

Concrete Shear Wall Design Guide

Sets out basic theory for the behavior of reinforced concrete structural elements and structures in considerable depth. Emphasizes behavior at the ultimate load, and, in particular, aspects of the seismic design of reinforced concrete structures. Based on American practice, but also examines European practice.

Complete coverage of earthquake-resistant concrete building design Written by a renowned seismic engineering expert, this authoritative resource discusses the theory and practice for the design and evaluation of earthquakeresisting reinforced concrete buildings. The book addresses the behavior of reinforced concrete materials, components, and systems subjected to routine and extreme loads, with an emphasis on response to earthquake loading. Design methods, both at a basic level as required by current building codes and at an advanced level needed for special problems such as seismic performance assessment, are described. Data and models useful for analyzing reinforced concrete structures as well as numerous illustrations, tables, and equations are included in this detailed reference. Seismic Design of Reinforced Concrete Buildings covers: Seismic design and performance verification Steel reinforcement Concrete Confined concrete Axially loaded members Moment and axial force Shear in beams, columns, and walls Development and anchorage Beam-column connections Slab-column and slab-wall connections Seismic design overview Special moment frames Special structural walls Gravity framing Diaphragms and collectors Foundations 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.

Solid design and craftsmanship are a necessity for structures and infrastructures that must stand up to natural disasters on a regular basis. Continuous research developments in the engineering field are imperative for sustaining buildings against the threat of earthquakes and other natural disasters. Performance-Based Seismic Design of Concrete Structures and Infrastructures is an informative reference source on all the latest trends and emerging data associated with structural design. Highlighting key topics such as seismic assessments, shear wall structures, and infrastructure resilience, this is an ideal resource for all academicians, students, professionals, and researchers that are seeking new knowledge on the best methods and techniques for designing solid structural designs.

Third Printing, incorporating errata, Supplement 1, and expanded commentary, 2013. The definitive guide to stability design criteria, fully updated and incorporating current

research Representing nearly fifty years of cooperation between Wiley and the Structural Stability Research Council, the Guide to Stability Design Criteria for Metal Structures is often described as an invaluable reference for practicing structural engineers and researchers. For generations of engineers and architects, the Guide has served as the definitive work on designing steel and aluminum structures for stability. Under the editorship of Ronald Ziemian and written by SSRC task group members who are leading experts in structural stability theory and research, this Sixth Edition brings this foundational work in line with current practice and research. The Sixth Edition incorporates a decade of progress in the field since the previous edition, with new features including: Updated chapters on beams, beam-columns, bracing, plates, box girders, and curved girders. Significantly revised chapters on columns, plates, composite columns and structural systems, frame stability, and arches Fully rewritten chapters on thin-walled (cold-formed) metal structural members, stability under seismic loading, and stability analysis by finite element methods State-of-the-art coverage of many topics such as shear walls, concrete filled tubes, direct strength member design method, behavior of arches, direct analysis method, structural integrity and disproportionate collapse resistance, and inelastic seismic performance and design recommendations for various moment-resistant and braced steel frames Complete with over 350 illustrations, plus references and technical memoranda, the Guide to Stability Design Criteria for Metal Structures, Sixth Edition offers detailed guidance and background on design specifications, codes, and standards worldwide.

Reinforced concrete shear walls are commonly used to provide lateral strength and stiffness to concrete buildings in seismic regions. Typically installed in the wall face, mechanical anchors are responsible for connecting various nonstructural systems to the main structure. During an earthquake, anchors in reinforced concrete structural elements need to retain their strength and stiffness, despite the inevitable presence of cracks and damage in the concrete, developed as a consequence of the lateral cyclic loading. Anticipating damage to the concrete, which will naturally influence anchor response, current guidelines to qualify anchors for seismic applications require adequate performance in cracked concrete to assure minimal anchor load loss. However, these guidelines are based on anchor performance in pure flexural cracks, as this is the typical damage condition occurring in reinforced concrete frame elements, which has been studied for decades. The response of anchors to a mix of flexure and shear cracks, i.e., the complex situation realized in shear-flexure structural components such as shear walls, however, has largely not been studied. To address the paucity of data regarding anchor behavior in cracked concrete, the behavior of anchors installed horizontally in three full-scale reinforced concrete shear walls with different aspect ratios (wall height/length) is studied in this dissertation. Notably, two types of post-installed anchors were investigated in these tests, namely: i) expansion anchors and ii) bonded anchors. One slender and two identical low-aspect ratio walls were designed according to current U.S. design codes. Simulated seismic loading was imposed at the top of the wall using an equivalent cyclic displacement history, while uniform compression was applied on the slender and one of the two identical low-aspect ratio shear walls. One of the low aspect ratio walls was tested without axial compression to investigate its effect on the anchor response. Anchors were continuously loaded to their design tension while the walls were cycled. The slender full-scale wall failed in a predominantly flexural mode, precipitated by buckling and fracture of the boundary reinforcement. The two identical full-scale low-aspect ratio walls failed in a mixed flexure-shear response, with severe web concrete crushing and buckling and rupture of the boundary reinforcement. Anchor axial load and displacement data, continually measured during the wall cyclic tests, confirmed the

sensitivity of the performance of anchors amidst the presence of a variety of cracked concrete conditions, especially in walls prone to develop large shear stress and shear induced damage when subjected to lateral cyclic loads. Following the wall cyclic tests, tension failure tests performed on the anchors indicated that their residual tension load capacity was significantly compromised by concrete damage. Such damage was concentrated in specific wall regions, such as the boundary elements and the plastic hinge region in slender walls, or along the diagonal struts, the boundary elements and near the base of low-aspect ratio walls. Of the two types of anchors tested, expansion anchors observed the most significant load loss (and consequentially axial displacement) in the presence of both the wall cyclic loading and the residual tests on the anchors themselves. Following the experimental program, a multiple vertical line finite element model was used to predict the response of each of the tested full-scale shear walls. Numerical analyses cross-comparison with test results demonstrated a high level of accuracy of the selected modeling approach. As such, an expanded parametric study was conducted to understand the extent of severe concrete strains on the crack distribution and width, using a smeared crack approach. Wall models designed for the parametric study were intended to explore different geometry, reinforcement and axial compression to study the damage distribution within the wall elevation. Crack pattern distribution plots developed using the parametric study results were used to identify regions where anchors would be vulnerable to load loss upon achievement of service, design and severe seismic damage. Ultimately, the findings from this dissertation shed light on the vulnerability of anchors placed in reinforced concrete shear walls, where damage in the form of mixed mode cracking and spalling can be expected. Future design guidelines would benefit from precluding crack sensitive anchors in the most highly damaged regions of these essential lateral force resisting components of the structural system.

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 Discontinuous shear walls Horizontally offset shear walls The portal frame Rigid moment-resisting frame walls--the frame method of analysis

Advances in Engineering Materials, Structures and Systems: Innovations, Mechanics and Applications comprises 411 papers that were presented at SEMC 2019, the Seventh International Conference on Structural Engineering, Mechanics and Computation, held in Cape Town, South Africa, from 2 to 4 September 2019. The subject matter reflects the broad scope of SEMC conferences, and covers a wide variety of engineering materials (both traditional and innovative) and many types of structures. The many topics featured in these Proceedings can be classified into six broad categories that deal with: (i) the mechanics of materials and fluids (elasticity, plasticity, flow through porous media, fluid dynamics, fracture, fatigue, damage, delamination, corrosion, bond, creep, shrinkage, etc); (ii) the mechanics of structures and systems (structural dynamics, vibration, seismic response, soil-structure interaction, fluid-structure interaction, response to blast and impact, response to fire, structural stability, buckling, collapse behaviour); (iii) the numerical modelling and experimental testing of materials and structures (numerical methods, simulation techniques, multi-scale modelling,

computational modelling, laboratory testing, field testing, experimental measurements); (iv) innovations and special structures (nanostructures, adaptive structures, smart structures, composite structures, bio-inspired structures, shell structures, membranes, space structures, lightweight structures, long-span structures, tall buildings, wind turbines, etc); (v) design in traditional engineering materials (steel, concrete, steel-concrete composite, aluminium, masonry, timber, glass); (vi) the process of structural engineering (conceptualisation, planning, analysis, design, optimization, construction, assembly, manufacture, testing, maintenance, monitoring, assessment, repair, strengthening, retrofitting, decommissioning). The SEMC 2019 Proceedings will be of interest to civil, structural, mechanical, marine and aerospace engineers. Researchers, developers, practitioners and academics in these disciplines will find them useful. Two versions of the papers are available. Short versions, intended to be concise but self-contained summaries of the full papers, are in this printed book. The full versions of the papers are in the e-book.

Construction Details From Architectural Graphic Standards Eighth Edition Edited by James Ambrose A concise reference tool for the professional involved in the production of details for building construction, this abridgement of the classic Architectural Graphic Standards provides indispensable guidance on standardizing detail work, without having to create the needed details from scratch. An ideal "how to" manual for the working draftsman, this convenient, portable edition covers general planning and design data, sitework, concrete, masonry, metals, wood, doors and windows, finishes, specialties, equipment, furnishings, special construction, energy design, historic preservation, and more. Construction Details also includes extensive references to additional information as well as AGS's hallmark illustrations. 1991 (0 471-54899-5) 408 pp. Fundamentals of Building Construction Materials And Methods Second Edition Edward Allen "A thoughtful overview of the entire construction industry, from homes to skyscrapers...there's plenty here for the aspiring tradesperson or anyone else who's fascinated by the art of building." —Fine Homebuilding Beginning with the materials of the ancients—wood, stone, and brick—this important work is a guide to the structural systems that have made these and more contemporary building materials the irreplaceable basics of modern architecture. Detailing the structural systems most widely used today—heavy timber framing, wood platform framing, masonry loadbearing wall, structural steel framing, and concrete framing systems—the book describes each system's historical development, how the major material is obtained and processed, tools and working methods, as well as each system's relative merits. Designed as a primer to building basics, the book features a list of key terms and concepts, review questions and exercises, as well as hundreds of drawings and photographs, illustrating the materials and methods described. 1990 (0 471-50911-6) 803 pp. Mechanical and Electrical Equipment for Buildings Eighth Edition Benjamin Stein and John S. Reynolds "The book is packed with useful information and has been the architect's standard for fifty years." —Electrical Engineering and Electronics on the seventh edition More up to date than ever, this reference classic provides valuable insights on the new imperatives for building design today. The Eighth Edition details the impact of computers, data processing, and telecommunications on building system design; the effects of new, stringent energy codes on building systems; and computer calculation techniques as applied to daylighting and electric lighting design. As did earlier editions, the book provides the basic theory and design guidelines for both systems and equipment, in everything from heating and cooling, water and waste, fire and fire protection systems, lighting and electrical wiring, plumbing, elevators and escalators, acoustics, and more. Thoroughly illustrated, the book is a basic primer on making comfort and resource efficiency integral to the design standard. 1991 (0 471-52502-2) 1,664 pp.

Offers the latest regulations on designing and installing commercial and residential buildings. The NCEES SE Exam is Open Book - You Will Want to Bring This Book Into the Exam. Alan

Williams' PE Structural Reference Manual Tenth Edition (STRM10) offers a complete review for the NCEES 16-hour Structural Engineering (SE) exam. This book is part of a comprehensive learning management system designed to help you pass the PE Structural exam the first time. PE Structural Reference Manual Tenth Edition (STRM10) features include: Covers all exam topics and provides a comprehensive review of structural analysis and design methods New content covering design of slender and shear walls Covers all up-to-date codes for the October 2021 Exams Exam-adopted codes and standards are frequently referenced, and solving methods—including strength design for timber and masonry—are thoroughly explained 270 example problems Strengthen your problem-solving skills by working the 52 end-of-book practice problems Each problem's complete solution lets you check your own solving approach Both ASD and LRFD/SD solutions and explanations are provided for masonry problems, allowing you to familiarize yourself with different problem solving methods. Topics Covered: Bridges Foundations and Retaining Structures Lateral Forces (Wind and Seismic) Prestressed Concrete Reinforced Concrete Reinforced Masonry Structural Steel Timber Referenced Codes and Standards - Updated to October 2021 Exam Specifications: AASHTO LRFD Bridge Design Specifications (AASHTO) Building Code Requirements and Specification for Masonry Structures (TMS 402/602) Building Code Requirements for Structural Concrete (ACI 318) International Building Code (IBC) Minimum Design Loads for Buildings and Other Structures (ASCE 7) National Design Specification for Wood Construction ASD/LRFD and National Design Specification Supplement, Design Values for Wood Construction (NDS) North American Specification for the Design of Cold-Formed Steel Structural Members (AISI) PCI Design Handbook: Precast and Prestressed Concrete (PCI) Seismic Design Manual (AISC 327) Special Design Provisions for Wind and Seismic with Commentary (SDPWS) Steel Construction Manual (AISC 325)

Concrete Design covers concrete design fundamentals for architects and engineers, such as tension, flexural, shear, and compression elements, anchorage, lateral design, and footings. As part of the Architect's Guidebooks to Structures Series it provides a comprehensive overview using both imperial and metric units of measurement. Written by experienced professional structural engineers Concrete Design is beautifully illustrated, with more than 170 black and white images, contains clear examples that show all design steps, and provides rules of thumb and simple tables for initial sizing. A refreshing change in textbooks for architectural materials courses, it is an indispensable reference for practicing architects and students alike. As a compact summary of key ideas it is ideal for anyone needing a quick guide to concrete design.

This invitation conference, held Dec. 2 and 3, 1994, included earth scientists, engineers, social scientists, agency program managers, and practitioners and others who implement earthquake research. Chapters include: NSF-funded Northridge Earthquake researchers; summary of USGS Northridge supplementary funding; NIST Northridge research; FEMA Northridge research; organizational research programs: Calif. Div. of Mines and Geology, Calif. Seismic Safety Comm., EERI, NCEER, NHRAIC, Rand Critical Technologies Inst., and SAC Joint Venture; Info. Services: EERC-NISEE, NCEER Info. Services, and OES DFO; and individuals' research projects.

This comprehensive and well-organized book presents the concepts and principles of earthquake resistant design of structures in an easy-to-read style.

The use of these principles helps in the implementation of seismic design practice. The book adopts a step-by-step approach, starting from the fundamentals of structural dynamics to application of seismic codes in analysis and design of structures. The text also focusses on seismic evaluation and retrofitting of reinforced concrete and masonry buildings. The text has been enriched with a large number of diagrams and solved problems to reinforce the understanding of the concepts. Intended mainly as a text for undergraduate and postgraduate students of civil engineering, this text would also be of considerable benefit to practising engineers, architects, field engineers and teachers in the field of earthquake resistant design of structures.

This SEAOC Blue Book: Seismic Design Recommendations is the premier publication of the SEAOC Seismology Committee. The name Blue Book is renowned worldwide among engineers, researchers, and building officials. Since 1959, the SEAOC Blue Book, previously titled Recommended Lateral Force Requirements and Commentary, has been a prescient publication of earthquake engineering. The Blue Book has been at the vanguard of earthquake engineering in California and around the world. This edition of the Blue Books offers a series of articles, that cover specific topics, some related to a particular code provision and some more general relating to an area of practice. While different than the previous editions of the Blue Books, it builds upon the tremendous effort of those who have forged earthquake engineering practice via the previous half-century of Blue Book editions. The Blue Book provides: insight and discussion of earthquake engineering concepts; interpretations of sometimes ambiguous or conflicting provisions of various codes, standards, and guidelines; and practical guidance on design implementation.

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.

This volume contains the papers presented at the Third International Conference on Thin-Walled Structures, Cracow, Poland on June 5-7, 2001. There has been a substantial growth in knowledge in the field of Thin-Walled Structures over the past few decades. Lightweight structures are in widespread use in the Civil Engineering, Mechanical Engineering, Aeronautical, Automobile, Chemical and Offshore Engineering fields. The development of new processes, new methods of connections, new materials has gone hand-in-hand with the evolution of advanced analytical methods suitable for dealing with the increasing complexity of the design work involved in ensuring safety and confidence in the finished products. Of particular importance with regard to the analytical process is the growth in use of the finite element method. This method, about 40 years ago, was confined to rather specialist use, mainly in the aeronautical field, because of its requirements for substantial calculation capacity. The development over recent years of extremely powerful microcomputers has ensured that the

application of the finite element method is now possible for problems in all fields of engineering, and a variety of finite element packages have been developed to enhance the ease of use and the availability of the method in the engineering design process.

The Definitive Guide to Designing Reinforced Masonry Structures Fully updated to the 2009 International Building Code (2009 IBC) and the 2008 Masonry Standards Joint Committee (MSJC-08), Design of Reinforced Masonry Structures, second edition, presents the latest methods for designing strong, safe, and economical structures with reinforced masonry. The book is packed with more than 425 illustrations and a wealth of new, detailed examples. This state-of-the-art guide features strength design philosophy for reinforced masonry structures based on ASCE 7-05 design loads for wind and seismic design. Written by an internationally acclaimed author, this essential professional tool takes you step-by-step through the art, science, and engineering of reinforced masonry structures. **COVERAGE INCLUDES:** Masonry units and their applications Materials of masonry construction Flexural analysis and design Columns Walls under gravity and transverse loads Shear walls Retaining and subterranean walls General design and construction considerations Anchorage to masonry Design aids and tables

"With the rise in constructing using FRP reinforcement, owing to corrosion problems in steel-reinforced structures, there is a need for a system to resist lateral loads induced from wind and earthquake loads. The present study addressed the applicability of reinforced-concrete shear walls totally reinforced with glass-fiber-reinforced polymer (GFRP) bars to attain reasonable strength and drift requirements as specified in different codes. Four large-scale shear walls - one reinforced with steel bars (as reference specimen) and three totally reinforced with GFRP bars - were constructed and tested to failure under quasi-static reversed cyclic lateral loading. The GFRP-reinforced walls had different aspect ratios covering the range of medium-rise walls. The reported test results clearly showed that properly designed and detailed GFRPreinforced walls could reach their flexural capacities with no strength degradation, and that shear, sliding shear, and anchorage failures were not major problems and could be effectively controlled. The results also showed recoverable and self-centering behavior up to allowable drift limits before moderate damage occurred and achieved a maximum drift meeting the limitation of most building codes. Acceptable levels of energy dissipation accompanied by relatively small residual forces, compared to the steel-reinforced shear wall, were observed. Finite element simulation was conducted and the analyses captured the main features of behavior. Interaction of flexural and shear deformations of the tested shear walls was investigated. It was found that relying on the diagonal transducers tended to overestimate shear distortions by 30% to 50%. Correcting the results based on the use of vertical transducers was assessed and found to produce consistent results. Decoupling the flexural and shear deformations was discussed. Using GFRP bars as elastic material gave uniform distribution of shear strains along the shear region, resulting in shear deformation ranging from 15 to 20% of total deformation. The yielding of the steel bars intensified the shear strains at the yielding location, causing significant degradation in shear deformation ranging from 2 to 40% of total deformation. The results obtained demonstrated significantly high utilization levels of such shear wall type, therefore, primary guidelines for seismic design of GFRP-reinforced shear wall in moderate earthquakes regions was presented, as no design guidelines for lateral load resistance for GFRP-reinforced walls are available in codes. The ultimate limit state was addressed by providing strength capacity that limit ductility demand to their safe flexural displacement capacity. The strength demands were derived from ground motion spectra using modification factors that depend on both the strength and energy absorption of the structure. Deformation capacity was derived by proposing new definitions for elastic (virtual yield)

displacement and maximum allowable displacement. Strength modification factor was proposed based on the test results. The occurrence of "virtual plastic hinge" for GFRP-reinforced shear walls was described providing new definitions convenient with the behavior of the GFRP-reinforced shear walls. "Virtual plastic hinge" length was estimated based on observations and calculations. Subsequently, the experimental results were used to justify the proposed design procedure. The promising results could provide impetus for constructing shear walls reinforced with GFRP bars and constitute a step toward using GFRP reinforcement in such lateral-resisting systems."

Standard ASCE/SEI 41-17 describes deficiency-based and systematic procedures that use performance-based principles to evaluate and retrofit existing buildings to withstand the effects of earthquakes.

This book discusses resilience in terms of structures' and infrastructures' responses to extreme loading conditions. These include static and dynamic loads such as those generated by blasts, terrorist attacks, seismic events, impact loadings, progressive collapse, floods and wind. In the last decade, the concept of resilience and resilient-based structures has increasingly gained in interest among engineers and scientists. Resilience describes a given structure's ability to withstand sudden shocks. In other words, it can be measured by the magnitude of shock that a system can tolerate. This book offers a valuable resource for the development of new engineering practices, codes and regulations, public policy, and investigation reports on resilience, and provides broad and integrated coverage of the effects of dynamic loadings, and of the modeling techniques used to compute the structural response to these loadings.

Guidelines for Design of Low-Rise Buildings Subjected to Lateral Forces is a concise guide that identifies performance issues, concerns, and research needs associated with low-rise buildings. The book begins with an introduction that discusses special problems with low-rise buildings subjected to wind and earthquakes. Chapter 2 examines probabilistic methods and their use in evaluating risks from natural hazards. It also addresses the characteristics of wind and seismic forces and levels of risk implied by building codes. Wind forces are covered in more detail in Chapter 3, with discussions of wind force concepts and wind-structure interactions. Chapter 4 is devoted to earthquake forces and traces the development of building codes for earthquake resistant design. Chapter 5 describes the main framing systems used to resist lateral forces and discusses the code requirements for drift control. The designs and requirements for connections between building elements are addressed in Chapter 6. It includes examples along with several illustrations of suitable connections. The performance of non-structural elements during wind and earthquake forces is also examined in detail. This book serves as an important reference for civil engineers, construction engineers, architects, and anyone concerned with structural codes and standards. It is an excellent guide that can be used to supplement design recommendations and provide a design basis where there are no current requirements.

Illustrated in full color throughout. The primary purpose of this document is to provide a selected compilation of seismic rehabilitation techniques that are practical and effective. The descriptions of techniques include detailing and constructability tips that might not be otherwise available to engineering offices or individual structural engineers who have limited experience in seismic rehabilitation of existing buildings. A secondary purpose is to provide guidance on which techniques are commonly used to mitigate specific seismic deficiencies in various model building types.

The architect's favorite handbook-more informative and easier to use than ever! The Architect's Studio Companion is the laborsaving design resource that architects and builders have relied on for years. Now in its fourth edition, this industry standard continues its reputation as a reliable tool for the preliminary selecting, configuring, and

sizing of the structural, mechanical, and egress systems of a building. Bestselling authors Edward Allen and Joseph Iano reduce complex engineering and building code information to simple approximations that enable the designer to lay out the fundamental systems of a building in a matter of minutes and get on with the design. Now in a flex binding that makes it even easier to use, The Architect's Studio Companion, Fourth Edition provides quick access to reliable rules of thumb that offer vital help for selecting, configuring, and sizing: * Structural systems * Heating, cooling, and electrical systems * Egress provisions, including exit stairways, parking garages, and parking lots * Daylight provisions The book concludes with precalculated tables of building code height and area limitations.

The most up to date structural concrete text, with the latest ACI revisions Structural Concrete is the bestselling text on concrete structural design and analysis, providing the latest information and clear explanation in an easy to understand style. Newly updated to reflect the latest ACI 318-14 code, this sixth edition emphasizes a conceptual understanding of the subject, and builds the student's body of knowledge by presenting design methods alongside relevant standards and code. Numerous examples and practice problems help readers grasp the real-world application of the industry's best practices, with explanations and insight on the extensive ACI revision. Each chapter features examples using SI units and US-SI conversion factors, and SI unit design tables are included for reference. Exceptional weather-resistance and stability make concrete a preferred construction material for most parts of the world. For civil and structural engineering applications, rebar and steel beams are generally added during casting to provide additional support. Pre-cast concrete is becoming increasingly common, allowing better quality control, the use of special admixtures, and the production of innovative shapes that would be too complex to construct on site. This book provides complete guidance toward all aspects of reinforced concrete design, including the ACI revisions that address these new practices. Review the properties of reinforced concrete, with models for shrink and creep Understand shear, diagonal tension, axial loading, and torsion Learn planning considerations for reinforced beams and strut and tie Design retaining walls, footings, slender columns, stairs, and more The American Concrete Institute updates structural concrete code approximately every three years, and it's critical that students learn the most recent standards and best practices. Structural Concrete provides the most up to date information, with intuitive explanation and detailed guidance.

The objective of the "Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds" is to inform and assist design professionals, hospital administrators, and facility managers in implementing sound mitigation measures that will decrease the vulnerability of hospitals to disruptions caused by natural hazard events. The intent of the Design Guide is to provide its audience with state-of-the-art knowledge on the variety of vulnerabilities faced by hospitals exposed to earthquakes, flooding, and high-winds risks, as well as the best ways to mitigate the risk of damage and disruption of hospital operations caused by these events.

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