Urban Roads Bridges & Flood Control

城市道桥与防洪

主管：中华人民共和国住房和城乡建设部
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图为西安市政设计研究院有限公司设计的西安市后围寨立交工程

因为我们专心，所以我们专业！

——《城市道桥与防洪》

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● 本期看点

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总 编 辑：骆燕妮
责任编辑：叶 露 赵晓燕
美术编辑：杨建华
英文校审：孙宁萍
地址：上海市中山北二路 901 号 邮编：200092
电话：(021)55008850 传真：(021)55008850
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广告索引

封面工程

本期封面工程为西安市后围寨立交工程,由西安市政设计研究院有限公司设计。

西安市后围寨互通式立交地处西安市后围寨,位于三桥新街、世纪大道、天台路、尚航路、西安高架快速干道、西宝高速引道等 6 条道路的交叉口处,是西安主城区与沣东新城及对外交通联系的重要交通枢纽。

该立交工程跨越陇海铁路、西成高铁等多条铁路,采用大跨径顶推施工方法跨越。

该立交总体布局为三层苜蓿叶互通式立交。立交南北长约 2.1 km,东西长约 1.7 km。立交设置 3 条主线及 9 条匝道。立交总占地面积约 66.7 hm^2,桥梁总面积约 90 000 m^2,总投资约 8.1 亿元。

南北向尚航路为立交主线,位于第三层,道路红线宽 60 m,双向 8 车道;东西向高架快速干道为立交主线,位于第二层,双向 4~6 车道;东西向三桥新街位于地面一层,道路红线宽 80~100 m,双向 10 车道。尚航路南北主线跨越陇海铁路(西城高铁等),两侧辅道以箱涵形式下穿铁路。

该立交于 2017 年建成,目前为西北地区最大的城市立交。

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CONTENTS

ROADS & COMMUNICATION

Abstract: The plane, vertical section and cross section involved in the geometric design of urban road intersection, and the continuous surface of intersected roads are analyzed in detail, and the influence of the vehicle turn mode within intersection on the geometric design is set forth. The proposed values are given for some parameters. The deficiencies in the specification are supplemented. The complete geometric safety design technology of urban road intersection is proposed.

Keywords: urban road, grade intersection, geometric design, safety

Abstract: The article sets forth the design principle of highway grade crossing, analyzes the problems of no way right distribution of crossing, improper layout of turning lane, and improper design of crossing channelization existing in the design of highway grade crossing now, and puts forward some issues for attention in the design of highway grade crossing by the engineering practices.

Keywords: highway engineering, design of grade crossing, distribution of road right, layout of turning lane, traffic island

Abstract: The road intersection is the node in the urban road network. The reasonable intersection arrangement and the appropriate traffic channelization not only affect the smooth flow of urban traffic, but also are closely related to the road traffic safety. Taking the reconstruction of a Y-type intersection reserved in the city development as an example, this paper analyzes the design scheme of intersection channelization, and simulates and analyzes the traffic status of intersection through the forecast result of traffic flow in order to provide the basis for the selection of schemes.

Keywords: Y-type intersection, forecast of traffic flow, traffic simulation, reconstruction

Abstract: This paper sets forth the relationship of road planning and road design in small and medium-sized cities from two aspects of the relation and difference of road planning and road design, analyzes the problems

BRIDGES & STRUCTURES

Abstract: The curved girder bridge is an important bridge type in modern transportation. The coupled effect of bending and torsion caused by its plane irregularity makes the seismic response of curved girder bridge more complicated. The environment at the structure of concrete curved girder bridge in the freeze-thaw area of the western is very bad. The bridge not only bears the freeze-thaw cycle, but also suffers from the erosion of chloride ions, which lead to the durability damage of the existing bridge structure, and cause the seismic performance degradation of the existing bridge structure. Aiming at the complexity of bending and torsion coupled stress of curved girder bridge, the dynamic control differential equation of isolated curved girder bridge under earthquake is established, and the reasonable elastic modulus degradation model under the freeze-thaw environment is selected to analyze the seismic performance of the isolated curved beam bridge. The analysis results show that the dynamic response value of the curved girder bridge not only pier-top displacement but also acceleration will increase with the increase of the freeze-thaw cycle times, and the corresponding seismic performance will decrease under the action of earthquake.

Keywords: curved girder bridge, freeze-thaw environment, seismic behavior

Abstract: The main bridge of Yellow River Bridge in Binhe of Yinchuan is a three-pylon double-plane composite beam self-anchorage suspension bridge. Its span layout is 88 m+218 m+218 m+88 m. The bridge site is at the seismic basic intensity of VIII degrees. The basic seismic oscillation peak ground acceleration is designed by 0.26 g. In order to solve the too big responses of middle pylon and side pylon, it is required to select the reasonable vertical and horizontal structural system. Therefore, the reasonable connection method of pylon, beam and pier of the three-pylon self-anchorage suspension bridge is studied. The mechanical property of the structure is analyzed vertically aiming at the float, pylon beam fixed constraint, elastic cable constraint and damping system, and compared and analyzed horizontally aiming at the fixed constraint and damping system. After the comprehensive comparison and selection, the middle pylon is vertically installed with the viscous damper and the rest pylon piers are vertically free, and the double-way damping system of metal damper is set up at every pylon pier horizontally, which can effectively control the static and dynamic responses of the structure.

Keywords: self-anchorage suspension bridge, three-pylon, composite beam, structural system, damper

Abstract: This bridge is located in Shenma Road of Pingdingshan City and crosses Zhan River. Its main bridge is a pre-stressed concrete continuous girder bridge with corrugated steel webs. Its span layout is 52 m+ 85 m+52 m, and its deck width is 40 m. The article introduces the engineering situation, the structural design

Abstract: In recent years, the economy has been developing rapidly and the process of modern city construction is getting faster and faster in China. The tall buildings rise and the people are such as weaving in city. There are more and more urban bridges as an important link to solve the urban traffic function. The traditional bridge design ignores the influence on the urban landscape only from the structure and function. However, it is necessary to design the rich landscape, humanity, harmony and grace of bridges from higher and higher voices of the international metropolis.

Keywords: urban bridge, landscape design, design concept, standard

FLOOD CONTROL & DRAINAGE

Abstract: This paper briefly analyses the series of problems existing in the traditional wastewater treatment plants, and taking Xiamen City Maluan Bay Water Recycling Plant as an example, introduces the construction of its fully underground wastewater treatment plant in detail. The effluent water quality of this plant is based on the water quality standard of Class IV. The main technological process is the "dividual-point inflow multi-stage AAO + secondary sedimentation tank + high-efficiency sedimentation tank + denitrification deep-bed filter + ultra-filtration membrane". The fully underground intensification layout can build the green landscape of the plant area, and realize the land saving and environment friendly.

Keywords: fully underground wastewater treatment plant, Class IV water quality, dividual-point inflow multi-stage AAO, denitrification deep-bed filter, ultra-filtration technology

Abstract: The most of small and middle rivers have the serious pollution problems in China. The water conservancy construction departments everywhere have started to further study the pollution treatment technologies of small and middle rivers, and use these technologies into the practical treatment. The article summarizes the application of the main desilting technologies of underwater desilting, main drain desilting and environmental protection desilting, analyzes its advantages, disadvantages and application scope, also sums up the relative technologies of sludge treatment, introduces and analyzes the different technologies and application scopes, and forecasts and prospects the development direction of desilting and sludge treatment disposal technologies in order to provide the reference for the river desilting and sludge treatment of China.

Keywords: river dredging, desilting technology, sludge treatment

Abstract: The technology of SBR sewage treatment process is advanced. Its performance is reliable. The treatment technological process is very simplified. Especially, its engineering land can be saved more 113% than the traditional oxidation ditch process. SBR process gives rise to the extensive attentions by its many

MANAGEMENT & CONSTRUCITON

Abstract: Aiming at the difficulties of fine management and expenditure allocation in the management and maintenance work, the article points out it is necessary to discuss and study the economical attribute of highway management and maintenance in order to find the source. After the analysis to find the orientation of its public service, the article points out the value of management and maintenance includes the service capacity and efficiency. The article points out that the public rating is a beneficial measure in the mechanism analysis. Focusing on the practical problems, the article proposes that the prices of management and maintenance are different on the different service capacities of enterprises. The article points out the feasibility of calculating the amount of work according to the historical data, puts forward two supervision situations of work amount, and analyzes the causes and solving method of fine maintenance problem.

Keywords: highway management and maintenance, economical attribute, public service, service capacity

Abstract: In recent years, the concrete-filled steel tube arch bridge is an important bridge, and is widely used in the construction of modern bridge, in which the through concrete-filled steel tube arch bridge is especially suitable for the poor geology. The poor geological phenomenon at the location of Nanmenguan Bridge is the local collapse caused by the debris flow and left shore ice water accumulation body after the debris flow washes the foot of slope. The comprehensive consideration determines to use the through concrete -filled steel tube simple -supported bowstring arch bridge. The "per -beam and post -arch" construction method is analyzed in detail for reference.

Keywords: concrete-filled steel tube arch bridge, per-beam and post-arch, long-span bridge

Abstract: The 21-hole double-line cast-in-situ simple-supported box girder of Huaian Bridge in Lianyungang - Zhenjiang Railway changes the conventional construction technology. According to the engineering characteristics and on the basis of demonstration after full comparison and selection, the bowl button support method is selected for the cast-in-situ construction. In order to reduce the safety risk of lateral formwork of box girder in the assembling and disassembling process, to decrease the hidden danger of safety, to save the resources, to reduce the cost, to speed up the construction progress and to improve the economic benefit and social benefit, the longitudinal shift construction technique of lateral formwork is used. The successful application of longitudinal shift construction technology of lateral formwork for the cast-in-situ simple-supported box girder by the bowl button support method solves many difficulties of safety, quality, progress and cost in the construction of box girder. The expected goal is achieved.

Keywords: bowl button support, cast-in-situ box girder, lateral formwork, longitudinal shift

Abstract: The expressway widening will certainly involve the demolition and reconstruction of overpass

Abstract: Taking the South-to-north Water Transfer East Route Phase I Jining Continued Construction Auxiliary Project as an example, the article elementarily analyzes the design and construction of directional drilling through G327 National Highway. The relative experience can be referred for the relative specialized persons.

Keywords: directional drilling, National Highway G327, construction, method

Abstract: Taking the Juye County Continued Construction Auxiliary Project in South-to-north Water Transfer East Route Phase I Project as an example, the article discusses the key technical measures in the engineering construction process, which can be referred for the construction of the similar projects.

Keywords: continued construction auxiliary project, engineering construction, method, discussion

Abstract: With the rapid urbanization process year by year, the index of construction land is not enough. The further development and utilization of underground space are the effective way to relieve this contradiction. The promotion of underground diaphragm wall is the effective way to further develop and utilize the underground space, and relieve the insufficient index of construction land. The underground diaphragm wall has been widely used in the construction field of China now. But speaking the construction technique of underground diaphragm wall in China now, there are many problems and deficiencies. The article further discusses the quality control methods of guide wall construction, slurry preparation construction, grooving construction, reinforcement cage manufacture and concrete pouring construction in order to improve the construction quality of underground diaphragm wall and able to provide the referring materials.

Keywords: underground diaphragm wall, quality control, construction

Abstract: A historical building in Shanghai is closely adjacent to a deep foundation pit project. The effective protection measures are taken to the historical building including the use of a new type of composite pile for the comprehensive base shift reinforcement of the old building. The supporting scheme combined with the adjacent deep foundation pit project and the main underground structure is used. The settlement of the historical building is monitored in the whole engineering construction. The result shows that the settlement of the surrounding historic buildings has been effectively controlled in the excavation stage of the foundation pit. The monitoring result also shows that the settlement caused in the construction stage of underground diaphragm wall is not to be ignored. The successful experience of protection measures and monitoring of historical buildings close to the deep foundation pit can provide a useful reference for the similar projects.

Keywords: historical building, deep foundation pit, settlement, base shift reinforcement

Abstract: After half-a-year operation of the new built project of T219# Road in Pengjiaping of Lanzhou City, there are more cracks on its asphalt pavement. Combined with the design characteristics of road pavement structure and according to the field survey, the article analyzes and studies the forming causes of the different cracks on the asphalt pavement of semi-rigid base, and puts forward the relative treatment measures and proposals of core-bit sampling and slicing the disease part of asphalt pavement from three aspects of design, construction and new technical application. The engineering experience is proposed for preventing the similar quality diseases existing in the construction of semi-rigid base asphalt pavement in the future. The article summarizes the crack cause of semi-rigid base asphalt pavement, analyzes the kind and forming mechanism of cracks, and puts forward the control measures to prevent the crack forming of semi-rigid base asphalt pavement.

Keywords: asphalt pavement, semi-rigid base, crack, cause, treatment, prevention, measures

Abstract: In the bridge engineering construction, the concrete crack is a common disease, which will not only cause a certain influence on the bridge beauty, but also affect the structure safety of bridge. The article firstly introduces some kinds of concrete cracks commonly in the construction of municipal bridges, then analyzes the causes of crack cracks from some aspects of cement, steel bar corrosion, sunlight, contraction crack and differential settlement, and finally sets forth the preventive measures of strictly controlling the material quality, preventing the corrosion and crack of steel bar, and controlling the concrete pouring taken for the causes of concrete cracks, which can be referred for the similar projects.

Keywords: bridge construction, concrete crack, bridge load

Abstract: In order to ensure the highway engineering quality and to realize the rapid, high-effective and safe construction, it must be to pay attention to the mechanized construction and management of highway maintenance, to appoint the relevant technical experts and equipment, and to use the modern mechanized construction method. The selection of suitable machinery, strict operation and careful standard strives to make the whole highway engineering quality optimized.

Keywords: highway maintenance, mechanization, construction technology

Abstract: With the continuous development of transportation industry in China, the construction scope of highway engineering is getting bigger and bigger, the fund investment is getting more and more, and the construction period is getting longer and longer. In result, the importance of mechanical equipment allocation and management has also become increasingly prominent. The highway engineering construction management can not only ensure the smooth implementation of construction, reduce the construction cost, guarantee the operation stability and safety of construction mechanical equipment, but also directly ensure the construction safety of highway engineering. Therefore, it should be to realize the significance of mechanical equipment

STUDY ON SCIENCE & TECHNOLOGY

Abstract: In rail transport planning and public transport planning projects, the key challenge is judgment on the existing bus corridors and survey of passenger flow in the corridors. The article briefly introduces the conventional public traffic survey and analyzes its survey result. The result shows that the conventional public traffic survey means is used only, the overall sampling rate is lower, and it is difficult to achieve a relatively comprehensive passenger flow survey of a city. Therefore, on the basis of routine survey, the article introduces the data analysis by the means of signaling data via mobile phones. After fitting of many modes, the article judges and studies the main passenger corridors of city. The result can provide the adequate basis for the follow-up planning and design.

Abstract: Compared with the common asphalt pavement, the large-voidage asphalt pavement has higher requirements for the modified asphalt and aggregate. According to analysis and comparison of the performances of SBS, rubber powder, SBS and rubber powder recombination, TPS modified asphalt, and the different kinds of fiber, and study on the influences of the different modified asphalt and fibers on the performance of large-voidage asphalt pavement, it is concluded that the performance of SBS and rubber powder recombined modified asphalt is close to the performance of TPS modified asphalt, and the different kinds of fiber have the different effects on the mixture, which can be referred for the relative projects.

Abstract: Aiming at the problem of the concrete hydration of bridge in the low-temperature areas at high altitudes or high latitudes, the hydration heat of the 0.24, 0.31 and 0.38 water cement ratios of cement paste is tested under the curing condition of -3℃ constant temperature, and the hydration extents of cement at each age are calculated. Considering the influence of age and water cement ratio on the hydration extent of cement paste, the calculation model of cement hydration extent is established by the form of sum of quadratic function and logarithm function. The results show that the hydration extent of cement will increase under -3℃ constant temperature curing with the increase of water cement ratio, but the effect of water cement ratio on the hydration extent of cement will decrease with the age. The cement hydration extent of 0.27 water cement ratio cement pastes at the different ages is calculated by the established model. Compared with the measured values, the deviation value of calculation value is less. The accuracy of the model forecast will be higher.

Abstract: The asphalt concrete pavement is widely used in the highway and urban road. The reasonable

APPLICATION OF ACHIEVEMENTS

THE RELATIVE SPECIALITIES

the subdivision principle and ventilation form of the utility tunnel, and analyzes and discusses the operation characteristics, potential safety hazard and interaction of the professional pipelines into the utility tunnel. Taking into account the protection of the safety of inspectors and the safety of pipeline operation, this paper gives some proposals to the monitoring design and safety operation management of the ancillary facilities of the utility tunnel.

Keywords: utility tunnel, underground pipeline, environmental characteristics, potential safety hazard

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Address: No.901 Zhongshan Bei Er Road, Shanghai

P.C.: 200092 Tel.: (021)55008850

Fax: (021)55008850

E-mail: cdq@smedi.com

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