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UNDERSTANDING THE HYDRAULIC STATE AND DRAINAGE CAPACITY OF A STORMWATER SYSTEM THROUGH MODELLING

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EXTENDED SUMMARY

With the process of urbanization in Beijing, political and economic status of the population has improved. In order to ensure the safety of the city, people, and property, the importance of urban stormwater system has become gradually more evident. In recent years, due to global climate change, urban heat island effects, local climate change and other reasons, both the intensity and frequency of extreme rainfall have increased significantly in Beijing. For example, the heavy rain on 23 June 2011 and 21 July 2012 resulted in many areas being seriously flooded, and the road was blocked, resulting in a large loss that had a negative impact on urban security and development (Xiyan et al, 2012).

Through learning from developed countries' storm drainage systems as well as those of major cities (New York, Paris, London, Tokyo), we consider that these cities have more adequate planning systems and legislation. These are typically well suited to the local conditions and help control urban waterlogging disasters and urban water pollution prevention.

Lianhua Bridge is located in the Fengtai District, Beijing. It is a sunken overpass under West Third Ring, and it crosses Lianhua Pond Road and Beijing West Railway Station Railway. The West Third Ring Road and Lianhua Pond Road are urban expressways. The sunken length of road is about 1100m.

The Beijing Municipal Commission of Urban Planning led the Beijing Urban Planning and Design Institute, the Beijing Municipal Engineering Design and Research Institute, Beijing University of Technology, Beijing Water Resources Planning and Design Institute and others to propose measures to guide the project design and implementation.

Based on features of the Lianhua Bridge basin, in order to ensure the plan is feasible, Beijing took the following measures (related investments are given in Table 1):

1. Through the construction of regulation pools upstream to improve the capacity of the new underground drain drainage, solving the problem of backwater in the new underground drain flooded pipe.

2. A newly built drainage pump station at Lianhua Park, which discharges rainwater into the Lianhuachi pool.

3. Since a large amount of external rainwater flows into the sunken area bridge, improve the drainage capacity of high pipes that surround Lianhua Bridge, re-design the pipes within the West Third Ring Road and Lianhuachi East Road (shown in Figure 1) and appropriately raise the elevation of critical points, to minimize the external rainwater flow into the bridge area.

4. Due to lack of drainage capacity, increase the number of gullies and transform the small diameter pipes to improve the drainage capacity, building new regulation pools in the green land of sunken areas.

Due to the process of urbanization, urban surface is changed; stormwater drainage ways and flow status also is changed. The vast majority of people and property are congregated in urban areas, so if the city flood occurs in extreme weather, it may cause huge losses to society and people's lives and property. We can predict flood disaster and provide technical support by flood modelling.

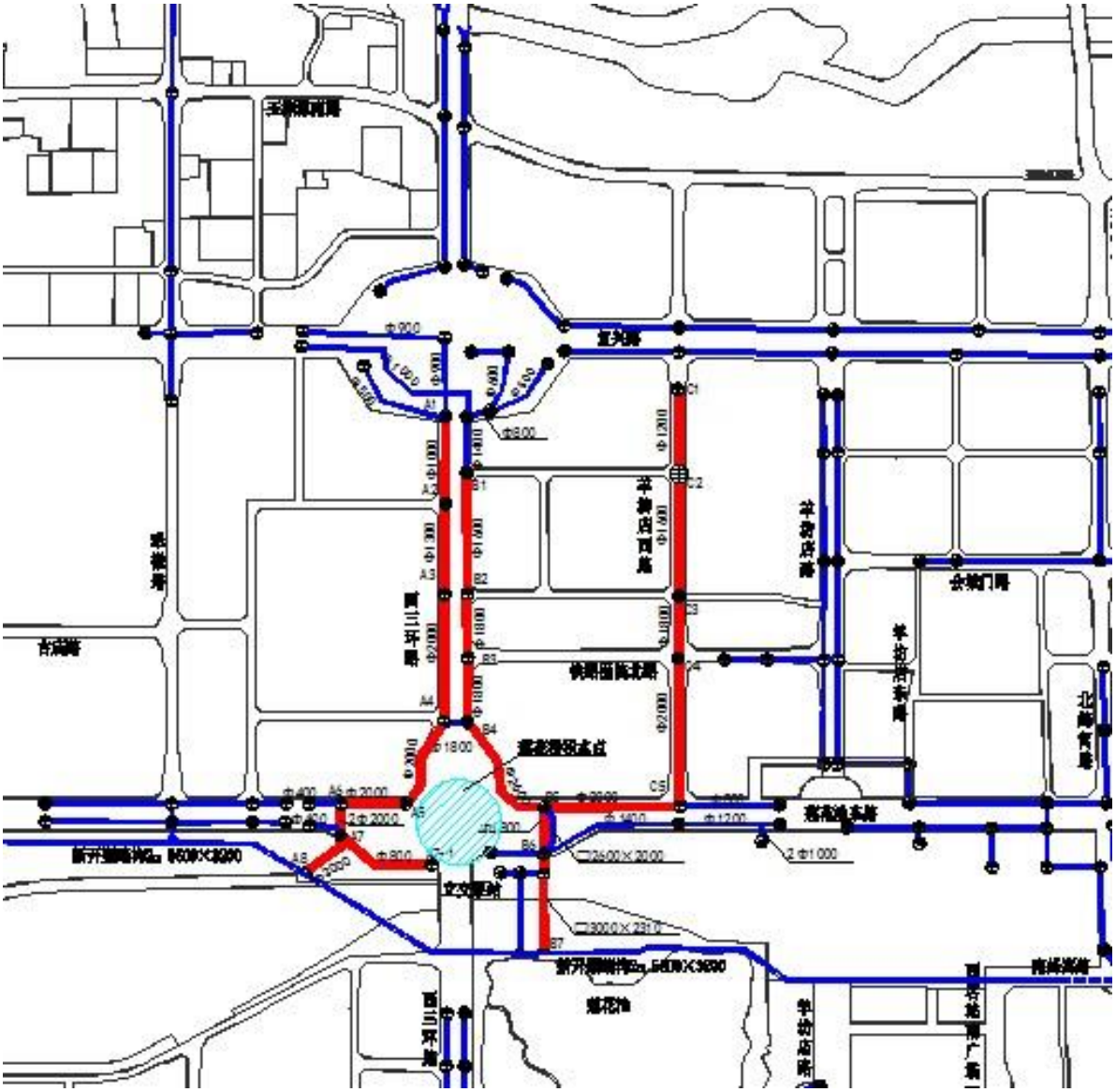

Figure 1. Re-designed pipes (shown in red)

Table 1 project amount and investment estimation

project	Structure	Investment（CNY）
storage project upstream of new canals	1 building	103 million
high pipe system	4070meter	65.1 million
low pipe system	470meter	3.52 million
Regulation Pool	12000m3	33.6 million
total		1.13222 billion

REFERENCES

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