# DOWNLOAD PDF BUILDING CONSTRUCTION PRINCIPLES PRACTICES AND MATERIALS

## Chapter 1 : Principles of Building Construction

*Introductory book for building construction and architecture covering; principles, practices, methods, and materials for light-heavy commercial construction. Read more Product details.*

An eco-house at Findhorn Ecovillage with a turf roof and solar panels Green buildings often include measures to reduce energy consumption â€" both the embodied energy required to extract, process, transport and install building materials and operating energy to provide services such as heating and power for equipment. Studies such as the U. LCI Database Project [18] show buildings built primarily with wood will have a lower embodied energy than those built primarily with brick, concrete, or steel. They also specify high-performance windows and extra insulation in walls, ceilings, and floors. Another strategy, passive solar building design , is often implemented in low-energy homes. Designers orient windows and walls and place awnings, porches, and trees [20] to shade windows and roofs during the summer while maximizing solar gain in the winter. In addition, effective window placement daylighting can provide more natural light and lessen the need for electric lighting during the day. Solar water heating further reduces energy costs. Onsite generation of renewable energy through solar power , wind power , hydro power , or biomass can significantly reduce the environmental impact of the building. Power generation is generally the most expensive feature to add to a building. Water conservation Reducing water consumption and protecting water quality are key objectives in sustainable building. One critical issue of water consumption is that in many areas, the demands on the supplying aquifer exceed its ability to replenish itself. To the maximum extent feasible, facilities should increase their dependence on water that is collected, used, purified, and reused on-site. The protection and conservation of water throughout the life of a building may be accomplished by designing for dual plumbing that recycles water in toilet flushing or by using water for washing of the cars. Waste-water may be minimized by utilizing water conserving fixtures such as ultra-low flush toilets and low-flow shower heads. Bidets help eliminate the use of toilet paper, reducing sewer traffic and increasing possibilities of re-using water on-site. Point of use water treatment and heating improves both water quality and energy efficiency while reducing the amount of water in circulation. The use of non-sewage and greywater for on-site use such as site-irrigation will minimize demands on the local aquifer. Their environmental engineering consists of a hybrid central chilled water system which cools floor-by-floor with steam instead of water. For concrete a high performance or Roman self-healing concrete is available. Indoor environmental quality enhancement[ edit ] See also: During the design and construction process choosing construction materials and interior finish products with zero or low VOC emissions will improve IAQ. Draft LEED [30] is about to expand the scope of the involved products. These IAQ standards have been adopted by and incorporated into the following programs: A well-insulated and tightly sealed envelope will reduce moisture problems but adequate ventilation is also necessary to eliminate moisture from sources indoors including human metabolic processes, cooking, bathing, cleaning, and other activities. Creating a high performance luminous environment through the careful integration of daylight and electrical light sources will improve on the lighting quality and energy performance of a structure. Wood itself is considered to be hypo-allergenic and its smooth surfaces prevent the buildup of particles common in soft finishes like carpet. The Asthma and Allergy Foundation of America recommends hardwood, vinyl, linoleum tile or slate flooring instead of carpet. Extensive investigation of such processes is the subject of indoor air scientific research and is well documented in the journal Indoor Air. Well-designed buildings also help reduce the amount of waste generated by the occupants as well, by providing on-site solutions such as compost bins to reduce matter going to landfills. To reduce the amount of wood that goes to landfill, Neutral Alliance a coalition of government, NGOs and the forest industry created the website dontwastewood. When buildings reach the end of their useful life, they are typically demolished and hauled to landfills. Deconstruction is a method of harvesting what is commonly considered "waste" and reclaiming it into useful building material. Rainwater collectors are used for similar purposes. Centralized wastewater

treatment systems can be costly and use a lot of energy. An alternative to this process is converting waste and wastewater into fertilizer, which avoids these costs and shows other benefits. By collecting human waste at the source and running it to a semi-centralized biogas plant with other biological waste, liquid fertilizer can be produced. This concept was demonstrated by a settlement in Lubeck Germany in the late s. Practices like these provide soil with organic nutrients and create carbon sinks that remove carbon dioxide from the atmosphere, offsetting greenhouse gas emission. Producing artificial fertilizer is also more costly in energy than this process. Peak demand is measured in the units of watts W. It shows how fast electrical energy is consumed. Residential electricity is often charged on electrical energy kilowatt hour , kWh. Green buildings or sustainable buildings are often capable of saving electrical energy but not necessarily reducing peak demand. When sustainable building features are designed, constructed and operated efficiently, peak demand can be reduced so that there is less desire for electricity network expansion and there is less impact onto carbon emission and climate change. Photo-voltaics, new appliances, and modern technologies tend to cost more money. And broader benefits, such as reductions in greenhouse gases GHGs and other pollutants have large positive impacts on surrounding communities and on the planet. The savings in money come from more efficient use of utilities which result in decreased energy bills. Numerous studies have shown the measurable benefit of green building initiatives on worker productivity. In general it has been found that, "there is a direct correlation between increased productivity and employees who love being in their work space. EPA studies indicate indoor levels of pollutants may be up to ten times higher than outdoor levels. LEED-certified buildings are designed to have healthier, cleaner indoor environmental quality, which means health benefits for occupants. In some cases, codes are written so local governments can adopt them as bylaws to reduce the local environmental impact of buildings. They award credits for optional building features that support green design in categories such as location and maintenance of building site, conservation of water, energy, and building materials, and occupant comfort and health. The number of credits generally determines the level of achievement. Some of the major building environmental assessment tools currently in use include: It is a comprehensive blueprint of action to be taken globally, nationally and locally by organizations of the UN, governments, and major groups in every area in which humans impact on the environment. The number 21 refers to the 21st century. The process is also intended to allow the alignment of project goals with local conditions and priorities and to assist those involved in managing projects to measure and verify their progress. For each individual Sub-Theme a core project indicator is defined along with guidance as to the relevance of that issue in the context of an individual project. The Sustainability Reporting Framework provides guidance for organizations to use as the basis for disclosure about their sustainability performance, and also provides stakeholders a universally applicable, comparable framework in which to understand disclosed information. The Guidelines are used as the basis for all reporting. They are the foundation upon which all other reporting guidance is based, and outline core content for reporting that is broadly relevant to all organizations regardless of size, sector, or location. The Guidelines contain principles and guidance as well as standard disclosures â€" including indicators â€" to outline a disclosure framework that organizations can voluntarily, flexibly, and incrementally, adopt. Protocols underpin each indicator in the Guidelines and include definitions for key terms in the indicator, compilation methodologies, intended scope of the indicator, and other technical references. Sector Supplements respond to the limits of a one-size-fits-all approach. Sector Supplements complement the use of the core Guidelines by capturing the unique set of sustainability issues faced by different sectors such as mining, automotive, banking, public agencies and others. The Code is intended as a good practice global standard for measuring the environmental performance of corporate buildings. Its aim is to accurately measure and manage the environmental impacts of corporate buildings and enable property executives to generate high quality, comparable performance information about their buildings anywhere in the world. The Code covers a wide range of building types from offices to airports and aims to inform and support the following; Creating an environmental strategy Inputting to real estate strategy Communicating a commitment to environmental improvement Creating performance targets.

## Chapter 2 : Green building - Wikipedia

*A unique organization creates an unparalleled exploration of building construction-principles of construction are covered in Part 1, and materials and systems of construction are covered in Part 2-providing students with a balanced learning approach.*

The field of sustainable design seeks to balance the needs of these areas by using an integrated approach to create "win-win-win" design solutions. The main objectives of sustainable design are to reduce, or completely avoid, depletion of critical resources like energy, water, land, and raw materials; prevent environmental degradation caused by facilities and infrastructure throughout their life cycle; and create built environments that are livable, comfortable , safe , and productive. Buildings use resources energy, water, raw materials, etc. Building owners, designers, and builders each face unique challenges to meet demands for new and renovated facilities that are accessible , secure , healthy and productive, while minimizing any negative impacts upon society, the environment, and the economy. In addition to including sustainable design concepts in new construction, sustainable design advocates commonly encourage retrofitting existing buildings rather than building anew. Retrofitting an existing building can often be more cost-effective than building a new facility. Designing major renovations and retrofits for existing buildings to include sustainable design attributes reduces operation costs and environmental impacts, and can increase building resiliency. The location, orientation, and landscaping of a building affect local ecosystems, transportation methods, and energy use. Incorporating smart growth principles into the project development process is important whether a project is a single building, a campus, or a large complex such as a military base. Siting for physical security is a critical issue in optimizing site design, including locations of access roads, parking, vehicle barriers, and perimeter lighting. Whether designing a new building or retrofitting an existing building, site design must integrate with sustainable design to achieve a successful project. If possible, strive to support native flora and fauna of the region in the landscape design. Optimize Energy Use With ever-increasing demand on fossil fuel resources and growing concerns about energy independence and security, and impacts of global climate change becoming more evident, it is essential to find ways to reduce energy load, increase efficiency, and maximize the use of renewable energy sources in federal facilities. Improving the energy performance of existing buildings is important to increasing our energy independence. Government and private sector organizations are increasingly committing to building and operating net zero energy buildings to significantly reduce dependence on fossil fuels. Protect and Conserve Water In many parts of the United States, fresh water is an increasingly scarce resource. Since building fundamentally changes the ecological and hydrological function of non-built land, a sustainable building should seek to minimize the impervious cover created through practices that can reduce those impacts while using water efficiently, and reusing or recycling water for on-site use, when feasible. The effort to bring drinkable water to our household faucets consumes enormous energy resources in pumping, transport, and treatment. Often potentially toxic chemicals are used to make water potable. The environmental and financial costs of sewage treatment are significant. Optimize Building Space and Material Use While the world population continues to grow to more than 9 billion by , consumption of natural resources will continue to increase and the demand for additional goods and services will continue to stress available resources. A sustainable building is designed and operated to use and reuse materials in the most productive and sustainable way across its entire life cycle, and is adaptable for reuse during its life cycle. The materials used in a sustainable building minimize life-cycle environmental impacts such as global warming, resource depletion, and toxicity. Environmentally preferable materials reduce impacts on human health and the environment, and contribute to improved worker safety and health, reduced liabilities, and reduced disposal costs. From conception the project was charged to "make use of the best commercially-available materials and technologies to minimize consumption of energy and resources and maximize use of natural, recycled and non-toxic materials. Among other attributes, a sustainable building

maximizes daylighting, has appropriate ventilation and moisture control, optimizes acoustic performance, and avoids the use of materials with high-Volatile Oorganic Compounds VOC emissions. Principles of IEQ also emphasize occupant control over systems such as lighting and temperature. Encourage building operators and maintenance personnel to participate in the design and development phases, to ensure optimal operations and maintenance of the building and the features such as stormwater facilities designed to reduce the impact of the building on the land. Recruit, develop, and train highly skilled maintenance personnel to operate increasingly sophisticated high-performance buildings. Also design facilities to include metering, to track the progress of sustainability initiatives, including reductions in energy and water use and waste generation, in the facility and on-site. Related Issues Building resiliency is the capacity of a building to continue to function and operate under extreme conditions, such as but not limited to extreme temperatures, sea level rise, natural disasters, etc. As the built environment faces the impending effects of global climate change, building owners, designers, and builders can design facilities to optimize building resiliency. Building adaptability is the capacity of a building to be used for multiple uses and in multiple ways over the life of the building. For example, designing a building with a modular and integrated approach to infrastructure delivery and interior systems furniture, ceiling systems, demountable partitions and access floors allows the building to support multiple uses and multiple futures. Additionally, using sustainable design allows for a building to adapt to different environments and conditions.

## Chapter 3 : Sustainable Building Guidelines

*and teaching, Building Construction: Principles, Materials & Systems 2nd Edition is a comprehensive and fully illustrated introduction to construction methods and materials.Ã‚â¬ Ã‚â¬ Continuing on with the books.*

Historical development[ edit ] Lauri Koskela, in , challenged the construction management community to consider the inadequacies of the time-cost-quality tradeoff paradigm. With recurring negative experiences on projects, evidenced by endemic quality problems and rising litigation, it became evident that the governing principles of construction management needed revisiting. Listen carefully to the message in this comment. We are not talking about just materials, methods, equipment, or contract documents. We are talking about how we work to deliver successful capital projects and how we manage the costs of inefficiency. Koskela then used the ideal production system embodied in the Toyota Production System to develop a more overarching production management paradigm for project-based production systems where production is conceptualized in three complementary ways, namely, as a Transformation T , as a Flow F , and as Value generation V. Transformation is the production of inputs into outputs. Both conceptualizations provide a solid intellectual foundation of lean construction as evident from both research and practice Abdelhamid  Recognizing that construction sites reflect prototypical behavior of complex and chaotic systems, especially in the flow of both material and information on and off site, Bertelsen a and b suggested that construction should be modeled using chaos and complex systems theory. Bertelsen b specifically argued that construction could and should be understood in three complimentary ways: As a project-based production process As an industry that provides autonomous agents As a social system What is lean construction? Lean construction recognizes that desired ends affect the means to achieve these ends, and that available means will affect realized ends Lichtig  Essentially, lean construction aims to embody the benefits of the Master Builder concept Abdelhamid et al. Lean construction draws upon the principles of project-level management and upon the principles that govern production-level management. Lean construction recognizes that any successful project undertaking will inevitably involve the interaction between project and production management. While lean construction is identical to lean production in spirit, it is different in how it was conceived as well as how it is practiced. The view of Lauri Koskela, Greg Howell, and Glenn Ballard is very different, with the origin of lean construction arising mainly from the need for a production theory in construction and anomalies that were observed in the reliability of weekly production planning. Getting work to flow reliably and predictably on a construction site requires the impeccable alignment of the entire supply chain responsible for constructed facilities such that value is maximized and waste is minimized. With such a broad scope, it is fair to say that tools found in Lean Manufacturing and Lean Production, as practiced by Toyota and others, have been adapted to be used in the fulfillment of Lean construction principles. Similarly, tools and methods found in other areas, such as in social science and business, are used where they are applicable. The tools and methods in construction management, such as CPM and work breakdown structure, etc. A sampling of these tools includes: The priority for all construction work is to: The IPD approach to contracting aligns project objectives with the interests of key participants. IPD relies on participant selection, transparency and continuing dialog. Construction consumers might consider rethinking their contracting strategies to share more fully in the benefits. Matthews and Howell [13] Commercial arrangements that support IPD and Lean Project Delivery[ edit ] There are at least five principal forms of contract that support lean construction In America, IFoA [14] uses explicit lean construction principles. The process aims to eliminate waste across the construction value chain, [21] through evaluation of initial planning and design, and examination of construction processes to predict where and when waste will occur, which is then eliminated through the use of lean tools in the IPD process. You may improve this article , discuss the issue on the talk page , or create a new article , as appropriate. The project demonstrated very clearly that lean thinking would only deliver major performance improvements if the construction sector learned from the extensive experience of other business sectors. Lean thinking must

become the way that all the firms in the design and construction supply chain co-operate with each other at a strategic level that over-arches individual projects. The collaborative, commitment-based planning system that integrates should-can-will-did planning pull planning, make-ready, look-ahead planning with constraint analysis, weekly work planning based upon reliable promises, and learning based upon analysis of PPC plan percent complete and reasons for variance. It is based on simple paper forms, so it can be administered using Post-it notes , paper, pencil, eraser and photocopier. A spreadsheet can help. Risk analysis ensures that float is built in where it will best protect programme integrity and predictability. Where appropriate the process can be used for programme compression too. In this way, one constructor took 6 weeks out of an week programme for the construction of a 40 bed hotel. Benefits to the client are enormous. Why put work into production if a pre-requisite is missing? This MakeReady process continues throughout the project. This weekly work planning processes is built around promises. The agreed programme defines when tasks should be done and acts as a request to the supplier to do that task. The last planners that is the trade foremen on site or design team leaders in a design process only promise once they have clarified the conditions of satisfaction and are clear that the task can be done. This measures the Percentage of Promises Completed on time. This score is measured site-wide and displayed around the site. Weekly measures are used by the project and by individual suppliers as the basis for learning how to improve the predictability of the work programme and hence the PPC scores. A key part of the continual improvement process is a study of the reasons why tasks promised in the WWP are delivered late. The following chart shows typical reasons: Using tools like 5 Why analysis and cause-effect diagrams will help the team understand how they can improve the clarity of information and ensure that there are sufficient operatives. LCI retains a registered Trademark on the term and Copyright in the idea and materials to prevent people who misunderstand or misrepresent the system from using it in trade. Consulting companies or individuals wishing to use the Last Planner System in trade commercial offering of service must first be approved by LCI. For more information about the development process see Ballard , [3] and Ballard and Howell for example. For a detailed description and list of the benefits of LPS, see Mossman: Managing the interaction between activities and combined effects of dependence and variation, is a first concern in lean construction because their interactions highly affects the time and cost of projects Howell, [25] ; in comparison, these interactions are not considered in PMI. In lean construction, optimization efforts focus on making work flow reliable Ballard, LPDS, ; in contrast PMI focuses on improving productivity of each activity which can make errors and reducing quality and result in rework. The project is structured and managed as a value generating process value is defined as satisfying customer requirements ; [25] while PMI considers less cost as value. In the lean approach, downstream stakeholders are involved in front end planning and design through cross functional teams Ballard, LPDS,  In lean construction, project control has the job of execution Ballard, PhD thesis, [26] ; whereas, control in PMI method relies on variance detection after-the-fact. In the lean approach, pull techniques govern the flow of information and materials, from upstream to downstream; [26] with PMI, push techniques govern the release of information and materials. Capacity and inventory are adjusted to absorb variation Mura. In lean construction, decision making is distributed in design production control systems; [26] by comparison, in PMI decision making is centered to one manager some times. Lean construction production system design resists the tendency toward local suboptimization, [26] however, PMI persists on optimizing each activity. The PMI-driven approach only considers managing a project at the macro-level. This is necessary but not sufficient for the success of projects. Lean Construction encompasses Project and Production Management, and formally recognizes that any successful project undertaking will inevitably involve the interaction between project and production management. Networks, journal and conferences[ edit ] The Lean Construction Institute conducts research and industry outreach activities. Articles in the Lean Construction Journal are available for free, [10] [13] [14] under a Creative Commons license , and go back to  Readers are referred to the Lean Construction Institute. A list of groups in the global Lean Construction community is available via dropbox. Illinois Institute of Technology; U. Universidad Politecnica de Valencia. Technion Israel Institute of Technology. Indian Institute

of Technology Madras. The Lean Construction Light House has sample course materials. Glenn Ballard UK [26] Dr. Lauri Koskela Finland [7] Around , the University of California, Berkeley, became the first university to offer lean construction modules within its existing graduate offering.

## Chapter 4 : Building Construction Principles, Practices and Materials - GlennHardie - (87)

*Building construction is a complex, significant, and rewarding process. It begins with an idea and culminates in a structure that may serve its occupants for several decades, even.*

## Chapter 5 : Green Building Guiding Principles - Green Building Solutions

*1- introduction 2-product- material range 3- construction equipment used for the job 4- production including crew configuration and productivity 5- procedures including preparation, method and precaution.*

## Chapter 6 : Building Construction: Principles, Materials, & Systems, 2nd Edition

*Explain the elements of building construction as they apply to construction codes. Describe the elements of building construction as they apply to firefighter safety. Anticipate fire behavior based on structural elements of, and thermal effects on, each of the following types of construction.*

## Chapter 7 : Building Construction Principles, Practices and Materials

*Lean construction (LC) is a method of production aimed at reducing costs, materials, time and effort. Essentially, the methodology is to minimize the bad and maximize the good.*

## Chapter 8 : Lean construction - Wikipedia

*building construction, methods of construction, materials used in building construction, and fire-resistance requirements in order to conduct fire scene operations safely and make sound strategic decisions.*

## Chapter 9 : Building Design and Construction Handbook, Sixth Edition

*Written by an author team with decades of experience in architecture, building construction, engineering, and teaching, Building Construction: Principles, Materials & Systems 2nd Edition is a comprehensive and fully illustrated introduction to construction methods and materials.*