Journal of Civil Engineering and Urban Planning (2022)
Clausius Scientific Press, Canada

DOI: 10.23977/jceup.2022.040103
ISSN 2616-3969 Vol. 4 Num. 1

Problems Existing in Urban Drainage Engineering Construction

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Keywords: Urban Drainage, Engineering Construction, Sewage Reuse, Pumping Station Construction

Abstract: As an important part of urban construction, municipal engineering mainly includes urban roads, sewage treatment systems, sewage treatment, and underground transportation. The purpose of this paper is to study the problems and suggestions in the construction of urban drainage engineering. Based on a comprehensive analysis and summary of the research progress of domestic and foreign experts and researchers in the drafting of the special design of sewage projects, the background and importance of the special design of urban sewage projects are introduced. Analyze, discuss and study key issues such as sewage volume prediction, and put forward targeted countermeasures and suggestions, providing reasonable reference opinions and suggestions for cities in M province when formulating specific design of sewage projects. Using planning, selection of urban sewer system, and prediction and collection of sewer points, through case analysis, the distance between rainwater pumping stations and buildings must be greater than 35 meters, in order to do urban sewer preparation work for corresponding industries with similar urban conditions , providing reports and references in special designs.

1. Introduction

With the rapid development of urban construction projects and the soaring increase in engineering quantity, the application of modern road drainage engineering construction technology is constantly updated. Urban road drainage project is a set of engineering facilities used to collect, transport, treat and dispose of various urban wastewater [1]. In order to meet the needs of urban construction and the development of modern cities, and to fulfill the government's commitment to people-oriented modernization of the people, the government promotes the construction of road drainage works and pipe networks influence [2].

Under the combination of the continuous development of road drainage pipe network technology and the penetration of various design technologies, road drainage pipe network engineering will

play a more important role in urban road drainage engineering, and its role will be more prominent, and it will undertake more comprehensive business [3]. Rokade VM performs drainage morphometric analysis by estimating linear aspects such as number of rivers, river sequence, river length, mean river length, river length ratio, bifurcation ratio, surface flow length, drainage pattern; aerial circulation ratio, elongation ratio, watershed Topography such as density, basin relief, relief ratio, relative relief, roughness and other terrains. Try to analyze the morphological parameters of the two sub-basins under different geological and geomorphological conditions [4]. Kuok K K integrates geospatial with IR4.0 on a global scale by combining SuperMap Geographic Information System (GIS) with InfoWorks Integrated Watershed Modeling (ICM) software for water level simulation. Physical data such as drainage pipe diameter and flow rate were initially input to SuperMap GIS. Thereafter, drainage information is imported into Infoworks ICM. The results show that Infoworks ICM can accurately simulate the water level in the drainage system. After the addition of a detention pond downstream, the water level of the drainage system dropped significantly [5]. Through the implementation and development of road drainage pipe network project, my country's current market and technology exchange value bureau will be completely changed, which will play an important role in my country's comprehensive arrangement of urban road construction strategies and long-term development prospects [6].

At present, there are few references to the relevant literature on the drafting of the special design and drafting of the sewer project in M province. Based on the current situation of urban sewer engineering in M province, this paper studies and analyzes the three. A collection of key issues raised by experts and researchers in the literature on urban sewage system selection, sewage volume forecasting, and stormwater use planning. Combined with examples, the theories and methods proposed in this paper are used to select drainage forecast indicators and analyze rainwater utilization planning, which provides scientific basis for the problems existing in the construction of urban drainage projects in the province. Provide urban reports and references for other similar projects in the country for areas with urban conditions.

2. Research on Problems Existing in Urban Drainage Engineering Construction

2.1. Urban Drainage Project

Any text or figures outside the aforementioned margins will not be printed. Urban drainage belongs to the category of urban water management. At present, the domestic academia has formed a relatively complete and unified definition of urban water. It refers to the development, utilization, management, distribution, conservation and protection of water resources in urbanized areas. The general term for water affairs involving flood control, water resources development, water supply, water delivery, water use, drainage, sewage treatment and reuse, and cross-regional water transfer [7-8].

Urban drainage engineering is an important part of urban water management. Drainage engineering is a project for timely and proper removal, treatment or utilization of various sewage and wastes continuously discharged from residences, factories and various public buildings [9-10].

2.2. Development Countermeasures for Drainage Engineering Construction

2.2.1. Clarify the Project Owner and Establish an Owner System that is in Line with International Practices

Reform the construction management mode of urban water supply and drainage projects, with the project legal person as the owner, and the owner chooses the appropriate construction management mode driven by interests. It is suggested that the existing system in which the municipal water engineering construction management center is subordinate to the municipal water affairs bureau should be changed, so that the municipal water affairs project construction management center should be changed. The Engineering Construction Management Center is independent of the Water Affairs Bureau, the administrative supervision department for water affairs construction, or the Municipal Water Affairs Engineering Construction Management Center is merged into the Urban Construction and Public Works Bureau. The second is to separate the construction management and relax the management of the personnel establishment and salary system of the Municipal Water Engineering Construction Management Center. It is allowed to hire experienced professionals to participate in project construction management through the market. Furthermore, a project construction management responsibility system and restraint mechanism should be established, and a system of authorized persons for water supply and drainage projects can be established. Finally, strengthen the use of legal and economic means to establish the mutual relationship between the water affairs bureau, the municipal water affairs project construction management center, the urban water affairs group company and the parties involved in the construction of urban water supply and drainage projects, so as to effectively ensure the use of funds and the quality of construction.

2.2.2. Reform the Preliminary Management Work Such as the Planning and Construction of Water Supply and Drainage Projects, and Scientifically Control

Reforming the preliminary management of the planning and construction of urban water supply and drainage projects. First, strengthen the preliminary demonstration of urban water supply and drainage engineering construction, emphasizing the scientific nature and seriousness of government investment. Second, strengthen the review of urban water supply and drainage engineering construction funds. It is recommended to use the national treasury centralized payment.

2.2.3. Improve Water Source Construction and Water Pollution Prevention and Control Path Methods

Carry out comprehensive and in-depth technical and economic analysis and demonstration, and select economically feasible water source construction and water pollution prevention and control methods. For example, City L can combine the low cost of seawater in coastal cities and use seawater as water for toilet flushing, firefighting and industrial use in order to save water. Taking advantage of the geographical environment of many deep seas and bays, vigorously construct bay reservoirs and water collecting ditches, which not only increases the water collecting area, but also can store a large number of water sources and rain and floods transferred from abroad. Taking advantage of the characteristics of being surrounded by the sea, the sewage is initially treated and then discharged into the deep sea, giving full play to the dissolution and dilution function of seawater, which greatly reduces the treatment cost and operating cost, which not only meets the environmental protection standards but also is economically feasible. Conduct research to explore the feasibility of implementing similar programs, and strengthen water source construction and water pollution prevention and control.

3. Investigation and Research on Problems Existing in Urban Drainage Engineering

Construction

3.1. The Current Situation of the Quality of Drainage Facilities in M City

The discharge rate of industrial wastewater in City M is 90%. Part of the domestic sewage is directly discharged without treatment. The sewage in the upper reaches of the river is still directly discharged into the river, and the phenomenon of river pollution still exists. The utilization rate of urban sewage treatment plants is not high due to the small laying of the pipe network. At present, there is a Chengdong sewage treatment plant with a scale of 120,000 tons/d, but the average daily water inflow is less than 80,000 tons. A bridgehead sewage with a design scale of 50,000 tons/d in the near future and 120,000 tons/d in the long-term The current water intake of the lifting pump station is only 51,800 tons/d. Sewage collection rates are seriously insufficient. In the drainage system of the main urban area, the confluence system is dominant, resulting in a long-term low concentration of influent water from the sewage plant and poor biodegradability.

With the construction of roads, rainwater and sewage in the main urban area will be gradually diverted.

In Zhengdong New District, the main sewage interception pipes with a diameter of d600~d1600 are laid along the Jingshui River, estarting from Ruyi Avenue, and crossing the Jingshui River at Ruyi Park to transport the intercepted sewage to the Dongyi Sewage Treatment Plant.

There is a sewage pipeline along the B river, with a diameter of d900~d1200, which is connected to the C river interception pipe.

There are also interception pipes along both sides of the D River, and the sewage is intercepted to the C river interception trunk pipe.

A combined sewage control and interception canal has been built on the north bank of Guannan District, and the main canal is about 5km long. Later, a d800 sewage pipe was added in parallel with the channel to separately intercept the municipal sewage along the Jialv River, and the original drainage channel was used as a special drainage channel for Xincheng.

3.2. Current Problems of Drainage Facilities in M City

The current drainage treatment facilities in M City mainly have the following problems:

(1) The construction of drainage facilities is insufficient, resulting in an imperfect drainage system and the capacity of drainage facilities cannot meet the design requirements.

(2) The rain and sewage are combined and discharged directly. There are many outlets and scattered points. They are discharged into the two water systems of Kongmu River and Yuan River nearby. The water pollution is serious and affects the health of urban residents.

(3) The construction of the drainage pipe network is slow. Many roads that have been constructed have no rainwater and sewage collection pipes. The sewage treatment plant cannot reach the design scale, and the sewage treatment rate is low.

(4) In the drainage system of the main urban area, the confluence system is dominant, resulting in a long-term low concentration of the influent of the sewage plant and poor biodegradability.

(5) Erma Road, Yima Road, and the vicinity of the railway station in the main urban area are seriously flooded and need to be renovated urgently.

(6) Some newly planned roads have no design elevation, and the drainage planning can only be designed according to the current elevation.

(7) The diameter of the drainage pipes in some road sections is too small, which causes the flooding of rain and sewage, which has a bad impact on the environment.

3.3. Hydraulic Calculation

The calculation formula for the design flow of the sewage main pipe of the split drainage system:

$$Q_{max} = Q_z \times K_z \quad (1)$$

In the formula: Qmax—design flow rate of main sewage pipe (L/s);
Qz—average daily average hourly integrated sewage flow (L/s);
Kz—the total variation coefficient of sewage volume.
Drainage pipeline hydraulic calculation:

$$V = \frac{1}{n} R^{\frac{2}{3}} I^{\frac{1}{2}} \quad (2)$$

In the formula: V—flow velocity (m/s);
R—hydraulic radius (m);
I—hydraulic slope;
n—pipe roughness coefficient, take 0.009~0.010.

4. Analysis and Research on Problems Existing in Urban Drainage Engineering Construction

4.1. Planning of Reclaimed Water Utilization

Table 1: Number of sewage system works.

Serial number	Project	Specification	Unit	Amount of work	Remark
1	HDPE double wall corrugated pipe	d500	m	5582	New
2	HDPE double wall corrugated pipe	d800	m	4687	New
3	HDPE double wall corrugated pipe	d400	m	6921	New
4	HDPE double wall corrugated pipe	d600	m	8452	New

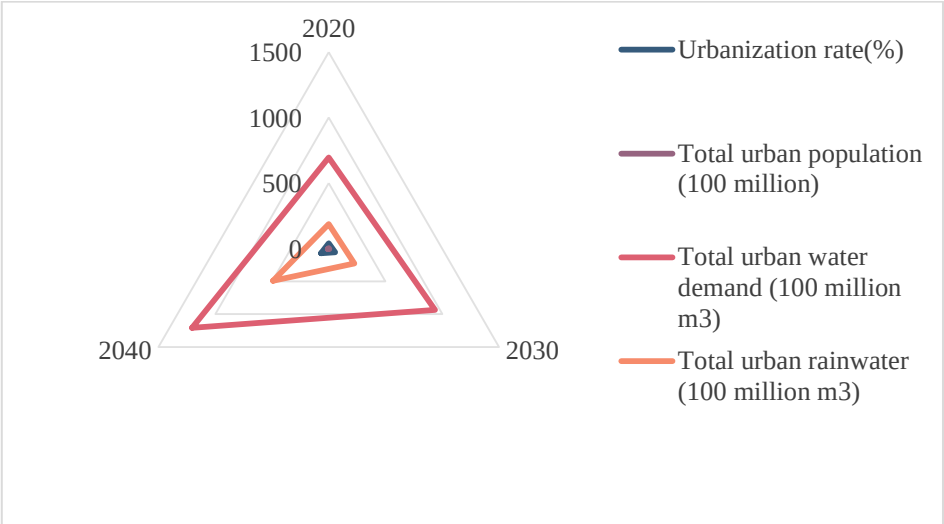

Figure 1: Urbanization process and its partial water volume forecast.

As far as the current prospect of wastewater reuse is concerned, due to the abundant water resources in M city, no large-scale wastewater reuse users have been found so far. Therefore, this

design only considers the planned reuse land for advanced treatment of the sewage treatment plant, and the scale is controlled at 25% of the long-term scale of the sewage treatment plant.

Zhengdong New District has recently completed the renovation of the old pipelines on the existing roads that do not meet the planned flow and elevation requirements, and laid sewage pipes on the completed roads without sewage pipes. Because the main urban areas within the planning scope are basically old areas, the focus of recent planning projects is to transform and improve the sewage pipeline system.

4.2. Sub-Subsection Titles Planning of Rainwater Pipes and Canals and Construction of Drainage Pumping Stations

Urban stormwater pipes are designed to be placed along the road, parallel to the main line, and as far as possible under the sidewalk, green belt or slow lane. Roads with a width of more than 45 meters are laid on both sides of the road. Generally, there is no hidden rainwater pipe about 80 meters from the beginning of the rainwater main pipe, making full use of the drainage capacity of the roadside ditches.

According to the layout of the rainwater system in City M and the hydraulic calculation results of the urban rainwater pipes and canals, determine the location and scale of the rainwater drainage pumping station. It is planned to retain the existing rainwater pumping station, scientifically calculate its drainage power according to the drainage area of the rainwater pumping station, rebuild and expand the drainage pumping station, improve the facilities of the drainage station, and improve the drainage capacity. The planning land for the rainwater pumping station considers the surrounding environmental conditions to determine the land area of each pumping station. The planned rainwater pumping station should be set at a distance of more than 35 meters from residential and public buildings.

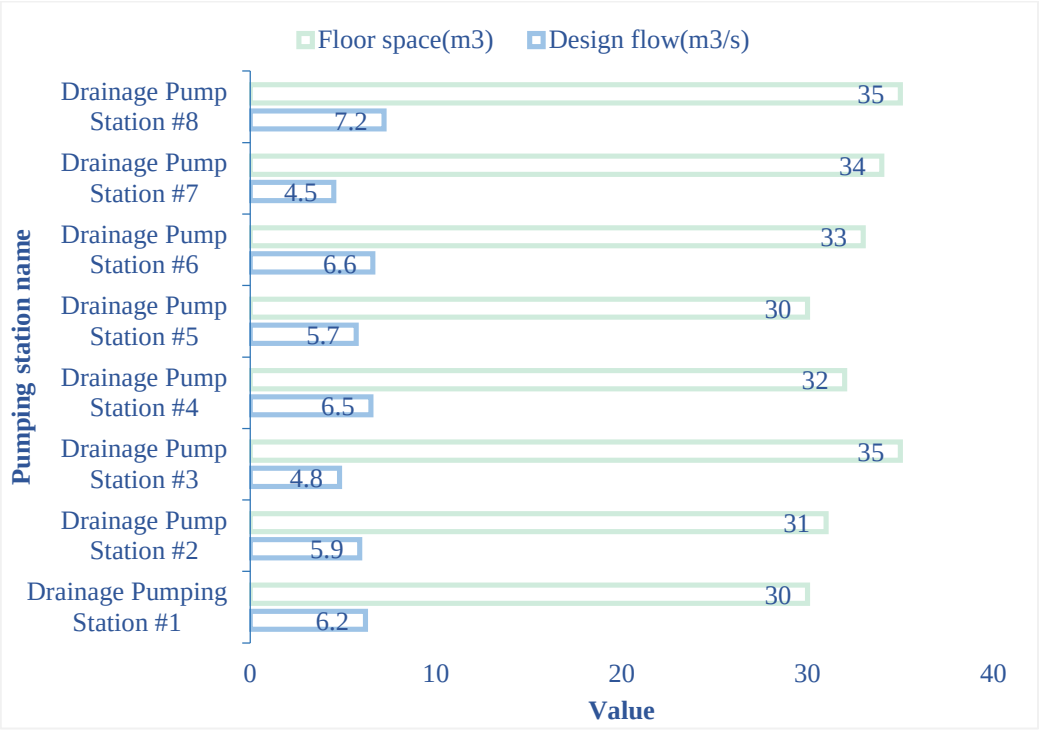

Figure 2: Relevant situation of planning rainwater pumping station and drainage pumping station.

5. Conclusions

The continuous development of the city makes the scale of the underground pipe network system continue to expand. The underground drainage pipeline is an important infrastructure for the treatment of rainwater and sewage, like the "blood vessel" of the city, which operates day and night to ensure the stability of citizens' lives. With the continuous acceleration of the urbanization process in my country, the requirements for the construction of municipal infrastructure such as urban pipeline networks are constantly increasing. This paper introduces the importance and technical orientation of urban drainage engineering construction, discusses the differences in the design and drafting of urban drainage engineering construction at home and abroad, as well as the hotspots in the drafting of urban drainage engineering construction in the new period, and summarizes the selection of urban drainage treatment systems, the amount of sewage treatment The forecasting and planning of rainwater utilization are the three main issues in the drafting of special drainage design. Finally, the theories and methods proposed in this paper are analyzed with examples, and reasonable reference suggestions are put forward for the construction planning of urban drainage engineering in M province.

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