Urban Roads Bridges & Flood Control

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# 城市道桥与防洪

主管：中华人民共和国住房和城乡建设部

主办：上海市政工程设计研究总院(集团)有限公司

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图为上海奉贤建设发展集团市政公路工程有限公司施工建设的上海奉贤生活垃圾末端处置中心工程

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## 本期看点



中华人民共和国住房和城乡建设部优秀期刊

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## 封面介绍

本期封面工程为上海奉贤生活垃圾末端处置中心工程,由上海奉贤建设发展集团市政公路工程有限公司施工建设。

上海奉贤生活垃圾末端处置中心工程坐落于上海市奉贤区柘林镇楚华地块。项目占地面积为52 381 $m^2$,垃圾日处理能力1 000 t,垃圾年处理能力33.3万 t。项目总建筑面积28 561.3 $m^2$,其中主厂房25 424 $m^2$,综合楼1 313 $m^2$。设置2台往复式机械炉排炉,单台焚烧炉处理能力500 t/d;设置1台18 MW凝汽式汽轮机和1台20 MW发电机。该项目是一座用于废弃物焚烧的现代化垃圾处理中心,将生活垃圾转化为电能。每天大约近千吨垃圾被运往这里,年焚烧处理生活垃圾达33万 t,可节约土地2.75万 $m^2$,相当于节约4个标准足球场,年发电上网电量约0.7亿度,可供5万户家庭一年用电,相当于节约2.28万 t 煤炭资源。

该工程于2014年6月1日开工建设,2016年3月31日竣工。工程被评为2015年上海市重大工程文明示范工地和2017年上海市市政金奖。

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# CONTENTS

## ROADS & COMMUNICATION



**Abstract:** With the speedup of urbanization process, the traffic problems are becoming more and more serious in the urban area of city, and the construction of expressway is becoming the important demand of perfecting the urban infrastructure. The article analyzes and introduces the Hohhot Ring III Expressway from the functional orientation, building traffic system, overall traffic organization and engineering design, innovatively puts forward the application of design idea of sharing the urban utility tunnel into the selection of line location, and points out that the attention should be paid to the construction of urban traffic system to study the preconditioning of overall design of expressway and to the study on the design of road traffic organization from the aspects of traffic levels, traffic conversion and road network coordination in order to provide the reference for the planning and design of urban expressways.

**Keywords:** expressway, traffic system, sharing of utility tunnel, coordination of road network



**Abstract:** The East of City – North Peak Fast Channel as the important component of the " 田 –shaped skeleton" north radiation line in Quanzhou is the main channel of connecting the East China Sea – East of City – North Peak, and is also the traffic link corridor of the north ring line in the city area of Quanzhou. The article introduces the construction conditions of this project. The main transit traffic in the north of city mainly passes Shaolin Road and Donghu Street now, and the traffic volume is oversaturated. But the lands at the both sides have been formed, and the reconstruction and widening conditions are insufficient. It is urgently to need a new channel for replacement in order to optimize the structure of road network and to upgrade the operation efficiency of road network. The article sets forth the overall design scheme of this project including the construction background, construction necessity, main technical standards, interchange node design, cross section, road engineering and bridge tunnel engineering.

**Abstract:** Due to various reasons, many cities in China have accumulated a large number of deformed grade intersections, which have seriously affected the road capacity and safety. Therefore, the reconstruction of deformed intersections also becomes one of the important contents in the present municipal road projects. This article expounds the classification, existing problems and reconstruction ideas of urban road deformed intersections, and introduces the practical tests on the basis of specific projects. The good achieved effects can be referred for the design of the similar projects.

**Keywords:** urban road, deformity, grade intersection, reconstruction



**Abstract:** Aiming at the difference of highway and urban road in the technical standards and design standards of the specifications, the article compares the key technical indicators between highway interchange and urban road interchange in detail from the horizontal and longitudinal alignments of the main line, the horizontal and longitudinal alignments of ramp, and the cross sections of ramp, points out the causes of the difference between the both, analyzes the imperfect or unreasonable regulations, and puts forward the reference suggestions.

**Keywords:** highway interchange, urban road interchange, technical indicator, horizontal, longitudinal and transversal design, interconnecting pieces



**Abstract:** The interchange intersected with expressway and urban road is a difficulty in the design of interchange. Based on the scheme design of Kunming Lianda Interchange, this paper completely considers the influences of planning roads, surrounding community architecture, planning land situation, land occupation size, toll station layout and engineering cost in the design of interchange, and puts forward five design schemes. After fully comparison of five schemes, the final design scheme is achieved.

**Keywords:** interchange, urban road, interchange, design scheme



**Abstract:** In order to guarantee the normal operation of railway passenger terminal, the article studies the organization optimization of the road traffic flow surrounding the railway passenger terminal. This study

**Abstract:** Taking the Zibo City Century Road Reconstruction Project as an example, the article analyzes and studies the structure methods of old pavement disease treatment, reflection crack prevention and asphalt concrete overlaying layer in the reconstruction process of old cement concrete pavement overlaying the asphalt concrete reinforced layer.

**Keywords:** old cement concrete pavement, asphalt concrete overlaying layer, disease treatment, reflection crack prevention



**Abstract:** With the fast development of highway construction in China, the disease problems of road are growing. The crack is one of the most common harms in the road disease, and seriously damages the road safety. The article concludes and analyzes the common crack harms and causes of cement concrete pavement and asphalt pavement, and summarizes the preventive and treatment measures taken for the different cracks.

**Keywords:** road disease, cement concrete pavement, asphalt pavement, crack harm, preventive measures

## BRIDGES & STRUCTURES



**Abstract:** Nijiang Lake Bridge is a landscape bridge in Lake Road of East West Lake District in Wuhan, spans the branch of Jinyin Lake, and is a three-span through bowstring compound steel-arch concrete-beam composite bridge. Its total length is 167.24 m and its span layout is 31 m+90 m+31 m. Its main arch is extroversive, and its sub arch is introversive. The steel box is used for the main arch and sub arch. The main beam is a pre-stressed concrete box beam. The bridge deck is widening. The bridge width at the abutment is 43.492 m. The maximum width of bridge in the spans is 54.5 m. This bridge is the symbolic landscape bridge in East West Lake District of Wuhan.

**Keywords:** landscape bridge, arch beam composite bridge, suspender, steel arch, concrete box beam



**Abstract:** Sichuan Province Bazhong City Huahu Lake Bridge No.1 is a 180 m span deck steel reinforced concrete box arch bridge. The arching technology of the main arch ring is designed on the arch bridge with

## FLOOD CONTROL & DRAINAGE

## MANAGEMENT & CONSTRUCITON

**Abstract:** In the construction of steel box girder of elevated bridge, the bracket slipping construction technique is a common construction technique. Combined with a bridge engineering case, and aiming at the practical situation of this project in the selection of the bracket slipping construction technique, the article introduces the support and adjustment, slip track technique, construction traction system and hydraulic system in the slipping system in detail. And the article introduces the construction essentials of this bracket slipping construction technique, such as assembly of steel box girder, control of elevation, transversal and longitudinal slip reversing, adjustment of slip to place and unloading in order to provide the reference for the construction of the similar projects.

**Keywords:** elevated bridge, steel box girder, bracket slipping, construction technique



**Abstract:** Taking the mass concrete of pylon base slab of a cable-stayed bridge as the engineering background, the article studies and discusses the temperature field and stress field distribution of base slab structure in the hydration heat stage of mass concrete through the numerical simulation analysis. The study results show that the temperature variation in the hydration heat stage of mass concrete is very obvious, the temperature difference between the inside and outside of ordinary Portland cement concrete will be maximum after 4 d pouring and soon afterwards go down steadily, and the temperature difference between the inside and outside of low-heat cement concrete will be maximum after 8 d concrete pouring. The cement and fly ash contents of concrete will most obviously affect the heating effect. The higher is the cement content, and the lower is the fly ash content. The more obvious is the heating effect, the larger is the temperature difference between the inside and outside. In comparison, the maximum temperature rise, inside and outside temperature difference, and the concrete surface temperature are lower than the ordinary Portland cement under the same grading and layering pouring mode. The stress variation in the concrete hydration heating stage is extremely obvious. The maximum tension stress of ordinary Portland cement concrete will reach the peak value after 3~4 d concrete pouring. And the low heat cement concrete will reach the peak value after 7 d pouring. The concentration phenomenon of tension stress is very obvious within the chamfer of base slab and at the open space of cold water pipe, and very easily exceeds the permitted tension stress so as to cause the surface cracks. The cracks can be effectively prevented by the on-site optimization of concrete mixing proportion, control of concrete casting temperature, increment of surface concrete insulation measure, control of concrete pouring interval and layer thickness, adjustment of water running time, control of influent flow and temperature, and delay of curing time with water.

**Keywords:** cable-stayed bridge, base slab, mass concrete, hydration heat, crack control



**Abstract:** The steel reinforced concrete truss arch bridge was widely used in 70s and 80s twentieth century because of its low cost, convenient construction and other advantages. At present, all these bridges have the different degrees of diseases. Based on the background of structure status detection and maintenance reinforcement project of a truss arch bridge, the article sets forth the main contents and process of the structure status assessment of bridge. According to the actual disease situation of bridge structure and the assessment result of carrying capacity, the article makes clearly the target of maintenance reinforcement and the structural stress requirements in the reinforcement process, and puts forward the targeted reinforcement scheme, which can be referred for the structure status assessment and the maintenance reinforcement design of the similar bridges.

**Keywords:** truss arch bridge, detection, structural assessment, carrying capacity, maintenance, reinforcement



**Abstract:** The durability of concrete means the use performance and appearance integrity kept well for a long time to resist various environmental mediums and external destroying factors under the condition of normal service so as to maintain the safety of concrete structure and the capacity of its normal service. There are many factors influencing the durability of concrete. The different environmental mediums and external factors have the different damages to concrete. The article analyzes the factors of concrete freeze thawing, carbonization and steel bar corrosion to influence the durability of concrete, and briefly introduces the control of key links in construction.

**Keywords:** concrete, durability, factors, construction, links, measures



**Abstract:** Nanjing Metro Line 3 Xinzhuang Station to Jimingsi Station passes through Xuanwu Lake. The strata of the lake where the shield is located are mainly silty clay, silty clay with gravel cobble and strongly weathered hornstone mudstone. This stratum is soft upper and hard lower. Its self-stability is poor and permeability is strong. There is a high risk of shield construction. This paper introduces the application of

## STUDY ON SCIENCE & TECHNOLOGY

## APPLICATION OF ACHIEVEMENTS

**Abstract:**According to the finite element numerical simulation and the site static and dynamic test of a pre-stressed concrete hollow slab bridge reinforced by a CFRP reinforcement method, the article compares and analyzes the changing situation of the deflections, stresses and dynamic characteristics of the main girder before and after the reinforcement of this bridge to evaluate the reinforcement effect of the CFRP reinforcement method in the field of bridge reinforcement on this account. The study result shows that the tensile property of girder bottom and the bearing capacity of bridge are improved to a larger extent after the reinforcement of pre-stressed concrete hollow slab bridge by CFRP reinforcement method than before the reinforcement. It is explained that this reinforcement method has the good reinforcement effect.

**Keywords:** CFRP reinforcement method, finite element analysis, loading experiment, reinforcement effect



**Abstract:** With the rapid development of transportation, the phenomenon of pot hole, frost boiling, subsidence, rut and so on occur in the most roads of Shanghai Section of G15 Shenyang – Haikou Expressway under the action of heavy duty traffic, which will seriously influence the traffic safety of vehicles. In order to improve the service level of road, to eliminate the hidden danger of traffic safety and to ensure the good road appearance and road condition, Shanghai Road Administration Bureau started the pavement overhaul of Shanghai Section (Songpu Bridge II – S4 Xinzhuang – Fengxian – Jinshan Expressway) in G15 Shenyang – Haikou Expressway in 2017. The modified asphalt of heavy duty traffic is used as the asphalt surface mixture of this overhaul. This modified asphalt has the good properties of rutting resistance and fatigue resistance, and good durability. This modified asphalt has the important application and promotion significance in the new construction or overhaul of heavy-duty traffic road, port, wharf and so on.

**Keywords:** modified asphalt of heavy duty traffic, rutting resistance, pavement overhaul



**Abstract:** In the municipal road projects, various traditional manholes have the phenomena of manhole crib sinking, pavement cracking and manhole cover upheaval under the vehicle load and rainwater impact, which serious influence the comfort and safety of driving. The maintenance of the traditional manhole crib needs the concrete to pour and fix the manhole crib with a long construction period. The "adjustable fiver-preventive

## THE RELATIVE SPECIALITIES

measurement, high efficiency, plentiful information and etc., and is playing an increasingly important role in digital city construction. Taking a building as a research object, this paper puts forward a method of building 3D model reconstruction based on UAV images. Firstly, the UAV is used to shoot the roof and wall of the building, the image matching is performed to generate the dense point cloud, and then the scanner is used to scan the wall that UAV is hard to shoot. And the scanning point cloud and image generation point cloud are rectified. After preprocessing of point cloud, the triangle network is built, the refined model is built by 3D Max, and the quality of model is assessed. The result shows that this method can achieve the refined 3D model of building.

**Keywords:** UAV, image matching, 3D modeling, accuracy assessment



**Abstract:** According to the introduction of bridge design and analysis of engineering cost of Qujiang Avenue Jiangwan Bridge, the article puts forward the problems existing in the engineering cost control and management of bridge, and the strategies for strengthening the management. The whole process of cost control is completed, the pre-control work is good, the errors are rectified in time in the process of project implementation, and the engineering quality is effectively controlled at the same time to reduce the engineering cost so as to improve the economic benefit and social benefit of the bridge engineering.

**Keywords:** Jiangwan Bridge, overall design, cost analysis, cost control



**Abstract:** The budget estimate making quality of metro engineering has the larger influence on the engineering investment. Therefore, to control engineering investment needs to upgrade the budget estimate making quality. Firstly it is required to clarify the significance of investment forms of metro engineering on upgrading the budget estimate making quality of design, the details for attention and process control in the budget estimate making of the project in order to find the effective method to reasonably control the investment. The article discusses the application of this method in the practical budget estimate making.

**Keywords:** metro engineering, preliminary design, process control



**Abstract:** At present, the common pricing manners of China are mainly the quota pricing and list pricing, in which the list pricing is also called comprehensive unit price method. The comprehensive unit price only

includes the prices of labor, material and machine, the management fee, profit and risk cost. The stipulated fees and taxes are the non-competitive costs. There is still trace of the planned economy age, which does not conform to the future development trend. The total cost unit price commonly adopted internationally now includes the prices of labor, material and machine, measure cost, management fee, profit, taxes and fees, does not list other any charges except the risk cost of material price difference, more obviously conforms to the present market economy, and is the development trend of the future pricing manner of China.

**Keywords:** total cost unit price method, comprehensive unit price method, quota pricing method

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