

International Conference on Road Tunnel Safety and Risk Prevention and Control (ICRTSR-2019)

IOP Conference Series: Materials Science and Engineering
Volume 741

Chongqing, China
5-7 December 2019

ISBN: 978-1-7138-4696-3
ISSN: 1757-8981

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

This work is licensed under a Creative Commons Attribution 3.0 International Licence.
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

International Conference on Road Tunnel Safety and Risk Prevention and Control (ICRTSR 2019)

Peer review statement

Research on Low Altitude Illumination Configuration Technology of Highway Tunnel	1
<i>Dengrong Bei, Peng Liu, Fei Ma, Yangyuyu Xia</i>	
Nonlinear Response of a Subsea Tunnel Constructed by Two Tunnelling Methods subjected to Strong Seismic Shaking.....	8
<i>Juntao Chen, Kun Hao, Jiabao Chen, Jianyun Ma</i>	
Trial Study on Visual Recognition of Cross-channel Indication Signs in Limited-visibility Tunnels	14
<i>Pan Yong, Liu Shuai, Chen Jian Zhong</i>	
Review on Tunnel Concrete Invert NDT Methods.....	22
<i>Liu Qiuzhuo, Zhou Yunteng</i>	
Application of FCTEM60-1 Instrument in Invert Rebar Testing for Highway Tunnel.....	29
<i>Qiuzhuo Liu, Yao Wang</i>	
Comparative Study on the Application Effect of Intelligent Evacuation System and Traditional Evacuation System in Road Tunnel.....	35
<i>Zhengmao Cao, Xiao Liu</i>	
Strength Reduction Method Based Study on Tunnel Excavation Effect on Front Slope Stability	42
<i>Wu Mengjun, Xi Yang, Guo Hongyan</i>	
Numerical Modeling of the Strata Deformation During Tunnel Excavation Based on Discrete Element Method	48
<i>Peng Cao, Mengjun Wu, Lin Fang, Shouchao Chen</i>	
Study on Luminance in the Threshold Zone of Highway Tunnel.....	57
<i>Wenwei Chang, Zihao Wang, Bingyin Jing, Fei Ma</i>	
Experimental Investigate on Pulling out of Anchor Based on Fiber Bragg Grating Monitoring	66
<i>Jun Duan, Chunhai Mou, Zhongwei Wang</i>	
Monitoring and analyzing the shallow-buried highway tunnel in the soft stratum.....	71
<i>Zhihua Yang, Zhongwei Wang</i>	
Study on Settlement Prediction of Soft Soil Subgrade Based on Grey Theory	78
<i>Jun Duan, Chunhai Mou, Zhongwei Wang</i>	
Study on Slope Stability of Baoshi Expressway Based on the Analytic Hierarchy Process.....	84
<i>Zhihua Yang, Zhongwei Wang</i>	
Stability analysis of surrounding rock-supporting system of shallow buried soft rock tunnel based on time effect.....	91
<i>Wei Mao, Xuejun Liu, Ruhyan Muhmar, Zhe Feng</i>	
Reinforcement Analysis of Bifurcated Highway Tunnels with Large Section of Different Surrounding Rock Grades in Tiger Leaping Gorge.....	100
<i>Dong Zhou, Wenqi Ding, Dongwu Xie, Shuwang Chen</i>	

Numerical simulation on ground deformation characteristics during double-line shield tunnel crossing airport runway	106
<i>Wenqi Ding, Zhili Shao, Xingbang Lu, Yafei Qiao</i>	
Seismic and sealant behaviour of segmental joint gaskets in shallow immersed tunnel	112
<i>Weifeng Wu, Wenqi Ding, Shiping Ge, Xingbang Lu, Tianchi Zhao</i>	
Deformation characteristics of latticed diaphragm wall in revetment foundation trench for one immersed tunnel	119
<i>Xiaoqing Chen, Wenqi Ding, Tianchi Zhao, Xingbang Lu, Lixin Wei</i>	
Design and Calculation Method for Composite Foundation Using Large-diameter Rigid Piles in Pebble Bearing Soil	127
<i>Wenhan Zhang, Feng Li, Lijuan Cheng, Jianxiao Xu</i>	
Study on Section Selection of Super Large Oil Storage Tunnel Based on Strength Reduction Method	135
<i>Liang Xiang, Fei Wang, Chao Kong, Zaiyan Zou, Huijian Zhang</i>	
Study on the Aging Deterioration Curve of Tunnel Lining in Water Rich Area	141
<i>Rihua Li, Xinqiang Gao, Chao Kong</i>	
Research on Influence Zoning of Tunnel Side Crossing Existing Urban Roads Based on Ultimate shear strain Failure Criterion	148
<i>Mingjie Tian, Daiqi Zhang, Guiyang Qu, Lei Gao, Yuqiong Li, Huijian Zhang, Wenge Qiu</i>	
Research on Influence Zoning of New Tunnels Crossing Existing Urban Roads by Orthogonal Design Considering Horizontal and Longitudinal Effects.....	156
<i>Mingjie Tian, Jiangbo Zhang, Shun Zhao, Yuqiong Li, Zhiheng Mou, Huijian Zhang, Wenge Qiu</i>	
Development of an automatic monitoring system for ground settlement induced by shield tunnelling.....	162
<i>Shifu Wan, Qiming Huang, Hailin Zhao, Xingxin Qi, Yi Liu, Wenge Qiu</i>	
Study on deformation law of double-line shield tunnel obliquely crossing underneath existing municipal tunnel	168
<i>Xingxin Qi, Wenge Qiu, Ganggang Gao, Zhenghao Zhou, Zhiheng Deng, Hailin Zhao, Shifu Wan, Qiming Huang</i>	
Three-dimension numerical analysis of large-span bridges' pile foundation adjacent to an existing tunnel.....	174
<i>Keguo Sun, Zhifei Xiao, Xu Liu, Yiqin Hong, Zonghao Hou</i>	
The Correlation Research on Reflection Characteristics of Road Tunnel's Internal Surface & Lighting Quality	179
<i>Chao Wang, Yangyuyu Xia, Peng Liu, Fei Ma</i>	
Application of 3D Laser Scanning Technology for Shield Tunnel Inspection.....	188
<i>Hailin Zhao, Qiming Huang, Shifu Wan, Xingxin Qi, Yunjian Chen, Wenge Qiu</i>	
Preparation and Evaluation of Composite Flame Retardant Asphalt in Tunnel	194
<i>Qi Pang, Jun Li, Lei Gao, Bo Sun, Shenglei Yao</i>	
Hierarchical coding system of tunnel engineering for highway maintenance informatization.....	200
<i>Kunlin Han, Feng Qin, Duan Pu</i>	

Research on Risk Assessment of Complex Mountain Tunnels Based on AHP-FCE	208
<i>Changqing Zheng, Binke Chen, Weiping Li, Zhiqiang Zhang</i>	
Quantitative analysis and calculation of traffic social cost during the construction of open-cut subway station	220
<i>Jixuan Liao, Chun Guo, Yumin Xu, Jiapeng Zhang, Kun Yang</i>	
Lighting environment analysis of Chengdu underground commercial spaces	226
<i>Yi Xie, Jixuan Liao, Chun Guo, Ke Zhang, Jiapeng Zhang, Kun Yang</i>	
Atomization performance of Tiantaishan tunnel spray dust reduction	232
<i>Bin Song, Changsong Dong, Xin Wang, Chun Guo</i>	
Dust Migration Law in Working Area of Large Cross-section Tunnel by Mining Method	238
<i>Junxiu Song, Changsong Dong, Chun Guo</i>	
Optimization of Gas Drilling in Pre - pumping Coal Seam of Gas Tunnel	243
<i>Yuqi Wang</i>	
Optimization of Jacking Sequence of Shallow-buried Pipes in Saturated Soft Soil.....	249
<i>Likang Chen, Hehua Zhu, Panpan Cheng, Long Zhou</i>	
A Fast Image Dehazing Algorithm for Highway Tunnel Based on Artificial Multi-exposure Image Fusion	259
<i>Wenfeng Li, Hongyan Wei, Guanqiu Qi, Hao Ding, Ke Li</i>	
Study on the Characteristics of Flow Field and Gas Migration in Gas Tunnels.....	265
<i>Zhengmao Cao, Xiao Liu</i>	
The Physical Model Test's Research of Ventilation in Super-long Highway Tunnels	272
<i>Chen Jianzhong</i>	
Monitoring Study on Dust Diffusion in High Altitude Tunnel under Drilling and Muck Removal Conditions	281
<i>Zhuoma Nima, Xuebing Hu, Jianzhong Chen, Ye Yuan</i>	
Monitoring and numerical simulation analysis of corrugated steel support in weak surrounding rock mountain tunnels	287
<i>Wentong Liu, Xiaoming Wang, He Jiang, Wenqi Ding, Qingzhao Zhang</i>	
Study of Freezing Scheme in Artificial Horizontal Ground Freezing Method in Multi-lane Road Tunnel Based on Numerical Simulation of Temperature Field.....	295
<i>Jun Zhang</i>	
The Setting of Road Tunnel Cross Passages Based on Risk Analysis.....	306
<i>Shuai Liu, Hao Ding, Yong Pan, Li Bin, Wei Li, Lianghong Lü</i>	
Investigation and Analysis on the Vehicle Cross Passages of Highway Tunnels.....	317
<i>Bin Li, Wei Li, Lianghong Lü, Hao Ding, Shuai Liu</i>	
Study on influence partition of tunneling adjacent to multi-storey building in upper-soft and lower-hard stratum.....	323
<i>Zhu Rui, Yang Yujie, Niu Xiaoyu, Zhang Huijian, Guo Hongbo, Qiu Wenge</i>	
The numerical analysis of the cross passage of large diameter shield tunnel beneath the river	329
<i>Biguang Chen</i>	

Study on Traffic Organization around Pivotal Tunnel Entrance/Exit.....	336
<i>Xinghong Jiang, Ke Li, Xiangyang Cui</i>	
ShenZhong Passage (Island-Tunnel) Project – Refined Exploration Technology and Management	341
<i>Jian Liu, Fengyong Xia</i>	
Road Tunnel Detection Robot and Method Based on Laser Point Cloud.....	348
<i>Wenfeng Li, Yulei Liu, Ke Li, Yong Peng, Hao Ding, Qiu-Zhuo Liu</i>	
Summary of the Development of New Technologies for Submarine Immersed Tunnel Foundation Reinforcement and Settlement Control	354
<i>Bai-yong Fu, Wei-le Chen, Guo-ping Xu, Shen-you Song, Feng-yong Xia</i>	
Numerical simulation study on the width of coal pillar in dynamic pressure roadway	370
<i>Peiliang Ren, Zongze Li, Xiangyin Guo</i>	
Analysis on Application Effect of Prestressed Anchor Cable in Large Span Tunnel.....	377
<i>Ke Li, Xinghong Jiang</i>	
Deformation Control Standard of Utility Tunnel Based on Crack Control Standard	383
<i>Yanbiao Cai, Zipeng Du, Gen Zhang, Jiajia Feng</i>	
Investigation of Deformation Influence on Throat Area of Highway Tunnel across the railway station	388
<i>Pinpip Li, Haiyun Huang, Wenge Qiu</i>	
Review on the Development Status of Tunnel Refractory Technology Research	396
<i>Shengyou Song, Yang Xi</i>	
Study on Deformation of Shallow Buried Underground Pipe Gallery	403
<i>Junfei Xie, Nenghao Huang, Jiajia Feng, Gen Zhang</i>	
Research on Fault Diagnosis Method of Tunnel Inspection Robot Based on T-S Fuzzy FTA.....	409
<i>Wen-feng Li, Hao Ding, Ke Li, Qiu-zhuo Liu, Xing-hong Jiang</i>	
Study on Prediction of Gas Burst Hazard Before Advancing a Tunnel Through Coal Seam.....	417
<i>Xuebing Hu, Liang Cheng</i>	
Safety Analysis of the Secondary Lining Structure of Existing Tunnel with Cracks.....	422
<i>Shuang Cai, Hao Ding</i>	
Study on the Limit Value of Safety Overburden Layer Thickness of Large-Span Bias Tunnel.....	429
<i>Hongyan Guo, XinRong Liu, Like, Xiangyang Cui</i>	
Experimental Study on Mechanical Property of Highly Weathered Tuff for High-altitude Tunnel.....	438
<i>Li Ke, Guo Hongyan, Song Hengxiang, Jiabao Chen</i>	
Numerical Ultimate Load Analysis Based Study on Safety Monitoring Reference Value for Tunnels in Weak Rock	444
<i>Hongyan Guo, Zhiwei Xiao, Ke Li, Hengxiang Song</i>	
Development and Application of Portable Intelligent Warning System for Safe Tunnelling.....	450
<i>Hao Ding, Hongyan Guo, Ke Li, Jianyun Ma</i>	
Development and Implementation of Structural Safety and Typical Distress Long Term Monitoring Technology for Operating Tunnels.....	456
<i>Fei Jin, Hongyan Guo, Ke Li, Fei Ma, Junwei Su</i>	

Study on the Influence of Micro Parameters of Numeric Model Using Particle Flow Code on Macroscopic Mechanical Properties in Cobble Stratum.....	463
<i>Lin Fang, Peng Hu, Mengjun Wu, Peng Cao, Shouchao Chen</i>	
Eye Adaptation Effect Based Study on Configuration of Tunnel Entrance Structure	471
<i>Guogang Gao, Yangyuyu Xia, Zihao Wang</i>	
Research on Assessment of Highway Tunnel Operating Safety.....	480
<i>Siyang Chen, Yangyuyu Xia, Fei Ma, Haomiao Liao</i>	
Web Crawler Based Study on Traffic Accident Data Acquisition for Operating Tunnels	486
<i>Zhipeng Liao, Hao Ding, Yangyuyu Xia, Fei Ma</i>	
Study on Features of Hazardous Goods Transport Accidents on Highway.....	493
<i>Yangyuyu Xia, Fei Ma, Haomiao Liao, Zhipeng Liao</i>	
Simulation study on rock slope reinforced by anti-slide pile: a case study	501
<i>ZhongShuai Liu, Feng Xu, Yu Fu, Hong Kang</i>	
Study on calculation method of new corrugated steel reinforcement structure of highway tunnel	509
<i>Chengshuo Yu, Wenqi Ding, Tianxiang Wu, Qingzhao Zhang</i>	
Analysis and Evaluation of the Countermeasures for the Protection Measures of Subway Near-line Pipeline.....	516
<i>Weiping Xu, Chuxuan Zhao, Zonghao Hou, Ziyi Yuan, Zhifei Xiao, Keguo Sun</i>	
Survey on the Application of Prefabricated Structure in Underground Engineering	523
<i>Zhaoyang Chen, Xinqiang Gao, Xiaoyong Zhao, Fei Wang, Chao Kong</i>	
Analysis of the Influence of New Parallel Tunnels on the Safety of Existing Highway Tunnels	528
<i>Yonggang Fang, Xiqiang Dong, Jin Feng, Zhuoqian Ma, Zhe Ma, Hao Ding</i>	
Parameter optimization of corrugated steel initial support structure of mountain tunnel based on sensitivity analysis.....	535
<i>Guofeng Li, Chengshuo Yu, Xiaoming Wang, Wenqi Ding, Qingzhao Zhang</i>	
Study on Reasonable Combination of Retaining Structure and Main Structure for Tunnel Shaft in the Offshore Environment	542
<i>Li Jin</i>	
Analysis and Safety Assessment of Lining Thickness Defects in Highway Tunnels.....	551
<i>Xinghong Jiang, Ke Li</i>	
Scale Model Study on Water Seepage from Cracked Lining Structure.....	560
<i>Hao Ding, Xinghong Jiang, Ke Li</i>	
Safety Analysis for Construction of Building Structures in Close Proximity to Existing Tunnel.....	566
<i>Wu Shengzhong, Jiang Xinghong</i>	
Study on static mechanical properties of gabion specimen	574
<i>Miao Longgang, Zhang Huijian, Niu Xiaoyu, Zhu Rui, Xue Qingshuai, Jiang Yongwang</i>	
Research on the Mechanical Response of Tunnel Structure under Water Softening Surrounding Rock	580
<i>Kun Qian, Xiaoming Wang, Rongqing Zhu, Wenqi Ding</i>	

Research on Safety Evaluation Method of Tunnel Visual Environment.....	586
<i>Qi Zhang</i>	
Research on Influence of Pile-arch Conversion Structure on Existing Tunnel	595
<i>Zhiheng Deng, Xiliang Gao, Menggen Yang, Feiyue Yan, Xingxin Qi, Wenge Qiu</i>	
Seismic Response and Damage Mechanism of the Subway Station in Rock and Soil Strata.....	601
<i>Juntao Chen, Kun Hao, Jiabao Chen, Jianyun Ma</i>	
Study on Dust Concentration Control Index during Construction of High Altitude Tunnel	607
<i>Zongliang Zou, Xuebing Hu, Langcairen Nan, Jianzhong Chen</i>	
Study on Application of a Five-step Approach to Gradual and Fast Coal Uncovering during Gassy Tunnel Construction.....	615
<i>Liang Cheng, Ke Li, Xinghong Jiang</i>	
Research on Fire Smoke Controlling Effect of Submarine Road Tunnel Based on FDS.....	622
<i>Zhengmao Cao, Xiao Liu, Jianzhong Chen</i>	
Analysis of the influence of super high-rise building construction on large-span tunnels adjacent to overlapping tunnels	628
<i>Shun Yu, Bo Xiao, Xixi Zheng</i>	
Optimization of construction parameters of Highway Tunnel CRD Method.....	637
<i>Wang Yuwen, Hua Kaicheng, Li Ke, Guo Hongyan, Cui Xiangyang</i>	
Optimized Selection of Construction Scheme for Huiqing Expressway Tunnel.....	644
<i>Hua Kaikeng, Guo Hongyan, Li Ke, Cui Xiangyang</i>	
Study on Prediction of Burst Hazard Associated with Advancing a Tunnel through Goaf.....	652
<i>Liang Cheng, Hao Ding, Xinghong Jiang</i>	
Development and Application of Tunnel Apparent Distress Monitoring System Based on Video Image Analysis	657
<i>Hongsheng Ang, Fei Ma, Junwei Su, Hongyan Guo, Ke Li</i>	
Study on Fire Accidents in Tunnels	665
<i>Jianying Bai, Haomiao Liao, Yangyuyu Xia</i>	
AHP and Casualties Calculation Based Research on Road Tunnel Fire Risk Evaluation.....	674
<i>Yangyuyu Xia, Busan Wang, Fei Ma</i>	
“Human-Vehicle-Tunnel-Environment” Based Study on Key Issues and Solutions of Operation and Maintenance Risk Evaluation for Urban Road Tunnels	682
<i>Hao Ding, Fei Ma, Yangyuyu Xia, Zhipeng Liao</i>	
Finite Element Analysis of the Influence of Deep Foundation Pit Excavation Construction on Adjacent Subway Tunnel Structure.....	693
<i>Guangping Li, Weizheng Xi</i>	
Application and Prospect of New Steel Corrugated Plate Technology in Infrastructure Fields.....	705
<i>Xingping Wang, Zhijie Wang, Chun Guo, Yu Han, Jianhua Zhao, Nan Lu, Huizhi Tang</i>	
Study on Temperature Control of Ventilation System in Construction Period of High Ground Temperature Tunnel	716
<i>Zengwei Zhang, Fan Chen, Song Yang, Zubin Ai, Zhensheng Cao, Qibo Mou</i>	

Study on multi-arch tunnel leakage disease with influence of rainfall and groundwater change	722
<i>Jianxun Shi, Xingkai Zhang, Jizong Liang, Lihang Hu, Zhaozhi Li</i>	
Research on the influence zone dividing of tunneling adjacent to existing tunnel based on ultimate strain criterion.....	732
<i>Zhiheng Mou, Huijian Zhang, Mingjie Tian, Wenge Qiu</i>	
Construction of a large-section long pedestrian underpass using pipe jacking in water-filled clay	738
<i>Lishuai Wang, Chao Kong, Feng Peng, Baobao Zhang, Jiqing Deng, Song Gu, Quan Sun</i>	
Discussion on the Treatment of Karst Water of Jinmen Tunnel During Construction.....	744
<i>Li Xiaobo, Yu Shun, Zhu Jiong</i>	
Analysis of controlled blasting for Large-span Tunnel Passing beneath Cultural Relics Building.....	751
<i>Jun Xiong, Junling Si, Yuchao Zheng</i>	
Study on the Seismic Response of Long and Large Tunnel under Non-Uniform Excitations	758
<i>Xiwen Zhang, Weidong Zhu, Yan Liu, Jian Tang</i>	
Study on the optimization of the approaching construction of the four-hole large-section municipal tunnels crossing railway tunnel	764
<i>Lun Gong, Jingwen Yu, Xuefei Sun, Zhixin Zhang, Jinlin Wu</i>	
Study on Fire Smoke Characteristic in Double-tube Road Tunnel with Complementary Ventilation System	771
<i>Yonggang Fang, Jian Shen, Jianrong Chen, Jingyu Wang, Weiping Li</i>	
Health Damage Assessment about Construction Noise of Tunnel Adopting Drilling and Blasting Method	779
<i>Xiaofeng Chen, Chun Guo, Jianghao Cheng</i>	
Study on the Standard of Fire Disaster Prevention for Super Large Cross Section Immersed Tunnels	786
<i>Xiaohua Deng, Zhengmao Cao</i>	
Monitoring Study on CO and Dust Diffusion in High Altitude Tunnel under Blasting Operation	794
<i>Zongliang Zou, Xuebing Hu, Ye Yuan, Jianzhong Chen</i>	
Research Progress on Smoke Control Technology for Highway Tunnel Fire.....	800
<i>Fengyong Xia, Yuxuan Yang</i>	
Design and construction example of inadequate embedded depth of retaining piles in ventilation tower basement excavation of underwater tunnel.....	811
<i>Yang Linsong</i>	
Design and Rapid Construction Technique for Bibanpo High-speed Railway Bifurcation Tunnel	816
<i>Xinghong Jiang, Ke Li</i>	

Author Index