Seismic Design Of Floor Diaphragms Springer

Interest continues to develop in the design and construction of high-rise towers and tall buildings, structures with heights ranging from 75m to 500m and even more. This volume presents the papers from the third in a series of international conferences on the subject, organised by the International Federation of High-rise Structures. The papers have been drawn together under the grand theme of the Conquest of Vertical Space in the 21st Century. The conference has been organised by the UK's Concrete Society, and sponsored by the IFHS and the Council on Tall Buildings and Urban Habitat and the Fdration Internationale de la Prcontrainte (FIP). This prestigious collaboration has brought forth a body of high quality practical and research papers.

A simple design procedure for the deformable connections in an earthquake-resistant building is proposed. The seismic design forces for the deformable connections are calculated using a modified version of the ASCE7-16 method for calculating the seismic design forces for floor diaphragms.

This book presents the selected peer-reviewed proceedings of the International Conference on Recent Trends and Innovations in Civil Engineering (ICRTICE 2019). The volume focuses on latest research and advances in the field of civil engineering and materials science such as design and development of new environmental materials, performance testing and verification of smart materials, performance analysis and simulation of steel structures, design and performance optimization of concrete structures, and building materials analysis. The book also covers studies in geotechnical engineering, hydraulic engineering, road and bridge engineering, building services design, engineering management, water resource engineering and renewable energy. The contents of this book will be useful for students, researchers and professionals working in civil engineering.

Reflecting the historic first European seismic code, this professional book focuses on seismic design, assessment and retrofitting of concrete buildings, with thorough reference to, and application of, EN-Eurocode 8. Following the publication of EN-Eurocode 8 in 2004-05, 30 countries are now introducing this European standard for seismic design, for application in parallel with existing national standards (till March 2010) and exclusively after that. Eurocode 8 is also expected to influence standards in countries outside Europe, or at the least, to be applied there for important facilities. Owing to the increasing awareness of the threat posed by existing buildings substandard and deficient buildings and the lack of national or international standards for assessment and retrofitting, its impact in that field is expected to be major. Written by the lead person in the development of the EN-Eurocode 8, the present handbook explains the principles and rationale of seismic design according to modern codes and provides thorough guidance for the conceptual seismic design of concrete buildings and their foundations. It examines the experimental behaviour of concrete members under cyclic loading and modelling for design and analysis purposes; it develops the essentials of linear or nonlinear seismic analysis for the purposes of design, assessment and retrofitting (especially using Eurocode 8); and gives detailed guidance for modelling concrete buildings at the member and at the system level. Moreover, readers gain access to overviews of provisions of Eurocode 8, plus an understanding for them on the basis of the simple models of the element behaviour presented in the book. Also examined are the modern trends in performance- and displacement-based seismic assessment of existing buildings, comparing the relevant provisions of Eurocode 8 with those of new US prestandards, and details of the most common and popular seismic retrofitting techniques for concrete buildings and guidance for retrofitting strategies at the system level. Comprehensive walk-through examples of detailed design elucidate the application of Eurocode 8 to common situations in practical design. Examples and case studies of seismic assessment and retrofitting of a few real buildings are also presented. From the reviews: "This is a massive book that has no equal in the published literature, as far as the reviewer knows. It is dense and comprehensive and leaves nothing to chance. It is certainly taxing on the reader and the potential user, but without it, use of Eurocode 8 will be that much more difficult. In short, this is a must-read book for researchers and practitioners in Europe, and of use to readers outside of Europe too. This book will remain an indispensable backup to Eurocode 8 and its existing Designers' Guide to EN 1998-1 and EN 1998-5 (published in 2005), for many years to come. Congratulations to the author for a very well planned scope and contents, and for a flawless execution of the plan". AMR S. ELNASHAI "The book is an impressive source of information to understand the response of reinforced concrete buildings under seismic loads with the ultimate goal of presenting and explaining the state of the art of seismic design. Underlying the contents of the book is the in-depth knowledge of the author in this field and in particular his extremely important contribution to the development of the European Design Standard EN 1998 - Eurocode 8: Design of structures for earthquake resistance. However, although Eurocode 8 is at the core of the book, many comparisons are made to other design practices, namely from the US and from Japan, thus enriching the contents and interest of the book". EDUARDO C. CARVALHO

The quality and testing of materials used in construction are covered by reference to the appropriate ASTM standard specifications. Welding of reinforcement is covered by reference to the appropriate AWS standard. Uses of the Code include adoption by reference in general building codes, and earlier editions have been widely used in this manner. The Code is written in a format that allows such reference without change to its language. Therefore, background details or suggestions for carrying out the requirements or intent of the Code portion cannot be included. The Commentary is provided for this purpose. Some of the considerations of the committee in developing the Code portion are discussed within the Commentary, with emphasis given to the explanation of new or revised provisions. Much of the research data referenced in preparing the Code is cited for the user desiring to study individual questions in greater detail. Other documents that provide suggestions for carrying out the requirements of the Code are also cited.

"The use of untopped hollow core slabs as diaphragms in seismic prone regions may be a practical and economical construction alternative due to the optimum use of materials, slenderness of the construction, environmental friendliness and reduction on the self-weight of the floors. However, the use of untopped precast diaphragms in high seismic regions remains largely unexplored and lacks experimental evidence. A study on the seismic performance of untopped hollow core floor diaphragms of buildings where all the vertical elements (walls and columns) are part of the lateral force resisting system was conducted to provide analysis and design parameters for the potential use of this diaphragm system in seismic zones corresponding to Seismic Design Category D." -- Tomado del Formato de Documento de Grado.

This book contains papers presented at the 1st International Conference on Timber Structures, which was held in collaboration with the Technical Centre of Wood Industry in Belgium. It explores the latest developments in wood products and their application as structural components. The focus of the included works is to draw attention to new research and real applications from both researchers and practitioners, and to present new and innovative ideas in this significant field. Rapid advances have recently been made in the development

and processing of innovative ecologically friendly wood products. A variation of new structural shapes can now be fabricated and used to construct buildings and bridges which have minimal impact on the environment. Wood is particularly appealing since it is renewable and has no carbon footprint when it is harvested in a sustainable way. Timber structures are ecologically sound and comparatively low cost. The material lends itself to ground-breaking designs and new types of composites offer reliable, robust and safe materials. The content of this book comprises a range of topics: Material properties of wood; Durability aspects, service life modelling; Fire safety of timber structures; Protection against decay; Non-destructive inspection and monitoring; Glued, laminated structures, Xlam and CLT; Timber joints and connections; Vernacular wood and heritage timber structures; Timber housing and eco-architecture; Timber bridges; Large span timber roof structures; Shell structures in timber; Mixed, composite and hybrid structures; Computational analysis and experimental methods; Structural engineering and design; Seismic behaviour of timber structures; Protection of timber; Repaired timber structures; Rapidly assembled and transferable timber structures; Guidelines, codes and regulations; Structural failures; Art and craftsmanship.

A Complete Guide to Solving Lateral Load Path Problems The Analysis of Irregular Shaped Structures: Diaphragms and Shear Walls explains how to calculate the forces to be transferred across multiple discontinuities and reflect the design requirements on construction documents. Step-by-step examples offer progressive coverage, from basic to very advanced illustrations of load paths in complicated structures. The book is based on the 2009 International Building Code, ASCE/SEI 7-05, the 2005 Edition of the National Design Specification for Wood Construction, and the 2008 Edition of the Special Design Provisions for Wind and Seismic (SDPWS-08). COVERAGE INCLUDES: Code sections and analysis Diaphragm basics Diaphragms with end horizontal offsets Diaphragms with intermediate offsets Diaphragms with openings Open front and cantilever diaphragms Diaphragms with vertical offsets Complex diaphragms with combined openings and offsets Standard shear walls Shear walls with openings Discontinous shear walls Horizontally offset shear walls The portal frame Rigid moment-resisting frame walls--the frame method of analysis

Floor and roof systems are designed to carry gravity loads and transfer these loads to supporting beams, columns or walls. Furthermore, they play a key role in distributing earthquake-induced loads to the lateral load resisting systems by diaphragm action. In reinforced concrete buildings, the in-plane flexibility of the floor diaphragms is often ignored for simplicity in practical design (i.e., the floor systems are frequently treated as perfectly rigid diaphragms). In recent building standards (ASCE-7, 2005), it is acknowledged that this assumption can result in considerable errors when predicting the seismic response of reinforced concrete buildings with diaphragm plan aspect ratio of 3:1 or greater. However, the influence of floor diaphragm openings (typically for the purpose of stairways, shafts, or other architectural features) has not been considered. In order to investigate the influence of diaphragm openings on the seismic response of reinforced concrete buildings; several 3-story reinforced concrete buildings are designed as a Building Frame System according to the International Building Code (2006). Each building is assumed to be in the Saint Louis, Missouri area, and it's analyzed using IDARC2, a non-commercial program capable of conducting nonlinear analysis of RC buildings with rigid, elastic, or inelastic floor diaphragms, under both static lateral loads (pushover) and dynamic ground motions (time-history), where a suite of three well-known earthquakes is scaled to model moderate ground motions in the Saint Louis region. The comprehensive analytical study conducted involves placing different opening sizes (none, 11%, 15% and 22% of total floor area) in various floor plan locations with respect to the location of the shear walls (located at end frames or at the interior frames), where three types of floor diaphragm models (rigid, elastic, and inelastic) are assumed. Building floor plan aspect ratios of 3:1 and 4:1 are investigated. IDARC2 is enhanced by modifying the fiber model (strain compatibility) computation routine involved in obtaining the idealized moment-curvature curves of floor slabs with openings (symmetric and nonsymmetric). Also, a new option is added so that the user can over-ride IDARC2 idealized moment-curvature curves for slabs with openings and by defining their own. The results are then presented and discussed. It is concluded that in order to capture the seismic response of reinforced concrete buildings with floor diaphragm openings accurately; it is necessary to use an inelastic diaphragm model for floor diaphragm aspect ratio of 3:1 or greater. Thus, using a rigid diaphragm assumption, as specified by ASCE7-05 for buildings concrete floor diaphragms with aspect ratio of 3:1, and elastic diaphragm assumption, as allowed by ASCE7-05 for floor diaphragm with aspect ratio of 4:1, can result in significant underestimations of the lateral loads resisted by the interior building frames and building maximum frame displacements, particularly when the diaphragm openings are located in the middle two-thirds of the building plan. The base shear redistribution due to inelastic slab deformations increases the load subjected to the interior frames significantly. Hence, the influence of inelastic inplane diaphragm deformations due to floor openings cannot be overlooked in such buildings. Simple design recommendation is given for determining proper diaphragm chord reinforcement to prevent in-plane floor slab yielding when openings are present.

Brick and Block Masonry - From Historical to Sustainable Masonry contains the keynote and semi-keynote lectures and all accepted regular papers presented online during the 17th International Brick and Block Masonry Conference IB2MaC (Kraków, Poland, July 5-8, 2020). Masonry is one of the oldest structures, with more than 6,000 years of history. However, it is still one of the most popular and traditional building materials, showing new and more attractive features and uses. Modern masonry, based on new and modified traditional materials and solutions, offers a higher quality of life, energy savings and more sustainable development. Hence, masonry became a more environmentally friendly building structure. Brick and Block Masonry - From Historical to Sustainable Masonry focuses on historical, current and new ideas related to masonry development, and will provide a very good platform for sharing knowledge and experiences, and for learning about new materials and technologies related to masonry structures. The book will be a valuable compendium of knowledge for researchers, representatives of industry and building management, for curators and conservators of monuments, and for students.

Addresses the Question Frequently Proposed to the Designer by Architects: "Can We Do This? Offering guidance on how to use code-based procedures while at the same time providing an understanding of why provisions are necessary, Tall Building Design: Steel, Concrete, and Composite Systems methodically explores the structural behavior of steel, concrete, and composite members and systems. This text establishes the notion that design is a creative process, and not just an execution of framing proposals. It cultivates imaginative approaches by presenting examples specifically related to essential building codes and standards. Tying together precision and accuracy—it also bridges the gap between two design approaches—one based on initiative skill and the other based on computer skill. The book explains loads and load combinations typically used in building design, explores methods for determining design wind loads using the provisions of ASCE 7-10, and examines wind tunnel procedures. It defines conceptual seismic design, as the avoidance or minimization of problems created by the effects of seismic excitation. It introduces the concept of performance-based design (PBD). It also addresses serviceability considerations, prediction of tall building motions, damping devices, seismic isolation, blast-resistant design, and progressive collapse. The final chapters explain gravity and lateral systems for steel, concrete, and composite buildings. The Book Also Considers: Preliminary analysis and design techniques The structural rehabilitation of seismically vulnerable steel and concrete buildings Design differences between code-sponsored approaches The concept of ductility trade-off for strength Tall Building Design: Steel, Concrete, and Composite Systems is a structural design guide and reference for practicing engineers and educators, as well as recent graduates entering the structural engineering profession. This text examines all major concrete, steel, and composite building systems, and uses the most up-to-date building codes.

Force-Limiting Deformable Floor Diaphragm Connection for Earthquake-Resistant Buildings

The aim of this state-of-art report is to present current practices for use of precast and prestressed concrete in countries in seismic regions, to recommend good practice, and to discuss current developments. The report has been drafted by 30 contributors from nine different countries. This state-of-art report covers: state of the practice in various countries; advantages and disadvantages of incorporating precast reinforced

and prestressed concrete in construction; lessons learned from previous earthquakes; construction concepts; design approaches; primary lateral load resisting systems (precast and prestressed concrete frame systems and structural walls including dual systems) diaphragms of precast and prestressed concrete floor units; modelling and analytical methods; gravity load resisting systems; foundations; and miscellaneous elements (shells, folded plates, stairs and architectural cladding panels). Design equations are reported where necessary, but the emphasis is on principles. Ordinary cast-in-place reinforced concrete is not considered in this report. This fib state-of-the-art report is intended to assist designers and constructors to provide safe and economical applications of structural precast concrete and at the same time to allow innovation in design and construction to continue. This Bulletin N° 27 was approved as an fib state-of-art report in autumn 2002 byfib Commission 7, Seismic design.

ANSI / AWC SDPWS-2015 - Special Design Provisions for Wind and Seismic standard provides criteria for proportioning, designing, and detailing engineered wood systems, members, and connections in lateral force resisting systems. Engineered design of wood structures to resist wind or seismic forces is either by allowable stress design (ASD) or load and resistance factor design (LRFD). Nominal shear capacities of diaphragms and shear walls are provided for reference assemblies.

Talking about earthquake engineering, this second edition is intended for practising structural engineers, including those with little or no knowledge of the subject, and also for advanced engineering students. It discusses the provisions of seismic codes, particularly Eurocode 8.

Seismic Design for Architects shows how structural requirements for seismic resistance can become an integral part of the design process. Structural integrity does not have to be at the expense of innovative, high standard design in seismically active zones. * By emphasizing design and discussing key concepts with accompanying visual material, architects are given the background knowledge and practical tools needed to deal with aspects of seismic design at all stages of the design process * Seismic codes from several continents are drawn upon to give a global context of seismic design * Extensively illustrated with diagrams and photographs * A non-mathematical approach focuses upon the principles and practice of seismic resistant design to enable readers to grasp the concepts and then readily apply them to their building designs Seismic Design for Architects is a comprehensive, practical reference work and text book for students of architecture, building science, architectural and civil engineering, and professional architects and structural engineers.

A brief summary of the history of seismic design as given in chapter 1, indicates that initially design was purely based on strength or force considerations. When the importance of displacement, however, became better appreciated, it was attempted to modify the existing force-based approach in order to include considerations of displacement, rather than to totally reconsider the procedure on a more rational basis. In the last decade, then, several researchers started pointing out this inconsistency, proposing displacement-based approaches for earthquake engineering evaluation and design, with the aim of providing improved reliability in the engineering process by more directly relating computed response and expected structural performance. The main objective of this report is to summarize, critically review and compare the displacement - based approaches proposed in the literature, thus favouring code implementation and practical use of rational and reliable methods. Chapter 2 Seismic performance and design objectives of this report introduces concepts of performance levels, seismic hazard representation, and the coupling of performance and hazard to define performance objectives. In fact, for displacement analysis to be relevant in the context of performance-based design, the structural engineer must select appropriate performance levels and seismic loadings. A critical review of some engineering limit states appropriate to the different performance levels is therefore proposed. In chapter 3 Conceptual basis for displacement-based earthquake resistant design, the fundamental principles associated with displacement of the ground during an earthquake and the effects, in terms of displacement, in the structure, are reviewed. The historical development guides the presentation with a review of general linear and nonlinear structural dynamics principles, general approaches to estimate displacement, for both ground and structure, and finally a general presentation of the means to measure and judge the appropriateness of the displacements of the structure in section. Chapter 4 Approaches and procedures for displacement-based design can be somehow considered the fundamental part of the report, since a critical summary of the displacement - based approaches proposed by different researchers is presented there. Displacement - based design may require specific characterization of the input ground motion, a topic addressed in Chapter 5 Seismic input. In general, various pertinent definitions of input motion for non-code format analysis are included, while peak ground parameters necessary for code base shear equations are only addressed as needed for the definition of motion for analysis. Chapter 6 Displacement capacity of members and systems addresses the fundamental problem of evaluating the inelastic displacement capacity of reinforced concrete members and realistic values of their effective cracked stiffness at yielding, including effects of shear and inclined cracking, anchorage slip, bar buckling and of load cycling. In Chapter 7 Application and evaluation of displacement-based approaches, some of the many different displacement based design procedures briefly introduced in Chapter 4 are applied to various case studies, identifying and discussing the difficulties a designer may encounter when trying to use displacement based design. Results for five different case studies designed in accordance with eight different displacement based design methods are presented. Although in general case studies are considered a useful but marginal part of a state of the art document, in this case it has to be noted that chapter 7 is possibly the most innovative and fundamental part of the whole report. The conclusions of chapter 7 are the fundamental and essential conclusions of the document and allow foreseeing a bright future for displacement - based design approaches. The state-of-art report has been elaborated over a period of 4 years by Task Group 7.2 Displacement-based design and assessment of fib Commission 7Seismic design, a truly international team of experts, representing the expertise and experience of all the important seismic regions of the world. In October 2002 the final draft of the Bulletin was presented to the public during the 1st fibCongress in Osaka. It was also there that it was approved by fib Commission 7Seismic Design.

This volume elucidates the design criteria and principles for steel structures under seismic loads according to Eurocode 8-1. Worked Examples illustrate the application of the design rules. Two case studies serve as best-practice samples.

Infrastructure Risk Assessment & Management contains selected papers presented at both the 10th International Conference on Computer Simulation in Risk Analysis and Hazard Mitigation and the 14th International Conference on Structures under Shock and Impact, organized by the Wessex Institute. The papers cover a variety of topics, including impact and blast loading, response of buildings and other structures to blast and their dynamic behaviour. These are all areas of active research and general interest, focused on the survivability of physical facilities and the protection of people. It contains a series of research contributions, essential to deepen the knowledge of how structures and materials behave under a wide variety of dynamic load actions. Current events emphasise the importance of the analysis and management of risk to planners, civil authorities, law enforcement agencies, non-governmental organisations, information technology experts and many other researchers and practitioners throughout the world. This volume brings together the work of researchers and other professionals actively involved in finding new ways to cope with the increased demands for a more effective control of impact and blast effects as well as risk management and control.

In recent years knowledge of concrete and concrete structures has increased, as has its applications. New types of concrete challenged scientists and engineers, and ecological constraints encouraged the implementation of life cycle design of concrete structures, moving the focus more and more to maintenance and uprating of structures. And since buildings are not only designed for safety and serviceability, but also for flexibility and adaptability, the design of performance based materials and structures has become more and more important. Tailor Made Concrete Structures. New Solutions for our Society comprises the proceedings of the International fib Symposium 2008 (Amsterdam, 19-22 May 2008), and considers these new perspectives and developments,

including sections on new materials (i.e. fire resisting concrete, ultra-high performance fibered concrete, textile reinforced concrete, bacteria-based self healing concrete) and codes for the future (i.e. the American P2P Iniative, fibre-reinforced polymer (FRP) applications in construction, Codes for SFRC Structures). The book includes contributions from leading scientists and professionals in concrete and concrete structures worldwide, and covers: – Life cycle design – Design strategies for the future – Underground structures – Monitoring and Inspection – Diagnosis – Innovative materials – Codes for the future – Modifying and adapting structures – Architectural Concrete – Developing a modern infrastructure – Designing structures against extreme loads – Increasing the speed of construction Tailor Made Concrete Structures. New Solutions for our Society includes the state-of-the-art in research on concrete and concrete structures, and will be invaluable to professionals, structural engineers and scientists.

This book focuses on the seismic design of building structures and their foundations to Eurocode 8. It covers the principles of seismic design in a clear but brief manner and then links these concepts to the provisions of Eurocode 8. It addresses the fundamental concepts related to seismic hazard, ground motion models, basic dynamics, seismic analysis, siting considerations, structural layout, and design philosophies, then leads to the specifics of Eurocode 8. Code procedures are applied with the aid of walk-through design examples which, where possible, deal with a common case study in most chapters. As well as an update throughout, this second edition incorporates three new and topical chapters dedicated to specific seismic design aspects of timber buildings and masonry structures, as well as base-isolation and supplemental damping. There is renewed interest in the use of sustainable timber buildings, and masonry structures still represent a popular choice in many areas. Moreover, seismic isolation and supplemental damping can offer low-damage solutions which are being increasingly considered in practice. The book stems primarily from practical short courses on seismic design which have been run over a number of years and through the development Eurocode 8. The contributors to this book are either specialist academics with significant consulting experience in seismic design, or leading practitioners who are actively engaged in large projects in seismic areas. This experience has provided significant insight into important areas in which guidance is required.

This book comprises select proceedings of the International Conference on Smart Technologies for Energy, Environment, and Sustainable Development (ICSTEESD 2018). The chapters are broadly divided into three focus areas, viz. energy, environment, and sustainable development, and discusses the relevance and applications of smart technologies in these fields. A wide variety of topics such as renewable energy, energy conservation and management, energy policy and planning, environmental management, marine environment, green building, smart cities, smart transportation are covered in this book. Researchers and professionals from varied engineering backgrounds contribute chapters with an aim to provide economically viable solutions to sustainable development challenges. The book will prove useful for academics, professionals, and policy makers interested in sustainable development.

Floor diaphragms on transfer levels of tall buildings typically experience significant shear and flexural demands and complex local behavior as they are used to re-distribute large seismic forces among vertical lateral force resisting structural elements. For Performance Based Seismic Design (PBSD), it is important that rational procedures are used to estimate diaphragm demands and a comprehensive approach is used for the design of diaphragm components (i.e., chords, collectors, drags). However, various modeling and design methodologies are used in engineering practice, potentially leading to significant discrepancies in estimated diaphragm seismic demands. In order to address current design and modeling issues related to transfer diaphragms of tall buildings, the objectives of this research are to: 1) provide improved guidance of stiffness modeling of diaphragms as function of demand, 2) investigate the sensitivity of diaphragm demands to modeling approach (i.e., elastic versus nonlinear elements) and geometry discretization, 3) provide guidance on extracting design forces from finite element analysis, and 4) provide guidance on use and interpretation of diaphragm demands when simplified models are used (e.g., strut and tie, beam model) and compare them with results obtained from finite element analysis. For this study, a structural model of a recently completed design of a tall building located in Los Angeles is used. Diaphragm demands are assessed and compared systematically for both global and local responses for seven pairs of MCE ground acceleration response histories for a variety of modeling approaches and assumptions according to the aforementioned research objectives. Based on analysis results and comparisons between different model configurations as well as effective stiffness values no general trend was determined. It has been found that forces reported by the analytical model not only depend on the model configuration and effective stiffness value used, but the location of the section cut and the demand of interest as well. Due to this, recommendations were unable to be made for diaphragm modeling. However, when comparing different methods of extracting diaphragm demands, trends had been found and recommendations based on worst case scenario and consistency between different loading directions were provided. Additionally, when comparing forces obtained using simplified methods against results from the analytical model, forces are either underestimated or overestimated. These results depended on what type of floor response was used for the simplified methods (i.e. translational versus rotational floor acceleration). Therefore, the considered simplified models are currently unable to accurately estimate diaphragm demands from a finite element analysis.

This book is intended to serve as a textbook for engineering courses on earthquake resistant design. The book covers important attributes for seismic design such as material properties, damping, ductility, stiffness and strength. The subject coverage commences with simple concepts and proceeds right up to nonlinear analysis and push-over method for checking building adequacy. The book also provides an insight into the design of base isolators highlighting their merits and demerits. Apart from the theoretical approach to design of multi-storey buildings, the book highlights the care required in practical design and construction of various building components. It covers modal analysis in depth including the important missing mass method of analysis and tension shift in shear walls and beams. These have important bearing on reinforcement detailing. Detailed design and construction features are covered for earthquake resistant design of reinforced concrete as well as confined and reinforced masonry structures. The book also provides the methodology for assessment of seismic forces on basement walls and pile foundations. It provides a practical approach to design and detailing of soft storeys, short columns, vulnerable staircases and many other components. The book bridges the gap between design and construction. Plenty of worked illustrative examples are provided to aid learning. This book will be of value to upper undergraduate and graduate students taking courses on seismic design of structures.

This book provides a single-source reference for whole life embodied impacts of buildings. The comprehensive and persuasive text, written by over 50 invited experts from across the world, offers an indispensable resource both to newcomers and to established practitioners in the field. Ultimately it provides a persuasive argument as to why embodied impacts are an essential aspect of sustainable built environments. The book is divided into four sections: measurement, including a strong emphasis on uncertainty analysis, as well as offering practical case

studies of individual buildings and a comparison of materials; management, focusing in particular on the perspective of designers and contractors; mitigation, which identifies some specific design strategies as well as challenges; and finally global approaches, six chapters which describe in authoritative detail the ways in which the different regions of the world are tackling the issue.

This report synthesizes the existing information on hybrid coupled wall (HCW) systems into helpful recommendations pertaining to their seismic analysis and design.

The primary objective of the dissertation work is to examine the capacity of precast concrete diaphragms. This work is part of a multi-university research effort to develop a new seismic design methodology for precast/prestressed concrete floor diaphragms. To accomplish this, two-dimensional finite element (FE) models of precast floor diaphragms are created, including new elements to match the response of reinforcing details under combined forces. Using these models, nonlinear static"pushover"analyses are performed by applying body forces in the plane of the floor. The analyses are composed of three major parts:(1) Parametric studies to determine the required diaphragm shear strength relative to design (flexural) strength, termed"shear reinforcement overstrength", to promote a ductile mechanism in precast diaphragms. The performance of precast diaphragms with different shear reinforcement overstrength is examined. Appropriate shear reinforcement overstrength design factors are proposed to produce certain performance targets, in terms of a number of key parameters related to diaphragm geometry and the properties of the diaphragm reinforcing details.(2) Parametric studies to examine the effects of"secondary"diaphragm elements (spandrels, internal beams) on precast diaphragm behavior. Though not directly counted in design to participate diaphragm action, the secondary elements and their connections to the main diaphragm may modify the strength, stiffness and deformation capacity of the diaphragm. Analytical studies are performed to examine their effect on the global characteristics and local demands of precast floor diaphragms. The parameters evaluated include the characteristics of the connection details, the seismic hazard level used in design, diaphragm geometry, and layouts of spandrels and internal beams.(3) Development of a rational method for calculating the service stiffness and yield strength of precast concrete diaphragms. The method involves input of diaphragm geometry andreinforcing details. The method is verified analytically through comparisons to a set of FE analyses for an idealized diaphragm representation (regular single span diaphragm idealized with simple end supports). The method verified for a single set of diaphragm reinforcement details is used to estimate the properties over a range of untopped and topped diaphragm systems. Consideration of spandrel and internal beams in the method is discussed.

This handbook contains up-to-date existing structures, computer applications, and infonnation on planning, analysis, and design seismic design of wood structures. A new and very useful feature of this edition of earthquake-resistant building structures. Its intention is to provide engineers, architects, is the inclusion of a companion CD-ROM disc developers, and students of structural containing the complete digital version of the handbook itself and the following very engineering and architecture with authoritative, yet practical, design infonnation. It represents important publications: an attempt to bridge the persisting gap between l. UBC-IBC (1997-2000) Structural advances in the theories and concepts of Comparisons and Cross References, ICBO, earthquake-resistant design and their 2000. implementation in seismic design practice. 2. NEHRP Guidelines for the Seismic The distinguished panel of contributors is Rehabilitation of Buildings, FEMA-273, Federal Emergency Management Agency, composed of 22 experts from industry and universities, recognized for their knowledge and 1997. extensive practical experience in their fields. 3. NEHRP Commentary on the Guidelinesfor They have aimed to present clearly and the Seismic Rehabilitation of Buildings, FEMA-274, Federal Emergency concisely the basic principles and procedures pertinent to each subject and to illustrate with Management Agency, 1997. practical examples the application of these 4. NEHRP Recommended Provisions for principles and procedures in seismic design Seismic Regulations for New Buildings and practice. Where applicable, the provisions of Older Structures, Part 1 - Provisions, various seismic design standards such as mc FEMA-302, Federal Emergency 2000, UBC-97, FEMA-273/274 and ATC-40 Management Agency, 1997.

The prime purpose of this book is to serve as a design is of considerable value in helping the classroom text for the engineering or architec student make the transition from the often sim ture student. It will, however, also be useful to plistic classroom exercises to problems of the designers who are already familiar with design real world. Problems for solution by the student in other materials (steel, concrete, masonry) but follow the same idea. The first problems in each need to strengthen, refresh, or update their capa subject are the usual textbook-type problems, bility to do structural design in wood. Design but in most chapters these are followed by prob principles for various structural materials are lems requiring the student to make structural similar, but there are significant differences. planning decisions as well. The student may be This book shows what they are. required, given a load source, to find the magni The book has features that the authors believe tude of the applied loads and decide upon a set it apart from other books on wood structural grade of wood. Given a floor plan, the student design. One of these is an abundance of solved may be required to determine a layout of struc examples. Another is its treatment of loads. This tural members. The authors have used most of book will show how actual member loads are the problems in their classes, so the problems computed. The authors have found that students, have been tested.