

城市道桥与防洪

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我国特大型桥梁的技术创新

雨污混接调查在上海市崇明地区的实践

二维码技术在预制拼装桥梁施工管理中的应用



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封面工程

本期封面工程为上海市政交通设计研究院有限公司设计的呼和浩特市快速路环线BRT工程。

快速公交系统简称BRT,是一种介于轨道交通与常规公交之间的新型公共客运系统。呼和浩特市快速路环线BRT工程的中途站点设置在快速路主线中央分隔带位置,车沿快速路环线行驶,线路全长约46 km,采用了“双快模式”(快速路+快速公交),在北方地区属首创。站点选址综合考虑了与轨道交通的友好衔接、与常规公交的接驳换乘、与东客站的无缝对接等因素,工程共设置42座BRT中途站(快速路环线41座,火车东客站北广场1座),平均站间距约1.1 km。全线按进站形式划分,共分为36座人行天桥进站,5座人行横道进站,1座火车东客站北广场路侧站台。

BRT站台建筑采用“雄鹰展翅”造型。雄鹰展翅,道劲有力,象征着呼和浩特市人民不断迎接挑战、开拓进取的奋发精神。站台充分利用新材料的特点,美观新颖、简洁大方,并极具现代感,体现出了现代BRT快速公交系统建筑的特点。该工程于2016年8月30日竣工。

Urban Roads, Bridges & Flood Control (Monthly)

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Discussion of Urban Road Based on“Sponge City”Concept Ke Shuiping, Zhang Shuning, Bai Zijian (1)

Abstract: The sponge city is an urban rainwater and flood management concept. Compared with the traditional fast discharge mode, it has a series of advantages of replenishing the underground water, decreasing the runoff pollution and adjusting the urban climate. As the main carrier and component of the relative urban rainwater facilities, the road sponge of road system is an indispensable link in the construction of sponge city. On the basis of summarizing the basic concept of sponge city, the article compares and analyzes the advantages and disadvantages of sponge road and traditional road, and discusses some key problems existing in the design of urban road.

Keywords: sponge city, low impact development (LID), design of urban road

Application of Flexibility Design in Urban Road Li Ying, Cao Sulong, Wang Qida (5)

Abstract: Urban road is an important part of municipal infrastructure. The diversity of the urban road function determines the flexibility and diversity of the design. Combining with the engineering cases, the using of the flexible design concept and the rational using of design parameters carry out the engineering design so as better to balance contradiction among the planning, construction and current situation in order to create the conditions for the engineering implementation.

Keywords: urban road, flexibility design, application

Analysis of Parking Facilities in Local Hub Airport and Study of Key Technological Issues Xiong Kun (8)

Abstract: In recent years, the aircraft industry of China has been greatly developed, and the construction of large-sized airport greatly increases the aviation passenger capacity. With the increment of aviation passenger capacity, the higher requirements are put forward to the supporting service facilities of airport, i.e. the service level of parking facilities will be directly related to the travel feeling of aviation passengers. According to some design cases and comparison of large-sized airports in China, some universality is found. The article summarizes the key technical issues of roadside parking facilities of airport, and provides some value referring

proposals for designing the roadside traffic of the other large-sized airports.

Keywords: hub airport, parking facilities, key technology

Evaluation of One-way Street System Based on Service Level of Intersection Sun Feng (11)

Abstract: The optimization of traffic organization to improve the operation efficiency is a necessary means to ease the traffic contradiction of central area under the condition of basically completing the road construction in the central area of city. The one-way traffic is one of the important measures for the management of urban traffic. The article analyzes the principle and condition to set up the one-way traffic, and based on the practices, analyzes the advantage of one-way street system from the service level of intersection.

Keywords: intersection, one-way street, one-way traffic, traffic capacity, traffic organization, service level

Application of Humanized Concept in Road Design Zhang Lei, Lu Jiaying (14)

Abstract: The urban road mileage continuously increases, but it cannot more and more satisfy the continuous increment demand of the residents. With the continuous improvement of urban road construction level, the requirement of urban road is not only limited to the traffic demand, but also provides the convenient function, viewing function and using function, that is the humanized design of urban road. Therefore, the article analyzes the application of humanized concept in the design of urban road from the basic conception of urban road humanized design and the problems existing in the design of urban road.

Keywords: urban road, humanized design, design

Design of Renmin Road – East Ring Road Full Interchange in Handan City Zhou Yumei, Chen Yi (17)

Abstract: The article analyzes the traffic, terrain and ground objects along the project of Renmin Road – East Ring Road Full Interchange in Handan City, introduces the engineering design scheme, and analyzes the gist and difficulties in the design process of the project.

Keywords: full interchange, alignment, number of lanes, design

Study on Optimization of Traffic Reconciliation Scheme during Metro Construction
..... Zhou Jianguo, Guo Jianmin, Wang Min (19)

Abstract: The metro station is normally set up in the area where the vehicle flow and pedestrian flow of road intersection are centralized. The determination of traffic reconciliation scheme is the key to guarantee the ground traffic in order and stable operation because of long metro construction period and large influence on road traffic during construction. Aiming at Shengfuzhuang Station in Rail Traffic R3 of Jinan City, two traffic reconciliation schemes are designed during design, and various factors are comprehensively considered. The analytic hierarchy process (AHP) is used to evaluate, compare and select two schemes.

Keywords: metro construction, traffic reconciliation, analytic hierarchy process (AHP)

Scheme Design of Guilin East II Ring Road Reconstruction Project Meng Weiwei, Gao Lixia, Wang Li (23)

Abstract: Combined with the engineering cases, the article puts forward the design idea of road reconstruction scheme, and based on the inspection result, analyzes the pavement fault causes, assesses the road using property, and puts forward the reconstruction scheme of pavement structure, which can be referred for the similar projects.

Keywords: East II Ring Road, asphalt pavement reconstruction, scheme design

Greening Design Concept of Intersection in Suyuzhang Highway Fast Channel Project Zhang Wenwen, Fang Ke, Cao Lei (27)

Abstract: The main characteristics of highway fast channel are more intersections and more complex plant arrangement at the relative intersections. Taking Suyuzhang Highway as an example, the article sets forth the greening arrangement surrounding intersection how to more effectively guide the driving vehicles and play the identification effect. The region features are made clear by the different seasons of plant seasonal aspect further to explain the style of the whole road, and also to make Suyuzhang Highway have the bright feature. Meanwhile, the variation of soft landscape can also improve the driving safety and comfort.

Keywords: fast channel, greening, Suyuzhang Highway, intersection

Study on Treatment Scheme of Rutting at Urban Road Intersection in Wuhan City Zhang Shoucheng (29)

Abstract: This paper analyzes the causes of rutting at urban road intersection in Wuhan City, which are not only objective factors of vehicle load, natural environment and material properties, but also subjective factors of design, construction, maintenance and management. Combining with the rutting cause characteristics of intersection pavement and the design requirements of pavement structure, this paper delimits the treatment range of intersection rutting, and puts forward the pavement structure of double modified layers and adding anti-rutting agent as well as the taken measures of decreasing pavement temperature and shifting road marking so as to delay the rutting at intersection pavement.

Keywords: urban road, intersection, rutting

Discussion on Drawing Standardization of Traffic Engineering Design Tang Hao (32)

Abstract: The traffic engineering design is an important link in the design of urban road and highway, and has the important guiding significance to reflect the road function, to improve the road service level and to ensure road safe driving. However, owing to the different design levels and the different drawing habits of traffic engineering designers, the styles of drawing result are often different in the practical drawing. And also there will be many problems in the pattern exchange and reference among the departments and designers, and during the pattern merging and printing, which will not only influence the work efficiency, but also be hard to guarantee the drawing quality. At the same time, as a survey design unit, its drawing result standardization is also an important link in the construction of enterprise standardization system. Therefore, it is imperative to

standardize the traffic engineering drawing.

Keywords: traffic engineering, engineering design, drawing standardization

BRIDGES & STRUCTURES

Technological Innovation of Super-large Bridge in China Mu Xiangchun (35)

Abstract: The article systematically introduces the technological innovation of six super-large bridges built one after another in China since entering Twenty-first Century. The article analyzes the technological innovation of the typical bridge engineering, and tries hard to provide the referring materials and the related inspiration for the similar projects of China in order to promote China towards to the powerful bridge country of the world.

Keywords: super-large bridge, technological innovation, typical bridge

Analysis on Mechanical Property in Cable Anchorage Zone of Steel-concrete Combined Girder
..... Wang Lianglei (40)

Abstract: The cable-stayed bridge structure has become the most common structural style in the bridge engineering, and is greatly developed in the recent years. But the reasonable design of cable anchorage zone is always the emphasis in the design of cable-stayed bridge. The optimization of cable and beam anchorage style of cable-stayed bridge is also developed in a certain extent. The most common cable and beam anchorage types include the tooth block type, anchor box type and anchor plate type, in which the anchor plate type is relatively less used. Aiming at the background engineering, the article studies the anchor plate type of cable and beam anchorage zone used in the combined beam, analyzes the contact nonlinearity of the force transmission characteristic between anchor head and anchor bearing plate, studies its structural property of anchor plate and the mechanical property of main beam in anchorage zone, and studies the mechanical state of key welding lines, and comprehensively assesses the structural property of anchorage zone.

Keywords: cable-stayed bridge, anchor plate, mechanical property, numerical simulation, welding line stress

Finite Element Calculation of Cable Pylon Segment of Arched Pylon Cable-stayed Bridge
..... Chen Lixin, Xu Fulin (44)

Abstract: The 3D finite element model is established for the largest segment of cable pylon stress for Zhenyuling Bridge in Fangchenggang City to simulate the structural details, pre-stressing system, additional load and boundary constraint condition of cable pylon segment. The results of calculation and analysis show some more important conclusions, which can be referred for the design and construction of cable pylon of cable-stayed bridge.

Keywords: cable-stayed bridge, concrete cable pylon, segment model, finite element

Linear and Nonlinear Comparison and Analysis of Prefabricated Pier Zhang Shuqing (47)

Abstract: The finite element software ANSYS is used to establish the finite element model of high-strength pipe prefabricated pier. Combined with the overall calculation of superstructure, the article calculates and analyzes the step-by-step loading of structure, analyzes the stress nephogram of prefabricated pier to obtain the most harmful stress point location and to draw the most harmful stress point stress and the pier top loading curve graph in order to guide the design.

Keywords: prefabricated pier, stress, finite element, calculation and analysis

Overall Design of Main Bridge of Ligui Bridge Chen Wei, Hu Zhimin, An Liyong, Huang Longtian (50)

Abstract: The main bridge of Ligui Bridge is a prestressed concrete single-pylon double-plane cable-stayed bridge with the main span of 160 m. The main girder is a super-wide flat concrete box girder. The bridge is 42 m wide. It is the widest concrete cable-stayed bridge in China now. the article summarizes the design of bridge and provides some experience for the design of super-wide concrete cable-stayed bridges.

Keywords: single pylon, double-plane, super-wide concrete girder, design of cable-stayed bridge

Design Gist of Dabategou Bridge Dong Shiqiu (54)

Abstract: DAbategou Bridge is located in Minzhu Village of Akesai County. The highest height of the bridge is 63.5 m. It is Shungou Bridge. The topography environment of bridge location is complex because of narrow side channel of small pile, steep ditch shore and large debris flow gully. In order to quicken the construction progress and effectively to reduce the engineering construction cost, the bridge schemes should be compared during design. According to the result of scheme comparison and selection, the pre-stressed concrete prefabricated continuous box beam structural type is finally determined.

Keywords: scheme comparison and selection, thin-wall pier, continuous box beam, column-type platform

Design Idea and Solving Scheme of Widening and Loading for Sandy Bridge – Open Spandrel Double-curve Arch Bridge Feng Jianliang (56)

Abstract: With the continuous development of the national economy, a large quantity of old bridges in the national and province highways are very hard to meet the demand of modern traffic logistics. Some low design standards and poor traffic capacities of bridges are urgently reconstructed. Under the condition of old bridges still having the utilization value, the original bridges are reconstructed and reinforced as much as possible and are made to glow the new vitality in some special areas because of limited national condition. The article introduces the reconstruction and reinforcement design of sandy bridge. Based on the original bridge structure and according to the local condition, the decision is carefully made, and its mechanical characteristics are fully utilized. The auxiliary means and technologies are used to upgrade the strength of main girder, to strengthen the integrated structure, to improve the bearing capacity of bridge, to widen the bridge deck, and to satisfy the traffic flow demand. The article discusses the reconstruction, reinforcement and prolonging utilization of old

bridges in the throat road section.

Keywords utilization of old bridge, steel reinforced concrete double-curved arch bridge, widening and loading reinforcement

Experimental Study on Key Technology of Aojiang River Bridge IV Zhang Hongxing, Chen Xiaogang, Liu Debao (59)

Abstract: The main bridge of Aojiang River Bridge IV is a 130-m + 150-m single-pylon double-plane steel-concrete composite beam cable-stayed bridge. Through the model test, two key technical problems of the shear-lag effect of composite beam and the anchorage structure fatigue performance of cable and beam are studied, the shear-lag coefficient of composite beam is concluded and the safety of cable-girder anchorage structure under fatigue loading is verified, which can be referred for the design of the similar bridges.

Keywords steel-concrete composite beam, shear lag fatigue

Checking and Analysis on Persistence Condition and Crack Resistance of Pre-stressed Concrete Hollow Simple-supported Slab Chen Haiyang (64)

Abstract: Based on the existing design information and the latest bridge design code, and according to the checking basis of the relative theory, the article preliminarily studies the persistence condition and crack resistance calculation method of a pre-stressed concrete hollow simple-supported slab, and checks and analyzes its inner force. The result shows that its structure satisfies the requirements of strength, rigidity and stability.

Keywords pre-stressed, concrete hollow simple-supported slab, persistence condition, crack resistance, checking analysis

Design, Study and Analysis of External Pre-stressing Reinforcement Technology in Reinforcement of Bridge Structure Yang Yuanyuan (68)

Abstract: The external pre-stressing technology has the advantages of simple construction, reliable structure and cost economy, and is widely applied in the newly built bridge structures. A large number of old bridges have the structural cracks or are greatly deformed because of the steel bar corrosion and overloading, or because of load upgrade of highway bridge required to reinforce. The article introduces the construction of the external pre-stressing reinforced bridge structure system, and the reinforcement design and quality monitoring technological measures of external pre-stressing steering gear.

Keywords bridge, external pre-stressing reinforcement design, anchor system

Study and Discussion on Seismic Design of General Bridges in Tianjin Area Feng Keyan, Li Lianqiang, Chen Liangtian, Zhao Xingzhong (71)

Abstract: The new bridge seismic resistance codes of *Highway Bridge Seismic Design Details* (JTG/T

B02-01-2008), *Urban Bridge Seismic Design Code* (CJJ 166-2011) and *Highway Engineering Seismic Code* (JTG B02-2013) are issued in succession. The seismic design of general bridge is different from the former. Taking seismic calculation and analysis of bridge in Tianjin as the examples, the article summarizes the different seismic designs of the old and new bridge codes in E1 stage, and reveals the basic laws of general bridge seismic design in E1 stage in Tianjin.

Keywords: design of two stages, fortification of two levels, response spectrum, seismic ductility design, seismic mitigation and absorption design

Inspection Evaluation and Maintenance Reinforcement Technology of Bridge after Fire
..... Cheng Haiqian, Wang Jiayu, Zhang Jian, Wang Kangming (75)

Abstract: The fire failure will cause the structural damage of bridge and endanger the operation safety. Taking Shizigu River Bridge after fire as an example, the article discusses the contents and methods of inspection evaluation in detail. The maintenance reinforcement scheme is defined according to the details of this bridge structural damage, and its implementation effect is tested by the load experiment. The result shows that the maintenance reinforcement achieves the good effect, which can be referred for the maintenance reinforcement of the similar bridges after fire.

Keywords: bridge, fire, inspection, maintenance reinforcement, load experiment

Design and Case Analysis of Bridge Foundation Pile in Karst Region Guo Kuo (80)

Abstract: With the continuous Deepening of the study on the construction technology and design method of pile foundation, the study on the design theory, construction technology and treatment method of bridge pile foundation also becomes more and more important in the karst region. According to the detailed engineering practice, the article systematically summarizes the design theory application of pile foundation and treatment measures of karst fault in karst region, and introduces the application in the engineering practices with the good effect.

Keywords: karst, bridge foundation pile, design, case analysis

Elementary Analysis on Design of Special-shape Arch Bridge in South Sixin Road Chen Quan, Tao Hua (83)

Abstract: The special-shape arch bridge is a more new and distinctive spatial composite structure system bridge structure and is developed from the normal arch bridge with the novel appearance and innovative design. The South Sixin Road Bridge crossing Zonggang is a one-span special-shape arch bridge. The calculated span is 56 m. The double-pin antisymmetric steel box arch ring is used without wind bracing. The main beam is the pre-stressed concrete structure. The article sets forth the structural design and calculation analysis of this special-shape arch bridge.

Keywords: special-shape arch bridge, bridge aesthetics, structural analysis

Analysis and Study of Bridge Structure Safety under Heavy Vehicle Load Effect Han Bo (86)

Abstract: The heavy vehicle is small proportion in the whole traffic vehicles, but the special traffic requirement of bridge cannot be calculated according to the load class required in the current code, and is required to upload and calculate based on the practical vehicle loads. Owing to the practical vehicle load effect of heavy vehicle load larger than the calculation standard value of code, it is required to achieve the vehicle weight, axle load, wheel base, space headway, vehicle speed and the other parameters of the practical passing vehicles for the integral and local checking calculation of bridge structure.

Keywords: heavy vehicle load, vehicle load, load effect

FLOOD CONTROL & DRAINAGE

Elementary Analysis on Special Drainage Planning of Small Town Wang Jun (89)

Abstract: With the development of urbanization, the town drainage planning problems have become the new task to be solved. Taking a town drainage planning of Xian City as an example, the article analyzes the characteristics and methods of small town drainage planning.

Keywords: drainage engineering planning, drainage system, rainstorm intensity, specific discharge of sewage

Survey on Combined Sewer of Rainwater and Sewage in Chongming Area of Shanghai Gao Jian (92)

Abstract: This paper introduces the survey on the combined sewer of rainwater and sewage in Chongming of Shanghai, finds out the cause of abnormal water flow, provides an important foundation for the subsequent reconstruction, and also can provide the reference for the similar situations.

Keywords: drainage pipe network, combination of rainwater and sewage, CCTV inspection, flow measurement, CODcr concentration

Application of Gas Shield Dam in Changzhi City Heishui River Controlling Project
..... Chi Limin, Hu Zhengrong, Su Qin (96)

Abstract: The article introduces the gas shield dam and its advantages by the engineering design case of gas shield dam in Heishui River of Changzhi City, and sets forth the wide application of gas shield dam as a safe and convenient structure adapting for the rivers of the northern cities.

Keywords: gas shield dam, city river, water retaining structure

MANAGEMENT & CONSTRUCTON

Study on Maintenance Management and Strategy of Highway Ci Weichao (98)

Abstract: The highway maintenance is the effective guarantee for the high-effective operation of the national

road traffic system. In recent years, with the rapid promotion of highway infrastructure construction in China, the maintenance management problems of highway are more and more prominent, and seriously restrict the sustainable development of highway. In order to improve the highway maintenance management level, and aiming at the problems existing in the current maintenance and management of highway in China, the article deeply analyzes the problem source and puts forward the relative proposal and strategy.

Keywords: highway maintenance, reform of maintenance mechanism, maintenance management

Application of Self-balance Method in Bearing Capacity Test of Single Pile in Yellow River Bridge at Hekou Liao Haidong (100)

Abstract: The Hekou Yellow River Bridge is located at Hekou Town in Xigu District of Lanzhou City. It is the control engineering of South Ring Expressway in Lanzhou. The superstructure of bridge is a combined bridge of precast box girder and continuous beam with variable cross-section (177 m + 360 m + 177 m + 2 × 40 m + 5 × 35 m), and the substructure is a cylinder pier platform. The main bearing stratum of pile foundation is the cretaceous clay rock, which belongs to the weak swelling soft rock. The determination of the bearing capacity of single pile is one of the main tasks in the survey and design of this bridge. Based on the static load test by self-balanced method, the bearing characteristics of single pile of the cretaceous clay rock in bridge site are systemically studied in this paper.

Keywords: self-balanced method, bearing capacity of single pile, clay rock, Hekou Yellow River Bridge

Study on Load Shift Installation Technology of Long-span Continuous Steel Box Girder Chen Xu (104)

Abstract: The article introduces a construction method of long-span continuous steel box girder. It is the load shift construction method. This method is suitable for the long-span steel box girder crossing the existing line and the clearance of ground traffic intersection and railway limited by the obstacles of high voltage cables and etc. And the better quality effect and economic benefit can be achieved.

Keywords: long span, continuous steel girder, load shift

Analysis on Construction Technology of Highway Bridge Culvert Tunnel Engineering Peng Xianxiang (107)

Abstract: Combined with Qianxi - Zhijin Project in Chishui - Wangmo Expressway, the article analyzes the engineering construction technology of highway bridge culvert tunnel. The relative experience can be referred for the similar projects.

Keywords: highway bridge, construction technology, culvert tunnel

Construction Technological Measures for 40-m Pre-stressed Concrete I-beam Tian Wei (109)

Abstract: The pre-stressed concrete I-beam has the advantages of long span, light weight, economy, reasonable and simple construction, and is more and more widely used in the highway construction. Based on its structural characteristics of I-beam, only the key control point of quality is mastered better, the engineering quality and safety can be guaranteed in the engineering construction. According to the

construction practice of Shimengou Bridge in the transit section of Lanzhou in the National Highway 312, the article summarizes the construction technology and key control point of pre-stressed concrete I-beam. The relative experience can be referred for the similar projects.

Keywords: 40-m I-beam, lateral bending control, tensioning management, erection of side beam, bend transport

Application of Two-dimension Code Technology in Construction Management of Prefabricated Assembled Bridge
..... Li Yizhi, Jiang Haixi, Kang Zhuang (112)

Abstract: The bridge prefabrication and assembly technology, as the building technology of professional factory prefabrication and rapid field assembly, not only greatly improves the construction efficiency and decreases the field workers, but also reduces the influence of construction on the environment and traffic, and improves the working environment of field workers. Owing to the great difference of the factory prefabrication of bridge component from the conventional construction mode, it is required to use a more advanced and feasible management mode to satisfy the advancement of construction mode, ie. the two-dimension code management mode of professional prefabrication factory. The article introduces the application of two-dimension code technology in the construction management of prefabricated assembled bridge including the two-dimension code standard format and special software development, the research and development of two-dimension code scanning display technology, and the special software development of two-dimension tracking management

Keywords: bridge prefabrication and assembly technology, prefabrication factory, construction management, two-dimension code

Elementary Discussion on Design of Mix Proportion of New Duct Grouting Material by Post-tensioning Method ...
..... Hu Qiongxin (115)

Abstract: The post-tensioning method of prestressing is widely used in the modern bridge, and specially plays the important role in the modern standard span of simple-supported bridge. The mix proportion design of duct grouting by post-tensioning method is strictly according to the concrete industrial code and requirement of the Ministry of Communication for the test mixing. The old and new codes are compared. Under the condition of satisfying the code and design requirement, the cost is economized and the effect is obvious.

Keywords: post-tensioning method, new grouting material, design

Application and Practice of ROV Diving Robot Detection Technology in Inverted Siphon Crossing Huangpu River
..... Xu Chan, Bao Yuequan, Sun Yueping, Wu Jiandong (118)

Abstract: The urban sewage pipeline network is hard to implement the detection, i.e. the inverted siphon crossing the large river because of some pipelines been deeply embedded in long distance, and long in full water state. According to the practical detection cases, the article introduces the pipeline detection technology

of the pipeline sonar detecting probe equipped with ROV diving robot, and the technological scheme formed an integrating detection, and summarizes the achievements of implementing the detection of three inverted sewage siphons under Huangpu River of Shanghai.

Keywords: ROV diving robot, sonar detection, inverted siphon, long-distance detection, no-stop conveying detection

Brief Description of Cast-in-site Construction of Main Arch Ring Bracket of Fengyu Bridge on Qingshui River

..... Peng Li (121)

Abstract: The main span of Fengyu Bridge on Qingshui River of Kaili City is a 150-m uniform section catenary suspension box fixed-end arch. Its net rise of arch is 30 m and is constructed by bracket in site. The article introduces the design scheme of its cast-in-site bracket and the construction technology of main arch ring.

Keywords: boxed arch bridge, main arch ring, cast-in-site bracket, scheme, construction

Elementary Discussion on Construction Technology of Stand Column in Prefabrication and Assembly of Bridge

..... Wu Jianbing, Zhang Yufu, Yang Guangqiang (123)

Abstract: With the rapid development of city construction, the traffic problem has become the important issue in the city development. In order to solve the traffic problem, more elevated roads are required to build in city. The conventional cast-in-situ construction technology of bridge pier column will bring many contradictions and adverse impact, and instead cause the larger pressure on city. Therefore, the rapid construction and green construction have become the urgent demand in the construction of urban bridge. The advantage of bridge prefabrication and assembly technology just satisfies the construction requirement of urban bridge pier column. The article focuses introduction on the main construction technology of stand column in the prefabrication and assembly technology.

Keywords: prefabrication and assembly of stand column, high accuracy, rapid construction

Elementary Discussion on Crack Fault and Prevention of Cement Stabilized Macadam Base ... Wang Mingxia (126)

Abstract: According to the crack fault causes of highway cement stabilized macadam base, the article puts forward the relative prevention measures. The practice shows that the reasonable preventive measures can decrease the cracks, and discusses the crack fault and prevention of cement stabilized macadam base. The relative experience can be referred for the similar projects.

Keywords: cement stabilized macadam, crack fault, prevention

Elementary Discussion on Disposal of Road Fault in Maintenance of Urban Road Wang Sishun (128)

Abstract: According to the routine maintenance of roads in Kaifeng City, the article analyzes the maintenance characteristics and requirements of asphalt concrete road cracks, and the factors for attention.

Keywords: road, maintenance, asphalt concrete pavement, crack

STUDY ON SCIENCE & TECHNOLOGY

Study on Mechanical Properties of Polyurethane Fly Ash Material and Its Application in Seismic Reinforcement of Bridge PierDeng Xiaoqiong (130)

Abstract: The article introduces the experimental study on the mechanical properties of polyurethane fly ash material, proposes the new method of external polyurethane fly ash material and hooping to carry out the seismic reinforcement of steel reinforced concrete bridge pier, and uses the finite element software ABAQUS to establish the solid model for the numerical simulation and to analyze its seismic property.

Keywords: polyurethane fly ash material, concrete, steel reinforced concrete bridge pier, curve, seismic reinforcement

Study on Preparation and Property of CA Mortar for CRTS I-type Slab Ballastless Track Li Liangying, Yuan Feng (134)

Abstract: As a cushion layer structure completely bearing track slab, CA mortar will directly impact the economy, durability and safety of the slab track structure. This experiment compounds the emulgator to prepare the emulsified asphalt. The orthogonal experiment determines the optimum formula of emulsified asphalt. The result verifies that various technical indexes of this formula can satisfy the relative requirements of *Tentative Specifications of Cement Emulsified Asphalt Mortar for CRTS I-type Slab Ballastless Track of Passenger Dedicated Railway*. And this formula has good storage stability and cement adaptation. Various indexes all satisfy the requirements if this emulsified asphalt is used to mix CA mortar. And on this basis, the article analyzes the factor influencing the strength of CA mortar.

Keywords: ballastless track, CA mortar, emulsified asphalt

Research on Friction Property of Pile-soil Interface under Moisture Content Change Environment Duan Jie (137)

Abstract: The water level fluctuation of lake area will make the surrounding soil mass be under the environment of periodic moisture content change. For the friction pile under such environment, the friction coefficient of pile-soil interface will be changed therewith. Taking the pile foundation reinforcement project of expressway soft roadbed in a lake area as an example, and by the methods of field survey, indoor and outdoor experiments, and theoretical analysis, the article studies the friction property of pile-soil interface under the environment of moisture content change. The results of experimented soil samples show the change rules of friction coefficient, cohesion and friction angle of pile-soil interface with the changing of moisture content, which can be referred for the similar projects.

Keywords: pile-soil character, moisture content, friction coefficient, shear

Comparison and Study on Prediction Method of Highway Operating Vehicle Load Extremum

..... Yuan Weizhang, Huang Haiyun, Zhang Junping, Yin Xing, Liu Zege (140)

Abstract: In order to study the prediction method of bridge structure to bear the maximum vehicle load during service period, according to the dynamic weighting data of more than 30 000 group trucks on an expressway of Guangdong, the logarithmic normal distribution model, the POT model based on extreme value theory and the order statistics model are used to fit the tail distribution of operating vehicle load. Based on this model, the article predicts the vehicle load extremum possibly in the next two years, and compares to validate with the corresponding measured data. The results show that the predicted values of POT model and logarithmic normal distribution are close to the measured data. Finally, POT model is more suitable for the prediction and analysis ... of vehicle load extremum due to the existence of the theoretical defects of logarithmic normal distribution.

Keywords: ehicle load, extremum theory, POT model, order statistics model, logarithmic normal distribution

Analysis on Cantilever Retaining Wall of Top Slab Based on Temperature Action Wang Bo, Xu Bo (144)

Abstract: The cantilever retaining wall is designed to retain the soil pressure at top slab, and the mechanic characteristics of its wall structure will be obviously changed. Based on the analysis of soil pressure calculation method of cantilever retaining wall, a three-dimensional numerical calculation model of cantilever retaining wall is established to analyze the influence of its top slab temperature action on the structure stress of cantilever retaining walls. The calculation result shows that the maximum tensile stress in the middle outside of retaining wall exceeds the maximum resistance of concrete and the middle outside of vertical wall will be cracked under the combined action of soil pressure and top slab temperature rise, and the maximum tensile stress at the bottom inside of retaining wall exceeds the maximum resistance of concrete and the bottom inside of vertical wall will be cracked under the combined action of soil pressure and top slab temperature drop. The finite element calculation result is basically consistent with the actual situation. The calculation result is reliable. Accordingly, the reinforce method is proposed to the fault of structure.

Keywords: road engineering, cantilever retaining wall, variation of temperature, finite element

Application of Two Regression Equation Based on Genetic Algorithm in Settlement Data Processing

..... Wang Jiangrong, Zhao Rui, Yuan Weihong, Ren Taiming (149)

Abstract: There is non-linear relationship between the settlement and the influence factors of soft subgrade. Taking a soft subgrade expressway as an example, taking the period of time, the load of time and the loaded average rate of time as the explanatory variables, and taking the settlement of time as the explained variable, the nonlinear quadratic regression model is established. And the genetic algorithm is used to estimate model coefficients. The engineering cases show that the nonlinear regression equation optimized by the genetic algorithm has the higher prediction accuracy, its effect is better than the neural network, and it is feasible to use this model for the forecast analysis of soft subgrade expressway settlement.

Keywords: subgrade settlement, two regression equation, neural network, genetic algorithm, prediction analysis

THE RELATIVE SPECIALITIES

Damage Identification for Wood Frame Structure Based on Modal Curvature Method Wang Xin (152)

Abstract: The modal data of structural displacement is obtained by ANSYS finite element software. The different damages of wood frame structures are analyzed by the modal curvature method. The results show that the modal curvature index is more sensitive to the damage of wood frame structures and can accurately judge the detailed location of wood frame damage in order to establish the theory basis for studying the damage identification of wood building structures.

Keywords: wood frame structure, damage identification, dynamic characteristics, modal curvature

Application of Pre-stressed Concrete Beam in Transfer Floor Li Yuanjian (156)

Abstract: According to the design of the pre-stressed supporting frame girder of Suzhou Xishan Hotel, the article introduces the application of pre-stressed concrete girder in the transfer floor. The relative experience can be referred for the similar projects.

Keywords: pre-stressed concrete girder, transfer floor, bearing frame

Analysis on Overall Design of Urban Underground Comprehensive Tunnel
..... Luo Chunyu, Yuan Shaojian, Yang Zhengrong (158)

Abstract: The urban underground comprehensive tunnel is an artificial space to concentrate and lay out various urban pipelines so as to form an infrastructure integrated with intensification and modernization, and is the main development direction of city construction in the future. Based on this, this paper analyzes and discusses the overall design of urban underground comprehensive tunnel project.

Keywords: city, underground comprehensive tunnel, overall design

Design Concept of Newly Built Tunnel near Existing Small-distance Tunnel Wang Anxiang (161)

Abstract: With the quickening procedure of urban infrastructure construction in China, the newly built projects near the existing engineering gradually become a common phenomenon, but the relative contents are less, even blank in the current design code provisions. Taking a newly built tunnel near an existing tunnel as an example, the article analyzes and studies the interaction of the both newly built tunnel and the existing tunnel through the numerical simulation analysis, which can provide the technical support for the design and construction of the projects.

Keywords: existing tunnel, newly built tunnel, construction method, structural safety

Elementary Discussion of Application of LISP in Secondary Development of CAD
..... Wang Jiaqing, Zhu Qixiang, Shi Xiaozhong (164)

Abstract: The article mainly introduces the secondary development of AUTOCAD in the working environment by the use of Lisp language development program in order to achieve the improvement of working efficiency.

Keywords: LISP language, secondary development of CAD, function language, development environment

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