

建筑工程设计BIM应用指南

CSCEC Building Information Modeling Guide for Design

(第二版)

(Second Edition)

中建《建筑工程设计BIM应用指南》编委会

李云贵 主 编

何关培 邱奎宁 副主编



中国建筑工业出版社

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第二版前言

建筑信息模型 (Building Information Modeling, 简称 BIM) 作为一项新的信息技术, 它的提出和发展, 对建筑业的科技进步产生了重大影响, 已在业界得到了普遍关注, 并对其寄予厚望, 希望能够通过 BIM 技术的应用促进建筑业的技术升级和生产方式转变。

应用 BIM 技术, 可望大幅度提高建筑工程的集成化程度, 促进建筑业生产方式的转变, 提高投资、设计、施工乃至整个工程生命期的质量和效率, 提升科学决策和管理水平。对于投资, 有助于业主提升对整个项目的掌控能力和科学管理水平、提高效率、缩短工期、降低投资风险; 对于设计, 支撑可持续设计、强化设计协同、减少因“错、缺、漏、碰”导致的设计变更, 促进设计效率和设计质量的提升; 对于施工, 支撑工业化建造和绿色施工、优化施工方案, 促进工程项目实现精细化管理、提高工程质量、降低成本和安全风险; 对于运维, 有助于提高资产管理以及物业使用和应急管理水平。

中国建筑股份有限公司 (以下简称“中建”) 十分重视 BIM 的研究和推广应用, 于 2012 年 12 月印发了《关于推进中建 BIM 技术加速发展的若干意见》(中建股科字 [2012] 677 号, 以下简称“若干意见”), 标志着从总公司到各子企业, 开始统筹规划, 全面推进 BIM 技术应用。在“十二五”期间, 按照《若干意见》的指导思想和基本原则, 中建组织开展了组织机构建设、标准体系建设、人才队伍建设、基础平台建设、集成能力建设、示范工程建设等一系列 BIM 技术研发和推广应用工作, 各子企业也积极引进 BIM 并结合单位实际, 投入一定的人力、物力, 将 BIM 应用于一批示范试点工程及一些代表性工程中。

为充分利用中建全产业链“四位一体”优势, 整合全集团 BIM 资源, 优化资源配置, 协调 BIM 技术发展, 提高应用水平和效率, 在一批 BIM 示范试点工程应用基础上, 在集团层面组织技术人员编写了中建 BIM 企业标准《建筑工程设计 BIM 应用指南》和《建筑工程施工 BIM 应用指南》第一版 (以下简称“《指南》(第一版)”), 于 2014 年 11 月由中国建筑工业出版社出版并在中建内部发行。《指南》(第一版) 的出版, 起到了良好作用, 虽未公开发行, 但在业内仍引起了较大

反响。

《指南》(第一版)编写组针对“十二五”期间行业 BIM 应用的发展趋势和存在问题,结合企业自身需求,在收集、整理大量国内外资料的基础上,通过总结 BIM 示范工程应用经验,形成《指南》(第一版)。在《指南》(第一版)编写过程中,注重时效性、实用性和中建企业特点,针对 BIM 应用尚处于初始阶段的现实情况,探索了如何将 BIM 技术用得好、用得快的方法,明确了应用 BIM 技术能解决什么技术问题,可用 BIM 软件有哪些、如何用,当前 BIM 应用还存在什么问题、如何解决,以及经验教训等。设计《指南》(第一版)主要内容包括:企业 BIM 应用环境、项目 BIM 应用计划、建筑专业设计 BIM 应用、绿色建筑设计 BIM 应用、结构专业设计 BIM 应用、机电设计 BIM 应用、多专业 BIM 协同应用等。

“十三五”期间,建筑行业发展的环境和形势发生了很大变化,为贯彻十八大以来党中央国务院信息化发展相关精神,落实十八届五中全会“创新、协调、绿色、开放、共享”发展理念,顺应“互联网+”发展趋势,进一步推动建筑业技术进步和管理升级,助力建筑产业现代化,提高工程建设与管理水平,行业主管部门也从产业政策方面加快了推进 BIM 技术应用步伐。2015 年 6 月 16 日住房城乡建设部发布了《关于推进建筑信息模型应用的指导意见》(建质函[2015]159 号),明确了“到 2020 年,建筑行业甲级勘察设计公司以及特级、一级房屋建筑工程施工企业应掌握并实现 BIM 与企业管理系统和其他信息技术的一体化集成应用;以国有资金投资为主的大中型建筑,申报绿色建筑的公共建筑和绿色生态小区的新立项项目的勘察、设计、施工、运营维护中,集成应用 BIM 的项目比率要达到 90%。”的发展目标。2016 年 8 月 23 日住房城乡建设部又发布了《2016~2020 年建筑业信息化发展纲要》(建质函[2016]183 号),提出了“十三五时期,全面提高建筑业信息化水平,着力增强 BIM、大数据、智能化、移动通讯、云计算、物联网等信息技术集成应用能力,建筑业数字化、网络化、智能化取得突破性进展,初步建成一体化行业监管和服务平台,数据资源利用水平和信息服务能力明显提升,形成一批具有较强信息技术创新能力和信息化应用达到国际先进水平的建筑企业及具有关键自主知识产权的建筑业信息技术企业。”的发展目标。旨在通过统筹规划、政策导向、分类指引,进一步提升建筑业整体信息化水平,进一步提升行业 BIM、大数据、智能化、移动通讯、云计算、物联网等信息技术集成应用能力,塑造绿色化、工业化、智能化建筑新业态,促进建筑业转型升级。

面对“十三五”期间行业发展形势和要求,为了进一步贯彻落实国务院和住房城乡建设部有关文件精神,推进 BIM 技术深度应用,我们组织力量编写了中建 BIM 企业标准《建筑工程设计 BIM 应用指南》第二版(以下简称“《指南》(第二版)”)。《指南》(第二版)从总体结构上与第一版保持一致,从企业、项目、专业

三个层面详细描述了项目全过程、全专业和各方参与 BIM 应用的业务流程、建模内容、建模方法、模型应用、专业协调、成果交付等具体指导和实践经验，并给出了经过工程项目实践的应用方案。

考虑到当前各专业和不同类型企业应用水平不同，《指南》（第二版）在第一版基础上有所扩展、有所深化。首先，《指南》（第二版）增加了“总图设计 BIM 应用”、“装饰设计 BIM 应用”、“幕墙设计 BIM 应用”、“建筑经济 BIM 应用”等内容。其次，原“机电设计 BIM 应用”细分为“给水排水设计 BIM 应用”、“暖通空调设计 BIM 应用”、“电气设计 BIM 应用”三章。为了响应住房城乡建设部《关于进一步推进工程总承包发展的若干意见》（建市〔2016〕93 号）的精神，增加“设计牵头工程总承包 BIM 应用”一章。此外，其他章节内容也都有所丰富和更新。

中建是国家“十三五”重点研发计划“绿色施工与智慧建造关键技术”项目（项目编号：2016YFC0702100）的承担单位，项目涉及主要科学问题之一就是“建筑工程建造技术从数字化到智能化升级发展问题”，项目将集成应用 BIM、大数据、云计算、物联网等信息技术，开展智慧建造起步研究，引领建造技术向绿色化和智能化方向发展。项目的很多研发人员参与了本书的编写，所以本书也是智慧建造技术研究与应用成果之一。

本指南是中建 BIM 应用的实践总结，可作为企业开展 BIM 技术应用的辅助资料，鉴于 BIM 技术应用本身还处于探索发展阶段，中建 BIM 应用范围、深度和水平及编者水平所限，可能还有很多不足之处，有些观点和结论也可能片面或有一定的局限性，也不一定能代表行业最高技术水平，期待将来逐渐完善。本指南内容仅供参考，并敬请全国同行批评指正！

Preface of The Second Edition

Building Information Modeling (BIM) is a new kind of information technology, but it draws attention of the building industry due to its significant impact on the scientific and technological progress of the industry. The application of BIM technology is expected to promote technology upgrading and transformation of production mode of the industry.

The application of BIM technology can greatly enhance integration degree of construction projects, promote transformation of production mode, elevate both quality and efficiency of project investment, design, construction and even the whole life circle and facilitate scientific decision-making and management. BIM technology can assist owner in conducting project control, scientific project management, improving efficiency, shortening construction period and reducing investment risk; BIM technology supports sustainable design, highlights design coordination, so it can prevent design alterations caused by "mistakes, omissions, conflicts and damages" and improve both efficiency and quality of project design; BIM technology supports industrialized and green construction, so it can optimize construction scheme, promote delicacy project management, improve project quality and reduce cost and safety risk; BIM technology can also elevate asset management, property utilization and emergency management level.

China State Construction Engineering Corporation (CSCEC) attaches importance to BIM research and application. It released the Several Opinions on Accelerating BIM development of CSCEC (ZJGKZ [2012] No. 677, hereinafter referred to as the "Several Opinions") in December 2012. Since then, CSCEC and its subsidiaries began to make overall planning to comprehensively promote BIM technology application. Based on the guiding principle and basic principles as stipulated in the Several Opinions, CSCEC had conducted a series of BIM technology R&D and application works with regard to organizational structure building, standard system building, talent team building, foundation platform construction, integration capability building and demonstration project construction during the "12th Five-year Plan" Period. The subsidiaries of CSCEC also actively input manpower and materials to boost the application of BIM technology in a number of demonstration and pilot projects as well as representative projects based on their actual situations.

To fully utilize its "four-in-one" advantage in the whole industrial chain, integrate BIM resources within the group, optimize resource allocation, coordinate BIM technology

development and enhance application level and efficiency, CSCEC organized its technical personnel to compile the CSCEC Building Information Modeling Guide for Design and the First Edition of the CSCEC Building Information Modeling Guide for Construction (hereinafter referred to as the First Edition of the Outline.), which were published and distributed in October 2014 by China Architecture & Building Press. The First Edition of the Outline has drawn wide attention in the building industry.

The drafting team of the First Edition of the Outline summarized BIM demonstration project application experiences based on vast domestic and overseas data collected and in consideration of the development trend and existing problems of BIM application during the "12th Five-year Plan" Period as well as the actual demand of CSCEC, and formulated the First Edition of the Outline. In which, the drafting team focused on timeliness, practicability and characteristics of CSCEC, explored ways to use BIM technology better and faster at the initial stage of BIM application, and identified problems to be settled by using BIM technology can settle, available BIM software and way of use, problems found in current BIM technology application the way to settle them and experiences. Main contents of the First Edition of the Outline include BIM application environment of construction enterprises, project BIM application plan, BIM applications in architectural design, green building design, structural design and electro-mechanical design as well as coordinated BIM application of multiple disciplines.

Building industry development environment and trend change greatly during the "13th Five-year Plan" Period. In this context, competent industrial department speeds up formulation of industrial policies on BIM technology application with the aim to implement the information-based development spirit proposed by the Party Central Committee and the State Council at the 18th CPC National Congress, follow through the development concept of "innovation, coordination, green, open and sharing" put forward in the Fifth Plenary Session of the 18th CPC National Congress, adapt to the "internet+" development trend, further promote building industrial technology progress and management upgrading, assist the modernization of the building industry and elevate project construction and management level. On June 16, 2015, the Ministry of Housing and Urban-Rural Development released the Guiding Opinions on Promoting Architectural Information Model Application (JZH [2015] No. 159), identifying the development goal of "by 2020, Class A survey & design companies, super class and first class house construction enterprises shall master and realize integrated application of BIM, enterprise management system and other information technologies, and 90% of state-owned fund medium and large-sized buildings, public buildings applying for green buildings and new ecological residential area projects shall adopt integrated application of BIM technology during survey & design, construction and operation & maintenance." On August 23, 2016, the Ministry of Housing and Urban-Rural Development released the Outline of Information Development of the Building Industry from 2016 to 2020 (JZH [2016] No. 183), identifying the development goal of

"comprehensively elevating information level of building industry, enhancing integrated application capability of such information technologies as BIM, big data, intelligent technology, mobile communication, cloud computing and Internet of Things, and making breakthrough in digitalized, network-oriented and intelligent building industry, establishing an integrated industrial supervision and service platform, improving data resource utilization level and information service capability, and cultivating a number of building enterprises with strong technical innovation capability and of international advanced level in information application and information technology enterprises in the building industry with key proprietary intellectual property right". The Outline is designed to elevate overall informatization level of the building industry and integrated application ability of such information technologies as BIM, big data, intelligent technology, mobile communication, cloud computing and Internet of Things, shape a new business type which is green, industrialized and intelligent and promote the transformation and upgrading of the building industry by means of overall planning, policy orientation and classified guidance.

Based on the building industry development trend and requirement during the "13th Five-year Plan" Period, and in order to implement relevant documents issued by the Ministry of Housing and Urban-Rural Development and the State Council, and to promote in-depth application of BIM technology, CSCEC has compiled the Second Edition of the CSCEC Building Information Modeling Guide for Design (hereinafter referred to as the Second Edition of the Outline). The Second Edition of the Outline is basically the same as the first edition in terms of overall structure. It details business procedure, modeling content, modeling method, model application, disciplinary coordination and achievement delivery and practical experiences from three levels; enterprise, project and disciplines, and lists the practical application schemes.

Given that different disciplines and projects of different kinds vary in BIM technology application, the Second Edition of the Outline is an expansion and development of the First Edition. Firstly, the Second Edition adds "BIM application in general drawing design" "BIM application in decoration design" "BIM application in curtain wall design" and "BIM application in building economy". Secondly, the original "BIM application in electro-mechanical design" is further divided into "BIM application in water supply & drainage design", "BIM application in HVAC design" and "BIM application in electrical design". In order to respond to Several Opinions on Further Promoting General Contracting of Engineering (JS [2016] No. 93 issued by the Ministry of Housing and Urban-Rural Development of P. R. C., "BIM application in design-guided general contracting of engineering" chapter is added. In addition, contents of other chapters are also added and updated.

CSCEC undertakes the project of "key technologies for green construction and intelligent building", a national key R&D plan during the 13th five-year plan (project No. : 2016YFC0702100). The national project mainly involves "upgrading of architectural

engineering construction technology from digitalization to intelligence", which integrates such information technologies as BIM, big data, cloud computing and Internet of Things, conduct initial study on intelligent building, and usher in green and intelligent building technology development direction. Many researchers of the national project also participated in the compilation of this Guide. Therefore, this Guide is part of intelligent building technology research and application results.

The Outline is a summary of the practices of CSCEC in BIM technology application, and can be used as auxiliary information for enterprises in applying BIM technology. Given that BIM technology is still at exploration stage, there might be inadequacies in the Outline, and some opinions and conclusions might be one-sided or limited due to the scope, depth and level of BIM application by CSCEC and restriction of the editors' level. The Outline may not represent the highest industrial technology level and needs improvement in the future. Hence, the Outline is for reference only and we value your suggestions!

第一版前言

建筑信息模型 (Building Information Modeling, 简称 BIM) 是工程项目物理和功能特性的数字化表达, 是工程项目有关信息的共享知识资源。BIM 的作用是使工程项目信息在规划、设计、施工和运营维护全过程充分共享、无损传递, 使工程技术和管理人员能够对各种建筑信息做出高效、正确的理解和应对, 为多方参与的协同工作提供坚实基础, 并为建设项目从概念到拆除全生命期中各参与方的决策提供可靠依据。

BIM 的提出和发展, 对建筑业的科技进步产生了重大影响。应用 BIM 技术, 可望大幅度提高建筑工程的集成化程度, 促进建筑业生产方式的转变, 提高投资、设计、施工乃至整个工程生命期的质量和效率, 提升科学决策和管理水平。对于投资, 有助于业主提升对整个项目的掌控能力和科学管理水平、提高效率、缩短工期、降低投资风险; 对于设计, 支撑绿色建筑设计、强化设计协调、减少因“错、缺、漏、碰”导致的设计变更, 促进设计效率和设计质量的提升; 对于施工, 支撑工业化建造和绿色施工、优化施工方案, 促进工程项目实现精细化管理、提高工程质量、降低成本和安全风险; 对于运维, 有助于提高资产管理和应急管理水平。

BIM 是一种应用于工程设计建造管理的数据化工具, 支持项目各种信息的连续应用及实时应用, 可以大大提高设计、施工乃至整个工程的质量和效率, 显著降低成本。在发达国家和地区, 为加速 BIM 的普及应用, 相继推出了各具特色的技术政策和措施。美国是 BIM 的发源地, BIM 研究与应用一直处于领先地位, 2007 年发布的《美国国家 BIM 标准第一版第一部分》确定的目标是到 2020 年以 BIM 为核心的建筑业信息技术每年为美国节约 2000 亿美元 (相当于美国 2008 年建筑业产值的 15% 左右); 2011 年英国发布的《政府建筑业战略》为以 BIM 为核心的建筑业信息技术应用设定的目标是减少整体建筑业成本 10%~20%; 2012 年澳大利亚发布的《国家 BIM 行动方案》指出, 在澳大利亚工程建设行业加快普及应用 BIM 可以提高 6%~9% 的生产效率。韩国计划从 2016 年开始实现全部公共设施项目使用 BIM。新加坡计划到 2015 年建筑工程 BIM 应用率达到 80%。

BIM 正在成为继 CAD 之后推动建设行业技术进步和管理创新的一项新技术，将是进一步提升企业核心竞争力的重要手段。BIM 的发展得到了我国政府和行业协会的高度重视，BIM 技术是住房和城乡建设部建筑业“十二五”规划重点推广的新技术之一，国家从“十五”、“十一五”到“十二五”在科技支撑计划中相继启动了 BIM 研究工作，科技部于 2013 年批准成立“建筑信息模型（BIM）产业技术创新战略联盟”。上述工作对我国 BIM 技术研究和应用起到了良好的推动和引导作用。

中国建筑股份有限公司（以下简称“中建”）十分重视 BIM 的研究和推广应用，于 2012 年 12 月印发了《关于推进中建 BIM 技术加速发展的若干意见》（以下简称“若干意见”），标志着从总公司到各子企业，开始统筹规划，全面推进 BIM 技术应用。2013 年是起步年，按照《若干意见》的指导思想和基本原则，中建组织开展了一系列 BIM 技术研发和推广应用工作。各设计企业、工程企业积极引进 BIM 并结合单位实际，投入大量人力、物力将 BIM 应用于一些代表性工程，提升了公司的技术能力与影响力，取得了较好的经济效益和社会效益。

但我们也要看到目前存在的不足。从行业宏观层面上讲，尚未形成完善的 BIM 标准体系，还缺少具有自主知识产权的 BIM 软件支撑，仅在设计和施工领域开展了一定程度的应用，还未能投资策划、设计、施工和运维全生命期得到较高水平应用；从企业层面上讲，有些企业对 BIM 技术仅停留在一般认识上，尚未进行深入的研究、尝试和应用，对于 BIM 技术理解不深、人才培养不足，造成项目实施环节出现各种各样的问题。

鉴于 BIM 技术应用过程的复杂性，2013 年中建启动了“建筑工程设计 BIM 集成应用研究”研究课题。课题目标是：通过研究、应用和推广 BIM 技术，提升中建工程设计的质量和效率。课题目标成果之一就是《建筑工程设计 BIM 应用指南》（以下简称“指南”）。在中建 BIM 技术委员会的策划指导下，课题组组织编写了本指南。指南作为一份重要的技术资料，将用于指导、推动中建设计企业的 BIM 应用。

在指南编写过程中，注重时效性、实用性和中建企业特点。时效性是针对目前各单位的 BIM 应用尚处于初期阶段，正在摸索如何将 BIM 技术用得好、用得快，通过指南明确：应用 BIM 技术能解决什么技术问题；可用 BIM 软件有哪些、如何用；当前 BIM 应用还存在什么问题、如何解决，以及应用经验和教训等。实用性是指南从三个层面（企业、项目、专业）详细描述了设计全过程（方案设计、初步设计、施工图设计）BIM 应用的业务流程、建模内容、建模方法、模型应用、专业协调、成果交付等具体指导和实践经验，并给出了软件应用方案。本指南更突出中建的企业特点：一方面，充分考虑企业 BIM 应用基础，特别是中建设计企

业 BIM 软件基础、企业 CAD 标准，本指南涉及的 BIM 软件及建议的 BIM 软件应用方案，均为目前中建各子企业正在应用的 BIM 软件，或是在行业应用中的主流 BIM 软件；另一方面，也充分考虑中建在行业的技术领先和新技术的引领作用，在指南中创造性地作出一些符合国情的规定，例如，对模型细度和模型内容的规定，没有照搬美国的 LOD 系列规定，而是考虑到我国行业技术政策的具体规定，参照中华人民共和国住房和城乡建设部发布的《建筑工程设计文件编制深度规定》文件的规定，将设计阶段的模型细度分为三级，分别为：方案设计模型、初步设计模型和施工图设计模型，模型细度和内容按照《建筑工程设计文件编制深度规定》的规定给出。同时，将施工阶段 BIM 模型细度也划分为三个等级，分别为：深化设计模型、施工过程模型和竣工交付模型，有关施工 BIM 模型内容将在《建筑工程施工 BIM 应用指南》中介绍。

本指南内容按照设计专业分工组织，以建筑设计、绿色建筑设计、结构设计作为重点，考虑到给水排水、暖通和电气三个专业所应用的 BIM 软件及工作流程相近，将这三个专业合并表达。协同在设计 BIM 应用中占据较高重要性，在本指南中将协同作为独立的一章内容，但考虑到在 CAD 技术应用中的协同基础有限，在本指南中重点阐述了软件应用技术层面的协同，尚未深入到管理层面的协同。

本指南是辅助 BIM 技术应用的参考资料，鉴于 BIM 技术应用刚刚起步，典型案例较少，应用效果总结也不系统。限于作者的水平和时间有限，还有很多不足之处，有些观点和结论也不一定正确，期待将来逐渐完善。

Preface of The First Edition

A Building Information Model (BIM) is a digital representation of physical and functional characteristics of a facility and a shared knowledge resource of relevant information. The role of BIM is to make the project information fully sharing and nondestructively in the planning, design, construction and facility maintenance processes. Engineers and managers can make decisions efficiently, and understand and cope all kinds of building information correctly through BIM. BIM lies a solid foundation for participants' cooperative work, and provide involved parties with reliable basis throughout the project's lifespan from conception to demolition.

The appearance and development of BIM has significant influences on the scientific and technological progress of construction industry. BIM applying technology will substantially enhance the integration of construction engineering, bring changes to method of construction industry, improve the quality and efficiency of investment, design, construction and the whole project's lifespan, upgrade the level of scientific decision-making and management. In investment, BIM is conducive to strengthen owners' control over whole project and scientific management, and also helpful to increase efficiency, shorten construction period, lower risk of investment. In design, BIM supports green building design and design coordination, reduces design alterations caused by mistakes, deficiency, leak and collision, raises design efficiency and quality. In construction, BIM enables industrialized production and green construction, optimizes construction scheme, facilitates actualization of engineering project's delicacy management, and increases project's quality while decrease its safety risk. In facility operation and maintenance, BIM is helpful to improve the standard of assets management and emergency management.

BIM is a digital tool applied to construction management, which allows all kinds of project's information being used continuously and timely. It can greatly increase quality and efficiency of the design, construction and even the whole project itself, and remarkably decrease the cost. In developed countries and regions, distinctive technical polices and measures were introduced to accelerate popularization of BIM. The United States is the birthplace of BIM, and also takes the leading position of BIM's research and applying. According to the first part of "The National Building Information Model Standard" version 1 published in 2007, by the year of 2020, through applying BIM-focused information technology, 200 billion dollars per year will be saved, this is equivalent to 15% of US

building industry production value in 2008. The United Kingdom published "The government construction strategy" in 2011, the goal is to reduce 10%—20% of the industry cost through applying BIM-focused information technologies. In "National Building Information Modeling Initiative" published in 2012, Australia pointed out that production efficiency will be lifted 6%—9% by speeding up the popularization and applying BIM. Korea plans to introduce BIM to all public utilities projects from the year 2016. Singapore plans to reach a rate of 80% BIM applying in building industry by 2015.

After CAD, BIM becomes a new technology that pushes building industry technological progress and management innovation and will be an important mean to further enhance the core competitiveness of enterprises. Chinese government and trade association paid high attentions to the development of BIM. It is one of the key technologies in the 12th Five-Year Plan promoted by Ministry Of Housing and Urban-Rural Development. Government started the research of BIM in science and technology support program since the 10th Five-Year Plan, and to the 11th and 12th Five-Year Plan. Ministry of Science and Technology authorized the establishment of BIM Industry Technology Innovation Strategic Alliance in 2013. Foresaid efforts had favorable effect on the promotion and guidance of domestic BIM research and applying.

CHINA STATE CONSTRUCTION ENGINEERING CORPORATION (CSCEC) attaches great importance to research and applying BIM. In December 2102, "SEVERAL OPTIONS ABOUT PROMOTING CSCEC BIM TECHNOLOGY ACCELERATED DEVELOPMENT"(hereinafter referred to as "Options") was published and marked the overall planning and promotion of BIM applying from the parent company to the child enterprises. The year 2013 is a beginning, according to the guiding concepts and basic principles of "Options", CSCEC organized a series of research, promotion and applying works of BIM technology. All design and engineering companies actively introduced BIM to their works, put a lot of manpower and material to apply BIM to some iconic project. Through applying BIM, the technical capacity and influence of CSCEC was improved, and better preferable economic and social benefit was acquired.

However, there are some deficiency in our work. From the macro perspective of the industry, there is not a complete BIM standard system. Lacks of proprietary intellectual property rights BIM software, applying is limited in the field of design and construction, not to mention high-level applying in investment planning, design, construction and operation maintenance. From the perspective of enterprise level, some companies' practice remains on the level of simple understanding, haven't advanced to deep research and applying. Inadequate understanding of BIM, lack of personnel training caused all kinds of problems in project implementation.

Because of the complexity of BIM applying process, CSCEC started a research project "Research on the integrated applying of BIM in building design". The goal of the project is to promote the quality and efficiency of CSCEC's engineering design through research,

apply and promote BIM technology. One of achievement of the project is "CSCEC Building Information Modeling Guide for Design". Under the guidance of CSCES BIM Technology Committee, the project team compiled the guide. The guide will be used as an importance technical literature to guide and promote CSCEC design companies' BIM applying.

In the process of compiling, timeliness, practicability and CSCEC's trait were mostly concerned. The reason of paying attention to timeliness is because that the BIM applying in many companies are still in the early stages, the way of how to apply BIM well and efficiently is still unclear. The guide will show clearly how the technical problems can be solved by applying BIM technology and currently available list of BIM software and their briefings, the problems remain in BIM applying, how to solve them, experience and lessons were also included for the same concerning. From the perspective of practicability, the guide particularly described detailed guidance and practical experience of BIM applying workflow, modeling content, modeling method, modeling application, professional coordination in the whole design process (project design, preliminary design, construction document design) on three level of enterprise, project and professional. Application profile of software was also given. The guide emphasizes the trait of CSCEC enterprises: on the one hand, the CSCEC's BIM applying basis, especially the BIM software usage condition of CSCES design companies and company CAD standard, were fully considered. BIM software referred in the guide are all the software currently used by CSCEC, or the mainstream BIM software applied in the industry; on the other hand, some regulations were creatively drafted with concerning of CSCEC's technical leading position and influence. For example, the regulation of level of development (LOD) of model content was not directly copy from correlative LOD regulations from US. In consideration of Chinese industry's specific provision, according to THE DEPTH OF ENGINEERING DESIGN DOCUMENTATION REQUIREMENTS published by PRC Ministry Of Housing and Urban-Rural Department, models in design stage was divided into three level: Conceptual Design Model, Preliminary Design Model and Construction Documents Design Model, fineness and content of the models was give according to the national standard mentioned above. Meanwhile, LOD of BIM model in construction stage was also divided into three level: Detailed Design Model, Construction Process Model and Completion of Delivery Model. The construction BIM model will be introduced in "CSCEC Building Information Modeling Guide for Construction".

The content of guide is organized by professions, especial focus on architectural design, green architectural design and structural design. Considering the similarity of BIM software workflow in Plumbing, HVAC and Electric engineering, these three professions is expressed combined. Collaboration occupy a superior importance in design BIM applying, so it was put into an independent chapter. But considering the fact that collaboration is not widely realized in CAD application, the guide emphasized the collaboration of software, not yet reach the collaboration in management.