

Underground Infrastructures Planning Design And Construction

Janice Morphet sets out and analyses the key components of infrastructure delivery in Britain, both at national and neighbourhood level, situating this within international, European and domestic economic, territorial and social policy. Underground Infrastructures Planning, Design, and Construction Butterworth-Heinemann

Underground infrastructure (traffic and railway tunnels, water and sewage ducts, garages, and subways) is essential for urbanized areas, as they fulfill an important role in the transportation of people, energy, communication and water. Underground Infrastructure of Urban Areas is a collection of papers on the design, application, and maintenance of underground and subterranean systems, with a focus on geotechnical aspects and town planning issues. The topics covered include: Gas and potable water pipes; Underground storage reservoirs; Urban technical infrastructure and city management; Drainage system infrastructures; Micro tunneling pipelines; Underground garages; Material structures; and, Road tunnels. Underground Infrastructure of Urban Areas is of interest to academics, designers and builders of underground structures, manufacturers and suppliers of building materials and equipment, and to policy makers involved in managing and maintaining these structures. ..

"The increased use of underground space for transportation systems and the increasing complexity and constraints of constructing and maintaining above ground transportation infrastructure have prompted the need to develop this technical manual. This FHWA manual is intended to be a single-source technical manual providing guidelines for planning, design, construction and rehabilitation of road tunnels, and encompasses various types of road tunnels"--P. ix.

This book presents human factors research focused on achieving and assessing sustainability in the built environment and architecture. It reports on advanced engineering methods for architecture and design, and on assessments of the social, environmental, and economic impacts of various designs and projects. The book covers a broad range of practical studies relating to ergonomic design and assessment of public and private places, urban ecological constructions, and urban planning for smart city. Further topics include green area planning, environmentally-responsive architecture, and conservation and adaptation of vernacular architectures in modern design. Based on the AHFE 2021 Conference on Human Factors in Architecture, Sustainable Urban Planning and Infrastructure, held virtually on 25-29 July, 2021, from USA, this book offers a wealth of perspectives on sustainability and ergonomics in architecture and urban planning. As such, it represents a timely source of inspiration for designers, architects, urban planners, as well as civil and environmental engineers, and other professionals, including policy-makers, involved in the development of

sustainable buildings and infrastructure.

The so-called fourth dimension of a metropolis is the underground space beneath a city which typically includes structures such as tunnels, which facilitate transport and provide gas, water and other supplies. Underground space may also be utilised for living, working and recreational facilities and industrial storage. These volumes focus on underground city design and planning; geotechnical survey and improvement of ground mass; and research, development and design of underground constructions in built-up areas. Also covered is the construction and monitoring of urban tunnels, including underground constructions executed from the surface; distribution and management of risks and accidents during tunnelling; tunnel equipment; fire and operational safety. This collection of papers will be invaluable to researchers, scientists, engineers and professionals working in the underground space.

Share our experiences, our successes and failures, and our ideas and dreams, all with the goal of getting better at the work we love: building tunnels. Every two years, industry leaders and practitioners from around the world gather at the Rapid Excavation and Tunneling Conference (RETC), the authoritative program for the tunneling profession, to learn about the most recent advances and breakthroughs in this unique field. The information presented helps professionals keep pace with the ever-changing and growing tunneling industry. This book includes the full text of 111 papers presented at the 2019 conference covering such topics as contracting practices, design and planning, geotechnical considerations, hard-rock tunnel boring machines, new and innovative technologies, pressure-face TBM case histories, and tunneling for sustainability. The papers will inform, challenge, and stimulate each reader.

To help researchers from different areas of science understand and unlock the potential of the Polish Grid Infrastructure and to define their requirements and expectations, the following 13 pilot communities have been organized and involved in the PLGrid Plus project: Acoustics, AstroGrid-PL, Bioinformatics, Ecology, Energy Sector, Health Sciences, HEPGrid, Life Science, Materials, Metallurgy, Nanotechnologies, Quantum Chemistry and Molecular Physics, and SynchroGrid. The book describes the experience and scientific results achieved by the project partners. Chapters 1 to 8 provide a general overview of research and development activities in the framework of the project with emphasis on services for different scientific areas and an update on the status of the PL-Grid infrastructure, describing new developments in security and middleware. Chapters 9 to 13 discuss new environments and services which may be applied by all scientific communities. Chapters 14 to 36 present how the PLGrid Plus environments, tools and services are used in advanced domain specific computer simulations; these chapters present computational models, new algorithms, and ways in which they are implemented. The book also provides a glossary of terms and concepts. This book may serve as a resource for researchers, developers and system administrators working on efficient exploitation of available e-

infrastructures, promoting collaboration and exchange of ideas in the process of constructing a common European e-infrastructure.

Project planning is generally accepted as an important contributor to project success. However, is there research that affirms the positive impact of project planning and gives guidance on how much effort should be spent on planning? To answer these questions, this book looks at current literature and new research of this under-studied area of project management. The author presents his findings from an extensive review of project planning literature that covers more than 270 sources. He also discusses new research that analyzes data from more than 1,300 global projects. The book confirms that the time spent on planning activities reduces risk and significantly increases the chances of project success. It also concludes that there can be too much planning and shows that the optimum ratio of planning to effort is 25%. The book examines the impact of project planning on different industries. It discusses research in the construction and information technology (IT) industries, and presents a case study of how to plan and track a software development project. The book also looks at the impact of geography on project planning and success. Intended as a basic tool in the library of any project manager or general manager, this book brings to light project planning techniques and information that have never been published previously. It is an important resource on how to plan projects properly and propel your career forward.

This book presents selected papers from the International Symposium on Geotechnics for Transportation Infrastructure (ISGTI 2018). The research papers cover geotechnical interventions for the diverse fields of policy formulation, design, implementation, operation and management of the different modes of travel, namely road, air, rail and waterways. This book will be of interest to academic and industry researchers working in transportation geotechnics, as also to practicing engineers, policy makers, and civil agencies.

This book explains how water, electricity/power and roads are linked together within the general basket of development and how to obtain the optimum use of resources. The emphasis, nowadays, is on multipurpose activities, optimum use of resources, environmental approach, minimum use of energy. This book tries to integrate all of these, by showing the links between the different components of infrastructure and trying to model them. A very good design may fail during the implementation or operation because of bad design, but also due to inadequate attention given to the human aspects required for its operation. This book is intended for graduates or practicing professionals who are involved in the general development planning of their country/region. It creates a general awareness about what is needed to communicate with other professionals in terms of their own fields and others.

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Geologists and civil engineers related to infrastructure planning, design and building describe professional practices and engineering geological methods in

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different European infrastructure projects.

Trenchless technology allows for the installation or renewal of underground utility systems with minimum disruption of the surface. As water and wastewater systems age or must be redesigned in order to comply with environmental regulations, the demand for this technology has dramatically increased. This is a detailed reference covering construction details, design guidelines, environmental concerns, and the latest advances in equipment, methods, and materials. * Design and analysis procedures * Design equations * Risk assessment * Soil compatibility and more

This volume contains a compilation of studies regarding novel technology of underground space development, behavior analysis and modelling of soils and underground infrastructure from the 6th GeoChina International Conference held in Nanchang, China from July 19 to 21, 2021. The scope of the studies covers both methodological and pragmatic solutions to critical issues, including soil arching and invert heaving, penetration resistance of mono-bucket foundations in silty soil, inception of debris avalanches, and novel infrastructure survey methods based on point cloud and image analysis. It is anticipated that this updated knowledge will lead to more resilient design, expedited inspection, timely maintenance and rehabilitation of underground infrastructure, and will be beneficial to both researchers and practitioners in the field.

Underground the way to the future was the motto of the World Tunnel Congress 2013 in Geneva, Switzerland. The use of underground space has gained importance during the last years due to the tremendous global urbanization, the high demand on transportation capacities and energy production. All this result in a wider range of use of underground spa

Planning Sustainable Cities: An infrastructure-based approach provides an analytical framework for urban sustainability, focusing on the services and performance of infrastructure systems. The book approaches infrastructure as a series of systems that function in synergy and are directly linked with urban planning. This method streamlines and guides the planning process, while still highlighting detail, each infrastructure system is decoded in four "system levels". The levels organize the processes, highlight connections between entities and decode the high-level planning and decision making process affecting infrastructure. For each system level strategic objectives of planning are determined. The objectives correspond to the five focus areas of the Zofnass program: Quality of life, Natural World, Climate and Risk, Resource Allocation, Leadership. Developed through the Zofnass Program at the Harvard Graduate School of Design, this approach integrates the key infrastructure systems of Energy, Landscape, Transportation, Waste, Water, Information and Food and explores their synergies through land use planning, engineering, economics and policy. The size and complexity of infrastructure systems means that multiple stakeholders facing their own challenges and agendas are involved in planning; this book creates a common, collaborative platform between public authorities,

planners, and engineers. It is an essential resource for those seeking Envision Sustainability Professionals accreditation.

This text presents about 150 papers based on an international symposium on mine planning and equipment selection, held in Canada in 1995. Coverage includes: design and planning of surface and underground mines; surface mining and the environment; tailings disposal; and slope stability analysis.

This dissertation, "Feasibility Study of Vertical Greening for Underground Space in Hong Kong" by Jo-yi, Ho, ???, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. Abstract: Due to the scarce and limited land resources for infrastructure development in Hong Kong, the government has proposed the enhanced utilization of underground space in the future infrastructure development. Though utilization of underground space provides significant benefits in urban planning, its associated negative effects (both psychological and physiological) could not be overlooked. Implementation of vertical greening as one of the design elements serves as a solution to tackle with the negative effects in underground infrastructures. This study aims to investigate and evaluate the feasibility of vertical greening for underground space in technical, economic and operational aspects. The methodologies used in this study includes literature review, questionnaire and interview. Through studying the literature, the current development and technical issues of indoor vertical greening and the knowledge gap is identified. This method is also used for summarizing the potential environmental benefits provided by indoor vertical greening in underground space. After obtaining fundamental knowledge related to the research topic, questionnaire is conducted to assess the public attitude towards perception of underground space and vertical greening as well as acceptance and concerns about these issues. The public shows a supportive attitude for the implementation of vertical greening in underground space, and more than half of them do think the vertical greening can help to alleviate negative effects brought by underground environment. In addition, they show positive attitude towards the applications in underground MTR station and shopping centres. The public also indicated that though there is investment, they think it is still worthy to install vertical greening in underground space as it could provide environmental, social and economic benefits. At the same time, interviews are conducted with experts in landscape and property management field respectively in order to obtain professional and marketing information of vertical greening in Hong Kong. The findings help to consolidate the feasibility studies. In the technical feasibility study, technical issues of two main classifications of vertical greening and four applications in Hong Kong and other countries have been discussed. In the economic feasibility study, the cost-benefit

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analysis of vertical greening for underground space has been discussed. Environmental, psychological, social and private benefits have been covered and elaborated comprehensively. The estimated cost of the vertical greening based on the assumptions (i.e. a 12.5 m DEGREES2 living wall system with 10-year service life) is HKD \$50,050 per year. In the operational feasibility study, the issues most likely concerned by the public and potential stakeholders have been discussed and explained with practical solutions. Recommendations are made for the enhancement of sustainability of the vertical greening in underground space. Also, it is suggested that the environment, social and economic benefits should be further investigated and explored in order to enhance public acceptance and willingness of property owners/project proponents to implement vertical greening in the coming underground space development. Subjects: Underground areas - China - Hong Kong Vertical gardening - China - Hong Kong Challenges, Opportunities and Solutions in Structural Engineering and Construction addresses the latest developments in innovative and integrative technologies and solutions in structural engineering and construction, including: Concrete, masonry, steel and composite structures; Dynamic impact and earthquake engineering; Bridges and

For thousands of years, the underground has provided humans refuge, useful resources, physical support for surface structures, and a place for spiritual or artistic expression. More recently, many urban services have been placed underground. Over this time, humans have rarely considered how underground space can contribute to or be engineered to maximize its contribution to the sustainability of society. As human activities begin to change the planet and population struggle to maintain satisfactory standards of living, placing new infrastructure and related facilities underground may be the most successful way to encourage or support the redirection of urban development into sustainable patterns. Well maintained, resilient, and adequately performing underground infrastructure, therefore, becomes an essential part of sustainability, but much remains to be learned about improving the sustainability of underground infrastructure itself. At the request of the National Science Foundation (NSF), the National Research Council (NRC) conducted a study to consider sustainable underground development in the urban environment, to identify research needed to maximize opportunities for using underground space, and to enhance understanding among the public and technical communities of the role of underground engineering in urban sustainability. Underground Engineering for Sustainable Urban Development explains the findings of researchers and practitioners with expertise in geotechnical engineering, underground design and construction, trenchless technologies, risk assessment, visualization techniques for geotechnical applications, sustainable infrastructure development, life cycle assessment, infrastructure policy and planning, and fire prevention, safety and ventilation in the underground. This report is intended to inform a future research track and will be of interest to a broad audience including those in the private and

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public sectors engaged in urban and facility planning and design, underground construction, and safety and security.

Underground facilities, such as tunnels, sewer, water and gas networks form the backbone of the economic life of the modern city. In densely populated areas where the demands for transportation and services are rapidly increasing and the construction of new roads and railways are prohibited, the construction of a tunnel might be the only alternative. Brief and readable, this reference is based on a combined 75 years of field experience and places emphasis is on simple practical rules for designing and planning, underground infrastructures. The books' begins with a clear and rigorous exposition of the classification of underground space, important considerations such as geological and engineering and underground planning. This is followed by self-contained chapters concerning applications for underground water storage, underground car parks, underground metros & road tunnels and underground storage of crude oil, lpg and natural gas. The book has 15 chapters covering various usage of underground space. There are about 135 figures and tables. The book contains about 20 case histories/examples. One of the first book to address all of the major areas in which this technology is used, this book deals with major topics such as: hydroelectric projects with modern planning of complex underground structures; underground storages of food items, crude oil and explosives and highly cautious underground nuclear waste repositories. Rail and road tunnels and TBM are described briefly. Risk management in underground infrastructures is of vital importance. Civil Engineers, Mining Engineers, and Geotechnical Engineers will find this book a valuable guide to designing and planning underground infrastructures both in terms of its applications. Risk management method for underground infrastructures Vital tips for the underground storage of food, water, crude oil, natural gas and munitions Provides design tips for Underground Parking Facilities Instruction for the designing planning and construction for underground Metros and road tunnels Planning and design of underground nuclear waste repositories Clearly explains the benefits and drawbacks of underground facilities Quick guide to the various modern mechanical underground parking options Explanation of construction planning and Risk management Places expert advice for planning and constructing projects at the finger tips

Underground infrastructure (traffic and railway tunnels, water and sewage ducts, garages, and subways) is essential for urbanized areas, as they fulfill an important role in the transportation of people, energy, communication and water. Underground Infrastructure of Urban Areas is a collection of papers on the design, application, and maintenance o

Infrastructure Planning and Finance is a non-technical guide to the engineering, planning, and financing of major infrastucture projects in the United States, providing both step-by-step guidance, and a broad overview of the technical, political, and economic challenges of creating lasting infrastructure in the 21st

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Century. Infrastructure Planning and Finance is designed for the local practitioner or student who wants to learn the basics of how to develop an infrastructure plan, a program, or an individual infrastructure project. A team of authors with experience in public works, planning, and city government explain the history and economic environment of infrastructure and capital planning, addressing common tools like the comprehensive plan, sustainability plans, and local regulations. The book guides readers through the preparation and development of comprehensive plans and infrastructure projects, and through major funding mechanisms, from bonds, user fees, and impact fees to privatization and competition. The rest of the book describes the individual infrastructure systems: their elements, current issues and a 'how-to-do-it' section that covers the system and the comprehensive plan, development regulations and how it can be financed. Innovations such as decentralization, green and blue-green technologies are described as well as local policy actions to achieve a more sustainable city are also addressed. Chapters include water, wastewater, solid waste, streets, transportation, airports, ports, community facilities, parks, schools, energy and telecommunications. Attention is given to how local policies can ensure a sustainable and climate friendly infrastructure system, and how planning for them can be integrated across disciplines.

A successful underground project is one where relationships are strong, the objectives as understood by each party are met or exceeded, and the work product serves its stakeholders and is maintainable in a way that fits with the project vision. High-level metrics for project success relate to safety, quality, schedule, and budget. The first edition of Recommended Contract Practices for Underground Construction has become a valued resource for the underground industry, serving as a concise guide for drafting and implementation of contract provisions. It provided improvements to underground contracting practices during all project stages. It also presented clear roles and responsibilities for project participants to promote better contracts. This second edition was undertaken by the UCA of SME because the industry has undergone numerous changes over the last decade. Changes in tunneling technology, more common use of design-build as a contracting mechanism, and many lessons learned have sparked some creative contract approaches. The recommendations contained in this edition are intended to guide owners and their engineers in developing and administering contracts and to give contractors a better understanding of the rationale behind contract provisions. The goal is that more underground projects in this country can be best projects, where improved relationships and fair contracts enable all project participants to personally invest in cost-effective, profitable projects, ensuring the continued health of the underground industry. Transit Cooperative Research Program (TCRP) Synthesis 124: Planning and Design for Fire and Smoke Incidents in Underground Passenger Rail Systems documents the state of the practice to address fire and smoke incidents. Fires in underground passenger rail tunnels require implementation of different measures

in order to provide safety for the passengers and ensure structural and system integrity of the facilities and operating infrastructure. The publication addresses planning, design, and operations to address fire and smoke incidents, and identifies current practices including lessons learned, challenges, and gaps in information.

This volume comprises a set of high-quality, refereed papers that address the different aspects related to the geotechnical and structural design and construction of deep excavations, tunnels and underground space facilities as well as the effect of their construction on the surroundings. The papers cover planning, design, modeling, monitoring and construction aspects of these essential structures. The utilization of underground space using tunneling and deep excavations has become much needed to support the increasing needs of urban environments and to allow for functional extensions and sustainable developments in heavily congested areas. Recently, more utilities and transportation transit systems have been relocated underground because of scarcity of surface space. The growing interest in the use of underground space has necessitated commensurate advancements in related fields (geotechnical engineering, engineering geology and structural engineering), design tools, construction techniques and analytical and interpretation methods. The volume is based on the best contributions to the 2nd GeoMEast International Congress and Exhibition on Sustainable Civil Infrastructures, Egypt 2018 – The official international congress of the Soil-Structure Interaction Group in Egypt (SSIGE). This single-volume thoroughly summarizes advances in the past several decades and emerging challenges in fundamental research in geotechnical engineering. These fundamental research frontiers are critically reviewed and described in details in lights of four grand challenges our society faces: climate adaptation, urban sustainability, energy and material resources, and global water resources. The specific areas critically reviewed, carefully examined, and envisioned are: sensing and measurement, soil properties and their physics roots, multiscale and multiphysics processes in soil, geochemical processes for resilient and sustainable geosystems, biological processes in geotechnics, unsaturated soil mechanics, coupled flow processes in soil, thermal processes in geotechnical engineering, and rock mechanics in the 21st century.

Green infrastructure encompasses many features in the built environment. It is widely recognised as a valuable resource in our towns and cities and it is therefore crucial to understand, create, protect and manage this resource. This Handbook sets the context for green infrastructure as a means to make urban environments more resilient, sustainable, liveable and equitable. Including state-of-the-art reviews that summarise the existing knowledge as well as research findings, this Handbook provides current evidence for the beneficial impact of green infrastructure on health, environmental quality and the economy. It discusses the planning and design of green infrastructure as a strategic network down to the individual features in a neighbourhood and looks at the process of

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green infrastructure implementation, emphasising the importance of collaboration across multiple professions and sectors. This comprehensive volume operates at multiple spatial scales, from strategic networks at the regional level to individual features in neighbourhoods, with international case studies used throughout to illustrate key examples of good practice. This collection of expert contributions will be invaluable to students and academics in the fields of planning, urban studies and geography. Practitioners and policy-makers will also find the policy discussion and examples enlightening.

"This book aims to bridge the gap in the current literature by addressing the overall problems present in major infrastructure in society, and the technologies that may be applied to overcome these problems"--Provided by publisher.

This volume comprises a set of high-quality, refereed papers that address the different aspects related to the geotechnical and structural design and construction of deep excavations, tunnels and underground space facilities as well as the effect of their construction on the surroundings. The papers cover planning, design, modeling, monitoring and construction aspects of these essential structures. This volume is part of the proceedings of the 1st GeoMEast International Congress and Exhibition on Sustainable Civil Infrastructures, Egypt 2017.

Based on the work of Poly5, or the Mediterranean Corridor, mega-transport infrastructure project, this ground-breaking reference explains how and why traditional top-down government-defined transport planning policies are failing, due to their tendency to eschew acknowledgement of profoundly multifarious local and regional issues. The authors use cognitive reports from the Mediterranean Corridor experience as a learning platform, unpacking the tangled sources of the challenges faced to find firm ground from which to embark upon future projects. They propose the replacement of the current fragmented and unbalanced implementation efforts across various territories with a bottom-up, holistic, inclusive approach in which individual territories and regions have buy-in from the outset, a chance to bring their strengths to bear on the broader infrastructural planning, an ongoing communication channel to report and tackle difficulties and clear, strategic directives to drive sustainable future growth of environmentally desirable and practical mega-transport systems.

Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art contains the contributions presented at the World Tunnel Congress 2019 (Naples, Italy, 3-9 May 2019). The use of underground space is continuing to grow, due to global urbanization, public demand for efficient transportation, and energy saving, production and distribution. The growing need for space at ground level, along with its continuous value increase and the challenges of energy saving and achieving sustainable development objectives, demand greater and better use of the underground space to ensure that it supports sustainable, resilient and more liveable cities. This vision was the source of inspiration for the design of the logos of both the International (ITA) and

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Italian (SIG) Tunnelling Association. By placing key infrastructures underground - the black circle in the logos - it will be possible to preserve and enhance the quality of the space at ground level - the green line. In order to consider and value underground space usage together with human and social needs, engineers, architects, and artists will have to learn to collaborate and develop an interdisciplinary design approach that addresses functionality, safety, aesthetics and quality of life, and adaptability to future and varied functions. The 700 contributions cover a wide range of topics, from more traditional subjects connected to technical challenges of design and construction of underground works, with emphasis on innovation in tunneling engineering, to less conventional and archetypically Italian themes such as archaeology, architecture, and art. The book has the following main themes: Archaeology, Architecture and Art in underground construction; Environment sustainability in underground construction; Geological and geotechnical knowledge and requirements for project implementation; Ground improvement in underground constructions; Innovation in underground engineering, materials and equipment; Long and deep tunnels; Public communication and awareness; Risk management, contracts and financial aspects; Safety in underground construction; Strategic use of underground space for resilient cities; Urban tunnels. Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art is a valuable reference text for tunneling specialists, owners, engineers, architects and others involved in underground planning, design and building around the world, and for academics who are interested in underground constructions and geotechnics.

Offers exposition of the classification of underground space, important considerations such as geological and engineering and underground planning. This title includes chapters concerning applications for underground water storage, underground car parks, underground metros and road tunnels and underground storage of crude oil, lpg and natural gas.

A comprehensive, state-of-the-art guide to site planning, covering planning processes, new technologies, and sustainability, with extensive treatment of practices in rapidly urbanizing countries. Cities are built site by site. Site planning—the art and science of designing settlements on the land—encompasses a range of activities undertaken by architects, planners, urban designers, landscape architects, and engineers. This book offers a comprehensive, up-to-date guide to site planning that is global in scope. It covers planning processes and standards, new technologies, sustainability, and cultural context, addressing the roles of all participants and stakeholders and offering extensive treatment of practices in rapidly urbanizing countries. Kevin Lynch and Gary Hack wrote the classic text on the subject, and this book takes up where the earlier book left off. It can be used as a textbook and will be an essential reference for practitioners. Site Planning consists of forty self-contained modules, organized into five parts: The Art of Site Planning, which presents site planning as a shared enterprise;

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Understanding Sites, covering the components of site analysis; Planning Sites, covering the processes involved; Site Infrastructure, from transit to waste systems; and Site Prototypes, including housing, recreation, and mixed use. Each module offers a brief introduction, covers standards or approaches, provides examples, and presents innovative practices in sidebars. The book is lavishly illustrated with 1350 photographs, diagrams, and examples of practice.

Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art. Volume 1: Archaeology, Architecture and Art in Underground Construction contains the contributions presented in the eponymous Technical Session during the World Tunnel Congress 2019 (Naples, Italy, 3-9 May 2019). The use of underground space is continuing to grow, due to global urbanization, public demand for efficient transportation, and energy saving, production and distribution. The growing need for space at ground level, along with its continuous value increase and the challenges of energy saving and achieving sustainable development objectives, demand greater and better use of the underground space to ensure that it supports sustainable, resilient and more liveable cities. The contributions cover a wide range of topics, from urban tunnelling under archaeological findings in Naples (Italy) with ground freezing and grouting techniques, via the functional role of heritage in metro projects, to interdisciplinary research in geotechnical engineering and geoarchaeology – a London case study. The book is a valuable reference text for tunnelling specialists, owners, engineers, archaeologists, architects, artists and others involved in underground planning, design and building around the world, and for academics who are interested in underground constructions and geotechnics.

The destruction of the World Trade Center complex on 9/11 set in motion a chain of events that fundamentally transformed both the United States and the wider world. War has raged in the Middle East for a decade and a half, and Americans have become accustomed to surveillance, enhanced security, and periodic terrorist attacks. But the symbolic locus of the post-9/11 world has always been "Ground Zero"--the sixteen acres in Manhattan's financial district where the twin towers collapsed. While idealism dominated in the initial rebuilding phase, interest-group trench warfare soon ensued. Myriad battles involving all of the interests with a stake in that space--real estate interests, victims' families, politicians, the Port Authority of New York and New Jersey, the federal government, community groups, architectural firms, and a panoply of ambitious entrepreneurs grasping for pieces of the pie--raged for over a decade, and nearly fifteen years later there are still loose ends that need resolution. In *Power at Ground Zero*, Lynne Sagalyn offers the definitive account of one of the greatest reconstruction projects in modern world history. Sagalyn is America's most eminent scholar of major urban reconstruction projects, and this is the culmination of over a decade of research. Both epic in scope and granular in detail, this is at base a classic New York story. Sagalyn has an extraordinary command over all of the actors and moving parts involved in the drama: the long

parade of New York and New Jersey governors involved in the project, Mayor Michael Bloomberg, various Port Authority leaders, the ubiquitous real estate magnate Larry Silverstein, and architectural superstars like Santiago Calatrava and Daniel Libeskind. As she shows, political competition at the local, state, regional, and federal level along with vast sums of money drove every aspect of the planning process. But the reconstruction project was always about more than complex real estate deals and jockeying among local politicians. The symbolism of the reconstruction extended far beyond New York and was freighted with the twin tasks of symbolizing American resilience and projecting American power. As a result, every aspect was contested. As Sagalyn points out, while modern city building is often dismissed as cold-hearted and detached from meaning, the opposite was true at Ground Zero. Virtually every action was infused with symbolic significance and needed to be debated. The emotional dimension of 9/11 made this large-scale rebuilding effort unique; it supercharged the complexity of the rebuilding process with both sanctity and a truly unique politics. Covering all of this and more, *Power at Ground Zero* is sure to stand as the most important book ever written on the aftermath of arguably the most significant isolated event in the post-Cold War era.

Underground – the way to the future was the motto of the World Tunnel Congress 2013 in Geneva, Switzerland. The use of underground space has gained importance during the last years due to the tremendous global urbanization, the high demand on transportation capacities and energy production. All this result in a wider range of use of underground space: besides the traditional road, railway, metro and utility tunnels, more and more other functionalities of modern life are placed under ground in order to free the surface for other uses. The 300 papers of the present book cover important aspects of modern underground infrastructures: Development and use of underground space; project planning and implementation (construction management, risk control, cost estimation and scheduling, contracting practices); design and analysis methods and considerations; construction technology developments; tunnel operation (safety, maintenance, rehabilitation and repair); case histories (learning from failures, long deep tunnels, underground construction for hydropower). Underground – the way to the future will be invaluable to specialists, contractors and design engineers in underground planning, construction and tunnelling worldwide, and to academics interested in underground and geotechnical engineering.

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