



城市道桥与防洪



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图为上海浦东路桥建设股份有限公司
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——《城市道桥与防洪》

● 本期看点

大城市道路系统发展规律研究——以武汉市为例
上海市中环线国定东路下匝道预制拼装桥梁技术
深圳市低冲击开发模式实际应用
沉井下沉纠偏技术

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封面工程

本期封面工程为诸暨 31 省道王家湖至五泄段改建工程,由上海浦东路桥建设股份有限公司建设施工。

诸暨 31 省道王家湖至五泄段改建工程起点位于暨阳街道诸暨中学东南侧,沿线经过暨阳街道、王家井镇、草塔镇、五泄镇,终点位于五泄镇狮象北侧,线路全长约 23.158 km。工程按一级公路结合城市道路标准设计,设计速度 80 km/h。主线起点至 03 省道(K3+200~K15+870)路基宽度为 46.5 m(其中分离式路基宽度为 22.75 m);03 省道至规划西三环段(K15+870~K17+279.77)采用分离式路基,宽度为 16.0 m;规划西三环(K17+279.77)至终点段路基宽度为 24.5 m。路面设计荷载:BZZ-100 kN;桥梁设计荷载:公路-I 级。主要工程量有:挖方 158.19 万 m³,填方 144.20 万 m³,路面面积约 65.9 万 m²;特大桥、大桥 4 座共 2 551.12 m,中小桥 10 座共 380.4 m,双向隧道 1 条长 560 m。

该项目于 2013 年 10 月 21 日开工建设,2016 年 4 月 20 日竣工。该项目荣获“浙江省安全文明标准化工地”称号。

Urban Roads, Bridges & Flood Control

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ROADS & COMMUNICATION

Study on Development Law of Urban Road System in Wuhan City Li Dan, Che Libin, Huang Jun (1)

Abstract: The urban road traffic system is the main infrastructure of city, is the framework of city pattern and the carrier of city function. It plays the important role in the comprehensive transportation planning system of city. In the last ten years, the framework systems of expressway are built in the large cities of China in succession. But the problem of urban traffic congestion still exists for a long time. Therefore, it is necessary to study the road traffic development law of large cities in China. Taking Wuhan City as an example, this paper introduces the construction and operation of road system, and evaluates the operation of road system in Wuhan, analyzes and studies the development law of road system in Wuhan, and at same time analyzes the optimization direction of road system now from the aspects of the different transportation modes for the different requirements of road, fully tapping the potential of road network, and practicing "the narrow road and dense road network".

Keywords: large city, road system, development law, operation evaluation, optimization direction

Elementary Analysis on Present Situation and Countermeasures for Public Transportation of Lanzhou

..... Gao Jianwei (6)

Abstract: Based on the axial traffic characteristics of urban transportation mainly in the east – west direction of Lanzhou, and in the situation of the traffic function of the main trunk road overlapped with the life function, the single urban bus system, and the low proportion of the residents to select the bus travel, the article puts forward preference to build the infrastructures of public transit, to adjust the network structure of public transit, and to guarantee the development strategy of public transit with the running road right.

Keywords: Lanzhou, public transit, development strategy

Planning Analysis of Landside Traffic System in Guiyang Airport Extension Project Liu Yunfei (10)

Abstract: The airport as a transportation link distinctly important in the modern traffic system provides a very convenient and rapid travel mode for the people, and quickens the economic and cultural exchange among the different regions of people. Owing the large pedestrian volume and more freight volume, the airport is required to equip with the perfected traffic system. Otherwise, the basic function of airport will be certainly impacted. Based on the practical situation of Guiyang Longdongbao International Airport, the article discusses the planning analysis of landside traffic system in the infrastructural extension in detail in

order to promote the further perfection of airport traffic systems in China.

Keywords: Guiyang Airport, extension project, landside, traffic system, planning analysis

Current Situation, Causes and Countermeasures for Parking Problems in Small and Middle Cities

..... Yang Xiaoming, Fu Qiang (12)

Abstract: With the rapid development of economy and the quick improvement of motorization level in China, the parking problem becomes one of problems in the small and middle cities. Different from the large cities, the parking problem of small and middle cities has its peculiarity not only in the specific performance, but also in the deep reason. The article analyzes the parking problem of small and middle cities from the current situation, causes and countermeasures, and puts forward the countermeasures of balancing the demand, developing the bus and slow traffic to reduce the parking demand, supply-side reform to increase parking facilities, developing the intelligent parking and sharing parking to liven the stock from the land utilization angle.

Keywords: traffic engineering, urban parking, intelligent parking, small and middle cities

Design Principles and Essentials of Plane Line Intersection of Highway Engineering ... Zhang Chao, Li Xinghua (15)

Abstract: Design principles of plane line intersection of highway engineering are firstly summarized. These principles are the basis of design practice. Then, the different types and characteristics of plane line intersection including the rotary intersection and forked intersection are analyzed. And some issues on several main intersections are also discussed. Finally, based on some design difficulties of plane intersection such as large traffic volume, steep slope plane and small angle, the design methods and essentials are proposed to improve the safety of plane line intersection design of highway.

Keywords: highway engineering, plane line, intersection, design principle, essential analysis

Study on Grade Separation Form Crossing Riverside Road Liu Chi (18)

Abstract: The grade separation form is usually used if crossing the riverside road because of the clearance requirement under bridge in an urban road cross-river project. But limited by the bridge structure hard to fork at the section of river surface or the water conservation not suitable to layout the piers in river, the common grade separation form is often not ideal. Under the above background and based on the engineering practical cases, the article puts forward several modified grade separation forms, which can be referred for the design of the similar cross-river projects.

Keywords: crossing riverside road, hub interchange, general interchange, modified

Elementary Discussion on Reconstruction Design of Bus Bay in Lanzhou Zhu Xiaoli (21)

Abstract: The article introduces the reconstruction of the traditional bus stop into bus bay in the old city area under the premise of transportation planning with the planning idea of "harmonious city". The relative experience can be referred for the similar projects.

Keywords: bus stop, city area of Lanzhou, to ease traffic congestion

Design of Fuan (Xibeiyang) – Saiqi Expressway Project in Fujian Wang Jianping, Xu Yunfei (23)

Abstract: The article introduces the design of Fuan – Saiqi Expressway Project. This project is an urban trunk road and is constructed on Class I highway standard. The article sets forth the design idea and thinking of line comparison and selection, roadbed pavement, bridge and tunnel of expressway.

Keywords: engineering design, line comparison and selection, roadbed, pavement, large bridge, tunnel

Introduction on Design Scheme of Yingbin Avenue – G106 Intersection Interchange in Huadu District

..... Yan Mincong (29)

Abstract: Yingbin Avenue – G106 Interchange is an important traffic transforming node at the most eastern end of Guangzhou Railway Station North – Baiyun International Airport Expressway, and is the traffic hub interchange for transforming two expressways and one urban trunk road. According to the introduction and analysis on the functional localization, main technical standard and engineering technical scheme of this interchange, the article discusses the engineering situation and design difficulties so as to provide the reference and proposal for the other similar projects.

Keywords: urban road, interchange, design scheme

Node Scheme Design of Provincial Highways S111 and S358 in Nansha New Free Trade Zone of Guangzhou City

..... Wei Wending (34)

Abstract: Based on the land planning and land development demand of the project, the article compares, selects and determines the main traffic current of interchange by the node traffic forecast analysis. All results can be referred for the design of the similar engineering projects.

Keywords: urban trunk road, forecast of traffic volume, interchange

Analysis on Design Technology Scheme of Hongqi Road Quick Reconstruction Project in Shunde

..... Li Ronghua (39)

Abstract: According to the analysis on the background and general situation of Hongqi Road Quick Reconstruction Project in Shunde District of Foshan City, the article puts forward the key control factors to select the road alignment and to link up the line terminal in the quick reconstruction project. Based on this, the engineering design scheme to solve the problems is determined.

Keywords: Hongqi Road, quick, high-voltage pylon

Thoughts on Drainage Design of Mountainous Highway

..... Wang Dan (42)

Abstract: The construction of highway and infrastructures has a significance to promote the local economic development. And for the mountainous areas, the mountainous highway even could be the lifeline to connect two areas. The article discusses the design of roadbed and pavement drainage of mountainous highway.

Keywords: mountainous highway, drainage design, roadbed drainage, pavement drainage

Treatment Scheme of Subgrade at Connection of Bridge and Road in Soft Soil Region ... Xia Feng, Wang Jiwen (45)

Abstract: The subgrade at the connection of bridge and road is always a difficulty of design and construction. Moreover, the soft soil foundation makes this problem very remarkable. The impact of soft soil

on the connection zone of bridge and road is analyzed. The treatment method of soft soil foundation in this zone is studied. Based on the features of soft soil, the normal and deep reinforcement methods can be selected for use. Finally, the construction technique and quality control essentials of the subgrade in this connection zone are discussed so as to improve the construction quality of subgrade.

Keywords: soft soil region, bridge, road, connection zone, subgrade, treatment scheme

Deep Study on Countermeasures for Roadbed Design Quality Control of Municipal Road

..... Ma Xinyu, Gao Rui (48)

Abstract: The roadbed design is the key in the construction of municipal road. Its design quality is very important to the whole municipal road project. But there is a problem existing in the design control of roadbed quality in the modern society. It is urgently solved. The article analyzes and studies some problems in the meaning of roadbed design quality and development situation of municipal road and in the construction of municipal engineering roadbed now, and deeply studies the countermeasures for the roadbed design quality control of municipal road in order to attract the attention and to achieve the good effect.

Keywords: municipal road, roadbed design, quality control

Discussion on Several Problems in Overhaul Design of Expressway Asphalt Pavement

..... Tan Saijie (50)

Abstract: Aiming at several problems existing in the overhaul design of expressway asphalt pavement now, the article analyzes the performance index of pavement, selection of overhaul scheme, clearance height of overpass, upright height of wave-shaped guard bar and safety organization of traffic. On this basis, the relevant solving method is proposed.

Keywords: road engineering, asphalt pavement, overhaul, maintenance design, pavement quality index

Improvement Measures of Problems Existing in Application of SMA Asphalt Mixture

..... Wang Fuhua, Wu Qixiang (53)

Abstract: The early damage of asphalt pavement has the direct relations of unsuitable mix proportion design of asphalt mixture, non-strict control of main technical indexes, and the mixture quality. The mix proportion of SMA asphalt mixture is designed through the raw material test, and its pavement performance is detected. Various indexes satisfy the standard requirements. Based on the construction and detection practices for many years, the article analyzes the problems existing in the application of SMA asphalt mixture, puts forward the improvement measures so as to strictly check on the design of mix proportion, and every link of construction and production in order to reach the objective of quality control in the construction process.

Keywords: SMA asphalt mixture, pavement performance, improvement measures

Discussion on Feasibility of Joint Construction of Rail Transit, Expressway and Utility Tunnel ...

... Li Changke (57)

Abstract: In the process of urban construction, the rational use of urban underground public space is of great significance. At present, Qingdao is undertaking a large-scale subway construction. At the same time of subway construction, according to the planning, the expressway is constructed and the underground utility tunnel is implemented to realize the "unified routing, unified planning, unified design and unified implementation" of rail transit, expressway and underground utility tunnel. This mode can avoid the

secondary excavation of pavement, effectively reduce the construction cost and decrease the travel trouble of the people. Aiming at Metro Line 4 of Qingdao under the construction now, the article analyzes the joint construction mode of rail transit, expressway and utility tunnel, and demonstrates the feasibility of synchronously joint construction from the aspects of engineering implementation difficulties and investment.

Keywords: rail transit engineering, expressway, metro, utility tunnel, synchronously joint construction

Application of Dynamic Compaction in Lanzhou New District Southeast Area Road Project Mou Deqing (60)

Abstract: When the roadbed in Phase II Road Project of Lanzhou New Area Southeast District Construction Land Development Project is designed, the present field has been preliminarily leveled and is in the natural settlement period. The loess silty soil and Malan loess are mostly in the field with the collapsibility. The filling height of plain fill stratum is larger because of shorter backfilling time. The self-weight consolidation is not yet completed. The engineering performance is general. It cannot be directly taken as the roadbed bearing stratum, and should be reinforced and treated. According to the above geological characteristics and the road construction requirements, the article puts forward the use of dynamic compaction to reinforce the roadbed in order to eliminate the loess collapsibility and improve the bearing capacity of roadbed.

Keywords: leveled area, reinforcement and treatment of roadbed, dynamic compaction

Analyze on Characteristics and Causes of Disease around Manhole of Roadway in Qingdao Si Yide (64)

Abstract: Based on the survey data of disease from 14780 various manholes of 91 important roadways with the total length of about 153.4 km, the article summarizes and analyzes the distribution, type and disease characteristics of manholes in Qingdao, and puts forward the targeted proposal on the basis of disease causes, which can guide the study and development of the rapid treatment technology of manhole disease (the project of construction technology planning in Qingdao), and can also provide references and suggestions for the other design and construction of manholes.

Keywords: manhole, disease around manhole, disease characteristics, causes of disease

BRIDGES & STRUCTURES

Prefabricated Assembled Bridge Technology for East Guoding Road Off-ramp of Shanghai Middle Ring Line

..... Shen Weifang, Lu Yongcheng (68)

Abstract: In the engineering construction of city central area, the negative impact of the traditional cast-in-situ construction method on the environment is becoming more and more difficult to adapt to the concept of people-oriented development in a city. To change the traditional construction mode into the high-efficient green construction mode is the inevitable development trend of engineering construction industry. The complete prefabrication assembly construction above the base slab of bridge is firstly realized in the city central area of East Guoding Road Off-ramp Project, which makes the green engineering construction come true, and presents the wide prospect of upgrading the industry. The prefabrication assembly combined with BIM technology also makes the design and construction management more highly efficient in order.

Keywords: prefabrication assembly, connection technology, grouting metal bellows, BIM

Study on Loading Features of Combined Cable Pylon Anchorage Zone of Xiaogan Bridge
..... Gao Enquan, Shen Xudong (74)

Abstract: Xiaoyu Bridge is located at the section from Zhoushan Putuogou Mountain to Xiaoyu Island in the National Highway 329. The span of main bridge is 130 m+300 m+130 m. It is a concrete cable-stayed bridge. The steel anchor beam and steel corbel combined structure is used for the cable pylon anchorage zone. The structural style of anchorage zone is complex. The space finite element theory is used to analyze its loading features, which can provide some referring basis for the similar anchorage structures.

Keywords: cable-stayed bridge, cable pylon anchorage zone, steel anchor beam - steel corbel, loading features, calculation model

Application of Large-diameter Pile Foundation for Single-pylon Cable-stayed Bridge in Highly Seismic Region ...
..... Wang Wenming (78)

Abstract: In order to solve the problems of higher seismic intensity in the site of a long-span single-pylon cable-stayed bridge, larger vertical horizontal bending moment and shearing force of foundation, and also appearing of uplifting force, the article introduces the application of large-diameter pile foundation for the single-pylon cable-stayed bridge in the highly seismic region from the calculation of dynamic characteristics, the calculation of seismic resistance and the design of main pier pile foundation by an example of single-pylon cable-stayed bridge.

Keywords: single-pylon cable-stayed bridge, highly seismic region, large-diameter pile foundation

Application of Long-span Pre-stressed Steel Box Beam Overpass in Design of City Construction
..... Zhang Luming, Wang Liwei, Yue Zhangsheng (81)

Abstract: The article sets forth some issues for attention in the design of steel box beam pedestrian overpass from the aspects of the structural design and fundamental frequency control of steel box beam overpass, and introduces the pre-stressing technology into the design of long-span steel box beam overpass. The truss unit temperature drop method is used to add the prestressing. The structural performance of steel box beam is analyzed and is applied in the harbor construction projects.

Keywords: steel box beam, pedestrian overpass, fundamental frequency, prestressing

Scheme Design of Central Beach Yellow River Bridge in Lanzhou Xi Rong (85)

Abstract: Central Beach Yellow River Bridge is located in the core section of Chengguang District Yanchangbao and Yantan Area, overpasses the South-North Binhe Road and crosses the Yellow River. The article introduces the general situation and technical characteristics of the engineering project, and the "one bridge, one landscape" in the bridge design. The article introduces the comparison and selection of grade separation design schemes in detail by the bridge design concept of "people foremost".

Keywords: bridge design, self-anchorage suspension bridge, comparison and selection of scheme, Lanzhou

Design Essentials and Methods of Steel–Concrete Composite Girder Bridge Qi Weijie (88)

Abstract: The structural features and development prospect of steel–concrete girder bridge are summarized, and the design essentials and difficulties of this structural system are also discussed. Four key design difficulties – connection construction of steel and concrete, cracking of hogging moment zone, baseplate buckling of hogging moment zone and lateral stability of the entire structure are concluded from three levels of structure, section and system. The design countermeasures and solving methods are proposed in order to promote the practical application of steel–concrete composite girder bridge in China.

Keywords: composite girder bridge, design, connection construction, hogging moment zone, overturning stability

Structural Design and Calculation Analysis of Shaped Steel Truss Arch Bridge Huang Kebang (90)

Abstract: The span layout of a three–span half–through steel truss arch bridge is 22 m+56 m+22 m. The arch rib of main bridge is the truss structure composed of middle arch rib, side arch rib, auxiliary arch rib and web member. The straining beam is constructed in the span of the main bridge. The main beam is composed of deck system and cross beam. The deck system is the orthotropic steel deck. The main beam, straining beam and arch rib are solidified and connected. 13 pairs of suspender are arranged for the bridge in the fan shape. The suspender anchoring is in the structural type of ear plate. The article mainly introduces the structural construction design and stress calculation analysis of this bridge. The modeling of this bridge is novel and beautiful. The stress and structure are more complicated. The relative experience can be referred for the similar projects.

Keywords: continuous half–through steel truss arch bridge, straining beam, orthotropic steel deck, suspender anchoring, structural design, calculation analysis

FLOOD CONTROL & DRAINAGE

Application of Shallow Tunneling Construction Method in Majiagou Sewage Interception Project

..... Guo Fengang (94)

Abstract: With the less demolition and flexible construction, the shallow tunneling construction method (STCM) can reduce the influence of the obstacles in construction field on the underground engineering structure. This method is widely used in the municipal sewage interception project. Based on the Majiagou Sewage Interception Project, the article introduces the necessity of selecting the STCM, its basic principle, structure design schemes, monitoring schemes and construction technology.

Keywords: shallow tunneling construction method, sewage interception, construction schemes

Elementary Discussion on Influence of Access Point on Realization of Upgrading Function of Deep Storage Pipeline System Li Pengcheng (98)

Abstract: The higher urban drainage standard is put forward in 2014 version of "Design Specification for Outdoor Drainage". But the pipeline networks in the most urban areas are hard to upgrade simply by the drainage reconstruction. The construction of deep storage pipeline is the effective means to upgrade the original system. The article analyzes the influence of the access point number and location of deep storage

pipeline on the realization of upgrading function of system. The conclusion can be referred for the similar projects.

Keywords: deep storage pipeline, system upgrading, number of access point, location of access point

Practical Application of Low-impact Development Mode in Shenzhen Chen Shaoxiong (101)

Abstract: The low-impact development is a technology used for the urban rainwater management proposed by America in recent years. Its advocated core idea of respecting the nature and integrating the nature is more and more paid attention. The high-speed development of city construction inevitably brings the increasingly severe environmental problem. The population pressure is large. The land resource is in short. The water resource lacks. The water pollution is serious. The ecological environmental conservation situation is severe. Therefore, it is more necessary to introduce and refer the low-impact development mode of rainwater and sewage. The city management strategy is continuously optimized and its idea is developed.

Keywords: low-impact development, city management, present situation of application, idea development

Study on Aerobic Biological Treatment Technology of Organic Wastewater Shen Wanfeng (105)

Abstract: The aerobic biological treatment is the widest method used in the wastewater biological treatment. Under the aerobic condition, the organic pollutant as the nutrition medium of aerobic micro-organism is oxidized and resolved to make the concentration of pollutant decreased. The aerobic biological treatment method is generally divided in two kinds of activated sludge process and biofilm process. The activated sludge process is an aerobic biological treatment method of utilizing the suspended growth of microbial floc to treat the organic wastewater. This kind of microbial floc is exactly activated sludge composed of aerobic microorganism and its metabolism and adsorption of organic matter and inorganic matter. The biofilm process is a technology of utilizing the growth of microorganisms on the surface of solid to biologically treat the wastewater.

Keywords: aerobic biological treatment, plug-flow activated sludge process, biofilter, MBBR

Analysis on Application and Study on Industry Trend of Artificial Wetland Sewage Treatment Technical Patent . . .

..... Wu Yuyan (107)

Abstract: According to searching the application situation of artificial wetland technical patent in China, this article analyzes the technical situation of artificial wetland technical study, the category of technical patent, and the distribution of application areas and applicants, and statistically analyzes the patent number of several main artificial wetland technical categories in order to study the development situations and prospects of the different artificial wetland technologies as well as the integral development trend of artificial wetland technology in China, which can be referred for the development and study of this industry.

Keywords: artificial wetland, patent number, development trend

Design and Analysis on Open Caisson Structure of Intake Pumping Station Project Li Yulei (110)

Abstract: Taking an open caisson of intake pumping station as an example, and according to the engineering geology, open caisson structural features and surrounding environmental situation, the article sets forth the

design gist of open caisson structure and the taken proactive measures for construction environment, which can be referred for the similar projects.

Keywords: open caisson structure, sinking stability, anti-floating check calculation, structural design

MANAGEMENT & CONSTRUCTION

Rectification Technique for Sinking of Open Caisson Yan Guoxian, Han Juyi (113)

Abstract: Combined with the actual project, for the situation of the larger tilt happening in the initial sinking stage and the final sinking stage of open caisson, two rectification construction technologies are analyzed by the mechanical calculation. Two rectification construction technologies are to use the hoist for transverse stretching combined with the soil removal outside of open caisson, and to use the jack for jacking combined with the soil removal inside of open caisson. The good rectification construction effect is achieved to ensure the smooth sinking of open caisson, which can be referred for the construction of the similar open caissons.

Keywords: open caisson, transverse stretching, jacking, rectification

Mechanical Characteristic and Construction Measures for Long-span Pre-stressed Concrete Frame Pier Structure Yuan Shuqiang (117)

Abstract: The long-span pre-stressed concrete frame pier structure is a common substructure in the bridge engineering construction. Taking a practical project as an example, the article analyzes the mechanical characteristic of long-span pre-stressed concrete frame pier, studies the method of improving the structural stress of frame pier in construction, and discusses the construction measures for long-span pre-stressed concrete frame pier structure.

Keywords: pre-stressed concrete, frame pier structure, erection of bowl buckle bracket

Study on Construction Technology of High Bridge Pier Wang Kewei (120)

Abstract: In recent years, the national economy of China is continuously developed, and every industry is also rapidly developed certainly including the highway industry. At present, the number of private car is increasing and the truck number of large-scale enterprise is also increasing in China. This situation means the bearing capacity and strong degree of highway bridges are all required to improve in China. It is undoubtedly to increase the construction technological difficulty of high pier of highway bridges. The article sets forth the construction technology of high bridge pier. The relative experience can be referred for the similar projects.

Keywords: high bridge pier, construction method, climbing form construction

Discussion on Construction Technology of High Bridge Pier in Expressway Liu Yaming (123)

Abstract: With the continuous increment of bridge construction scale, the bridge construction becomes complicated. The use of high pier is very important for the construction quality of expressway bridge. In order to effectively guarantee the safe operation of bridge, the construction technology control of high pier should be strengthened in the bridge construction. The article mainly discusses the construction technology of high bridge pier in expressway.

Keywords: expressway, bridge, high pier, construction technology

Construction Technology of Self-compacting Concrete Filled Steel-tube Truss Beam in Road and Bridge Engineering Shen Xiancai (126)

Abstract: In recent years, the concrete-filled steel tube structure is more and more increased in the road and bridge engineering. The construction technology of concrete-filled steel tube is very complex, but it synthesizes the advantages of steel and concrete materials, is appropriate for the modernization engineering construction, and can satisfy the long span and heavy load requirements of civil engineering structure. The article analyzes the construction technical difficulties of self-compacting concrete filled steel tube of road and bridge engineering, studies the mixing ratio design of self-compacting concrete, and sets forth construction technology of self-compacting concrete filled steel tube truss beam by the practical engineering cases.

Keywords: steel tube truss beam, self-compacting concrete, construction of road and bridge

Analysis on Treatment and Reinforcement Technology of Highway Slope Collapse Gan Rui (128)

Abstract: The operation mode of modern transportation is increasingly complex. The soft soil subgrade is the severely afflicted area in the construction of highway project, and is easy to cause the slope collapse and to disrupt the traffic order. According to the construction difficulty of slope, the article puts forward the treatment method of slope collapse to ensure the safety and stability of traffic operation in the area.

Keywords: highway, slope, collapse, reinforcement technology

Application of Steel Support Enclosure Technology of Foundation Pit in Construction of Road and Bridge Fu You (131)

Abstract: With the rapid development of social economy in China, the engineering construction of transportation infrastructure is widely carried out, and the engineering construction level of road and bridge is also continuously improved. The steel support enclosure technology of foundation pit is widely used in the road and bridge construction projects because of its many advantages of higher safety, better performance and excellent quality. The article briefly analyzes the steel support enclosure technology of foundation pit, sets forth the construction principle and gist, and then analyzes its application in the road and bridge construction by the engineering cases.

Keywords: steel support of foundation pit, enclosure technology, construction of road and bridge

Discussion on Application of Highway Rock-fill Roadbed Construction Technology Zeng Xiaosheng (134)

Abstract: The highway rock-fill roadbed construction technology is very important in the construction of highway. Only the solid roadbed can ensure the stability of highway. Later easier maintenance of highway can improve the bearing capacity of highway. Good supervision of each work can make the quality of highway improved and the service life of highway extended. The highway rock-fill roadbed construction technology is discussed. The relative experience can be referred for the similar projects.

Keywords: rock-fill roadbed, construction process, quality control, technical application

Discussion on Inspection Technology of Cement Concrete Pavement Test Lin Jiagui (137)

Abstract: The quality control of cement concrete used in the highway construction is more difficult. In order

to ensure its construction quality, the inspection of cement concrete pavement test is required. The inspection items and supervision mode of cement concrete test are clear and definite in the construction of this highway project. And as the emphasis on the inspection technologies of field test, durability test, and strength and elasticity modulus test, the relative basis is provided for its quality management to ensure the construction quality of this highway project and to effectively realize the comprehensive benefit of highway engineering.

Keywords: cement concrete, pavement test, inspection technology

Study on Application of Trenchless Structural Reinforcement Technology in Municipal Road Maintenance ·····

····· Zhang Bo, Dong Yonghui, Tian Min, Jia Jinxiu, Ren Kun (140)

Abstract: Aiming at the diseases of pavement net-shaped cracking, rutting and sinking of Yadi Road in Xian Hi-Tech Industrial Development Zone, based on the road inspection report and according to the working requirements of congestion relaxing, smoothness keeping, pollution control and haze reduction issued by the relative government departments, the article puts forward the maintenance scheme of polymer grouting reinforcement technology combined with asphalt surface in-situ thermal regeneration technology used for Yadi Road, and introduces the trace analysis on the implementation of this scheme. The analysis shows that the maintenance scheme of polymer grouting reinforcement technology combined with asphalt surface in-situ thermal regeneration technology can not only realize the reinforcement of trenchless semi-rigid base, recover the asphalt pavement performance, but also decrease the building rubbish, reduce the traffic impact and reduce the construction cost. The matters for attention in the construction process and the issues to be perfected are proposed.

Keywords: polymer grouting, in-situ thermal regeneration, deflection

Discussion on Construction Quality Control and Technical Control Gist of Asphalt Pavement ···· Luo Xiang (144)

Abstract: The construction quality control level of asphalt pavement will directly affect the service performance and service life of asphalt pavement. The article discusses the construction quality management and control gist of asphalt pavement. The relative experience can be referred for the similar projects.

Keywords: asphalt pavement, construction, quality control

Discussion on Construction Quality Control of Highway Cement Stabilized Macadam Base ···· Wang Youjia (147)

Abstract: The cement stabilized macadam as the semi-rigid material is widely used for the pavement base because of its strong integrality, high bearing capacity, high rigidity and good water stability. According to the working experience of Hainan Jinpai Harbor Highway Reconstruction Project (Phase I) for many years, the article discusses the influence factors on the construction quality of cement stabilized macadam base, and introduces the control measures for the influence factors.

Keywords: cement stabilized macadam base, influence factor, quality control

Discussion on Control Measures of Cast-in-situ Pile Construction Quality ····· Li Si (150)

Abstract: The construction quality of cast-in-situ pile is important to the construction quality of the whole bridge. Therefore, it is very significant to guarantee the correctness and normalization of the relative operations during the construction. According to the working experience of many years, the article discusses

the control measures of cast-in-situ pile construction quality. The relative experience can be referred for the similar projects.

Keywords: cast-in-situ pile, construction process, quality control

Discussion of Quality Management in Construction Process of Rural Highway ····· Yin Yong, Chen Kaoyu (153)

Abstract: Aiming at the construction of rural highway, the article puts forward the quality influence in the construction process of rural highway. On this basis, the article comprehensively considers the construction characteristics and requirements of rural highway and puts forward the effective quality management measures, and proposes the detailed method for avoiding the quality problems and realizing the expected quality objective.

Keywords: rural highway, construction, quality management

Discussion on Construction Technology of Highway Extra-long Gas Tunnel ····· Tian Hongyue (156)

Abstract: Based on the problems existing in the construction process of extra-long gas tunnel of highway engineering, the article analyzes the application of ventilation construction technology of highway gas tunnel by an example of 1-1 contracted section in Panxing Expressway, and puts forward the strategy method of optimization control. Its purpose is to provide some theoretical basis for the relative constructors. The relative experience can be referred for the similar projects.

Keywords: highway engineering, extra-long gas tunnel, ventilation technology

Elementary Discussion on Application of Operational Research in Development Construction of New City Area ···

······ Huang Aipeng, Zhu Shaocai (158)

Abstract: The construction of new city area goes without saying for the promotion of economic development in China. At present for the normalcy of continuously lowering economy, tightened land index, controlled government debt and increased land acquisition difficulty, the development of new city area in various regions is difficult to forecast. There are endless problems. In order to plan as a whole in the development construction of new city area, according to the experience of planning construction of new city area for many years and referring the successful cases of operational research in the engineering construction field, the article considers to systematically allocate the limited financial fund, land index, construction field and resource factors, to fully play the mobilizing and promoting roles of the government fund to construction the projects, and to put forward the relative detailed proposals of scientifically making the objective of developing and constructing the new city area, clearly defining the item classification of financial investment, making sure the construction sequence of project and safeguarding the implementation condition of project. The relative experience can be referred for the similar projects.

Keywords: operational research, development and construction, new city area

Analysis on Advantage and Disadvantage of Hydraulic Engineering Survey, Design and Construction Integration Bidding Mode ····· Xu Jie, Lin Zhaodi, Zuo Defei (162)

Abstract: Aiming at the present situation of large investment and limited construction period of hydraulic

engineering project, the article analyzes the advantage and disadvantage of survey, design and construction integration bidding mode from many aspects and proposes the construction units to select the most suitable bidding mode according to the detailed conditions of the project.

Keywords: integration, bidding time, construction period, overall benefit, investment control

Elementary Discussion on Problems Existing in Bidding and Tendering of Construction Engineering Zeng Qun (164)

Abstract: The construction engineering bidding and tendering start later, but are quickly developed in China. There are some problems existing in the process of quick development. The article discusses some problems existing in the bidding and tendering activities of construction engineering.

Keywords: construction engineering, bidding, tendering, problem

Motor Vehicle Safety Management in Municipal Engineering Construction Field Feng Zhenwei (167)

Abstract: There are various special motor vehicles in the municipal engineering construction field. Owing to no relevant standards and specifications, various safety accidents are easily caused in the construction field so as to impact the engineering quality, even to cause the serious safety accidents. Aiming at the features of vehicles and based on some present specifications, the article puts forward the proposal of safety management. The relative experience can be referred for the similar projects.

Keywords: motor vehicle, supervision, safety

Innovation of Internal Data Sorting Skill for Highway Engineering Deng Xuemei (170)

Abstract: The highway engineering projects are more complex, and the engineering project data are miscellaneous. The collection and perfection of internal data are more difficult because of relatively scattered working sections and procedures. But the improvement of attention level for the internal data can greatly upgrade the smooth level to collect the internal data, and also the management and use of internal data will play the important promoting role. Therefore, to attach importance to the management work of internal data will play an important helping role in the whole highway engineering project management, and will produce the beneficial effect on this construction project and the future engineering projects.

Keywords: engineering internal work, data sorting, skill innovation

STUDY ON SCIENCE & TECHNOLOGY

Study on Green Traffic System of Northwest Towns in China Based on Matter-element Analysis Method Zeng Junwei, Ren Chong, Qian Yongsheng, Guang Xiaoping (172)

Abstract: Aiming at the lack of systematic theoretical support to the green traffic evaluation of the northwest towns in China, the matter-element analysis and evaluation model is proposed in this paper. First of all, the basic concept of green traffic in the northwest towns of China is set forth, and the necessity of the study on green traffic system in the northwest towns of China is analyzed. Secondly, the evaluation index system of green traffic is established, and the matter-element analysis model of green traffic system in northwest towns of China is built on the basis of the principle of matter-element analysis. Finally, the implementation effect of

green traffic in the northwest towns of China is ranked, and the practicality of this model is verified by the example of Lanzhou. The analysis results show that the implementation effect of green traffic in Lanzhou is orderly, the environmental impact and resource saving of green traffic system in Lanzhou need further improvement.\

Keywords: green traffic system, matter–element analysis model, urbanization,Lanzhou

Evaluation of Groundwater Resources and Analysis of Exploitable Potentiality in Zara River of Eritrea

..... Lin Guoqing, Wu Xianyong, Pang Honglu, Chen Xiaolan, Li Wenjuan, Yan Xinyu(176)

Abstract: In order to ensure Koka Gold able to achieve the sustainable water supply and avoid the excessive pumping water leading to the unbalance of ecological environment in the surrounding areas, the groundwater resource is evaluated by the water pumping test and the seismic survey method. And the establishment of water balance model can analyzes the exploitable potentiality of groundwater in this area. The result shows that the aquifer of this area has the high permeability, the water yield exceeds 20 L/s and the calculation value of total storage reserves is 5.3 Mm³. The thicker alluvial aquifer can satisfy the water demand for the 8–year operation of this project. The water balance analysis result shows that the river runoff of normal flow year can provide the sufficient infiltration supply to make the aquifer recover to the maximum reserves. Under the condition of three simulated climates, the average drawdown of aquifer is 2.21~2.65 m, and the average groundwater level is about 15.1 m. And the water supply from the aquifer has no appreciable impact on the surrounding environment.

Keywords: aquifer, water pumping test, seismic survey, water balance model

Study on Influence of Soil Disturbance and Deformation on River Bank

Gong Yu (181)

Abstract: According to the needs of urban development, urban traffic facilities such as tunnel or pipe crossing and river became an important factor of river bank reinforcement and reconstruction. The soil disturbance and deformation caused in the construction of tunnel and pipe exert an influence on the surrounding river bank structures. This kind of influence on the river bank can be reduced after the certain soil reinforcement measures are taken in the areas of complex surrounding environment. The practical numerical modeling mode can forecast the influence of shield construction period on the river bank. The effect of reinforced soil is analyzed. The relative experience can be referred for the similar projects in the future.

Keywords: soil disturbance and deformation, numerical analysis, influence, countermeasures

Analysis of Seismic Isolation Design for Floor–out Structure of High Intensity Area

Yuan Kun (185)

Abstract: More than two thirds of land area is the mountain topography in China, especially in the western region. And these regions are located in in the high intensity area of the earthquake more frequently. The floor–out structure is a the representative structure of the mountain building, which means the bottom interface of the same building is placed on the different elevations of ground base level, and the ground structure of floor is set up according to the floor height below the highest ground point. When the floor–out structure of high–intensity area is required with the seismic isolation, the engineering experience is to set up the higher rigidity of basement in the floor–out section and the same elevation of seismic isolation layer is constructed.

This scheme not only leads to the material waste, but also results in the non-ideal space use effect of floor-out section. Taking Sichuan Lushan County People's Hospital Outpatient Building Project as the basis, from the characteristics of floor-out structure and aiming at the problems brought by the seismic isolation layer constructed at the same elevation, the article discusses the seismic isolation design scheme of constructing the seismic isolation layers at the different elevations of floor-out structure.

Keywords: high intensity area, floor-out structure, seismic isolation design

Study on Transverse Seismic Performance of Laminated Rubber Bearing Continuous Beam Bridge
..... Wang Ruilong (188)

Abstract: The laminated rubber bearing is widely used in the small-span and middle-span bridges in China. The main beam is normally and directly placed on the bearing. The laminated rubber bearing and the beam bottom will slide under the earthquake. Based on a laminated rubber bearing continuous beam bridge, the non-linear time-procedure analysis method is used to discuss the influence of three simulating methods of only considering the rigid restriction effect of lateral block, only considering the horizontal shear rigidity of bearing and considering the slide effect of bearing and beam bottom on the transverse seismic performance of bridge structure. The result shows that the seismic force of pier is obviously decreased after the slide effect of laminated rubber bearing and beam bottom is considered owing to the seismic isolation of bearing after the friction energy consumption and slide of the both. Also, the main beam displacement and the bearing deformation can be better controlled. The seismic mitigation and absorption of structure are the best. It is a reasonable seismic simulation method. At the same time to guarantee the fully playing the seismic mitigation and absorption functions of laminated rubber bearing after slide, the space between the lateral block and the main beam should be reserved or the displacement of bearing slide. This conclusion can be referred for the engineering practices.

Keywords: continuous beam bridge, laminated rubber bearing, slide effect, transverse, seismic performance

Analysis on Calculated Length of Reinforced Concrete Pier Based on Derivation Wang Yonghua (191)

Abstract: Aiming at the over simplification of the amplified coefficient of eccentricity and the effective length of long columns in the current bridge specification, the dual nonlinear is taken into account. The numerical simulation is used to calculate the amplified coefficient of eccentricity of independent long column under the normal constraint, and the effective length after the sidesway of the column. The results from the proposed method and the current specifications are compared. The comparison result shows that the amplified eccentricity coefficient of control sections considering dual nonlinear is smaller than the specified value and the specified standard is more conservative. The effective lengths of long columns consolidated on one end and hinged joint on the other end with consolidated on the both ends after sidesway trend to increase, but cannot exceed two times of column height. The effective lengths remain unchanged for the long column hinged joint on the both ends with consolidated on one end and cantilevered on the other end.

Keywords: reinforced concrete bridge, effective length, pier, sidesway component, no-sidesway component

Analysis on Calculation Error of Active Earth Pressure of Cohesive Soil for Roadbed Retaining Wall
..... Wu Rui, Hu Dingbo (196)

Abstract: The active earth pressure of cohesive soil at the back of roadbed retaining wall for a Class 2 highway is calculated by two common methods of equivalent internal friction angle method and force multi deformation method in the classics coulomb theory. The calculation result shows that the anti-slide stability coefficient error of this retaining wall calculated by these two methods is 33.4%, and the error will quickly increase with the increment of wall height. Therefore, the value of ϕD will be reduced according to the circumstances during the design of high wall. The calculation of active earth pressure of cohesive soil will be better on the practically measured the values of c and ϕ . The solution to the fore is used for the calculation.

Keywords: roadbed retaining wall, cohesive soil, calculation of active earth pressure, anti-slide stability coefficient

Analytic Calculation of Slope Stability Analysis (Sweden Slice Method) Based on Matlab Hu Hui (198)

Abstract: The Sweden Slice Method is widely used in the slope stability analysis, but more troubles in the calculation process. The use of Matlab efficient computing power and the Matlab programmed code can rapidly and efficiently give the slope stability coefficient of any circular sliding surface.

Keywords: slope stability, Sweden Slice Method, Matlab, analytic calculation

Study on Endurance Quality of Foam Light Soil to Treat Roadbed Zhang Qiang, Wang Xin (200)

Abstract: According to the laboratory test, the article analyzes the influence of fatigue properties of foam light soil and the different factors on its endurance quality. Combined with the stress conditions of practical pavement structure, the article measures the service life of foam light soil used for the roadbed filing. The test result shows that the foam light soil has the good durability, and can satisfy the design service life requirement of highway engineering.

Keywords: cast-in-situ foam light soil, endurance quality, fatigue test, corrosion resistance test

Study on Performance of Asphalt Mixture Mixed with Rubber Particles He Yan, Lu Libo (204)

Abstract: According to the grading design of mixture by CAVF method and the grading comparison and analysis of the traditional asphalt mixture, the pavement performances of JDAC-16 asphalt mixture are studied under the condition of the different mixing amounts of rubber particles. The test result shows that the mixing amount 3% of rubber powder can obviously improve the high-temperature, low-temperature and anti-water damage performances of asphalt mixture, but the exceed appropriate mixing amount will degrade the mixture performance.

Keywords: CVVF method, rubber asphalt mixture, pavement performance

Study on Engineering Characteristics of Peat and Peaty Soft Soil in Kunming Liu Ming (207)

Abstract: The soft soils in Kunming are mainly mucky soil, sludge, peaty soil and peat, in which the strong peaty soil and peat are rare in the country. The poor engineering characteristics of peaty soil and peat have the great harm to the joint positions of building engineering, road engineering and bridge beam. The article analyzes and studies the causes, distributions, characteristics and physical mechanical indexes of the more typical peaty soil and peat in the lacustrine sediment soft soil of Dianchi Lake in Kunming, which can be

referred for selecting the reasonable foundation form and the proper subgrade treatment method of the engineering construction in Kunming.

Keywords: Kunming, peaty soft soil, cause, engineering characteristic

Analysis on Influence of High Silt Content Aggregate on Concrete Performance and Its Effective Countermeasures

..... Lv Xiaoliang (209)

Abstract: The concrete performance is impacted by many factors, in which the high silt content aggregate is the most key factor to impact the concrete performance. The main reason of high silt content to impact the concrete performance is the high efficient slushing agent having the adsorption function to composition of cement, finally increasing the slump of concrete and impacting the strength of concrete. Therefore, the constructors should pay attention to the silt content of aggregate in the engineering construction, and control its silt content to improve the concrete performance. The article sets forth the detailed influence of high silt content aggregate on concrete performance and the detailed countermeasures to improve the concrete performance, which can be referred for the improvement of concrete performance.

Keywords: high silt content, concrete performance, influence, effective countermeasures

Calculation Method of Highway Tunnel Ventilation Requested Air Volume Based on Matrix Sun Ying (211)

Abstract: The calculation process of requested air volume is complex and is more repetitive according to the calculation formulas of requested air volume to dilute the smoke and carbon monoxide stipulated in *Design Details for Ventilation of Highway Tunnels (JTG/T D70/2-02-2014)*. Based on the characteristics of requested air volume calculation formulas and relative parameters, the matrix computing equipment is introduced. The transformation and calculation can give the total variable coefficients of X and Y to determine the requested air volume so as to conveniently and effectively achieve the requested air volume, and able to directly analyze the change rule of requested air volume. Taking an expressway tunnel in the western region as an example, the ventilation is calculated and compared. The result shows that the requested air volume made by matrix calculation method is same as the routine calculation method, and is also consistent with the change rule of requested air volume.

Keywords: tunnel, requested air volume, matrix, calculation method

THE RELATIVE SPECIALITIES

Analysis on Impact of New Toll-by-weight Policy on Operating Vehicles

..... Xu Wangxi, Huang Haiyun, Zhang Junping, Yuan Weizhang, Huang Dezhi (216)

Abstract: In order to study the intervention effect of new toll-by-weight policy (hereinafter referred to as the New Deal) to the operating vehicles in Guangdong Province, and based on the weigh-in-motion (WIM) system data of more than 240 000 trucks from January to June in 2014 of a toll station in Guangzhou - Shaoguan Section of Beijing-Zhuhai-Macao (formerly Beijing-Zhuhai) Expressway, the article analyzes the vehicle weight and axle load of operating loads according to the vehicle models before and after the New Deal. The two-peak normal distribution is used to fit the probability density distribution of vehicle weight. The least

square method of linear regression is used to get the linear relationship between each axle load and total weight. The results show that various parameters of the probability density distribution of vehicle weight and the axle load in the proportion of total weight are not changed much before and after the New Deal, that is the intervention effect of the New Deal is not obvious on the operating vehicles. Therefore, on this basis, the proposal is put forward for the perfection and amendment of the New Deal.

Keywords: weigh-in-motion (WIM) system, vehicle weight, axle load, multi-peak distribution

Characteristics and Design of Prefabricated Double-layer Lane Structure System in Shield Tunnel

..... Song Limei, Liu Nian (220)

Abstract: At present, the structural construction in the shield tunnel basically belongs to the semi-prefabrication phase. Many components are all casted in site. The construction efficiency is low, the energy consumption is high, the construction is slow, more construction waste is produced, the environmental pollution is large, and also it is limited in the limited construction space of shield tunnel and the quality of field workers. The construction quality is hard to guarantee. In order to realize the rapid construction and the green construction, the internal structure of shield tunnel will be prefabricated and industrialized. According to the comparison of the stress models and characteristics of cast-in-situ structure, the article analyzes the stress features and characteristics of various shield tunnel prefabricated double-layer lane structure systems.

Keywords: shield tunnel, internal structure, prefabrication and assembly, stress analysis

Study on Freeze Thawing and Damage Mechanism of Rock in Western Cold and Dry Areas

..... Shen Yu, Wang Xinxin (223)

Abstract: The climatic characteristics of drying, frigidty, temperature difference, strong ultraviolet ray and high wind in the western cold and dry areas form the typical natural conditions of dry and wet freeze-thaw cycle, and the cold and hot alternation. The article analyzes the freeze thawing and damage mechanism of rock under the heavy weather environment of the western cold and dry areas, sets forth the freeze thawing and damage process of rock in detail, and then analyzes the influence of the external factors of freeze-thaw cycle, freeze-thaw temperature, chemical environment and stress state on the freeze thawing and damage of rock.

Keywords: western cold and dry areas, rock, freeze and thawing

Optimization of Micro-vibration Blasting Control for Yanan Road Station Side-crossing Dangerous Building

..... Lu Quanxin (225)

Abstract: In order to reduce the influence of blasting vibration on dangerous building, taking the No.1 air duct of Yanan Road Station in the metro of Tingdao side-crossing the dangerous building as the engineering background, the article analyzes the cause of vibration reduction failure of compound-term wedge cutting. The use of large-diameter empty hole cutting and the hole-by-hole initiation network approach will effectively reduce the harmful effect of blasting vibration by about 50% and guarantee the tunnel smoothly side-crossing the dangerous buildings.

Keywords: tunnel blasting, vibration effect, empty hole, hole-by-hole initiation

Discussion on Design of Building Fire Protection in Metro Station Yang Yiqing (228)

Abstract: The important composed part of rail transit system – metro station becomes the fire hazard area because of dense passenger flow and complex composition within station. The article analyzes and discusses the designs of building fire protection and safe evacuation of metro station from the architecture angle by the relative cases in order to strengthen the design safety and normalization of metro station and to decrease the fire hazard of metro station.

Keywords: metro station, building fire protection, design

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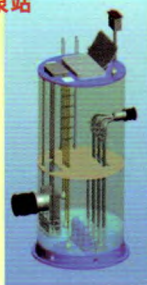
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