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Architects have been intrigued by prefabricated construction since the early twentieth century. Recent advances in design, engineering and manufacturing processes have led to a significant expansion in the use of pre-assembled components, which are fitted to finished structures on site. Collectively, such processes are becoming known as "offsite construction." A groundbreaking text, *Offsite Architecture* establishes the current – and future – state of thinking in this field. A range of the most highly regarded thinkers and practitioners from around the globe share their ideas and practical findings on offsite prefabrication, examining theory and practice, opportunities and challenges, successes and failures. A timely response to the growing interest in this method, the book provides the fundamental basis for a critical, reflective approach to offsite architecture. Contributions from both academics and professionals make *Offsite Architecture* required reading for practitioners as well as students taking courses in architecture, prefabrication, construction and engineering.

“Green buildings” that slash energy use and carbon emissions are all the rage, but they aren’t enough. The hidden culprit is embodied carbon—the carbon emitted when materials are mined, manufactured, and transported—comprising some ten percent of global emissions. With the built environment doubling by 2030, buildings are a carbon juggernaut threatening to overwhelm the climate. It doesn’t have to be this way. Like never before in history, buildings can become part of the climate solution. With biomimicry and innovation, we can pull huge amounts of carbon out of the atmosphere and lock it up as walls, roofs, foundations, and insulation. We can literally make buildings out of the sky with a massive positive impact. The

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New Carbon Architecture is a paradigm-shifting tour of the innovations in architecture and construction that are making this happen. Office towers built from advanced wood products; affordable, low-carbon concrete alternatives; plastic cleaned from the oceans and turned into building blocks. We can even grow insulation from mycelium. A tour de force by the leaders in the field, *The New Carbon Architecture* will fire the imagination of architects, engineers, builders, policy makers, and everyone else captivated by the possibility of architecture to heal the climate and produce safer, healthier, and more beautiful buildings. Bruce King, a structural engineer for thirty-five years, is Founder and Director of the Ecological Building Network (EBNet) and author of *Buildings of Earth and Straw*, *Making Better Concrete*, and *Design of Straw Bale Buildings*. He lives in San Rafael, California.

For the past half-century, the planning system has operated on the basis of a growth-dependence paradigm. It has been based on market-led urban development and has sought to provide community benefits from a share of development profits. However, we do not live in a world where growth can be taken for granted and we are more aware than previously of the implications for well-being and sustainability. This timely book provides a fresh analysis of the limitations of the growth-dependence planning paradigm. It considers alternative urban development models, ways of protecting and enhancing existing low value land uses and means of managing community assets within the built environment. In each case it spells out the role that a reformed planning system could play in establishing a new agenda for planning. The book will be of relevance to planning students, planning professionals and planning academics, as well as urban policy specialists more generally.

This book of Proceedings presents the latest thinking and research in the rapidly evolving

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world of architecture and sustainable development through 255 selected papers by authors coming from over 60 countries.

Building Materials is a textbook designed for undergraduate civil engineering students who are offered courses on Building and Construction Materials. The book primarily covers the AICTE syllabus on Materials, Testing, and Evaluation. It provides detailed and up-to-date information on various building and construction materials, including green materials. The book discusses the usual building materials like stones, bricks, lime, cement, aggregates, mortars, concrete and special concretes, wood, ferrous materials, steel, plastics, non-ferrous materials, glass, ceramic materials, plastics, paints, etc. Wherever necessary, the substitute materials and the greenness of the material are identified and explained. The book provides a thorough discussion of various materials using appropriate illustrations, real-life photographs, examples, and case studies for better understanding.

Performance of Bio-based Building Materials provides guidance on the use of bio-based building materials (BBBM) with respect to their performance. The book focuses on BBBM currently present on the European market. The state-of-the-art is presented regarding material properties, recommended uses, performance expectancies, testing methodology, and related standards. Chapters cover both 'old and traditional' BBBM since quite a few of them are experiencing a comeback on the market. Promising developments that could become commercial in the near future are presented as well. The book will be a valuable reference resource for those working in the bio-based materials research community, architects and agencies dealing with sustainable construction, and graduate students in civil engineering. Takes a unique approach to bio-based materials and presents a broad overview of the topics

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on relevant areas necessary for application and promotion in construction Contains a general description, notable properties related to performance, and applications Presents standards that are structured according to performance types

This new textbook provides a comprehensive introduction to every aspect of the technology of low-rise construction. It includes sub-structure (site work, setting out and foundations) and superstructure (flooring, roofs, finishes, fittings and fixtures). The material here covers the first year course requirement of all courses on which construction technology is taught - no matter what the ultimate qualification. It offers tried and tested solutions to a range of construction problems and is organised following the sequence of construction. It will show what has been done in the past, demonstrating good practice - what works and what doesn't - and common faults. There are summaries of the more important BSI documents and reference to the latest building regulations. Lengthy explanations are avoided by relying heavily on hundreds of illustrations, pairing detail drawings with clear photographs to show real life construction situations. The supporting spreadsheet referred to in the book can be found at this link http://www.blackwellpublishing.com/pdf/fleming/Fleming_spreadsheet.xls

Timber construction is one of the most prevalent methods of constructing buildings in North America and an increasingly significant method of construction in Europe and the rest of the world. Timber Engineering deals not only with the structural aspects of timber construction, structural components, joints and systems based on solid timber and engineered wood products, but also material behaviour and properties on a wood element level. Produced by internationally renowned experts in the field, this book represents the state of the art in research on the understanding of the material behaviour of solid wood and engineered wood

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products. There is no comparable compendium currently available on the topic - the subjects represented include the most recent phenomena of timber engineering and the newest development of practice-related research. Grouped into three different sections, 'Basic properties of wood-based structural elements', 'Design aspects on timber structures' and 'Joints and structural assemblies', this book focuses on key issues in the understanding of: timber as a modern engineered construction material with controlled and documented properties the background for design of structural systems based on timber and engineered wood products the background for structural design of joints in structural timber systems Furthermore, this invaluable book contains advanced teaching material for all technical schools and universities involved in timber engineering. It also provides an essential resource for timber engineering students and researchers, as well as practicing structural and civil engineers.

The built environment has the potential to have a major impact on biodiversity, not least with the increasingly demanding requirements to design more energy efficient and airtight buildings, leaving less space for species to inhabit. The construction industry has an important role to play in ensuring that buildings are designed and refurbished in a way in which biodiversity can be enhanced. Through written guidance and architectural drawings, this book advises on how to incorporate provision for biodiversity within developments. With sections on different building-reliant species, general principles for design, ready-made products that be incorporated into designs, and legislation, policy and regulations, this book is an invaluable resource for all architects, ecologists and anyone involved in designing or briefing for biodiversity in buildings. The book demonstrates how new houses can be designed to be more sustainable and

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ergonomic. Specifically, it describes a prototype building that could be constructed in the near future. Responding to some of the poor standards of mass estate housing in the UK and its out-of-date space standards, it contributes towards improving the current status quo by describing a house design, including drawings, that can compete with today's mass housing. The author examines the traditional geometrical reliance on the square in the design of houses and the planning of housing estates and promotes instead the adoption of polygonal forms. This is explained using geometric analysis, diagrams and references to existing housing. These concepts have been developed with reference to technical literature from various companies with one company interested in taking it further. Providing a novel and up-to-date design concept, this book is of value to practitioners and researchers looking to improve the standard of mass housing in the UK. It is also of interest to anyone wishing to build their own house and to manufacturers wanting to move into modern housing technology.

A home's appeal depends a great deal on its exterior paint or stain, brick-and stonework, siding, trims, and other details--and it's not just the type of finish that's important, it's also how well the job was done. This first-ever compilation by "Fine Homebuilding on the popular subject provides builders with ideas for choosing the correct finishes for home exteriors, plus solid how-to information.

Nonconventional and Vernacular Construction Materials: Characterisation, Properties and Applications, Second Edition covers the topic by taking into account sustainability, the conservation movement, and current interests in cultural identity and its preservation. This updated edition presents case studies, information on relevant codes and regulations, and how they apply (or do not apply) to nocmats. Leading international experts contribute chapters on

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current applications and the engineering of these construction materials. Sections review vernacular construction, provide future directions for nonconventional and vernacular materials research, focus on natural fibers, and cover the use of industrial byproducts and natural ashes in cement mortar and concrete. Takes a scientifically rigorous approach to vernacular and non-conventional building materials and their applications Includes a series of case studies and new material on codes and regulations, thus providing an invaluable compendium of practical knowhow Presents the wider context of materials science and its applications in the sustainability agenda

This SpringerBrief presents strategies for fire mitigation based on combustible assembly systems of exterior walls. Providing background information on common exterior wall systems, the mechanisms of fire spread, and case studies, it examines the difficulties in controlling a fire with several materials and assembly methods. The brief compiles information on typical fire scenarios which involve the exterior wall, along with further exploration into test methods, approval and regulatory requirements for the various assembly systems. Offering testing approaches for possible mitigation strategies, the brief takes into account that current commercial wall assembly systems are constructed to improve energy performance, reduce water and air infiltration, and allow for aesthetic design flexibility. Exterior Insulation Finish Systems, metal composite claddings, high-pressure laminates, and weather-resistive barrier systems all have components which directly impact the fire hazard. Recommendations for future exterior wall construction are based on identified knowledge gaps.

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Cross-laminated Timber An Introduction to Low-impact Building Materials Cross-laminated Timber An Introduction to Low-impact Building Materials Materials for Architects and Builders Routledge

Materials for Architects and Builders provides a clear and concise introduction to the broad range of materials used within the construction industry and covers the essential details of their manufacture, key physical properties, specification and uses.

Understanding the basics of materials is a crucial part of undergraduate and diploma construction or architecture-related courses, and this established textbook helps the reader to do just that with the help of colour photographs and clear diagrams throughout. This new edition has been completely revised and updated to include the latest developments in materials research, new images, appropriate technologies and relevant legislation. The ecological effects of building construction and lifetime use remain an important focus, and this new edition includes a wide range of energy saving building components.

The Environmental Design Pocketbook 2nd ed places the information you need for sustainable, low energy building design at your fingertips. Packed with diagrams, tools and tips, it cuts through the complex mass of technical data and legislation that faces the designer, and distils all the key guidance into a single reference that is quick, easy to use and points to the facts, figures and performance data that are most important.

This 2nd edition is now fully up-to-date with the latest Building Regulations Part L and F

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legislation (England and Wales), RIBA Plan of Work 2013, new information on the Green Deal and Zero Carbon and contains revised references and further reading sections throughout. Whether used in the classroom, office or on-site, the book guides the designer through the entire process; from the fundamentals to the building details. From future-proofing for a changing climate to rainwater harvesting, retrofit, and zero-carbon technologies - the Pocketbook has got it covered.

This book started life as a successor to Sustainable Architecture, published in 2007, which set out to prove that sustainable architecture can indeed both 'lift the spirit' as well as save the planet. This fully revised edition seeks to take a step further, exploring how sustainable buildings are occupied and work, and sheds light on the methods used to observe this. Through short essays from thought-leaders and case studies of visually stunning, environmentally ground-breaking projects, Better Buildings provides architects with the inspiration and tools they need to deliver sustainable design.

Revised and significantly expanded, the fifth edition of this classic work offers both new and substantially updated information. As the definitive reference on fire protection engineering, this book provides thorough treatment of the current best practices in fire protection engineering and performance-based fire safety. Over 130 eminent fire engineers and researchers contributed chapters to the book, representing universities and professional organizations around the world. It remains the indispensable source for reliable coverage of fire safety engineering fundamentals, fire dynamics, hazard

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calculations, fire risk analysis, modeling and more. With seventeen new chapters and over 1,800 figures, the this new edition contains: Step-by-step equations that explain engineering calculations Comprehensive revision of the coverage of human behavior in fire, including several new chapters on egress system design, occupant evacuation scenarios, combustion toxicity and data for human behavior analysis Revised fundamental chapters for a stronger sense of context Added chapters on fire protection system selection and design, including selection of fire safety systems, system activation and controls and CO2 extinguishing systems Recent advances in fire resistance design Addition of new chapters on industrial fire protection, including vapor clouds, effects of thermal radiation on people, BLEVEs, dust explosions and gas and vapor explosions New chapters on fire load density, curtain walls, wildland fires and vehicle tunnels Essential reference appendices on conversion factors, thermophysical property data, fuel properties and combustion data, configuration factors and piping properties "Three-volume set; not available separately"

Since the sixth edition of this classic text/reference was published in 1981, there have been so many developments in the field that the new seventh edition represents an almost total rewrite of the subject matter. The opportunity has been taken to rearrange the structure and broaden the scope to cover areas of conversion, machining and the application of paints and finishes; the format has also been enlarged to improve readability. Part 1 contains chapters that deal with

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the structure of wood at the gross, cellular and molecular levels; variability is also covered. Part 2 has five chapters on the properties of wood, with special coverage of elastic behaviour, toughness and the use of structural-sized timber for strength tests. Part 3 on processing has material on several new areas not covered in earlier editions of the book; for example, log conversion, seasoning, and the machining of wood and board. The discussion of grading and grade stresses is fully updated. Part 4 on utilisation examines the latest techniques and standards for the manufacture of wood products. Part 5 examines all aspects of timber in service, including protection and preservation. The book will appeal to a wide readership, both as a student text and reference. Students of wood science and forestry at undergraduate and equivalent level will find it of special value. All institutions with courses in the built environment will wish to make the book available as a reference source.

Contents: (1) Background: Congressional Interest in Carbon Sequestration; (2) Carbon Cycling in Forests: The Forest Cycle; Forest Types: Tropical Forests; Temperate Forests; Boreal Forests; (3) Measuring and Altering Forest Carbon Levels: Forest Carbon Accounting; Land Use Changes; Forestry Events and Management Activities: Vegetation and Soil Carbon; Forest Events & Wildfires; Forestry Practices; Wood Energy; Leakage: Land Use Leakage; Product

Demand Leakage; Federal Government Programs: Federal Forests; Federal Assistance for State and Private Forestry; Federal Tax Expenditures; Federal Programs Affecting Land Use; Accounting for Forest Carbon Sequestration; (4) Conclusions. Table.

Structural Design for Fire Safety, 2nd edition Andrew H. Buchanan, University of Canterbury, New Zealand Anthony K. Abu, University of Canterbury, New Zealand A practical and informative guide to structural fire engineering This book presents a comprehensive overview of structural fire engineering. An update on the first edition, the book describes new developments in the past ten years, including advanced calculation methods and computer programs. Further additions include: calculation methods for membrane action in floor slabs exposed to fires; a chapter on composite steel-concrete construction; and case studies of structural collapses. The book begins with an introduction to fire safety in buildings, from fire growth and development to the devastating effects of severe fires on large building structures. Methods of calculating fire severity and fire resistance are then described in detail, together with both simple and advanced methods for assessing and designing for structural fire safety in buildings constructed from structural steel, reinforced concrete, or structural timber. Structural Design for Fire Safety, 2nd edition bridges the information gap

between fire safety engineers, structural engineers and building officials, and it will be useful for many others including architects, code writers, building designers, and firefighters. Key features:

- Updated references to current research, as well as new end-of-chapter questions and worked examples.
- Authors experienced in teaching, researching, and applying structural fire engineering in real buildings.
- A focus on basic principles rather than specific building code requirements, for an international audience. An essential guide for structural engineers who wish to improve their understanding of buildings exposed to severe fires and an ideal textbook for introductory or advanced courses in structural fire engineering.

Details 450 non-traditional house types classified by form of construction: metal framed, precast concrete, in-situ concrete and timber framed. Extensive background information and an invaluable search tool are included

This book offers a practical guide to embedding energy modelling in architectural practice. With expert contributions from leading architects and practices, this book illustrates architects' approaches to learning, sharing and integrating energy modelling across a range of design projects, in both small and large firms in the UK and internationally. Discussing the practical and business implications of embedding energy modelling in practice, this is an essential manual for the

energy-literate architect.

In a world now forced to address the issues of sustainability, environmental impact, and the widespread pollution of land and oceans with manmade materials, alternative resources must be considered for the future of the planet. A vast array of natural materials is available throughout the world with properties that are often superior to the man-made alternatives. *Designing with Natural Materials* fills the gap between the current scientific knowledge of the use of natural materials and product design and acts as a bridge between the two disciplines. The book serves as an introduction to natural materials within the context of design. The chapters include case studies, research, and a historical perspective. It develops ideas of designing with natural materials in specific areas and looks to the future of new biobased materials and how these will influence design. The work offers insight to designers of biobased materials across a range of different design disciplines while also providing insights to scientists on the process of design, production, and the needs of a material beyond those traditionally analyzed in the laboratory. The final chapters touch on the use of bioinspiration and biomimicry in the development and use of biobased materials and how natural design will influence both material design and products in the future. The book will be of interest to engineers, scientific researchers,

professional designers, students, those working in industry who are considering using natural materials as an alternative to current unsustainable options, and anyone who has an interest in the subject.

Recent progress in enhancing and refining the performance and properties of wood composites by chemical and thermal modification and the application of smart multi-functional coatings have made them a particular area of interest for researchers. Wood Composites comprehensively reviews the whole field of wood composites, with particular focus on their materials, applications and engineering and scientific advances, including solutions inspired biomimetrically by the structure of wood and wood composites. Part One covers the materials used for wood composites and examines wood microstructure, and wood processing and adhesives for wood composites. Part Two explores the many applications of wood composites, for example plywood, fibreboard, chipboard, glulam, cross-laminated timber, I-beams and wood-polymer composites. The final part investigates advances in wood composites and looks at the preservation and modification of wood composites, environmental impacts and legislative obligations, nano-coatings and plasma treatment, biomimetic composite materials, the integration of wood composites with other materials and carbonized and mineralized wood composites. Comprehensively reviews the entire field of wood composites in a single volume Examines recent progress in enhancing and refining the performance and properties of wood composites by chemical and thermal modification and the application of smart multi-functional coatings Explores the range of wood composites, including both new and traditional products The Structural Engineer's Pocket Book British Standards Edition is the only compilation of all

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tables, data, facts and formulae needed for scheme design to British Standards by structural engineers in a handy-sized format. Bringing together data from many sources into a compact, affordable pocketbook, it saves valuable time spent tracking down information needed regularly. This second edition is a companion to the more recent Eurocode third edition. Although small in size, this book contains the facts and figures needed for preliminary design whether in the office or on-site. Based on UK conventions, it is split into 14 sections including geotechnics, structural steel, reinforced concrete, masonry and timber, and includes a section on sustainability covering general concepts, materials, actions and targets for structural engineers.

Embodied and Whole Life Carbon will change the way buildings are designed, yet carbon emissions associated with the construction and life of buildings are not yet wholly understood by the profession. Energy is assumed to be the province of services engineers, yet energy from materials is as big an issue. Architects have the opportunity to take the lead in redefining how buildings are designed to achieve a low carbon future.

Environmental concerns and advances in architectural technologies have led to a greater number of green buildings or buildings with green, eco-friendly elements. However, from a practical standpoint, there is no incident reporting system in the world that tracks data on fire incidents in green buildings. Fire safety objectives are not explicitly considered in most green rating schemes, and green design features have been associated with photovoltaic panels and roof materials, lightweight timber frame buildings, and combustible insulation materials. Fire Safety Challenges of Green Buildings is the result of an extensive global literature review that sought to identify issues related to green building elements or features and ways to ensure

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those issues are tracked for future improvement. The book identifies actual incidents of fires in green buildings or involving green building elements, points out issues with green building elements that would increase fire risk, clarifies reports and studies that address ways to reduce fire risk in green design elements, and compares research studies that explicitly incorporate fire safety into green building design. The authors also pinpoint gaps and specific research needs associated with understanding and addressing fire risk and hazards with green building design. Using their data, the authors developed a set of matrices relating these green attributes and potential fire hazards. With these comprehensive tools, potential mitigation strategies for addressing the relative increase in fire risk or hazard associated with the green building elements and features have been identified. *Fire Safety Challenges of Green Buildings* is intended for practitioners as a tool for analyzing building safety issues in green architecture and developing methods for tracking data related to green design elements and their potential hazards. Researchers working in a related field will also find the book valuable.

Over the past 10-15 years a renaissance in wood architecture has occurred with the development of new wood building systems and design strategies, elevating wood from a predominantly single-family residential idiom to a rival of concrete and steel construction for a variety of building types, including high rises. This new solid wood architecture offers unparalleled environmental as well as construction and aesthetic benefits, and is of growing importance for professionals and academics involved in green design. *Solid Wood* provides the first detailed book which allows readers to understand new mass timber/massive wood architecture. It provides: historical context in wood architecture from around the world a strong environmental rationale for the use of wood in buildings recent developments in contemporary

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fire safety and structural issues insights into building code challenges detailed case studies of new large-scale wood building systems on a country-by-country basis. Case studies from the UK, Norway, Sweden, Germany, Austria, Italy, Canada, the United States, New Zealand and Australia highlight design strategies, construction details and unique cultural attitudes in wood design. The case studies include the most ambitious academic, hospitality, industrial, multi-family, and wood office buildings in the world. With discussions from leading architectural, engineering, and material manufacturing firms in Europe, North America and the South Pacific, Solid Wood disrupts preconceived notions and serves as an indispensable guide to twenty-first century wood architecture and its environmental and cultural benefits.

Bricks and brickwork; Blocks and blockwork; Lime, cement and concrete; Timber and timber products; Ferrous and non-ferrous metals; Bitumen and flat roofing materials; Glass; Ceramic materials; Stone and cast stone; Plastics; Glass-fibre reinforced plastics, cement and gypsum; Plaster and board materials; Insulation materials; Sealants, gaskets and adhesives; Paints, wood stains, varnishes and colour; Energy-saving materials and componets; Recycled and ecological materials; Sustainability

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