition expenses without any reason and achieve effective control of budget costs. In the specific site selection, the surrounding open land hillside should be selected, and the development scale and product characteristics of the oil field enterprise should be analyzed reasonably, so that the site is not worth more compact, and the site shape selection is more regular. Every inch of land within the site can be fully utilized to eliminate the waste of land resources, which is to some extent an effective form of land-saving expression.[4]

Secondly, it should be ensured that the site selection of oil field stations has certain space for development of the site. The petroleum resources are more precious, and the corresponding oil demand will gradually increase. Under this circumstance, in order to effectively meet the demand for petroleum energy in social development, the enterprises in the oil station sites will inevitably continue to develop, and the expansion of the oil station will become inevitable. Therefore, when preparing site selection, it is ready to prepare for the rain, so that the site of the site has certain potential for expansion, so that it can meet the development needs of society and oil enterprises, and can effectively save resources. After all, the expansion on the basis of the original is more resource-saving and other resources than the "restarting the stove". Therefore, it has a more positive impact on land conservation.

Finally, reasonable control of the plane shape of the oil stations. Generally speaking, the good shape of the oil stations field has a positive impact on the land area utilization rate and layout effect of the stations, and should be combined with the actual rectangular shape as much as possible. It is strictly forbidden to choose irregular triangles with narrow space to avoid land use dead angles.

DOI: https://doi.org/10.30564/frae.v1i4.246

Generally speaking, the aspect ratio of the site selection of the oil stations is controlled at about 3:1, which is more conducive to the utilization of land resources.[5]

3.2 Total Plane Fire Spacing Control

According to the "Fire Prevention Code", for the new A-B process equipment and facilities layout, the linear distance from the fence of the plant should be controlled at 25m. At the same time, the distance between the newly-built A-B process facilities and facilities should be controlled at 50m. The above-mentioned so-called pitch is a safe distance between the land boundary line of the device and the facility and the land boundary line of the factory area. However, in actual planning and design, it is generally encountered that the boundary line of the land on both sides of the device and the facility is generally adjacent to the site road. For the oil field road, there is generally a red line of the road, that is, a boundary line for the road land. After the power boundary line of the corresponding process device can only overlap with the road boundary line or retreat to the road boundary line, it is strictly forbidden to cross the road boundary line. The width of the road boundary line generally exceeds 60m, that is, the distance between the boundary line of the device wall and the center line of the road is 30m. If the land boundary of the installation and facilities is controlled at 25m, the 25m empty space in the middle will be wasted. Based on this, in the principle of saving land, when the design is actually carried out, the distance between the newly built facilities and the process equipment and the wall can be appropriately reduced, and a good land saving effect can be achieved.[6] When the premise is that the red line of the road has been determined and it is guaranteed that no facilities will be built, the corresponding distance should also ensure that the actual pipeline layout and fire protection requirements are met.

3.3 Plane Spacing Control of Building Layout

The "Fire Prevention Code" have clear regulations on the control of the fire prevention plant equipment and the plane fire distance of the building, that is, for the facilities and equipment such as the oily sewage regulating tank, the dirty oil tank, the grease trap containing the combustible gas, the fire prevention distance should be controlled at 15m, and all of the above structures belong to the same nature, that is, they are all flammable and explosive places. Therefore, it is not necessary to set the fireproof spacing between structures that are in the same sewage treatment and have the same nature. Structures with different properties need to control the fire distance to 15m. Therefore, when the safety control of the building plane is controlled, the nature of the corresponding structure can be understood, and unnecessary fire distance control can be constructed, and the purpose of saving land can be achieved.

3.4 Reasonable Setting of Roads in the Factory Area

The roads in the factory area occupy a large area in the general plan design of the oil field station, which generally accounts for about 30% of the total site area, and the potential for saving land is also relatively large. Some planners pay too much attention to the "grade" of the road. In the design of oil field station roads, large-scale roads and large-channel forms are adopted, ignoring the core functional requirements of road design. While occupying a large amount of land area, but not fully exerting the actual road transportation effect, the related construction cost has been seriously wasted, which can be described as "a thankless task". It has a serious impact on the general quality design of the general oil field stations. Therefore, in the actual design process, reasonable design should be carried out in combination with the type of roads, so that it can meet the requirements of actual transportation functions and achieve the purpose of saving land, thereby effectively reducing design costs and improving design economic benefits. Generally speaking, the roads in the factory area can be generally divided into three types, namely main roads, secondary trunk roads and branch roads. In the specific design, the road type should be reasonably determined in combination with the flow of people in the factory area, product transportation, etc., to ensure that each road design can make the best use of it. In particular, attention should be paid to the width design of the road. Generally, the width of the main road in a large factory area is between 7 and 9 m, and the width of the main road in a small factory area should be less than 7 m. For the design of main roads used in non-production office areas, the urban road styles can be used for reference. As far as possible, the road width can be built according to actual needs, which can effectively save land.[7] For the secondary trunk road, it is generally mainly responsible for school fire protection, overhaul, etc. Therefore, combined with the actual driving demand for roads for fire trucks and maintenance vehicles, the width can be controlled at 6 to 7 m, and the small factory area can be controlled at 4 to 6 m.

3.5 Arrangement of Flammable Liquid Storage Tanks

In the general drawing design of the oil field stations, the arrangement of the flammable liquid storage tank group is very important. In the actual design, it is necessary to take into account the safety of the tank group and ensure that

 DOI: https://doi.org/10.30564/frae.v1i4.246

the grounding purpose can be achieved, so strict design is required. According to the "Fire Prevention Code", when the flammable liquid storage tank group is designed and designed, it should not exceed two rows (excluding the C-type tank group) for the safety of the tank group, so that once the tank group fires, it can make the rescue more convenient and more secure. Therefore, in the actual design of the flammable liquid storage tank group layout, it should strictly comply with the requirements of the "Fire Prevention Code", which can not only ensure the actual fire protection requirements of the tank group, but also effectively save the land. In the actual transformation process of the flammable liquid storage tank, two flammable liquid storage tank group arrangement schemes as shown in Figure 1 and Figure 2 can be adopted:

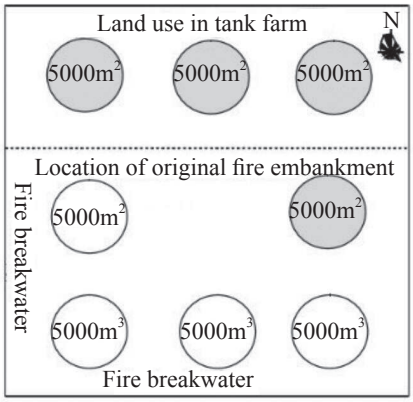

Figure 1. Flammable Liquid Storage Tank Group Arrangement Plan A

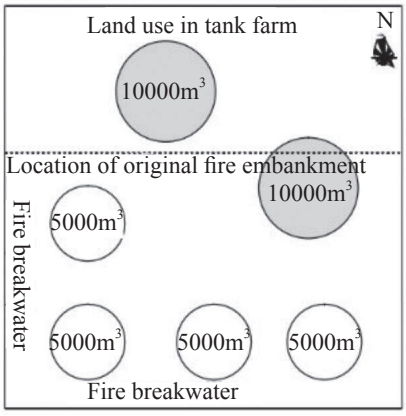

Figure 2. Flammable Liquid Storage Tank Group Arrangement Plan B

As can be seen from Figure 1 and Figure 2, this arrangement seems to have exceeded the arrangement of two rows, but mainly based on the perspective of saving land, and this arrangement is based on the original tank arrangement, if it belongs to the new tank group layout, the layout of the schemes 1 and 2 should be avoided. Specifically, Figure 1 and Figure 2 above show the existing coal-fired tank group of a chemical plant with a total volume of 5000m^3 and only 4 tanks in the early stage. Two tank locations are reserved during the position design, used for subsequent expansion. In the east, south and west directions of the tank group, fire exit passages were arranged. On the north side of the tank group, restrictions were imposed on the land boundary of the tank group. At the request of Party A, it is necessary to increase the jet fuel volume by 200003 on the basis of the original tank group. Since the aviation coal tank belongs to Class B, it can be known from the "Fire Prevention Code" that tanks of Class B or above should not be arranged in two rows or more. The above Plan A and B seem to violate the requirements, but they are not. From the perspective of tank arrangement in Schemes I and II, Scheme 1 added four jet fuel tanks, each with a tank capacity of 5000 m^3, and Option 2 added two jet fuel tanks, each with a capacity of 10,000 m^3. And from the arrangement position, no matter which position direction meets the requirements of fire protection and storage tank cooling, it does not conflict with the specification requirements, and the newly added storage tank area is generally large. Based on the existing fire dam height and calculating the effective volume of the tank group, the above two schemes can also meet the requirements in the "Fire Prevention Code", that is, the tank volume should be greater than the maximum volume of a tank. Based on this, the above two plans can meet the actual requirements, and achieve good land-saving effects, and do not conflict with the provisions of the "Fire Prevention Code". After further analysis, Plan B was selected as the final implementation plan. The reason is that the tank layout is not new, but the optimization is carried out on the basis of the original tank. If the plot is re-selected for construction, on the one hand, it will increase the floor space, on the other hand, the corresponding pipeline will be further elongated, and other supporting public works will increase, and for the north side of the tank group, the area where3 tanks can be added (the tank volume is 5000m^3) cannot be fully utilized, thus causing a certain waste of land resources.[8]

4. Conclusion

In summary, in the actual design of the oil field station yard, the oil field-related site is inflammable and explosive, so it is necessary to strictly follow the fire protection requirements in the "Fire Prevention Code", and at the same time, It is necessary to further integrate the land-saving requirements, and it also has a more positive impact on the specific design implementation cost reduc-

DOI: https://doi.org/10.30564/frae.v1i4.246

tion. However, because the "Fire Prevention Code" have a wide range of applications, some of the provisions are difficult to match the actual design requirements. Therefore, it is necessary to analyze the specific problems in the actual design, and to have a deep understanding of the various elements in the specification, in order to meet the safety requirements of the "Fire Prevention Code", and to achieve cost savings and land resource conservation in order to make the oil field station drawing design more scientific and reasonable, compact and beautiful.

References

[1] Xue Zhang. Analysis of the Land Use for the General Plan Design of Oil Field Stations[J].Chemical Industry Management, 2016(14):23-23. (in Chinese)

[2] Na Zheng. Analysis of the Land Use for the General Plan Design of Daqing Oilfield Station[J].Oil & Gas Field Engineering, 2013(6):125-125. (in Chinese)

[3] Qi Niu. Analysis of the land saving design of oilfield station yard design[J].Engineering Technology: Citation Version: 00260-00261. (in Chinese)

[4] Xitong Yang. Analysis of land saving in the general layout of petrochemical enterprises[J].Petroleum Planning and Design, 2015(3):37-39. (in Chinese)

[5] Dingsheng Lu. Discussion on the strategy of saving land use in the design of petrochemical general transportation[J].Chemical Engineering Design Communication, 2016,42(12):114-114. (in Chinese)

[6] Hua Song. Research on Standardization Design of General Map of Oil Field Stations[J].Chemical Industry Management, 2016(12):144-144. (in Chinese)

[7] Xiaoli Li, Peng Sun, Yang Li, et al. Standardization design of general map of oilfield station[J].Rubber & Plastics Technology & Equipment, 2015(18):10-11. (in Chinese)

[8] Xiaoli Li, Wenfeng Zhou. Research on optimization of comprehensive layout of oilfield station pipelines[J].Natural Gas and Oil, 2017,35(5):99-102. (in Chinese)

 DOI: https://doi.org/10.30564/frae.v1i4.246

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Frontiers Research of Architecture and Engineering
http://ojs.bilpublishing.com/index.php/frae

ARTICLE

Spatial Green Belt Development Report in China

Xi Peng*
The University of Sheffield, Sheffield, England, S102TN, UK

ARTICLE INFO

Article history:
Received: 5 September 2018
Revised: 30 September 2018
Accepted: 18 October 2018
Published Online: 31 October 2018

Keywords:
Green belt development
Advantages and disadvantages
Report
China

ABSTRACT

The green belt, located on the outskirts of a metropolis, has many characteristics such as good location, better landscape environment than urban areas, high availability in an original environment, low development costs and large and concentrated open spaces. With the huge population in China, this has led to a shortage of green space per capita and the shortage of recreational space. In view of such conditions, the recreational function of the green belt is very important, and can compensate for the shortcomings of tight urban recreation space. However, there has always been an important question about the scientific aspects and rationality of green belt use and control measures. In this paper, some outcomes of the Chinese green belt policy will be introduced. Then, three advantages and two disadvantages will be shown. Finally, reasons analyse and comparisons between China's main cities and cities with a successful green belt will be given.

1. Introduction

Since the Chinese Reform and Opening-up Policy in the 1980s, the trend has been rapid urbanization in China, at a growth of 1171.4 square kilometres of urban construction each year.[1] This rapid urbanization has caused a series of urban problems such as urban-rural conflicts, deteriorating environment, heavy traffic and chaotic urban areas. With the rapid development of Chinese cities, methods that can relieve the problems have increasingly drawn attention. Against this background, some cities and regions in China, such as Beijing, Shanghai and the Zhu River Delta region, have begun to incorporate construction of green belts into urban planning programmes and urban development management programmes.[2]

Green belt can be traced back to the theory of Garden Cities, proposed by Howard in the late 19th century.[3] It refers to green land or afforestation having a higher proportion of land, with a shape or a line formed around the city or city area.[4] There are two main objectives for the green belt, firstly it is to prevent urban sprawl, which is the expansion of low-density, dispersed, and automotive-dependent development into rural land, by ensuring the permanent opening of green land. According to The Draft National Policy Planning Framework (2011),[5] the limitation of urban sprawl has some idealized contributions to prevent neighbouring towns from being integrated, to protect rural areas from urban embezzlement and to promote urban regeneration by reusing urban land. The second aim is that a green belt always has the role of providing recreation space in urban areas.[6]

**Corresponding Author:*
Xi Peng,
The University of Sheffield, Western Bank,
Sheffield, England, S102TN, UK,
E-mail: xpeng6@sheffield.ac.uk.

DOI: https://doi.org/10.30564/frae.v1i4.247

In China, the first city to put the green belt policy into use was Beijing. Set out in Beijing's General Planning in 1958, the thinking of green belt has been practiced in Beijing for nearly half a century.[7] In that planning, the policy of a green isolation area was introduced and continued to be followed in many future editions of Beijing's General Planning document. In recent years, many Chinese cities, such as Shenzhen, Beijing and Wuhan, have adopted green belt management through space control and basic ecological control. Furthermore, cities, such as Hangzhou and Chengdu, have made great innovations in delineating the boundary of urban growth through the green belt policy.[8]

2. Critical Analysis

2.1 Spatial Development Outcomes in China

Many cities in China, including Beijing, Shanghai, Chengdu, Tianjin and Wuhan, have begun to consider restricting the rapid expansion of urban space through having a green belt and maintaining a compact spatial pattern. However, the green belt policy, which comes from Britain, has encountered many difficulties in its "localization" process. Beijing's first Green Isolation Area was generally considered to have evolved into an urban construction area like the Tokyo green belt[9] and the green belts in Shanghai are actually just a few kilometres wide around the Shanghai Ring Expressway.[10]

Due to the conflict from the rapid urbanization, the control of urban construction land is not enforced, leading to a large amount of green belt land having been invaded. This is the most prominent problem in the planning and construction of Chinese cities' green belts.[11] For instance, an area of green land in Zhengzhou, in the city's general planning for 1995-2010, was 187 square kilometres. However, with the pressure of rapid urbanization, the 2010-2020 Zhengzhou General Planning reduced this green land to 91.8 square kilometres. At the same time, the urban development land in Zhengzhou has continued growing (Table 1).

Table 1. Green land change and urban development land change in Zhengzhou

	1995-2010 Zhengzhou General Planning	2010-2020 Zhengzhou General Planning
Green Land	187 km2	189 km2
Urban Development Land	91.8 km2	400 km2

Sources: 1995-2010 Zhengzhou General Planning. 2010-2020 Zhengzhou General Planning

In terms of difficulties in a green belt "localization" process, major cities are also exploring new ways for green space development. The Beijing government proposed the construction of a second green belt area in 2013, and the Shanghai government expanded the "green belt around the city" to the "urban open space ring". These indicate the preliminary exploration of the implementation of the green belt policy in local areas.[12] Through changes to the "localization" process, the impact of the methods, which limit construction activities, such as green belt policy and the urban growth boundary policy are more directly focussed on the size and structure of cities than traditional planning methods, which arrange and guide construction activities.

2.2 Advantages

After the implementation of the green belt policy based on a combination of worldwide practices and related research, it has both advantages and disadvantages on China's urban planning policies. The main advantages are:

(1) Significantly reducing the urban development land unplanned expansion rate and the formation of a reasonable urban morphology;

(2) Providing recreation space around the city and metropolitan areas which makes urban living environments more liveable and more sustainable;

(3) Reducing the impacts of an urban heat island effect, storm and flood and other extreme climate changes in urban areas.

Firstly, a green belt can control the speed of the urban sprawl and make the urban morphology more reasonable. There are three major urban containment policies: urban growth boundaries, urban infrastructure service boundaries, and greenbelts.[13] The rapid expansion of a city has become an engine of rapid economic growth in China because of Chinese Land Finance. However, the over quick urban expansion leads to the unsustainability of urban development planning in addition to incongruous urban morphology.[14] Therefore, the method for resolving the urban sprawl is very important in rapid urbanization. In the Greater London Planning of 1944, Abercrombie proposed a green belt for London of 8-15 km wide, with a total area of over 2,000 km^2, which has a history of being effective in achieving its purposes, such as to control urban growth, to enhance landscape protection, to improve the landscape (Figure 1). The implementation of the green belt policy eased the unreasonable expansion of urban development land areas in London after World War II.[15] In Beijing, to date, the change of land use and reduction of urban sprawl reflects the spread of the green belt in controlling the city.[16] The green belt is the organic combination of city and natural ecology, which can effectively control urban over-expansion and promote the sustainable development of the city.[17] Therefore, a green belt policy, as a green

 DOI: https://doi.org/10.30564/frae.v1i4.247

field open space set up around cities to control their expansion is the first major advantage effectively mitigating a city's uncontrolled sprawl.

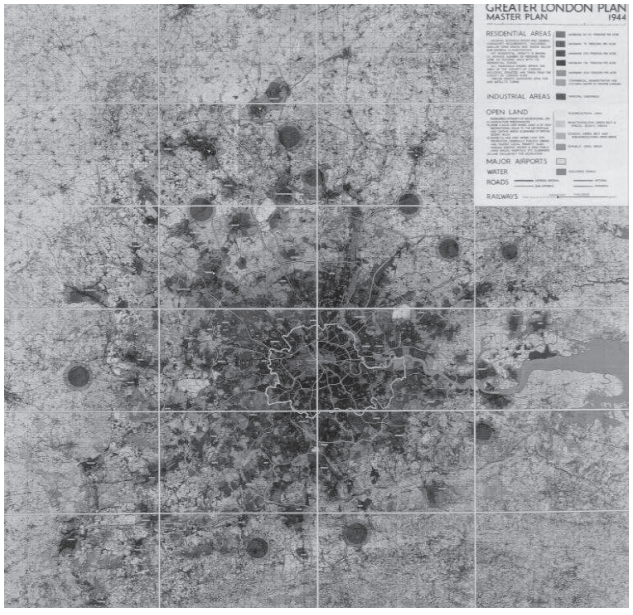

Figure 1. Greater London Plan

Sources: 1944 Greater London Plan

Secondly, as with the objectives of setting up green belts, providing urban recreation space efficiently is the second key advantage of green belts. Torkildsen [18]states that with the advent of the leisure era and the development of Internet technology, the changes in people's habits have expanded the connotation of recreation; increasingly urban spaces are beginning to integrate into recreation functions thereby making urban recreation space to the cities more important. In Berlin, the economic utility of the green belt is that it serves as an open space that preserves agricultural and forest landscapes as its original landscape features and provides space for recreation in the rural areas surrounding the city and metropolitan area [19]. In china, the recreation space has been in a disadvantageous position in the urban space competition with other industries, resulting in a significant convergence of the leisure and recreation space in the metropolis. Green belt policy can solve the contradiction between the supply and demand of urban recreation space efficiently, which is the second significant advantage of a green belt policy.

Thirdly, green belts can maintain urban ecological stability. With the rapid development of urban scale and the rapid expansion of urban populations, the urban heat island effect, caused by the drastic changes of urban underlying surface structures and the rapid increase of anthropogenic heat emission in cities, has gradually become a key factor impacting on urban living environments and residents' health.[20] Therefore, it is very important to be able to alleviate the ecological changes in cities and stabilize the urban ecological balance. Amati [9] states that the green belt policy in Paris reduces its urban heat island effects, storms and floods on urban centres through the protection of open space and changing the ecological environment in urban areas, which is always an evaluation of the urban environment. Furthermore, the Paris green belt reduces the spread of central areas to reduce the total resident commuting volume and finally reduces the burning of fossil fuels, which reduces man-made damage to the urban environment. As the green belt can improve the urban environment, the advantages of the greenbelt in improving the ecological environment in urban areas are obvious, given that environmental problems have become increasingly serious.

2.3 Disadvantages

Firstly, the most serious disadvantage of green belt is generally the "leapfrog" land use structure, which is defined as a low-density urban sprawl with intermittent faults and disorganized features.[21] Due to the authority and permanence of the green belt policy, it is extremely difficult for construction within the green belt area, especially residential construction.[22] However, with the continuing development of cities, the number and quality of existing residential buildings cannot meet the growth of the Chinese urban population and variation of family structures[23]. Daniel et al. [24] states that although more residential land development is needed, the extent of the urban area is limited by the presence of the green belt. Developers are more focused on agricultural land outside the green belt, resulting in a "leapfrog" land development model, which will lead to land-use confusion in the marginal areas and the occupation of agricultural land.

In addition, when the green belt has become an obstacle between the centre of the city and the fringe, it will inevitably bring increased, unnecessary transportation costs.[25] There is more land needed for traffic construction within a green belt, which causes the green belt to be gradually cut and fragmented. Additionally, this not only hinders the traffic, but also damages the integrity and stability of the green belt. Therefore, the disadvantages come from the misuse of green belt policy leading to "leapfrog" land use structures, which then leads to an increase in urban commuting and infrastructure construction, and causes disorder of the urban land use structure.

3. Reasons and Lessons

In the context of China's rapid urbanization, urban planners have tried to incorporate the construction of the green belt into urban planning and urban development management. Several decades of green belt construction in

DOI: https://doi.org/10.30564/frae.v1i4.247

China have seen some achievements. For instance, part of the expected results has been achieved in Beijing's green belt and the green belt in Guangzhou, but these have not completely reached the goals or expectations. However, in reality, the urban green belt areas in China are mostly formed under the double structure of urban and rural areas. In these areas, there are a large number of natural villages and plots of land. Furthermore, there are many serious contradictions, which make the green belt policy in China unsuccessful between the trend of continuous urban development land sprawl and the original intention of green belt restoration and ecological environment restoration.

The first reason for these contradictions is that the green belt institutional system is incomplete. Although the demand for green belt construction in Chinese cities has risen rapidly in recent years, due to the lack of theoretical guidance, a systematic approach has never been formed. In comparison with the United Kingdom, where the 1947 Urban and Rural Planning Law of the United Kingdom explicitly proposed the Green Belt Policy and in 1988, the British Environment Ministry released Planning Policy Guidance Note 2: Green Belts, to fully illustrate the legal nature and status of the Green Belt Policy in the UK.[26] However, in China, the ordinances are set too rigidly, resulting in poor compatibility in the process of construction. Apart from that, there has been a serious lack of public participation and a significant departure from the original intention of construction. The Chinese green belt policy is based on local regulations. The discrepancy of the policy system is an important reason that has led to the differences in the performance of the Green Belt policies between China and the United Kingdom.

The second reason is the unfair land system in rapid urbanisation. In China, unequal opportunities for state-owned land and collective land to enter the market have left a huge space for rent-seeking, which has led to the repeated banning of enclosure.[27] At the same time, China is experiencing rapid urbanization and is inevitably facing the multiple needs of economy, population and space growth. As the green belt limits the supply of land, it leads to an increase in land and housing prices, which will produce many social conflicts because of the unfair land system. When compared with a developed country, such as the UK, which completed urbanization as early as 1911, the different national conditions mean China has more problems in promoting a green belt policy and these needs to be resolved.

These two reasons represent China's unsuccessful green belt policy, indicating that the green belt policy has its limitations. Achieving the dual goal of protecting the ecological environment, restraining the spread of cities and promoting economic and social development probably cannot be realized only through the construction of the green belt.

4. Conclusion

In summary, a green belt policy is a method to ease urban sprawl and add urban recreation space. The green belt has some advantages, such as its efficiency in inhibiting the spread of the city, improvement of recreation space and maintaining urban ecology systems. However, the Chinese green belt has not had a great success largely due to the institution system and land system in China's rapid urbanization.

References

[1] Jaros, K.A., 2016.Forging Greater Xi'an: The Political Logic of Metropolitanization. Modern China, 42(6), pp.638-673.

[2] Le, L.I., Jiaming, L.I.U., Tao, S.O.N.G., He, Z.H.U. and Hui, T.A.O., 2014. Research progress of urban green belt and recreational use. PROGRESS IN GEOGRAPHY, 33(9), pp.1252-1261.

[3] Ping, W., Bin, L. and Pengjun, Z., 2015. Planning and Practice of Urban Green Belts: Cases of London, Tokyo and Seoul. Urban Planning International, p.91.

[4] Taylor, J., Paine, C. and FitzGibbon, J., 1995. From greenbelt to greenways: four Canadian case studies.Landscape and urban planning, 33(1), pp.47-64.

[5] Hulme, J., 2011.The draft National Policy Planning Framework. Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 4(3), pp.199-199.

[6] Amati, M. ed., 2008. Urban green belts in the twenty-first century.Routledge.

[7] Tan, M., Guy, M.R. and Li, X., 2011. Urban spatial development and land use in Beijing: implications from London's experiences.Journal of Geographical Sciences, 21(1), pp.49-64.

[8] Sit, V.F., 1996. Soviet influence on urban planning in Beijing,1949-1991. Town Planning Review, 67(4), p.457.

[9] Yokohari, M. and Amati, M., 2005. Nature in the city, city in the nature: case studies of the restoration of urban nature in Tokyo, Japan and Toronto, Canada. Landscape and ecological engineering,1(1), pp.53-59.

[10] LI, W., Paulussen, J., WANG, R. and LI, D., 2009. The structure and ecological function of greenbelt in mega-city.City[J], 2, p.02.

[11] Shuzhan, Q., Weibing, J. and Jiaxing, W., 2017. Ring Road Greenbelts in China: Problems, Countermeasures and Prospects.Journal of Chinese Urban Forestry, 3, p.003.

[12] Li, Z., Li, C., Wang, X., Peng, C., Cai, Y. and Huang, W., 2018. A hybrid system dynamics and optimization

 DOI: https://doi.org/10.30564/frae.v1i4.247

approach for supporting sustainable water resources planning in Zhengzhou City, China. Journal of Hydrology,556, pp.50-60.

[13] Pendall, R., Martin, J. and Fulton, W.B., 2002.Holding the line: urban containment in the United States. Center on Urban and Metropolitan Policy,t he Brookings Institution.

[14] Cao, G., Feng, C. and Tao, R., 2008. Local "land finance" in China's urban expansion: challenges and solutions. China & World Economy,16(2), pp.19-30.

[15] Longley, P., Batty, M., Shepherd, J. and Sadler, G., 1992. Do green belts change the shape of urban areas?A preliminary analysis of the settlement geography of South East England. Regional Studies,26(5), pp.437-452.

[16] Wang, H., Cai, Y.M. and Zhang, W.X., 2011.Evaluation of implementation of the first greenbelt's policy in Chaoyang District, Beijing City. Scientific and Technological Management of Land and Resources,28(2), pp.6-12.

[17] Abercrombie, P., 1944.Greater London Plan. London [UK].

[18] Torkildsen, G., 2005.Leisure and recreation management. Psychology Press.

[19] Kühn, M. and Gailing, L., 2008. From green belts to regional parks: History and challenges of suburban landscape planning in Berlin. Urban Green Belts in the Twenty first Century,pp.185-202.

[20] Satterthwaite, D., 2007.Adapting to climate change in urban areas: the possibilities and constraints in low-and middle-income nations (Vol. 1). Iied.

[21] Yue, W., Liu, Y. and Fan, P., 2013.Measuring urban sprawl and its drivers in large Chinese cities: The case of Hangzhou. Land use policy, 31, pp.358-370.

[22] Gant, R.L., Robinson, G.M. and Fazal, S., 2011. Land-use change in the 'edgelands': Policies and pressures in London's rural–urban fringe. Land Use Policy, 28(1), pp.266-279.

[23] Champion, A.G., 2001. A changing demographic regime and evolving poly centric urban regions: Consequences for the size, composition and distribution of city populations. Urban Studies,38(4), pp.657-677.

[24] Arribas-Bel, D., Nijkamp, P. and Scholten, H., 2011. Multidimensional urban sprawl in Europe: A self-organizing map approach. Computers, Environment and Urban Systems,35(4), pp.263-275.

[25] Taylor, L., Martichenko, R. and LeanCor, L.L.C., 2006. Lean Transportation–Fact or Fiction?Fedex and LeanCor White paper.

[26] Amati, M. and Yokohari, M., 2006.Temporal changes and local variations in the functions of London's green belt. Landscape and urban planning, 75(1), pp.125-142.

[27] MIN, X. and YANG, B., 2003.THE SECOND GREEN BELT AND BEIJING SPATIAL DISTRIBUTION [J]. City Planning Review,9, pp.17-21.

  DOI: https://doi.org/10.30564/frae.v1i4.247

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Frontiers Research of Architecture and Engineering
http://ojs.bilpublishing.com/index.php/frae

ARTICLE

Safety Risks and Preventive Measures for Construction Supervision of Construction Projects

Ting Zhou*
Jiangxi Vocational College of Industry and Engineering, Pingxiang, Jianxi, 337055, China

ARTICLE INFO

Article history:
Received: 3 October 2018
Revised: 10 October 2018
Accepted: 18 October 2018
Published Online: 31 October 2018

Keywords:
Cnstruction engineering
Construction supervision
Safety risks
Preventive measures

ABSTRACT

Based on the analysis of construction project safety risk and its preventive measures, it is first necessary to clarify the safety risks and existing problems of construction project supervision and to formulate effective construction procedures. It is necessary to check the production safety of the construction unit, strengthen the company's own safety production management, and reasonably control the risk to familiarize with the construction drawings, and make a special construction plan for the work of the bottom line. Finally, an effective solution is drawn to comprehensively expound the importance of construction project construction safety risk and its preventive measures.

1. Introduction

In the continuous development of China's social economy, in the era of big data, people have raised the quality requirements for the quality of construction projects, and they have also received extensive attention from the society. There are security risks in the construction project during the construction of the construction projects. Therefore, the relevant personnel should comprehensively analyze the construction personnel and life and property in light of the actual conditions of the construction, and maximize the strengthening and improvement of construction safety risk management. As long as the safety management is caught, the construction safety accident can be reduced. In the process of building construction, the risks in the construction should be evaluated and effective measures should be taken to solve the problem, so that the construction can be completed smoothly.[1]

Project Cases:

It is considered that the construction process of the construction project is very complicated, and the construction scale is relatively large, which brings certain difficulties to the project safety production management work. Therefore, it is inevitable that there are hidden dangers of safe production, and may even lead to safety accidents.

In a certain year, urban subway construction, because the corresponding support safety precautions were not carried out during the excavation of the foundation pits, the main reason was that the duties of the safety supervision personnel were not fulfilled, and the safety hazards were not discovered in time, which was affected by geological problems and precipitation problems, causing collapse accidents. . It will have a serious impact on the later construction. From the process of construction of this project, if the safety is not done, it will seriously affect the con-

**Corresponding Author:*
Ting Zhou,
Jiangxi Vocational College of Industry and Engineering,
No. 106*, Yuhu East Road, Economic Development Zone, Pingxiang, Jianxi,* 337055*, China,*
*E-mail: zt*0919@163*.com.*

 DOI: https://doi.org/10.30564/frae.v1i4.248

struction of the project, which will not only threaten the safety of the construction personnel, but also threaten the national economic development.

In the dumping platform of the atrium of the west building of a certain LED lighting and lighting exhibition center in a certain city, four people fell on the platform, and the hospital died after being rescued. After the incident occurred, the detailed investigation was carried out. The main reason was the 8th floor overhanging unloading platform of the accident project. The cantilever beam anchoring did not meet the requirements. After the loading platform was loaded, the cable fell off and the platform rolled over.

In a certain city, the construction of the construction site was neglected by safety regulations. A migrant worker fell from the third floor due to the fracture of the scaffolding. The doctor who was treated urgently confirmed that the migrant worker had died on the spot. It is understood that the deceased did not wear a safety rope and did not wear a helmet when working.[2]

2. The Importance of Safety Supervision for Engineering Project Construction

In the process of building construction, the basic content of supervision work is mainly to prevent the occurrence of safety accidents. In the management, construction safety should be taken seriously to avoid the occurrence of safety accidents and affect the building. Before safe production, comprehensive management should be carried out, which is also the most important means of production. The main purpose of engineering safety supervision is to ensure the quality of construction and build a safe construction environment. During the construction, the management personnel should fully mobilize the enthusiasm of the personnel, and also regularly cultivate safety awareness for the construction personnel. If the construction workers work in an unsafe environment for a long time, they will have greater psychological pressure and the spirit is in a state of tension. If this is difficult, the staff will not be able to work with peace of mind and lack of interest in work. It also affects the quality of construction. This proves that a safe construction environment should be built for the construction workers to improve the construction efficiency and to complete the work on time, thus promoting the economic development of China's construction enterprises.

3. Construction Project Supervision Safety Risks

3.1 Policy Risk

Policy risk usually means that the relevant policies of the construction project have changed, which has a serious impact on the construction progress and quality, and at the same time it is an investment in economic loss. Therefore, before the bidding for construction projects, the contractor should conduct a careful study and analysis of the project materials and be able to grasp the overall information of the project. Relevant staff should analyze the policies and forms of the localities and take effective measures in time to avoid serious consequences for the construction project.

3.2 Natural Risk

Construction projects will also be affected by environmental factors. However, for natural risks, it is not an irresistible event that human beings cannot change because of the will of human beings and human beings cannot prevent natural risks. Therefore, relevant managers should adopt economic measures to compensate for the impact of risks. At the same time, because construction work is basically open-air construction work, it is easily affected by natural conditions. For example, in the case of relatively high temperatures, construction workers may experience problems such as heat stroke. Therefore, in the construction work, it is necessary to analyze the risks faced and take corresponding measures to prevent them.

3.3 Operating Management Risk

In the process of construction engineering management, it will also be affected by many factors, which are mainly in risk management. In the process of business management, in the face of different risks, relevant management personnel should conduct detailed analysis in combination with the main problems of the factors. Therefore, the operation and management of construction enterprises not only involves bidding, production and construction, etc. Therefore, there are great risks in operation and management.

3.4 Economic Risk

Compared with policy risks, economic risks are found to be very different. Economic risks are not like political risks, and can be calculated by calculating data. Therefore, the relevant staff should do a good job in information collection and research, and take effective measures for the predicted risks, so as to achieve the purpose of reducing risks. However, for economic risks, companies should have a detailed understanding and mastery of building materials and markets, and adjust their procurement strategies according to information adjustments. When enterprises face economic risks, enterprises can adopt risk dispersion and transfer methods to reduce economic risks.[3]

3.5 Contract Risk

The contract for the project is mainly the legal document for the management of the project. At the same time, it is

DOI: https://doi.org/10.30564/frae.v1i4.248

also important evidence in project management. Therefore, the manager of the project must raise the awareness of risk. In the process of drafting the contract, each article of the contract must be analyzed and studied in detail to avoid large impacts due to small mistakes. Effectively analyze risk and ultimately reduce risk.[4]

3.6 Construction Technology Risk

In the process of construction enterprise development, the construction technology risk mainly comes from the management level and construction quality. The engineering design plan of the construction project is mainly implemented after the relevant personnel determine it. The construction enterprise should pay attention to the change of the construction plan, adjust the construction plan in time, find out the problems in the construction, and effectively reduce the occurrence of construction risks. At the same time, the construction unit should also pay attention to the problem of the claim, evaluate the construction technology in time, and formulate a reasonable construction plan to ensure smooth progress.

4. The Main Causes of Construction Project Safety Risks

4.1 The Restriction of Construction Environment

In the construction industry, because construction and the main body cannot be transferred and divided, the construction of workers is usually carried out in the open air. In the process of building construction, there will be some constraints, including natural conditions such as high-altitude operations, high winds and precipitation. In this complicated and relatively difficult construction situation, the construction quality and progress will be affected. Therefore, the relevant management personnel should operate in accordance with the actual conditions of the construction. Because the geology is different, the construction method is different. It is necessary to ensure the consistency of the appearance and design of the construction building. If they are inconsistent, it will directly cause construction safety risks.

4.2 The Construction Projects Are Highly Processable

In the construction project, a perfect communication platform should be established to promote mutual cooperation and assistance between various departments, so as to ensure the progress and quality of the construction project. There will be frequent movements of personnel on the construction site, and the personnel work will be out of order, once it appears in management. Such problems can have serious consequences. In the construction project, because personnel are required to unload and dispose of equipment and materials, it is easy for personnel to encounter danger during the process of walking. There are also some personnel who work in more dangerous places. For example, cranes in aerial work, within the specified range, there will be some other staff, in case the hook items fall will have serious consequences. Therefore, there is no effective communication between the staff, and it is not possible to effectively match the equipment reasonably, which will affect the occurrence of security risks to a certain extent.[5]

4.3 The Quality of Construction Workers is Not High

In the process of building construction, there are still many workers who are under the subcontractor's package team. The construction unit adopts this method, which can reduce the construction cost of the enterprise. It is precisely because of the quality of the construction workers that the quality of the project and the safety of the project have a great impact. Some enterprises will also use migrant workers to participate in the construction of the project. The migrant workers not only have no professional skills, but the comprehensive quality is not high, which has an impact on the quality of the construction of the project. It also poses a threat to the safety of the construction workers on the construction site. This shows that enterprises have not effectively implemented safety education and paid attention to the production process.

5. The Preparation Work for Construction Projects

5.1 Check the Production Safety of the Construction Units

Before the construction of the building, the relevant personnel carefully check the production safety of the construction unit. The main check content is the rules and regulations of the construction unit's equipment, construction technology and management system. The construction unit in the production process, as long as it meets the production conditions. Relevant standards can ensure the safety of construction workers and reduce the risk of property damage. At present, China needs to establish a sound safety production system and prohibit contracting projects. Therefore, in the supervision project, it is necessary to carry out real-name certification. At the same time, it is also necessary to examine the safety of the completed projects, regular maintenance and inspection.[6]

5.2 Formulate Special Construction Plans

In the process of building construction, it will be affected

 DOI: https://doi.org/10.30564/frae.v1i4.248

by internal and external factors, such as deep foundation pit engineering and formwork engineering. To ensure production safety, effective protective measures must be taken. On this basis, the relevant staff must combine the actual characteristics of the project construction and adopt the construction plan. The supervision department should focus on the safety production technology, and on the basis of safety production, reduce the danger of construction. Strictly review and unify the construction data and plans to avoid mistakes, which will affect the construction quality.

5.3 Be Familiar with Construction Drawings, and Do a Good Job of Handover

In the early stage of construction, the designer should design according to the actual situation of the construction. The chief management engineer should establish a design team that can familiarize with the analysis and analysis of drawings, and identify construction safety issues, take effective solutions to the problems, and develop feasible construction plans. At the same time, the construction unit should actively participate in the construction of key projects such as new materials, new equipment and new technologies used in construction. It is recommended that the designer ensure the safety of the construction personnel and prevent safety during the design process.[7]

6. Safety Risks and Preventive Measures for Construction Supervision of Construction Projects

6.1 Strengthen the Enterprises' Own Safety Production Management and Rational Control of Risks

In order to solve the problems of the supervision industry, the construction market should be planned, but each enterprise should further optimize and improve the internal management system to consolidate the competitive position of the establishment of the market. First of all, the responsibility system for production safety is the main core of enterprise safety production. Only in the process of continuous development and improvement of relevant rules and regulations, enterprises can achieve safe production. In the process of development, the construction engineering construction laws and regulations are mainly used as the basis of enterprise standards. The relevant staff should prepare a complete set of project safety supervision responsibility system for the supervision enterprise. The state requires the supervision of the company's responsibilities, should undertake all the supervision safety duties, mainly through the establishment of the responsibility system, effectively implement each management project, each staff member should bear the responsibility for safety production management.

6.2 Pay Attention to Construction Projects and Establish Insurance Work

In the face of serious safety establishment risks, the supervision unit should take double effective measures to avoid and transfer risks, and at the same time establish and improve the insurance system. At this stage, the risk awareness of the supervision unit has been continuously strengthened. The key work of strengthening risk management awareness and establishing risk management mechanism is the insurance system for safety supervision.

6.3 Control the Safety Management of Hazard Sources

In order to improve the safety management level of dangerous sources, relevant staff should identify and evaluate the construction phenomenon. According to the basic content of the construction safety management regulations, it is necessary to formulate safety hazard source management standards at the construction site in combination with the actual conditions of the project, and construct a site construction hazard source management system and emergency response speed. At the same time, different safety control measures can be formulated according to different hazards. There are certain gaps in the geographical and construction conditions involved in different projects. Construction related personnel should determine the major hazards and hidden dangers of safety accidents. After systematic analysis, finalize effective measures to prevent and control risks.

6.4 Conduct Strict Supervision Measures Implementation Procedures

Construction enterprises should improve the internal supervision system, clarify the safety management objectives, and implement the safety management responsibility to each worker. If there is a safety accident at the scene, they are directly responsible. It is good for construction enterprises to establish a supervision team to stipulate practice to carry out safety supervision on the construction site. For some construction units without relevant regulations, they must be investigated for legal responsibility and arouse severe punishment. In the process of safety supervision of construction engineering, managers should carry out maintenance and inspection of daily phenomena. In the inspection work, if there are some illegal phenomena or safety hazards, they should be strictly handled in accordance with the relevant supervision procedures. Therefore, the construction party should be notified in a

DOI: https://doi.org/10.30564/frae.v1i4.248

timely manner, combined with measures to carry out rectification, and then written notices and instructions should be issued. Therefore, we must ensure the timeliness of the construction documents. After the notice, if the construction personnel have not taken measures to carry out the rectification, the establishment personnel should organize the construction unit in time, the construction unit, etc. to hold the special supervision meeting, etc. After that, it is emphasized in combination with relevant regulations. If the construction party does not carry out rectification, or refuses to rectify, if the construction party is required to stop work under severe circumstances, the supervision engineer should report to the superior.[8]

7. Conclusion

In summary, China's national economy is developing at a relatively fast pace. The development of the construction industry is the main pillar of production and lays a good foundation for China's economic development. Among them, in the construction industry, supervision work is very important. In the whole construction process, each construction link should be carefully and carefully treated. In combination with the low quality of construction workers, the Highly Processable construction, and the Restriction of the construction environment, comprehensively analyze the countermeasures and effectively improve the construction quality. While ensuring the safety of construction workers, it is also necessary to improve the economic benefits of construction, which will ensure the smooth completion of construction projects.

References

[1] Lei Chen. Discussion on Risk Management and Preventive Measures of Construction Engineering Safety Supervision[J]. Building Materials and Decoration, 2018(29):152-153. (in Chinese)

[2] Guoquan Zhong. Research on Risk Management and Preventive Measures for Construction Engineering Safety Supervision[J]. House and Resident, 2018(08):133-134. (in Chinese)

[3] Jianfang Zhang. Safety Risks and Preventive Measures for Construction Supervision of Construction Engineering[J]. Doors and Windows, 2017(12):65. (in Chinese)

[4] Haiyan Wang. Research on Construction Safety Risk Management and Prevention of Construction Engineering[J]. Henan Building Materials, 2017(06):130-131. (in Chinese)

[5] Dehong He. Research on Safety Risk Management and Prevention of Construction Engineering[J].Jiangxi Building Materials, 2017(20):259+264. (in Chinese)

[6] Jinxi Shi. Safety Risks and Preventive Measures for Construction Supervision of Standardized Construction Engineering[J].China Standardization, 2016(17):94. (in Chinese)

[7] Dengfu Yang. Reflections on the Safety Risks of Construction Project Supervision and Its Preventive Measures[J]. Green Building Materials,2016(10): 161. (in Chinese)

[8] Xiaoling Li. Research on Risk Management and Preventive Measures of Construction Engineering Safety Supervision[J]. Informatization Construction, 2016(01): 329+332. (in Chinese)

 DOI: https://doi.org/10.30564/frae.v1i4.248

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Frontiers Research of Architecture and Engineering
http://ojs.bilpublishing.com/index.php/frae

ARTICLE

Technical Development and Safety Risk Analysis of Urban Underground Engineering

Zhiqiang Ye*
College of Civil Engineering and Architecture, China Three Gorges University, YiChang, HuBei, 443002

ARTICLE INFO

Article history:
Received: 17 September 2018
Revised: 30 September 2018
Accepted: 18 October 2018
Published Online: 31 October 2018

Keywords:
Underground engineering
Construction technology
Development
Safety risk

ABSTRACT

With the rapid development of China's urban construction, the acceleration of urbanization and the rapid expansion of population, the effective development and utilization of urban underground space have attracted great attention. Therefore, it is inevitable to study the comprehensive technology of deep underground engineering, and the research results will play an important guiding role in the design and construction of middle and shallow space of underground engineering in the future. This paper analyzes several common construction techniques and methods in the current construction process of urban underground engineering, summarizes the main construction methods of underground engineering, forecasts the development of urban underground engineering construction, and analyzes the safety risks of urban underground engineering construction.

1. Development Trend of Urban Underground Engineering

There is a popular view internationally that "the 19th century is the century of roads and Bridges, the 20th century is the century of tall buildings, and the 21st century is the century of underground space". [1] Since the middle of the 20th century, with the acceleration of urbanization in the world, urban land has become increasingly scarce, and the problems of backward infrastructure and environmental deterioration have become increasingly prominent. In order to solve these problems, some developed countries in the world began to use the underground space of cities. The European and American countries and Japan were the first to develop and utilize underground space. Among them, European countries have made good use of underground space, which greatly alleviates the shortage of urban land through extensive construction of subway, underground shopping malls, underground warehouses and underground comprehensive service areas. After entering the 21st century, with the acceleration of China's urbanization process and the rapid economic development, Chinese cities are carrying out large-scale underground space construction (such as subway, underground shopping mall, underground ga-

**Corresponding Author:*
Zhiqiang Ye
College of Civil Engineering and Architecture, China Three Gorges University,
No. 8 *University Road, YiChang, HuBei,* 443002*,*
E-mail: 2205894846@qq.com.

DOI: https://doi.org/10.30564/frae.v1i4.249

rage, and underground reservoir). The utilization of urban underground space will also develop from the current shallow space to the middle and shallow space (30 m below the surface). The complex theory and key technology of underground engineering construction involved in the development of underground space in deep cities in China are still lack of in-depth and systematic research. Therefore, it is inevitable to carry out comprehensive technical research on ultra-deep and complex underground engineering, and its research results will play an important guiding role in the design and construction of underground engineering in middle and shallow space in the future.

The construction of urban underground engineering is carried out inside the underground rock and soil body. Therefore, its construction is very different from the construction of ground buildings. The construction of underground engineering mainly has the following characteristics: (1) it is greatly influenced by the engineering geological and hydrogeological conditions; (2) poor working conditions, narrow working face and poor working environment; (3) underground excavation has little impact on the ground, but it may lead to ground subsidence when buried in a shallow place; (4) large amount of waste soil and gravel should be properly treated. The mechanical deformation, construction conditions and technical difficulty of the tunnel and underground engineering are quite different from the surface structure. Generally speaking, its risk and risk are higher than the surface structure.[2]

2. Main Construction Techniques of Underground Engineering

The key to the success or failure of urban underground engineering is the construction problem. The selection of construction method should be determined by technical and economic comparison according to the factors such as the nature of the project, scale, conditions of soil and rock strata, environmental conditions, construction equipment and time limit. The construction method should be safe and applicable, technically feasible and economically reasonable. China has made great progress in the construction technology and method of underground engineering, and has successively adopted the research and application of construction technology methods such as open excavation method, reverse method, underground excavation method, caisson method, shield construction method, pipe jacking method and submerged pipe method, some of which have reached the international advanced level.[3]

2.1 Excavation Method

Open excavation method, also known as foundation pit excavation technology, has the advantages of simple construction, safety, speed and economy, and its disadvantages are mainly greater impact on the surrounding environment. Open excavation method is suitable for open ground and better underground geological conditions. The open excavation method is mainly used in the engineering practice of a large number of deep foundation pit projects, and has formed a complete variety of foundation pit enclosure excavation technology.[4]

2.2 Reverse Method

The reverse method is based on the underground structure itself as the wall, and also as the supporting system, which is the construction method of digging and constructing the underground structure system step by step from top to bottom. Because it works in reverse with the traditional sequence construction method of first supporting and then digging, it is called reverse operation. The principle of reverse action is supported by the structural noumenon (floor system), whose stiffness is quite large, which also reduces the overall deformation of the supporting structure, showing obvious advantages. Reverse action needs to set up temporary column and column pile first, want to increase a few expenses, and in each stage of concrete casting, cast first and cast after working procedure, its junction brings inconvenience to construction.

2.3 Concealed Excavation Method

Underground excavation construction technology is under the surface of the construction, the advantages of life without interference, but the technical requirements and high cost. There are three kinds of working methods: new Austria method, shallow excavation method and pipe curtain method.[5]

2.3.1 New Austrian Tunnelling Method

New Austrian Tunnelling Method is a kind of tunnel design and construction method, which is designed to make surrounding rock form a hollow tubular support ring structure.

2.3.2 Shallow Excavation Method

Shallow buried and dark excavation is a method of underground excavation for various types of underground caverns near the surface of soft soil layer, which is based on strengthening and treatment of weak stratum and adopts sufficiently rigid composite lining (composed of initial support, secondary lining and intermediate waterproof layer) as the basic supporting structure.

2.3.3 Pipe Curtain Method

The pipe curtain method is based on the single pipe jacking, and each single pipe is connected by the lock port to form a pipe row on the side of the steel pipe, and grouted between the lock ports to form a sealed stop pipe curtain,

 DOI: https://doi.org/10.30564/frae.v1i4.249

which is then reinforced to the soil in the pipe curtain, and finally excavated and supported inside the pipe until the pipe segment is through and then poured the structure.

2.4 Open Caisson Method

Caisson sinking method, also known as caisson sinking method, is a special construction method for constructing vertical shaft in unstable water-bearing stratum. When a shaft is dug into a shaft by unsteady water-bearing stratum, a section of shaft is prepared on the designed shaft position. The shaft has a blade foot at the lower end.

2.5 Shield Method

Shield tunnel construction method refers to the method of building tunnel without disturbing surrounding rock by using shield machine to control the excavating surface and surrounding rock at the same time without collapse and instability, and carrying out tunnel excavation at the same time. Shield is widely applicable. Tunneling allows the construction of underground structures below the longitudinal length, with shallow overburden, which will not cause surface fracture or large subsidence in unstable stratum and ground water bearing stratum. It can be used in very loose soil or high pressure and strong stratum, such as soft and plastic stratum or flowing stratum, and also realized effective application in temporarily stable stratum, playing the role of top protection. Therefore, shield construction method has a broad application range and prospect.

2.6 Pipe Jacking Method

The pipe jacking method is to use hydraulic jacks or equipment with jacking and traction function. The pipe jacking working well is used as the pressure wall. While the stratum is excavated, prefabricated underground pipes (or tunnels) are pushed forward in sections along the design route together to the destination. It is a kind of underground construction method for tunnel or underground pipeline crossing various obstructions such as railway, road, river or building.

2.7 Immersed Tube Method

The submerged pipe method is also called precast pipe section sinking method, that is, the reinforced concrete structure is preloaded in the dock, and the water is discharged to float and then buried to the designed position to build the underwater project. This method is easy to guarantee the quality of tunnel construction, low project cost, short construction period in the tunnel site, good operating conditions, safe construction, wide range of water depth, free choice of section shape and size, section space can be fully utilized, but the drawback is high technical requirements.

3. Technical Prospect of Urban Underground Engineering Construction

The effective utilization of underground space will be a new land resource to benefit mankind. As domestic rapid advance of urbanization, land resources quickly reduce bring to people's life followed by a series of problems, while the development of urban underground space can effectively alleviate the urban traffic problems, improve the city's comprehensive disaster prevention ability, improving urban environment on the ground, so the reasonable development and utilization of urban underground space has become the inevitable trend of city development, it also bring huge development opportunities for geotechnical engineers.

The construction technology of urban underground railway is the main direction of the future development of urban underground engineering in China. The construction method of tunnel and station should be chosen according to local conditions to shorten the construction period, save investment and double the result with half the effort. We should focus on developing new construction methods, construction equipment and construction techniques suitable for China's national conditions in the 21st century, which will accelerate the construction speed of China's subway project and effectively improve the development of China's urban underground transportation.

4. Safety Risk Analysis of Underground Engineering Construction

Underground engineering construction is characterized by large investment, high complexity, strong concealment, long construction period and uncertainty of surrounding environment.[6] Therefore, in the process of concrete construction, there are a lot of risk factors, especially some risk factors, it is not easy to be found lurking in the process of project construction and combined with the current underground engineering construction safety risk management system in our country is not perfect enough, related engineering safety management standard is not perfect, increased the occurrence of safety accidents in underground engineering, to the modern society economy and environment have brought many bad effects. And according to the specific condition of underground engineering construction, build a set of scientific, rational and feasible security risk management system, effectively for the underground engineering construction is the whole process of risk management, advance the security risks existing in the construction process of science assessment, not only can radically enhance the construction management department of risk management consciousness and ability, still can greatly reduce the occurrence of safety accidents

DOI: https://doi.org/10.30564/frae.v1i4.249

in the process of underground project construction, ensure the safety of underground engineering construction.

4.1 The Safety Risk Management System Is Not Sound

In the underground engineering construction safety risk management, while also issued a series of our country has a guidance document, but the safety risk management in the underground engineering construction, never build a relatively perfect system of laws and regulations, to the status of the risk management of project construction and the importance of accurate positioning, lead to underground engineering construction safety risk management also temporarily in a state of disorder, the management of content and process didn't have a set of standards as the basis, lead to underground engineering construction safety risk management is difficult to obtain the ideal effect.[7]

4.2 The Safety Risk Management Is Underfunded

Due to budget, at the early stages of the underground project construction will be no risk of construction safety management costs money and use the standard for clear rules, causes responsible for the construction contractor in order to increase their own economic interests, and reduce the investment in capital construction safety risk management, lead to a serious shortage of funds in security risk management, a lot of security risk management work are not normal, for the construction of the underground engineering is buried under the great potential safety hazard.

4.3 The Project Monitoring Is Not In Place

Monitoring quality of construction projects is an important risk avoidance strategy, a lot of practice shows that if you can further enhance the quality of the engineering monitoring, and can be scientific and reasonable to evaluate the safety of the engineering construction risk, can effectively improve the safety of underground engineering construction, can effectively reduce the incidence of security risks. However, as far as the current construction situation is concerned, in most underground engineering construction, there is no set of effective standards for the project monitoring market, which has a great impact on the effectiveness and accuracy of the project monitoring data and cannot provide scientific and accurate data information for the implementation of safety risk management.

5. Construction Method of Safety Risk Management System for Urban Underground Engineering Construction

5.1 Establish a More Complete Safety Risk Management Plan

In charge of underground engineering construction unit must develop a set of feasible safety risk management plan, through the risk management plan to improve the safety of construction personnel management consciousness, and referring to the management plan as a key component part of the underground engineering construction, it can not only contribute to the safety of the relevant personnel to make the right risk management decision, also can effectively reduce the incidence rate of construction safety accidents, ensure the life property safety of the construction personnel and related businesses. Therefore, the units in charge of underground engineering construction must strictly implement the safety risk management plan standards, and timely adjust and revise the specifications that may constitute safety hazards. In an actual underground engineering construction, the comprehensive safety risk management of the risk analysis and evaluation, timely find the source of risk and risk existing in the construction process, according to the degree of risk, the risk may cause safety accident, the consequences of safety accident happens to build a complete monitoring system, in a timely manner according to the relevant contents in monitoring system using scientific and reasonable prevention and treatment measures, avoid and reduce the safety risk.

5.2 Improve Relevant Laws and Regulations on Safety Risk Management of Underground Construction

In underground engineering construction safety risk management work, the construction unit should strengthen, the ministry of railways and ministry of construction, the ministry of communications and the cooperation between other departments, formulate a set of relatively complete specifications and standards, to guide the safety risk management work smoothly, and risk management of construction safety in the standard specification of cost budget, determine the safety risk management in the position and the importance in underground engineering construction, strictly funds audit supervision, to ensure the maintenance funds can be fully applied to the safety risk management.

6. Conclusion

The construction of underground engineering in China should constantly develop existing technologies, study the technologies that are being applied abroad, introduce and absorb them into their own technology in combination with the national conditions, and catch up with the international advanced level through efforts. At the same time, the development of underground engineering construction technology is bound to have a greater impact on the development of urban construction technology in China and

 DOI: https://doi.org/10.30564/frae.v1i4.249

make due contributions to the utilization and development of underground space in the 21st century.[8]

References

[1] Linbo Hou. Construction Methods and Prospects of Underground Engineering[D]. North Traffic, 2010,62. (in Chinese)

[2] Jinxiang Li. Environmental Engineering Geological Problems Caused by Urban Underground Engineering[D]. West-China Exploration Engineering, 2016(3):20. (in Chinese)

[3] Bo Liang. Current Situation of Urban Underground Engineering Construction Technology in China, Classification and development[D].Modern Tunnel Technology, 2008,20. (in Chinese)

[4] Sheng Ran. Summary of New Technology Development in Urban Underground Construction[D]. New Building Materials and Construction Technology, 2017(8):153. (in Chinese)

[5] Hongkuang Feng. Construction Characteristics, Opportunities and Challenges of Urban Underground Space Engineering[D]. Sichuan Architecture, 2017(8):106. (in Chinese)

[6] Guoliang Zhang. Risk Analysis in Underground Engineering Construction[D]. West-China Exploration Engineering, 2005,17(3):217-219. (in Chinese)

[7] Hongyu Liu. Thinking on Safety Risk Management System of Underground Engineering Construction[D]. Productivity Economy, 2016(4):360. (in Chinese)

[8] Guoqi Liu. Development and Prospect of Underground Engineering Construction Technology in China[D]. Building Technology,1997(7):483. (in Chinese)

DOI: https://doi.org/10.30564/frae.v1i4.249

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Frontiers Research of Architecture and Engineering
http://ojs.bilpublishing.com/index.php/frae

REVIEW

Discussion on the relationship between Construction of Forest Towns and Reform & Development of State-owned Forest Farms

Sha Qiao*
China Forest International Engineering Consulting Co., Ltd., Beijing, 100013, China

ARTICLE INFO

Article history:
Received: 22 August 2018
Revised: 10 September 2018
Accepted: 18 October 2018
Published Online: 31 October 2018

Keywords:
Forest towns
State-owned forest farms
Reform and development

ABSTRACT

In recent years, China's social economy has continued to develop. While paying attention to the pursuit of the economy, people are paying more and more attention to the pursuit of quality of life. China has vast territory and abundant resources, forest resources are particularly rich, in order to make full use of forest resources and regulate the use and protection of forests, China has promoted the development of forestry by deepening the construction and reform of state-owned forest farms, and using forest resources to obtain benefits to meet people's living needs. This paper explores the necessity and advantages of building a forest town by analyzing the reform and development situation of state-owned forest farms.

1. Introduction

The forest town is a special form of a characteristic town. It is to strengthen the construction of green homes by utilizing forest resources, and to create a harmonious, beautiful and livable ecological environment for the purpose of beautifying the environment and benefiting mankind. This is consistent with the goal and path of building state-owned forest farms and to a certain extent has driven the use and development of forest resources and promoted the process of ecological civilization construction. But regarding the relationship between the construction of forest towns and the reform and development of state-owned forest farms, there are still many problems, which need to be further improved and solved, so as to effectively coordinate the relationship between the two and better play their role in the sustainable development of society.

2. The Cognition of Forest Towns

The forest town refers to the suitable location of the field, site and work area of the state-owned forest farm with rich forest resources and good ecological environment, and the forestry bureau of the state-owned forest area. The emphasis is placed on the use of old site worksites and field houses, through scientific planning and design, rational layout, complete reception facilities, complete infrastructure and perfect service functions. With the main features of providing forest tourism, leisure vacation, sports and other ecological products and ecological services, it integrates the innovation and development platform of industry, culture, and tourism and community functions. It is a special characteristic town, which is a functional community combining four kinds of production, city, people and literature to meet people's production and life needs.[1]

**Corresponding Author:*
Sha Qiao, female, engineer;
Research direction: forestry planning and design;
China Forest International Engineering Consulting Co., Ltd.,
4th Floor, Block A, No. 14*, Hepingli North Street, Dongcheng District, Beijing,* 100013*, China,*
*E-mail: qiaosha*999@163*.com.*

 DOI: https://doi.org/10.30564/frae.v1i4.250

2.1 Rich Resources

In the process of building a forest town, we must make full use of the forest's own resources and give full play to the role of forest resources to build a characteristic forest community environment. The biggest features and advantages of the forest are green, green hills, woods, and grass, giving people a sense of self-cultivation and a happy mood. Therefore, when building a forest town, we must use green as the background to develop green industries, such as forest leisure and production, and rely on the beautiful environment of the forest to bring people a leisurely and lingering mood.

2.2 Combine Forest with Production

When developing forest towns, we can make full use of abundant forest resources for production and construction, promote green production, and rely on the ecological environment for ecological tourism and tourism activities, thus promoting local cultural and economic exchanges. Finally, promote the further development of forest towns and economic growth.[2] For example, carrying out forest original catering, operating tourism and tourism industries, or operating forest specialty products, etc., make full use of the forest ecological environment to carry out ecological industry construction, thereby promoting the effective integration of forest and living production, and exerting the important value of forest resources.

2.3 The Openness of Forest Towns

When building a forest town, we must adhere to the principle of opening up to the outside world, strengthen the exchange of life between the town and the outside world, and must not stagnate development. The forest resources should be rationally used and configured, and resources and products should be continuously shared and exchanged, and some public cultural activities should be held to strengthen the exchanges between the town and the outside world, and to carry out cultural exchanges and integration, so as to keep pace with the times, we constantly improve the existing content and form of life.

3. Current Status of the Construction of Forest Towns in China

In recent years, leaders of the country and various regions have paid more and more attention to the construction and development of forest towns. The state has also promulgated relevant laws and regulations to strongly encourage and regulate this behavior. The construction of forest towns has promoted economic growth to a certain extent, and also optimized the development and transformation of the industry, which plays an important role in people's ecological civilization construction and sustainable development of society. However, due to the current understanding of the forest town is not very thorough, there is still a lack of theoretical practice for its development, so there are still some development defects.[3,4]

3.1 Unclear Understanding of Ideas and Lack of Effective Management

When the local government built a forest town, it did not have a deep grasp of the purpose and concept of developing a forest town, and confused it with urban and rural planning and development. It only focused on policy guidance, to engage in project construction, build a town, develop eco-tourism projects, and ignore the importance of ecological development and protection. In the end, the scale of investment will be large, resulting in waste of resources; ecological environment pollution is more serious, which is not conducive to ecological protection and sustainable development. At the same time, in the construction of forest towns in many places, only pay attention to the corresponding slogan, but lack of effective management, resulting in the construction of the town is not complete, not comprehensive.

3.2 Lack of Scientific Planning

In some places, when building a forest town, it only pays attention to the development of the project and the construction of real estate. It does not combine the natural advantages of the forest to develop the characteristic industry and ecological culture, which leads to a biased construction goal.

3.3 Facilities and Functions Need to Be Improved

The location of the forest town is relatively remote, and the surrounding development is relatively backward. Therefore, when building community facilities, certain difficulties have arisen. There is still a lack of convenient access to water supply and power supply, medical education, and transportation.

4. Problems in the Process of Reform and Development of State-owned Forest Farms in China

4.1 Forest Farm Operating Mechanism Falls Behind

In the original forest farm management mode, there are many problems. The messing together and egalitarianism within the management of state-owned forest farms are more serious, and the wage distribution system lacks effective management, and it is impossible to implement a wage distribution system that is more labor-intensive and unworkable. And within the management of forest farms,

DOI: https://doi.org/10.30564/frae.v1i4.250

there is a lack of adjustment and use of some incentive systems, and there is a phenomenon of uneven pay. In addition, in the personnel management of state-owned forest farms, there is no effective incentive system, and the selection and appointment of employees cannot be carried out in a manner of open competition, which encourages employees' enthusiasm for work to be low. Moreover, considering the current development of China's forest farms, the development is still very slow, lacking effective management and overall planning, resulting in insufficient employee confidence and hindering the production and operation activities of the forest farm.[5]

4.2 Lack of Funds

In view of the current development of state-owned forest farms, there is still a lack of effective management and related capital investment, which has led to the state of lack of mental capacity in the development of the state-owned forest farms, which has hindered the further development and expansion of the forest farms. Moreover, the road facilities and related communication equipment of the forest farm are relatively backward, which makes the forest farm very disadvantageous in developing forestry projects. On the other hand, although some forest farms have promoted their own economy, promoted their own further development, and vigorously introduced funds to develop characteristic industries. However, due to lack of systematic management and effective management, they still failed to reverse the plight of the forest farm. Moreover, in terms of introducing funds and developing forestry specialty industries, the current forest farms will still be affected by the original forest farm management mode.

5. Strategic Analysis of Strengthening the Reform and Development of State-owned Forest Farms

5.1 Deepen Reform and Focus on Management

In order to make better use of the resources of state-owned forest farms and promote the further development of state-owned forest farms, it is necessary to change the views on state-owned forest farms in terms of understanding and concept, and affirm its important value and status. On the basis of focusing on system reform, strengthen management. Attach importance to the protection of state-owned forest farms, and strengthen management measures for afforestation and scientific forestry, and attach importance to the construction of ecosystem forest farms.[6] In order to achieve good results in the reform and development of state-owned forest farms, governments and state agencies should also strengthen management, attach importance to the construction of state-owned forest farms, and continue to increase investment in this project, and increase investment in its funds and technology. At the same time, it is necessary to improve the corresponding management mechanism and scientifically manage and use the funds invested by the state and the government to achieve deepening reforms and promote the continuous development of state-owned forest farms.

5.2 Promote Forest Farm Reform and Forest Town Construction

5.2.1 Unity of Ideas

Whether it is the construction of a forest town or the construction of a state-owned forest farm, its ideological concept must be unified. It is also necessary to follow the local conditions and always follow the concept of not cutting trees, not filling the lake and not digging mountains, to promote the development of forest farms and the construction of forest towns. In this way, we can achieve the synchronization of China's social and economic development and ecological environmental protection time, promote the sustainability of greening construction, and improve the current ecological environment damage.

5.2.2 Coordination of Thoughts

When building a forest town, it is necessary to adapt to local conditions. When building a forest farm, it is also necessary to focus on local characteristics and environment to promote harmonious integration between the two. In order to maximize its strategic positioning, promote the development of regional green businesses, and build ecological barriers. On the basis of strengthening the investment in production facilities, the villages and towns will be integrated with these green developments to achieve the goal of improving air, reducing pollution and ensuring ecological balance.

6. How to Combine the Construction of Forest Towns with the Reform and Development of State-owned Forest Farms

6.1 Unify Development Concept and Improve Development System

When building a forest town, the forestry management department should play its own mission and responsibility to correctly understand and promote the construction of forest towns. And constantly reform the management mechanism to create targeted and maneuverable town planning for development purposes and requirements. In deepening the concept of a forest town, strengthen the main role of the market, and encourage people from all walks of life to participate in the construction of the town, thereby

 DOI: https://doi.org/10.30564/frae.v1i4.250

establishing a mechanism of government guidance, enterprise-oriented, market-oriented operation, and active participation of all sectors of society. At the same time, it is necessary to set up a special organization to effectively plan and construct this development concept, and rely on the leadership role of the government to develop a public service system that covers urban and rural areas and ecological significance, thus maintaining ecological balance and stability.[6]

6.2 Develop Forestry Ecological Products with Characteristics

In the process of construction, it is necessary to make effective use of the ecological environment and natural landscape of the forest area, and vigorously introduce cultural activities such as forest tourism, health care, leisure, etc., focusing on the development and cultivation of forest products, so as to form forestry ecological products with characteristics. The forest town is located in a forest-rich forest area, and the proportion of forest resources in China's land area is very large. The geographical differences between forest resources are also very large. Therefore, when building a small town, it should pay attention to their characteristics and individualized construction according to the resource structure, topography and biological types of the place, and develop ecological products with ecological significance. In addition, you can also take advantage of the richness of forest species to develop tourism, camping, adventure and other activities; use the natural terrain of the forest area to develop forest production and production; finally, the scientific research value and educational purpose of the forest area can be brought into play, and science education, Chinese herbal medicine planting, and specimen production can be carried out. In the end, we will form a mechanism to promote the transformation of traditional industries with green as the standard, develop ecological industries that are beneficial to human health, actively develop products with forest characteristics, maintain the vitality and competitiveness of forests, and thus play a demonstration role of small towns.[7]

6.3 Enhance Cognition and Promote Development

In order to promote the mutual dependence and common development of forest towns and state-owned forest farms, we need to strengthen our understanding and development on the basis of existing knowledge, so as to create a more comprehensive community service platform that is suitable for living and suitable for travel. The construction of forest towns relies on forest resources and develops characteristic ecological products and ecological culture, which is conducive to the construction of ecological civilization in China. In order to adapt the construction and development concept of the forest town to the reform and development direction of the state-owned forest farm, it is necessary to play the role of the market mechanism when building the forest town. In the process of development, effective measures should be taken to protect natural resources, use natural resources in a reasonable way, pay attention to the development and cultivation of natural resources, and develop ecological resources with development characteristics.[8]

7. Conclusion

In summary, in order to promote the construction of ecological civilization in China and maintain the sustainable development of society, China needs to focus on the construction and development of forest towns on the basis of developing and reforming state-owned forest farms. In the process of construction, it is necessary to make full use of the advantages of forest resources and develop forestry ecological products and ecological industries with distinctive characteristics, thus strengthening the role and significance of the construction of forest towns.

References

[1] Yunhai Wu. Discussion on the Reform and Development of Forest Towns and State-owned Forest Farms[J]. China Forestry Economics, 2017(6):56-57. (in Chinese)

[2] Baolin Li. A Preliminary Study on the Reform and Sustainable Development of State-owned Forest Farms[J]. Modern Agricultural Science and Technology, 2016(5):181-182. (in Chinese)

[3] Junning Wang. Reflections on Issues Related to the Reform and Development of State-owned Forest Farms[J]. China Science and Technology, 2014(20):229-229. (in Chinese)

[4] Jinbo Zhao, Haiyun Wang. Efforts to Speed up the Creation of Forest Towns to Paint a Green Development "a Forest"[J]. Times Economics, 2018(2):45-47. (in Chinese)

[5] Jianping Tan. Analysis of the Relationship between State-owned Forest Farm Reform and Ecological Civilization Construction[J]. China Chief Accountant, 2015(4):100-101. (in Chinese)

[6] Weidong Zhang. Discussion on Some Problems in the Reform and Development of State-owned Forest Farms[J]. China Forestry Industry, 2016(8). (in Chinese)

[7] Banghua Mei. Analysis on the Necessity and Suggestions of the Reform of State-owned Forest Farms in Jingde County[J]. Science and Fortune, 2015,7(33):336 -337. (in Chinese)

[8] Pinghao Li. Discussion on Sustainable Development after the Reform of State-owned Forest Farms[J]. China Forestry Industry, 2016(4). (in Chinese)

  DOI: https://doi.org/10.30564/frae.v1i4.250

BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Frontiers Research of Architecture and Engineering
http://ojs.bilpublishing.com/index.php/frae

REVIEW

Analysis on Construction Quality Control Technology of Reinforced Concrete Shear Wall Structure

Ting Zhou*
Jiangxi Vocational College of Industry and Engineering, Pingxiang, Jianxi, 337055, China

ARTICLE INFO

Article history:
Received: 3 October 2018
Revised: 10 October 2018
Accepted: 18 October 2018
Published Online: 31 October 2018

Keywords:
Reinforced concrete
Shear wall structure
Construction quality
Control technology

ABSTRACT

In the process of continuous development of construction enterprises, new requirements have been put forward for construction projects. By strengthening the construction quality control of reinforced concrete shear wall structure, the construction level of reinforced concrete can be continuously improved, the construction quality can be guaranteed, and the construction project can be successfully completed, which is worthy of extensive application and promotion in construction enterprises, thus providing a broader development space for construction enterprises.

1. Introduction

In the construction project, the shear wall structure has been widely applied and popularized. For the shear wall, it can bear the internal forces caused by various loads, and can effectively control the horizontal force of the structure. The shock resistance and stability of the structure are extremely significant, which in turn has a profound impact on the construction project. However, in the actual construction process, it is extremely vulnerable to many external factors. Therefore, it is necessary to formulate practical and feasible optimization measures to ensure the construction quality of reinforced concrete shear walls. This paper mainly focuses on the construction quality control technology of reinforced concrete shear wall structure for the reference of relevant personnel.

2. Summary and Analysis of Construction of Reinforced Concrete Shear Wall Structure

2.1 Advantages and Disadvantages

2.1.1 Advantages

In the process of continuous development of science and technology in China, new materials and new technologies have been widely applied and promoted in construction projects, and under the influence of the improvement of the quality of life of the society, they are not consistent with the requirements of basic materials, so the construction The overall framework and comfort requirements of the project are getting higher and higher. In the past, the traditional slab beam frame construction technology is very prone to the phenomenon of external leakage of

**Corresponding Author:*
Ting Zhou,
Jiangxi Vocational College of Industry and Engineering,
No. 106*, Yuhu East Road, Economic Development Zone, Pingxiang, Jianxi,* 337055*, China,*
*E-mail: zt*0919@163*.com.*

 DOI: https://doi.org/10.30564/frae.v1i4.251

the beam. If the ceiling is used for covering, it is difficult to improve the space frame of the construction project and bring a sense of visual depression. For the reinforced concrete shear wall structure, this problem can be greatly solved. By comparing and analyzing with the original beam and slab construction technology, the space advantage is more significant, and the characteristics of the overall frame are also extremely obvious. For example, the bearing capacity and seismic performance of the shear wall technology frame are significant, and can withstand large vertical loads and lateral loads. If the construction works partially damaged, it can bear the corresponding load to ensure the overall stability and seismic performance of the construction project. The concrete reinforced concrete shear wall structure is shown in Figure 1:

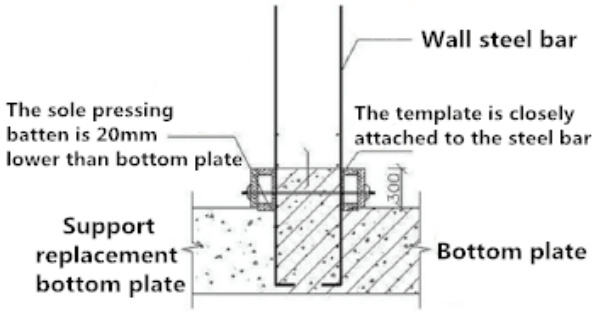

Figure 1. Structure of reinforced concrete shear wall

2.1.2 Disadvantages

For the shear wall frame construction technology, its advantages are more significant, but because the shear wall structure construction technology is still in the initial exploration stage in China, there are still many problems in the actual application process. For example, the construction project has a relatively high self-weight, and the requirements for many aspects are increasing, such as ground treatment and overall frame stability. At the same time, in the construction project, the shear wall frame is one of the most important components. In the graphic design process, it takes a lot of time to reflect the practical application functions of construction projects; it is difficult to give full play to the flexibility of construction engineering.[1] In the construction of large-scale public construction projects, there are many restrictive factors. Furthermore, it brings new challenges to the construction of reinforced concrete shear wall structure in China.

2.2 Characteristics of Reinforced Concrete Shear Wall Structure

2.2.1 Stress Nature

Based on the external perspective of the frame, for the frame shear wall, it has a perpendicular relationship with the ground. In the case of external forces, there is a significant difference between the horizontal bearing capacity and the horizontal bearing capacity due to the strong bearing capacity of the frame structure. The shear wall has a good horizontal load carrying capacity, but the vertical force is weak. Furthermore, under the action of the two, the hollow frame cantilever beam structure of the overall frame shear wall appears to be curved, and its shape is biased toward the curve.

2.2.2 Rigidity Nature

There is no significant difference between the force response of the frame shear wall structure and the pure frame structure, but if the bending moment of the substrate reaches 20%, the frame stiffness will change dramatically. Generally speaking, the construction personnel should set the seismic resistance level of the frame shear wall in time. After the bending moment of the frame shear structure itself reaches 80% of the bending moment, the frame stiffness will gradually shrink. Combined with the relevant documents of the seismic design of the building, it can be seen that the rigid proportional relationship between the frame and the shear wall must be coordinated and standardized to determine the structural seismic rating of the frame shear wall.

3. Technical Points for Construction of Reinforced Concrete Shear Wall Structure

3.1 Steel Works

In the steel works, the amount of steel materials used is large and the types are extremely rich. For example, the primary steel bar has a diameter of 6 mm and the tertiary steel bar has a diameter of 18 mm. The main technical difficulty is that in the case of dense steel bars, the steel bars are prone to displacement during the installation and pouring process. In this case, the following measures should be taken: First, fix the stirrup frame. Combine the physical lofting, make the relevant processing and shaping molds such as the column ribs, and fully exert the positioning function of the frame ribs. Moreover, the application of the vertical or horizontal wall ladder reinforcement is strengthened to control the position of the steel bar to prevent the steel bar from shifting.[2] Second, clear the beam and column nodes. In high-rise buildings, the requirements for the number of steel bars are clearly stated. If the number of steel bars is large, dense beam-column joints are prone to occur. In order to ensure good implementation results, it is necessary to strengthen the application of computer technology to draw and stake out the on-site steel bars, and then use them as template

DOI: https://doi.org/10.30564/frae.v1i4.251

templates to prevent them from being on the construction site. In the construction of the project, the construction of the beam-column joints of the steel bars can be effectively guided. Finally, the sample guide system. In the construction, in order to ensure the good precision of the steel bar project, the staff must increase the control of the physical model during the construction process, and give certain guarantees to the project quality.

3.2 Template Engineering

3.2.1 Inside and Outside Template Design

In the process of template matching, the proportion of the external wall template is lower than the proportion of the outer template to ensure the accuracy of the template. In the process of supporting the mould, the reference object is the wall to be poured, and the outer template and the wall are to ensure a high degree of coordination and consistency.

3.2.2 Fix the Inner Template

In the process of template casting, the wall root simulated on the inner template and the inner side is very prone to movement,[3] which affects the accuracy of the template. Therefore, the designer will place the short steel head on the inside of the template to play a good control role.

3.2.3 Lifting Wall Formwork

For the lifting of wall molds, to ensure good stability and accuracy, in the hoisting process, in order to prevent the wall mold from hitting the steel bar, it is necessary to effectively control the lifting position, continuously improve the stability of the floor, and maintain the personal safety of the construction personnel.

3.3 Concrete Engineering

In the concrete construction process, it is necessary to attach great importance to the problem of concrete material configuration, and then rationally control the material proportion to prevent the collapse phenomenon, so as not to threaten personal safety. Moreover, in the pouring process, the specific pouring sequence should be followed. In the process of pouring large-section beams, the application of the layered casting method should be strengthened, and various ingredients should be sturdy to ensure good density.

In addition, after the completion of the concrete project, the engineering designer should conduct an in-depth analysis of the humidity on the construction site and do a good job in concrete sprinkling maintenance to ensure a good wetness of the concrete surface. The humidity is controlled at least for about 7 hours.

4. Quality Control Measures for Construction of Reinforced Concrete Shear Wall Structure

4.1 Prepare for the Construction

First of all, it is necessary to arrange the construction personnel reasonably. In terms of concrete pouring quality, technical parameters such as initial setting time and slump of concrete are extremely important influencing factors, so it is necessary to reasonably arrange the construction organization of concrete pouring to give a certain guarantee of concrete strength. Secondly, we also carefully selected commercial concrete suppliers, conducted in-depth analysis of concrete daily output, timely completed the signing of concrete contracts, and conducted in-depth analysis of the characteristics of the pouring parts and weather conditions to select the most suitable admixture. Once again, it is necessary to determine the various technical parameters of the required materials. In various experimental reports, the focus is on various raw material tests, cement, construction ratios, etc., to provide certain convenience for the technicians to conduct experiments.[4] Finally, for the equipment required at the construction site, to ensure the completeness and integrity of the configuration, before the construction, the use of the equipment should be carefully examined. At the same time, it is necessary to prepare the on-site operating conditions, such as: do the hidden inspection of steel bars, check the iron and the blocks, ensure the proper thickness of the protective layer, and clean the impurities in the template in time. In the case of preparing for work before construction, it can lay a solid foundation for the smooth progress of the construction process.

4.2 Conduct Rationalized Control of Raw Material Quality and Concrete Ratio

In the construction process of reinforced concrete shear wall structure, if the cement encounters water, it is very prone to hydration reaction and produce corresponding heat, which becomes an important cause of cracking of the shear wall, which makes it difficult to ensure the overall stability of the reinforced concrete shear wall structure, and the quality of the project is also threatened accordingly. Therefore, in the application process of construction materials, it is necessary to increase the control of the quality of construction materials. For example, in the concrete proportioning process, the application of coarse sand should be strengthened to effectively control the water content of concrete. In the actual construction process, in order to fully reflect the concrete and the easiness of the concrete, it is necessary to continuously improve the anti-segregation function of the concrete. Therefore, in the

 DOI: https://doi.org/10.30564/frae.v1i4.251

concrete proportioning process, it is necessary to add an admixture to ensure that the concrete meets the pumping requirements, and the concrete mixing work is minimized to ensure a good saving effect.

4.3 Properly Select the Construction Process and Carry out the Concrete Pouring Work

(1) The construction process of reinforced concrete is fully reflected in the process of pouring concrete. It is necessary to ensure that the pouring work is completed at one time to avoid the accumulation or inclination of concrete. We must also attach great importance to the problem of selecting concrete discharge, slow down the speed of the hopper,[5] and ensure the flatness of concrete pouring. Moreover, it is necessary to properly control the pouring speed of the concrete and combine the standard speed of the construction to carry out the pouring, thereby ensuring the steady improvement of the quality of the pouring work.

In addition, in the pouring process, the concrete temperature should be rationalized. In the aspect of construction quality control, it is necessary to increase the supervision and control of the concrete mold temperature, do a good job of cooling the concrete, and regularly spray water.

(2) In the construction process of concrete shear wall structure, it is necessary to strengthen the application of one-time pouring method. Ensure good cleanliness of the shear wall before carrying out concrete pouring work. On the surface of the shear wall, the mortar should be poured, and its thickness should be controlled at about 1.5 cm to prevent the buckling phenomenon of the coarse aggregate in the concrete, so as not to threaten the quality of the shear wall structure. In the lap joint work of the shear wall structure template steel column and beam ribs, because the pores are narrow and widely distributed, the height of the material below should be controlled below 50 cm, and then the application of the plug-in high-frequency vibrator should be strengthened. In this way, the concrete vibrating work is carried out, and after the vibrating and compacting, the layered pouring work is also carried out.

4.3 Do a Good Job in Water and Cement Ratio, and Pay Attention to Vibration Management

(1) In the construction of reinforced concrete shear wall structure, it is necessary to minimize the difficulty of pumping and prevent the influence of steel bar density on concrete vibration. In actual construction, the water addition method will be used to continuously improve the fluidity of the concrete, but to a certain extent, this will lead to an increase in the rate of concrete segregation, thus affecting the stability of the shear wall structure.[6] Therefore, in the specific construction process, it is necessary to strengthen the application of modern science and technology, and calculate the proportion of various raw materials rationally before the concrete ratio. In the process of adding water and loading, it is necessary to strengthen the application of quantitative equipment and facilities to ensure that the quality of various concrete proportions is in line with actual needs. In addition, the project supervision function should be fully exerted, and on-site inspection and inspection work should be done to ensure the concrete water-cement ratio quality.

(2) After the concrete is poured, and before the initial setting, a second vibrating work needs to be carried out to avoid affecting the quality of the pouring to ensure good tightness between concrete and steel, give a certain guarantee to the construction quality of reinforced concrete shear wall structure, to prevent cracks in concrete walls. In the first layer of vibrating process, the vibrating bar should penetrate deep into the concrete root to complete the vibrating work and avoid the separation of the mortar and the post-cast concrete,[7] which makes it difficult to reflect the stability of the shear wall structure.

5. Project Cases

Take an A project as an example, its footprint is 300m2, and the total construction area is 11050m2. The construction project consists of 12 floors, mainly including shops, commercial houses and hop houses. Among them, 1-3 floors are shops, and 5-11 floors are commercial houses. In the foundation construction method of this project, the pre-tensioning method is applied to the pre-tensioning method. The foundation is the concrete pipe pile, and the reinforced concrete frame is the main structure. For the elevator shaft, the shear wall structure has been widely used.

Firstly, use the template engineering technology. In this project, the new multi-layer glued template has been widely used. The thickness of the template is 18mm. The combination of the layer height is combined with the layer height. The size of the wood selected by the main keel and the secondary keel is 100×100mm, 50×100mm.

Secondly, use the concrete crack control technology: (1) Design the proportion of raw materials. In the concrete configuration process, it is necessary to select good quality raw materials and add quantitative water reducing agent to continuously increase its density and firmness. (2) Properly lower the temperature. For concrete materials, it has certain peculiarities. When it encounters high temperature, it is prone to bulging, which leads to pores in the casting process and cracks.[8] Therefore, the construction workers of the project focus on controlling the temperature of the building concrete. (3) Timely testing of concrete. The

DOI: https://doi.org/10.30564/frae.v1i4.251

engineering technicians use the electronic thermometer to actively detect the temperature of the concrete on the concrete, so as to promote the smooth progress of the concrete pouring work.

6. Conclusion

In summary, in the construction project, it is crucial to strengthen the construction quality control of the reinforced concrete shear wall structure, which can continuously improve the overall quality of the construction project, conform to the construction safety principles, maintain the personal safety of the construction personnel, and create a standardized and safe construction engineering environment. Therefore, in the process of construction quality control of reinforced concrete shear wall structure, it is necessary to do a good job in preparation before construction, rationalize control of raw material quality and concrete ratio, correctly select construction technology, and carry out concrete pouring work, etc., thereby promoting the smooth construction of reinforced concrete shear wall structure.

References

[1] Haitao Zhang. Solution to the Super-strength of Reinforced Concrete Shear Wall Structure Coupling Beam[J]. Gansu Science and Technology, 2018,47(08):62-64. (in Chinese)

[2] Yuli Wang. Construction Technology of Frame Shear Wall Structure Engineering in Construction Engineering under New Situation[J]. House and Resident,2018(18):70. (in Chinese)

[3] Juan Li, Huqun Bai. Analysis on Construction Quality Control Technology and Key Points of Reinforced Concrete Shear Wall Structure[J]. Building Materials and Decoration, 2018(10):1-2. (in Chinese)

[4] Xiuli Cui, Guangzhou Li. Application of Frame Shear Wall Structure Construction Technology in Construction Engineering[J]. Building Materials and Decoration, 2018 (10):14-15. (in Chinese)

[5] Zuyi He, Bangxin Zhou, Xiankui Bai. On the Construction Technology of Frame Shear Wall Structure Engineering in Construction Engineering[J]. Building Materials and Decoration, 2017(14):33-34. (in Chinese)

[6] Jianye Wang. Discussion on the Design of Reinforced Concrete Shear Wall Structure for High-rise Buildings[J]. Engineering and Technological Research, 2017(03):223-224. (in Chinese)

[7] Aiping Fu. Construction Technology of Frame Shear Wall Structure in High-rise Building Engineering[J]. Urban Construction Theory Research (Electronic Edition), 2016(26):76-77. (in Chinese)

[8] Wenchao Zhang. Application Research of Frame Shear Wall Structure Construction Technology in Construction Engineering[J].China High-tech Enterprise, 2016(17):108-109. (in Chinese)

 DOI: https://doi.org/10.30564/frae.v1i4.251

Frontiers Research of Architecture and Engineering

Author Guidelines

I. Manuscript Format

- Manuscripts should be in MS Word format. Authors are advised to download the document, Manuscript Submission Template, as a template or for more details on preparing their submissions for consideration.
- Authors must ensure that the manuscripts are written in clear and comprehensible English. Manuscripts may be written in either American or British English. Non-English words usage must be kept to a minimum and the font must be italicized (except for e.g. and i.e.).
- Authors whose first language is not English may wish to have their manuscripts professionally edited before the final submission to ensure that the academic content of the paper is fully understood by its prospective readers.

II. Cover letter

All articles that are submitted should attach a cover letter as a separate file. Authors should note that the cover letter is an important document that would provide all the information about the novelty and importance of your findings. It also functions as a proof that the author has approved the submission of the article and that it has not been submitted to more than one journal simultaneously.

Please find the information below for the declarations section (to be included in the manuscript or cover letter).

Conflict of interests: Researcher A is an employee of XXX. Researcher B has received grants from XXX.

Informed consent: Written informed consent was obtained from all subjects prior to the study.

Ethical approval: The ethics committee of XXXX has approved this study (REC number: XXXX).

Trial registration: Name of trial registry (Trial Registration Number)

Contribution: Researchers A and B researched literature and conceived the study. Researcher A was involved in protocol development, gaining ethical approval, patient recruitment and data analysis. Researcher B wrote the first draft of the manuscript. All authors reviewed and edited the manuscript, and approved the final version of the manuscript.

A well-written cover letter would provide an opportunity to convince journal editors to consider the article for publication. The author's cover letters will only be read by the editors and will be kept strictly confidential. It will not be shared with the reviewers. Below is an example of the information that should ideally be included in your cover letter:

1. The relevance of the study and its relevance to the journal
2. The research question
3. Major experimental results and overall significant finding
4. Important conclusions that can be drawn from your research
5. A self-written statement that the manuscript has yet to be published in any other journal and is not under consideration for publication in any journal other than the Journal.
6. Any additional details that may encourage the editor to send your article for review.

III. Title

Authors should avoid the usage of excessive uncommon jargon that may affect the target audience's understanding. Avoid titles that are too long (less than 50 words). Spell out in full the first mention of any acronyms before using it throughout your article. Also avoid irony, puns or humour in the title as it tends to be culturally-specific; titles that may not be easily understood by non-native speaking readers may be deemed to be unsuitable for a broad audience.

IV. List of Authors

Authors' names should be spelled out fully instead of only listing their initials with their respective affiliations included in the footnotes. It must be ensured that the authors of a particular manuscript are listed based on the extent of their contribution and the major contributor should be listed first. Corresponding authors (maximum 2) must be identified with an asterisk. Affiliations should contain the following core information: department, institution, city, state, postal code, and country. Only include the email of one corresponding author for contact purposes in the manuscript. It is compulsory that all authors have viewed and approved the final version of the manuscript before submitting it via the system.

V. Abstract

Authors should include an abstract which is a concise summary of a research paper that is fully self-contained and makes sense by itself. It should be informative for the readers and include the research purpose and significant results achieved. Please note that

the abstract should be the range of 200-250 words, indented and single spaced. Ideally, an abstract should be the last thing that the author writes after completing his manuscript.
Authors should also include 5-8 keywords after the abstract and avoid using the words that have already been used in the title of the manuscript.

VI. Section Headings

Authors must ensure that all section headings, subheadings and sub-subheadings are differentiated by font size. The bold font must be used for the major headings and subheadings, and italic font must be used for the sub-subheadings in parenthesis.
Example:
Main Headings: **Bold,** font size 14
Headings: **Bold,** font size 12
Sub headings: **Bold and Italic,** font size 12
Sub-sub headings: Italic, font size 12

VII. Introduction

The introduction of the paper should start with an explanation of why a particular research is being conducted and conclude with the selected research approach. Authors must ensure that a non-technical reader would be able to understand the introduction, including the technical goals and objectives, any technical issues faced and its application in the real world. It would be beneficial for the readers if the authors provided a clear, one sentence purpose statement of the research. It would be advisable to keep the length of the introduction to approximately 1/2 page (1-2 paragraphs).

VIII. Materials and Methods

In this section, authors are required to provide a detailed account of the procedure that was followed while conducting the research described in the report. This will help the readers to obtain a clear understanding of the research and also allow them to replicate the study in the future. Authors should ensure that every method used is described and include citations for the procedures that have been described previously. Avoid any kind of discussion in this section regarding the methods or results of any kind.

IX. Ethics

Ethics information, including IACUC permit numbers and/or IRB name, if applicable. This information should be included in a subheading labeled "Ethics Statement" in the "Methods" section of your manuscript file, in as much detail as possible.

X. Results

This section can be divided into subheadings. This section focuses on the results of the experiments performed.

XI. Discussion

In this section, authors should state their interpretations and explain the implications of their results and make suggestions for future research. The discussion should be kept as short as possible while clearly and fully stating, supporting, explaining, and defending the author's answers and discussing other important and directly relevant issues. Authors should avoid discussing side issues as it may obscure the message.

XII. Conclusion

Authors should note that the conclusion is extremely important as it provides a closure for their paper. An effective conclusion would leave the reader feeling satisfied that the concepts have been fully explained. The conclusion should start with a clear and concise statement of principal findings. This would help to set the paper in the context of previous work as this shows the readers how significant or worthy the research is. Recommendations for further research can be included in this section. Please restrain from rewriting the abstract as the conclusion.

XIII. Funding

It is the authors' responsibility to declare all financial and non-financial support that may be considered as a source of competing interest in relation to their submitted manuscript in this section. Any grants, royalties, consulting fees are considered as financial supports and must be declared. Other forms of non-financial support that must also be declared are externally-supplied equipment/ biological sources, writing assistance, administrative support, contributions from non-authors etc.

XIV. Appendix

Any technical details that are necessary to include, but that interrupts the flow of the article, can be attached in the appendix section. Any appendices should be included at the end of the main text of the paper, after the acknowledgments section (if any) but

before the reference list. For supplementary figures, authors are advised to include it in the 'Supplementary figures' section.

XV. Text

The text of the manuscript should be in Microsoft Word or Latex. The length of the manuscript cannot be more than 50000 characters (inclusive of spaces) or approximately 7000 words.

XVI. Figures

Authors should include all figures into the manuscript and submit it as 1 file in the OJS system. Figures include photographs, scanned images, graphs, charts and schematic diagrams. Figures submitted should avoid unnecessary decorative effects (e.g. 3D graphs) as well as be minimally processed (e.g. changes in brightness and contrast applied uniformly for the entire figure). It should also be set against a white background.

Please remember to label all figures (e.g. axis etc.) and add in captions (below the figure) as required. These captions should be numbered (e.g. Figure 1, Figure 2, etc.) in boldface. All figures must have a brief title (also known as caption) that describes the entire figure without citing specific panels, followed by a legend describing each panel. Panels should be identified with uppercase letters in parenthesis (e.g. A, B, C, etc.)

The preferred file formats for any separately submitted figure(s) are TIFF or JPEG. All figures should be legible in print form and of optimal resolution. Optimal resolutions preferred are 300 dots per inch for RGB colored, 600 dots per inch for greyscale and 1200 dots per inch for line art. Although there are no file size limitation imposed, authors are highly encouraged to compress their figures to an ideal size without unduly affecting legibility and resolution of figures. This will also speed up the process of uploading in the submission system if necessary.

The Editor-in-Chief and Publisher reserve the right to request from author(s) the high-resolution files and unprocessed data and metadata files should the need arise at any point after manuscript submission for reasons such as production, evaluation or other purposes. The file name should allow for ease in identifying the associated manuscript submitted.

XVII. Tables, lists and equations

Tables, lists and equations must be submitted together with the manuscript. Likewise, lists and equations should be properly aligned and its meaning made clear to readers. Tables created using Microsoft Word's table function are preferred. Tables in the manuscript should be placed right after the paragraph in which it is first cited.

Tables should not be submitted in separate files. The tables should include a concise but sufficiently explanatory title at the top. Vertical lines should not be used to separate columns. Leave some extra space between the columns instead. All tables should be based on three horizontal lines to separate the caption, header and body. A few additional horizontal lines MAY be included as needed. Any explanations essential to the understanding of the table should be given in footnotes at the bottom of the table. SI units should be used if necessary.

XVIII. Supplementary Information

This section is optional and contains all materials and figures that have been excluded from the entire manuscript. This information is relevant to the manuscript but is non-essential to readers' understanding of the manuscript's main content. All supplementary information should be submitted as a separate file in Step 4 during submission. Please ensure the names of such files contain 'suppl.info'.

XIX. In-text citations

Reference citations in the text should be numbered consecutively in superscript square brackets.

Some examples:

- Negotiation research spans many disciplines[3,4].
- This result was later contradicted by Becker and Seligman[5].
- This effect has been widely studied[1-5,7].

Personal communications and unpublished works can only be used in the main text of the submission and are not to be placed in the Reference section. Authors are advised to limit such usage to the minimum. They should also be easily identifiable by stating the authors and year of such unpublished works or personal communications and the word 'Unpublished' in parenthesis, E.g. (Smith J, 2000, Unpublished).

XX. References

Click ***http://ojs.bilpublishing.com/index.php/jams/about/editorialTeam*** to view/download the complete Reference Guideline.

About the Publisher

Bilingual Publishing Co(BPC) is an international publisher of online, open access and scholarly peer-reviewed journals covering a wide range of academic disciplines including science, technology, medicine, engineering, education and social science. Reflecting the latest research from a broad sweep of subjects, our content is accessible worldwide – both in print and online.

BPC aims to provide an academic platform for academic exchange and cultural communication that help organizations and professionals in advancing society for the betterment of mankind. BPC hopes to be indexed by well-known databases in order to expand its scope to the science community, and eventually grow to be a reputable publisher recognized by scholars and researchers around the world.

BPC adopts the Open Journal Systems, see on ojs.bilpublishing.com

About the Open Journal Systems

Open Journal Systems (OJS) is sponsored by the Public Knowledge Project Organization from Columbia University in Canada, jointly developed by PKP, the Canadian Academic Publishing Center and Canada Simon Fraser University Library. OJS can realize the office automation of periodical editing process, station build and full-text journals by network publishing. The system design is in line with international standards, and supports peer review. It is very helpful to improve the citation rate, academic level and publication quality of periodicals.