出國報告（出國類別：考察）

考察BIM在美國實務應用

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摘　　要

為深入瞭解美國建立「建築資訊建模（BIM，Building Information Modeling）」技術與應用現況，本所派員赴美國拜會美國推動BIM相關技術的專業團體、政府機關與核心人物，交流經驗，瞭解國際間對BIM規劃趨勢，並增加爾後交流BIM政策及技術管道，作為我國規劃BIM政策及研發本土化技術參考。本次考察拜會參訪行程，包括機關拜會行程及考察美國建築資訊建模的市政建設。

赴美考察後發現，因為美國業界在BIM應用已相當普遍，且公部門及業界均非常肯定BIM能為建築工程節省許多施工時間及成本支出，因此美國國內無論公部門或業界皆非常積極研發新的BIM相關應用範圍及制定相關新資訊交換格式及規範。反觀國內，因BIM應用尚屬起步階段，業界使用尚不普遍，且相關人才亦不足，致使國內業界許多人對BIM的使用效益仍抱持懷疑態度，甚至認為BIM非但未能節省施工時間及成本支出，反而增添他們的困擾。經探討，這應屬國內BIM使用尚不普遍之陣痛期現象，當國內BIM使用環境成熟及普遍化後，應可被業界普遍接受及肯定。

考察建議包括下列幾項：一、建議內政部營建署所有大型公共工程案皆採用BIM；二、協助建立公共工程運用BIM推動平台；三、彈性結合政府機關、BIM軟體供應商、專業組織、及學術/研究機構資源進行BIM相關研究；四、鼓勵BIM軟體供應商、專業組織，及學術機構開辦BIM訓練課程。

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一、國家建築科學研究所（National Institute of Building Sciences）2份簡報資料及National BIM Guide for Owners
二、美國建築師學會（AIA）總部提供下列文件:
(一) Guide, Instructions and Commentary to the 2013 AIA Digital Practice Documents
1. AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit
2. AIA Document G201™–2013, Project Digital Data Protocol Form
3. AIA Document G202™–2013, Project Building Information Modeling Protocol Form
(二) Legislative Guidelines and Model Law/Model Regulations (by NCARB, National Council of Architectural Registration Boards)
三、美國聯邦總務署（General Services Administration，GSA）提供BIM Gides 下載網址:
https://www.gsa.gov/real-estate/design-construction/3d4d-building-information-modeling/bim-guides

壹、考察目的

為深入瞭解美國建立「建築資訊建模（BIM，Building Information Modeling）」技術與應用現況，本所派員赴美國拜會美國推動BIM相關技術的專業團體、政府機關與核心人物，交流經驗，瞭解國際間對BIM規劃趨勢，並增加爾後交流BIM政策及技術管道，作為我國規劃BIM政策及研發本土化技術參考。本次考察拜會參訪華盛頓哥倫比亞特區及紐約市行程，特別感謝本國駐美國台北經濟文化辦事處(華府)及駐紐約台北經濟文化辦事處積極協助聯繫、安排。本次考察拜會包括機關拜會行程，拜會主導美國國家BIM標準(National Building Information Modeling Standard，NBIMS）研究和發佈機構的國家建築科學研究所（National Institute of Building Sciences，NIBS）、美國建築師學會（AIA）、美國聯邦總務署（GSA）、紐約市政府及駐紐約台北經濟文化辦事處(Taipei Economic and Cultural Office in New York)。同時考察美國建築資訊建模的市政建設，包括雲杉街8號（8 Spruce Street）、康乃爾大學(Cornell University)理工學院紐約市羅斯福島分校、世界貿易中心(World Trade Center)一號大樓、華盛頓國民隊棒球場（National Ball park）及憲法廣場建築群（Constitution Square）等重大建設。

貳、考察過程

一、行程表

日期	活動內容	備註
9 月 1 日 (週六)	1、台北-美國紐約市	啟程
9 月 2 日 (週日)	2、紐約市-華盛頓哥倫比亞特區	
9 月 3 日 (週一)	3、參訪 BIM 案例：馬丁・路德・金恩紀念圖書館 (Martin Luther King Jr. Memorial Library)	
9 月 4 日 (週二)	4、參訪 BIM 案例：華盛頓國民隊棒球場（Nationals Park）	
9 月 5 日 (週三)	5、拜會美國建築師學會（AIA）、美國聯邦總務署（GSA）	
9 月 6 日 (週四)	6、(1) 拜會國家建築科學研究院（NIBS）；(2) 華盛頓哥倫比亞特區-紐約市	
9 月 7 日 (週五)	7、拜會紐約市政府、駐紐約台北經濟文化辦事處	
9 月 8 日 (週六)	8、參訪 BIM 案例：New York by Gehry（雲杉街 8 號）、康乃爾大學(Cornell University)理工學院紐約市羅斯福島分校	
9 月 9 日 (週日)	9. 參訪 BIM 案例：世界貿易中心一號大樓	
9 月 10 日 (週一)	10、美國紐約市-台北	返國
9 月 11 日 (週二)	11. 美國紐約市-台北	路程

二、拜會及參訪內容

(一)拜會國家建築科學研究所（National Institute of Building Sciences，NIBS）

國家建築科學研究所(National Institute of Building Sciences，NIBS)是美國國家BIM標準(National Building Information Modeling Standard，NBIMS）的研究和發佈機構，大量的BIM及其關聯概念、技術、方法、流程、資料都跟這個機構有關。

NIBS是根據1974年的住宅和社區發展法案（the Housing and Community Development Act of 1974）Public Law 93-383, Sect. 809由美國國會批准成立的非營利、非政府組織，作為建築科學技術領域溝通政府機關和民間企業之間的橋樑。

NIBS的使命是通過支持建築科學技術的進步改善建築環境（building environment）與自然環境（natural environment）來為國家和公眾利益服務。

NIBS集合政府、專家、產業、勞工和消費者的利益，專注於發掘和解決居住、商業和工業設施建置的問題和潛在問題。NIBS同時為產業和公眾機構提供建築科學技術應用的權威性建議。

本次拜會，首先由Ryan Colker (Director, Consultative Council/Presidential Advisor)以簡報方式說明NIBS組織的願景、目標及研究的四大範疇包含「建築資訊技術」、「安全防災準備」、「設施性能和可持續性」及「產業領導與推廣」等。他除談到BIM於建築設施全生命週期之應用外，亦從資訊層次之結構應用談地理資訊系統(GIS)、城市資訊系統(CIM)、建築資訊建模(BIM)的關係，從國家到整體城市視圖，可以快速定位到一個區域、一棟建築，快速查找獲取裡面所有相關資料，另概述利用工業基礎類別(Industry Foundation Classes，IFC)來轉換及串接各階段或軟體間資訊流。

此外，簡報提到兩個有趣的計畫。一是2011年底，由國家建築科學研究院（NIBS）與全面學習研究所（TLRI）及美國航太總署（NASA）合作，建立了一個旨在實現科學(Science)、技術(Technology)、工程(Engineering)及數學(Mathematics)的 STEM教育計劃，培養學生應對這行業挑戰的能力。

Mars City Facility Ops Challenge STEM Program使用最初由TLRI和NASA建構的虛擬火星城基地（這是全國各種STEM教育計劃的基礎），開發了火星城設施運營（Ops）挑戰，讓學生使用目

前設施管理人員使用的設施維護管理系統(CMMS)工具，負責在火星上營運虛擬基地，讓學生熟悉設施管理人員履行的各種職責、建築系統，以確保火星基地得到維護和有效運作。

為了確保最大程度的實際適用性，Mars City Facility Ops Challenge團隊為該基地及設施建置了建築資訊模型（BIM），並使用施工營運建築資訊交換（COBie）標準，將營運、維護及資產管理階段所需的資訊加載到CMMS中。除了模擬本身，Mars City Facility Ops Challenge團隊正在開發一個職業中心，向學生介紹建築行業的潛在就業機會。該中心透過採訪來自各行各業的專業人士，並提供材料與規劃工具，幫助學生確定產業中的教育及就業途徑。

另一計畫是整體建築設計指南(Whole Building Design Guide，WBDG)，其服務範圍包含美國國防部（DOD）、美國陸軍工程兵團（USACE）、海軍設施工程司令部（NAVFAC）等公部門及民間建築相關專業人士，以建置高效能建築為前提，提供建築專案全生命週期各階段，包括規劃，設計，施工、營運及維護相關的設計指導、標準及技術。

「整體建築設計指南」內容依三個類別進行編排：設計指導、專案管理及營運與維護，提供更具聚焦性的專業資訊。此外，WBDG提供線上工具，包括建築及設施標準(包括施工指南規範、手冊及標準文件等)、建築資訊建模指南、精選案例研究、聯邦法令及其他資源的數據庫，並免費為建築師及其他建築專業人士提供70多個線上教育課程。

接著，由Roger J. Grant (Program Director,NIBS；Product Room Leader, buildingSMART International) 透過線上會議方式，與在NIBS會議室現場人員以簡報方式進行分享。簡報中點出BIM物件及參數化的優勢，並強調建築生命週期各階段資訊的正確、交付內容及軟體間資訊轉換Open data及標準的重要性，並提及國際組織buildingSMART International(bSi)刻正努力推動Open BIM及IFC開放格式，另IFC標準已在ISO中正式註冊。

bsi是一個研究BIM於建築工程全生命週期應用的中立化、國際性、獨立的非營利組織，旨在促進建築工程全生命週期各參與方之間的訊息交流與協同合作。其主要貢獻，包括為開發軟體交流的數據接收提供準則和依據的IFC標準，和基於開放標準和透明流程的Open BIM工作模式等。其常用工具有工業基礎類別IFC、資訊交付手冊(IDM)/模型視域定義(MVD)/資訊交換需求(ER)、國際資料字典框架(IFD/bSDD)、協同作業的格式標準 (BCF)。

在會議中， NIBS針對推展BIM的應用、NBIMS的後續發展，與bsi機構間的合作關係及美國

公私部門間對BIM的應用與推動部分進行分享。此外，雙方亦針對OpenBIM推動及實際執行遭遇的問題、IFC各版本後續的發展及版次間相容性的問題，及BIM與GIS之間的整合應用進行討論。另外，NIBS亦提供簡報及相關研究如Penn State提出的25個BIM USEs、National BIM Guide for Owners等下載連結供本所後續研究參考。

圖1. 拜會國家建築科學研究所（National Institute of Building Sciences，NIBS）

(二)拜會美國建築師學會（AIA）總部

美國建築師學會（American Institute of Architects, 縮寫：AIA） 與 RIBA 英國皇家建築師學會並稱為當今世界最權威的兩大建築師學會，總部位於華盛頓哥倫比亞特區。AIA 的宗旨是為建築師提供良好的後續教育、社區重建及其他可持續提升建築業界形像的工作為己任。

本次拜會，由Michael Bomba (Director & Counsel)、Robert (bob) E. Middlebrooks (Senior Vice President, Contract Business Solutions)、Sarah Dodge (Sr. Vice President of Advocacy & Relationships)及Derek Washam (Manager, International Relations)等人致詞歡迎本所派員參訪、介紹AIA相關業務，及與本所交換本國與美國BIM發展現況及實務運作相關訊息。

AIA提供教育、政府宣傳、社區重建，及協助建築產業，並辦理改善其公眾形象的公共宣傳。此外，AIA還與設計和施工團隊的其他成員合作，協助建築產業相關團隊的協調合作。AIA由董

事會管理，擁有200多名員工。雖然AIA是一個國際組織，但它的217個地方和州分部為會員提供設計和直接服務，以便在他們的職業生涯中為他們提供協助。這些分部不僅覆蓋了整個美國及其領土，還在英國、歐洲大陸、中東、日本、香港、上海及加拿大運營。AIA藉由統一的發言管道，影響政府的施政方針，進而影響建築師的執業業務及美國生活品質。 AIA監督立法，並利用其成員的集體力量參與聯邦、州和地方政策制定者的決策。為了服務民眾，AIA的社區計畫也與聯邦立法者及地方政府合作提升公共空間的設計、保護國家的基礎設施。AIA為其會員提供職業發展的機會、設計及施工的合約文件範本、專業的設計資訊服務、以個人利益及客戶為本的相關資源。

圖2. 拜會美國建築師學會（AIA）總部

本所由本國駐美國台北經濟文化辦事處(華府)袁鴻麟秘書陪同下拜會AIA，AIA於會中與本所交換美國與本國BIM發展現況及實務運作相關訊息，包括美國業主請設計建築師及施工廠商繳交BIM模型是否需額外付費一節，AIA表示因美國BIM應用於設計及施工階段較普遍，通常美國業主請設計建築師或施工廠商繳交BIM模型，並不額外付費。相較美國，因國內BIM應用仍未普遍，故本國業主請廠商繳交BIM模型通常須額外付費。為了回饋本所的參訪，AIA提供本所下列文件供作BIM相關研究參考，概述如下：

1. Guide, Instructions and Commentary to the 2013 AIA Digital Practice Documents

AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit

AIA Document G201™–2013, Project Digital Data Protocol Form

AIA Document G202™–2013, Project Building Information Modeling Protocol Form

隨著近年來建築資訊模型（BIM）和其他類型的數字數據在設計和建築產業中不斷發展，業界已開始提出有關如何實施這些概念和工具的實際問題。 為了提供指導，美國建築師學會（AIA）自2007年起發佈了本相關指導文件。

2. Legislative Guidelines and Model Law/Model Regulations (by NCARB, National Council of Architectural Registration Boards)

本文件提供立法指南、示範法及示範條例，內容包含針對特定結構類別和特徵，哪些人員執行建築設計可能無須註冊；須有建築師參與的工程項目；對未註冊人員實施建築的規定等。

(三)拜會美國聯邦總務署（General Services Administration，GSA）

美國聯邦總務署（General Services Administration，GSA）負責提供聯邦機構的大部分空間要求。GSA在建築、工程、城市發展、可持續設計、美術、歷史保護、建築服務及工程管理等領域提供國家領導、政策指導及標準。

2003年，GSA透過其公共建築服務(PBS)建立了國家3D-4D-BIM計畫。從那時起，該計畫已透過其治理委員會發展公共建築資訊技術服務（PB-ITS）和PBS之間的合作。該計畫協助所有PBS業務的BIM使用。GSA致力於戰略性和逐步採用3D、4D及BIM技術。

本所由本國駐美國台北經濟文化辦事處(華府)袁鴻麟秘書陪同下拜會GSA，GSA於會中說明其於BIM相關領域的發展策略，認為BIM可以作為共享知識資源及決策的可靠基礎，並減少重新收集或重新格式化訊息的需要。 GSA目前正在研究如何在整個建築的生命週期中更廣泛使用BIM技術。

GSA要求BIM模型設計須能提供，在所有工程里程碑的BIM原始格式及IFC（Industry Foundation Classes，工業基礎類別）格式的可交付成果、須從BIM模型中獲得的任何2D補充可交付成果，以及開放標準的設施管理資料。同時，GSA鼓勵其所有的工程案盡可能將成熟的3D、4D及BIM技術應用到最大範圍，以解決特定的工程問題，並繼續引領工程界開發和採用BIM作為建築工程生命週期的工具。

圖3. 拜會美國聯邦總務署（General Services Administration，GSA）

以下是GSA執行3D-4D-BIM國家計畫的重點：

1. 制定政策，要求所有主要工程案及GSA相關業務皆採用BIM。
2. 為正在進行的工程提供3D、4D及BIM專家協助及資源，以整合相關技術。
3. 為持續使用資產和設施管理的BIM資訊提供指導。
4. 評估業界準備情況及技術成熟度。
5. 為3D-4D-BIM服務開發招標和契約用語（僅限GSA內部使用）。
6. 與BIM供應商、其他聯邦機構、專業協會、開放標準組織及學術/研究機構合作。
7. 在GSA內建立BIM優勝群組。
8. 發布BIM指南系列：

(1) BIM Guide 01 – 3D-4D-BIM Overview

(2) BIM Guide 02 – Spatial Program Validation

(3) BIM Guide 03 - 3D Laser Scanning

(4) BIM Guide 04 - 4D Phasing

(5) BIM Guide 05 - Energy Performances

(6) BIM Guide 06 - Circulation and Security Validation*

(7) BIM Guide 07 - Building Elements

(8) BIM Guide 08 - Facility Management

(四) 參訪BIM案例：馬丁‧路德‧金恩紀念圖書館(Martin Luther King Jr. Memorial Library , MLKML)

由著名的現代建築師Ludwig Mies van der Rohe設計的馬丁·路德·金恩紀念圖書館 (Martin Luther King Jr. Memorial Library , MLKML)，佔地400,000平方英尺（37,000平方公尺），主要建材為鋼、磚及玻璃，是哥倫比亞特區公共圖書館（DCPL）的中心設施，也是華盛頓特區現代建築的一個罕見例子，並於2007年被列入國家史蹟名錄。

馬丁·路德·金恩紀念圖書館是中央圖書館的中心圖書館，於2017年3月4日暫時關閉，目前正在進行全面的現代化改造。這項耗資2.08億美元的修繕改建工程，由Martinez+Johnson Architecture建築師事務所及荷蘭的Mecanoo建築師使用BIM合作完成改建設計，改建設計的圖書館將擁有一個壯觀、充滿活力和透明的入口通道、雕刻的巨大樓梯、大禮堂和會議中心、音樂製作和藝術創作的創作空間、地面咖啡廳、雙層閱覽室，以及屋頂活動空間，新圖書館預計於2020年開放。

圖4. 參訪BIM案例：馬丁・路德・金恩紀念圖書館

(五) 參訪BIM案例：華盛頓國民隊棒球場（Nationals Park）

華盛頓國民隊棒球場是一位於華盛頓特區海軍造船廠附近的阿納科斯蒂亞河沿岸的棒球公園，它是該市的棒球大聯盟球隊華盛頓國民隊的主場球場。當華盛頓國民隊搬到華盛頓特區時，他們暫時在RFK體育場比賽，直到華盛頓國民隊棒球場完工才搬去該球場比賽。

華盛頓國民隊棒球場是美國第一個獲得LEED認證的綠色主要專業體育場，由HOK Sport和Devrouax & Purnell建築師和規劃師設計，花費6.93億美元建造，另外花費8420萬美元用於運輸、藝術和基礎設施升級。

由於華盛頓國民隊棒球場建造工程使用BIM創新技術、加快了設計及建造施工進度（僅在23個月內設計和建造）、聘請當地工人、按時及按預算完成了球場，並獲得LEED銀級認證，使該工程成為華盛頓特區2008年最受矚目的建築工程。

華盛頓國民隊棒球場建造工程與許多其他工程施工模式不同，該工程在設計階段即開始開始施工，這除了需要施工廠商與設計團隊及分包商於施工現場持續進行協調作業，更需利用BIM才能順利達成此目標。

藉由使用BIM，施工廠商Clark工程公司減省了訂購鋼材、製造及現場到貨之間的傳統準備時

間，以滿足施工進度的需求，並降低施工成本。

圖5. 參訪BIM案例：華盛頓國民隊棒球場

(六)拜會駐紐約台北經濟文化辦事處

「駐紐約台北經濟文化辦事處」(Taipei Economic and Cultural Office in New York)前身為「中華民國駐紐約總領事館」，1979 年我國與美國斷交後，依據「台灣關係法」更名為「北美事務協調委員會駐紐約辦事處」，1996 年採用現行名稱。該處規模在美國屬第二大駐外機構，僅次於駐美國代表處。外交部、文化部、教育部、經濟部、僑務委員會、行政院金融監督管理委員會、交通部觀光局、內政部移民署、法務部調查局及中央銀行等單位均派駐人員，共同推動台灣與紐約、紐澤西、賓夕法尼亞及康乃迪克州等州之政治、經貿、文化、教育及觀光等各方面之交流。

圖 6. 拜會駐紐約台北經濟文化辦事處

本所拜會辦事處時，受到辦事處處長徐儷文大使的熱情接待，徐大使與其秘書對於辦事處的相關工作內容進行說明介紹，並詳細介紹紐約辦事處的相關歷史及負責業務，由於 9 月中旬正值聯合國會議期間，所以辦事處業務較為忙碌，但是辦事處仍積極協助本所此次紐約市拜訪行程，並由政治組呂志堅組長以及魏浩威副領事對於本所的紐約拜會及參訪地點進行重點介紹，在辦事處的說明中也了解了紐約市政府對於 BIM 的規劃有極深入的規劃建置。

(七)拜會紐約市政府

本所由駐紐約台北經濟文化辦事處呂志堅組長陪同下，拜會紐約市政府秘書 Tommy Lin ，Tommy 本身是於臺灣出生，並在臺灣接受教育後才移民美國，因此對臺灣及美國兩地的文化及政經歷史都相當的了解，他深刻理解本所希望了解 BIM 在紐約市政府的實際應用狀況，並說明目前此部分由紐約市政府設計及建設部門(Department of Design and Construction，簡稱 DDC)負責此方面的業務，並於 2012 年出版了 BIM Guidelines 等讓設計顧問公司及施工廠商可以依循的指南，其內容包含：[1] General Information；[2] BIM USE and Requirements；[3] Submission and Deliverables；[4] Glossary and Appendix，且此部分 BIM Guidelines 與臺灣的[臺灣 BIM 指南]有部分異曲同工的相關

內容，Tommy 特別表達 BIM Guidelines 的執行重點在於是否能落實應用在全生命週期中，方才能表現出此部分的成效，我們非常感激 Tommy 的協助，也誠摯邀請 Tommy 再次回到臺灣給我們相關的指導及交流。

圖 7. 紐約市政府 Tommy Lin 秘書與本所熱烈討論

(八) 參訪BIM案例：New York by Gehry（雲杉街8號）

New York by Gehry（雲杉街 8 號）位於曼哈頓下城區的雲杉街，緊鄰 City Hall 及其臨近的公園。Cass Gilbert 設計的地標性建築 Woolworth Building 及 Brooklyn Bridge 是與之相鄰的建築物群。顯著的高度使之成為了紐約天際線的一個重要的組成部分，它落成時是北美最高的住宅建築，為當地居民人口數量的增加做出了極大的貢獻，該大樓還包括一個公立小學及一所紐約市中心醫院。

New York by Gehry 採用最新的 BIM 技術以及結構計算模型，有效地提供多樣化和活力的外觀。憑藉 BIM 對於垂褶面品質的提昇以及弧度造型的模擬，讓此建築外立面創造了奇特的標誌性和地標建築，該建築本身是以傳統建築規則為基礎，塔樓的差異主要是由兩個方面組成：[1]清潔設計，及[2]空間和諧，用以強調此棟建築重視現代生活的關鍵。

圖 8. 參訪 BIM 案例：New York by Gehry（雲杉街 8 號）

(九) 參訪BIM案例：康乃爾大學(Cornell University)理工學院紐約市羅斯福島分校

康乃爾大學(Cornell University)理工學院紐約市羅斯福島分校於 2017 年 9 月正式啟用，這座斥資 20 億美元興建的校園，其中兩棟大樓採用環保設計，穿透度極高，在自然光線下能瀏覽曼哈頓東河兩岸河景，堪稱紐約市最美校園，此校園由前紐約市市長彭博（Mike Bloomberg）任內推動，於 2011 年底開始興建，校園位於曼哈頓與皇后區中間，東河（East River）上羅斯福島（Roosevelt Island）南端，佔地約 52 萬平方呎，包括一座以彭博命名的教學大樓「The Bloomberg Center」、商界與教學共用的中心「The Bridge」、26 層高學生教職員宿舍「The House」，以及大片休憩用草地等。

設計上運用 BIM 技術於設計階段模擬透明建築物料如玻璃，大量採用節能設備及可再生能源等相關規劃，讓 The Bloomberg Center 成為全美規模最大的「淨零能耗建築物（net-zero energy

building）」，另「The House」則是全球最高及最大型的「被動式節能屋（Passive House）」。

「被動式節能屋（Passive House）」為建築業最高規格環保要求，建築物外牆如穿上「恆溫衣服」，能保持室內溫度夏天時不超過 25 度，冬天時不低於 20 度，大大減低能源消耗。「TATA Innovation Center」使用大規模玻璃外觀構造，並加入曲線型的造型模板，增加施工難度，也成為 BIM 技術應用於設計階段之參考典範。

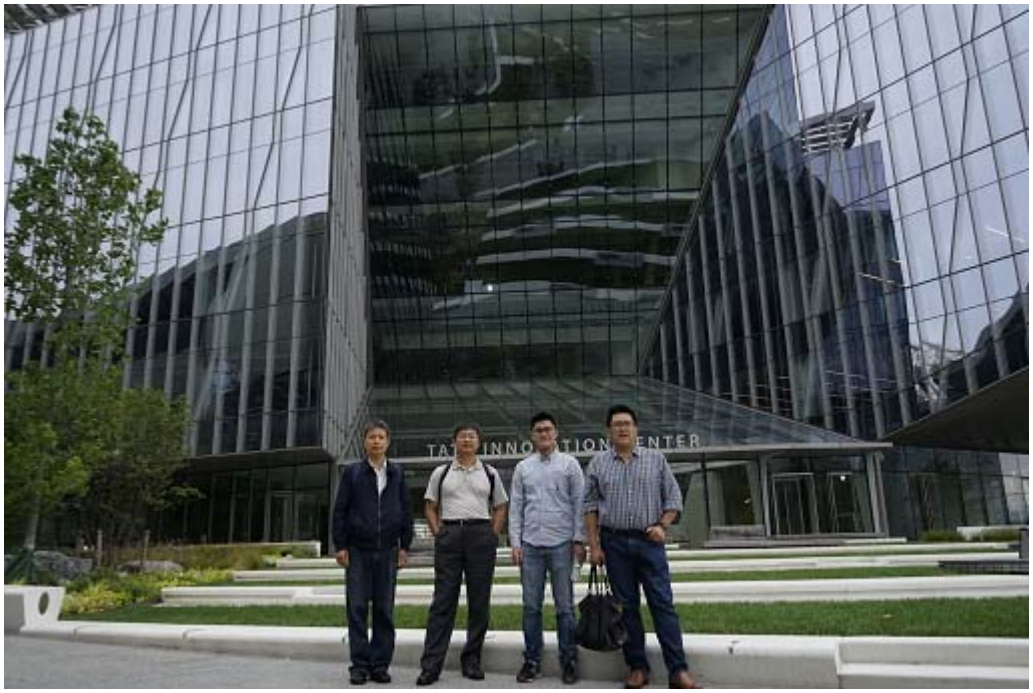

圖 9. 參訪 BIM 案例：康乃爾大學(Cornell University)理工學院紐約市羅斯福島分校 TATA Innovation Center

圖 10. 參訪 BIM 案例：康乃爾大學(Cornell University)理工學院紐約市羅斯福島分校 Bloomberg Center

(十) 參訪BIM案例：世界貿易中心一號大樓(One World Trade Center, 1WTC)

世界貿易中心一號大樓是位於美國紐約曼哈頓下城的摩天大樓，為世界貿易中心在911 襲擊事件中遭到損毀後所重建的建築之一，由SOM 建築設計事務所設計，總樓層共地上 94 層、地下 5 層，樓高 541 公尺，此高度是為紀念 1776 年簽署的「美國獨立宣言」而定的。本大樓於 2006 年 4 月 27 日動工興建，2013 年 5 月 10 日上樑，2014 年 11 月 3 日完工，目前為美國與紐約第一高樓，以及世界第六高樓，並取代在 911 襲擊事件中倒塌的世貿雙子星大樓，成為世界貿易中心的主建築，由於其表現災後復原的精神，該棟大樓的整體設計也融合舊紐約天際線的一些重要組成部份。

世界貿易中心一號大樓建築內所有的電梯、滅火裝置以及電路管線均被一個約 6M 厚的空心混凝土裝置保護起來。此外，大樓還為救援人員特意加裝了一個樓梯通道，以確保緊急情況發生時，救援人員可以從容進入大樓。整棟大樓的帷幕牆使用「超透明」玻璃（和反射玻璃或染色玻

璃恰恰相反），如此有助於自然採光，並於世界貿易中心配置一套雨水循環再利用系統，世界貿易中心一號大樓有些角度看起來就像原先雙子塔樓呈長方形，有些角度看起來則像個巨大的方尖碑，塔底和塔頂的牆面偏轉了 45 度，塔身有交錯的三角形切面。世界貿易中心一號大樓被美國認為是首座應用BIM技術建造的超高層大型指標性建築。

圖 11. 參訪 BIM 案例：世界貿易中心一號大樓

圖 12. 世界貿易中心一號大樓地下車站一隅

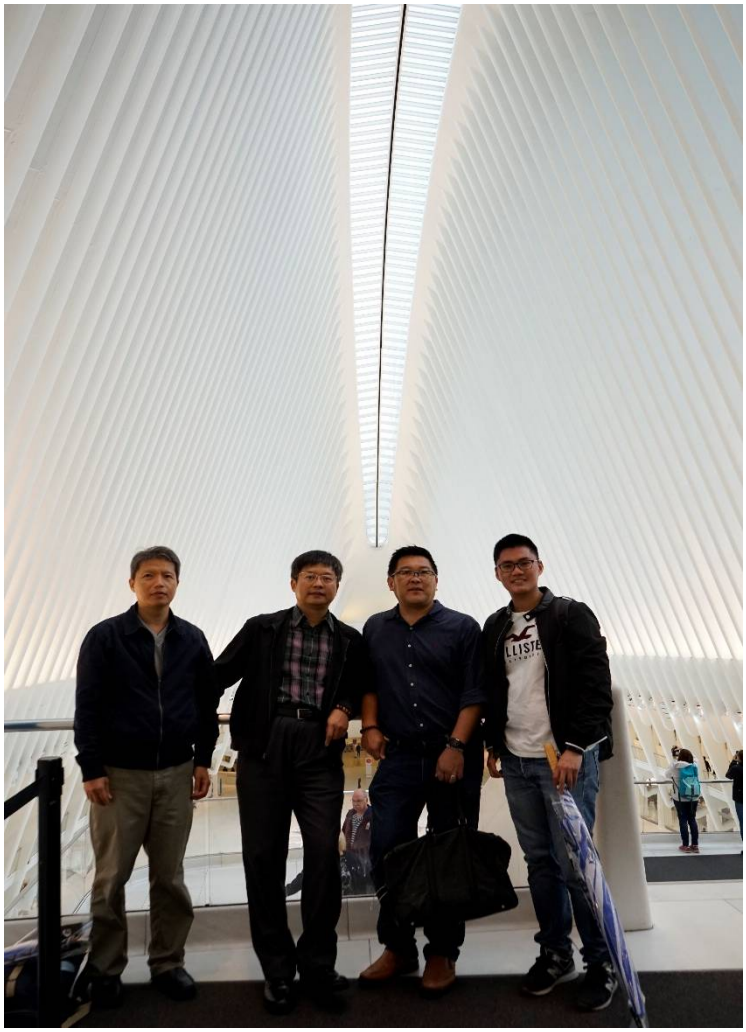

圖 13. 世界貿易中心一號大樓地下車站一隅

參、考察心得

赴美考察後發現，因為美國業界在BIM應用已相當普遍，且公部門及業界均非常肯定BIM能為建築工程節省許多施工時間及成本支出，因此美國國內無論公部門或業界皆非常積極研發新的BIM相關應用範圍及制定相關新資訊交換格式及規範。例如，國家建築科學研究所（National Institute of Building Sciences）於BIM之應用研究，不再只侷限於建築工程全生命週期之應用，並已擴展研究至利用工業基礎類別(Industry Foundation Classes，IFC)來轉換及串接地理資訊系統(GIS)、城市資訊系統(CIM)、建築資訊建模(BIM)等不同系統，及從國家到整體城市視圖，快速定位到一個區域、一棟建築，快速查找到一棟建築，獲取裡面所有相關資料；美國聯邦總務署（General Services Administration，GSA）認為BIM可以作為共享知識資源及決策的可靠基礎，減少重新收集或重新格式化信息的需要，並透過其公共建築服務(PBS)建立了國家3D-4D-BIM計畫，該計畫透過其治理委員會發展公共建築資訊技術服務（PB-ITS）和PBS之間的合作，支持所有PBS業務的BIM使用；紐約市政府出版了BIM Guidelines等讓設計顧問公司以及施工廠商可以依循的指南；馬丁‧路德‧金恩紀念圖書館(Martin Luther King Jr. Memorial Library , MLKML) 改建設計案應用BIM軟體完成；華盛頓國民隊棒球場建造工程工程應用BIM軟體在設計階段即開始開始施工，協助施工廠商與設計團隊及分包商於施工現場進行持續協調作業，施工廠商Clark工程公司亦藉由使用BIM，減省了訂購鋼材、製造及現場到貨之間的傳統準備時間，以滿足施工進度的需要，並降低施工成本。New York by Gehry（雲杉街8號）建築工程設計也是藉由BIM對於垂褶面及弧度造型的模擬，有效地提供多樣化和活力的外觀，讓外立面創造了奇特的標誌性和地標建築；康乃爾大學(Cornell University)理工學院紐約市羅斯福島分校設計上運用BIM技術於設計階段模擬透明建築物料如玻璃，大量採用節能設備及可再生能源等相關規劃，讓The Bloomberg Center成為全美規模最大的「淨零能耗建築物（net-zero energy building）」。

根據美國建築師學會（AIA）總部表示，因為美國BIM應用於設計及施工階段較普遍，通常美國業主請設計建築師或施工廠商繳交BIM模型，並不額外付費。反觀國內，因BIM應用尚屬起步階段，業界使用尚不普遍，且相關人才亦不足，致使國內業界許多人對BIM的使用效益仍抱持懷疑態度，甚至認為BIM非但未能節省施工時間及成本支出，反而增添他們的困擾。經探討，這應屬國內BIM使用尚不普遍之陣痛期現象，當國內BIM使用環境成熟及普遍化後，應可被業界普

遍接受及肯定。

肆、建議事項

一、建議內政部營建署所有大型公共工程案皆採用BIM

因國內BIM應用尚屬起步階段，業界使用尚不普遍，且相關人才亦不足，致使國內業界許多人對BIM的使用效益仍抱持懷疑態度，建議內政部營建署所有大型公共工程案皆採用BIM，引導業界逐漸接受及使用BIM，以促使國內BIM使用環境成熟及普遍化。

二、協助建立公共工程運用BIM推動平台

建議政府應結合產、官、學資源，協助建立公共工程運用BIM推動平台，為正在進行的公共工程提供BIM專家諮詢及相關資源(例如，教材、人員培訓、BIM元件庫等)，以整合相關技術及資源，並藉由推動國內公共工程BIM運用成熟化及普遍化，促使業界加速使用BIM。

三、彈性結合政府機關、BIM軟體供應商、專業組織、及學術/研究機構資源進行BIM相關研究

政府機關擁有較多行政資源，BIM軟體供應商擁有直接修改軟體便利性，專業組織擁有較多實務經驗，學術/研究機構擁有較高研發能力，倘能彈性結合以上資源進行BIM相關研究，必能收到事半功倍之效。

四、鼓勵BIM軟體供應商、專業組織，及學術機構開辦BIM訓練課程

因國內BIM人才缺乏，致使許多公司無法培植公司內專職的BIM人員，須以外包方式請他人協助建置BIM模型，不僅增加資本支出，也浪費雙方許多時間溝通BIM模型建置內容，且此狀況於變更設計時不斷重複發生，建議政府應鼓勵BIM軟體供應商、專業組織，及學術機構開辦BIM訓練課程，引導各公司培植專職的BIM人員，進而降低各公司建置BIM模型資本及時間支出。

伍、附錄

一、國家建築科學研究所（National Institute of Building Sciences）提供2份簡報資料及National BIM Guide for Owners

二、美國建築師學會（AIA）總部提供下列文件:

1. Guide, Instructions and Commentary to the 2013 AIA Digital Practice Documents

AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit

AIA Document G201™–2013, Project Digital Data Protocol Form

AIA Document G202™–2013, Project Building Information Modeling Protocol Form

2. Legislative Guidelines and Model Law/Model Regulations (by NCARB, National Council of Architectural Registration Boards)

三、美國聯邦總務署（General Services Administration，GSA）提供BIM Gides下載網址:
https://www.gsa.gov/real-estate/design-construction/3d4d-building-information-modeling/bim-guides

Presentation to Taiwan Architecture & Building Research Institute

September 6, 2018
Washington, DC

National Institute of BUILDING SCIENCES
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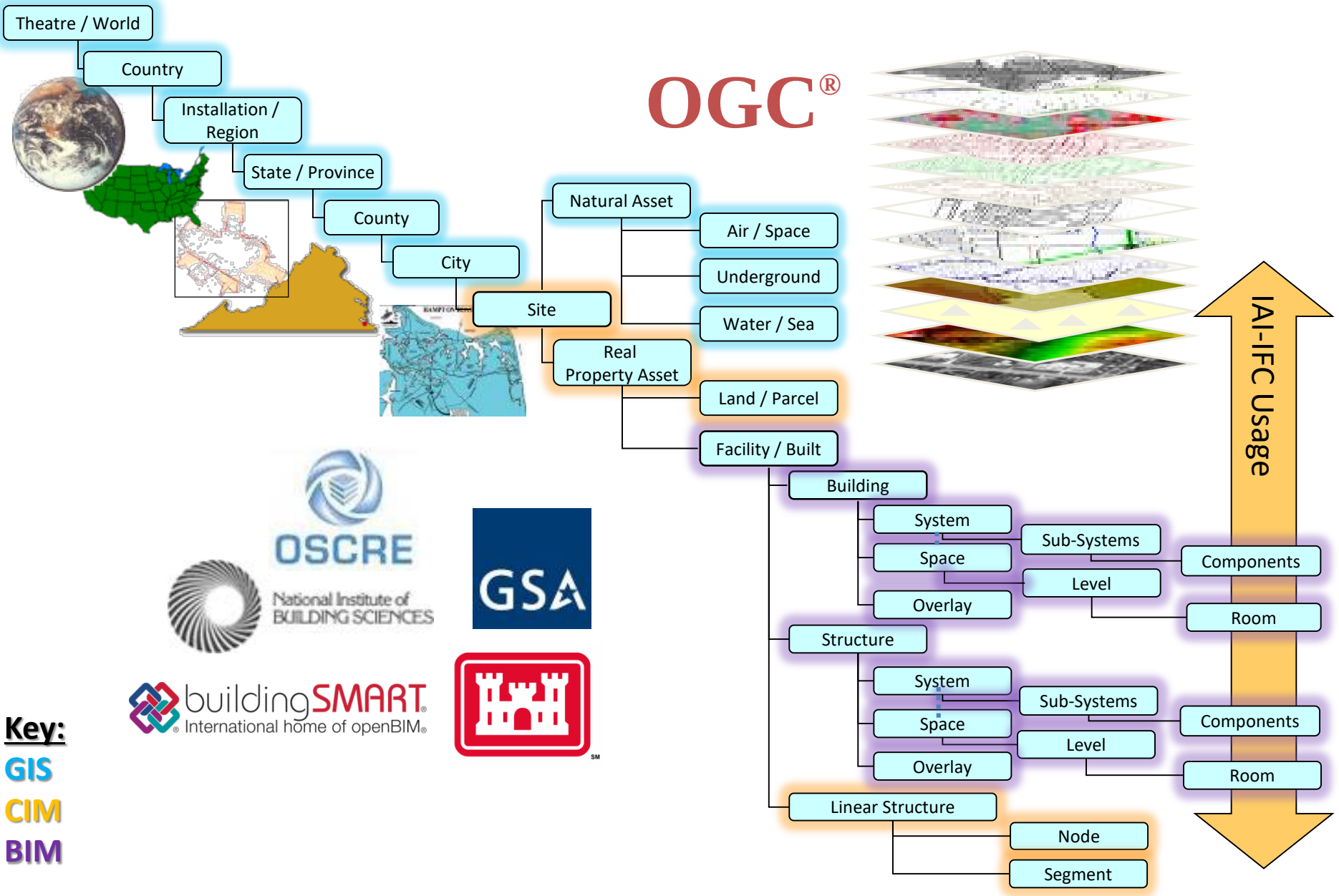
High-Performance Buildings Defined

High-Performance building means a building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy [and water] conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.

-Energy Independence and Security Act of 2007 §401 (PL 110-140)

Information Hierarchy – GIS-CIM-BIM Relationship

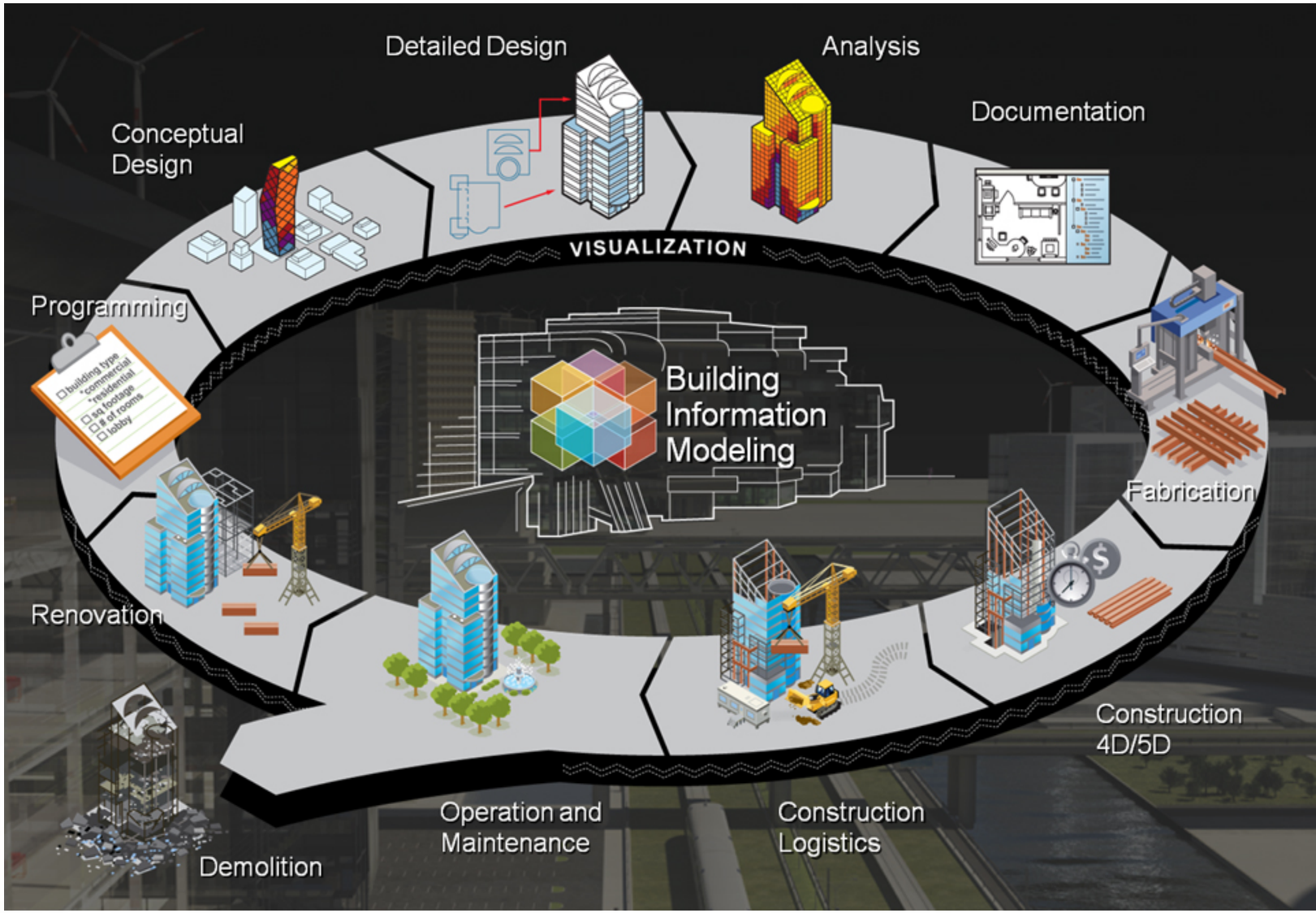


A **Building Information Model (BIM)** is a digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle from inception onward.

A basic premise of BIM is collaboration by different stakeholders at different phases of the life cycle of a facility to insert, extract, update or modify information in the BIM process to support and reflect the roles of that stakeholder. The BIM is a shared digital representation founded on open standards for interoperability.

United States National BIM Standard V1, P1 Jan 2008

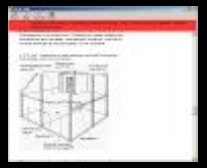
The Facility Lifecycle



Courtesy of Autodesk

IFC - Building Information Model

Laws and regulations
-Building regulations
-Building specifications

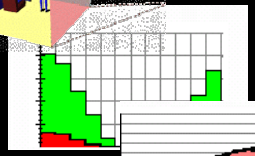


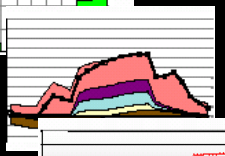
Design and Analysis
-Drawings, calculations
-Architect, engineer,…

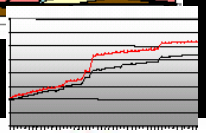
Knowledge databases
-Best practise knowledge
-Own practice

Modeling
-Visualisation, 3D models

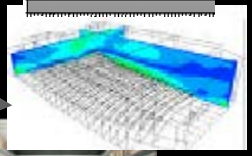
Briefing
-Functional req.
-Estimates
-Conditions
-Requirements



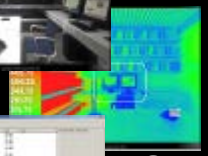




Simulations
-Comfort
-Ventilation, heating
-Energy
-Light, sound
-Insulation
-Fire, usage
-Environment
-Life time predictions
-Crowd behavior
- Safety



Demolition, refurbishment
-Rebuild
-Demolition
-Restoration

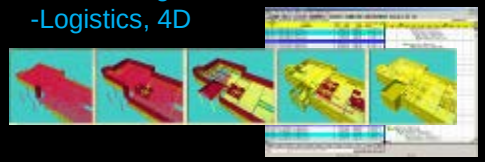


Costing
- Initial cost
- Life-cycle
- Value Engineering

Facility management
-Letting, sale, operations
-Maintenance
-Guaranties

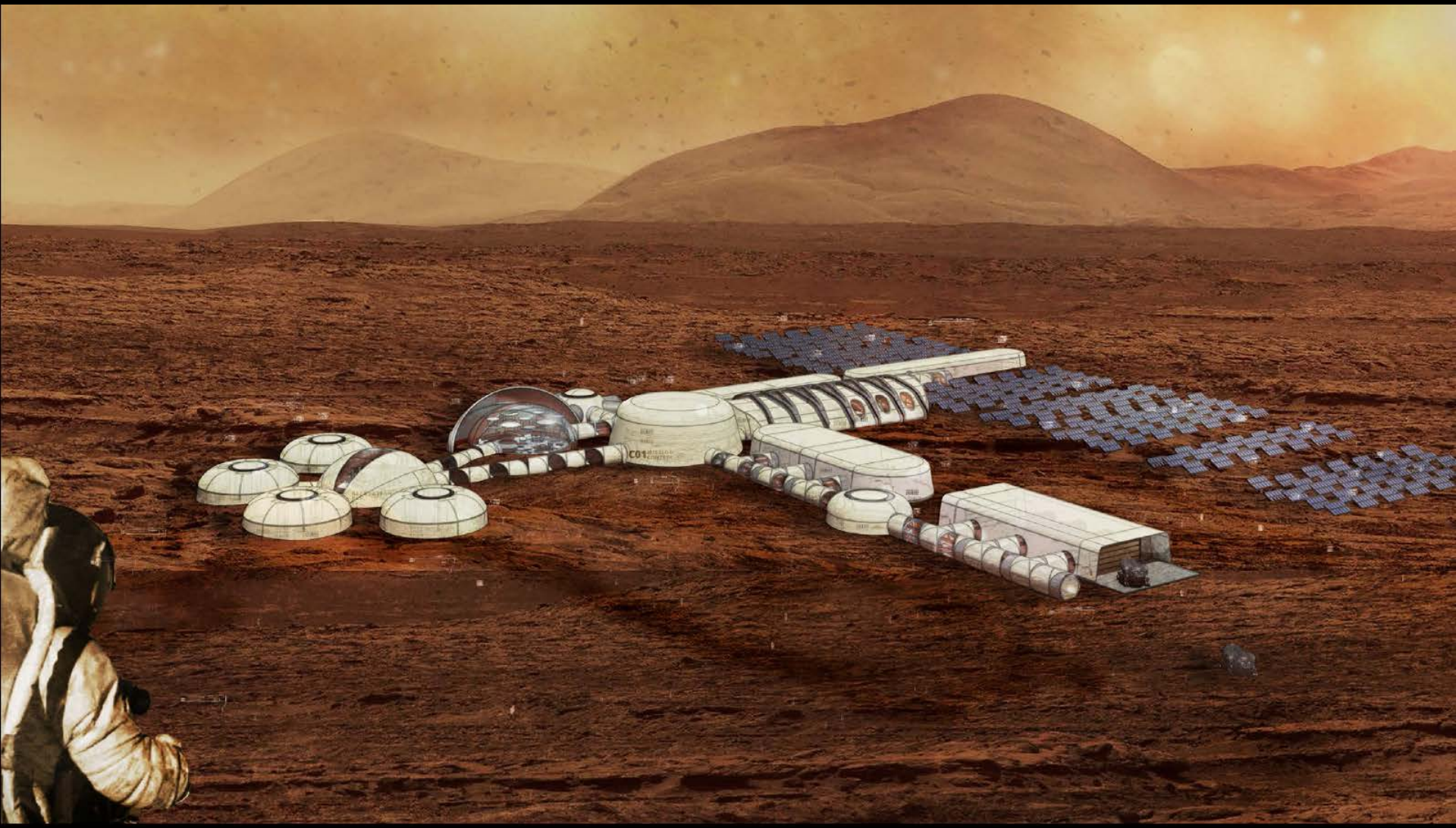
Specifications
-Specification sheets
-Classification standards
-Estimates, accounting

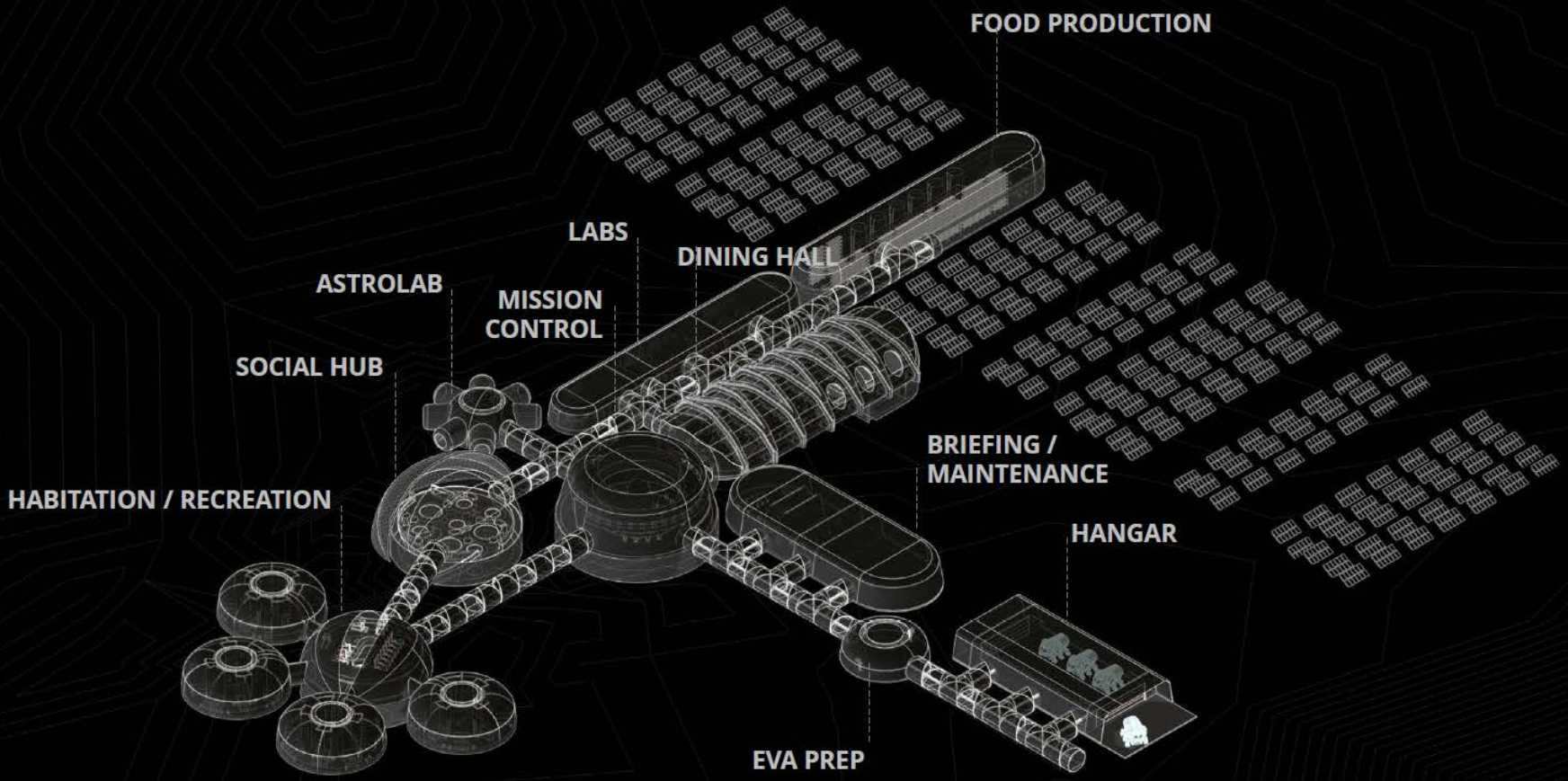
Construction management
-Scheduling
-Logistics, 4D

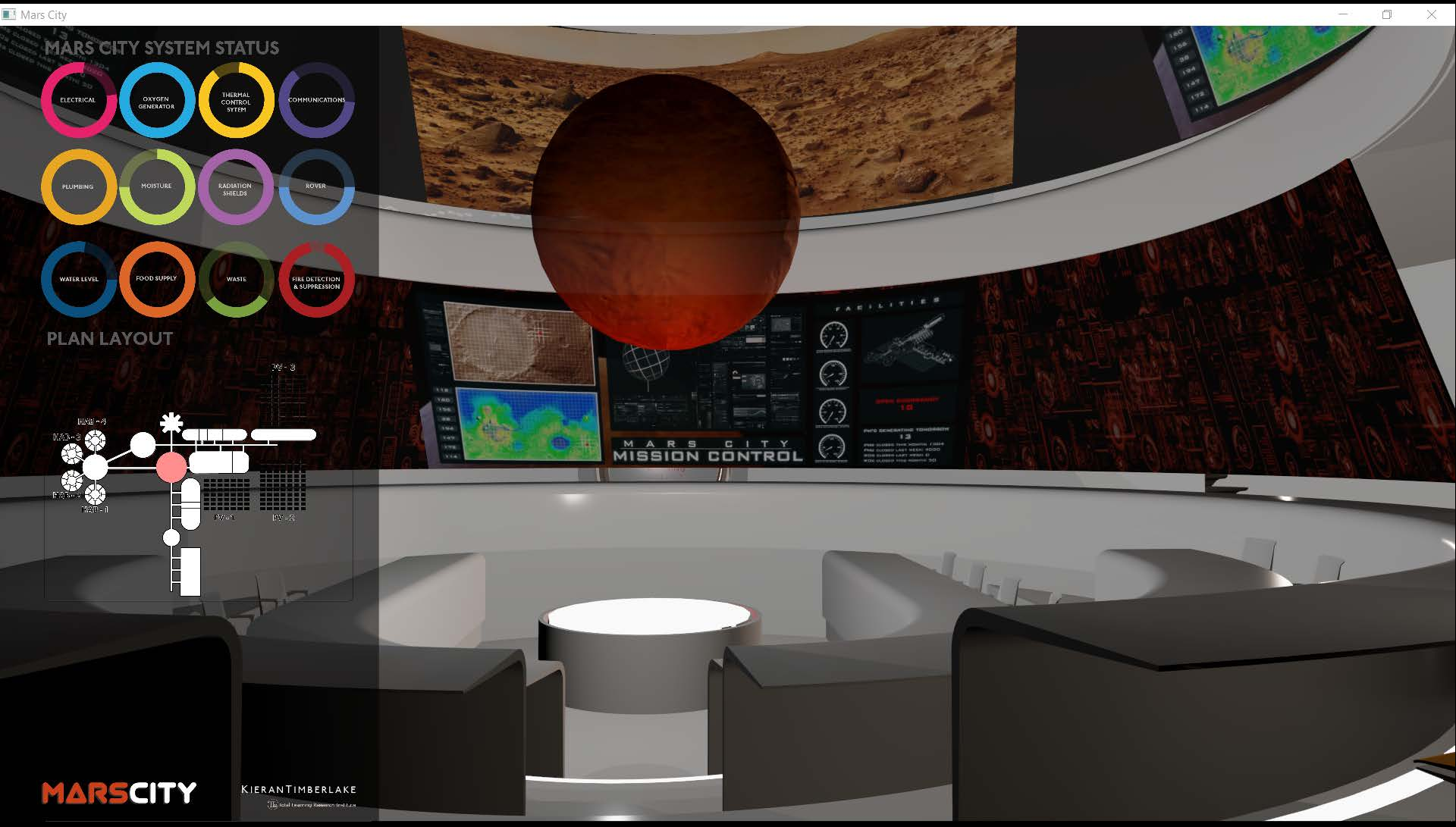


Procurement
-Product databases
-Price databases

By Lars Bjørkhaug
Illustrations by: Byggforsk, Olof Granlund, NBLN University of California, Stanford University




FOOD PRODUCTION
LABS
DINING HALL
ASTROLAB
MISSION CONTROL
SOCIAL HUB
BRIEFING / MAINTENANCE
HABITATION / RECREATION
HANGAR
EVA PREP


MARS CITY SYSTEM STATUS
ELECTRICAL
OXYGEN GENERATOR
THERMAL CONTROL SYTEM
COMMUNICATIONS
PLUMBING
MOISTURE
RADIATION SHIELDS
ROVER
WATER LEVEL
FOOD SUPPLY
WASTE
FIRE DETECTION & SUPPRESSION
PLAN LAYOUT
MARS CITY
MISSION CONTROL
MARSCITY
KIERANTIMBERLAKE

Criticality Table

01 Life Threatening
Requires immediate attention

02 Life Endangering
Overrides all other work orders

03 High Priority
Critical to continued operation

04 Medium Priority
Necessary for continued operation

05 Low Priority
Can be scheduled as needed

06 Preventative Maintenance
Follows pre-determined schedule

Low Priority

PV Panel Array 02 Cleaning

Medium Priority

Water Leak in Aquaponic Unit 03

High Priority

Compression seal failure Hab 01

THE GATEWAY TO UP-TO-DATE INFORMATION ON INTEGRATED 'WHOLE BUILDING' DESIGN TECHNIQUES AND TECHNOLOGIES

The goal of 'Whole Building' Design is to create a successful high-performance building by applying an integrated design and team approach to the project during the planning and programming phases.

WBDG UPDATES

SECURE / SAFE DESIGN OBJECTIVE

This section pertains to the physical protection of occupants and assets from man-made and natural hazards.

Related topics:

- Fire Protection
- Occupant Safety and Health
- Natural Hazards Mitigation
- Security for Building Occupants and Assets

PARTICIPATING AGENCIES

Select an agency below for more information on its building programs and criteria.

POPULAR FEDERAL CRITERIA & GUIDANCE

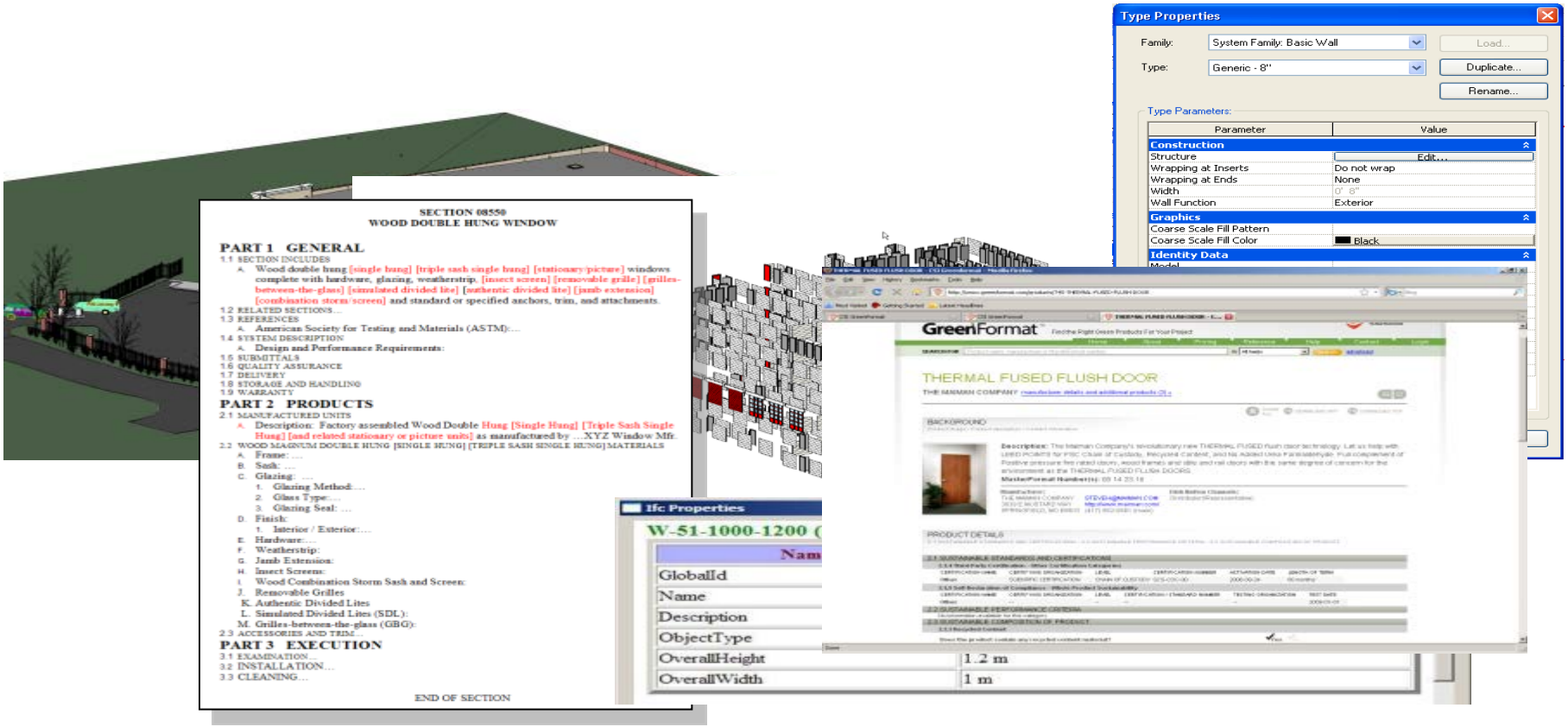
Building Information Management

Roger J. Grant, CSI

Program Director, National Institute of Building Sciences

Product Room Leader, buildingSMART International

BIM – Information Modeling and Management



The Importance of Standards

Requirements

Open Shareable Machine Readable Data

Good data is essential

Living with legacy

Benefits

Save time and money on design, construction and operations

Make better, more informed decisions

Deliver better results for customers

Preserve information for future

Good data requires open standards

Standards Framework

International	Regional	National

buildingSMART International home of openBIM

"IFC4"

ISO 16739

EN ISO 16739

DIN EN ISO 16739
BSI EN ISO 16739

ISO 8879
XML

ISO 10303
STEP

ISO 19775
X3D

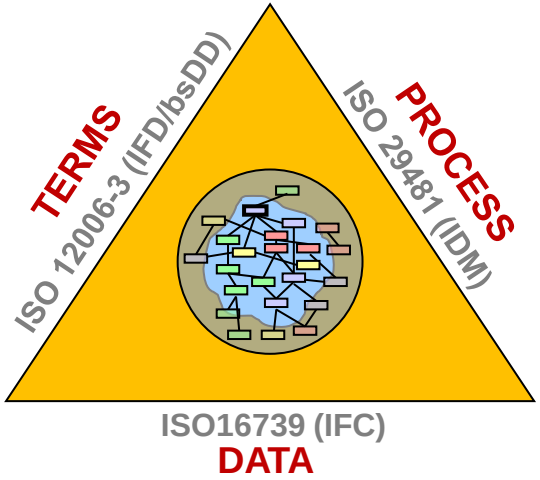
ISO TC184/SC4 (data model standard)

ISO TC59/SC13 (process, terms, BIM guidance, etc.)

OGC (BIM and Geospatial)

buildingSMART Standards and Tools

Set the open standard for object-based data exchange and sharing for virtual buildings:



Data Model - IFC

- **Schema for structured information**
- **Syntax for exchange (SPF, XML, JSON,….)**
- **Comprehensive information specification**
- **Tools: http://www.buildingsmart-tech.org/specifications/ifc-releases**

Processes – IDM/MVD/ER

- **Identify exchange requirements and rules for particular business processes**
- **Map requirements to IFC**
- **Scope for software implementation**
- **Tools: ifc.Doc**

Terminology - bSDD

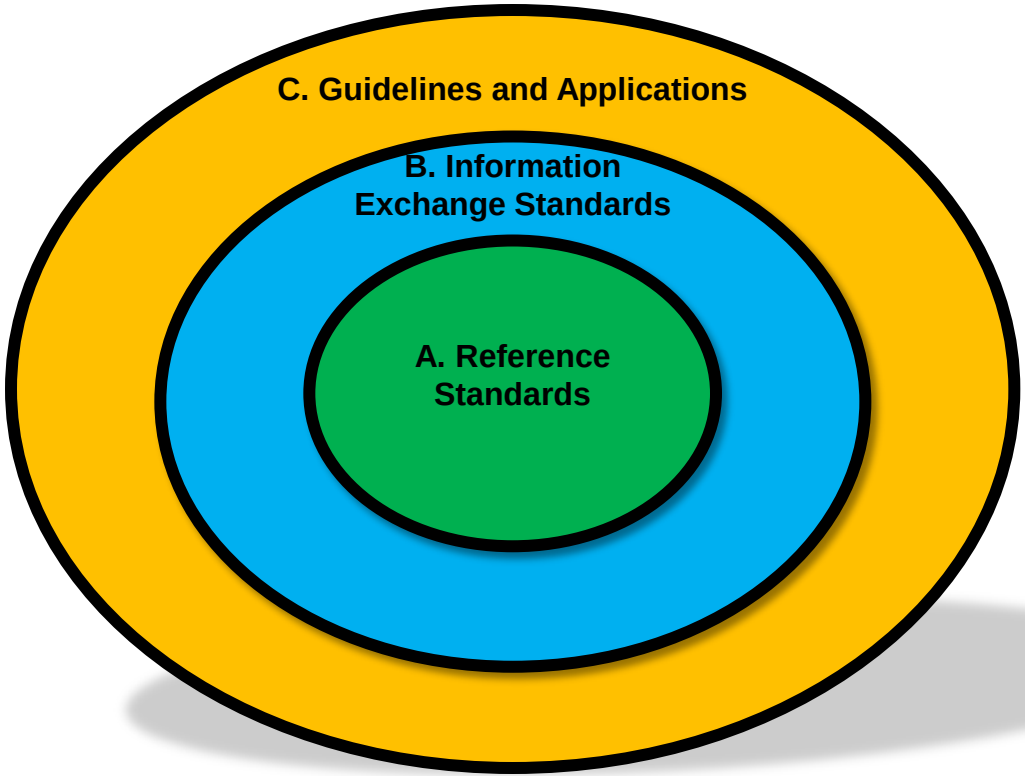
- **Uniquely identify properties and objects**
- **Multilingual support**
- **Dynamically extend the IFC model**
- **Tools: buildingSMART Data Dictionary (bSDD)**

Collaboration - BCF

- **Electronic messages when using models (RFI, RFC)**
- **Tools: http://www.buildingsmart-tech.org/specifications/bcf-releases**

National Standards Model

National BIM Standard - United States™
an initiative of the National Institute of Building Sciences buildingSMARTalliance™



A. Reference Standards

- A.1. ISO Standards
- A.2. Normative Standards - bSI
- A. 3. Conformance Specifications
- A. 4. Test Suite

B. Information Exchange Standards

- B.1. Information Exchanges
- B.2. Reference Processes
- B.3. Reference Specifications
- B.4. Reference Examples

C. Guidelines and Applications

- C.1. Contract Specifications
- C.2. Best Practice Guides
- C.3. Open Standards based Applications

NBIMS Roadmap and Projects

DESIGN	PROCURE	ASSEMBLE	OPERATE
REQUIREMENTS	**SUPPLIERS**	**QUALITY**	**COMMISSION**
Program	Qualifications	Testing	Startup
Schedule	Availability	Validation	Testing
Quality	Stability	Inspection	Balance
Cost	Capacity	Acceptance	Training
SITE	**MATERIAL**	**SAFETY**	**OCCUPY**
Zoning	Submittal	Requirements	Leasing
Physical	Selection	Logistics	Building Management
Utilities	Purchase	Training	Security
Environmental	Certification	Inspection	Tenant Services
FORM	**CONTRACTING**	**SCHEDULE**	**MODIFY**
Architecture	RFQ	Fabrication	Assessment
Structure	RFP	Deliveries	Refurbish
Enclosure	Selection	Resources	Renovate
Systems	Agreement	Installation	Demolish
ESTIMATE	**PRICE**	**COST**	**MAINTAIN**
Quantity	Quantity	Productivity	Prevention
System Price	Unit Price	Solicit	Scheduled
Comparison	Labor	Pricing	Warranty
Escalation	Equipment	Selection	Contracted

Project Categories

- Best Practices Projects
- Information Architecture Projects
- Information Exchange Projects
- Organizational Projects
- Procedural Projects
- Other Projects

Project	Status
BIM Service interface exchange (BIMSie)	Pending NBIMS Submission
Building Automation Modeling information exchange (BAMie)	Pending NBIMS Submission
Building Programming information exchange (BPie)	Submitted to NBIMS-US V3
Construction-Operations Building information exchange (COBie)	NBIMS-US V2, Updated for NBIMS-US V3
Electrical System information exchange (Sparkie)	Submitted to NBIMS-US V3
HVAC information exchange (HVACie)	Submitted to NBIMS-US V3
Life Cycle information exchange (LCie): BIM for PLM	Submitted to NBIMS-US V3 as COBie Appendix
Quantity Takeoff information exchange (QTie)	Under Development
Specifiers' Properties information exchange (SPie)	Under Development
Wall information exchange (WALLie)	Under Development
Water System information exchange (WSie)	Submitted to NBIMS-US V3

www.nibs.org/?page=bsa

www.nationalbimstandard.org/

National Institute of BUILDING SCIENCES

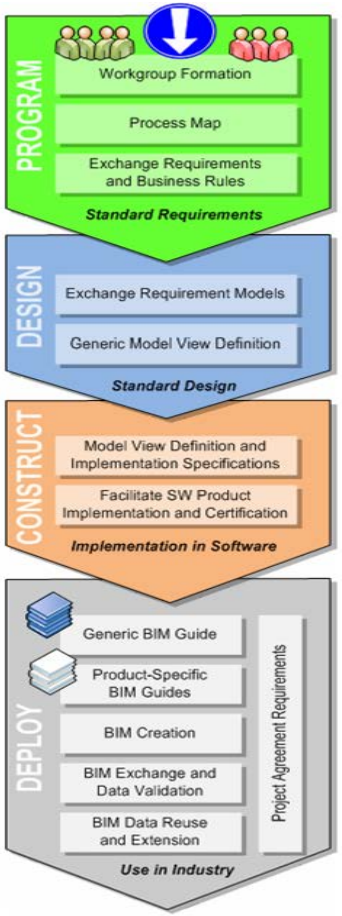
BIM Standard Development Process per U.S. National BIM Standard

1. Program -> *Standard Requirements*
   - Process Map
   - Exchange Requirements and Business Rules

2. Design -> *Standard Design*
   - Exchange Requirements Model
   - Generic Model View Definition

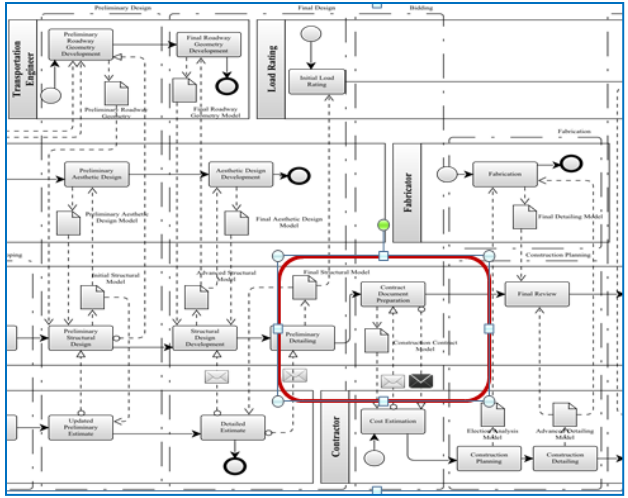
3. Construction -> *Implementation in Software*
   - Model view definition and Implementation Specifications
   - Facilitate S/W Product Implementation and Certification

4. Deployment -> *Use in Industry*
   - Generic BIM Guide
   - Product specific BIM Guides
   - BIM Creation
   - BIM Exchange and Data Validation
   - BIM Data Reuse and Extension
   - Project Acquisition Requirements

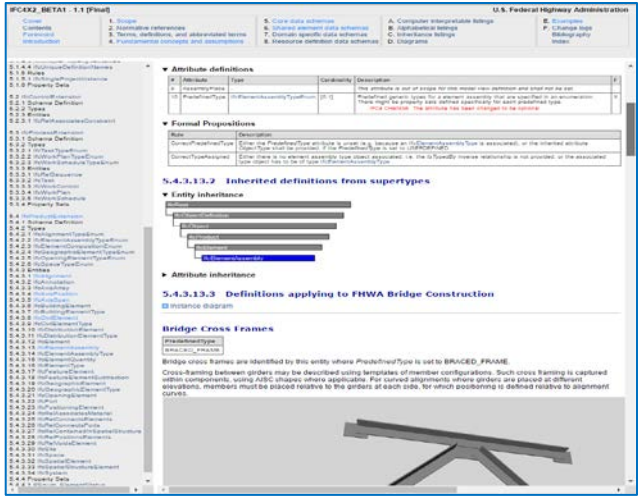


FHWA Use Case: Bridge Design to Construction Contract Exchange Requirements U.S.

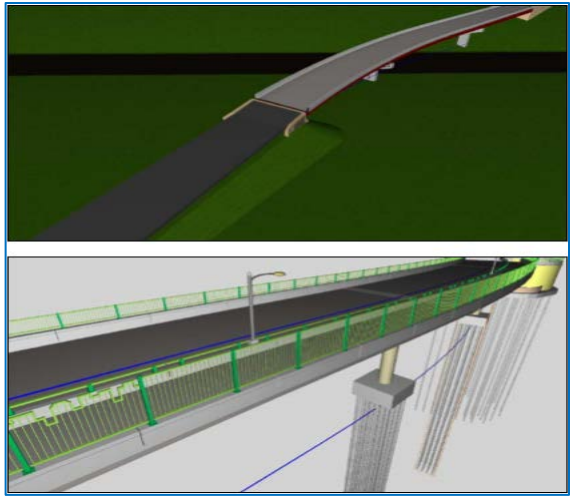
Process Map - IDM



Exchange Specification - MVD



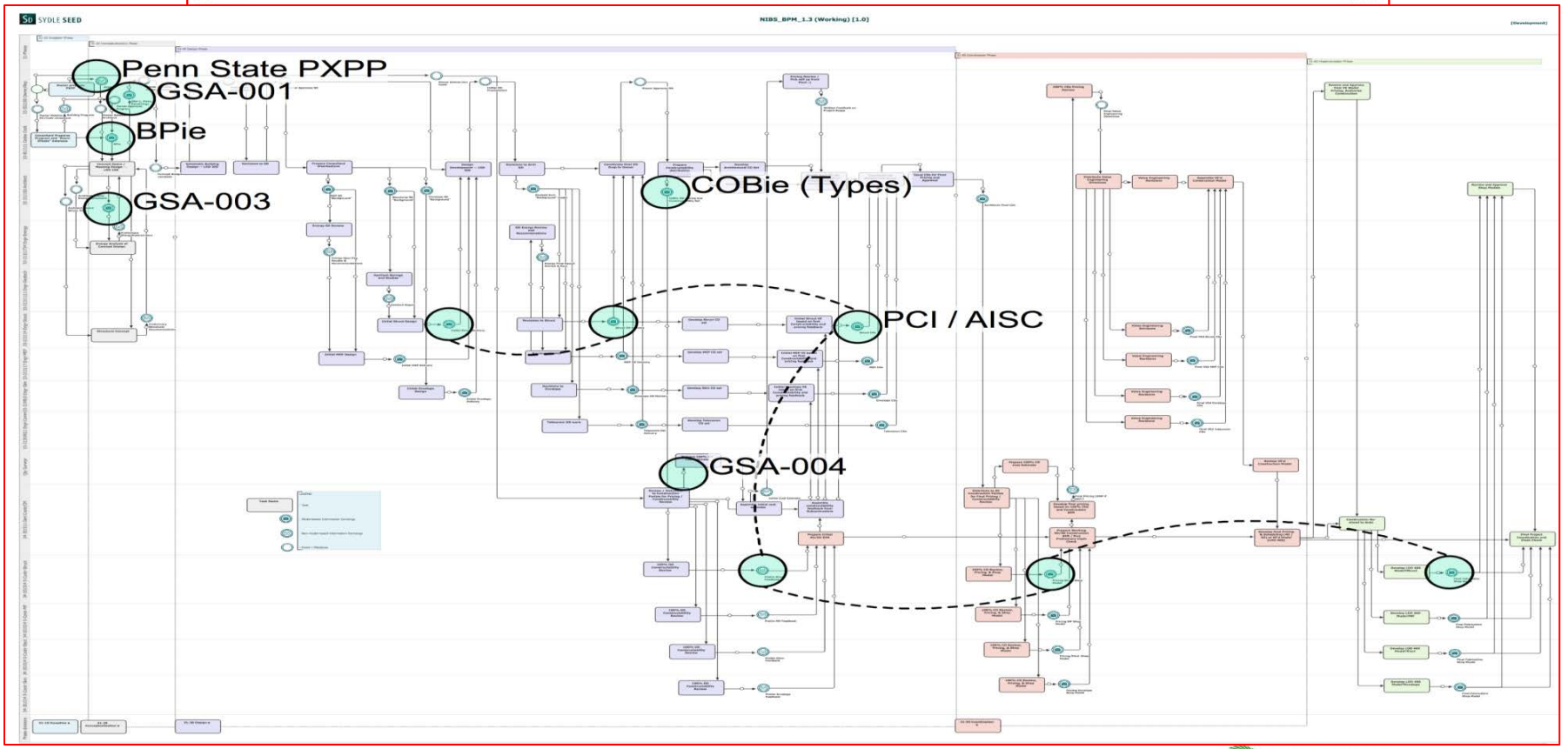
Examples



- With IFCBridge developing Terminology Library
- AASHTO and FHWA moving to implementation phase

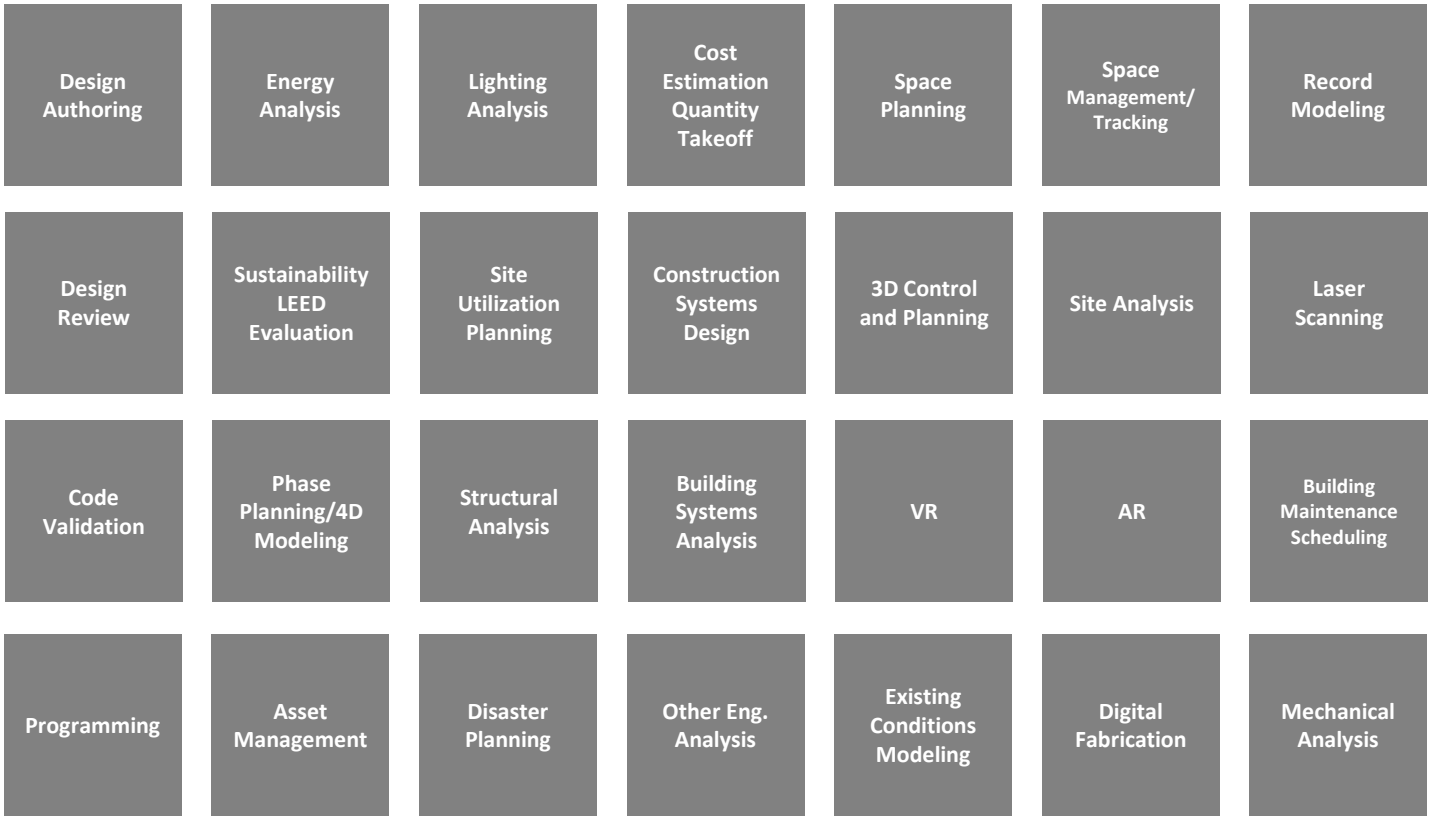
http://www.nibs.org/?page=bsa_bridge
https://www.fhwa.dot.gov/bridge/pubs/hif16011/

Process Map – IDM for Buildings



Courtesy Robert Anderson, buildingSMART alliance

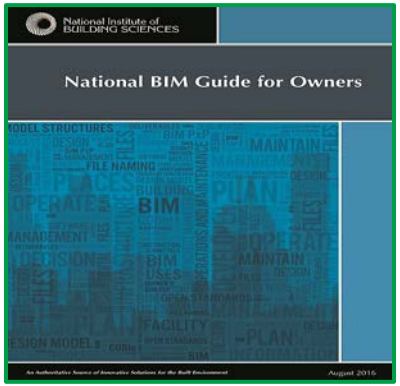
BIM Use Cases



Penn State has identified **25 BIM Uses.**

National Institute of BUILDING SCIENCES

National BIM Guide for Owners



1. INTRODUCTION
FOREWORD
1.1 PURPOSE
1.2 SCOPE
1.3 USE

2. PROCESS
2.1 DEFINE BIM REQUIREMENTS
2.2 TEAM ROLES AND RESPONSIBLITIES
2.3 BIM PROJECT EXECUTION PLANNING
2.4 MANAGING PROJECT REQUIREMENTS AND DELIVERABLES

3. INFRASTRUCTURE AND STANDARDS
3.1 TECHNOLOGY INFRASTRUCTURE
3.2 STANDARDS
3.3 SPACE AND DRAWING STANDARDS
3.4 FILE STRUCTURE
3.5 MODEL STRUCTURES
3.6 MODELING REQUIREMENTS

4. EXECUTION
4.1 BIM EXECUTION PLAN (PXP)
4.2 BIM USES
4.3 MODEL DELIVERABLES

DHA/VA Use Case: Space and Equipment Planning

Space

Equipment

Department of Defense
Defense Health Agency

Courtesy Kimon Onuma, Onuma, Inc.

National Institute of BUILDING SCIENCES

DHA/VA Use Case: Space and Equipment Planning

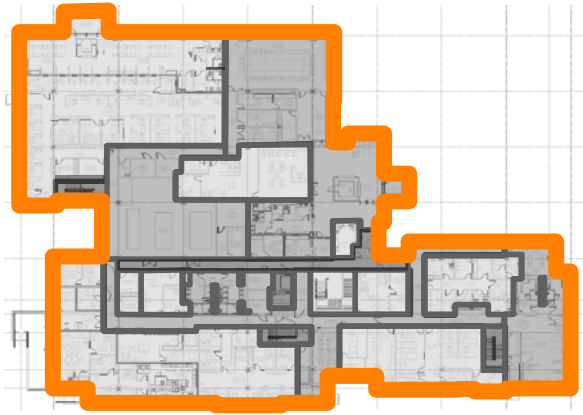
SEPS2BIM.org

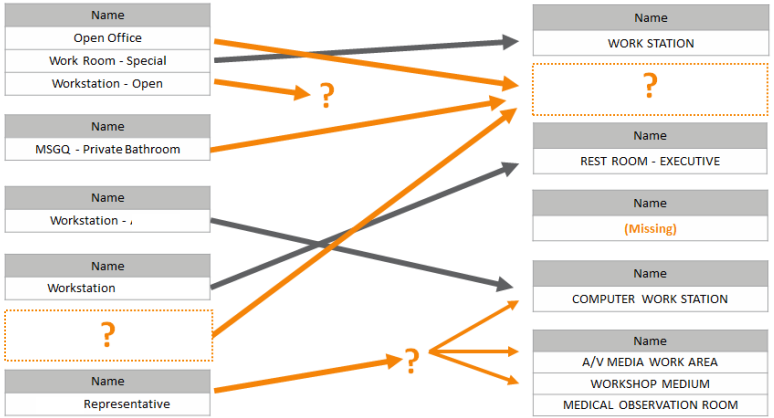
Available Online

Courtesy Kimon Onuma, Onuma, Inc.

National Institute of BUILDING SCIENCES

Agency Use Case: Space Planning





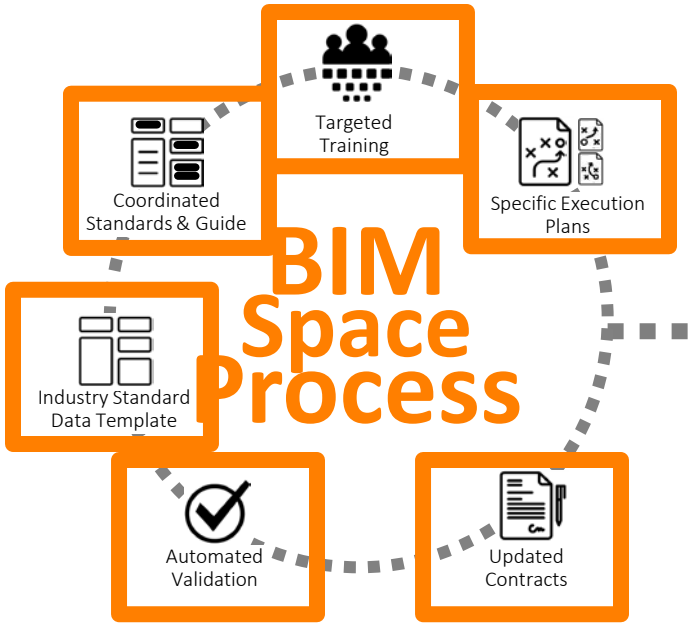
Measured ~8,800 GSM

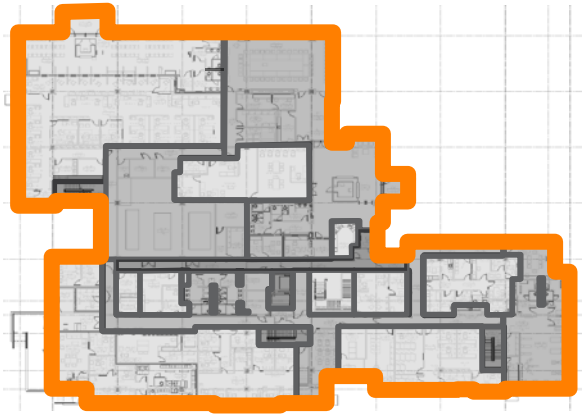
Range in Systems:
~ 8,000 GSM - ~ 4,000 GSM

6,000 Space Types in Various Systems

900 Space Types in OmniClass

Agency Use Case: Space Planning

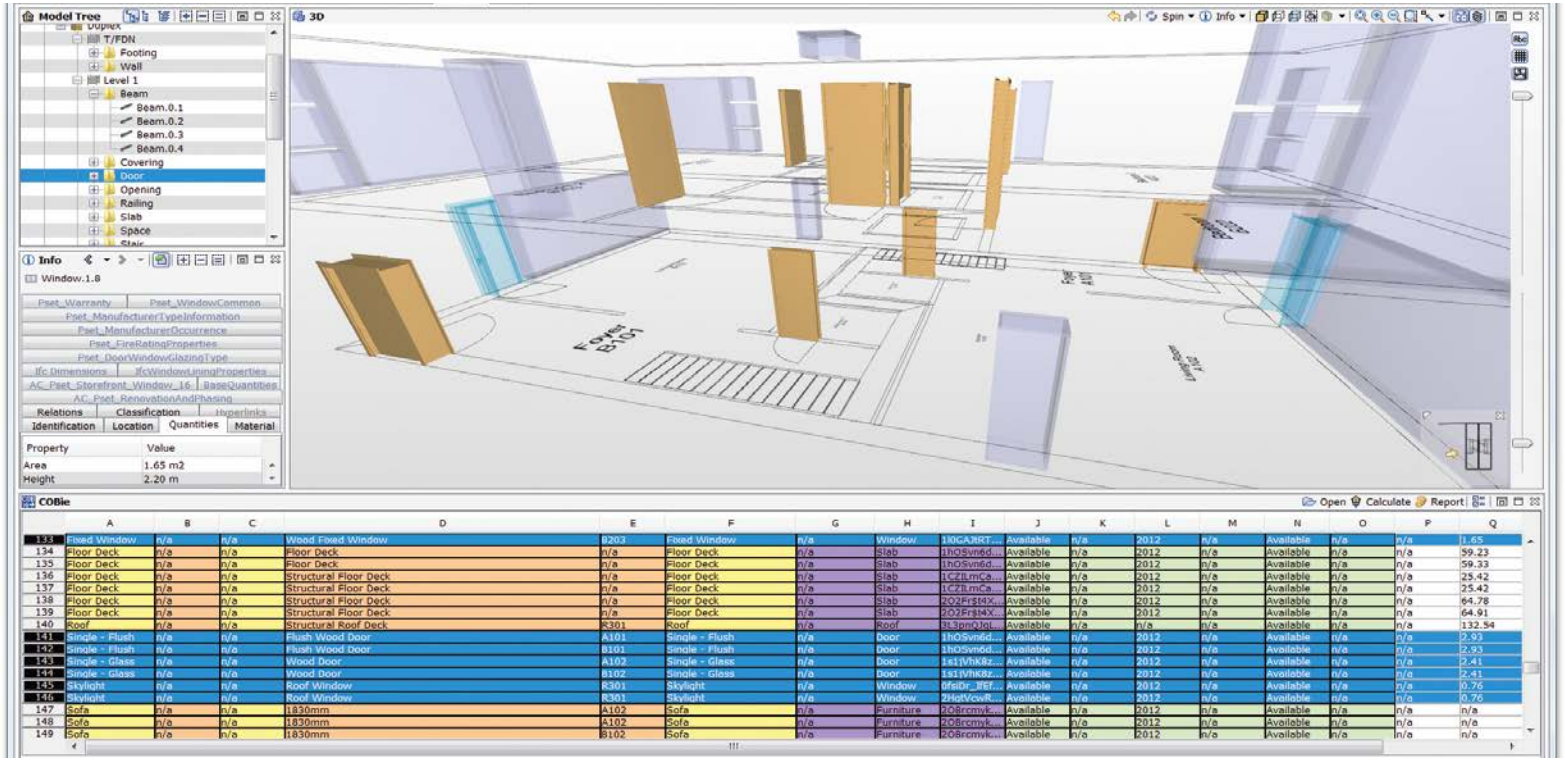




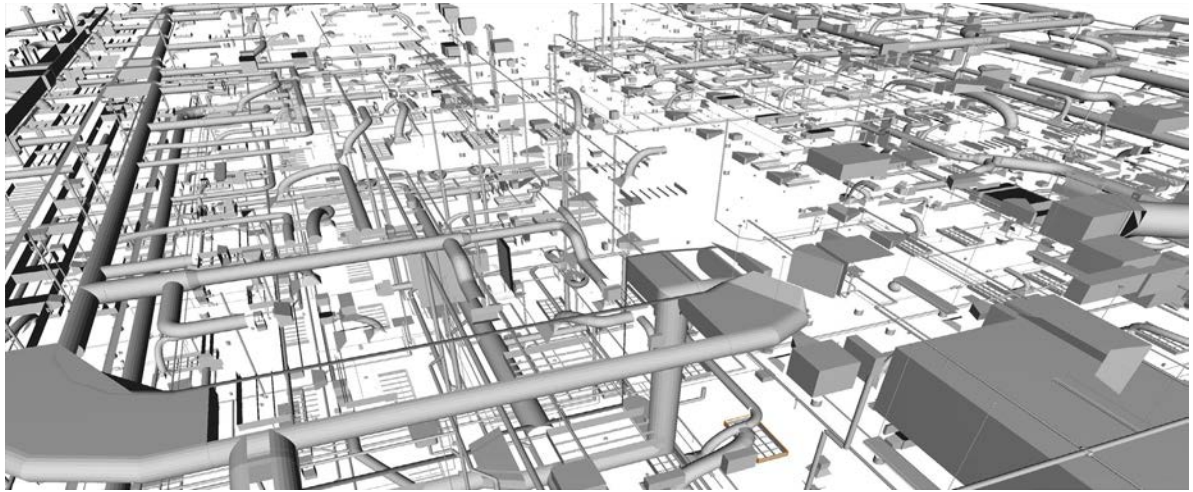
Measured 8,800 GSM

All Systems 8,800 GSM
Common Space Names
Requirements Communicated

Use Case: Asset Management (COBie)



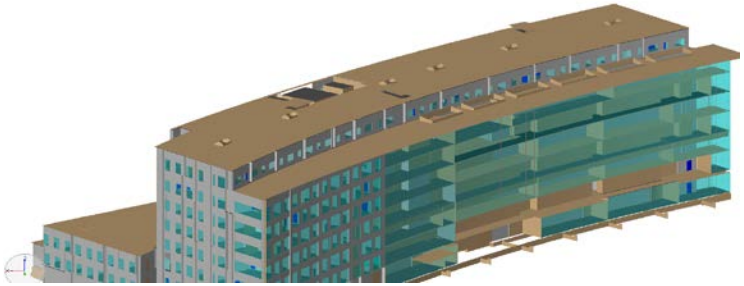
GSA Use Case: Energy Analysis



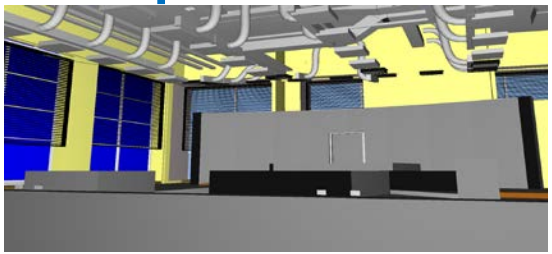
- This presentation references ongoing work performed by NIBS for GSA related to energy analysis.
- This work has been specifically prepared for GSA Office of the Public Buildings IT Services.
- Much of this work, when completed, will be posted on the GSA external website (www.gsa.gov) and NIBS will share an abbreviated courtesy copy, that references the study commissioned by GSA at (www.nibs.org).

GSA Use Case: Energy Analysis

Example building envelope

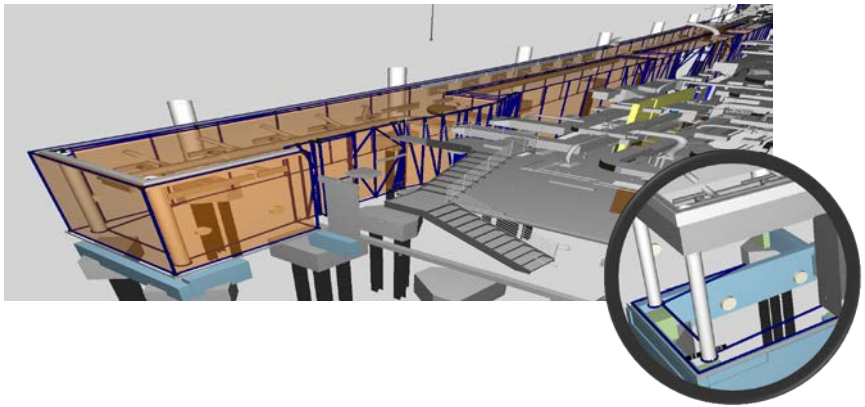


Example ductwork

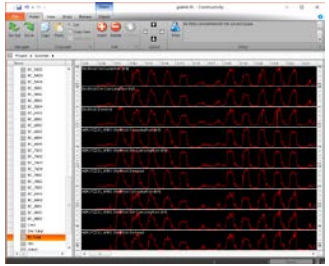


Example equipment

Example space boundaries



Example meter data



GSA Use Case: Energy Analysis

Data Exchange Scenarios

- Capture space occupancy and equipment scheduling
  - buildingSMART IFC, NBIMS/COBie
- Capture performance data
  - Baseline (ASHRAE 90.1) simulation results
  - Design (EnergyPlus) simulation results
- Actual building performance
  - Project Haystack
- Relate baseline, design, and actual performance data with specific objects
  - buildingSMART IFC

Takeaway

- Useful data already exists
- Useful technology already exists
- The real work: bringing data and technology together – It's a Journey, Get Started!

Get Involved:

http://www.nibs.org/bsa

http://www.buildingsmart.org

buildingSMART®
International home of openBIM®

Questions/Discussion

Roger Grant, CSI
rgrant@nibs.org
www.nibs.org

National Institute of BUILDING SCIENCES
美国国家建筑科学研究院

National BIM Guide for Owners
商业建筑业主BIM实践指南

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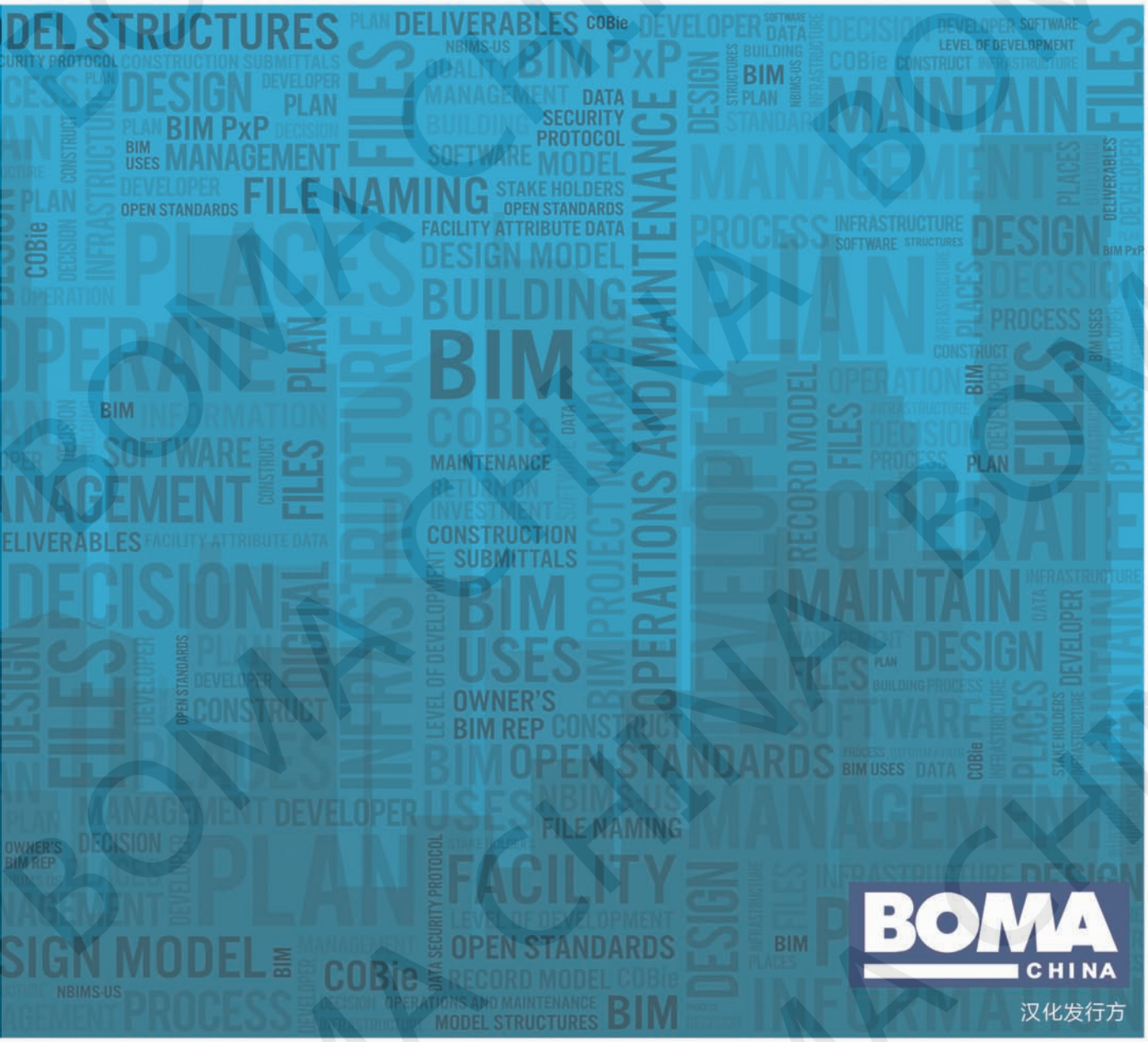

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FOREWORD

Recent SmartMarket Reports by McGraw Hill Construction (now Dodge Data & Analytics) indicate the business value of Building Information Modeling (BIM) is increasing. *The Business Value of BIM in North America: Multi-Year Trend Analysis and User Ratings* (2007-2012) showed BIM adoption increasing from 17% in 2007 to 71% in 2012, with 62% of respondents among the industry perceiving a positive return on their investment in BIM. *The Business Value of BIM for Owners* (2014) identified 68% of U.S. Owners surveyed as either requiring or encouraging BIM for their projects.

The National Institute of Building Sciences is proud to introduce the *National Building Information Modeling Guide for Owners (NBGO)*, intended to outline for the building Owner how to develop and implement requirements for BIM application in internal policies and procedures as well as in contracts to plan, design, construct, and operate buildings.

As BIM adoption in the U.S. continues to rise, the Owner stands to benefit most, by implementing BIM as a tool to maximize a building's value throughout its lifecycle. BIM potentially facilitates better-informed Owner decision-making, design-intent communication, project coordination across various phases, enhanced project delivery schedule and budget management, post-construction asset and facility management, building automation and control, and many other benefits, including increased property resale values of the building, as well as leasing revenues.

We authored the *NBGO* to assist Owners in working with the other members of the building team to maximize the potential of BIM on their projects. We would welcome your comments and feedback as you put the *NBGO* to work for you.

Sincerely,

Henry L. Green, Hon. AIA
President
National Institute of Building Sciences
January 1, 2017

前言

McGraw Hill Construction（现在为 Dodge Data & Analytics）最近发布的 SmartMarket 报告显示建筑信息模型（BIM）的商业价值正在提升。《BIM 在北美地区的商业价值：年度趋势分析及用户评级（2007 年 -2012 年）》显示，BIM 的使用率从 2007 年的 17% 增至 2012 年的 71%，业内 62% 的受访者认为他们对 BIM 的投资产生了正回报。《BIM 对业主的商业价值（2014 年）》认定有 68% 的美国受访业主正在要求或鼓励他们的项目使用 BIM。

美国国家建筑科学研究院自豪地向您介绍《商业建筑业主 BIM 实践指南》（NBGO），此指南意在向业主总体介绍如何制订和实施内部政策流程及建筑规划、设计、施工和运营合同的 BIM 适用要求。

随着美国 BIM 应用的比例不断上升，通过实施 BIM 这一使建筑物价值在其全生命周期中最大化的工具，业主的获益注定将会增多。BIM 能够帮助业主基于更好的信息做出决策，表达设计意图，在项目的各个阶段进行协调，加快项目交付进度，强化预算管理和施工阶段之后的资产和设施管理，提高建筑物的自动化控制水平，此外还有其它诸多好处，包括增加建筑物的地产转售价值及租赁收益。

我们编写本书旨在协助业主与建筑团队的其他成员在他们的协作项目上，推动 BIM 潜能最大化。在您使用本书的过程中，欢迎您进行评论并提供反馈。

Henry L. Green，AIA 荣誉会员

会长

美国国家建筑科学研究院

2017 年 1 月 1 日

EXECUTIVE SUMMARY

The intended audience for this Guide is the building Owner. The Guide defines an approach to creating and fulfilling Building Information Modeling (BIM) requirements for a typical project from the Owner’s standpoint.

Merely requiring BIM on a project does not equate to success if the Owner’s goals for the project are not clearly set and BIM requirements do not correlate to achieving those goals. BIM must be well planned and properly executed; not just BIM, but “BIM DONE RIGHT,” [1] aligning the right amount and types of resources to achieve the right results.

This Guide builds on the premise that BIM, in and of itself, is not the end but rather the means to a number of potentially valuable project delivery outcomes for the Owner. It offers a toolset addressing three broad areas the Owner should understand in order to direct the Project Team to BIM DONE RIGHT: process, infrastructure and standards, and execution.

The Process for using BIM effectively on a project begins with defining BIM requirements in the Owner's contracts with service providers (to plan, design, construct, and operate the building) and with other stakeholders based on the project delivery method (design-bid-build, design-build, IPD, etc.). Early on, a successful BIM process includes identifying the roles and responsibilities of key project stakeholders with respect to information modeling as well as creating a BIM Project Execution Plan (PxP), an outcome-driven BIM roadmap that details how the project will be completed. Process also includes managing the project for compliance with the PxP and contract requirements, including the project deliverables.

Infrastructure and standards acknowledges the high degree of human collaboration and software interoperability needed for successful project information modeling , particularly as the project moves from phase to phase. To achieve the necessary level of interactivity, the Owner must require all members of the Project BIM Team to adhere to a framework of standards and structures from the project’s onset.

Execution encompasses creating a Project Execution Plan (PxP), a master plan for how information modeling will be done and managed, at the inception of a project. The PxP documents the Owner’s and the Project BIM Team’s mutual agreement on how, by whom, when, why, to what level, and for what project outcomes (called “BIM Uses”) information modeling will be used.

While the Guide highlights the essential requirements for BIM, it also offers options for Owners who wish to go beyond minimum requirements. And finally, while the guide uses the term “building” generically, in keeping with the terminology of “Building Information Modeling,” it is intended to apply to information modeling for the built environment; i.e., site elements and facilities as well as buildings.

内容摘要

本指南的目标受众应为建筑物的所有者即业主。本指南从业主的角度指出应以什么方法设定并满足典型项目的建筑信息模型（BIM）要求。

如果业主对项目设立的目标并不清晰，也没有把对 BIM 的要求与实现这些目标结合起来，仅仅要求在项目中实施 BIM 并不等于会取得成功。对 BIM 必须有良好的规划和适当的实施；仅有 BIM 并不足够，而是要“正确实施 BIM”，[1] 即以恰当数量和类型的资源相配合，方可取得适当的结果。

本指南依据的前提是，BIM 本身并非目的，而是为业主提供手段，借以实现若干具有潜在价值的项目交付结果。它提供了一套处理三大类领域问题的工具，业主应了解这些问题以指导项目团队“正确实施 BIM”，它们是：流程，基础设施和标准，以及执行。

流程 在项目有效使用 BIM 之初，业主应根据项目的交付方法（设计 - 投标 - 建设、设计 - 建设、 项目综合交付等），在与服务提供商（规划、设计、施工和运营建筑物）及与利益相关人订立合同时确定对 BIM 的要求。成功的 BIM 流程在早期阶段包括识别项目的关键利益相关人在信息模型方面的角色和责任，以及制订项目的 BIM 实施方案（PxP），这是一个详细阐述项目将如何完成的结果驱动的 BIM 路线图。流程中还包括旨在符合 PxP 及合同要求的项目管理，包括项目的可交付成果。

基础设施和标准 认可项目信息模型的成功依赖于人们之间的高度合作及软件间的可互用性，尤其是项目从一个阶段进入另一个阶段时。为实现必要程度的互动，业主必须要求项目 BIM 团队的所有成员从项目自启动时就遵循一整套标准和业务方式。

执行 涵盖如何制订一个项目实施方案（PxP）， 它是对信息模型如何进行及如何管理的总体规划。项目执行计划记载了业主与项目 BIM 团队就如何利用模型所达成的一致，包括将如何、由谁、何时、为何、达到何种程度、以及为实现哪种项目结果进行使用（称为“使用 BIM”）达成共识。

本指南虽然突出了对 BIM 的基本要求，但也为希望超越最低要求的业主提供了选择。最后，尽管本指南在一般意义上使用“建筑”一词，以与“建筑信息模型”这个术语保持一致，除建筑物外，信息模型也适用于建成的环境（如现场元素、设施）。

1. INTRODUCTION

1.1 PURPOSE

The purpose of the National Building Information Modeling Guide for Owners (NBGO) is to outline for the building Owner how to develop and implement requirements for the application of Building Information Modeling (BIM) for internal policies and procedures, and explain how to include these requirements in contracts to plan, design, construct and operate buildings. This Guide uses the term "building" generically, in keeping with the terminology of "Building Information Modeling." It is intended to apply to information modeling for the built environment: site elements and facilities as well as buildings.

1.2 SCOPE

This Guide establishes recommendations for processes, standards, and deliverables for a BIM-enabled project that can be continually shared and agreed upon by the Owner and the rest of the Project BIM Team, which can include planners, constructors, facilities managers, and subcontractors, as well as designers.

1.3 USE

The recommendations in this Guide should be used by the Owner to create specific project requirements for BIM based on the project's unique and individual needs that can then be followed and implemented by the Project BIM Team to enhance facility value.

Many aspects of the building industry are discovering increased value in BIM. Owners, architects, engineers, contractors, subcontractors, and facility managers all have collective and individual interests for the project and their business continuity, respectively. BIM has the capacity to be used within each phase of a project – from conceptual, through final design, construction, and on to operations – with a variety of applications ranging from Clash Detection, Quantity Takeoff, Scheduling, FM operations, and many others. While each application or 'use' of BIM offers value in itself and any project participant engaging in these various 'uses' could state they are 'doing BIM'; the efforts won't likely yield optimal results without proper planning, coordination, and execution. It is the project team's activities in concert with the Owner's requirements that provide the greatest potential lifecycle value. This is "BIM Done Right" and helping Owners achieve this for their projects is the goal of this Guide.*

--Johnny Fortune
BIM/IT Director, Bullock Tice Associates

* Tice, John, Bullock Tice Associates BIM DONE RIGHT, a BIM-enabled, client-focused delivery approach and strategy (2015).
http://www.bulltice.com/

1. 引言

1.1 目的

《商业建筑业主 BIM 实践指南》（NBGO）的目的在于向业主总体介绍如何按建筑信息模型 (BIM) 的要求制订和实施内部政策和流程，并说明如何在建筑规划、设计、建造和运营合同中纳入这些要求。本指南在一般意义上使用“建筑”一词，以与“建筑信息模型”这个术语保持一致。除建筑物外，信息模型也适用于建成的环境，如现场元素和设施。

1.2 范围

本指南针对使用 BIM 的项目流程、标准和可交付成果提出了建议，这些建议可由业主和项目 BIM 团队的其他人员不断地进行分享并达成一致，他们可包括规划者、施工者、物业和分包商以及设计者。

1.3 用途

对于本指南中的建议，业主应根据项目独特且单独的需要，创建对 BIM 的特定要求，然后可由项目的 BIM 团队遵照实施，以此提高设施的价值。

建筑行业的许多方面都正在见证着 BIM 的飞速增长。业主、建筑师、工程师、承包商、分包商和设施经理对于项目和他们业务的连续性都有共同和各自的利益诉求。BIM 能用于项目的每个阶段，从概念设计一直到最终设计、施工再到运营——其应用范围广泛，涉及碰撞检查、工程估算、进度安排、FM 运营及其它许多应用。虽然 BIM 的每种应用或“用途”本身都提供价值，运用这些“用途”的任何项目参与者也都可以说他们“在做 BIM”，但若没有适当的规划、协调和执行，这些努力不太可能产生最优的结果。项目团队的活动要与业主的要求相协调，这样才能提供最大可能的全生命周期价值。这是“正确实施 BIM”，而帮助业主实现这一点是本指南的目标。*

——Johnny Fortune
Bullock Tice 公司 BIM/IT 主管

* Tice, John, Bullock Tice 公司：《“正确实施 BIM”——启用 BIM 的、以客户为中心的交付方法和战略》（2015 年）。
http://www.bulltice.com/

2. PROCESS

At the project’s inception, the Owner establishes the intent and general requirements for the building. Collectively, these are known as the Owner’s Project Requirements (OPR), and are defined by the National BIM Standard – United States® (NBIMS-US ™) Version 3[2] (V3) as the “Owner's written documentation of the functional requirements of the "facility" and the expectations of how it will be used and operated. They include project and design goals, budgets, limitations, schedules’. These requirements are transferred into the building’s “basis of design,” (BOD), used by the building’s design team to define the approach and parameters for designing the building to meet the Owner’s requirements. The data developed during design is then transferred by the design team into construction documents, which become the record of all the building’s physical elements. As each building element’s construction is completed, it is either accepted through traditional design team construction contract administration practices and/or commissioned by an independent Commissioning Authority that the final construction meets the OPR and that the functional performance of the element has been verified.

As the project moves from phase to phase, the information contained within the BIM grows in both quantity and specificity. The nature of BIM technology and the interoperability (ability to be exchanged and used) of the data contained within the BIM allow different Owners to use the BIM in multiple ways, depending on their specific needs. In addition to design and construction, BIM applications can include asset management, building automation and control, interdisciplinary coordination, scheduling, cost estimating, and integrated construction specifications.

Models generated during planning, design, construction, and operations continue to serve as information resources used to keep the building operating at optimal efficiency. When well planned and executed, the use of BIM may reduce the building life-cycle cost. Using BIM in concert with planning and team building, with its shared and continually updated information, also helps the team minimize conflicts, cuts down on repetition and duplication of tasks, and helps to optimize planning, design, construction, and operations.

The process for enabling BIM to be used effectively on a project should follow these steps:

1. Define minimum BIM requirements in the Owner's contracts with service providers (planning, design, construction, operations, etc.) and other stakeholders based on the project delivery method (design-bid-build, design-build, IPD, etc.).
2. Identify the roles and responsibilities of key project stakeholders with respect to information modeling.
3. Collaboratively create a BIM Project Execution Plan (PxP) with key project stakeholders.
4. Manage the project for compliance with the PxP and contract requirements, including Model and Data Deliverables, through periodic reviews.

Where the model(s) is to be used for design/documentation and then for construction, the BIM PxP should address model exchange procedures, i.e., how the model(s) can migrate between project phases effectively with minimum effort. First, the Project BIM Team members need to coordinate the BIM Uses they seek to leverage when they determine the model exchange procedures. For example, model coordination would require a

2. 流程

在项目伊始，业主确定针对建筑物的意图和总体要求。它们统称为“业主的项目要求”（OPR），在《BIM 国家标准——美国®》（NBIMS - US ™）第 3[2] 版（V3）中被定义为“业主对‘设施’的功能要求及对如何使用和运营预期书面文件”。它们包括项目及设计目标、预算、限制条件和进度。这些要求被调用至建筑物的“基础设计”（BOD），建筑物的设计团队用 OPR 设定建筑物设计的方法和参数，以满足业主的要求。设计过程中形成的数据随后由设计团队转移至施工文件，成为建筑物所有物理单元的记录。完成建筑物每个分部的施工后，它要么经过传统的设计团队按施工合同管理实践所接受，要么经独立的调试机构调试，以验证最终的施工符合 OPR 且该分部的功能性能满足要求。

随着项目从一个阶段进入另一个阶段，BIM 中所含的信息在数量和具体性方面均在增加。BIM 技术的性质及 BIM 中所含信息的互用性（能够交换使用）使得不同的业主能够依据各自的具体需要以多种方式使用 BIM。除设计和施工外，BIM 的应用还可包括资产管理、建筑自动化和控制、多部门协调、进度安排、成本估算及施工规范整合。

规划、设计、施工和运营阶段产生的模型继续起到信息资源的作用，用于使建筑物的运营保持最优效率。如果规划且实施得当，使用 BIM 技术可减少建筑物在全生命周期内的成本。如果在使用 BIM 时注重与规划和团队建设的协调，注重信息分享和持续更新，还会帮助团队尽可能减少冲突、减少重复性工作，并有助于实现规划、设计、施工和运营的最优化。

使 BIM 得到有效使用的流程应遵循以下这些步骤：

1. 基于项目的交付方法（设计 - 招标 - 施工、设计 - 施工、IPD 等），在业主与服务提供商（规划、设计、施工、运营等）及其它利益相关人之间的合同中明确 BIM 的最低要求。
2. 识别项目的关键利益相关人在信息模型方面的角色和责任。
3. 与项目的关键利益相关人一起创建 BIM 项目实施方案（PxP）。
4. 通过定期审核对项目进行管理，使其符合 PxP 及合同要求，包括模型和数据方面的可交付成果。

如果模型将被用于设计 / 文件编制和后期的施工，则 BIM 的 PxP 应包含模型互换流程，即怎样才能以最小的努力让模型从项目的一个阶段高效地移交至另一个阶段。在项目的 BIM 团队确定模型互换流程时，首先需要协调他们试图采用的各项 BIM 用途。例如，模型协调要求设计模型要有很高水平的几何准确性。一旦识别了 BIM 的用途，团队应决定由谁来开发哪个模型以及何时交换这些模型。BIM 的 PxP 应当用于系统化建立各种责任和模型要求。

high degree of geometric accuracy for the design model. Once BIM Uses are identified, the team should decide who is developing which models, and when these models are exchanged. The BIM PxP should be used to organize responsibilities and modeling requirements.

2.1 DEFINE BIM REQUIREMENTS

BIM requirements are defined by the Owner’s overall goals, business practices, and corporate culture and are shaped by the OPR. They are developed on a project-by-project basis, as the Project BIM Team selects BIM Uses to achieve these requirements. The Owner should provide any resources, such as feasibility studies and/or access to stakeholder interviews, for the BIM Project BIM Team to define Owner-related goals. Once the Owner’s project BIM goals are defined, the Project BIM Team should also ensure that these BIM goals can be met with current technology practices and required team competencies. The project BIM goals should lead to the choice of BIM Uses and additional BIM requirements.

2.1.1 BIM Uses and Requirements

The Owner should at a minimum require the five Essential BIM Uses described in Section 4.2.2: Existing Conditions, Design Authoring, Design Review, three-dimensional (3D) Coordination, and Record Modeling. Project conditions may justify other Enhanced BIM Uses, as described in Section 4.2.3, or Owner-Related Uses, as described in Section 4.2.4. The Project BIM Team should develop the recommended BIM Uses for the project by leveraging resources provided in the National BIM Standard– United States® (NBIMS-US ™) Version 3 (V3) along with other resources. NBIMS-US ™ , developed by the National Institute of Building Sciences buildingSMART alliance®, contains core consensus-approved standards regarding the exchange of information and standard practices for implementing BIM on a project.

Once BIM Uses are defined, the Level of Development (LOD) requirements should be determined. There are Default LOD, Template LOD, and Custom LOD (see Section 3.6.4). An Owner can adopt a Default LOD that references established LOD requirements, such as the United States Army Corps of Engineers (USACE) Minimum Modeling Matrix (M3).[3] The Owner also can use existing templates to develop LOD requirements, such as the American Institute of Architects (AIA) G-202 Building Information Modeling Protocol.[4] It also is possible for Owners to develop a custom LOD matrix for their organization, but if they do so, they should adhere to the LOD spec definitions. Any of these three forms of LOD specification provides a means for Owners to develop contract requirements for models and data requirements.

2.1.2 Project Delivery Method

The choice of project delivery method for the project affects the way in which the BIM is developed and how information is exchanged. A design-build (DB) project may only have one Project BIM Manager, while a design-bid-build (D-B-B) project should have one BIM Manager for design and another one for construction. Similarly, the Owner should understand that the project delivery method will affect the level of responsibility that the Owner assumes for information management and exchange between project phases.

2.1 设定 BIM 要求

BIM 需求由业主的总体目标、商业惯例和企业文化定义且由 OPR 发展成形。这些要求在各个项目的基础上制定，因为项目的 BIM 团队是选择 BIM 的相应用途来实现这些要求的。业主应提供诸如可行性研究和 / 或与利益相关人面谈的机会等资源，供 BIM 项目团队设定与业主相关的目标。一旦设定了业主对项目的 BIM 目标，项目的 BIM 团队应确保这些目标在现有的技术经验和所要求的团队能力条件下能够达到。项目的 BIM 目标应该以 BIM 用途以及额外的 BIM 需求选择为导向。

2.1.1 BIM 用途和要求

业主应至少要求第 4.2.2 部分所述的五个基本的 BIM 用途：现有条件、设计创作、设计审核、3D 协同和记录模型。项目条件可为第 4.2.3 部分所述的其它 BIM 强化用途或第 4.2.4 部分所述的与业主相关的用途提供理由。项目的BIM团队应利用《BIM国家标准——美国®》（NBIMS-US ™）第3版（V3）中提供的资源及其它资源为项目推荐 BIM 用途。NBIMS-US ™由美国国家建筑科学研究院的智能化建筑联盟 ® 编写，其中包含就实施项目 BIM 的信息交换和标准实践方面在核心共识基础上获得批准的标准。

一旦设定了 BIM 用途，即应确定开发标准（LOD）要求。有三种 LOD，它们是默认 LOD、模板 LOD 和定制 LOD（参见 3.6.4 部分）。业主可采用默认 LOD，它所参考的是既定的 LOD 要求，如美国陆军工程兵部队（USACE）的最低模型矩阵（M3）。[3] 业主也可采用现有模板来制定 LOD 要求，如美国建筑师学会（AIA）的《G-202 建筑信息模型协议》。[4] 业主还可为自己的组织开发定制 LOD 矩阵，但如果这样做，他们应遵循 LOD 规范定义。这三种形式的 LOD 规范均为业主提供了一种就模型和数据要求制定合同要求的手段。

2.1.2 项目交付方法

项目交付方法的选择将影响到 BIM 的开发方式及信息交换方式。设计 - 建设（DB）项目可仅有一位项目 BIM 经理，而设计 - 投标 - 建设（D-B-B）项目应有一名 BIM 经理负责设计及另一名负责施工。同样，业主应了解项目交付方法影响到自己对信息管理及项目各阶段间信息交换所承担责任的轻重。

For example, in D-B-B, the Owner may be responsible for information exchange between design stakeholders and construction stakeholders. The project contracts should define responsibilities for the design and construction contracting entities, and, therefore, the Level of Development (LOD) and division of responsibilities. Information exchange across contracting parties also should be clearly defined and closely managed.

2.1.3 Intellectual Property.

Project deliverables should be clearly and completely defined in the Owner/designer and Owner/contractor agreements, especially if the PxP is developed after contracts have been executed. The intellectual property rights of the Owner should be clearly defined and validated in the PxP. The Owner should, at a minimum, have the right to use the project data defined as project deliverables in the BIM PxP. Project data should include the:

- Model files (BIM, CAD)
- Drawing files (CAD, electronic sheets such as PDFs, and/or plot files)
- Electronic manuals
- Tabular/textual information derived from BIM (e.g., spreadsheets)
- Reference files necessary to supplement other project data

Publicly funded projects are subject to the governing authority’s acquisition requirements. Federally funded projects are governed per Federal Acquisition Regulation (FAR) Part 27, Patents, Data, and Copyrights.[5] Any exceptions to ownership rights should be clearly noted in the project contract(s), documented in the BIM PxP, and approved by the Project BIM Team. Ownership of project data is conveyed to the Owner at the time of project closeout. Owner reuse rights should be defined in the Owner/stakeholder contracts. The Project

Commentary:

When using this Guide to develop contracts between stakeholders regarding the use of BIM to plan, design, construct and operate buildings, the information herein should not be considered a substitute for legal, business, insurance or financial advice. Contracts may have important legal, business, insurance and financial consequences. Each stakeholder or party to a contract is strongly encouraged to seek the advice of attorneys, and business, insurance, and financial counselors and advisers, as each stakeholder deems appropriate, when drafting, reviewing, and negotiating all contracts and clauses including, but not limited to, all terms and conditions, contract and project management requirements, intellectual property rights, and the electronic storage and transfer of documents and data.

BIM Team should review this guide, the BIM PxP, and the project contract(s) to determine governing requirements and permissions and/or limitations for ownership, conveyance, and/or reuse of data. The project contract conditions and terms take precedence over this guide, and, as with all contract documents, it is advisable to seek the advice of legal counsel.

例如，在 D-B-B 中，业主可负责设计方与施工方之间的信息交换。项目合同就应规定设计和施工合同方的责任，从而规定开发规范（LOD）和责任分工。与此同时，还应对合同各参与间的信息交换做出清晰界定和严格管理。

2.1.3 知识产权

在业主与设计方之间及业主与承包商之间的协议中，应对项目的可交付成果做出清晰完整的规定，尤其是如果 PxP 是在合同签署之后制订的。业主的知识产权应在 PxP 中有明确规定，并具有法律效力。业主应至少有权使用 BIM PxP 中定义为项目可交付成果的项目数据。项目数据应包括：

- 模型文件（BIM、CAD）
- 图纸文件（CAD、PDF 之类的电子表格和 / 或打印文件）
- 电子手册
- 源自 BIM 的图表 / 文字信息（如电子表格）
- 对其它项目数据构成必要补充的参考文件

政府出资的项目应符合相关政府当局的采购要求。联邦政府出资的项目应受《联邦采购条例》（FAR）第 27 部分《专利、数据和版权》的管辖。[5] 所有权的任何例外情况应在项目合同中明确指出，在 BIM 的 PxP 中加以记录并经项目的 BIM 团队批准。项目数据的所有权在项目收尾时转移给业主。业主的再次使用权应在业主与利益相关人之间的合同中予以规定。

评论：

在使用本指南制订利益相关人之间有关如何使用 BIM 来规划、设计、建造及运营建筑物的合同时，本指南中的信息不应被视为取代法律、商业、保险或财务的建议。合同可能具有重大的法律、商业、保险和金融后果。在起草、审阅和商讨所有合同和条款时，包括但不限于所有的条款和条件、合同和项目管理要求、知识产权及文件和数据的电子存储和转让，根据每位利益相关人的适宜情况，强烈建议每位利益相关人或合同的每一方均寻求律师及商业、保险和金融顾问及咨询人员的建议。

项目的 BIM 团队应审阅本指南、BIM 的 PxP 及项目合同以确定数据的所有权、所有权的转让和 / 或再次使用权方面的管辖要求、许可和 / 或限制条件。项目合同的条件和条款优先于本指南，与所有合同文件一样，建议寻求律师意见。

2.1.4 Final Turnover Requirements

The Owner should consider the final deliverable requirements for project data. Owners should review their current information needs for operations and maintenance, and establish data requirements that support those needs. The Owner also should consider how BIM can support future facilities management and operations, and develop requirements that support future needs as well. At a minimum, major equipment should be described by facility attributes such as make, model, manufacturer, and serial number. Additional attributes include warranty information, parts lists, maintenance schedules, and manufacturer contact information.

2.2 TEAM ROLES AND RESPONSIBILITIES

2.2.1 Owner’ s BIM Representative(s)

Especially for larger and more complex projects, the Owner should designate an Owner’ s BIM Representative. The Owner’ s BIM Representative should have a clear understanding of BIM and the OPR. The Owner's BIM Representative should, at a minimum:

- Represent the Owner’ s requirements and be able to effectively communicate them to other stakeholders.
- Serve as the primary liaison between the Owner and the Project BIM Manager(s) for all BIM-related issues.
- Have oversight of BIM requirements in all project phases, from planning through the construction of the project, and at least the beginning of the operations phase.
- Receive, review, and approve BIM deliverables.

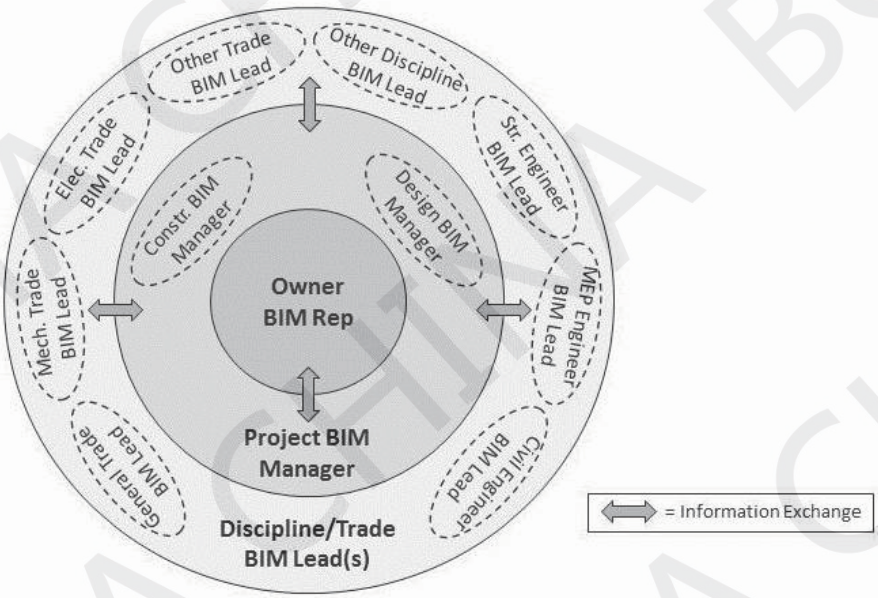


Figure 1. BIM Role and Responsibility Chart

2.1.4 最终交接要求

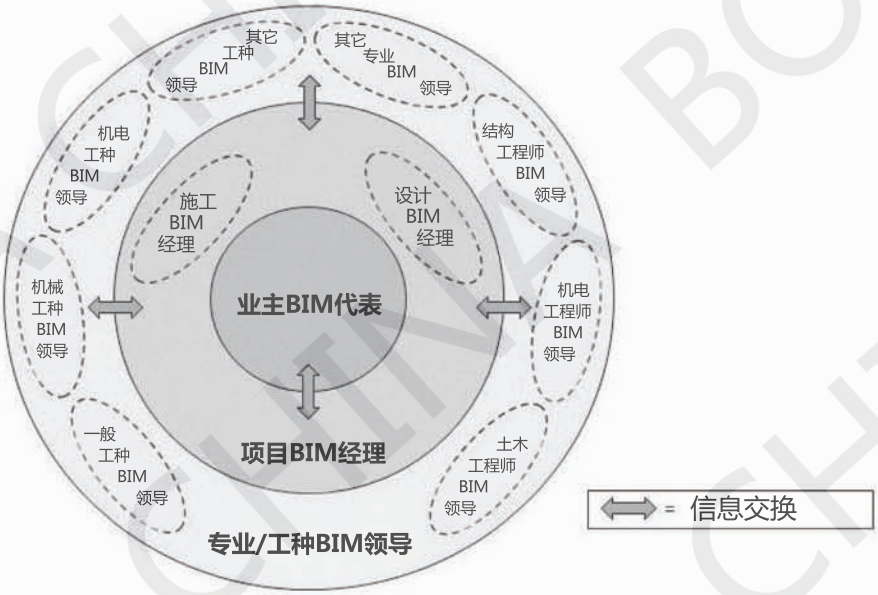
业主应考虑项目数据的最终交付要求。业主应审视自己对于运营和维护当前的信息需求，然后确定支持这些需求所要的数据要求。业主还应考虑 BIM 如何支持设施的未来管理和运营，然后制定支持未来需求的要求。至少主要设备应按诸如样式、型号、生产商和序列号这样的设施特性加以描述。额外的特性包括质保信息、部件清单、维护进度表及生产商联系信息。

2.2 团队的角色和职责

2.2.1 业主 BIM 代表

尤其针对大型的和较为复杂的项目，业主应指定一名业主 BIM 代表。业主 BIM 代表应对 BIM 和 OPR 有清楚了解。业主 BIM 代表应至少：

- 代表业主的要求并能够有效地将其传达给其它利益相关人。
- 担任业主与项目 BIM 经理之间主联络人，解决与 BIM 相关的所有问题。
- 有权监督 BIM 要求在项目的各个阶段中的落实情况，从项目的规划到施工，并至少要一直延续至运营阶段的开始。
- 接收、审核并批准 BIM 可交付成果。



图一 BIM 角色和职责图

2.2.2 Project BIM Manager Role

The project should have a designated Project BIM Manager. The Project BIM Manager role may be fulfilled by more than one person; for example, many projects have a lead design BIM Manager and a lead construction BIM Manager (see Figure 1). The Project BIM Manager should have sufficient BIM education and experience for the size and complexity of the project, as well as the relevant proficiency in the proposed BIM authoring and coordination software selected for use on the project. In the absence of an Owner’s BIM Representative, the Project BIM Manager should serve as the main point of contact with the Project BIM Team for all BIM-related issues.

During each phase of a project, the Project BIM Manager at a minimum should:

- Lead the process of creating and updating the BIM PxP in accordance with the OPR.
- Verify compliance of the PxP deliverables.
- Coordinate all updates for individual models, specialized models, and databases.
- Administer Project Quality Management and Data Security Management.
- Develop, coordinate, publish, and verify necessary configurations required for integration of project data.
- Facilitate distribution of project data.
- Compile project data for review and coordination.
- Facilitate design review.
- Meet with relevant project stakeholders for review of turnover documents.
- Deliver model(s) and Facility Data to Owner for use in operations.

2.2.3 Discipline/Trade BIM Leads

Each discipline/trade should assign an individual to the role of BIM lead for the duration of the project. These individuals should have the relevant BIM experience required by the complexity of the project. The discipline/trade BIM lead maintains a continuous interface with the Project BIM Manager.

The responsibilities of the discipline/trade BIM leads for their respective discipline/trade include:

- Act as the lead BIM contact for the discipline/trade.
- Develop and manage exchange of models.
- Maintain and manage integrity of the model.
- Assume additional roles and responsibilities as defined to support the PxP and other contractual requirements.

2.2.4 Collaboration

The Project BIM Team should not rely on information exchange as the sole means of project communication; information exchange is not collaboration. The Project BIM Team should schedule regular BIM coordination meetings during which team members meet to discuss design and construction issues, using the model as a shared resource. The frequency of such interactions depends on the project's goals, BIM Uses, and Project BIM Team members’ capabilities.

2.2.2 项目 BIM 经理的角色

项目应指定人员担任项目 BIM 经理。项目 BIM 经理角色可由多人担任；例如许多项目都有领导设计 BIM 经理和领导施工 BIM 经理（见图一）。项目 BIM 经理应接受过足够的 BIM 教育且对项目的规模和复杂程度有足够经验，同时应熟练掌握拟用于项目的 BIM 建模和协同软件。如没有业主 BIM 代表，则项目 BIM 经理应担任项目 BIM 团队所有与 BIM 相关问题方面的主联络人。

在项目的每个阶段，项目 BIM 经理应至少：

- 依据 OPR 领导创建和更新 BIM 的 PxP 流程。
- 验证 PxP 可交付成果是否符合要求。
- 协调单个模型、专业模型和数据库的所有更新。
- 实施项目质量管理和数据安全管理。
- 制定、协调、发布及验证项目数据整合所需的所有配置。
- 促成项目数据的分发。
- 汇总项目数据供审核和协调之用。
- 促成对设计的审核工作。
- 与相关的项目利益相关人会见面，对交接文件进行审核。
- 向业主交付模型和设施数据，供运营使用。

2.2.3 专业 / 工种 BIM 领导

每个专业 / 工种应指定一人在项目期间担任 BIM 领导的角色。这些人应有与项目的复杂程度相匹配的相关 BIM 经验。专业 / 工种 BIM 领导须与项目 BIM 经理持续互动。

专业 / 工种 BIM 领导对各自专业 / 工种的职责包括：

- 担任本专业 / 工种的主 BIM 联系人。
- 开发及管理模型的互换。
- 维护并管理模型的完整性。
- 按规定承担其它的任务和职责，以支持 PxP 及合同的其它要求。

2.2.4 协作

项目 BIM 团队不应依赖于信息互换为项目沟通的唯一方式；信息互换不是协作。项目 BIM 团队应定期举行 BIM 协作会议，在此期间团队成员见面讨论设计和施工问题，使用模型作为共享资源。此等互动的频率取决于项目的目标、BIM 的用途及项目 BIM 团队成员的能力。

Through the BIM project planning process, the Project BIM Team should agree on how and in what ways the Project BIM Team members will collaborate using the BIM. All project stakeholders involved with modeling should develop and agree to a project-specific BIM PxP. This plan should include the requirements for information exchange among the parties, as well as for expected interactions with the model.

2.3 BIM PROJECT EXECUTION PLANNING

The BIM Project Execution Plan (PxP) is the central document for BIM implementation. This plan should be authored by the Project BIM Team collectively, and onboarding processes should be developed for Project BIM Team members who join the project after the initial plan has been developed. The steps of BIM PxP include:

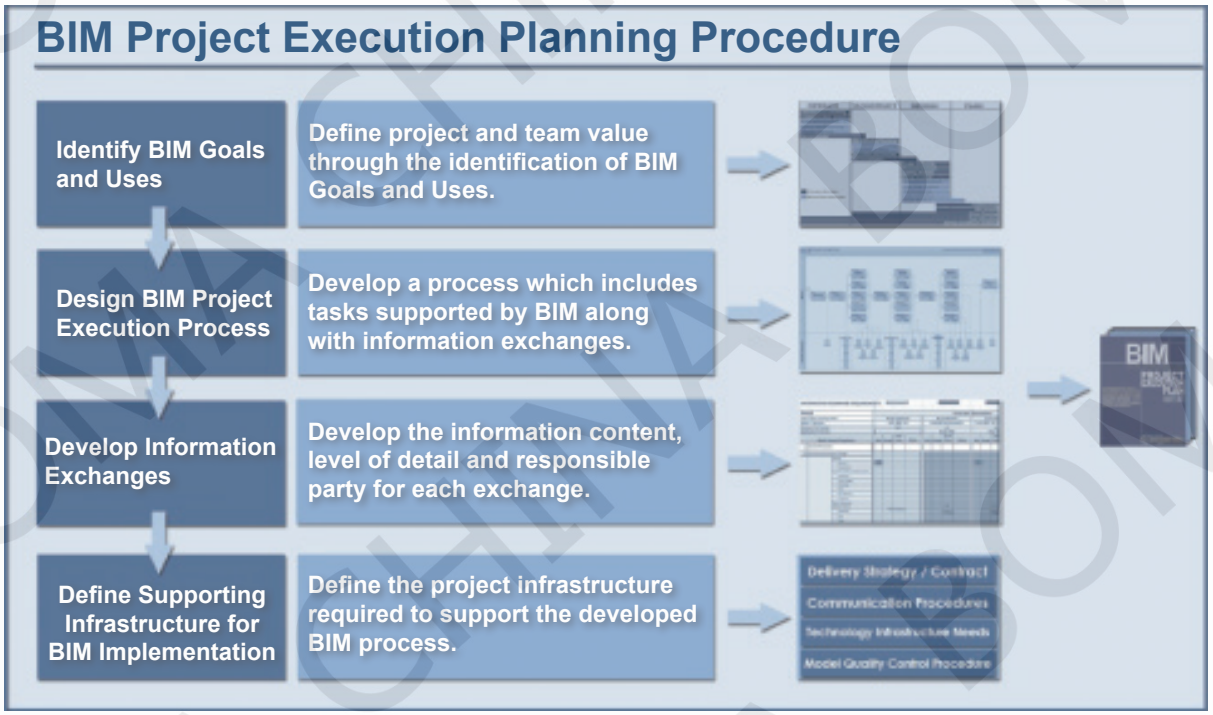


Figure 2. BIM Project Execution Planning Procedure[6]

The BIM PxP should contain all content necessary to document the process of implementing BIM on a project. Specific BIM PxP content requirements can be found in Section 4.1 of this document. Specifically, the team should develop plans and protocols to meet the OPR, including, as a minimum, file sharing and data security.

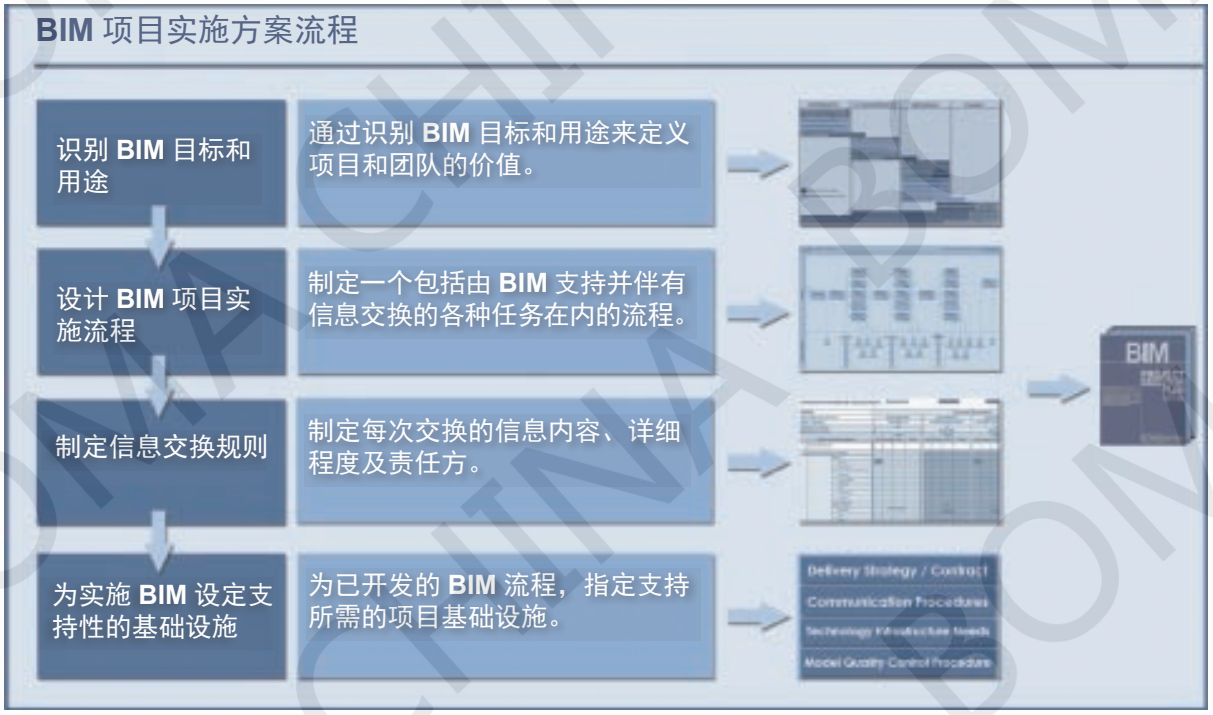
2.3.1 File Sharing Requirements

The file sharing requirements will vary depending on the project’s BIM Uses. At a minimum, the PxP should include a description of the:

通过BIM项目规划过程，BIM项目团队应就BIM团队成员如何及以何种方式协同使用BIM达成一致。涉及模型的所有项目利益相关人均应制定项目特定的BIM PxP并就其达成一致。此方案应包括各方之间交换信息的要求，以及拟进行的与模型之间的互动。

2.3 BIM 项目实施方案

BIM项目实施方案（PxP）是实施BIM的核心文件。此方案应由项目BIM团队集体撰写，对于在初始方案已经制定后加入项目的项目BIM团队成员，应为他们制定相应的培训流程。BIM的PxP步骤包括：



图二 BIM 项目实施方案流程 [6]

BIM的PxP应包含记录项目中BIM实施流程必要的所有内容。具体的BIM PxP的内容要求可在本文件的第4.1部分找到。具体而言，项目团队应制定计划和协议以符合OPR，其中至少包括文件共享和数据安全。

2.3.1 文件共享要求

文件共享要求随项目的BIM用途的不同而不同。PxP至少应包括对以下事项的描述：

- File system(s) the team will use to exchange, merge, and visualize models
- Schedule for or frequency of model updates and clash detection checks
- Tools and process to be used for clash detection checking
- Process to be used to generate drawings from coordinated models

2.3.2 Data Security

Owners should apply their existing data security standards to BIM protocols. The Owner should consider the security risks in terms of the protection of data. The Owner may wish to consider including data restrictions procedures, such as check-out and check-in, as well as stipulating the degree of access control for project participants. The Owner should require the Project BIM Team to complete a Data Security Protocol that complies with data security requirements as defined below.

2.3.2.1 Data Security Protocol (DSP). As part of the PxP, the Project BIM Team should develop and submit a Data Security Protocol (DSP) to the Owner that outlines security protocols to be implemented for the project. The DSP should be approved by the Owner prior to commencing work. At a minimum, the DSP should address:

- User access rights and permissions, outlining the various roles and degrees of access to the data. Roles should correlate to those defined in this guide and the BIM PxP. The DSP also should identify any additional user access required.
- Data protection, documenting how the data will be protected from:
  - Accidental loss
  - File Corruption (malware, viruses)
  - Misuse/negligence
  - Unauthorized conveyance
  - Deliberate attack (internal or external)
- Data process and handling protocol procedures for:
  - Exchange: How and with what frequency data will be exchanged. The DSP should align with other requirements in the BIM PxP and provide more detail specific to data exchange.
  - Maintenance: Describe the maintenance plan for all data sources, transmission devices, and storage devices used for the project.
  - Backup: Describe in detail the backup scheme implemented by the Project BIM Team, including frequency and retention of backups.
  - Archiving: Describe the storage, retrieval, and retention system to be used by the Project BIM Team.

2.4 MANAGING PROJECT REQUIREMENTS AND DELIVERABLES

2.4.1 Quality Planning

The entire Project BIM Team is responsible for quality control. However, the team should specify roles and responsibilities for model management and quality management for the project. The BIM PxP includes the management strategies for implementing BIM Uses and requirements. Quality management processes should be used to ensure BIM is created for downstream uses of the model data.

- 团队用于交流、合并模型并用于创建可视化模型的文件系统
- 模型更新和碰撞检查的进度或频率
- 用于碰撞检查的工具和流程
- 用于从各协同模型中生成图纸的流程

2.3.2 数据安全

业主应对 BIM 议定书使用其现有的数据安全标准。业主应考虑数据保护方面的安全风险。业主可能希望考虑纳入数据限制流程，如登录和退出，以及规定项目参与者的访问权限。业主应要求项目 BIM 团队完成符合以下数据安全要求的《数据安全议定书》。

2.3.2.1《数据安全议定书》（DSP）。作为 PxP 的一部分，项目 BIM 团队应制定《数据安全议定书》（DSP）并提交业主，书中应大致介绍项目即将实施的安全议定书。在开始工作前，DSP 应获得业主批准。DSP 应至少规定以下事项：

- 用户的访问权和许可，阐释各个角色接触数据的程度。各职责应与本指南及 BIM 的 PxP 中规定的职责相关联。DSP 还应识别规定的任何其他用户访问权限。
- 记录如何保护数据防止以下情况的数据保护措施：
  - 意外丧失数据
  - 文件遭到破坏（因恶意软件、病毒）
  - 误用 / 发生过失错误
  - 未经授权的转发
  - 遭受故意的攻击（来自内部或外部）
- 适用于以下方面的数据加工和处理议定书流程：
  - 交换：如何及以何种频率交换数据。DSP 应结合 BIM 的 PxP 中的其它要求，对数据交换规定更为具体的要求。
  - 维护：描述用于项目的所有数据源、传输设施和存储设施的维护计划。
  - 备份：详细描述项目 BIM 团队所实施的备份方案，包括备份的频率和留档时间。
  - 存档：描述项目 BIM 团队将采用的存储、调用和留档系统。

2.4 管理项目要求和可交付成果

2.4.1 质量规划

整个项目 BIM 团队均应对质量控制负责。不过，团队应为项目的模型管理和质量管理规定具体的角色和职责。BIM 的 PxP 应包括实施 BIM 用途和要求的管理战略，而质量管理流程需确保创建的 BIM 模型数据可供下游使用。

The quality standards for the modeling activities should be discussed in detail at the early stages of the project. The following items should be developed by the Project BIM Team prior to the start of the modeling activities:

- A clearly defined Quality Assurance (QA) and Quality Control (QC) section within the BIM PxP
- A detailed QA approach for monitoring the modeling process
- A detailed QC approach to test the final deliverables for compliance with the quality standards

Each QA and QC activity should identify a Project BIM Team member specifically responsible for performing the task. The QA and QC approaches may also be incorporated into project contracts to ensure compliance.

2.4.2 Quality Assurance

Quality assurance procedures should be defined to ensure that the Project BIM Team members are performing the modeling process defined within the BIM PxP. The QA activities should also be consistent with the contract. Minimum QA activities should include:

- Definition and validation of testing or prototyping process to verify the model meets the minimum modeling requirements
- Validation of resource availability and capabilities to perform modeling activities
- Review of the information exchange definitions to assure that the deliverables are clearly defined and unambiguous

Additional QA activities may include:

- Periodic reviews of the modeling procedures to ensure that the activities being performed are consistent with the initial plan
- Documentation of the final modeling process for future reference by Project BIM Team members

2.4.3 Quality Control

Quality control tests should be defined to verify that the project deliverables comply with the project requirements. The Project BIM Manager should verify that all required deliverables are submitted and appropriately distributed as defined within the BIM PxP and any additional contractual agreements.

The following QC activities should be performed on all project data delivered to the Owner:

- Verification of the file or data exchange metadata as defined within the BIM PxP to include (as appropriate for the data exchange types):
    - Date of submission
    - File type (if file)
    - File name (if file)
    - Database access instructions (if there is database content)
    - General description of content

应在项目的早期阶段对建模活动的质量标准进行详细讨论。在建模活动开始前项目 BIM 团队应制定以下事项：

- BIM 的 PxP 中定义明晰的质保（QA）和质控（QC）条款
- 对建模过程进行监督的详细的 QA 方法
- 一个详细的 QC 方法，可对最终可交付成果是否符合质量标准进行检验

每项 QA 和 QC 活动均应指出具体负责履行此项任务的项目 BIM 团队成员。也可在项目合同中纳入 QA 和 QC 的方法，以确保符合要求。

2.4.2 质保

应对质保流程做出规定，以确保项目 BIM 团队成员依照 BIM 的 PxP 中的规定开展建模过程。QA 活动还应与合同一致。QA 活动至少应包括：

- 规定和验证测试或样板流程，以确认模型符合最低的建模要求
- 验证资源的可用性和能力，以开展建模活动
- 审核信息交流的定义，以保证可交付成果有清晰的定义而非含糊不清

额外的 QA 活动可包括：

- 定期审核建模流程，以确保所开展的活动与初始方案一致
- 记录最终的建模过程，供项目 BIM 团队成员将来参考

2.4.3 质控

应对质控检验加以规定，以验证项目可交付成果是否符合项目要求。项目 BIM 经理应验证所有要求提交的可交付成果均已按照 BIM 的 PxP 及任何额外的合同协议中的规定提交且已适当下发。

应对交付业主的所有项目数据开展以下 QC 活动：

- 验证 BIM 的 PxP 中规定的文档或数据交换的元数据是否包括（如适用于数据交换的类型）：
  - 提交日期
  - 文档类型（如为文档）
  - 文档名称（如为文档）
  - 数据库登录指令（如有数据库内容）
  - 内容的概要描述

    - Data schema (organization) of the file, including version, date created, and date modified by buildingSMART International (as appropriate)
    - Description of the data exchange standard (if an open standard)
- Validation of the proper file type, naming convention, and appropriate software version
- Validation of final submitted model files (content) against the information exchange standard:
    - Manual validation of a specified sample of elements to verify that the information is properly structured and accurate. The sample size may vary based upon the level of criticality of the information element. The sampling procedure should be defined within the BIM PxP
    - Visual model inspection to review general model content
    - Inspection of the coordinate system to ensure that all model files have a common coordinate system
- Validation that model clashes have been resolved per the owners predefined minimum requirements and the criteria established within the BIM PxP.

The tests should be performed within an agreed-upon time before or after project milestones, as specified by the contract.

Additional QC activities may include:

- **Checks:** All Project BIM Team members should check the modeling content that they receive from other team members or the Owner to verify that the exchanges contain valid field entries and the proper information elements. Project BIM Team members should report any unusual information content.
- **Project Data Submission Log:** The Project BIM Team should develop and use a Project Data Submission Log, which includes model/modeling compliance issues and corrective actions. The Project BIM Manager should review the Project Data Submission Log, participate in collaborative team resolution, and provide direction when needed.

- 文档的数据安排（组织），包括版本、创建日期、及经由国际智能化建造软件修订（如适用）的日期
- 对数据交换标准的描述（若为公开的标准）

- 对适当的文档类型、命名公约及软件版本的验证
- 对照信息交换标准对最终提交的模型文档（内容）的验证：
  - 手动确认特定的元素样本，以验证信息结构适当且内容准确样本大小可依信息元素的重要性程度而变。取样流程应在 BIM 的 PxP 中加以规定
  - 对模型进行目测检查，以审核模型的总体内容
  - 检查坐标系，以确保所有的模型文档均有共同的坐标系
- 确认模型冲突已依据业主事先规定的最低要求及 BIM 的 PxP 中确定的标准予以解决。

应按合同的规定在事先约定的项目里程碑之前或之后的时间内进行检验。

额外的 QC 活动可包括：

- **检查**：项目 BIM 团队的所有成员均应检查自己从团队其他成员或业主那里拿到的建模内容，以验证交换包含有效的输入域值及适当的信息元素。项目 BIM 团队成员应汇报任何异常的信息内容。
- **项目数据提交台账**：项目 BIM 团队应编写并使用项目数据提交台账，其中包括模型 / 建模的合规性问题及纠正措施。项目 BIM 经理应审核项目数据提交台账，如有需要，应参与团队协作解决问题并提供指导。

3. INFRASTRUCTURE AND STANDARDS

3.1 TECHNOLOGY INFRASTRUCTURE

For the purposes of this Guide, *infrastructure* is defined as the entire technology system used for a BIM project. It broadly encompasses BIM as the digital representation of the physical and functional characteristics of the built environment. The use of the term *platform* in this section applies to all project-relevant computing platforms (hardware and software), including but not limited to computers, servers, network devices, backup systems, and file-sharing systems, be they resident on a local network or web/cloud based. Computing platforms are part of an Owner’s and other project stakeholders’ technology infrastructure, along with networks and physical workspaces.

Computing platform generally and broadly applies to the computer hardware and operating systems (OS) on which computer programs or software are designed to run. The Owner should consider current hardware and OS, and software-specific application capabilities that exist within his/her own organization and the organization of other project stakeholders—as well as future hardware and OS capabilities that are preferred or can be anticipated. Infrastructure requirements should be considered for all project phases, from planning concept through what will be available during the facility management and operations phase of the project. For each project phase, the Owner should consider how information is created, stored, exchanged, secured, backed up or archived, and delivered, and whether each should be localized, cloud- or web-based, or a hybrid.

The Owner should require that any BIM-related work products be:

- Compatible with the Owner's computer platform requirements
- Capable of supporting current and legacy file formats
- Agnostic (i.e., designed to be compatible across most common OS, hardware or software systems), adaptable, and scalable with respect to potential future computing
- Able to support open, consensus standards to maximize future compatibility

Additionally, the Owner should consider requiring the Project BIM Team to use specific technology infrastructure to support the Owner’s overarching business and project goals.

All technology infrastructure used for a project should be documented in the BIM PxP.

3.2 STANDARDS

3.2.1 Categories of Standards

The Owner should consider three broad categories of BIM standards: Organizational (internal) Standards, Primary Standards, and Reference Standards. Organizational Standards and Primary Standards for BIM (or appropriate portions of them) should be cited in the Owner's contract language with other stakeholders as the minimum acceptable standards when BIM is used and BIM deliverables are required. Merely citing the standard by name in a contract will not ensure that any use of BIM on a project or BIM deliverable required will meet an Owner's current and future needs.

3. 基础设施与标准

3.1 技术基础设施

就本指南而言，基础设施的定义是用于 BIM 项目的完整技术体系。它广泛地围绕 BIM 对建成环境的实物和功能特点进行数字化再现。本部分中“平台”一词用于与项目相关的所有平台（软硬件），包括但不限于计算机、服务器、网络设备、备份系统及文档分享系统，无论它们身处本地网络还是基于互联网 / 云端。计算平台与网络及实际的计算空间一起构成业主及项目其他利益相关人的技术基础设施的一部分。

计算平台普遍广泛地应用于计算机硬件和操作系统（OS），计算机程序或软件在这一平台上设计及运行。业主应考虑目前的硬件和 OS，以及自己和项目其他利益相关人各自的组织中现有的软件特定的应用能力，还有最好选用或可以拟选用的将来的硬件和 OS 能力。应就所有的项目阶段考虑基础设施的要求，从规划概念一直到有哪些基础设施要求可以用于项目的设施管理和运营阶段。对于项目的每个阶段，业主应考虑信息如何创建、存储、交换、保障安全、备份或存档及交付，以及是否应分别存放在本地、云端或互联网中，或者混合存放。

业主应就与 BIM 相关的任何工作成果做如下要求：

- 与业主的计算机平台的要求兼容
- 能够支持目前及以后的文档格式
- 在潜在未来的计算方面具备兼容性（即其设计能够兼容大多数常见的 OS、硬件或软件系统）、适应性和可扩展性
- 能够支持开源、共识标准，以最大化未来的兼容性

此外，业主应考虑要求项目 BIM 团队使用特定的技术基础设施，以支持业主首要的业务和项目目标。用于项目的所有技术基础设施都应记录在 BIM 的 PxP 中。

3.2 用途

3.2.1 标准的类别

业主应考虑三大类别的 BIM 标准：组织（内部的）标准、基本标准和参考标准。在使用 BIM 且要求提供 BIM 可交付成果时，BIM 的组织标准和基本标准（或其适用部分）应作为最低可接受的标准引用到业主与其他利益相关人的合同文本中。仅在合同中引用标准名称将无法确保项目使用 BIM 或要求提供的 BIM 可交付成果满足业主目前及将来的需要。

Commentary:
Standards, as used in this guideline, are documents created to establish minimum levels of quality or achievement that are acceptable. Mandatory standards are those that have been formally adopted by a code agency or government entity (authority) such as municipalities, state or federal agencies, or departments. Voluntary standards are those non-mandatory standards used by Owners and other organizations and industries to set minimally acceptable standards of quality and achievement.

BIM is not a mandatory requirement in the United States. However, numerous countries around the world are beginning to write BIM requirements into their local and federal codes and statutes.

This section addresses the standards that Owners should reference when requiring BIM. These requirements include, but are not limited to, the Owner's internal policies, procedures, and requirements (Organizational Standards), as well as Primary and Referenced Standards. The Owner should include these standards in the OPR.

3.2.2 Standards in this Guide

The following standards should be used when applying this guide. Where the Owner already has Organizational Standards and OPRs or other agency-specific requirements that reference these standards or modify them, those standards should be used in conjunction with the guidance provided here. For dated references, only the edition cited applies. For undated references, the latest edition (including any amendments) applies.

The National BIM Standard– United States® (NBIMS-US ™) Version 3 (V3), developed by the National Institute of Building Sciences buildingSMART alliance®, contains core consensus-approved standards regarding the exchange of information and standard practices for implementing BIM on a project. In addition to NBIMS-US ™ V3, the buildingSMART International has developed multiple open information exchange standards. All information exchanges that require an open, standard format should comply with the information exchange standards approved within NBIMS-US ™ V3 or approved by buildingSMART International. The current approved information exchange standards include:

- Construction to Operations Building information exchange (COBie) (NBIMS-US ™ V3)
- Design to Spatial Program Validation (SPV) (NBIMS-US ™ V3)
- Design to Quantity Takeoff for Cost Estimating (NBIMS-US ™ V3)
- Design to Building Energy Analysis (BEA) (NBIMS-US® V3)
- Building Programming information exchange (BPie) (NBIMS-US ™ V3)
- Electrical System information exchange (Sparkie) (NBIMS-US ™ V3)
- Heating, Ventilation and Air Conditioning information exchange (HVACie) (NBIMS-US ™ V3)
- Water System information exchange (WSie) (NBIMS-US ™ V3)
- IFC 2x3 Coordination View (NBIMS-US ™ V3) (http://www.buildingsmarttech.org/downloads/view-definitions/coordination-view/subschema/CoordinationView_V20_EntityList_IFC2x3_Version16_Final.pdf)

These standards are available at no cost on the NBIM-US ™ V3 website, https://www.nationalbimstandard.org [login required]

评论：
本指南中所使用的标准系为旨在确定最低可接受程度的质量或成果的各种文件。强制标准系已为市级、州级或联邦机构或部门这样的立法机构或政府机关（当局）所正式采用的标准。自愿标准系由业主及其它组织和行业用于规定最低可接受程度的质量和成果标准的非强制性标准。

BIM 在美国不是强制要求。不过，世界各地的许多国家均已开始在其地方或国家法律中写入 BIM 的要求。

本章节讨论业主在需要 BIM 时可参考的标准。这些要求包括但不限于业主的内部政策、流程和要求（组织标准），以及基本标准和参考标准。业主应将这些标准纳入 OPR。

3.2.2 本指南中的标准

在应用本指南时应使用以下标准：如业主已有组织标准及对它们做出参考或修订的 OPR 或其它机构特有要求，则这些标准应结合本指南要求一起使用。对于注明日期的引用标准，仅适用该日期版本。对于没有注明日期的引用标准，适用最新的版本（包括任何修正版本）。

《BIM 国家标准——美国》®（NBIMS-US ™）第 3 版（V3）由美国建筑科学学会的智能化建筑联盟® 编写，其中包含就实施项目 BIM 的信息交换和标准实践方面在核心共识基础上获得批准的标准。除 NBIMS-US ™ V3 外，智能化建造国际机构也制定了多个开源信息交换标准。要求有开源、标准格式的所有信息交换均应遵守 NBIMS-US ™ V3 中批准的或智能化建造国际机构所批准的信息交换标准。目前已获批准的信息交换标准包括：

- 《施工到运营：建筑信息交换》(COBie) (NBIMS-US ™ V3)
- 《设计到空间项目确认》(SPV) (NBIMS-US ™ V3)
- 《设计到工程成本估算》(NBIMS-US ™ V3)
- 《设计到建筑能源分析》(BEA) (NBIMS-US® V3)
- 《建筑编程信息交换》 (BPie) (NBIMS-US ™ V3)
- 《电气系统信息交换》 (Sparkie) (NBIMS-US ™ V3)
- 《供热、通风及空调信息交换》(HVACie) (NBIMS-US ™ V3)
- 《水系统信息交换》(WSie) (NBIMS-US ™ V3)
- 《IFC 2x3 协调观点》NBIMS-US ™ V3)(http://www.buildingsmarttech.org/downloads/view-definitions/coordination-view/subschema/CoordinationView_V20_EntityList_IFC2x3_Version16_Final.pdf)

这些标准可在 NBIM-US ™ V3 网站上免费获取： https://www.nationalbimstandard.org [需要登录]

Approved by buildingSMART International but not yet included in NBIMS-US ™ V3 are:

- IFC4 Reference View (buildingSMART International) www.buildingsmart-tech.org/specifications/ifc-view-definition/ifc4-reference-view[7]
- IFC4 Design Transfer View (buildingSMART International) http://www.buildingsmart-tech.org/specifications/ifc-view-definition/ifc4-design-transferview[8]

The NBIMS-US ™ V3 also outlines a standard procedure for the development and documentation of a BIM PxP. (See NBIMS-US ™ V3, Section 5.3: BIM Project Execution Planning Guide.) The Project BIM Team should follow this standard planning approach and document format.

NBIMS-US ™ V3 also outlines by reference common information classifications defined within the OmniClass tables. When applicable, these information classification tables should be used to maintain standard information terminology and classifications.

In addition to NBIMS-US ™ -V3, there are other important standards that should be considered, including ISO 16739:2013,[9] which outlines the data schema for the Industry Foundation Classes, an open data schema for storing information regarding a building project. The United States National CAD Standard® (NCS) Version 6 (V6) should also be used to ensure that the final design documentation complies with standards.

These standards sometimes can cover similar subject areas. While areas of overlap or conflict should be identified in the BIM PxP, it is possible for inconsistencies between the documents to come to light during the project. In these instances, the Project BIM Manager should be notified immediately. In response, the Project BIM Manager should determine, in consultation with the Owner and other stakeholders, which document will take precedence or whether amendments are required.

Where an OPR is unique and its Organization Standards differ or are more stringent than the minimum requirements established by referencing the NBIMS-US ™ , the NBIMS-US ™ and its referenced standards should be formally extended, modified, and supplemented by clear and specific language in the Owner's contracts with other stakeholders.

3.2.3 Open Standards Format for Supporting Information

To ensure the life-cycle use of building information, information supporting common industry deliverables should be provided in open standards, along with their native file formats where applicable. The formats used should be specified in the BIM PxP and should include the following standards as appropriate:

- Industry Foundation Class (IFC), Model View Definition (MVD) formats. Three most commonly used model views are: Coordination View, COBie, and GSA Design to Spatial Program Validation[10].
- Additional open standard formats, such as gbXML[11].

获得智能化建造国际机构批准但尚未纳入 NBIMS-US ™ V3 的标准有：

- 《IFC4 参考观点》（智能化建造国际机构）
  www.buildingsmart-tech.org/specifications/ifc-view-definition/ifc4-reference-view[7]
- 《IFC4 设计转让观点》（智能化建造国际机构）
  http://www.buildingsmart-tech.org/specifications/ifc-view-definition/ifc4-design-transferview[8]

NBIMS-US ™ V3 还阐述了制定和记录 BIM 的 PxP 的标准流程。（参见 NBIMS-US ™ V3 第 5.3 部分：BIM 项目实施规划指南。）项目 BIM 团队应遵循此标准的规划方法和文件格式。

NBIMS-US ™ V3 还通过引用阐述了 OmniClass 表中所定义的常见信息分类。在适用情况下，这些信息分类表应用于保持标准信息术语和分类。

除 NBIMS-US ™ -V3 外，还有应当考虑的其它重要标准，包括 ISO 16739:2013，[9] 其阐述了用于行业基准分类的数据方案，此分类系建筑项目方面存储信息的开源信息方案。还应采用《美国国家 CAD 标准》®（NCS）第 6 版（V6）以确保最终的设计文件符合标准。

这些标准有时涉及类似的领域。虽然应在 BIM 的 PxP 中识别重叠或冲突的领域，但有可能只有在项目进行过程中才能发现这些文件中存在不一致。这时应立即通知项目 BIM 经理。项目 BIM 经理此时应与业主及其他利益相关人协商后决定应以哪份文件优先，或者是否需要做出修正。

如果 OPR 是独一无二的，并且其组织标准不同于通过引用 NBIMS-US ™而确定的最低要求或比这些要求更为严格，则应在业主与其他利益相关人之间的合同中以明确具体的描述对 NBIMS-US ™及其引用的标准做出正式扩展、修订及补充。

3.2.3 辅助信息的开源标准格式

为确保建筑信息在全生命周期内的使用，应以开源标准提供支持常见行业可交付成果的信息，如适用，应与其原本的文件格式一起提供。使用的格式应在 BIM 的 PxP 中加以规定，如适用，还应包括以下标准：

- 《行业基准分类》（IFC），“模型视图定义”（MVD）格式。三种常用的模型实图为：协调视图、COBie 及 GSA 设计到空间项目确认 [10]。
- 额外的开源标准格式，如 gbXML[11]。

For those contract deliverables whose open standard formats have not yet been finalized, the deliverable should be provided in a mutually agreed upon format that allows the reuse of building information outside the context of the proprietary BIM software.

3.3 SPACE AND GRAPHICAL STANDARDS

Commentary:
This section identifies standards and requirements for graphical output and/or paper printing.

3.3.1 Owner-Specified Guidelines and Standards

The Owner should specify any additional guidelines and standards for drawings and spaces. Rooms and spaces should adhere to the format as defined therein.[12]

3.3.2 Drawing

The United States National CAD Standard® (NCS) should be incorporated by reference. Graphical output from BIM should comply with the NCS per the clarifications outlined in its BIM Implementation Section. Sheet sets should be organized and numbered per the NCS. All annotation symbol requirements therein should be adhered to.

3.3.3 Sheet Layout

In addition to the sheet layout requirements in the NCS, all sheets should maintain a consistent size and orientation throughout the set. Title block borders should maintain the same positioning on each sheet to allow for overlay and appropriate printing of the extents of the sheet.

3.3.4 Areas/Rooms/Spaces

Identifying tags and schedules for areas, rooms, and spaces should comply with the NCS.

3.3.5 Digital Documentation and Archiving

Copies of all approved submittals and other documents normally provided in traditional paper-based formats should be provided Portable Document Format (PDF) format, or other open electronic document format. Documents authored directly by the Project BIM Team should be transformed to PDF to allow searching of the documents and selection of text within the document. Documents authored by others, but used by the Project BIM Team (such as manufacturer product data sheets), should be provided as PDFs made available by the manufacturer. If not available as PDFs from their authors, the documents should be scanned to create PDF documents. PDFs should comply with the following ISO Standards:

- ISO 19005-3 (2012): Document management—Electronic document file format for long-term preservation—Part 3: Use of ISO 32000-1 with support for embedded files (PDF/A-3).[13]
- ISO 32000-1 (2008): Document management—Portable document format—Part 1: PDF 1.7.[14]

对于其开源标准格式尚未最终确定的合同可交付成果而言，可交付成果应以彼此同意的格式提供，其允许在产权性的 BIM 软件背景之外重复使用建筑信息。

3.3 空间和图形标准

评论：
本部分识别针对图形和 / 或纸质打印的标准和要求。

3.3.1 业主专有的指导原则和标准

业主应对图纸输出和空间规定任何额外的指导原则和标准。房间和空间应遵循其中所规定的格式。[12]

3.3.2 图纸

应通过引用将《美国国家 CAD 标准》®（NCS）纳入。BIM 中的图形输出应遵循 NCS，按照其《BIM 实施部分》所述的澄清进行。应依据 NCS 对成套纸张进行组织和编号。其中，所有注解符号均应符合要求。

3.3.3 纸张布局

除 NCS 中的纸张布局要求外，成套纸张中的所有纸张均应保持统一的大小和方向。每张纸上标题区的边界应保持相同的位置，以让纸张的扩页得以叠放及适当打印。

3.3.4 区域 / 房间 / 空间

区域 / 房间 / 空间的识别标签和图表应遵循 NCS。

3.3.5 数码文档和存档

各份所有经批准的提交文件及通常以传统的纸质格式提供的其它文件均应以 PDF 格式或其它开源电子文件格式提供。直接由项目 BIM 团队编写的文件应转为 PDF 格式，以便可在文件中进行检索及文字选择。别人编写但由项目 BIM 团队使用的文件（如生产商产品数据表）应以生产商制作的 PDF 格式提供。如作者没有提供 PDF 格式，应扫描文件制作 PDF 文件。PDF 文件应遵循以下 ISO 标准：

- ISO 19005-3 (2012)：文件管理—长期保存的电子文件文档格式—第 3 部分：针对嵌入的文档在支持下使用 ISO 32000-1（PDF/A-3）。[13]
- ISO 32000-1 (2008)：文件管理—便携式文件格式—第 1 部分：PDF 1.7。[14]

PDFs of construction documents should comply with the *Guideline for Construction PDF Documents*[15] available from the Construction PDF Coalition. Additionally, the Construction PDF Coalition provides a web form for customizing the requirements on its website.

3.4 FILE STRUCTURE

Well-run BIM PxP and project data have well-defined project file naming and folder organization standards. The folder structure should be defined in the PxP. The project file sharing system should have the high level branches of the folder structure pre-populated in the system at the beginning of the project.

Since record documents will be distributed through the folder system, the project folder organization should align with the division of responsibilities of the stakeholders. It is beneficial to establish a file permission strategy on the shared folder system, where only appropriate organizations in the project have write permissions within their assigned folders, and the remainder of the team has read-only permission. At the highest level, the folder system should be controlled by the project administration.

File naming conventions similarly are needed to establish coherency of project documentation and simplify high level understanding of the file contents. The file naming system may identify a set of data fields to be contained in the file name. A typical file standard will establish a clear order on file name attributes with a reserved delimiter such as underscore (_) to identify the divisions between fields. The NCS provides a proposed naming convention for files, including standard contract documents https://www.nationalcadstandard.org/ncs6/

3.4.1 Owner-Specified Requirements

The project should comply with any Owner-specified platform requirements. The following sections are provided as examples for Owners who do not have predefined requirements. Regardless of the requirements used, the naming conventions should be consistent.

3.4.2 Folder Naming

Folder names should be numbered or alphabetized to control order. Folder names should be clear indicators as to what the folder contains (e.g., a folder for Models could be named *07_ Models*).

3.4.3 File Naming

File names should contain a discipline designator (such as “A” for Architectural) as defined in the NCS. Custom naming schema should be clearly documented in the BIM PxP.

- Sheet file names (regardless of file format, such as PDF) should comply with NCS, unless otherwise dictated or allowed by the Owner. At a minimum, they should include the sheet number (e.g., A-101.PDF)
- Model file names should contain discipline designator within the name, as outlined in the NCS (e.g., A-FP01.ext).

PDF 格式的施工文件应遵循可由施工 PDF 联盟提供的《PDF 施工文件指导原则》[15]。此外，施工 PDF 联盟还在其网站上提供网页形式以定制这些要求。

3.4 文档结构

运作良好的 BIM 的 PxP 和项目数据有着界定明晰的文档名称和文件夹组织标准。文件夹结构应在 PxP 中规定。项目文档分享系统应在项目开始时即做为文件夹结构的高层分支植入系统中。

由于记录文件将通过文件夹系统进行分发，所以项目文件夹的组织应与利益相关人的职责分工一致。最好对共享文件夹系统建立文件许可策略，其中仅有项目内的适当组织有读写许可，团队的其余成员则有只读许可。在最高层面，文件夹系统应由项目管理机构控制。

类似的，需要对文件命名做出约定，以确立项目文件的一致性并简化文件内容的高层面理解。文件命名体系可识别含有的一组数据文件的文件名。典型的文件标准将确立文件名后缀的清晰次序，有专门保留的分隔符如下划线（_）用于识别各区之间的分隔。NCS 提供了建议使用的用于包括标准合同文件在内的文件的命名约定： https://www.nationalcadstandard.org/ncs6/

3.4.1 业主规定的要求

项目应遵守业主规定的任何平台要求。以下各部分为没有预先规定要求的业主提供了一个例子。无论使用的是什么要求，命名约定应前后连贯。

3.4.2 文件夹命名

文件夹名称应以数字或字母进行编号以控制次序。文件夹名称应清楚表明文件夹中所含的是什么内容（如可将模型文件夹命名为 07_Models）。

3.4.3 文件命名

文件名称中应包括 NCS 中所规定的专业代号（如“A”代表“建筑的”）。定制的命名方案应在 BIM 的 PxP 中有清楚的记录。

- 纸质文件的名称（无论文件是何格式，如 PDF）应遵循 NCS，除非业主另有指示或得到其允许。它们至少应包括纸张的编号（如 A-101.PDF）。
- 模型文件的名称中应包含 NCS 中所述的专业代号（如 A-FP01.ext）。

3.4.4 Component Naming Conventions

The naming conventions used for the following should be documented in the BIM PxP: e.g. Systems/Elements/Objects/Components/Parameters.

3.4.5 Submittal Package

All files should be organized and stored in an appropriately named folder as part of the submittal package. The submittal package should contain the deliverables as outlined in this document, the BIM PxP, and the project contract(s). The submittal package should also contain any support, source, reference, and/or linked files necessary to maintain file integrity.

3.4.6 File Sharing

The Owner should require that the team use a model sharing system. If the Owner does not designate a system, then the Project BIM Manager should provide a model sharing system for the sharing of individual and merged models. The model sharing system should consider:

- Project BIM Team access, including real-time access and synchronization of models
- Automated versioning of models
- Data security
- Maintenance and archiving of the previous model versions
- Permission-based access for each team member to upload their models

3.4.7 Data Transmittal Requirements

At a minimum, all transmitted data should include the following printed on the media or included as metadata as applicable per media type (i.e., CD/DVD would have printed labels, whereas model files would include metadata):

- Project title
- Project location
- Contract number
- Designer(s) of record and/or contactor(s) (general or sub)
- Classifications for the data (i.e., sensitive, classified, etc.)
- Contents of the transmittal, including date created, date modified, version, etc.
- Author and/or responsible individual
- Recipient(s)

Any additional information required by the Owner or identified in the BIM PxP should be included.

3.5 MODEL STRUCTURE

Model structure defines the highest level of decomposition (breakdown into component parts) of the digital model(s). Model structure should align with the Owner's Project Requirements (OPR) and selected BIM Uses, as defined in NBIMS ™ -V3 Section 5.9: The Uses of BIM.

If, for technological limitations or work share requirements, the model must be decomposed to a structure below a single building, then each model should be clearly denoted as a

3.4.4 组件命名约定

用于以下文件的命名约定应在 BIM 的 PxP 中加以记录：如系统 / 元素 / 物品 / 组件 / 参数。

3.4.5 提交成果包

所有文件均应作为提交成果包的组成部分进行组织并存储在有着适当名称的文件夹中。提交成果包中应包含本文件、BIM 的 PxP 及项目合同中所述的可交付成果。提交成果包中还应包含保证文件完整性所需的任何支持文件、源文件、参考文件和 / 或链接文件。

3.4.6 文件分享

业主应要求团队使用模型共享系统。如业主没有指定一个系统，则项目 BIM 经理应提供一个模型共享系统，以供共享单个的及合并的模型。模型共享系统应考虑：

- 项目 BIM 团队登录，包括实时登录及模型同步
- 模型版本的自动管理
- 数据安全
- 先前模型版本的维护和存档
- 团队每位成员基于许可的登录以上载其模型

3.4.7 数据传输要求

所有传输的数据至少均应包括以下内容，它们打印在媒介上，或按媒介类型作为相应的元数据（即 CD/DVD 有打印的标签，而模型文件则包括元数据）：

- 项目名称
- 项目地点
- 合同编号
- 记录的设计者和 / 或承包商（总包商或分包商）
- 数据的类别（如敏感数据、机密数据等）
- 传输的内容，包括创建日期、修订日期、版本等
- 作者和 / 或责任者
- 接收人

业主所要求的或 BIM 的 PxP 中所识别的任何额外的信息均应包括进来。

3.5 模型结构

模型结构定义了数字化模型最高层面的分解（分解为各个组成部分）。模型结构应与 NBIMS ™ -V3 第 5.9 部分所定义的业主的项目要求（OPR）及选定的 BIM 用途相一致：BIM 的用途。
如因技术局限或工作共享要求导致必须将模型分解至单栋建筑物以下的结构，则每个模型均应作为建筑物的一部分清楚标出，且在每项可交付成果中均应提供每栋建筑物的一个构成模型。单独的模型文件（如部门专有的或按层面单独出来的等等）不足以作为最终的可交付成果。整体的构成模型很有必要，即使此构成模型仅用作链接的集成和 / 或参考（即将所有用于交付的相关文件打包的一种方式）。

portion of a building, and one composite model per building should be provided for each deliverable. Separate model files (i.e., discipline-specific or separated by level, etc.) are insufficient as a final deliverable. A holistic composite model is necessary, even if the composite model is only used as a container for links and/or references (i.e., a means of packaging all related files for delivery).

The model structure should be clearly defined in the BIM PxP.

3.6 MODEL REQUIREMENTS

The Owner should develop or adopt/adapt well-defined contract requirements to ensure the project model data requirements are met. The BIM Contract Requirements should address model requirements such as modeling responsibility, the modeling process, minimum model contents, Facility Data to be captured, and Level of Development (LOD). Because proper BIM planning at project inception is imperative to success and demands thorough understanding, it is recommended that the Owner procure the services of a specialized BIM consultant or identify one of the contracted parties to assist in identifying and defining the model/modeling requirements.

Alternatively, the Owner could consider following the example of successful Owner implementation of BIM requirements within NBIMS-US ™ V3, Section 5.8: Practical BIM Contract Requirements, which outlines BIM Contract Requirements developed by the United States Army Corps of Engineers (USACE) to "ensure consistent and usable BIM project deliverables and BIM process. These BIM Contract Requirements consist of Contract Language, a Project Execution Plan (PxP) Template, and a Minimum Modeling Matrix (M3)." [16]

If the USACE M3 is adapted for use, it should reflect the Owner's particular requirements and objectives, specifically in the Instructions (Tab 2), Phasing (Tab 3), and Model Element LOD/Grade goals. Once the template is complete, the tables should be restricted to read-only for the project (unless project-specific variations are specifically desired and permitted in the contract).

It should be understood that with any BIM Contract Requirements—developed or adopted and adapted—there may be an information gap between what is required for the final BIM deliverables to the Owner and what is required for each team member to perform their required and/or recommended BIM Use. It is the responsibility of the individual members of the Project BIM Team to provide the information necessary for the project's selected BIM Uses.

Generally, BIM should include the necessary process and content to produce accurate construction documents (e.g., plans, elevations, sections, schedules, and integrated specifications) and Record Model project data (e.g., equipment, manufacturer, and model number).

3.6.1 Modeling Responsibility

Project stakeholders' modeling responsibilities should be clearly defined within the BIM PxP. Each model element should be assigned to a Model Element Author (MEA) and a corresponding LOD for the element clearly defined; consequently, each MEA is required to provide the elements at the LOD specified in the BIM PxP or a corresponding LOD worksheet. Each MEA is responsible for attaching any data or metadata to the model elements as required by the contract, BIM PxP, or as needed to facilitate the project's selected BIM Uses.

模型结构在 BIM 的 PxP 中应有清楚规定。

3.6 模型要求

业主应制定或采纳 / 调整已定义明确的合同要求，以确保满足项目模型数据要求。BIM 合同要求中应规定模型的要求，如建模责任、建模过程、最低程度的模型内容、需要获取的设施数据以及开发程度（LOD）。由于项目开始时适当的 BIM 规划对取得成功和要求的透彻理解非常重要，所以建议业主采购专业的 BIM 咨询方的服务，或者请一家合同方协助识别并规定模型 / 建模要求。

业主也可考虑遵循下面的业主成功实施 NBIMS-US ™ V3 第 5.8 部分中 BIM 要求的案例：“实用的 BIM 合同要求，其概括了美国陆军工程兵部队（USACE）制定 BIM 合同要求，即确保连贯可用的 BIM 项目可交付成果和 BIM 流程。这些 BIM 合同要求由合同语言、项目实施方案（PxP）模板和最低程度的建模矩阵（M3）”[16] 构成。

如果 USACE M3 被采用，它应反映业主特定的要求和目的，特别是在指令（标签 2）、阶段规划（标签 3）和模型元素 LOD/ 等级目标等方面。一旦完成模板，这些表格应对项目体严格限定为只读（除非特别希望进行项目特定的变更且在合同中得到允许）。

应当了解，对于任何 BIM 合同要求，无论是制定的或采纳且调整的，最终给业主的 BIM 可交付成果的要求与对每位团队成员进行其职能所需或用于 BIM 推荐用途的要求，可能存在着信息差距的情况。项目 BIM 团队的各位成员有责任提供对项目所选 BIM 用途必要的信息。

一般而言，BIM 应包括必要的流程和内容，以产生准确的施工文件（如平面图、立面图、剖面图、图表和综合的规格书）及“记录模型”项目数据（如设备、生产商和模型编号）。

3.6.1 建模责任

项目利益相关人的建模责任应在 BIM 的 PxP 中明确并加以规定。每个模型元素均应分配给模型元素作者（MEA）且此元素所对应的 LOD 应有明确规定；因此，要求每个 MEA 均提供 BIM 的 PxP 中规定的或对应的 LOD 工作单中所规定的 LOD 中的元素。每个 MEA 均应按合同、BIM 的 PxP 的要求或按需要在模型后附上所有数据或元数据，以此达到项目所选择的 BIM 用途。

Model elements are most typically assigned to a MEA that also has the design or construction responsibility of the element. For example, a structural engineer or modeler is typically the MEA for structural slabs during the design phase. Models are typically divided by discipline or trade. As such, it is important that not only the MEA is identified for any given element but also the model in which the element is to reside. While there may be a duplication of some elements across multiple models, an MEA and LOD worksheet identifies the source responsible for the information and, therefore, that source is considered to be accurate and reliable.

3.6.2 Modeling Process

The project participants should fully implement industry- and software vendor-identified best practices and workflows for all aspects of modeling. These include, but are not limited to, using 3D geometry for representing physical characteristics of project and facility components and elements, using relevant object categories when possible, adding sufficient attribute information to elements, following proper naming conventions for all levels and types of data and metadata, and setting up shared resources and parameters to enable automatic display or extraction of model information to other formats (e.g., schedule or tabular formats).

Model elements should be used to produce representations shown in graphical legends and should match the graphical representations shown in other views and drawings. Model elements requiring a host or connection to some other component should be done within the same model whenever possible (e.g., a door is not freestanding but requires a wall as its host, so both door and wall should reside in the same model). Consideration should be given to how project phasing, display of content by other discipline/trade models, and workflows or features associated with specific software will be executed. The overall process utilized should be documented in the BIM PxP.

Modeling process requirements should not be overly prescriptive, but the general and minimum expectations should be established and responsibilities clearly defined as part of the BIM PxP.

Generally, the modeling process and responsibilities should include:

- Use of a standardized classification system organized according to NBIMS-US ™ Section 2.5: OmniClass Table 21 Elements
- Use of IFC-compliant software (within one version of the latest certification available)
- Use of BIM software (within one release version of the latest available) that is capable of meeting the OPR per project-specific selected BIM Uses
- Use of the appropriate tool(s) within the BIM software selected to create or document the building element being represented
- The model(s) should remain current and represent design intent. The Project BIM Team should update the model(s) with any revisions as required to complete the work, or at a minimum, at each project milestone.

The Project BIM Team should document the choice of platform in the BIM PXP.

While the modeling process and corresponding models may vary per project, the following graphic is an example of typical model progression across project phases and could serve as an information flow map for an Owner implementing BIM requirements.

模型元素最为典型的情况是被分配给某个对相应元素具有设计或施工责任的 MEA。例如，结构工程师或建模者通常是设计阶段做结构楼板的 MEA。模型通常按专业或工种划分。因此，重要的不仅是要识别任何给定元素的 MEA，而且要识别此元素在模型中的位置。虽然在多个模型间可能存在某些元素的重复，但 MEA 和 LOD 工作单识别对此信息负责的来源，因此此信息被视为准确且可靠。

3.6.2 建模流程

项目参与者应对建模的所有方面，充分实施行业及软件销售商所认可的最佳实践和工作流程。这包括但不限于使用 3D 几何图再现项目及设施部件和元素的实物特征，在可能时使用相关的物体分类，为元素添加足够的属性信息，在所有层面和类型的数据和元数据方面遵循适当的命名约定，以及设定共享资源和参数以促成向其它格式（如明细表或表格格式）自动展示或导出模型信息。

模型元素应要在图例中显示，且应与其它视图或图纸中的图像表示相匹配。只要有可能，模型元素要求有一个寄主或与其它某个部件相连，且应在同一个模型中建模（如一扇门并非自成一体，而要求有一面墙为其寄主，所以门和墙都应居于同一个模型中）。此外，项目阶段规划、由其它专业 / 工种的模型来展示内容及与特定软件相关的工作流程或特色也应被考虑。所采用的总体流程应在 BIM 的 PxP 中加以记录。

建模流程要求不应规定过于严格，但作为 BIM 的 PxP 的一部分，应确定总体的、最低程度的预期及对职责加以明确规定。

总体而言，建模流程及职责应包括：

- 依据 NBIMS-US ™第 2.5 部分 OmniClass 表 21：元素，组织标准化分类体系的运用：OmniClass Table 21 Elements
- 使用符合 IFC 的软件（在最新可用的认证的一个版本中）
- 使用项目特定的、经过 BIM 用途选择的、能够符合 OPR 要求的 BIM 软件（在最新可用的一个发布版本中）
- 在所选择的 BIM 软件中使用适当的工具创建或记录呈现的建筑元素
- 模型应始终为最新的且能体现设计意图。项目 BIM 团队应以完成工作所要求的任何修订更新模型，或至少在每个项目里程碑时进行更新。

项目 BIM 团队应在 BIM 的 PxP 中标明对平台的选择。

虽然建模流程及相应的模型可随项目而变，但以下图形为项目各阶段中典型的模型进程的例子，可作为业主实施 BIM 要求的信息流程图。

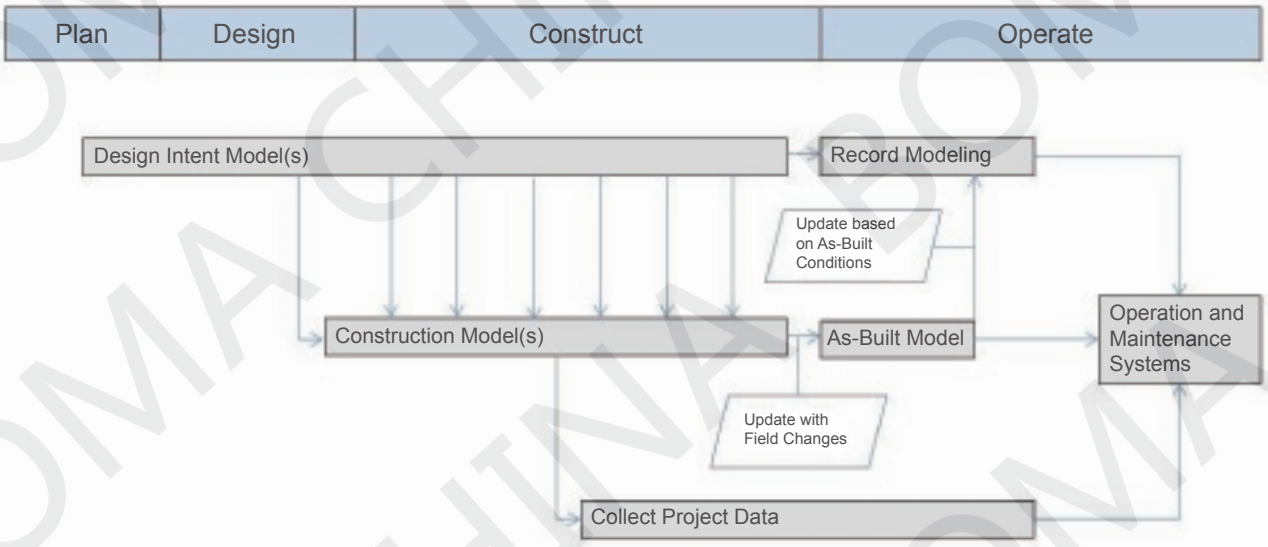


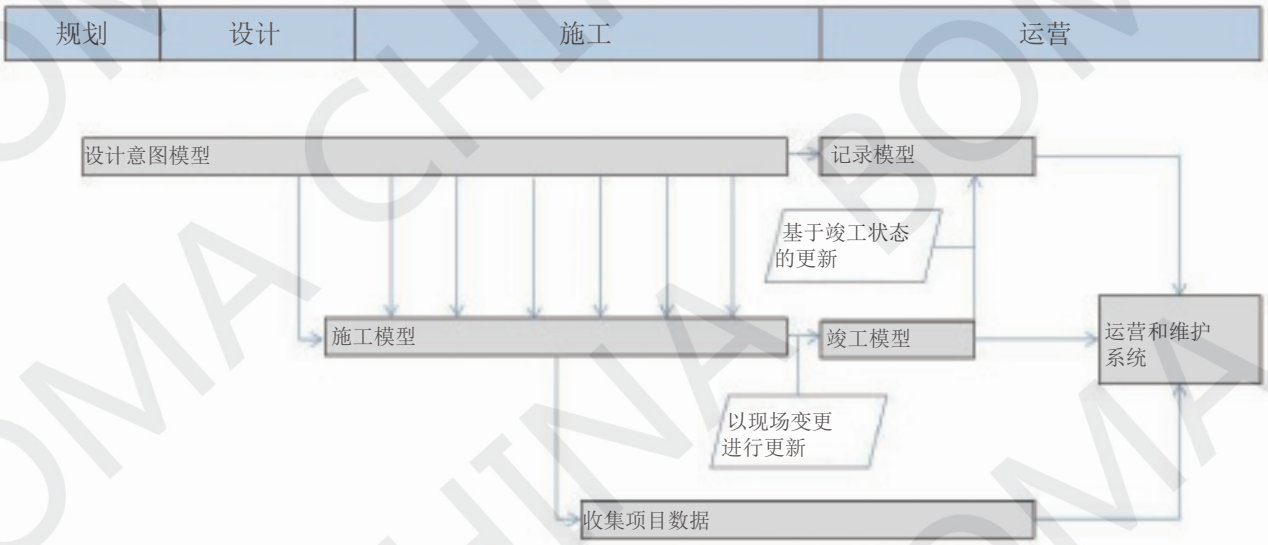
Figure 3. Lifecycle Model Requirements: A Sample Process

Project BIM Team members should use BIM application(s) and software(s) to develop and document the project. Design professionals should create the Design Intent Model(s) and use them to produce accurate construction documents. Construction professionals should use the Design Intent Model(s) and the construction documents as a starting point for developing the Model(s). Similarly as the Construction Model(s) are progressed during construction, they serve as the basis for Project Data (which oftentimes includes tabular or textual-based information). Also during construction, the various Construction Model(s) combine to develop an As-Built model that captures more-detailed construction conditions (e.g., trade-specific fabrication models). As the project progresses, the As-Built Model— along with the continual stream of project correspondence and information back to the Design professionals—facilitates the update of the Design Intent Model(s) into a Record Model. The construction model typically has highly detailed components that are not always an efficient source of information for operations and maintenance; hence the Record Model is developed from the Design Intent Model to provide a lightweight model. In general, the Record Model, along with the As-Built Model and Project Data, provides facilities management personnel with varying degrees of information in multiple formats to best support FM uses and activities.

3.6.3 Model Contents

Models and corresponding elements or sub-elements should be modeled at full scale (1:1) using actual (not nominal) dimensions. Models should include all content necessary to meet the requirements in the BIM PxP. Further content may be specified in the BIM LOD. General considerations for model content requirements include the following:

- Models should include all system components and connection points to utilities and/or components, whether site or building related. These components should include all information parameters and annotations required to produce accurate drawings, details, schedules, and sheets.



图三全生命周期模型要求样本流程

项目 BIM 团队成员应使用 BIM 应用和软件制定和记录项目。专业设计人员应创建设计意图模型用于产生准确的施工文件。专业施工人员应使用设计意图模型及施工文件作为开发模型的起点。类似的，随着施工模型在施工期间向前推进，它们起着项目数据（其经常包括基于图表或文字的信息）的基础作用。同样在施工期间，各种施工模型结合起来以开发竣工模型，捕捉更为具体的施工状况（如工种特有的制造模型）。随着项目的推进，竣工模型——以及持续进行的项目通信流及返回到专业设计人员那里的信息——促成设计意图模型更新为记录模型。施工模型通常有非常具体的组成部分，其并不总是运营和维护信息的有效来源；因此从设计意图模型中开发记录模型以提供一个轻量级的模型。一般而言，记录模型，再加上竣工模型和项目数据，以多种形式为设施管理人员提供了各种不同程度的信息，从而对 FM 用途和活动做出最佳支持。

3.6.3 模型内容

模型及对应的元素或次级元素应使用实际（而非名义）尺寸按全比例（1:1）建模。模型中应包括为符合 BIM 的 PxP 中的要求所必须的所有内容。更多内容可在 BIM 的 LOD 中加以规定。模型内容方面一般要求考虑包括以下这些：

- 模型中应包括所有的系统组件和 / 或连接公用设施的连接点，无论是否与场地或建筑物相关。这些组件中应包括制作准确的图纸、节点图、明细表和工作单所要求的所有的信息参数和注解。

- All Furniture, Fixtures, & Equipment (FFE) should be properly identified by make, model number, and building/department/room or space in which it resides.
- Clearance zones required for code compliance, access (such as needed for equipment, hatches, and panels), safety, maintenance, gauge reading, and other operations should be modeled.
- Any required layer of the systems, for example, insulation, double layered systems, or enclosures should be modeled.

3.6.4 Project Data

The Project BIM Team should develop Project Data for all elements that make up the model (e.g. doors, air handlers, electrical panels, etc.). This Project Data should include all material definitions and attributes that are necessary for the project planning, design, construction, and operations. All elements should be assigned the proper classification and category. All life safety and fire protection components and systems should be clearly identified as such. Minimum Project Data requirements should be identified in the BIM PxP.

3.6.5 Level of Development (LOD)

The Owner should define the desired LOD for BIM content that enables the project's specific organizational and project goals. The Owner may elect to reference an LOD standard holistically for all model content, or require a specific LOD per model or model element *and* by discipline, trade, and/or phase. When implementing an LOD, the Owner can use the default LOD, a template LOD, or develop a custom LOD. It should be understood that BIM cannot be successfully accomplished without some LOD defined for each model deliverable, which is typically recorded in a spreadsheet or worksheet. In general, the standard LOD definitions are defined in the BIMForum LOD Specification 2015, which is available as part of NBIMS-US ™ V3.[17]

Default LOD: If the Owner elects to reference an existing LOD without making modifications, use of the USACE Minimum Modeling Matrix (M3) is recommended, as it defines a minimum LOD of elements for a design model and a Record Model deliverable.

Template LOD: Several LOD templates are available to the Owner, but it is recommended that the Owner use a nationally recognized form. The Owner may adapt the USACE M3[18], use the AIA G-202 – 2013 document[19], or implement the Penn State University Model Element Matrix[20] or the PSU Project Execution Planning Guide.[21] Alternatively, the Owner may elect to use the worksheet provided with the BIMForum LOD Specification 2015 Model Element Matrix.

Custom LOD: Owners may elect to develop his/her own LOD Matrices identifying LOD and model element authors for models or model elements. Owners should adhere to the BIMForum LOD Specification 2015 definitions to avoid confusion among the Project BIM Team members.

At a minimum, BIM content should be developed to an adequate level to support:

- Establishment and communication of design intent

- 所有的家具、装置和设备（FFE）应按样式、模型编号及其所在的建筑物 / 部门 / 房间或空间加以识别。
- 规范要求的、安全、维护、仪表读数及其它操作等所需的净空区、出入口（如为设备、检修口和镶板所需）均应进行建模。
- 任何所要求的系统分层，如绝缘层、双层系统或围护，均应进行建模。

3.6.4 项目数据

项目 BIM 团队应对构成模型的所有元素（如门、空气处理设备、配电板等）制定项目数据。此项目数据中应包括项目规划、设计、施工和运营所需的所有材料定义和属性。所有元素均应分配适当的级别和类别。所有的人身安全和防火组件和系统均应清楚标注出来。项目数据最低要求应在 BIM 的 PxP 中加以说明。

3.6.5 开发程度（LOD）

业主应为 BIM 内容定义所希望实现的 LOD，此促成项目具体的组织和项目目标的实现。业主可选择就所有模型内容全部参考某项 LOD 标准，或要求按模型或模型元素及按专业、工种和 / 或阶段实施具体的 LOD。在实施 LOD 时，业主可使用默认 LOD、模板 LOD 或定制的 LOD。应当理解，若不针对每项模型可交付成果——其通常记录在电子表格或工作单中——规定某个 LOD，那么就无法成功实现 BIM。一般而言，标准的 LOD 定义在《BIM 论坛 LOD 规范 2015 版》中做出了规定，此文件可作为 NBIMS-US ™ V3 的一部分获得。[17]

默认 LOD：如业主选择参考现有的 LOD 而不做任何修订，则推荐使用 USACE 的“最低程度建模矩阵”（M3），因为它规定了设计模型和记录模型可交付成果最低程度的元素 LOD。

模板 LOD：有若干 LOD 模板可供业主使用，但推荐业主使用全国公认的形式。业主可调整 USACE M3[18]、使用 AIA G-202 2013 文件[19]，或实施宾州州立大学的“模型元素矩阵”[20]或宾州州立大学的《项目实施方案指南》。[21] 业主或者也可选择使用与《BIM 论坛 LOD 规范 2015 版》中“模型元素矩阵”一起提供的工作单。

定制 LOD：业主可选择制定自己的 LOD 矩阵，对模型或模型元素确认 LOD 和模型元素作者。业主应遵循《BIM 论坛 LOD 规范 2015 版》中的规定，以避免在项目 BIM 团队成员间造成混乱。

BIM 内容至少应足够完备以支持：

- 建立和传达设计意图

- Necessary content for construction documents
- Overall BIM requirements developed by the Owner
- Optional BIM requirements from this Guide chosen by the Owner
- Essential BIM Uses as identified in Section 4.2.2 of this document
- Enhanced BIM Uses that the Owner selects from Section 4.2.3 of this document
- Additional data and metadata necessary to achieve additional BIM Uses as documented in the BIM PxP

In summary, diligence should be given during project planning to select appropriate BIM Uses and develop a detailed BIM PxP, as these are the impetus for determining and assigning an adequate LOD.

BOMA CHINA

- 施工文件的必要内容
- 业主制定的 BIM 总体要求
- 业主从本指南中挑选的选择性 BIM 要求
- 本文件第 4.2.2 部分所规定的基本 BIM 用途
- 业主从本文件第 4.2.3 部分所选择的强化 BIM 用途
- BIM 的 PxP 中所记录的实现额外的 BIM 用途所需的额外的数据和元数据

总而言之，在项目规划阶段应尽职尽责地挑选适当的 BIM 用途并制定详细的 BIM 的 PxP，因为它们是确定和分配一个完整的 LOD 的推动力。

4. EXECUTION

Commentary:
The BIM PxP should be developed to provide a master information/data management plan and assignment of roles and responsibilities for model creation and data integration at project initiation. The team members and Owner should jointly agree on how, when, why, to what level, and for which project outcomes BIM will be used.

In those projects where construction information is available during the design phase, the BIM PxP would address both design and construction activities. The BIM PxP should be considered a living document and should be continually developed and refined throughout the project development life cycle.

4.1 BIM Project Execution Plan (PxP)

BIM Project Execution Planning is "a process performed by a Project BIM Team to design the execution strategy for implementing BIM on the project. The final product of the execution planning process is a documented BIM Project Execution Plan (PxP)." [22] To maximize the effectiveness of BIM, the execution plan should be designed in the early stages of a project and focus on the decisions required to define the scope of BIM implementation on the project, identify process impacts of using BIM, define the team characteristics needed to achieve the modeling, and quantify the value proposition for the appropriate level of modeling at the various stages in the project life cycle.

4.1.1 Development of the BIM PxP

The BIM PxP, created early in the project, should be considered a living document that evolves throughout the project. The BIM PxP should be developed and refined by the Project BIM Team to document the collaborative process of how BIM will be executed throughout the project life cycle.

The initial version of the BIM PxP should be developed by the Project BIM Manager, assisted by the Owner and the Project BIM Team (as referenced in NBIMS-US ™ V3, Section 5.4), to detail the BIM requirements for the project. It should be submitted for approval to the Owner.

The BIM PxP should be refined by the entire Project BIM Team as design progresses. If a contractor is not procured for preconstruction services, the design team and Owner should develop the collaborative BIM PxP and coordinate with the contractor when the contractor is procured.

The BIM PxP should be reviewed and coordinated with the entire Project BIM Team prior to construction and submitted to the Owner for final approval. The BIM PxP should be reviewed with specialty contractors prior to execution of their contracts. Any revisions to the BIM PxP should be submitted to the Owner for final approval.

The Project BIM Team should use the PxP template in the NBIMS-US ™ V3, Section 5.4: BIM PxP Content, which identifies the minimum BIM requirements to develop an acceptable BIM PxP. The PxP should specify how different versions of the model will be stored and retrieved as the project progresses.

4. 执行

评论：
应制定 BIM 的 PxP，以提供主要信息 / 数据管理计划并分派角色和职责，从而在项目开始时创建模型并整合数据。团队成员及业主应就如何、何时、为何、在何程度上及为哪些项目结果而使用 BIM 达成一致。

在那些设计阶段可获得施工信息的项目中，BIM 的 PxP 会规定设计和施工两方面的活动。BIM 的 PxP 应被视为可变的文件，应在项目开发的整个生命周期中持续制定并不断修改。

4.1 BIM 项目实施方案（PxP）

BIM 项目实施方案是“由项目 BIM 团队为项目采用 BIM 技术而设计执行策略的一个流程。执行规划过程的最终产品记录在 BIM 项目实施方案（PxP）中。”[22] 为尽量提高 BIM 的有效性，实施计划应在项目的早期阶段做出设计且着重于决策需求来设定 BIM 在项目中的实施范围，并在项目全生命周期中的各个阶段，识别使用 BIM 的流程影响，设定实现模型所需的团队特色，以及为适当深度的模型量化价值定位。

4.1.1 制定 BIM 的 PxP

在项目的早期阶段创建的 BIM 的 PxP 应被视为可变的文件，在项目的所有阶段不断发展。BIM 的 PxP 应由项目 BIM 团队制定及精炼，以记录将如何在项目的全生命周期中实施 BIM 的协作过程。

初始版本的 BIM 的 PxP 应由项目 BIM 经理制定，由业主及项目 BIM 团队提供协助（如 NBIMS-US ™ V3 第 5.4 部分所述），以详细记录项目的 BIM 要求。应提交业主供其批准。

随着设计的进展，BIM 的 PxP 应由整个项目 BIM 团队进行修改。如未采购承包商的施工服务之前，设计团队及业主应制定协作性的 BIM 的 PxP 并在采购承包商的服务时与其协调。

在施工前应对 BIM 的 PxP 进行审核并与整个项目 BIM 团队进行协调，并提交业主最终批准。在专业承包商执行其合同前应由其对 BIM 的 PxP 进行审核。BIM 的 PxP 的任何修订均应提交业主最终批准。

项目 BIM 团队应使用 NBIMS-US ™ V3 第 5.4 部分中的 PxP 模板：BIM 的 PxP 的内容，它是制定可接受的 BIM 的 PxP 的最低要求。随着项目的进展，PxP 应规定不同版本的模型将如何存储及调取。

4.2 BIM Uses

Commentary:
BIM Uses can be broadly categorized into authoring tools, auditing tools, and analytic tools. Some applications are designed or written to address a single task. Other uses are written to perform multiple tasks and are often referred to as "integrated software tools." The BIM Uses listed below can be either single-task applications or be part of integrated software tools.

BIM Uses focused on single tasks should be interoperable with the other BIM Uses used on a project. "Interoperability" is the ability of diverse systems and organizations to work together (inter-operate). Interoperability can be used in a technical systems engineering sense, or in a broader sense, including social, political, and organizational factors that affect system-to-system performance.

Interoperable BIM Uses are software programs designed to use the inputs and outputs of other BIM applications to perform the task and generate the output that the BIM Use being applied was designed to perform. Interoperable software reduces the amount of time required to manually exchange information and input it into single-task software. It also minimizes the risk of data transfer errors often caused by manual information exchange methods.

4.2.1 BIM Use Definition

A BIM Use is a method of applying Building Information Modeling during a facility's life cycle to achieve one or more specific objectives. 23 The nature of BIM technology allows different Owners to use the model in multiple ways, depending on their projects' specific needs. As the project moves from phase to phase, the information contained within the BIM grows in both quantity and specificity.

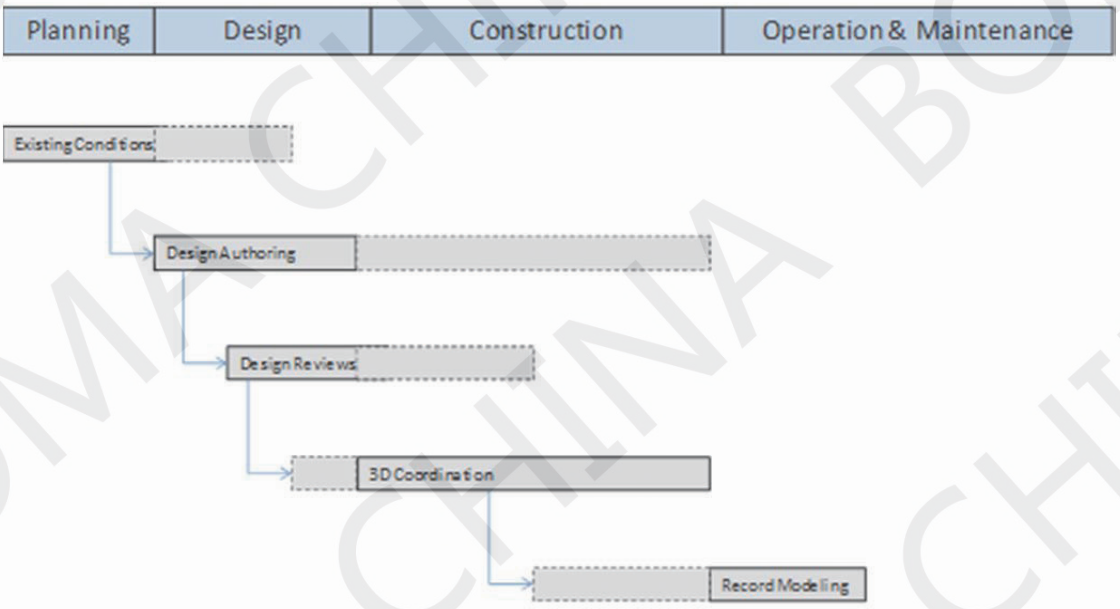


Figure 4. Minimum BIM Example

4.2 基本 BIM 用途

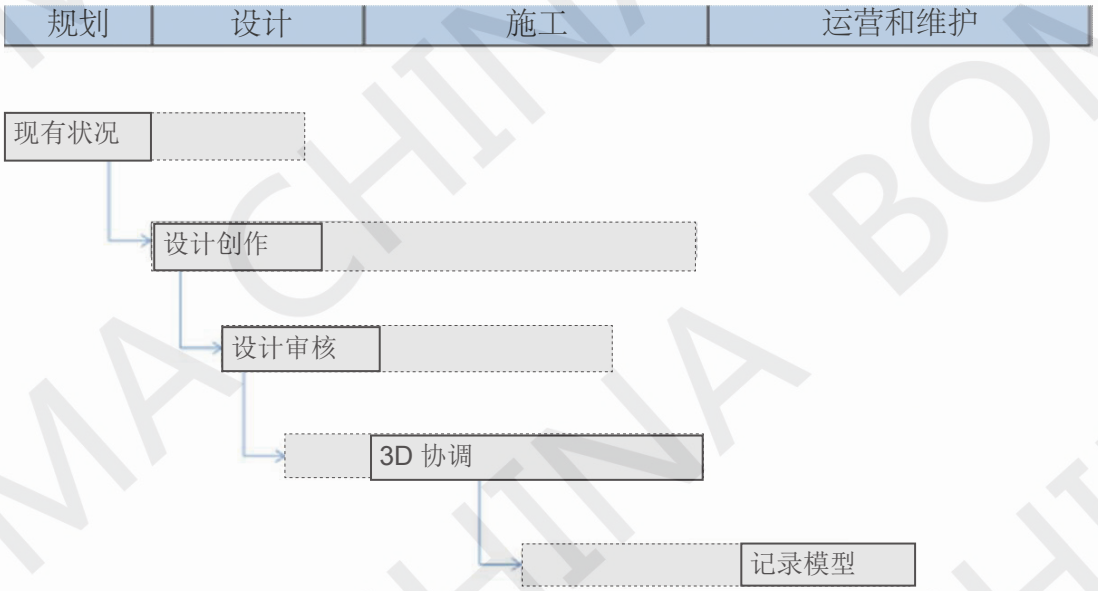
评论：
BIM 用途可大致分为编辑工具、审计工具和分析工具。有些应用设计或被书写出来是为了处理单一的任务。其它用途书写出来是为了执行多重任务，它们往往被称为“整合软件工具”。下列的 BIM 用途可为单一任务的应用或者整合软件工具的组成部分。

专注于单一任务的 BIM 用途应与用于项目的其它 BIM 应用彼此兼容。“兼容性”指各种系统和组织共同工作的能力（彼此兼容）。兼容性可用于技术系统工程的意义上，或用于更为广泛的意义上，包括影响系统间相互表现的社会、政治和组织因素。

可兼容的 BIM 用途是各种软件程序，其设计目的是使用其它 BIM 应用的输入和输出来执行任务和生成输出，为当前使用的 BIM 用途服务。可兼容的软件减少了手动交换信息并将其输入单一任务软件所需的时间量。它们还在最大程度上减少了手动交换信息方法所经常造成的数据转让错误的风险。

4.2.1 BIM 用途的定义

BIM 用途是在设施的全生命周期中运用建筑信息模型以实现一项或多项具体的目标的一种方法。[23]BIM 技术的性质使得不同的业主可以以不同方式使用模型，这取决于他们对项目的具体需要。随着项目从一个阶段进入另一个阶段，BIM 中所含的信息在数量和具体性方面均在增加。



图四最低程度的 BIM 举例

BIM Uses are characterized in this Guide as Essential BIM Uses, Enhanced BIM Uses, and Owner- Related Uses of BIM. The brief definitions below have been extracted and enhanced from the BIM Project Execution Planning Guide and the BIM Planning Guide for Facility Owners. BIM Uses should be considered and aligned with project goals, selected based on added value to the Owner, and clearly documented in the BIM PxP. This guide uses the term “building” generically, in keeping with the terminology of “Building Information Modeling”. It is intended to apply to information modeling for the built environment: site elements and facilities as well as buildings.

4.2.2 Essential BIM Uses

The following BIM Uses should be applied on all projects:

- **Existing Conditions:** A process in which the Project BIM Team develops a model (geometry and information) of the existing conditions for a site, facilities on a site, or a specific area within a facility. This model can be developed in multiple ways, depending on what is desired and what is most efficient. Once the model is developed, it can be queried for information and can be modified.

- **Design Authoring:** A process in which software is used to develop a BIM of the design. Design authoring tools are a first step toward implementing BIM, and the key is integrating the geometric representation of elements in the model with element properties. Construction drawings should be produced from and remain consistent with the models.

- **Design Review:** A quality management process in which a model is used to allow stakeholders to verify whether the design meets the OPR and to visualize criteria such as layout, sightlines, lighting, security, ergonomics, acoustics, textures and colors, etc. Virtual mock-up can be done in high detail, even on a part of the building, such as the façade, to quickly analyze design alternatives and solve design and constructability issues. If properly executed, these reviews can resolve design issues.

- **Coordination:** A process in which model elements can be organized and coordinated, and clash detection software can be used to identify conflicts between model elements within the BIM.

- **Record Modeling:** A process in which a model contains an accurate depiction of the physical and functional conditions and environment of a facility and its assets at a point in time. With the continuous updating and improvement of the Record Model and the capability to store more information, the model contains a true depiction of space with a link to information, such as serial codes, warranties, and maintenance history of all the components in the building. Eventually, the Record Model also contains information linking pre-build requirements to asbuilt conditions. This allows the Owner to monitor the project relative to the OPR.

4.2.3 Enhanced BIM Uses

- **Cost Estimating:** A process in which a model can be used to generate an accurate quantity takeoff and cost estimate early in the design process and provide cost

BIM 用途在本指南中被归纳为基本 BIM 用途、强化 BIM 用途及业主相关 BIM 用途。以下的简要定义系从《BIM 项目实施方案指南》和《设施业主的 BIM 规划指南》中摘取并提炼。BIM 用途应予以考虑并与项目目标一致，基于为业主增值而选择，且在 BIM 的 PxP 中清晰记录。本指南在一般意义上使用“建筑”一词，以与“建筑信息模型”这个术语保持一致。除建筑物外，信息模型也适用于建成的环境，如现场元素和设施。

4.2.2 基本 BIM 用途

以下 BIM 用途适用于所有的项目：

- **现有状况：**是指项目 BIM 团队为场地、场地上的设施或设施内的特定区域开发一种基于现有状况的模型（几何和信息）的过程。此模型可通过多种方式开发，这取决于希望得到什么及什么最有效率。模型一旦开发，可向其检索信息并对其做出修订。

- **设计创作：**是指用软件开发已有设计的 BIM 的过程。设计制作工具是实施 BIM 的第一步，其关键在于将模型中元素的几何呈现与元素属性整合起来。施工图纸应从模型中产生并与模型保持一致。

- **设计审核：**一种质量管理过程，在其中模型用于让利益相关人验证设计是否符合 OPR 及标准视觉化诸如规划图、视线、照明、安保、人类工程学、声学、纹理和色彩等。能以很高的细节进行视觉模拟，甚至对建筑物的一部分如外观进行模拟，以快速分析设计替代方案并解决可施工性问题。如是否执行适当，这些审核可解决设计问题。

- **协调：**可对模型元素进行组织和协调，且可用碰撞检查软件识别 BIM 中模型元素间是否有冲突的过程。

- **记录模型：**在模型中对设施及其资产在一个时点上物理和功能状况及环境进行准确描述的过程。随着记录模型的持续更新和改进及能够储存更多信息，此模型包含了对空间的真实描述并与各种信息相连，如建筑物中所有组件的序列号、质保期及维修历史记录。记录模型最终还包含将建造之前的要求与竣工状况联系起来的信息。这让业主得以对比 OPR 对项目进行监控。

4.2.3 提升 BIM 用途

- **成本概算：**可用模型在设计过程的早期生成准确的工程估算和成本概算并提供增量和变更的成本效应，且有潜在可能节省时间和金钱并避免预算超标的过程。这个过程还让设计者得以及时看到设计变更的成本效应。[24]

effects of additions and modifications, with the potential to save time and money and avoid budget overruns. This process also allows designers to see the cost effects of design modifications in a timely manner.[24]

- **Phase and 4D Planning:** A process in which a four-dimensional (4D) model (a model with the added dimension of time) is used to effectively plan the phased occupancy in a renovation, or to show the construction sequence and space requirements for laydown areas and temporary construction on a building site. 4D modeling is a powerful visualization and communication tool that can give a Project BIM Team a better understanding of project milestones and construction plans. (See also Construction Systems Design).

- **Site Analysis – Development**: A process in which BIM and GIS tools are used to evaluate properties in a given area to determine the most optimal site location for a future project. The site data collected is used to first select the site and then position the building based on the OPR.

- **Site Utilization – For Construction:** (See Phase and 4D Planning).

- **Digital Fabrication:** A process that uses machine technology to prefabricate objects directly from a model. The model is used as input into manufacturing and fabrication equipment for production of components, systems, and assemblies.

- **3D Location and Layout:** A process that utilizes a model to lay out the building assemblies and produce lift drawings, which are the two-dimensional (2D)/three-dimensional (3D) component drawings used by forepersons during site construction.

- **Engineering Analysis:** The integrated and/or interoperable tools that allow the use of the physical and material properties of project elements, assemblies, and systems within the model for engineering analysis, simulation, and documentation. Examples include structural engineering, energy analysis, daylighting, HVAC, plumbing, fire protection, life safety, and electrical systems design and documentation.

- **Sustainability Analysis:** The integrated and/or interoperable tools that allow the use of the physical and material properties of building elements, assemblies, and systems within the model for developing sustainable design elements. Examples include documenting sustainable features and attributes and documenting sustainable features for compliance with building rating systems.

- **Codes and Standards Compliance:** A process in which validation software is used to check the model parameters against applicable codes and standards. Code and standard validation is currently in its infant stage of development within the United States and is not in widespread use. However, as model checking tools continue to develop code and standard compliance software with more codes and standards, validation should become more prevalent within the design industry. Examples may include building code compliance, energy code compliance, accessibility compliance, etc.

- **阶段和 4D 规划：**使用四维（4D）模型（额外加入时间维度的模型）能有效规划改建工程中的分阶段使用或者显示施工顺序以及堆放区的空间要求、和建筑场地上的临时施工。4D 建模是个强大的视觉化和沟通工具，能够令项目 BIM 团队更好理解项目的里程碑和施工计划。（也可参见施工系统设计）。

- **场地分析—开发：**使用 BIM 和 GIS 工具评估指定区域的属性来确定未来项目的最优场地位置的过程。收集的场地数据先用于挑选场地，然后基于 OPR 确定建筑物的位置。

- **场地使用—用于施工：**（参见阶段和 4D 规划）。

- **数码制作：**使用机器技术直接从模型中预先制作物品的过程。模型用作制造和制作设备生产组件、系统和装配件的输入。

- **3D 位置和规划图:** 利用模型对建筑组件进行放样并产生立面图的过程，此放样图是两维（2D）/ 三维（3D）的组件图纸，由班组长在现场施工时使用。

- **工程分析：**一体化和 / 或可兼容的工具，令人得以使用模型中项目元素、组件和系统的物理和材料性质，用于工程分析、模拟和记录。例子包括结构工程、能源分析、自然采光、暖通空调、给排水、消防、人身安全及电气系统的设计和记录。

- **可持续性分析:** 一体化和 / 或可兼容的工具，令人得以使用模型中建筑元素、组件和系统的物理和材料性质，用于开发可持续的设计元素。例子包括记录可持续的特色和属性，以及记录可持续的特色以符合建筑评级体系。

- **规范及标准的合规性：**使用确认软件对照适用的规范和标准检查模型参数的过程。规范和标准验证在美国目前尚处于不成熟的发展阶段，没有得到普遍使用。不过，随着模型检查工具持续开发带有更多规范和标准的合规检查软件，验证在设计行业应会变得更为普遍。例子可包括建筑规范合规性、能源法规合规性及无障碍环境合规性等。

- **施工系统设计：**设计和分析同期系统（如模板工程、窗安装、系帘等）的过程。

- **Construction Systems Design:** A process to design and analyze the contemporary systems (e.g. formwork, glazing, tie-backs, etc.).

4.2.4 Owner-Related BIM Uses

- **Asset Management:** A process in which project data is linked to a Record Model to aid in the maintenance and operation of a facility and its assets. These assets, consisting of the physical building, systems, surrounding environment, and equipment, must be maintained, upgraded, and operated at an efficiency that will satisfy both the Owner and users in the most costeffective manner.

- **Disaster Planning and Management:** A process in which emergency responders have access to critical building information in the form of a model and information system. The BIM provides critical building information to the responders to improve the efficiency of the response and minimize the safety risks. The dynamic (real time) building information could be provided by building automation systems (BAS), life safety (fire alarm and fire protection), and security systems, while the static building information, such as geometry, floor plans, points of egress and access, and equipment schematics, reside in a model. These systems are integrated and made interoperable so that emergency responders can link to an overall system. The BIM— coupled with the BAS, life safety, and security systems—clearly displays where the emergency is located within the building, possible routes to the area, and any potentially hazardous locations within the building.

- **Space Management:** A process in which BIM is used to effectively distribute, manage, and track appropriate spaces and related resources within a facility. A model allows the facility management team to analyze the existing use of the space and effectively apply transition planning management towards any applicable changes. Maintenance scheduling is a process in which the functionality of the building structure (walls, floors, roof, etc.). and equipment serving the building (mechanical, electrical, plumbing, etc.) are maintained over the operational life of a facility.

4.3 Model Deliverables

The project execution plan should clearly define the deliverables that are to be transmitted to the owner at the completion of construction. These deliverables may include a design intent model in both native and open standard format; a construction model; and operations and maintenance data (see Figure 3). The model content for each of these deliverables should be clearly defined within the contract documents for each responsible party, as well as in the BIM PxP. The following sections provide a description of each deliverable.

4.2.4 业主相关 BIM 用途

- **资产管理：**项目数据与记录模型相联系以协助设施及其资产的维护和运营的过程。这些资产由实物的建筑物、系统、周围的环境及设备组成，对它们的维护、升级和运营必须以令业主和用户均感满意的最为节省成本的方式进行。

- **灾难规划和管理：**应急反应者能以模型和信息系统的形式接触关键的建筑信息的过程。BIM 向反应者提供关键的建筑信息以提高反应的效率并最大程度减少安全风险。动态（实时）的建筑信息可由建筑自动化系统（BAS）、人身安全（火灾报警和消防）及安保系统提供，而静态的建筑信息，如几何图、楼层平面图、出入口和设备原理图，则居于模型中。这些系统整合在一起且使其彼此兼容，这样应急反应者可将它们连为一个整个的系统。BIM——与 BAS、人身安全和安保系统一起——清楚展示紧急情况发生在建筑物中的哪里，前往该区域的可行路径以及建筑物中任何具有潜在危险的地方。

- **空间管理：**使用 BIM 有效分配、管理及跟踪设施内的适当空间及相关资源的过程。模型令设施管理团队得以分析空间的现有用途，并针对任何适用的变更有效运用转换规划管理。维护计划是在设施的运营全生命期内维护建筑结构（墙地板、房顶等）及服务于建筑物的设备（机械、电气、管道等）功能的过程。

4.3 模型可交付成果

项目实施方案应清楚规定施工完成时将转交业主的可交付成果。这些可交付成果可包括原有及开源标准两种格式的设计意图模型、施工模型及运营和维护数据（参见图三）。这些可交付成果各自的模型内容应在每个责任方的合同文件及 BIM 的 PxP 中加以明确规定。以下部分提供了对每项可交付成果的描述。

Design Intent Model: The Model(s) from the design team that captures the intended design. This model is used for project BIM Use execution, digital design mock-ups, decision support, and coordination. The approved model is a contract document for submission to the Owner and for construction handover.

Construction Model: The Model(s) based on criteria that relates the facility’s fabrication and construction. These models are developed from the Design Intent Model during construction coordination. The files are typically combined using a cross-platform 3D model viewing software to accommodate subcontractor file formats and a higher LOD. This new information is reviewed by the design team for approval.

As-Built Model: The Model(s) capturing conditions at the completion of construction. It should be initially based upon the Design Intent Model and increasingly incorporates project information as construction progresses.

Record Model: The Model(s) prepared for operations and maintenance. Typically the Design Intent Model is used as a baseline and then is updated to incorporate all the changes during construction. This is intended to be a “lightweight model” with enough detail to enable facilities management operations without overly detailed elements. This model may also include laser scan data. The Record Model will contain accurate attribute data on major equipment and systems for facilities management documented in the BIM PxP. The Record Model typically is updated by the designer from information provided by the contractor (e.g., digital mark-ups, photography, and laser scans). It may be used during commissioning or updated to reflect commissioning data.

Operations and Maintenance Data: This deliverable includes asset inventory with asset name, classification, and location. Owners should consider operations and maintenance data deliverables to include attributes such as make, model, and serial number of key components. Construction Operations Building information exchange (COBie), is an example of facilities data exchange (as referenced in NBIMS-US ™ V3, Section 4.2.)

The Project BIM Team should provide deliverables in compliance with the phases described in the BIM PxP. At each phase, the Project BIM Team should provide a written report confirming that consistency checks, as identified in the Quality Management section of the BIM PxP, have been completed. This report should be discussed as part of the review process and should address any identified interferences and constructability issues.

The Project BIM Team should provide the Owner with the following, as identified in the BIM PxP:

- Updated BIM PxP
- 2-D drawing deliverables printed directly from the model in PDF format. Documents are to be stamped and signed in traditional practice to comply with the Owner Design and Construction Standard and local permitting requests.
- Construction Model(s) per discipline

设计意图模型：来自设计团队的模型，展现了设计意图。此模型用于项目 BIM 用途的执行、数码设计小样、决策支持和协调。经批准的模型为合同文件，需提交业主并移交给施工方。

施工模型：基于规范的此模型将设施的制作与施工联系起来。这些模型在施工协调期间从设计意图模型中开发而来。这些文件通常结合一个跨平台的 3D 模型视图软件，以适应分包商的文件格式及更高层级的 LOD。这些新的信息由设计团队审核批准。

竣工模型：这些模型反映了施工完成时的状况。它在开始时基于设计意图模型，然后随着施工的进展越来越多地结合了项目信息。

记录模型：是为运营和维护所准备的模型。通常使用设计意图模型作为基准，并在施工期间进行更新以将所有的变更信息纳入进来。这意在成为“轻量级”的模型，有足够的细节可在没有过于详细的元素情况下促成设施管理运营。此模型也可包括激光扫描的数据。记录模型中将包含主要设备和系统方面准确的属性数据，以供记录在 BIM 的 PxP 中的设施管理。记录模型通常由设计师以承包商提供的信息（如数码标识、照片和激光扫描件）进行更新。它可在试运行期间使用，或进行更新以反映试运行的数据。

运营和维护数据：此项可交付成果包括注有资产名称、类别和地点的资产清单。业主应考虑在运营和维护数据可交付成果中加入核心组件的属性，如样式、型号和序列号。施工运营建筑信息交换（COBie）为设施数据交换的一例（在 NBIMS-US ™ V3 第 4.2 部分引用）。

项目 BIM 团队应提供与 BIM 的 PxP 中所述的阶段相一致的可交付成果。在每个阶段，项目 BIM 团队应提供书面报告确认一致性检查，如 BIM 的 PxP 的“质量管理”部分所识别，业已完成。这份报告应作为审核过程的组成部分加以讨论，且应处理任何发现的冲突和可施工性问题。

如 BIM 的 PxP 中所识别，项目 BIM 团队应向业主提供以下可交付成果：

- 更新后的 BIM 的 PxP
- 直接从模型中以 PDF 格式打印的二维图纸。文件要以传统方式签字盖章，以符合“业主设计和施工标准”及当地的许可证申请要求。
- 按专业提供的施工模型

- A 3-D interactive review format of the model in the latest version of software, as required in the BIM PxP. The file format for reviews can change between submittals.
- Construction Submittals. All construction submittals, requests for interpretation (RFIs), and change order requests (CORs) should make use of the model for clear interpretations.
- Record model(s)
- A report generated from the model of all assets and attributes
- A report verifying the model/modeling compliance with Owner Project Data exchange requirements
- A report verifying the accuracy of the delivered model elements and asset attributes
- An interference (clash detection) check report
- A list of all submitted files. The list should include a description, directory, and file name for each file submitted. Identify files that have been produced from the submitted model and Project Data.

The BIM PxP should define additional model deliverables for the project. Deliverable deadlines should be aligned with project milestones, for example:

- Schematic Design
- Detailed Design
- Construction Documents
- Bid/Procure
- Contract
- Notice to Proceed
- Construction
- Substantial Completion
- Commissioning
- Final Inspection
- Occupancy/Operations and Maintenance
- 10-Month Warranty Review

- 如 BIM 的 PxP 中所要求，采用最新版软件的模型的 3D 互动审核格式。供审核的文件格式可不必每次提交时均相同。
- 施工提交品。所有的施工提交品、解释请求（RFI）及变更单请求（COR）均应使用此模型以便做出清楚的解释。
- 记录模型
- 此模型产生一份有关所有资产及属性的报告
- 一份验证模型 / 建模符合业主项目数据交换要求的报告
- 一份验证交付的模型元素和资产属性的准确性的报告
- 一份冲突（冲突识别）检查报告
- 所有已提交文件的清单。此清单应包括每份已提交文件的描述、目录和文件名称。指出从已提交模型和项目数据中制作的文件。

BIM 的 PxP 应针对项目规定额外的模型可交付成果。可交付成果的交付截止时间应与项目的里程碑保持一致，如以下项目里程碑：

- 方案设计
- 深化设计
- 施工文件
- 招标 / 采购
- 合同
- 动工通知
- 施工
- 实体竣工
- 试运行
- 最终检查
- 入驻 / 运营和维护
- 10 个月的质保审核

5. GLOSSARY

(Please note that references to “model” and any related requirements refer to individual models, such as a particular discipline/trade model, as well as to composite or federated models.)

As-Built Model: The model(s) capturing conditions at the completion of construction. It should be initially based upon the Design Intent Model and increasingly incorporates information as construction progresses.

Attributes: descriptors that represent the characteristics of elements (e.g., name, length, weight, price, manufacturer, model, warranty information, etc.)

BIM Element Matrix: A structure that defines the elements to be modeled for each phase of the design and construction process.

BIM Project Execution Plan (PxP): A plan that defines how BIM will be implemented throughout the project life cycle.

BIM Use: A method of applying Building Information Modeling during a facility's life-cycle to achieve one or more specific objectives, as defined by Kreider, R., and Messner, J. I. The Uses of BIM (2013). Pennsylvania State University, University Park, PA. http://bim.psu.edu

Building Information Model (BIM)/Model, as defined in the National BIM Standard – United States® Version 3: The digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility, forming a reliable basis for decisions during its life cycle from inception onwards.”

Construction Model: The model(s) based on criteria that relates the facility’s construction.

Construction Operations Building information exchange (COBie), as defined in the National BIM Standard – United States® Version 3: The format for the exchange of information about building assets such as equipment, products, materials, and spaces.

Data Security Protocol (DSP): A definition of the security requirements for data to be implemented for the project and incorporated into the BIM PxP.

Design Intent Model: The model(s) from the design team that captures the intended design.

5. 词汇表

（请注意：提及“模型”及任何相关要求时是指单个的模型，如特定专业 / 工种的模型，也指复合模型或联合模型。）

竣工模型：这些模型的内容是反映施工完成时的状况。它在开始时应基于设计意图模型，随着施工的进展纳入越来越多各方面的综合信息。

属性： 表现元素特征的描述（如名称、长度、重量、价格、制造商、型号、质保信息等）。

BIM 元素矩阵：是定义设计和施工过程中的每个阶段建模所需元素的一种结构。

BIM 项目实施方案（PxP）：是定义 BIM 将如何在项目的全生命周期中实施的方案。

BIM 用途：在设施的全生命周期中运用“建筑信息模型”以实现一个或多个特定目标的方法，此定义见 Kreider, R. 和 Messner, J. I.：《使用 BIM》（2013 年）。宾州州立大学，宾州大学园。http://bim.psu.edu

建筑信息模型（BIM）/ 模型，定义见《BIM 国家标准——美国》® 第 3 版：数字化呈现设施的物理和功能特征。因此它发挥设施信息知识资源共享的作用，从成立起就为设施全生命周期期间的决策提供可靠的基础。”

施工模型：基于与设施施工相关的技术规范的模型。

施工运营建筑信息交换（COBie），定义见《BIM 国家标准——美国》® 第 3 版：设备、产品、材料和空间等建筑资产方面信息交换的格式。

数据安全议定书（DSP）：规定了项目即将实施且即将纳入 BIM 的 PxP 中的相应数据的安全要求。

设计意图模型：来自设计团队的模型，内容为设计意图。

Industry Foundation Class (IFC): The Industry Foundation Class (IFC) is a data standard (specification) maintained by buildingSMART International and accepted as ISO Standard 16739. It is intended to allow the exchange of building and construction industry data between software applications. It is a platform neutral, open file format specification that is not controlled by a single vendor or group of vendors.

Level of Development (LOD) (as defined the BimForum website, November 2015): The degree to which the element’s geometry and attached information have been thought through—the degree to which Project BIM Team members may rely on the information when using the model.

Model: See Building Information Model. Model Element: A portion of the model(s) representing a major component, assembly, or construction entity (part) which, in itself or in combination with other parts, fulfills a predominating function of a construction entity.

Model Element Author (MEA): The party responsible for creating or updating any given model element.

Model View Definition (MVD): An IFC View Definition, or Model View Definition, MVD, defines a subset of the IFC schema that is needed to satisfy one or many exchange requirements of the building industry. The method used and propagated by buildingSMART to define such Exchange Requirements is the Information Delivery Manual, IDM (also ISO/DIS 29481). An IFC Model View Definition defines a legal subset of the IFC Schema (being complete) and provides implementation guidance (or implementation agreements) for the IFC concepts (classes, attributes, relationships, property sets, quantity definitions, etc.) used within this subset.

OmniClass ™ : A classification system for the construction industry.

Owner: Person or entity that represents and controls financial interests of a property, building, or development.

Owner's Performance Requirements (OPR): The Owner's written documentation of the functional requirements of the building and expectations of how it will be used and operated. They include project and design goals, budgets, limitations, and schedules.

行业基准分类（IFC）：行业基准分类（IFC）是智能化建造国际机构主张的且被接受为第 16739 号 ISO 标准的数据标准（规范）。其旨在实现建筑施工行业数据在各软件应用之间进行交换。它是一套平台中立的、开源的文件格式规范，不受单一的销售商或一群销售商所控制。

开发程度（LOD）（定义见 BIM 论坛网站，2015 年 11 月）：在此程度上据以认识元素的几何形状及所附信息——项目 BIM 团队成员在使用模型时对信息可以依赖的程度。

模型：参见“建筑信息模型”。

模型元素：呈现某个主要组件、部件或施工体（部分）（其本身或与其它部分共同执行施工体的某项主导功能）的部分模型。

模型元素创造者（MEA）：负责创建或更新任何给定的模型元素的一方。

模型视图定义（MVD）：IFC 视图定义或模型视图定义（MVD）规定了满足建筑行业的一项或多项交换要求所需的 IFC 架构的一个子集。智能化建造机构所采用并推广的定义此等交换要求的方法是《信息交付手册》（IDM）（亦为 ISO/DIS 29481）。IFC 模型视图定义规定了 IFC 架构（完整架构）的一个法定子集并为此子集中使用的 IFC 概念（类别、属性、关系、性质集合、数量定义等）提供了实施指南（或实施协议）。

OmniClass ™：施工行业的一种分类体系。

业主：代表并控制地产、建筑物或开发项目的经济利益的个人或实体。

业主的性能要求：业主的书面文件，内容为对建筑物的功能要求及对建筑物如何使用和运营的预期。其中包括项目和设计的目标、预算、限制条件和进度。

Organizational Standards: Standards unique to every Owner and include the Owner's written policies, procedures, and processes. The Owner is encouraged, when creating any Organizational Standards that will be used as part of the contract language, PxPs, and OPRs, to document them in writing, especially when it comes to expected outcomes and deliverables.

Primary Standards: Standards written typically by local, national, and international organizations and industry groups by consent or consensus that establish minimum levels of performance and quality and are used for comparative evaluation and verification of compliance. Primary Standards are often adopted by an agency, organization, industry, or government body.

Project Data: Project data is the written and graphical information used to plan, design, construct and operate the building. It should include Model files (BIM, CAD); drawing files (CAD, electronic sheets such as PDFs, and/or plot files);electronic manuals; tabular/ textual information derived from BIM (e.g., spreadsheets); and reference files necessary to supplement other project data.

Project Life Cycle: The full development of a building project from conception to demolition, including four phases (Planning, Design, Construction, and Operations).

Project Quality Management: a subset of project management that includes the actions required to ensure that the project will satisfy the needs for which it was undertaken. It consists of quality planning, quality assurance, and quality control.

Project BIM Team: typical members include the Owner, architect, engineers, contractors, subcontractors, and other stakeholders. The Project BIM Team members can vary by phase; stakeholders or participants will be introduced to and leave the Project BIM Team as the project progresses through its life cycle.

Record Model: The model(s) prepared for Operations and Maintenance. Typically the Design Intent Model is used as a baseline and then is updated to incorporate all the changes during construction. This is intended to be a lightweight model with enough detail to enable facilities management operations without overly detailed elements.

Reference Standards: Standards included by reference in Organizational Standards, Primary Standards, and Contract Documents and carry the full force and effect of their requirements as if their entire text had been replicated in full where referenced. Care should be taken when including Reference Standards in an Organizational Standard, Primary Standard, or Contract Document to be specific whether compliance with the entire Reference Standard is required or whether only compliance with certain portions of the Reference Standard is required. Reference Standards not only reduce a primary document's size, but also improve a primary document’s usefulness and effectiveness by relying on other standards-development organizations with better-suited expertise on particular subjects.

组织标准：每位业主的独特标准，包括业主的书面政策、流程和过程。业主在创建用于合同语言、PxP 和 OPR 中的任何组织标准时，最好形成书面文字，尤其涉及预期的结果和可交付成果时更应如此。

基础标准：通常由地方性、全国性和国际性组织和行业团体经表示同意或达成共识制定的标准，确定最低程度的性能和质量，用于进行比较评价和验证合规性。基础标准通常由机构、组织、行业或政府部门所采纳。

项目数据：项目数据是用于建筑物规划、设计、施工和运营的书面的图形信息。它们应包括模型文件（BIM、CAD）、图纸文件（CAD、PDF 之类的电子表格和 / 或打印文件）、电子手册、源自 BIM 的图表 / 文字信息（如电子表格）以及对其它项目数据构成必要补充的参考文献。

项目全生命周期：建筑项目从酝酿到拆除的整个发展过程，包括四个阶段（规划、设计、施工和运营）。

项目质量管理： 项目管理的一个子集，其中包括为确保项目满足预定需要所要求采取的行动。它由质量规划、质量保证和质量控制所组成。

项目 BIM 团队： 成员通常包括业主、建筑师、工程师、承包商、分包商及其它利益相关人。项目 BIM 团队的成员在各个阶段可能不同；在项目全生命周期里，不同的利益相关人或参与者将会进入和离开项目 BIM 团队。

记录模型：为运营和维护所准备的模型。通常使用设计意图模型作为基准，在施工期间进行更新以将所有的变更纳入进来。这就成为“轻量级”的模型，它有足够的细节可使设施管理运营，但没有过于详细的元素。

引用标准：组织标准、基础标准及合同文件中通过引用纳入的标准，其要求具备完全的效力，仿如它们的全部文字在引用处完全复制。如在组织标准、基础标准或合同文件中纳入引用标准，应注意明确是要求符合整个的引用标准还是要求符合引用标准的某个部分。引用标准不仅减少了基础文件的规模，同时由于依赖对特定主题具有更合适的专业知识的其它标准开发组织，这样做也提高了基础文件的可用性和效果。

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ICMS may help to maximize the benefits of any cost analysis by providing clarity in the categorization of costs.

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Guide, Instructions and Commentary to the 2013 AIA Digital Practice Documents

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INTRODUCTION

Purpose of this Guide, Instructions and Commentary

As the use of building information modeling (BIM) and other types of Digital Data has continued to evolve in the design and construction industry in recent years, the industry has begun to ask practical questions regarding how these concepts and tools should be implemented. In an effort to provide guidance, the American Institute of Architects (AIA) published its first Digital Data documents, AIA Documents E201™–2007, Digital Data Protocol Exhibit, and C106™–2007, Digital Data Licensing Agreement, in October 2007. E201–2007 is an exhibit to an agreement that allows the parties to establish the procedures they agree to follow with respect to the transmission or exchange of Digital Data, including instruments of service. Unlike E201–2007, C106–2007 is not an exhibit and is instead a stand-alone agreement between

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two parties who otherwise have no existing licensing agreement for the use and transmission of Digital Data, including Instruments of Service.[1] Following the release of E201–2007, the AIA addressed the increasing use of BIM with the publication of AIA Document E202™–2008, Building Information Protocol Exhibit. Like E201–2007, E202–2008 is an exhibit that is attached to the parties' agreement. E202–2008 is used to establish the requirements for model content at five progressive levels of development, and the authorized uses of the model content at each level of development. E202–2008 also assigns authorship of each model element by project phase, defines the extent to which model users may rely on model content, clarifies model ownership, sets forth BIM standards and file formats, and provides the scope of responsibility for model management from the beginning to the end of the project.

Digital practice and the use of BIM are rapidly evolving areas of the industry. Typically AIA Contract Documents are revised on a ten year cycle. However, given the pace at which use of Digital Data in the construction industry is changing, a ten year review cycle for the Digital Practice documents would have been too long, to maintain a meaningful tool for industry participants. Accordingly, in 2011 the AIA undertook to again evaluate continued development and adoption of digital practice and BIM. As a result of this evaluation, the AIA created an updated and reconfigured new set of Digital Practice documents that includes AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit; AIA Document G201™–2013, Project Digital Data Protocol Form; and AIA Document G202™–2013, Project Building Information Modeling Protocol Form. This Guide, Instructions and Commentary to the 2013 AIA Digital Practice Documents (the "Guide") is intended to provide an in-depth look at this set of Digital Practice documents, and to provide guidance on how the documents are intended to be used.

Structural Revisions to AIA's Digital Practice Documents

The updated new set of Digital Practice documents includes a substantial amount of content from E201–2007 and E202–2008. The content, however, has been restructured, edited and expanded upon. This process has also resulted in a set of documents that are structurally different from their predecessors.

E203–2013 is an exhibit that is intended to be attached to an agreement at the time the agreement is executed. E203–2013 consists of general provisions (i.e., purpose statement, definitions) that would not normally change as the project proceeds. It also provides a place for the parties to identify which party, if any, will be charged with Digital Data management or model management responsibilities. Accordingly, to the extent these responsibilities affect the scope of services; they are included as a part of the initial agreement.

The primary purpose of E203–2013 is to initiate, at the outset of a project, a substantive discussion about the extent to which Digital Data and BIM will be utilized, and how Digital Data and models can be used and relied upon. Once a general understanding is reached, the project participants use E203–2013 to document the agreed upon expectations regarding scope and anticipated Authorized Uses of Digital Data and BIM. The premise is that there will be a single version of E203–2013 negotiated for a project and that version will be included as an exhibit to each contract on the project. Accordingly, the title page for E203–2013 does not reference a specific agreement. The agreements to which E203–2013 is made an exhibit will include a reference to the dated version of the incorporated E203–2013. For example, in B101–2007, the Owner and Architect would list and incorporate E203–2013 in Article 13. Through this process, the various Project Participants begin the Project with a common understanding of how Digital Data and BIM will, generally, be utilized on the project. To the extent Project Participants are utilizing AIA agreements that reference

[1] While C106–2007 was updated as part of the AIA's 2013 revisions to its Digital Practice documents, the only substantive change to the document was to add a fill point allowing the Parties to clearly identify the Digital Data subject to the license granted in the agreement. Therefore, C106–2013 is not discussed in detail in this Guide.

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E201–2007 or E202–2008, it will be necessary to delete or otherwise modify those references. E203–2013, G201–2013 and G202–2013 are substitutes for, and replace E201 and E202.

Having set the baseline regarding Digital Data and BIM expectations, E203–2013 then requires the Project Participants, "[a]s soon as practical" after execution of the agreement, to meet and decide upon the necessary and relevant protocols for the development and use of Digital Data and BIM. Once agreed to, the protocols are memorialized in G201–2013 and G202–2013. AIA Document G201–2013 is used to document the agreed upon Digital Data protocols while G202–2013 is used to document the Modeling protocols. G201–2013 and G202–2013 are not expressly incorporated into the project participants' agreements, however; the terms of the E203–2013 (attached to each Project Participant's agreement) require each party to follow the protocols once established, and as updated from time to time.

The separation of the exhibit and protocols is a departure from the approach taken in E201–2007 and E202–2008, in which the detailed protocols are part of the exhibit. There are a number of benefits to this new approach. E203 no longer requires the Project Participants to negotiate and finalize the detailed Digital Data and Modeling protocols at the same time they make their initial decisions regarding whether and how to use Digital Data and BIM. By separating the protocols from the exhibit, the Project Participants are able to first discuss and document their general expectations regarding use of Digital Data and BIM on the Project. Subsequently, the protocols are negotiated and agreed upon at a time that makes the most sense for the Project (e.g., after the key design and construction contracts are negotiated, and after all the relevant Project Participants are on-board). Further, because the protocols set forth in G201–2013 and G202–2013 are not a part of the underlying agreement, they can be modified and adjusted as necessary without the need to separately and formally amend each party's agreement.

While E203–2013 requires the Project Participants to follow the most recent protocols, enforcement of that obligation may ultimately depend on the ability of a Project Participant to prove that the other Project Participants agreed to the protocols seeking to be enforced. Accordingly, in utilizing G201–2013 and G202–2013, the Project Participants should develop an acceptable process to document the receipt of, and agreement to, each version of the protocols by each Project Participant. Such a process will protect against a Project Participant ultimately claiming that it never saw, or agreed to, the latest version of the relevant protocols and therefore is not bound by them. There are a variety of ways the Project Participants might document receipt and agreement. (See discussion at E203, Sections 3.2.2 and 4.5.3 below.)

Revisions to this Guide

This Guide not only allows the AIA to provide guidance on how to use the existing documents, it also provides the ability to address new topics as they develop. This Guide will be updated as necessary to reflect changing industry standards. The revision date of this document is included in the lower right hand corner of the document. Please check back periodically to confirm that you have the latest version of this Guide.

How to Use this Guide

The following is a section-by-section analysis and discussion of AIA Documents E203–2013, G201–2013 and G202–2013. For each section of the documents, the Guide reproduces the text of the underlying document, which is directly followed by a detailed discussion. In addition to the general discussion, the Guide also provides suggested alternate language for certain sections to address various project specific needs. The suggested language is indented from the body text of the Guide.

To go to specific sections of interest in this guide, click Bookmark links or topics in the Table of Contents. To view bookmarks, click the Bookmark button on the left-hand Navigation pane.

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GUIDANCE

Guidance, Instructions and Commentary to AIA Document E203–2013, Building Information Modeling and Digital Data Exhibit

E203–2013 is the anchor of the AIA's new set of Digital Practice documents and sets the stage for the development of Digital Data and Modeling protocols for the Project. It is comprised of five articles:

Article 1 General Provisions
Article 2 Transmission and Ownership of Digital Data
Article 3 Digital Data Protocols
Article 4 Building Information Modeling Protocols
Article 5 Other Terms and Conditions

Article 1 describes the overall purpose, contains key provisions related to the flow down of obligations and establishes a set of standard definitions for terms such as Digital Data, Level of Development, Authorized Use, Party, Project Participant, etc. that will be used throughout the Digital Practice documents. Terms that are defined in E203 Article 1 are capitalized throughout this Guide.

Article 2 addresses topics related to the transmission of Digital Data, including treatment of confidential Digital Data.

Article 3 addresses the Parties' intention to utilize Digital Data, and to subsequently establish protocols regarding its transmission and use. If necessary, in Article 3 the Parties will also identify who will be charged with the responsibility of managing a centralized electronic document management system for the Project.

Article 4 addresses the Parties' intentions for BIM utilization on the Project and, if necessary, the subsequent creation of applicable protocols. Article 4 also provides a place to identify who will be charged with Model management responsibilities.

As stated above, the actual protocols required to be established pursuant to both Article 3 and Article 4 are not set forth in E203–2013—instead, the protocols for Digital Data are described in G201–2013, and the protocols for BIM in G202–2013.

Article 5 provides a space for the Parties to indicate any other provisions that will apply to their use of Digital Data or BIM on the Project.

Article 1 General Provisions

E203–2013 Section 1.1

§ 1.1 This Exhibit provides for the establishment of protocols for the development, use, transmission, and exchange of Digital Data for the Project. If Building Information Modeling will be utilized, this Exhibit also provides for the establishment of the protocols necessary to implement the use of Building Information Modeling on the Project, including protocols that establish the expected Level of Development for Model Elements at various milestones of the Project, and the associated Authorized Uses of the Building Information Models.

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Article 1 of E203–2013 begins with a series of sections explaining the general purpose of the document, how the terms of the exhibit relate to the underlying Agreement into which it is incorporated, how it is applicable across the Project, and the potential impact subsequent protocols may have on the Parties' scopes of services, scopes of work, and related compensation. Section 1.1 establishes the intent and purpose of E203–2013.

E203–2013 Section 1.2

§ 1.2 The Parties agree to incorporate this Exhibit into their agreements with any other Project Participants that may develop or make use of Digital Data on the Project. Prior to transmitting or allowing access to Digital Data, a Party may require any Project Participant to provide reasonable evidence that it has incorporated this Exhibit into its agreement for the Project, and agreed to the most recent Project specific versions of AIA Document G201™–2013, Project Digital Data Protocol Form and AIA Document G202™–2013, Building Information Modeling Protocol Form.

A primary purpose of these Digital Practice documents is to encourage the useful sharing of Digital Data, by providing the Project Participants a way to establish the framework and expectations regarding the creation, sharing and use of Digital Data on the Project. Digital Data is defined in E203–2013 to include Building Information Modeling. To be effective, the subsequently agreed upon protocols and standards must be recognized by all the Project Participants that will create and use the Digital Data. Accordingly, the Parties agree that they will incorporate the Exhibit into all other agreements on the Project. (G201–2013 Section 1.1 contains a fill point to list of the Project Participants that have attached the Exhibit to their agreement.)

Section 1.2 requires the Parties (in all instances the term "Parties" refers to the parties to the underlying Agreement to which E203–2013 is attached) to incorporate E203–2013 into each of the Party's other agreements for the Project. For example, if an owner and architect negotiate and attach an E203–2013 to AIA Document B101™–2007, Standard Form Agreement between Owner and Architect, the architect would be required to incorporate the same E203–2013 into each of its consultant agreements. Similarly, the Owner would be required to incorporate E203–2013 into its agreement with the Contractor, who would in turn be required to incorporate E203–2013 into its Subcontractor agreements. Through this flow-down process, E203–2013 permeates the entire Project.

The intent is that E203–2013 will be incorporated into the underlying Agreement when the Agreement is executed. In B101–2007, E203–2013 can be incorporated by referencing it in Section 13.2.2 of Article 13, Scope of the Agreement. Currently, B101–2007 includes a reference to E201–2007 (note that B101–2007 does not reference E202–2008 because E202–2008 was published after B101–2007). As E203–2013 is intended to replace E201–2007 (and E202–2008), the existing language can be deleted and replaced with language referencing E203–2013 by name and date. An example of such language would be as follows:

> **§ 13.2.2** AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated _____.

The process for incorporating E203–2013 into AIA Contract Documents standard form Owner/Contractor agreements would be similar. In AIA Document A101™–2007, Standard Form Agreement between Owner and Contractor where the basis of payment is a Stipulate Sum, E203–2013 can be incorporated by reference in Section 9.1.7.1. As is the case in B101–2007, the current reference to E201–2007 should be

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deleted and replaced with language referencing E203–2013 by name and date. The suggested language above for B101–2007 would be sufficient in A101–2007 as well.

It is also possible that the Parties would need to incorporate E203–2013 after the initial execution of the Agreement. In that case, the Parties would execute an amendment to the Agreement. For amendments to Owner/Architect agreements, the AIA publishes AIA Document G802™–2007, Amendment to the Professional Services Agreement. In the space provided in G802–2007 below the words "As follows," the Parties can insert language indicating that the Agreement is being amended to incorporate E203–2013. An example of such language would be as follows:

> The Agreement is amended to incorporate AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated _____.

If the incorporation of E203–2013 will result in an adjustment to compensation or contract time, G802–2007 allows the Parties to indicate any adjustments.

For amendments to consultant agreements, the AIA publishes G803™–2007, Amendment to the Consultant Services Agreement. G803–2007 is set up similarly to G802–2007 and the suggestions above, and example language, would apply to G803–2007 as well.

If the Parties need to amend an Owner/Contractor agreement, the Parties can use AIA Document G701–2001, Change Order. In the space provided below the phrase "The Contract is changed as follows" the Parties can insert language indicating that the Contract is being amended to incorporate E203–2013. An example of such language would be as follows:

> The Contract is amended to incorporate AIA Document E203–2013, Building Information Modeling and Digital Data Exhibit, dated _____.

Similarly, if the incorporation of E203–2013 will result in an adjustment to compensation or contract time, G701–2001 allows the Parties to indicate any adjustments.

It should be noted that the general flow-down provisions of some of the AIA Contract Documents, including the AIA Architect/Consultant Agreement (C401–2007) and the Contractor/Subcontractor Agreement (A401–2007) may arguably already pass along the obligations of the E203–2013 if the exhibit is incorporated into the relevant Prime Agreement prior to the time the sub-agreements are executed. Relying on such a flow down, however, is possibly ambiguous. However, including language in the Agreement explicitly incorporating E203–2013 is likely the clearest way to assure that the document is incorporated in downstream agreements. Given the relative novelty of these documents, and the various nuances presented on a project-by-project basis, users may wish to consult with an attorney to determine the best way to incorporate E203–2013 into their agreements.

It may also be the case that a Model will only be shared amongst the Project Participants on one side of a Project (e.g., only the design team will be sharing the Model). E203–2013 can be utilized in such a scenario and there are a few options available to users to achieve this result. Some options are outlined below in the discussion pertaining to E203–2013 Section 4.1. Another solution would be to only incorporate E203–2013 into the Architect/Consultant and Consultant/Sub-consultant agreements. Accordingly, E203–2013 and the related protocol forms could be completed, but they would only apply to the design team. To achieve this

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result, however, this Section 1.2 would need to be modified. As currently drafted, if E203–2013 were attached to the Architect/Consultant agreement, the Architect would be obligated to incorporate E203–2013 into its agreement with the Owner, which would trigger the Owner's obligation to incorporate E203–2013 into its agreement with the Contractor. Accordingly, Section 1.2 would need to clarify that E203–2013 is not to be incorporated in the Architect/Owner agreement, but that the Architect and Consultant will incorporate E203–2013 in their downstream agreements only.

E203–2013 Section 1.2.1

§ 1.2.1 The Parties agree that each of the Project Participants utilizing Digital Data on the Project is an intended third party beneficiary of the Section 1.2 obligation to incorporate this Exhibit into agreements with other Project Participants, and any rights and defenses associated with the enforcement of that obligation. This Exhibit does not create any third-party beneficiary rights other than those expressly identified in this Section 1.2.1.

This section is intended to protect the Parties in situations where some Project Participants, with whom the Parties do not have a direct contractual relationship, fail to incorporate the exhibit into their agreements with consultants or contractors (please see the discussion below related to E203–2013 Section 1.4.12 for a discussion of the difference in definitions for the terms "Parties" and "Project Participants"). As noted above, it is E203–2013 that creates the contractual obligations to follow the agreed upon Digital Data and Modeling protocols. Therefore, it is necessary that the terms of E203–2013 be applicable to all the relevant Project Participants throughout the network of agreements on the Project. If a Party fails to incorporate the Exhibit, as required in Section 1.2, into any agreement with a consultant or contractor, that consultant or contractor may not be obligated to comply with developed protocols. Therefore, the protections that the protocols provide upstream (restrictions on Authorized Uses) may be lost.

To illustrate the concern that is being addressed, consider the following example. If the Owner and Architect incorporate E203–2013 into their Agreement, via Section 1.2, they both agree to incorporate the E203–2013 into their downstream agreements with other Project Participants. If the Owner, however, fails to incorporate E203–2013 into its agreement with the Contractor, the Owner has breached a contractual duty to the Architect and would be responsible to the Architect for resulting damages. So, for example, if the contractor, unaware of restrictions contained in the protocols, used some portion of the Digital Data supplied by the Architect for a purpose not otherwise sanctioned in the protocols, and subsequently brought a claim against the Architect for damages arising from reliance on the Digital Data the Architect provided, the Architect would have a claim against the Owner for its failure to incorporate E203–2013. Accordingly, the Architect receives some level of protection to the extent it can show some damage as a result of the Owner's breach of this provision.

Alternatively, consider a scenario where the Owner satisfies its obligations and incorporates E203–2013 into its Agreement with the Contractor but the Contractor fails to incorporate E203–2013 into its agreements with its sub-contractors and consultants. Thereafter, one of those consultants or subcontractors relies on the Digital Data in a manner that is inconsistent with the protocols, resulting in some injury to a third party. The third party then brings a claim against the Architect.

In this instance, in the absence of Section 1.2.1, the Architect would likely have no recourse against the Contractor based on the Contractor's failure to satisfy the Section 1.2 obligation to incorporate E203–2013

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downstream, because the Architect has no contractual relationship with the Contractor. The Architect's contractual relationship is with the Owner, who satisfied its obligation by incorporating E203–2013 into its Agreement with the Contractor.

However, Section 1.2.1 was created to give all the Project Participants the ability to enforce the obligations under Section 1.2 against all the other Project Participants. In the example above, the Architect, as a third party beneficiary, would therefore have the same protection against the Contractor, for contractual breach of Section 1.2, as it does against the Owner. The Architect might then bring a claim for breach of contract against the Contractor, and seek to recover any amounts paid on the third party claim as damages arising from the Contractor's breach.

Another option to protect against failure of downstream incorporation of E203–2013 would be to utilize some kind of a broad indemnification language. An example of such language would be as follows:

> **§ 1.2.1** If a Party fails to incorporate this Exhibit into its agreements with any other Project Participants that may develop or make use of Digital Data for this Project, that Party agrees to indemnify and hold harmless the other Project Participants and their contractors, consultants, agents and employees, to the fullest extent permitted by law, from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from such Project Participants' use of Digital Data inconsistent with the terms of this Exhibit.

Any indemnification language included, however, should be reviewed closely with legal and insurance counsel as indemnification provisions are notoriously difficult to enforce, and in some circumstances may create an uninsurable obligation. In many jurisdictions, anti-indemnification statutes limit the validity and enforceability of indemnification provisions in contracts. The suggested language contains an indemnification under which the indemnitor's obligation covers the indemnitee's losses to the extent caused by the use of Digital Data, inconsistent with the terms of the exhibit, by any of the indemnitor's consultants or contractors that do not have the E203–2013 attached to their agreement. As such, the indemnitee's obligations may be triggered by an act that does not otherwise constitute negligence on their part. Accordingly, it is unclear what effect, if any, anti-indemnifications statues may have on the enforceability of such an indemnity. Moreover, many Project Participants have a general aversion to broad indemnification provisions and seek to have them stricken as a matter of routine.

E203–2013 Section 1.3

§ 1.3 Adjustments to the Agreement

§ 1.3.1 If a Party believes that protocols established pursuant to Sections 3.2 or 4.5, and memorialized in AIA Documents G201–2013 and G202–2013, will result in a change in the Party's scope of work or services warranting an adjustment in compensation, contract sum, schedule or contract time, the Party shall notify the other Party. Failure to provide notice as required in this Section 1.3 shall result in a Party's waiver of any claims for adjustments in compensation, contract sum, schedule or contract time as a result of the established protocols.

§ 1.3.2 Upon such notice, the Parties shall discuss and negotiate revisions to the protocols or discuss and negotiate any adjustments in compensation, contract sum, schedule or contract time in accordance with the terms of the Agreement.

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§ 1.3.3 Notice required under this Section 1.3 shall be provided within thirty days of receipt of the protocols, unless otherwise indicated below:
(If the Parties require a notice period other than thirty days of receipt of the protocols, indicate the notice period below.)

E203–2013 is intended to be negotiated early in the Project, when the Parties' expectations for use of Digital Data are most likely not fully refined. E203–2013 only requires identification of the general anticipated uses of Digital Data, subject to refinement and greater detail in the protocols that are subsequently established in G201–2013 and G202–2013. Accordingly, negotiated fees and contract sums the Parties include in the Agreement are based on the general statements of anticipated use for Digital Data and not on the fully developed protocols. Once the Parties begin to identify specific standards and tasks to be performed as part of the protocols, it is quite conceivable that the fully developed requirements may exceed initial expectations regarding scope. To the extent the specific protocols and requirements represent a change to initial expectations, adjustments in compensation and/or contract time should be considered and negotiated.

If a Party believes that the protocols, once established, necessitate an adjustment in compensation, schedule or contract time, that Party must provide notice to the other Party. The standard language in Section 1.3 states that such notice must be provided within 30 days of receipt of the protocols; however, the Parties are free to insert a different notice period to better fit the unique characteristics of their Project.

Once notice is provided adjustments to compensation, schedule or contract time are made in accordance with the provisions of the Agreement. Accordingly, if E203–2013 is attached to an A101–2007, the Owner and Contractor would follow the Change Order provisions set forth in A201–2007. Under B101–2007, the Owner and Architect would then undertake to negotiate an amendment.

While the underlying contracts will control the process for making adjustments based on the Digital Data or Modeling protocols, users must be aware that E203–2013 adds a procedural condition precedent to the processes. A Party must first provide the notice required under this Section 1.3. Failure to provide notice within the time period set forth in Section 1.3 will result in the Party waiving the ability to seek any adjustments relating to the established protocols.

This issue of expanded scope will most likely come into play when the protocols issued as part of G201–2013 and G202–2013 are compared to the Parties' original statements in E203–2013 regarding the Anticipated Types of Digital Data (E203–2013 Section 3.1) as well as those regarding the Anticipated Building Information Modeling Scope, Authorized Uses, and Ancillary Modeling Activities (E203–2013 Sections 4.2, 4.3 and 4.4 respectively). The goal in completing E203–2013 should be to avoid having to renegotiate fees once the protocols are established, because such an effort can detrimentally impact Project relationships. To the extent users can provide as much detail and clarity as possible in E203–2013, with regard to the anticipated scope of modeling and use of other Digital Data, the greater likelihood subsequent disputes over fees can be avoided.

As noted, E203–2013 establishes the Parties' initial expectations regarding use of Digital Data, including Modeling. When those protocols are established and set forth in G201–2013 and G202–2013, however, each Party would be well served to review the protocols closely in conjunction with the original statements in E203–2013 to determine if they should pursue an adjustment in compensation or time.

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E203–2013 Section 1.4

§ 1.4 Definitions

Defined terms are capitalized throughout the document. The defined terms are coordinated for use with standard AIA Contract Documents. To the extent E203–2013 is used in conjunction with non-AIA agreements, the definitions may need to be modified to coordinate with the terms used in such documents.

E203–2013 Section 1.4.1

§ 1.4.1 Building Information Model. A Building Information Model is a digital representation of the Project, or a portion of the Project, and is referred to in this Exhibit as the "Model," which term may be used herein to describe a Model Element, a single model or multiple models used in the aggregate, as well as other data sets identified in AIA Document G202–2013, Project Building Information Modeling Protocol Form.

The definition of Building Information Model set forth in this section is largely consistent with current industry understandings. For example, the National BIM Standard defines a Building Information Model as "a digital representation of physical and functional characteristics of a facility," a definition explicitly crafted to encompass multiple files as well as information beyond 3D geometry.

To develop Model protocols it is important that the Project Participants have a good understanding of what will be considered part of the Project's Model. Because a Model is likely to contain a large number of files, and because there are often multiple ways of representing a given piece of Project information, it will be up to the Project Participants to explicitly determine which files are part of the Model. This has implications for a wide range of issues, including determining the responsibilities for Digital Data and Model management and defining how information will be represented within the Model and what information can be relied on in using the Model. In E203–2013 it is assumed that the Model will consist of a number of interrelated files and databases. G202–2013 Section 1.2 provides a place for explicitly listing these files.

E203–2013 Section 1.4.2

§ 1.4.2 Building Information Modeling. Building Information Modeling or Modeling means the process used to create the Model(s).

There is an entire process involved in the creation of Models (e.g. training, collaboration, sharing of information, clash detection). The term Building Information Modeling or Modeling is used to refer to that process.

E203–2013 Section 1.4.3

§ 1.4.3 Model Element. A Model Element is a portion of the Model representing a component, system or assembly within a building or building site.

The concept of what constitutes a Model Element is significant. In establishing protocols for Modeling, Project Participants are tasked with organizing the development of the Model. A Model consists of many component parts potentially developed by many different entities or individuals. In order to assign responsibility for managing and coordinating the development of the Model to the appropriate Project Participant, and assign the Level of Development, the Model needs to be broken down into component parts. The Model Elements represent these component parts.

It should also be noted that a Model Element is a portion of the Model. Therefore, based on the definition of "Model" as discussed above, the Model Element may not consist solely of a graphical representation.

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The Model Element will also include any other data sets the Project Participants have decided will be part of the Model, as set out in G202–2013 Section 1.2.

E203–2013 Section 1.4.4

§ 1.4.4 Level of Development. The Level of Development (LOD) describes the minimum dimensional, spatial, quantitative, qualitative, and other data included in a Model Element to support the Authorized Uses associated with such LOD.

Each Model Element develops at a different rate. The Level of Development (LOD) framework allows the Project Participants to understand the progression of a Model Element from conceptual idea to precise definition and description. The LOD of a given Model Element informs the other Project Participants about how developed the information is expected to be, and the extent to which that information can be relied upon, at a particular point in time in the development of the Model. Identifying the LOD for each Model Element, along its development path, helps prevents other Project Participants from using the Model Element in an unintended manner or inferring greater precision than the Model Element Author intends. See the Guide topics under G202–2013, Article 2, for a detailed discussion of Levels of Development.

E203–2013 Section 1.4.5

§ 1.4.5 Authorized Uses. The term "Authorized Uses" refers to the permitted uses of Digital Data authorized in the Digital Data and/or Building Information Modeling protocols established pursuant to the terms of this Exhibit.

A large amount of information can be included in a Model Element, regardless of whether or not it has been fully thought through by its author. The approach to this issue has often been to prohibit reliance on any information from the Model, through the use of a broad disclaimer. In essence, the position taken is: "because some of the information is not reliable don't rely on any of it."

The intent behind establishing an Authorized Use is to change the position to "because some of the information is not reliable you can only rely on the information that I explicitly say you can." This allows Project Participants to transmit information through Models for specifically intended purposes, while preventing unintended reliance. The G202–2013 Model Element Table provides a vehicle for defining Authorized Uses, Model Element by Model Element and milestone by milestone.

E203–2013 Section 1.4.6

§ 1.4.6 Model Element Author. The Model Element Author is the entity (or individual) responsible for managing and coordinating the development of a specific Model Element to the LOD required for an identified Project milestone, regardless of who is responsible for providing the content in the Model Element. Model Element Authors are to be identified in Section 3.3, Model Element Table, of G202–2013.

A Model Element Author (MEA) is identified to provide a single point of contact for development of each Model Element, at an identified Project milestone, in order to accomplish the organized development of the Model. As each Model Element evolves, the identity of the MEA may change. For example, when development of a Model Element moves from the design phase to the construction phase the MEA may switch from someone on the design team to a contractor or subcontractor. For example, in the development of the structural system, the designated MEA may change from the architect to the structural engineer and finally to the steel fabricator.

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The designation of an MEA does not change who is in responsible charge for the design. That responsibility is set by the Project Participants' scopes of work in their agreements. The identification of the MEA may be unrelated to the individual or entity that is in responsible charge of the underlying design. For example, while the structural engineer must be in responsible charge of all the structural engineering on a project, the Architect may be listed as the MEA because they are coordinating the development of the Model Element during the design stages.

The MEA is defined as an "individual or entity" to allow flexibility. On some projects consultants or trade contractors may be identified. On others, individual people within those firms may be named in order to facilitate communication and coordination.

E203–2013 Section 1.4.7

§ 1.4.7 Digital Data. Digital Data is information, including communications, drawings, specifications and designs, created or stored for the Project in digital form. Unless otherwise stated, the term Digital Data includes the Model.

Digital Data is defined broadly, and is intended to include all types of data stored or transmitted via digital means. It is important to note that unless stated otherwise, Digital Data includes Models. Accordingly, even though Article 2 of E203–2013 only uses the term Digital Data (and not Models), the provisions of Article 2 apply equally to all Digital Data, including Models.

E203–2013 Section 1.4.8

§ 1.4.8 Confidential Digital Data. Confidential Digital Data is Digital Data containing confidential or business proprietary information that the transmitting party designates and clearly marks as "confidential."

This section provides a specific definition of Confidential Digital Data. Care should be taken to make sure it is consistent and coordinated with any similar definitions in the Agreement. This definition relates directly to Section 2.2. That section addresses the Parties responsibilities with regard to Confidential Digital Data. Any changes or modifications made in Section 1.4.8 will affect Section 2.2.

E203–2013 Section 1.4.9

§ 1.4.9 Written or In Writing. In addition to any definition in the Agreement to which this Exhibit is attached, for purposes of this Exhibit and the Agreement, "written" or "in writing" shall mean any communication prepared and sent using a transmission method set forth in this Exhibit, or the protocols developed pursuant to this Exhibit, that permits the recipient to print the communication.

This section clarifies the meaning of the terms "Written" or "In Writing" as they relate to an increasingly digital world. This clarification is necessary because E203–2013 is an exhibit that will be attached to a complete agreement. It is very possible that the underlying agreement will use these terms, and do so in a context that did not contemplate means of transmission in the age of Digital Data.

E203–2013 Section 1.4.10

§ 1.4.10 Written Notice. In addition to any terms in the Agreement to which this Exhibit is attached, for purposes of this Exhibit and the Agreement, "written notice" shall be deemed to have been duly served if transmitted electronically to an address provided in this Exhibit or the Agreement using a transmission method set forth in this Exhibit that permits the recipient to print the communication.

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This section is a clarification of terms that maybe used in the Agreement in a context that did not contemplate an environment where Digital Data is the primary means of communication.

E203–2013 Section 1.4.11

§ 1.4.11 Party and Parties. The terms "Party" and "Parties" refer to the signing parties to the Agreement.

See E203–2013 Section 1.4.12 discussion.

E203–2013 Section 1.4.12

§ 1.4.12 Project Participant. A Project Participant is an entity (or individual) providing services, work, equipment or materials on the Project and includes the Parties.

While E203–2013 will generally be attached to an agreement between two specific Parties, its intended impact goes beyond just those two Parties. In order to be effective, the Digital Practice documents must guide and impact the actions and behavior of the various participants on the Project that will utilize Digital Data. Accordingly, in describing various responsibilities, E203–2013 and the associated protocol documents often need to refer to the larger group of Project Participants. This section provides the defined term "Project Participant" to address that need.

In some instances, however, there is also a need to refer to the specific Parties to the Agreement to which E203–2013 is attached. The duties and obligations created in E203–2013 contractually flow between the actual Parties who have signed the Agreement, not all of the Project Participants. (The exception to this rule is the limited third party beneficiary provision in Section 1.2.1.) Therefore, E203–2013 also has a definition for "Parties", in Section 1.4.11, in order to distinguish the signatories to the Agreement from all the other Project Participants. The definitions make clear, however, that the term Project Participant includes the Parties.

Further, when the E203 standard language refers to the capitalized term "Agreement," it is referencing the specific agreement to which E203 is attached. Accordingly, the terms of the E203–2013 are only binding on the Parties to the "Agreement." This is why identical versions of the E203–2013 must be incorporated into all the other Project Participants' agreements. Each Project Participant becomes a "Party" when E203–2013 is attached to their agreement. They thereby become subject to the same obligations and restrictions as all the other Project Participants that have E203–2013 attached to their agreements. By way of example, where E203–2013 is attached to an A101–2007, the Owner and the Contractor are the "Parties" and are bound by the terms of E203–2013. The Architect, however, is not a Party to the A101–2007 and is a Project Participant in the context of that agreement. Since the identical E203–2013 is attached to the B101–2007, to which the Architect is a Party, the Architect is bound by the same obligations as the Contractor.

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Article 2 Transmission and Ownership of Digital Data

E203–2013 Section 2.1

§ 2.1 The transmission of Digital Data constitutes a warranty by the Party transmitting Digital Data to the Party receiving Digital Data that the transmitting Party is the copyright owner of the Digital Data, or otherwise has permission to transmit the Digital Data for its use on the Project in accordance with the Authorized Uses of Digital Data established pursuant to the terms of this Exhibit.

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In exchanging Digital Data, the Party receiving Digital Data must trust that it is free to receive and use the information provided. Accordingly, Section 2.1 places a duty on the transmitting Party to warrant that it is either the copyright holder of the information being transferred or has permission from the copyright holder to transmit the information for use on the Project.

It should be noted that E203–2013 does not specifically address ownership of the Model. It is assumed that E203 will be used in conjunction with other AIA Contract Documents standard form agreements, which generally provide that copyright ownership of the Instruments of Service (which would include a Model) resides with the individual or entity that created them. AIA Contract Documents also generally require the copyright holders of the Instruments of Service to grant the Owner a license to use the Instruments of Service for the Project. Accordingly, the digital practice documents are silent on ownership because it is assumed the topic is addressed in the Agreement.

E203–2013 Section 2.2

§ 2.2 If a Party transmits Confidential Digital Data, the transmission of such Confidential Digital Data constitutes a warranty to the Party receiving such Confidential Digital Data that the transmitting Party is authorized to transmit the Confidential Digital Data. If a Party receives Confidential Digital Data, the receiving Party shall keep the Confidential Digital Data strictly confidential and shall not disclose it to any other person or entity except as set forth in Section 2.2.1.

See Section 2.2.1 discussion.

E203–2013 Section 2.2.1

§ 2.2.1 The receiving Party may disclose Confidential Digital Data as required by law or court order, including a subpoena or other form of compulsory legal process issued by a court or governmental entity. The receiving Party may also disclose the Confidential Digital Data to its employees, consultants or contractors in order to perform services or work solely and exclusively for the Project, provided those employees, consultants and contractors are subject to the restrictions on the disclosure and use of Confidential Digital Data as set forth in this Exhibit.

Confidential Digital Data is defined in E203–2013 Section 1.4.8 as "Digital Data containing confidential or business proprietary information that the transmitting party designates and clearly marks as 'confidential.'" It is imperative that both the Party transmitting and the Party receiving Confidential Digital Data understands its responsibilities with regard to such information. Section 2.2 establishes the Parties' rights in transmitting Confidential Digital Data and obligations in maintaining its confidentiality. Section 2.2.1, however, clearly establishes certain reasonable exceptions to the requirement that Confidential Digital Data be kept strictly confidential.

E203–2013 Section 2.3

§ 2.3 By transmitting Digital Data, the transmitting Party does not convey any ownership right in the Digital Data or in the software used to generate the Digital Data. Unless otherwise granted in a separate license, the receiving Party's right to use, modify, or further transmit Digital Data is specifically limited to designing, constructing, using, maintaining, altering and adding to the Project consistent with the terms of this Exhibit, and nothing contained in this Exhibit conveys any other right to use the Digital Data.

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The sharing of files is of concern to many professionals due to the fear of losing control over, ownership of, and/or copyright in the files shared. Because the value of many digital documents, specifically Models, is increased with file sharing and collaboration, it is no longer feasible to withhold access. Therefore, to encourage and protect the owner of the Digital Data, it is critical that the receiving party understands and agrees to the limits of use.

E203–2013 Section 2.4

§ 2.4 Where a provision in this Article 2 conflicts with a provision in the Agreement into which this Exhibit is incorporated, the provision in this Article 2 shall prevail.

E203–2013 is intended to be incorporated as an exhibit into the Agreement between the Parties. Many such agreements may already contain language regarding the transmission of copyrighted materials and the use of confidential information. To avoid the risk of conflicting provisions, Section 2.4 states that the terms of the Exhibit set forth in Article 2 will have precedence. It should be understood, however, that the terms of Article 2 apply only to Digital Data. Terms in the Agreement addressing non-Digital Data would not necessarily be in conflict with the terms of Article 2.

Regardless of this statement, however, the existence of two specific requirements or terms pertaining to the same issues, one in the main body of the Agreement and the other in the attached E203–2013, may create confusion and ambiguity. Accordingly, the Exhibit and the Agreement should be reviewed and coordinated to the extent practical.

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Article 3 Digital Data Protocols

E203–2013 Section 3.1

§ 3.1 Anticipated Types of Digital Data. The anticipated types of Digital Data to be used on the Project are as follows.

(Indicate below the information on the Project that shall be created and shared in a digital format. If the Parties indicate that Building Information Modeling will be utilized on the Project, the Parties shall also complete Article 4.)

Anticipated Digital Data	Applicability to the Project *(Indicate Applicable or not Applicable)*	Location of Detailed Description *(Section 3.1.1 below or in an attachment to this exhibit and identified below)*
Project Agreements and Modifications		
Project communications		
Architect's preconstruction submittals		
Contract Documents		
Contractor's submittals		
Subcontractor's submittals		
Modifications		
Project payment documents		
Notices and Claims		
Building Information Modeling		

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The range of potential types and uses of Digital Data is virtually limitless. This breadth of possibilities is perhaps the greatest benefit of using Digital Data on the Project, but these endless options and choices also represent risk. A lack of understanding among the Project Participants on the anticipated uses for Digital Data increases the likelihood of later misunderstandings and conflicts. The Project, and its participants, could suffer from inefficient and uncoordinated use of Digital Data, unintended use of Digital Data, the inability to use incompatible Digital Data, and unrealized expectations among Project Participants.

To complete Section 3.1, Project Participants should consider how Digital Data is expected to be utilized and shared. Section 3.1 is intended to be completed at the initiation of the Project, before a definitive list of all expectations can be established, however, the more specific the identification of the anticipated uses, the better.

This section further serves as a launching point for Project Participants to discuss and differentiate between the uses of Digital Data that are included in the fees or contract sum at the time the Agreement and E203–2013 are executed, and any subsequently established uses that may require the Parties to undertake additional efforts, assume additional risks or provide additional value to the Project. See the discussion for E203–2013 Section 1.3.

The first column of the table is pre-populated with commonly used types of data identified in G201–2013 although users should modify it as necessary to meet their specific Project needs. The user should indicate in the second column whether the Digital Data is anticipated to be used on the Project and then use the third column to indicate where the characteristics and anticipated use of the Digital Data are described in more detail. Remember that the intent is to establish a general understanding of the scope of Digital Data use so that expectations are in alignment and scope and fee are negotiated properly. The actual protocols for how the digital data will be used are later captured in G201–2013.

While the pre-filled list is likely to be sufficient for many projects, the table is flexible and allows other anticipated digital data to be added to meet specific project requirements. Examples include the following:

- Surveys
- Energy analyses
- Cost estimating
- Submittal approvals
- CAD
- Photographs
- Video

The list of uses identified in this section should ultimately be coordinated with G201–2013 where the protocols for sharing the Digital Data are described.

Note that if the Parties intend to use Building Information Modeling on the Project, which appears in the standard text of the list, the parenthetical instruction states that the Parties should indicate such intention in Section 3.1 and complete Article 4 to describe the unique characteristics of Model development, use and sharing. The protocols governing Digital Data under Article 3 may relate to BIM, but the Parties must also complete Article 4 to fully explain and address their expectations with regard to BIM.

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E203–2013 Section 3.1.1

§ 3.1.1 Insert a detailed description of the anticipated Digital Data identified in Section 3.1, if not further described in an attachment to this Exhibit.

Section 3.1.1 provides a fill point for the Parties to provide a detailed description of the types of Digital Data to be used on the Project. The Parties should describe the anticipated scope of services in as much detail as possible. Doing so will reduce the likelihood of a later disputes relating to the nature and types of information that would be digital.

E203–2013 Section 3.2

§ 3.2 As soon as practical following execution of the Agreement, the Parties shall further describe the uses of Digital Data, and establish necessary protocols governing the transmission and Authorized Uses of Digital Data, in consultation with the other Project Participants that are expected to utilize Digital Data on the Project.

Section 3.2 requires the Parties to meet to establish Digital Data protocols *as soon as practical following execution of the Agreement.*

E203–2013 purposely does not establish these protocols when the agreement between the Parties is executed. The way Digital Data is used, and the benefits that will result, will vary based on the team, the project delivery method, and the project itself. Because of these variables, it is impractical for this Exhibit to identify a specific time for the establishment of the protocols, favoring instead "as soon as practical following execution of the Agreement." While the notion of "as soon as practical following execution of the Agreement" will vary from project to project, the Project Participants should endeavor to establish the protocols before significant data exchanges begin, to avoid uncoordinated and inefficient use of Digital Data. It should also be noted that any use of Digital Data by a Project Participant prior to the agreement to and documentation of the Digital Data protocols in G201–2013 will be at the Project Participant's sole risk pursuant to Section 3.4.1.

Identifying specific Digital Data, its uses, and the methods for sharing and archiving is accomplished by completing the Digital Data protocols in G201–2013. Completing the initial G201–2013 and modifying it as necessary to reflect changing project requirements will ensure that a clear understanding of roles, responsibilities and uses are evident to all Project Participants.

Recognizing that at the time contracts are typically executed, a primary purpose of E203–2013 is to allow the Parties to adequately define their expectations regarding the use of Digital Data and to more clearly define the Parties' scope of services and compensation. Thereafter, and consistent with the parameters set in the E203–2013, the Parties flesh out the specific details regarding Digital Data in G201–2013.

This approach is not so different from the approach often taken with regard to LEED® related services. A building owner may include in its program the goal of obtaining a certain LEED® rating. Often, however, the specific steps to reach that goal are not established at the time the Owner/Architect agreement is executed. Typically, the Owner, Architect and Contractor have not yet determined which LEED elements to pursue, and those details often get worked out as the Project proceeds.

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E203–2013 Section 3.2.1

§ 3.2.1 Unless another Project Participant is identified below, the Architect shall prepare and distribute to the other Project Participants Digital Data protocols for review, revision and approval.
(If a Project Participant other than the Architect shall be responsible for preparing draft and final Digital Data protocols, identify that Project Participant.)

Assigning the responsibility to prepare written Digital Data protocols to a single Project Participant creates an advocate for the development of the protocols and is intended to ensure that the task is completed. Section 3.2.1 establishes the Architect as the default entity responsible for preparing the written protocols. The Architect is designated because, for most projects, the Architect is likely better situated in the early stages of the Project to assess the entire range of Digital Data necessary to see the Project to its completion. However, if someone other than the Architect, or if multiple Project Participants, will be responsible for preparing written protocols, those Project Participants must be identified. For example, if an Owner's representative has established protocols for document management, or if a Construction Manager is responsible for managing Project information, it may make more sense to have that Project Participant prepare the written protocols.

E203–2013 Section 3.2.2

§ 3.2.2 The agreed upon Digital Data protocols shall be set forth in AIA Document G201–2013 and each Project Participant shall memorialize their agreement in writing to such Digital Data protocols.

Section 3.2.2 establishes the expectation that the Project Participants will approve the Digital Data protocols and will memorialize their agreement in writing in G201–2013. (See E203 Section 1.4.9 for discussion of the defined term "in writing.")

As the enforcement of the protocols may ultimately depend on the ability of a Project Participant to prove that the other Project Participants agreed to the protocols, Section 3.2.2 also requires each Project Participant to manifest, in writing, their agreement to the Digital Data protocols. There are a range of possibilities available to users with regard to the mechanism through which Project Participants can manifest their agreement to the protocols. The most obvious option is to require each Project Participant to sign G201–2013. Less formal options may also be available such as requiring initials. Further, as project Web sites grow in popularity, the protocols may be distributed on such Web sites and Project Participants may be required to "check a box" that they have agreed to the latest versions of the protocols.

E203–2013 Section 3.2.3

§ 3.2.3 The Parties, together with the other Project Participants, shall review and, if necessary, revise the Digital Data protocols at appropriate intervals as required by the conditions of the Project.

As the Project progresses, the Project Participants will likely begin to adjust how they share and use Digital Data. Needs may change, efficiencies may be discovered, and new Project Participants may join the Project. Regardless of the reasons, Section 3.2.3 anticipates the likelihood that the established protocols will need to be revised.

E203–2013 Section 3.3

§ 3.3 The Parties shall transmit, use, store and archive Digital Data in accordance with the Digital Data protocols set forth in the latest version of AIA Document G201–2013 agreed to by the Project Participants.

This language creates a contractual obligation to follow the protocols as they are established and agreed to by the Parties and other Project Participants. As noted above, however, the enforcement of the protocols

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may ultimately depend on the ability of a Project Participant to prove that the other Project Participants agreed to the protocols. Accordingly, in utilizing G201–2013, the Project Participants should develop an acceptable process to document the receipt of, and agreement to, each version of the protocols by each Project Participant. Such a process will protect against a Project Participant ultimately claiming that it never saw, or agreed to, the latest version of the relevant protocols and therefore is not bound by them.

E203–2013 Section 3.4

§ 3.4 Unauthorized Use

§ 3.4.1 Prior to Establishment of Digital Data Protocols

If a Party receives Digital Data prior to the agreement to, and documentation of, the Digital Data protocols in AIA Document G201–2013, that Party is not authorized to use or rely on the Digital Data. Any use of, or reliance on, such Digital Data is at that Party's sole risk and without liability to the other Party and its contractors, consultants, agents and employees.

The premise of the Digital Practice documents is that the Project Participants are willing to share Digital Data because the protocols establish clear expectations and restrictions regarding the Authorized Uses of the Digital Data. Nevertheless, it may be necessary, or beneficial to the Project, for Digital Data to be shared prior to the establishment of the protocols. As the protocols are not yet established, the associated Authorized Uses have yet to be established. Accordingly, where Digital Data is shared prior to establishment of the required protocols any use of the Digital Data is at the sole risk of the Party using the Digital Data without liability to the other Party or any of its consultants, contractors, agents, and employees. This provision reinforces the notion that Digital Data should only be used and relied on after the protocols governing its use have been discussed and agreed to by the Project Participants.

If the Parties believe additional protection is necessary, indemnification language could be added to the end of this section. An example of such language is as follows:

> To the fullest extent permitted by law, such Party shall indemnify and hold harmless the other Party and its contractors, consultants, agents and employees from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from such Party's use, transmission, or reliance on such Digital Data.

As noted above in discussing E203–2013 Section 1.2.1, any indemnification language should be reviewed closely with legal and insurance counsel as indemnification provisions are complex and notoriously difficult to enforce.

E203–2013 Section 3.4.2

§ 3.4.2 Following Establishment of Digital Data Protocols

Following agreement to, and documentation of, the Digital Data protocols in AIA Document G201–2013, if a Party uses Digital Data inconsistent with the Authorized Uses identified in the Digital Data protocols, that use shall be at the sole risk of the Party using the Digital Data.

Once the protocols are established, the Project Participants have all agreed to use Digital Data consistent with the protocols. Use inconsistent with the Digital Data protocols, which include the Authorized Uses, is at the sole risk of the Party using the Digital Data.

If the Parties believe additional protection is necessary, they may consider including an indemnification obligation at the end of this section, such as the following:

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> **Further, to the fullest extent permitted by law, the Party using the Digital Data shall indemnify and hold harmless the other Party and its contractors, consultants, agents and employees from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from such Party's use of the Digital Data inconsistent with the Authorized Uses identified in the Digital Data protocols.**

For the reasons noted above, however, indemnification can be a complicated legal concept, and indemnification language should be reviewed closely with legal and insurance counsel. Generally speaking, the more broadly written the indemnity, the less likely that it will ultimately be enforceable.

E203–2013 Section 3.5.1

§ 3.5.1 Centralized document management system use on the Project shall be:
(Check the appropriate box. If the Parties do not check one of the boxes below, the default selection shall be that the Parties will not utilize a centralized electronic document management system on the Project.)

- ☐ **The Parties intend to use a centralized electronic document management system on the Project.**
- ☐ **The Parties do not intend to use a centralized electronic document management system on the Project.**

The use of centralized document management systems is becoming increasingly prevalent for today's projects. These systems range in complexity from a simple repository that allows those with access to view, use and modify project related electronic data files, to robust document management products that add features like access rights, document tracking and version control. Not all projects will utilize a centralized electronic document management system or program. If one is to be used, however, the management of that Project-wide system may result in additional scope for some or all of the Project Participants. Accordingly, in Section 3.5.1, the Parties should indicate their expectations regarding the use of such a system or program. If the Parties fail to check one of the boxes, the default shall be that a centralized electronic document management system or program will not be used on the Project.

§ 3.5.2 If the Project Participants intend to utilize a centralized electronic document management system on the Project, the Project Participants identified in Section 3.5.3 shall be responsible for managing and maintaining such system. The Project Participants responsible for managing and maintaining the centralized electronic document management system shall facilitate the establishment of protocols for transmission, use, storage and archiving of the centralized Digital Data and assist the Project Participants identified in Section 3.2.1 above in preparing Digital Data protocols. Upon agreement to, and documentation of, the Digital Data protocols in AIA Document G201–2013, the Project Participants identified in Section 3.5.3 shall manage and maintain the centralized electronic document management system consistent with the management protocols set forth in the latest version of G201–2013 approved by the Project Participants.

If the Parties determine that a centralized management system will be used on the Project, Section 3.5.3 provides an opportunity to identify the Project Participant(s) that will be responsible for maintaining it. The identified Project Participants are required to facilitate, with the other Project Participants, the establishment of the protocols relating to the centralized electronic document management system and to assist the Project Participant identified under Section 3.2.1 in preparing any related Digital Data protocols.

To develop the centralized Digital Data management system protocols, the Project Participants tasked with managing Digital Data should consider how to best facilitate communication and transfer of the Digital Data

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to all relevant Project Participants, as well as the archival requirements that ensure the integrity of record copies. Examples of other items to consider include the following:

- Who needs to have access to the Digital Data, at what point, and with what level of permissions?
- How to control the integrity of the Digital Data as it is being used, and limit the ability of editing to those who have permission?
- How does the manager establish access to Project Participants that are not active users of Digital Data, but may be required to observe progress?
- At what points during the Project are record copies of the Digital Data to be archived?

E203–2013 Section 3.5.3

§ 3.5.3 Unless responsibility is assigned to another Project Participant, the Architect shall be responsible for managing and maintaining the centralized electronic document management system. If the responsibility for management and maintenance will be assigned to another Project Participant at an identified Project milestone, indicate below the Project Participant who shall assume that responsibility, and the Project milestone.
(Identify the Project Participant responsible for management and maintenance only if the Parties intend to utilize a centralized electronic document management system on the Project.)

Responsible Project Participant	Project Milestone

When the Parties have agreed to use a centralized data management system, Section 3.5.3 assigns the management responsibility of that system to the Architect. If Project circumstances suggest another Project Participant might be better suited, the Parties are required to identify those who will be responsible. The table included in Section 3.5.3 allows the responsibility to be assigned based on the Project milestones acknowledging that, throughout the course of the Project, there may be different individuals or entities better suited to manage the centralized Digital Data. For example, when a Project shifts from the design phases to the construction phase, it may be appropriate for the management of shared Digital Data to shift from the Architect to the Contractor. In that instance, the table might be completed in this way:

Responsible Individual or Entity	Project Milestone
Architect	Project Inception
Contractor	Commencement of Construction

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Article 4 Building Information Modeling Protocols

E203–2013 Section 4.1

§ 4.1 If the Parties indicate in Section 3.1 that Building Information Modeling will be used on the Project, specify below the extent to which the Parties intend to utilize Building Information Modeling and identify the provisions of this Article 4 governing such use:

- ☐ The Parties shall utilize Building Information Modeling on the Project for the sole purpose of fulfilling the obligations set forth in the Agreement without an expectation that the Model will be relied upon by the other Project Participants. Unless otherwise agreed in writing, any use of, transmission of, or reliance on the Model is at the receiving Party's sole risk. The remaining sections of this Article 4 shall have no force or effect.
- ☐ The Parties shall develop, share, use and rely upon the Model in accordance with Sections 4.2 through 4.10 of this Exhibit.

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Section 4.1 requires the Parties to identify the intended scope of use of BIM via a check box.

If the Parties choose the first check box, the Parties will only use Modeling internally to facilitate the completion of their underlying contractual obligations. Under this option the Model is prepared without the expectation that it will be shared with and relied upon by the other Project Participants. If the Model is in fact shared, subsequent use of, or reliance on, the Model is at the sole risk of the Party receiving the Model. The remaining Sections of Article 4 do not apply because they are tailored to address the unique issues that arise when the Model is prepared with the expectation that it will be shared with the other Project Participants. It should also be noted that in checking the first box, the Parties arguably indicate they will not be sharing their own models with their own consultants or subcontractors. If models are to be shared on one side of the Project (i.e., amongst the design team only), the text of E203–2013 will need to be modified (see also discussion above at E203–2013 Section 1.2), or the second box should be checked and the G202–2013 protocol carefully completed (see discussion below.)

By choosing the second check box, the Parties agree that the Model will be developed, shared, used, and relied on in accordance with Sections 4.2 through 4.10, which allow for the subsequent establishment of the Modeling protocols that will be set forth in G202–2013. Even if the Parties check box 2, they can still exert a significant amount of control over how the Model is shared and relied upon on the Project.

If, for example, the Parties only intend to allow the architect and its consultants to share and rely on the Model, E203–2013 and G202–2013 could be crafted in such a way that the "Authorized Uses" only relate specifically to the provision of design services. The Authorize Uses, for example, would not permit fabrication or detailed cost estimating. So, while the Model will be shared and relied on, the ultimate scope of reliance and use is limited to the design team. Even if one of the contractors ended up receiving the Model, by the terms of E202–2013 attached to their Agreement, they agreed to follow the set forth in G202–2013.The protocols would limit reliance on the Model Elements to only design related services. Accordingly, pursuant to E203–2013 Section 4.7, any use inconsistent with those Authorized Uses would be at the contractor's sole risk.

Another option would be to add language to one of the options clarifying that the Model will only be shared during the design of the project and only among the design team. Users are encouraged to modify and revise the standard language to fit their specific needs.

Users should note that the standard language obligates the Parties, and not the Project Participants, to develop, share, use and rely upon the Model in accordance with the terms of E203–2013. This is because, as is discussed above in the definitions of Parties and Project Participants, E203–2013 is only binding on the Parties to the underlying agreement. E203–2013, however, is intended to be incorporated into every agreement on the Project. Accordingly, each Project Participant becomes bound by a common set of obligations and protocols by virtue of E203–2013 being incorporated into its Project Agreement.

Users should also understand the impact their selection in Section 4.1 can have on compensation. E203–2013 Section 1.3 states that the establishment of the protocols may result in an adjustment in compensation if such protocols result in a change to the originally anticipated scope of work or services. If the Parties choose the first box, the Party utilizing Modeling retains complete control over the scope of BIM services and the level of development it puts into the Model, as it is only using Modeling as a tool to fulfill its obligations in the underlying Agreement. Compensation will be based on that expectation.

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If the Parties agree that Models will be used for more than just the Parties' internal purposes, the Parties recognize that Models will be shared with and used by other Project Participants for certain identified Authorized Uses. The Parties further agree to subsequently establish protocols that will control development of, use of and reliance on the Model. Under option 2, the assumption is that the Model will be relied on by the other Project Participants for certain Authorized Uses. This means that the Modeling Parties must develop the Model sufficiently to meet such external needs and uses. This amount of effort may be inconsistent with the level of development a Party would normally provide if Modeling was only used as a tool to fulfill its own obligations and therefore warrant an adjustment in compensation.

E203–2013 Sections 4.3, 4.4 and 4.5 require the Parties to establish their anticipated scopes of work or services related to Modeling before the protocols are established. The clearer the Parties are in those sections, the easier it will be to determine if a change in scope has occurred when the protocols are subsequently established, thus reducing the possibility for conflict.

E203–2013 Section 4.2

§ 4.2 Anticipated Building Information Modeling Scope. Indicate below the portions of the Project for which Modeling will be used and the anticipated Project Participant responsible for that Modeling.

Consistent with the general scoping premise of the E203–2013, Section 4.2 provides the opportunity to broadly define how Modeling will be used on the Project and who will be responsible for such Modeling. Parties must be aware of the portions of the Project that are in the scope to be modeled, and those portions that will be referenced, diagrammed, or otherwise documented without Modeling—for example:

1) The Project Models will include structural and architectural Models.
2) Mechanical and Plumbing Model Elements will only be developed in the mechanical rooms and for pipes larger than 2½ inches in diameter.
3) Electrical Lighting Model Elements will be modeled, as well as raceways and duct banks and all conduits larger than 2 inches. All smaller conduits and wiring shall be symbolic LOD 100 only.

In addition to indicating what will be modeled, it is also important to indicate who will be doing the modeling. Again, the amount of Modeling a Project Participant expects to perform on the Project directly impacts their scope of services. Accordingly, it serves the entire Project to be as clear as possible in the Project Agreements as to the Modeling expectations so as to avoid scope disputes later in the Project.

While E203–2013 provides flexibility on the information to be included in this section and the format in which it is provided, the following is an example of how to complete this section utilizing a table format:

Anticipated Modeling Scope	**Project Participant Responsible**
The Project Models will include structural and architectural Models.	AQA Architects
Mechanical and Plumbing Model Elements will only be developed in the mechanical rooms and for pipes larger than 2 ½ inches in diameter.	SDS Engineering
Electrical Lighting Model Elements will be modeled, as well as raceways and duct banks and all conduits larger than 2 inches. All smaller conduits and wiring shall be symbolic LOD 100 only.	AQA Architects

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As noted above in the discussion of Section 4.1, if the subsequently established protocols vary from the anticipated Modeling scope set forth in this section, there may be a need to adjust compensation, contract sum or contract time.

E203–2013 Section 4.3

§ 4.3 Anticipated Model Authorized Uses. Indicate below the anticipated Authorized Uses of the Model for the Project, which Authorized Uses will be agreed upon by the Project Participants and further described for each LOD in G202–2013.

Without clearly defined anticipated Authorized Uses, the extent to which one Party anticipates using Models may not align with the other Project Participants' expectations, resulting in disputes over scope and compensation. A clear understanding among the Project Participants of the anticipated Authorized Uses for the Model will prevent complications later in the Project. To the extent the Parties can identify the anticipated Authorized Uses at Project inception they will be able to avoid many of these problems.

This section records the anticipated Authorized Uses for the Models. This list will eventually be included within the Level of Development definitions found in G202–2013 as the defined Authorized Uses when the Project Participants will provide much more detail on the Authorized Uses. For a further discussion on the Authorized Uses and Levels of Development, please refer to the portion of the Guide addressing Article 2 of G202–2013 below.

Examples of Authorized Uses that might be inserted in Section 4.3 include, but are not limited to, the following:

- Construction Sequencing
- Construction Coordination.
- Material Takeoffs in support of cost estimating
- Fabrication

E203–2013 Section 4.4

§ 4.4 Ancillary Modeling Activities. Indicate additional Modeling activities agreed upon by the Parties, but not included in G202–2013, if any.

(Describe any Modeling activities, such as renderings, animations, performance simulations, or other similar use, including the anticipated amount and scope of any such Modeling activities.)

Users will utilize this section to describe other expected Modeling activities. Generally, these Modeling activities will not carry with them an expectation of reliance for particular use, which is the focus of the Authorized Uses in Section 4.3. Even though reliance is not an issue, the Parties need to be aware of what the total scope of expectations is with regard to all Modeling activities. Section 4.4 allows the parties to discuss and negotiate their expectations about, for example, the number of renderings that will be done, or how many animations will be created from the Model.

E203–2013 Section 4.5

§ 4.5 Model Protocols

As soon as practical following execution of the Agreement, the Parties shall, in consultation with the other Project Participants that are expected to utilize Building Information Modeling on the Project, further describe the Authorized Uses of the Model and establish necessary protocols governing the development of the Model utilizing AIA Document G202–2013.

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This section requires the Parties to meet to establish Modeling protocols as soon as practical following execution of the Agreement. Like E203–2013 Section 3.2 relating to the Digital Data protocols, Section 4.5 purposely does not establish the Model protocols within E203–2013. The reasons for, and benefits of, such an approach are identical to those discussed above for E203–2013 Section 3.2.

E203–2013 Section 4.5.1

§ 4.5.1 The Model protocols shall address the following:

- **.1** Identification of the Model Element Authors;
- **.2** Definition of the various LOD for the Model Elements and the associated Authorized Uses for each defined LOD;
- **.3** Identification of the required LOD of each Model Element at each identified Project milestone;
- **.4** Identification of the construction classification systems to be used on the Project;
- **.5** The process by which Project Participants will exchange and share the Model at intervals not reflected in Section 3.3, Model Element Table, of AIA Document G202–2013;
- **.6** The process by which the Project Participants will identify, coordinate and resolve changes to the Model;
- **.7** Details regarding any anticipated as-designed or as-constructed Authorized Uses for the Model, if required on the Project;
- **.8** Anticipated Authorized Uses for facilities management or otherwise, following completion of the Project; and
- **.9** Other topics to be addressed by the Modeling protocols:
  (Identify additional topics to be addressed by the Modeling protocols.)

This section is intended as an illustrative list of topics to consider for protocols. The Parties can modify and supplement this list as necessary to fit the needs of their Project. Once agreed to, the items listed will be further developed as protocols in G202–2013.

The terms "as-designed" and "as-constructed" record Models as used in Section 4.5.1.7 are based on the use of the terms "as-designed" and as-constructed" record drawings in B101–2007. The instructions to B101–2007 define as-designed record drawings as "the record of everything the Architect designed for the Project, and include the original Construction Documents plus all addenda, Architect's Supplemental Instructions, Change Orders, Construction Change Directives and minor changes in the work." The instructions define as-constructed record drawings (or "as-builts") as "the record of the Project as constructed based on information the Contractor provides to the Owner under the contract for construction. Because the As-constructed Record Drawings will be based on the Contractor's mark-ups, the Architect is not responsible for the accuracy or completeness of the As-constructed Record Drawings."

E203–2013 Section 4.5.2

§ 4.5.2 Unless responsibility is assigned to another Project Participant identified below, the Architect shall prepare and distribute Modeling protocols to the other Project Participants for review, revision and approval.
(If a Project Participant other than the Architect shall be responsible for preparing draft and final Model protocols, identify that Project Participant.)

This section requires the Architect to prepare Modeling protocols, unless another Project Participant is identified. The discussion above for E203–2013 Section 3.2.1, with the Architect preparing the Digital Data protocols, applies here as well.

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E203–2013 Section 4.5.3

§ 4.5.3 The agreed upon Modeling protocols shall be set forth in AIA Document G202–2013 and each Project Participant shall memorialize their agreement in writing to such Model protocols.

Section 4.5.3 establishes the expectation that the Project Participants will approve the Modeling protocols and will memorialize them in G202–2013. The importance of recording agreement is identical to the discussion above for E203–2013 Section 3.2.2. (See also discussion at E203–2013 Section1.4.9, for the definition of the term "in writing.")

E203–2013 Section 4.5.4

§ 4.5.4 The Parties, together with the other Project Participants, shall review, and if necessary, revise the Modeling protocols at appropriate intervals as required by the conditions of the Project.

As is the case with the Digital Data protocols, the Project Participants will likely need to revise the Modeling protocols as the Project proceeds. This may be because needs change, efficiencies are discovered, or additional Project Participants may be involved. Regardless of the reasons, Section 4.5.4 allows for the possibility that the established protocols will be revised. Section 4.5.4 states that the Project Participants will revisit and revise the established Modeling protocols as necessary.

E203–2013 Section 4.6

§ 4.6 The Parties shall develop, use and rely on the Model in accordance with the Modeling protocols set forth in the latest version of AIA Document G202–2013, which document shall be included in or attached to the Model in a manner clearly accessible to the Project Participants.

Section 4.6 requires the Parties to develop, use and rely on the Model in accordance with the most recent set of established protocols. This language creates a contractual obligation to follow the Modeling protocols as they are established and agreed to by the Parties and other Project Participants. As noted above, however, the enforcement of the protocols may ultimately depend on the ability of a Project Participant to prove that the other Project Participants agreed to the protocols. Accordingly, in utilizing G202–2013, the Project Participants should develop an acceptable process to document the receipt of, and agreement to, each version of the protocols by each Project Participant. Such a process will help protect against a Project Participant ultimately claiming that it never saw or agreed to the latest version of the relevant protocols and therefore is not bound by them.

Section 4.6 also requires the Parties to include a copy of the latest version of G202–2013 in the Model so that it is accessible to the Project Participants. This requirement is easily accomplished with current software capabilities and ensures that any Project Participant that receives a Model will also receive the Model protocols governing the use of the Model.

E203–2013 Section 4.7

§ 4.7 Unauthorized Use

§ 4.7.1 Prior to Establishment of Model Protocols

If a Party receives any Model prior to the agreement to, and documentation of, the Modeling protocols in AIA Document G202–2013, that Party is not authorized to use, transmit, or rely on the Model. Any use, transmission or reliance is at that Party's sole risk and without liability to the other Party and its contractors, consultants, agents and employees.

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Section 4.7.1 is modeled after E203–2013 Section 3.4.1 and the related discussion is equally applicable here. As noted in the Section 3.4.1 discussion, in some instances the Parties may believe that additional protection is warranted and may decide to include an indemnification obligation. The following is an example of such indemnification language:

> To the fullest extent permitted by law, the receiving Party shall indemnify and hold harmless the other Party and its contractors, consultants, agents and employees from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from the receiving Party's use, transmission, or reliance on such Models.

As noted in the discussion for E203–2013 Section 1.2.1, however, any indemnification language should be reviewed closely with legal and insurance counsel as indemnification provisions are complex and notoriously difficult to enforce.

E203–2013 Section 4.7.2

§ 4.7.2 Following agreement to, and documentation of, the Modeling protocols in AIA Document G202–2013, if a Party uses or relies on the Model inconsistent with the Authorized Uses identified in the Modeling protocols, such use or reliance shall be at the sole risk of the Party using or relying on the Model. A Party may rely on the Model Element only to the extent consistent with the minimum data required for the identified LOD, even if the content of a specific Model Element includes data that exceeds the minimum data required for the identified LOD.

The justification for Section 4.7.2 is the same as the virtually identical provisions in Section 3.4.2. Upon the documentation of the Modeling protocols, the Parties have agreed that the shared Models can be used and relied upon only as set forth in the Authorized Uses in the protocols. Use and reliance inconsistent with the protocols remains unauthorized. Accordingly, Section 4.7.2 states that after the protocols are established, any use of the Model inconsistent with the protocols is at the sole risk of the Party using the Model. This section also clarifies that to the extent the Model contains information that exceeds the required LOD, the use or reliance is still controlled by the Authorized Uses associated with the required LOD as set forth in the G202–2013, Section 3.3 Model Element Table. For example, if an LOD 200 Model Element contains *specific* information regarding the location and type of light fixture to be used, the information can only be relied on consistent with an LOD 200. G202–2013 Section 2.3.1 defines LOD 200 to mean that the Model Element is represented as a *generic* system, object, or assembly with *approximate quantities, size, shape, location, and orientation*. Therefore, even though the information regarding the light fixture is specific, because the Model Element is indicated to be at the LOD 200 level, the information cannot be relied on as specific and instead can only be relied on to the extent appropriate for generic information.

If the Parties believe additional protection from the risks of unauthorized use is necessary, they may consider including an indemnification obligation following the first sentence in the section. The following is an example of such language:

> Further, to the fullest extent permitted by law, the Party using or relying on the Model shall indemnify and hold harmless the other Party and its contractors, consultants, agents and employees from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from such Party's use of the Model inconsistent with the Authorized Uses identified in the Modeling protocols.

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For the reasons noted above in the discussion for Section 1.2, however, indemnification is a complicated legal concept and indemnification language should be reviewed closely with legal and insurance counsel.

E203–2013 Section 4.8

§ 4.8 Model Management

§ 4.8.1 The requirements for managing the Model include the duties set forth in this Section 4.8. Unless assigned to another Project Participant, the Architect shall manage the Model from the inception of the Project. If the responsibility for Model management will be assigned to another Project Participant, or change at an identified Project milestone, indicate below the identity of the Project Participant who will assume that responsibility, and the Project milestone.

Responsible Project Participant	Project Milestone

Maintaining records and archives of the Model comes with a level of responsibility that the Project Participants should be aware of at the onset of the Project. Other Project Participants will be relying on the individual(s) or entity (ies) charged with managing and maintaining the Model. This may require an increase in scope of work for the Project Participants charged with this responsibility. The increase in scope is a factor that may affect compensation and should be included in the Agreement. Accordingly, Model management is included in E203–2013 as opposed to the G202–2013.

This section requires the Parties to identify the Project Participants that will be responsible for managing the Model. As is the case with the Digital Data management role, the Project Participant responsible for managing the Model may shift as the Project progresses.

The standard language states that the Architect will manage the Model from the inception of the Project and that the Parties may identify another Project Participant that will subsequently assume those responsibilities. The Architect is the default as it is the Project Participant that will more likely than not be engaged in the most Modeling activities at the beginning of the Project.

E203–2013 Section 4.8.2

§ 4.8.2 Model Management Protocol Establishment. The Project Participant responsible for managing the Model, in consultation with the other Project Participants that are expected to utilize Building Information Modeling on the Project, shall facilitate the establishment and revision of Model management protocols, including the following:

.1 Model origin point, coordinate system, precision, file formats and units
.2 Model file storage location(s)
.3 Processes for transferring and accessing Model files
.4 Naming conventions
.5 Processes for aggregating Model files from varying software platforms
.6 Model access rights
.7 Identification of design coordination and clash detection procedures
.8 Model security requirements
.9 Other: *(Identify additional Model management protocols to be addressed.)*

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The Section 4.8.2 list is not intended to be exhaustive and is only intended as a suggestion of common protocols to consider in managing a Model. The standard list appearing in this Section 4.8.2 corresponds to the list of protocols in G202–2013 Section 1.7. To the extent the Section 4.8.2 list is modified to fit the particular needs of the Project, similar revisions should be made to the G202–2013 Section 1.7 list.

E203–2013 Section 4.8.3

§ 4.8.3 Ongoing Responsibilities. The Project Participant responsible for managing the Model shall do so consistent with the Model management protocols, which shall also include the following ongoing responsibilities:

- .1 Collect incoming models:
  - .1 Coordinate submission and exchange of models
  - .2 Create and maintain a log of models received
  - .3 Review model files for consistency with Section 4.8.2.1 through 4.8.2.5
  - .4 Maintain a record copy of each model file received
- .2 Aggregate Model files and make them available for Authorized Uses.
- .3 Maintain Model Archives and backups consistent with the requirements of Section 4.8.4 below
- .4 Manage Model access rights
- .5 Other: *(Identify additional responsibilities.)*

Section 4.8.3 provides a list of common Model management responsibilities that will be performed on an on-going basis. The listed responsibilities are not intended to be exhaustive. It should be noted, however, that the "responsibilities" included in Section 4.8.3 will become a part of the Agreement and therefore become contractual responsibilities for the Project Participant assigned to manage the Model.

At a minimum, the Project will require a Model management activity to collect, coordinate and aggregate Models. The complexity of this task will vary from project to project, but could potentially include a sophisticated collaboration Web site to facilitate the task. Much depends on the level of sophistication of the Project Participants, and the level of reliance on each other's work.

The responsibility for data integrity, including backups, periodic and milestone archiving, and logs of interaction, is critical to maintaining the value and integrity of the data within the Model.

Other responsibilities could include:

- Preparation of visualization Models on a regular basis
- Preparation of Model data for submission to reviewing authorities
- Creating aggregated material takeoffs
- Preparing construction sequencing Models
- Preparing Model subsets for specialty use by consultants or subcontractors

E203–2013 Section 4.8.4

§ 4.8.4 Model Archives. The individual or entity responsible for Model management as set forth in this Section 4.8 shall compile a Model Archive at the end of each Project milestone and shall preserve it without alteration as a record of Model completion as of that Project milestone.

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This section requires the Project Participant responsible for managing the Model to compile and preserve an archive at the end of each Project milestone. The Project milestones are identified in the Model Element table of Section 3.3 in G202–2013. The Party responsible for managing the Model is required to create and maintain the archive consistent with the established protocols.

Although the default requirement is that the Model be archived at the conclusion of each Project milestone, if some other interval fits better, given the unique characteristics of each Project, that should be discussed and other archive dates agreed to by the Project Participants.

E203–2013 Section 4.8.4.1

§ 4.8.4.1 Additional Model Archive requirements, if any, are as follows:

Section 4.8.4.1 consists of a blank fill point that will allow the Parties to include any additional archive requirements necessary to satisfy the unique characteristics of their Project.

E203–2013 Section 4.8.4.2

§ 4.8.4.2 The procedures for storing and preserving the Model(s) upon final completion of the Project are as follows:

This section provides a place for the Parties to identify the manner in which the Model will be stored and preserved upon final completion of the Project.

Some of the issues that should be discussed include how long the archive files will be retained, how long each of the Parties and Project Participants will be able to have access to the archive files, who bears the responsibility and cost of maintaining the archive files, how those archive files can be used, and what processes should be established for the destruction of any archive files once the required retention period has elapsed.

E203–2013 Section 4.9

§ 4.9 Post Construction Model

The services associated with providing a Model for post construction use shall only be required if specifically designated in the table below as a Party's responsibility.

(Designate below any anticipated post construction Model and related requirements, the Project Participant responsible for creating or adapting the Model to achieve such uses, and the location of a detailed description of the anticipated scope of services to create or adapt the Model as necessary to achieve such uses.)

Post Construction Model	Applicability to Project *(Applicable or Not Applicable)*	Responsible Project Participant	Location of Detailed Description of Requirements and Services *(Section 4.10 below or in an attachment to this exhibit identified below)*
§ 4.9.1 Remodeling			
§ 4.9.2 Wayfinding and Mapping			
§ 4.9.3 Asset/FF & E Management			
§ 4.9.4 Energy Management			
§ 4.9.5 Space Management			
§ 4.9.6 Maintenance Management			

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This section is utilized only if there are additional requirements for Modeling beyond those necessary for design and construction execution as described in Section 3.3 of G202–2013. The services listed in this section are in addition to traditional basic services, and may be performed by any of the Project Participants designated in the Section 4.9 table.

This section is different from record Model activities or other LOD in that the characteristics of Models used for post-construction activities can vary greatly. While the post-construction Model may be a subset or extraction of the construction Model, the graphical format, data format, and specific scope of effort varies greatly with the intended post-construction Model use. Accordingly, the Modeling requirements for Post Construction Model Uses do not fit well simply under an LOD description within the G202–2013. For example, the representation of walls and doors for wayfinding is significantly different from that of energy management and require a different level of scope description to clarify the intent.

The rows of the table list the Post Construction Model uses, the applicability to the Project, the responsible Project Participant, and the location of the detailed description of the required services.

In the first column, Post Construction Models, common potential Post Construction Model Uses are listed. The list is a starting point and the Parties can add other potential uses as desired by the Owner. Currently there are no well-established standards for each of these uses, and each Owner or software interface will have a unique scope of how the Model data is developed and utilized. Accordingly, to clarify expectations, the Parties should provide as much detail as possible in describing the anticipated services necessary to provide a Model for post-construction use.

The "Applicability to Project" column is specifically useful to clarify scope and non-scope items. While deleting a line might otherwise be the simplest way to delete a non-scope item, indicating specifically that it is not applicable to the Project is the clearest way to clarify expectations. The affirmative step of marking an item as "not applicable" records that the Parties discussed the issue and affirmatively decided that it was not applicable. If the section were merely left blank, there could later be a dispute as to whether the scope was ever discussed.

The "Responsible Project Participant" is the Project Participant who will execute the work on the Model as required to meet the defined scope of services. This may be the architect, engineer, contractor, fabricator or material supplier. Because E203–2013 is intended to be a flow down document, it is important that the responsible Project Participant have this document attached to their related agreements, otherwise, it is a non-binding obligation. For a detailed discussion about the process for incorporating E203–2013 into the Project agreements, please refer to the section of the Guide discussing E203–2013 Section 1.2.

The last column, "Location of Detailed Description of Requirements and Services" is utilized to indicate where the requirements and scope of services/work are recorded. It may be in Section 4.10 below or an attached document. It may also indicate an external reference standard. If the owner has established a standard then it is easily referenced here.

In describing the scope of the requirements and services, either in E203–2013 Section 4.10 or as a separate attachment to this Exhibit, any number of methods can be utilized. One technique would be to establish a separate table, mirroring the list of model content in the G202–2013 Section 3.3, Model Element table, for

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each of the Post Construction Models. Each line could further designate the responsible Project Participant for that individual piece of content, and provide a note that clearly describes the requirements and scope for that line of content. This technique may require a separate table for each Post Construction Model, but may also be the best way to establish clear expectations of an owner's requirement.

The Parties should also take note of the potential relationship between the identified post-construction Models and the permissions, given to the Owner in the Agreement, for uses of the Parties' intellectual property. For example B101–2007 Section 7.3 gives the Owner a license to use the Architect's Instruments of Service (which would include the Model) for "constructing, using, maintaining, altering and adding to the Project." This language may be sufficiently broad to encompass the identified Post Construction Model uses, but it may not.

E203–2013 Section 4.10

§ 4.10 Insert a detailed description of the requirements for each Post Construction Model identified in Section 4.9 and the anticipated services necessary to create each Post Construction Model, if not further described in an attachment to this Exhibit.

Section 4.10 provides a fill point for the Parties to provide the scope of services with respect to each post-construction Model use identified in Section 4.9. As is always the case, the Parties should describe the anticipated scope of services in as much detail as possible. Doing so will reduce the likelihood of a later dispute over the scope of services.

Article 5 Other Terms and Conditions

E203–2013 Article 5 Other Terms and Conditions

Other terms and conditions related to the transmission and use of Digital Data are as follows:

Article 5 provides a space for the Parties to provide any additional terms and conditions relevant to Digital Data.

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Guidance, Instructions and Commentary to AIA Document G201–2013, Project Digital Data Protocol Form

G201–2013 allows the Project Participants to document the Digital Data protocols for the Project, exclusive of specific Modeling requirements, which are addressed in greater depth in G202–2013, Project Building Information Modeling Protocol Form. The protocols are established in the form documents, rather than in the Agreement, because it is likely that the protocols will change as the Project progresses. If the protocols were included in the agreements, the Project Participants would need to amend all of their agreements every time the protocols changed, which would be unduly burdensome. It should be noted, however, that even though the protocols are not part of the Agreement language, E203–2013, at Section 3.3, contractually requires the Parties to follow the protocols once established.

It is expected as that as the Project circumstances change, the Project Participant will jointly revise and issue updated versions of G201–2013. This would be the case anytime information contained in G201–2013 is revised or expanded. Accordingly, G201–2013 provides a space on the cover page to allow the Parties to designate a version number and a date, to differentiate between newer and older versions. Because the form content may change over the Project's duration, the version number, date, preparer, and distribution fields should be updated as needed. For example, as the Project moves into construction, the list of Project Participants responsible for creating, transmitting and reviewing Digital Data will likely grow and change significantly, and the distribution list should reflect the current Project Participants.

Users must also be aware that pursuant to E203–2013 Section 1.3, if the protocols established in G201–2013 will result in a change in the scope of work or services warranting an adjustment in compensation, contract sum, schedule or contract time, the user must satisfy the notice requirement set forth in Section 1.3.3 in order to request an adjustment. The standard provision in E203–2013 Section 1.3 requires 30 days written notice, although users are permitted to provide a different time period for the notice requirement. Refer to the discussion of E203–2013 Section 1.3 for more detail.

Article 1 General Provisions Regarding Use of Digital Data

G201–2013 Section 1.1

§ 1.1 List each Project Participant that has incorporated AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated _____, into its agreement for the Project:

Project Participant	Discipline

The Section 1.1 table, when completed, provides a complete list of each Project Participant that has incorporated E203–2013 into their Project Agreement. It is important for each Project Participant that will utilize Digital Data to incorporate E203–2013 into their agreements because E203–2013 Section 3.3 provides the contractual obligation to use the Digital Data consistent with the protocols established in G201–2013. If Digital Data is provided to a Project Participant that has not incorporated E203–2013 into its agreement, the protections against unauthorized use established in the protocols could be lost. It will also be important for the Project Participants to keep this table updated and issue updated versions of G201–2013 every time a new Project Participant is added to this list.

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G201–2013 Section 1.2

§ 1.2 Project Participants. For each Project Participant listed in Section 1.1, identify and provide contact information for the individuals responsible for implementation of the Digital Data protocols.

Project Participant	Individual Responsible	Contact Information

The Project Participant table found in Section 1.2 is a continuation of the discussion and decision making process that begins in Section 1.1. This section requires the document users to identify, for each Project Participant, the individuals responsible for implementation of the Digital Data protocols. This table provided can be expanded as needed.

A typical Project may begin with the Owner and Architect sharing digital programming, design concepts, and budgeting information. As the Project progresses, additional consultants, contractors and possibly sub-contractors and suppliers may be added. As projects move through specific phases, the assignment of Digital Data responsibilities may change within an organization. Care should be taken to keep this table current and accurate to maintain the seamless transfer of information, which will require the issuance of updated versions of G201–2013 as necessary.

The following is an example of how this table may be filled out:

Project Participant	Individual Responsible	Contact Information
AQA Architects	John Smith	JSmith@AQA.com; 212-555-2323
SDS Engineering	Susan Brown	SBrown@SDS ENG.com; 301-555-0987
FMD Construction	David Morse	DMorse@FMDcon.com; 212-555-3477

G201–2013 Section 1.3

§ 1.3 Terms in this document shall have the same meaning as those in AIA Document E203–2013.

By this cross-reference, the Project Participants recognize the use of the terminology found in E203–2013, including such terms as "Digital Data" and "Project Participant." Terms with specialized meanings are generally defined and capitalized in AIA Contract Documents.

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Article 2 Digital Data Management Protocols

G201–2013 Section 2.1.1

§ 2.1.1 Electronic Document Management System. If, pursuant to Section 3.5.1 of the Project specific version of AIA Document E203–2013, the Project Participants indicated an intent to use a centralized electronic document management system on the Project, the requirements for the centralized electronic document management system are as follows:
(The requirements for the system shall address, among other things, access to and security of Digital Data.)

This section requires identification of any centralized electronic document management system or program. There are a wide variety of options as to the selection, creation and management of such Project based systems. The potential impact on a Project Participant's normal methods for document storage and management makes this matter an important topic for discussion.

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The selected centralized electronic document management system, if any, can be as simple or complex as the Project for which it is being used. Often, the type and volume of shared Digital Data and the number of Project Participants will suggest the optimal solution. Something as simple as a shared FTP site where files can be posted and accessed may be all that is needed for certain Projects. As Project complexity increases, a system with additional capabilities such as commenting, version control, access logging and other features may be beneficial to serve as a centralized Project record that all Project Participants can access and utilize. It may also be appropriate to maintain separate systems for distinct types of electronic documents. For example, drawing data may be on one system managed by the Architect while correspondence and non-graphic data is maintained on the Owner's system. Article 2 provides the Project Participants with an opportunity to set forth the specific requirements of any such management system.

Because available software and system requirements continually evolve, it is important to gain acceptance from the Project Participants on the appropriate system for the Project. What may be standard practice for one Project Participant may require a considerable learning curve for others. Accordingly, due consideration should be given to system cost and the level of effort new users may need to get up to speed. For the benefit of the Project, such considerations should occur as early as possible.

Examples of issues that may need to be addressed in this section during the identification of the appropriate system could include the following:

- Access rights to submittals or other records after the Project is concluded, including time period for such access
- Rights to post, alter, view and archive the data
- Ownership of such a document management system

When completing Article 2, in addition to considering the operation of the centralized electronic document management system, the Parties should also focus on documenting what the system is intended to achieve and how the system will impact the role of the Project Participants. For example, the selection of a proprietary software system as the management system may require users to purchase a license or impact their ability to gain access from off-site.

Article 2 contains a series of fill points relating to system documentation, startup, and ongoing requirements. Although using the fill point(s) is recommended, it may be appropriate where large amounts of information will be provided, to include a summary of the information in G201–2013 and also reference a separate document containing more detailed information.

G201–2013 Section 2.1.2

§ 2.1.2 System Startup Requirements. Initial training and other startup requirements to be implemented with respect to the use or management of Digital Data, if any, are as follows:
(Describe in detail any initial training or other startup requirements.)

This section requires the Parties to describe training required for any centralized electronic document management program or system utilized on the Project. If the system selected in 2.1.1 above is a simple Web-based file sharing utility, the training and access requirements may be negligible. An example of such language would be as follows:

> The Architect will provide a one-half day Digital Data orientation for all Project Participants.

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If the system is complex, significant startup efforts may be necessary. Any such outside training, special hardware, or software requirements should be stated. Additionally, training may be necessary to bring other Project Participants up to speed on a particular program to be able to work with the others. If the selected system is already in use by some of the Project Participants, the need for training may not be evenly distributed among the other Project Participants.

G201–2013 Section 2.1.3

§ 2.1.3 Ongoing System Requirements. Ongoing training or support programs to be implemented with respect to the use or management of Digital Data, if any, are as follows:
(Describe in detail any ongoing training or support programs to be implemented.)

Individual Project Participants may employ staff with the expertise to provide training or maintenance for selected systems, in which case their contract scope and compensation may require amendment if they become responsible for providing such services. Some systems are maintained by outside vendors on a fee basis, or require independent digital resources. If these items are part of the Project requirements, they should be described in terms of who will provide the services, which Project Participant will engage the vendor, and how long the services will be in place.

G201–2013 Section 2.2

§ 2.2 Digital Data Storage Requirements. The procedures and requirements for storing Digital Data during the course of the Project, if any, are as follows:
(Describe in detail the procedures and requirements for storing Digital Data during the course of the Project.)

The potential topics under this section are quite numerous. Digital Data may be stored on a single Project Participant's server, on multiple Project Participants' servers, hosted by an outside provider, or a combination of these methods. The Project Participants should discuss how the Digital Data will be stored, saved and accessed by everyone involved. It would serve the Project well to have a detailed explanation of how this is achieved while also maintaining the free flow and integrity of Digital Data. Furthermore, the requirements established in this section need to be coordinated with any centralized electronic document management system identified in Section 2.1.1 above.

G201–2013 Section 2.3

§ 2.3 Digital Data Archiving Requirements. The procedures and requirements for archiving and preserving Digital Data during the course of the Project and following final completion of the Project, if any, are as follows:
(Describe in detail the procedures and requirements for archiving and preserving Digital Data during the course of the Project and following completion.)

This section requires identification of procedures and requirements for storing Digital Data during the Project and after the Project is completed. There are numerous approaches for accomplishing this task. A common solution is to require archiving of all Project Digital Data at specified Project milestones recognized by all Project Participants; or archiving requirements between two Parties could occur in parallel with deliverables as specified in their agreements. However the schedule and process of archiving are decided, the Project Participants should understand that this archive becomes a Project record and any agreed-to process should provide appropriate measures to maintain security, access and integrity.

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Some of the issues that should be discussed include the following: (1) how often the Digital Data will be archived, (2) how long the archive files will be retained, (3) how long each of the Project Participants will be able to have access to the archive files, (4) who will bear the responsibility and cost of maintaining such archive files, (5) how the archive files can be used, and (6) what processes should be established for the destruction of any archive files once the required retention period has elapsed.

G201–2013 Section 2.4

§ 2.4 Other Digital Data Management protocol requirements, if any, are as follows:
(Describe in detail any other requirements.)

This section provides a place for the Project Participants to identify any other requirements for Digital Data management, if any.

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Article 3 Transmission and Use of Digital Data

Article 3 is used to define the transmission methods and Authorized Uses of the Project's Digital Data. The assumption of this article is that virtually every Project communication can be transmitted and used in digital form, although it is certainly not a requirement. Article 3 is composed of two sections: a table to identify the Digital Data that will be transmitted and used, and a section that provides definitions of the terms used in the table. With so many Digital Data and communication options available, it is critical to establish which system or method will be used for each function so as to streamline work processes between Project Participants and prevent loss of Digital Data integrity due to incompatibility.

G201–2013 Section 3.1

Section 3.1 consists of the Digital Data Protocol table, which is composed of five columns:

Digital Data. This column identifies the Project document, record, or communication that is governed by the protocol. The Digital Data column is pre-populated with the Project items that are most likely to be found on the Project. Because every project is unique, however, the list should be considered as a starting point and the Project Participants should add, clarify, and delete items to reflect the specific Project's circumstances.

Digital Data Format. This is generally a software specific designation, or a file type that is compatible with multiple software platforms. An important issue to consider is the ability to modify the file when selecting Digital Data formats. Certain Digital Data will, by virtue of its phase in the Project, require modification as a part of its Authorized Use, while other Digital Data, such as agreements, should be transmitted in a format that prevents modification.

Transmission Method. The transmission method is the means by which, either electronic or physical, the Digital Data will be exchanged between the Project Participants. Recordable media, email, File Transfer Protocol (FTP), as well as a variety of proprietary software interfaces that employ similar strategies are likely candidates for use as a transmission method. The transmission method should provide an appropriate level of verification of transmittal and receipt commensurate with the type of Digital Data being transmitted.

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Authorized Uses. The Authorized Uses indicate the permitted uses for the Digital Data that is transmitted. As examples, Section 3.2 lists four possible options for Authorized Uses, from the limited (Store and View), to the complete (Modify as required). The distinctions allow the user to control the way the Digital Data will be viewed, reproduced, distributed, incorporated or modified by other Project Participants. Many Project variables will determine the appropriate restriction or use of the transmitted file. Note also that some Digital Data may have more than one permitted use. Authorized Uses should not be in conflict with the underlying agreements between the Parties utilizing this protocol. For example, the Architect's Instruments of Service have specific uses and ownership rights set forth in the prime agreement.

Notes. The Notes column allows the user to provide clarification of the items contained in the previous columns. For example, the table assumes that there is no specific author of the listed Digital Data, but if an item will be authored by a particular Party or Project Participant, the notes column can be used to designate that responsibility. Another example may be to note that a hard copy is to follow all transmissions of a particular type of Digital Data. Further, the notes could be used to capture particular nuances that cannot otherwise be captured in the Authorized Uses column. Remember that it is not necessary, however, to re-record responsibilities that are delineated elsewhere in the Project agreements.

An important concept to understand about the Section 3.1 table is its flexibility. While the table is pre-populated with data that is likely to be conveyed in a digital format, by no means should one construe that this is either the limit of Digital Data or that all of the items in the table must be provided in digital format. For example, a small-scale or simple project might only utilize Digital Data for communications via email with the balance executed utilizing traditional communication means. In this instance, the user can designate in the Section 3.1 table that the other items will be provided in a non-digital format, as shown below:

Digital Data	Digital Data Format	Transmission Method	Authorized Uses	Notes *(Enter #)*
§ 3.1.1 Project Agreements and Modifications	-	-	-	Non-Digital Data
§ 3.1.2 Project communications				
General communications	EM	EM	R	
Meeting notices	EM	EM	S	
Agendas	PDF	EMA	S	
Minutes	PDF	EMA	S	
Requests for information	EM	EMA	R,I	

Alternatively, users can delete the sections from the table that do not apply, as in the example below.

Digital Data	Digital Data Format	Transmission Method	Authorized Uses	Notes *(Enter #)*
~~§ 3.1.1 Project Agreements and Modifications~~				
§ 3.1.~~2~~1 Project communications				
General communications	EM	EM	R	
Meeting notices	EM	EM	S	
Agendas	PDF	EM	S	
Minutes	PDF	EM	S	
Requests for information	EM	EM	R,I	

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On the other hand, because the information is presented in an editable table, it is easy to add additional rows to include other Digital Data that a Project might require, as is done below.

Digital Data	Digital Data Format	Transmission Method	Authorized Uses	Notes *(Enter #)*
§ 3.1 ~~3~~1 Project communications				
General communications	EM	EM	R	
Meeting notices	EM	EM	S	
Agendas	PDF	EM	S	
Minutes				
Draft for Review	MSW	EMA	M	
Final for Record	PDF	EMA	S	
Requests for information	EM	EM	R,I	

The Section 3.1 table is intended to be completed utilizing short-hand abbreviations and Notes that are defined in Section 3.2. Each column in the Section 3.1 table has a corresponding list of definitions that are intended to simplify the completion of the Section 3.1 table. Standardizing the Digital Data Format, Transmission Method and Permitted Uses benefits all of the Project Participants by creating a uniform expectation for communication.

G201–2013 Section 3.2

§ 3.2 Digital Data Protocol Table Definitions and Notes

Section 3.2 is used to define the shorthand elements that populate the Digital Data Protocol Table. Except for the Digital Data column, each of the columns has a corresponding section in Section 3.2 that should be completed. Section 3.2 serves as the key to the abbreviations, acronyms, initialisms and notes used in the Section 3.1 table.

Section 3.2 provides terms that are commonly used and abbreviations for those terms. This does not mean that the Project Participants must use any or all of the suggested terms. The lists should be customized to match the specific practice and requirements presented by the work at hand. The most important consideration in completing these sections of the form is to avoid needlessly restricting the flow of information. There is a natural tendency to over complete the table with very specific software requirements, transmission procedures and usage permissions that may not support the flow of communication that is critical to project success. Additionally, the table in section 3.1 should not be viewed as a complete list of Digital Data available or required for the Project. The list should be viewed as a subset of deliverables required and is meant to establish efficiencies in communication between Project Participants where possible.

Digital Data Format

Today's projects generate Digital Data in a myriad of formats. Architects, consulting engineers, contractors and others will complete the work utilizing a variety of hardware platforms and software applications. The Digital Data Format section is intended to establish the compatibility of a given piece of Digital Data amongst the Project Participants. The most ubiquitous example of this would be email which is almost universally compatible across platforms and applications. A two or three letter abbreviation may be used in the table:

EM—Email

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Many communications are likely to be conducted directly via email. For communications requiring a more formal presentation, for example meeting minutes, a document attached to an email may be required. In order to assure that all Project Participants can utilize that Digital Data, a Microsoft Word Compatible format may be required in the instance where an editable file is desired:

MSW—Microsoft® Word Compatible

If a non-editable format is desired, the user might utilize this designation:

PDF—Portable Document Format; Adobe® Acrobat® or compatible

For certain Digital Data, compatibility may not be good enough. In those instances, uniformity may be the most important characteristic. For example, in a BIM environment, both the software and the version must be uniform amongst the participants in order to maximize the benefits that tool affords. In this instance the designation might be as follows:

RVT—Autodesk® Revit®—2011

Another example where uniformity may be important is the electronic review of shop drawings. Some commonly used software platforms track the annotations of a series of reviewers and allow each to be distinguished from the others, but the Project can only benefit if all of the Project Participants utilize the same software tool. In this instance the designation might be as follows:

BBM—Bluebeam® Revu®

The Digital Data format may also depend on the specific Authorized Use. Nevertheless, the table and this Section 3.2 are sufficiently flexible for users to develop a format that is sufficient to address their needs.

Transmission Method

The various methods by which Digital Data may be transmitted are continuously changing. The entries that are provided in this section are the most prevalent possibilities, but of course the user can add and delete to suit the Project's specific requirements. Thought should be given to the importance of verification, both transmittal and receipt, of any specific item of Digital Data transmission. For some items it may be important to record when the Digital Data changed hands. The previously mentioned electronic shop drawing review process is an excellent example of an instance where this kind of accounting is important. The Transmission Method selected for submittals should provide this capability.

Some Projects may utilize Web-based project management software to which all of the Project Participants have access, providing the ability to download and upload Digital Data as well as process Requests for Information through the software itself. By employing project management software, the Project Participants should take care in establishing who will manage the software, how the Digital Data will be hosted (internally or by an entity external to the Project) as well as where those costs will be assigned. This should be coordinated with any centralized electronic document management system referenced in G201–2013 Article 2.

File size is another important consideration in selecting a transmission method. Almost hand-in-hand, internet speeds have increased with the file sizes generated by various software products. Nonetheless, most email systems place limits on individual attachments and overall mailbox sizes. Utilizing email attachment (EML) as a means of dispersing large files is probably not the most effective means available.

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Lastly, when considering Transmission Method, consider the attention that the Digital Data warrants. Email is the prevalent means of project communication and it is not uncommon for large projects to generate tens, if not hundreds of thousands of emails. Determining how to differentiate critical information from more routine information is very difficult. Remember that the goal is to communicate with appropriate documentation.

Authorized Uses of Digital Data

The Authorized Uses options set the rules for use of, and reliance on, the Digital Data by the Project Participant receiving or accessing the Digital Data. Note that it is very possible that some Project Digital Data may be distributed to multiple Project Participants, each of whom may have a different permitted use. If that is the case, the Project Participants would be well served to make use of the Notes column to indicate such distinctions and nuances regarding the Authorized Uses.

Notes

Notes should be designated numerically in the table and described in detail in the Notes fill point in Section 3.2. This convention provides flexibility in completing the table. As previously discussed, responsibility for authorship is a likely topic to be included in the notes column as shown in this example:

Digital Data	Data Format	Transmission Method	Authorized Uses	Notes *(Enter #)*
§3.1.2 Project communications				
Minutes	PDF	EMA	S	1

Where note 1 is defined in Section 3.2 as follows:

1. Author: Design Phase—Architect; Construction Phase—Contractor

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Guidance, Instructions and Commentary to AIA Document G202–2013, Project Building Information Modeling Protocol Form

E203–2013 records the Parties' intentions regarding the use of Modeling on the Project, the Anticipated Uses of the Model and other basic assumptions about the roles and responsibilities of the Parties. E203–2013 also contractually obligates the Parties to discuss, establish, and follow protocols for the development and use of Models on the Project. G202–2013 is an extension of, and consistent with, those recorded intentions. The protocols, however, are not included in the actual Agreement because it is very likely that the protocols will need to evolve as the Project progresses and more Project Participants utilize the Model. Requiring the Project Participants to amend all of their agreements every time the protocols change would be burdensome and unrealistic from a practical standpoint, and would provide no real benefit.

It is expected as that as the Project circumstances change, the Project Participant will jointly revise and issue updated versions of G202–2013. This would be the case anytime information contained in G202–2013 is revised or expanded. Accordingly, as is the case with G201–2013, G202–2013 includes a fill point to allow the Parties to designate a revision number and date to differentiate between newer and older versions of the Building Information Modeling protocols.

Users must also be aware that pursuant to E203–2013 Section 1.3, if the protocols established in G202–2013 will result in a change in the scope of work or services warranting an adjustment in compensation, contract sum, schedule or contract time, the user must satisfy the notice requirement set forth in Section 1.3.3 in order to request an adjustment. The standard provision in E203–2013 Section 1.3 requires 30 days written notice, although users are permitted to provide a different time period for the notice requirement.

Article 1 General Provisions

G202–2013 Section 1.1

§ 1.1 For each Project Participant that has incorporated the Project specific AIA Document E203™–2013, Building Information Modeling and Digital Data Protocol Exhibit, dated _____, into its agreement for the Project, identify and provide the contact information for individuals responsible for implementation of the Modeling protocols. If, for any Project Participant, more than one individual will be responsible for implementation of the Modeling protocols, list each individual separately and describe the unique Modeling Role assigned to each individual.

Modeling Role	Project Participant	Individual Responsible	Contact Information

Each Project Participant in the Modeling process has a role and responsibility. Completing the table in this section clearly articulates those roles and provides the contact information to facilitate this important part of the planning process. The Project Participant is the entity that has incorporated E203–2013 into its Agreement and is for the identified Modeling Role. The Individual Responsible is the actual named person, and the primary point of contact for that particular Modeling Role. Contact Information should include information such as address, and more importantly, correspondence information deemed appropriate for timely and efficient communication, such as telephone numbers, mobile numbers, and e-mail addresses.

This table is a key example of the evolutionary nature of this document. In the early stages of the Project, the information may be limited to general scopes of work and the designation of a firm's responsibility. As the

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design progresses and Modeling begins, the table will be populated with specific responsible individuals and the list of Modeling Roles will grow.

The table can be extended to contain any number of individuals that have a separate Modeling Role. It may be that a single firm allocates responsibility for different portions of Modeling protocols to multiple individuals. Each would be recorded on a separate line. The key is to clearly indicate to all the Project Participants who the "go-to" person is for each area of responsibility and contact that person.

G202–2013 Section 1.2

§ 1.2 This document establishes the Modeling protocols for the Project. For purposes of these protocols, the Model is comprised of the following information and other data sets:
(Indicate disciplines, separate models, and other data that will be included within the Model and governed by the Modeling protocols.)

In addition to the fundamental Model Elements within the portions of the Project that are modeled, the Model is comprised of separate data sets and other non-geometric data. Section 1.2 allows the Project Participants to define exactly what is included in the Model for purposes of the Modeling protocols. This section is necessary given the vast amount of different information that can be included in, attached to, or referenced in Models. Large and complex Projects will also likely result in multiple Models, or aggregations of Models that include discrete portions of the Project. Section 1.2 allows the Project Participants to work from a common understanding as to what is included in the Model and therefore, what is governed and defined by the Modeling protocols. Accordingly, when a Project Participant indicates that a Model Element is developed to a Level of Development (LOD) 300, the other Project Participants understand that all the various items listed in this section, which are considered to be part of the Model Element, are also developed to LOD 300 (See also general discussion of LOD definitions G202–2013 Article 2.)

In determining what should be included, it may be worthwhile to address the expected Authorized Uses of the Model, which will help establish the appropriate LOD level. In many instances, the Authorized Use will inform what information should be included in the Model. Users should also be aware that this section may be approached differently depending on the relative size and/or complexity of the Project.

Examples of information that may be included in Section 1.2 are as follows:

- Architectural Models
- MEP Models
- Structural Engineering Models
- Linked Cost databases
- Specifications
- Operations and Maintenance Manuals
- Energy Efficiency Related Information
- Energy Analysis Models

G202–2013 Section 1.3

§ 1.3 Collaboration Protocols. The Project Participants' protocols for the collaborative utilization of the Model, if any, including communications protocols, a collaboration meeting schedule and colocation requirements, are as follows:

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The collaboration strategy has been made a fill point so that individual teams can record their preferences for project initiation, ongoing collaboration, and regular forms of communication. Keep in mind that these activities are limited to the collaborative uses of the Model. The document anticipates the need for establishing a means of communicating changes to the Model, scheduling meetings for the Project Participants to discuss the technical aspects of Modeling and the potential of physical colocation. Other items that might be included here include data hosting strategies, wide area networking or other activities or technical implementations that facilitate collaborative utilization of the Model. If a Project Participant has a pre-established collaboration strategy, it may be referenced as necessary in this section.

This section can be as detailed as is necessary to describe the strategy, or may be used as the point to record reference to a separate document.

Because some of these decisions can have a significant impact on the Project Participants' activities, strategies or collaboration requirements should be fully described. If the strategy for the Project includes Project Participants being colocated, space, equipment, lodging and other factors will need to be addressed.

G202–2013 Section 1.4

§ 1.4 Technical Requirements. The technical requirements relating to the utilization of Building Information Modeling, including specific software and hardware requirements are as follows:

The Project Participants will utilize Section 1.4 to describe any software and hardware requirements for the Modeling for the Project. At a minimum, the software and release version that will be used for Modeling should be established, but it is likely that there will be a variety of uses for the Model, some of which may require specific software capabilities. Uses such as shared visualization, fabrication, construction model aggregation, energy performance analysis, scheduling and estimating are all possible instances where a specific technical compatibility may be important.

Project specific hardware requirements should also be indicated here, especially if it is a shared piece of hardware such as those used on site or provided for a colocation team. Another example would be the anticipated use of mobile technologies for collaboration software, visual recording and records access.

G202–2013 Section 1.5

§ 1.5 Training and Support. The parameters for any training or support program(s) that will be implemented with respect to any collaboration strategy or technical requirements are set forth below:

Because the use of Modeling is still in the adoption phases within the industry, the collaborative opportunities it presents are evolving. While individual Project Participants will have training and workflow process analysis to complete in order to participate fully in the Project, the Project Participants as a group may also need to complete a similar undertaking in order to collaborate as effectively as possible. The processes and underlying software may require training, support, and specific capabilities to implement and maintain. For example, the Project Participants may choose to have the entire team, including key subcontractors and owner representatives, participate in a Modeling orientation class designed to set expectations for general Model uses. Or, the Owner may have a specific operations and maintenance program that the Architect and the Contractor are required to understand and to align with as the Model is produced. If the Project Participants do not anticipate any new training or support to implement the collaboration strategies this should be noted as well.

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G202–2013 Section 1.6

§ 1.6 Model Standard. The Model shall be developed in accordance with the following Model Standard, if any:

Standards served an important role in the adoption of Computer Assisted Design. It is unclear, however, what role standards will play with regard to Modeling. There are, in fact, proposed industry-wide standards being developed, and some industry professionals and owners have developed their own Modeling standards. The National Building Information Model Standards or NBIMS, may become a widely used standard as it develops. Other entities may produce similar or competing standards and the marketplace is continually evolving.

To the extent that a specific standard is utilized across parts or the entire spectrum of the Project, it should be recorded here. This clarifies expectations, and reduces inefficiency when coordinated early. Model Standards should be coordinated with Authorized Uses and software and hardware requirements to assure compatibility.

G202–2013 Section 1.7

§ 1.7 Model Management Protocols and Processes. The following Model Management Protocols and Processes shall apply to the Project only if specifically designated in the table below as being applicable. *(Designate the Model Management Protocols and Processes applicable to the Project in the second column of the table below. In the third column, indicate whether the detailed description of the Model Management Protocol or Process is located in Section 1.8 or in an attached exhibit. If in an exhibit, identify the exhibit.)*

Model Management Protocols	Applicability to Project *(Applicable or Not Applicable)*	Location of Detailed Description *(Section 1.8 below or in an attachment to this exhibit identified below)*
§ 1.7.1 Model origin point, coordinate system, precision, file formats and units		
§ 1.7.2 Model file storage location(s)		
§ 1.7.3 Processes for transferring and accessing Model files		
§ 1.7.4 Naming Conventions		
§ 1.7.5 Processes for aggregating Model files from varying software platforms		
§ 1.7.6 Model access rights		
§ 1.7.7 Design coordination and clash detection procedures		
§ 1.7.8 Model security requirements		

E203–2013 Section 4.8.2 lists a number of potential Model management protocols and processes. The table in G202–2013 Section 1.7 corresponds to the E203–2013 Section 4.8.2 list of potential Model management protocols and processes. In preparing the Modeling protocols, the Project Participants should utilize this table to identify the Model management protocols and processes that apply to the Project. Further, as the Model management protocols and processes may be very detailed, the table allows the Project Participants to identify where the detailed description of each applicable Model management protocol/process is located. Such a description can either be set forth in Section 1.8 or in a separate document that is referenced in the third column in the Section 1.7 table. Again, care should be taken to coordinate these protocols with established strategies, training, formats, etc.

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G202–2013 Section 1.8

§ 1.8 Insert a description of each Model Management Protocol and Process identified in Section 1.7, if not further described in an exhibit attached to this document:

To the extent the Project Participants indicate in the table that the detailed description of a Model management protocol or process is provided in Section 1.8, this section provides an open fill point for such information. If an acceptable description already exists, it can be copied into Section 1.8 or a reference can be provided to an attached document inserted in the table. As use of G202–2013 increases over time, it is anticipated that previously developed descriptions of protocols and processes will become standardized for some Project Participants and much, if not all, of this table can be covered in a referenced document.

G202–2013 Section 1.9

§ 1.9 Terms in this document shall have the same meaning as those in AIA Document E203–2013.

By this cross-reference, the Project Participants recognize the use of the terminology found in E203–2013, including such terms as "Model," "Project Participant," "Level of Development," and "Authorized Use." Terms with specialized meanings are generally defined and capitalized in AIA Contract Documents.

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Article 2 Level of Development

G202–2013 Section 2.1

§ 2.1 The Level of Development (LOD) descriptions, included in Section 2.2 through Section 2.6 below, identify the specific minimum content requirements and associated Authorized Uses for each Model Element at five progressively detailed levels of completeness. The Parties shall utilize the five LOD descriptions in completing the Model Element Table at Section 3.3.

The LOD framework utilized in G202–2013 is designed to accomplish two objectives with regard to Modeling. The LOD framework allows the Project Participants to efficiently communicate to one another the extent to which a Model Element has been developed by virtue of the defined minimum Model content requirement for each LOD. It also allows the Project Participants to communicate the extent to which a Model element may be used and relied on by virtue of the identified Authorized Uses of the Model. Accordingly, the LOD framework sets the floor for Model content and the ceiling for Model use.

With regard to the first objective, communicating the extent of development, it is important to recognize the difference between the detail of a Model Element and the development of a Model Element. In a Model, it is easy to misinterpret the meaning of the level of detail at which a Model Element is represented. To illustrate, consider traditional hand drawings. Hand drawings range from pen strokes on a napkin to detailed drawings with dimensions called out. The detailed hand drawing carries with it the designer's significant thought and effort in providing that detail. Therefore, it is safe to assume that because the designer took the time and affirmative step to draw an item with great precision and to include extensive additional details (dimensioning, notes, etc.), the designer has thoroughly evaluated and vetted the information such that it is sufficiently developed for its intended purposes.

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In a Model, however, it is inappropriate to assume that because a Model Element is depicted in extensive detail, it has been sufficiently developed for particular uses. The common use of library objects as placeholders in Modeling serves as a good example of why this is the case. A designer may pull a very detailed light fixture from an available object library and place that object in the Model, but only as a placeholder. The object, however, contains extensive detail (i.e., the manufacturer name, model number, etc.) and is precisely located despite the fact that the designer has not fully evaluated and decided upon this information. In other words, while the level of detail is extremely high, the level of development is extremely low. Therefore, unlike more traditional drawings, the visual level of detail is insufficient to accurately communicate a Model Element's level of development as the detail can be misleading.

The Project Participants can utilize the LOD framework to overcome this issue. As is discussed below in more detail, each LOD allows the Project Participants to describe the content requirements associated with the LOD. For example, the standard language for LOD 200 indicates that the "[t]he Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element." Therefore, even if a Model Element is extremely detailed, if it is identified to only be at LOD 200, it is clear that the detailed information contained in the Model Element has not been fully developed. Rather, the content has only been developed up to the point of being a generic system, object, or assembly.

The second objective for the LOD framework, communicating the extent of use and reliance, is intended to address the fact that the possible uses of a Model (and all the information included in the Model) are potentially limitless. This has caused significant concern to design professionals that their work may be used for unintended purposes. This concern has led to the proliferation of onerous disclaimers essentially stating that, while the Model is being shared, it cannot be used or relied on. To address this issue, the LOD framework allows the Project Participants to identify "Authorized Uses" for the Model content at each LOD. Any Project Participant using a Model Element can look to the defined Authorized Uses in G202–2013 to know the extent to which it can use and rely on the information in the Model Element.

It should also be noted that there is no intended correspondence between an LOD and traditional design phases. Systems progress at different rates through the design process—for example, design of the structural system is usually ahead of the design of interior construction. At Schematic Design, the model will include many elements at LOD 200, but will also include many at LOD 100, as well as some at 300, and possibly even 400. Similarly, there is no such thing as an "LOD—model". Models will invariably contain elements at various LODs.

In Article 2, the Project Participants define the actual Levels of Development that will be used on the Project. Each of the five standard Levels of Development consist of two components:

- **Model Element Content Requirements.** These sections provide a description of the minimal content requirements, in terms of representation within the Model, needed to qualify as the LOD. For an element to qualify as a given LOD, all the requirements for that LOD must be met. For example, at LOD 300, both specific assembly and final location must be determined.
- **Authorized Uses.** These sections describe the extent to which reliance can be placed on a Model Element, for certain identified uses. The Authorized Uses included in the standard text of G202–2013

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are suggestions and based on some of the more common Model uses. Document users should modify and revise the Authorized Uses to fit their particular needs. The Authorized Uses should be coordinated with the list of Anticipated Model Authorized Uses provided in Section 4.3 of E203–2013. It is also important to understand, however, that the LOD framework and related Authorized Uses specified in these documents are tied to Project Milestones. A somewhat common perception in the industry is that, in the process of creating various Model Elements, they are "tagged" with an LOD. While this may be a useful exercise in the process of creating and revising Model Elements, such a "tag" does not automatically carry with it the Authorized Uses listed in these documents. This is because the LOD framework in these documents describes Model Elements content requirements and the related Authorized Uses *at defined points in time only*. Those defined points in time are the agreed upon Project Milestones set forth in the G202–2013 Section 3.3 Model Element Table.

The LOD definitions, as developed by the AIA and included in Article 2, are gaining acceptance as standard definitions in the industry. Recently the BIMForum[2] utilized the AIA's LOD definitions in its Level of Development (LOD) Specification document. The LOD Specification utilizes the AIA's LOD definitions and graphically illustrates characteristics of Model Elements of different building systems at different Levels of Development. The LOD Specification is currently in draft form and is available to download (bimforum.org/lod).[3]

G202–2013 Section 2.2

§ 2.2 LOD 100

§ 2.2.1 Model Element Content Requirements. The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e., cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.

At LOD 100, Model Elements are in the form of narratives, program information, etc. An LOD 100 Model Element is not geometrically modeled, but may be included in a Model as a symbol that does not represent actual geometry. It is also possible that the Model Element is not individually represented in the Model in any graphical sense, but its existence can be derived from other Model Elements that are graphically represented in the Model. For example, the existence of a mechanical system can be derived from the square foot quantity associated with the floor slab that is represented in the Model at LOD 200.

LOD 100 elements are extremely useful early in the design process. They enable the designer to embed a great deal of intelligence regarding such things as approximate costs and system capacities in a Model consisting of nothing more than floors, and then to quickly derive overall costs and capacities as the Model is changed. Some Model Elements may remain at LOD 100 through to the end of the Project. See the discussion under "Cost Estimating" below.

[2] The BIMForum is an organization formed to facilitate and accelerate the adoption of building information modeling in the design and construction industry. For more information, visit bimforum.org.

[3] The AIA licensed the use of its copyrighted LOD definitions to the BIMForum to advance acceptance of a standardized set of LOD definitions in the design and construction industry.

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Examples of LOD 100 Model Elements:

- **Structural.** A unit quantity of pounds of steel per square foot linked to floor or roof elements.
- **Architectural.** Architectural elements at LOD 100 are not geometrically modeled. Information is in narrative form, including such items as space uses and their areas, allowances for circulation space, and types and quality levels of finish. Elements such as elevators and stairways may be included only in the narrative, or may be placed in a 3D model as non-geometric symbols. The latter approach provides the ability to specify counts and approximate locations of elements without having to model specific geometries earlier than necessary.
- **Interior Construction.** A unit cost per square foot of floor area linked to floor elements, stairways indicated by symbols
- **HVAC.** A unit quantity of tons of cooling capacity per square foot linked to floor elements, terminal units indicated by symbols.
- **Electrical.** A unit quantity of watts per square foot power consumption linked to floor elements.
- **Conveyance.** A common practice for estimating elevators is to include a cost for the machine and a cost per stop. This can be facilitated with an LOD 100 symbol for the machine and one for an elevator stop on each floor.

G202–2013 Section 2.2.2

§ 2.2.2 Authorized Uses

§ 2.2.2.1 Analysis. The Model Element may be analyzed based on volume, area and orientation by application of generalized performance criteria assigned to other Model Elements.

§ 2.2.2.2 Cost Estimating. The Model Element may be used to develop a cost estimate based on current area, volume or similar conceptual estimating techniques (e.g., square feet of floor area, condominium unit, hospital bed, etc.).

§ 2.2.2.3 Schedule. The Model Element may be used for Project phasing and determination of overall Project duration.

§ 2.2.2.4 Other Authorized Uses. Additional Authorized Uses of the Model Element developed to LOD 100, if any, are as follows:

Analysis. LOD 100 Model Elements can only be analyzed at a very conceptual level, and only through reference to Model Elements at higher Levels of Development. For example, if the HVAC system is still at LOD 100, space volumes might be determined from other Model Elements modeled at a higher LOD in order to help determine the ventilation air volume requirements.

Cost Estimating. LOD 100 can be extremely useful for this purpose. There are many Model Elements that never need to be modeled in 3D, but for which enough information is present in the Model to support accurate cost estimating. Paint, for example, is almost never graphically represented in the Model, but information about it can be linked to or derived from wall Model Elements, allowing accurate quantities to be determined. The Model Element table in Article 3 can show that these Model Elements will remain at LOD 100 through the entire design process. This is invaluable in managing everyone's expectations as to what will and will not be graphically modeled. If Cost Estimating is an Authorized Use, the estimating methods used will be conceptual (i.e., cost per floor square foot, per hotel key, per hospital bed, etc.) because of the nature of the Model Element content at LOD 100.

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Schedule. LOD 100 Model Elements can be coupled with measurements and counts of Model Elements at higher Levels of Development to generate high-level phasing schedules and overall Project duration. With respect to Model Elements at LOD 100, however, given the conceptual nature of the information, they can only be scheduled in general or conceptual terms.

Other Authorized Uses. LOD 100, like all the subsequent LOD definitions, includes a fill point to allow for the addition of other Authorized Uses anticipated by the Project Participants.

G202–2013 Section 2.3

§ 2.3 LOD 200

§ 2.3.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

In general, LOD 200 elements are generic placeholders. This is the lowest level at which a geometric representation of a Model Element will appear. By contrast, in LOD 100, a Model Element may be graphically represented by a symbol, but it will lack any geometry. For an LOD 200 Model Element, the size, shape, location, orientation, and any data associated with the Model Element are approximate. LOD 200 elements are useful both early in the design process when specifics have not yet been determined (the designation of LOD 200 tells downstream users that the element may change) and in final Models when selection of certain items, such as lighting fixtures, is left to others or is met by a range of choices.

In addition to the geometric representation, the LOD 200 Model Element may also include non-graphic information. The most common type of non-graphic information attached to Model Elements is cost information. There are several ways of attaching this data. Many authoring tools include fields for such information within the objects themselves, and there are also several tools that allow objects to be linked to line items in a separate database. Other examples of non-graphic information that may be included in an LOD 200 Model Element are thermal characteristics of envelope components, weight of an object, manufacturer/model data, and hyperlinks to operation and maintenance manuals.

Examples:

Structural. The structural grid and approximate structural depths (perhaps based on rules of thumb) are shown. This is a prime example of the necessity of coordinating carefully with the G202–2013 Section 3.3 Model Element table. Structural elements are usually selected from a library of objects.– For example, A W 14X34, selected because it is close to what is likely to be needed and placed approximately, looks exactly like a W 14X34 that has been fully engineered and placed in its final location. The designation of LOD 200 tells everyone that, despite its level of detail, the Model Element is still generic and should only be relied on as such.

Architectural:

- Walls and roofs: modeled as 3D objects, but thickness, composition, and location are not finalized.
- Window penetrations: modeled, but dimensions and locations are not finalized.

HVAC. The purpose of HVAC Model Elements at LOD 200 is primarily to verify early in the design process that spaces such as above-ceiling plenums, shafts, and mechanical rooms are large enough.

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Equipment and ductwork are modeled with as much accuracy as is reasonably possible in order to reserve space, but with the caveat that size and location may change as the design progresses. Often only large items or those in congested spaces are modeled at LOD 200—smaller items may be deferred until they can be modeled at higher Levels of Development.

Electrical. Lighting fixtures can be modeled as generic 3D objects to begin determination of layout and identification of coordination issues. Switch gear and major panels can also be modeled as generic 3D objects to aid in sizing and layout of equipment rooms and identification of access requirements.

G202–2013 Section 2.3.2

§ 2.3.2 Authorized Uses

§ 2.3.2.1 Analysis. The Model Element may be analyzed for performance of selected systems by application of generalized performance criteria assigned to the representative Model Elements.

§ 2.3.2.2 Cost Estimating. The Model Element may be used to develop cost estimates based on the approximate data provided and quantitative estimating techniques (e.g., volume and quantity of elements or type of system selected).

§ 2.3.2.3 Schedule. The Model Element may be used to show ordered, time-scaled appearance of major elements and systems.

§ 2.3.2.4 Coordination. The Model Element may be used for general coordination with other Model Elements in terms of its size, location and clearance to other Model Elements.

§ 2.3.2.5 Other Authorized Uses. Additional Authorized Uses of the Model Element developed to LOD 200, if any, are as follows:

Analysis. Any analysis based on LOD 200 elements will necessarily be very approximate. Model Elements at this LOD are useful for comparison of options, such as relative effects of building orientation on HVAC load.

Cost Estimating. Where costs of LOD 100 elements are based on measurement of other Model Elements, at LOD 200 the Model Element being estimated can be measured or counted directly. For example, at LOD 100 the cost of interior walls is based on floor area, whereas at LOD 200 the actual quantities of walls can be measured. Because the Model Elements are approximate in size and generic in composition, cost estimates based on LOD 200 should be stated as a range rather than as specific numbers.

Schedule. Scheduling is aided at LOD 200 by establishing quantities and durations for installation as well as lead times for equipment.

Coordination. Because final size and shape, as well as details such as access requirements and anchorage are not yet known, coordination is mostly limited to reservation of space and perhaps approximate routing of major elements.

G202–2013 Section 2.4

§ 2.4 LOD 300

§ 2.4.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

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LOD 300 Model Elements are specific assemblies, such as specific wall types, engineered structural members, system components, etc. The design of the Model Element is developed in terms of composition, size, shape, location and orientation. Constructability and coordination of other building components may require change to some Model Elements after they are designated LOD 300, but such changes should be minimized as much as possible. Other information such as cost, thermal characteristics, specifications, warranty, and operation and maintenance instruction may be attached to the element.

Examples:

Structural. Columns, beams, and joists are represented at their actual engineered sizes, shapes, and locations. Flanges, bases and joist webs can be relied upon for spatial coordination with other elements such as piping and ductwork, but LOD 300 does not usually include connection details such as gusset plates, which can impact coordination. If there is congestion near a connection, that connection should be taken to a higher LOD in order to assure coordination. Smaller details such as bolts, stiffeners and bracing will not be modeled at this level. Data such as steel tonnage and concrete volume can be derived accurately.

Architectural. Walls and roofs are represented at their actual thickness. The component layers (GWB, studs, etc.) may not be represented, but in that case they must be included in the non-graphical information attached to the Model Element. If that is the case, the non-graphical information relating to component layers should be listed as part of the Model in G202–2013 Section 1.2.

HVAC. Ductwork is represented at the actual engineered size and location, including space for insulation and location of accessories such as turning vanes, dampers and access hatches. Assembly and installation details such as flanges and hangers may not be shown. Data such as CFM and weight may be included in the attached non-graphical data.

Electrical. Equipment, switch gear and panels are represented at their actual sizes and locations, and required access space and clearances are shown. Fixtures and devices are accurately located at their actual configuration.

One of the challenges that the industry faces as Modeling becomes increasingly prevalent is the differentiation of the Level of Development of a Model Element from the broader range of information that may be contained in the Model pertaining to that Model Element. A Model that is developed sufficiently to derive traditional construction documents will appropriately include Model Elements with Levels of Development ranging from 100 to 300. Level of Development defines, most importantly, the maximum reliance that a designated user may place upon a given Model Element. When completing the Model Element table in G202–2013 Section 3.3, Project Participants should consider first what reliance is necessary to meet the Project's needs and then derive the Level of Development necessary to achieve that outcome.

With that in mind, consider that the electronic data set that comprises a Model will include a great deal more than the graphical information that is the three-dimensional representation of the Project. (The data, including non-geographic information, that comprises a Model is established in G202–2013 Section 1.2) For example, door hardware is most likely to be represented in the Model with meta-data embedded as a characteristic of the graphically represented door. A tabular or scheduled Model Element will display the information with a very high degree of specificity and reliance. Model Elements with this characteristic should use the Notes column of the table to identify the high level of reliance from non-graphical content.

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Another important issue is the content of the two-dimensional representations of the Contract Documents. Two-dimensional views of the Model, which for many Projects will continue to form the basis of the construction contract, include annotations, line work and other data that do not fit comfortably within LOD definitions. For example, a curtain wall window sill detail might include dimensional detail and anchorage characteristics typical of an LOD 400 for a Model Element that is otherwise represented in the Model at LOD 200 or 300. Generally speaking, the presence of the detail does not cause the curtain wall system to be defined in the Model Element table as LOD 400, nor require that other Model Elements of the curtain wall be modeled to LOD 400. The Model Element, in this case the curtain wall, should be modeled to the Level of Development necessary to achieve the reliance that the Project Participants agree is necessary. The detail is provided to communicate the intent of the design in a specific location or way that supplements the more general Level of Development.

It must be kept in mind that designation of a Model Element as LOD 300 is a statement that it is reliable for the LOD 300 Authorized Uses. These uses are substantially more detailed than those at LOD 200, so, if all the content requirements in the definition are not yet met, the designation must be left at 200.

G202–2013 Section 2.4.2

§ 2.4.2 Authorized Uses

§ 2.4.2.1 Analysis. The Model Element may be analyzed for performance of selected systems by application of specific performance criteria assigned to the representative Model Element.

§ 2.4.2.2 Cost Estimating. The Model Element may be used to develop cost estimates suitable for procurement based on the specific data provided.

§ 2.4.2.3 Schedule. The Model Element may be used to show ordered, time-scaled appearance of detailed elements and systems.

§ 2.4.2.4 Coordination. The Model Element may be used for specific coordination with other Model Elements in terms of its size, location and clearance to other Model Elements including general operation issues.

§ 2.4.2.5 Other Authorized Uses. Additional Authorized Uses of the Model Element developed to LOD 300, if any, are as follows:

Analysis. The accuracy of an LOD 300 Model Element is sufficient to perform detailed analyses such as HVAC load determination and structural simulation. These processes, though, are carried out through specialized software, and may require additional non-graphical data. Many analysis programs do not support the import of Models, in which case, the Model Element will have to be re-modeled in the specific program's format.

Cost Estimating. LOD 300 Model Elements can be measured and counted accurately, and specific unit prices can be applied, giving an accurate cost for the line items represented by the element.

Schedule. The Model Element contains sufficient information to develop the tasks needed to construct it and their durations.

Coordination. Coordination of most major building systems can be performed through "clash detection" cycles. There may be instances such as highly congested areas or bulky structural connections, however, where a higher LOD is needed in order to assure clearances.

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G202–2013 Section 2.5

§ 2.5 LOD 400

§ 2.5.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.

A designation of LOD 400 indicates that detail beyond that included in LOD 300 is to be provided, similar to the kind of detail that is traditionally supplied in shop drawings. Structural connections, slab-edge embeds, curtain wall details, and other items requiring special fabrication fall into this category. A Model Element qualifies as LOD 400 once all information necessary for fabrication and installation has been resolved.

Note that "fabrication," as the term is used here, refers to project-specific fabrication rather than manufacture of standard components. So, an LOD 400 store front Model Element would include the detail necessary to install it, but not to manufacture it. An LOD 400 custom metal railing Model Element would include detail necessary for manufacture.

Examples:

Structural:

- Steel: Model Element includes such details as bracing, stiffeners, masonry supports, lintels, etc.
- Elevated concrete slabs: Model Element includes rebar, accurate decking, etc.
- Slab on grade: includes gravel base and vapor barrier.
- Concrete block: shows if cells are grouted and any reinforcing within.

Architectural:

- Walls: metal and wood studs and blocking are shown
- Glass and glazing: thickness and airspace, if appropriate, are shown.
- Window and Door profiles are manufacturer specific and indicate connections, flashings and accessories.

HVAC: Model Elements include duct and pipe flanges, hangers, seismic bracing, etc. Required access clearances are modeled.

G202–2013 Section 2.5.2

§ 2.5.2 Authorized Uses

§ 2.5.2.1 Analysis. The Model Element may be analyzed for performance of systems by application of actual performance criteria assigned to the Model Element.

§ 2.5.2.2 Cost Estimating. Costs are based on the actual cost of the Model Element at buyout.

§ 2.5.2.3 Schedule. The Model may be used to show ordered, time-scaled appearance of detailed specific elements and systems including construction means and methods.

§ 2.5.2.4 Coordination. The Model Element may be used for coordination with other Model Elements in terms of its size, location and clearance to other Model Elements, including fabrication, installation and detailed operation issues.

§ 2.5.2.5 Other Authorized Uses. Additional Authorized Uses of the Model Element developed to LOD 400, if any, are as follows:

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Only selected Model Elements requiring significant detail will be taken to LOD 400. The Authorized Uses are similar to those for LOD 300, but more precision is provided.

G202–2013 Section 2.6

§ 2.6 LOD 500

§ 2.6.1 Model Element Content Requirements. The Model Element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements.

The LOD 500 filed verified representation may be viewed as an "as-built Model. When an as-built Model is required, obviously not every aspect of the Project is field verified. LOD 500 provides for specific indication of which elements will be field verified. This allows the owner to be clear on what is and is not verified, and allows whoever is responsible for producing the as-built Model to determine and price the effort involved. For obvious reasons, an LOD 500 element is the last stage of representation for that Model Element. The end user will be able to rely upon the Model Element's accuracy for use by other owner-initiated programs and systems that communicate with the Model software. Model data that in an earlier LOD indicated optional selections is replaced by the final installed choice.

Model Elements do not necessarily need to be brought up to LOD 400 before going to LOD 500. Likewise, not all Model Elements will be developed to be LOD 500 in order to be appropriate for the as-built Model. A Model Element representing paint might never be developed beyond LOD 100, but the owner may want the color field verified in certain areas.

It is important not to confuse the Phase or Project milestone with the act of field verification. If the Project milestone is called "Record Model" then the intersection of Model Elements contains the information for an LOD and for the Model Element Author. Some Model Elements might not require field verification, and, if they did not change during construction, that would not change. Those Model Elements would remain at the LOD to which they were previously developed for a "record model" or "as-built" phase. If a Model Element is required to be field verified, then the matrix would indicate them as LOD 500 and the Model Element Author would review the Project site against the Model and field verify the Model Element. There might also be change orders or field changes during construction that necessitate changes to the Model, in which the Model Elements would be updated, and recorded as LOD 500 and the matrix updated to show that condition. The Model Element Author in both cases would likely be the contractor or subcontractor or installer who thereby takes responsibility for the field verification of the Model Element.

Simply stated, a Project milestone called "record model," would consist of a mixture of Model Elements at LOD 100, 200, 300 and 400 that are not field verified and a mixture of LOD 500 Model Elements that have been field verified. The Project milestone of a "Record Model" is an imperfect activity, not unlike a "Record Drawing," as it represents the level agreed to by the Owner, Architect and Contractor as to the appropriate amount of effort for recording and investigating a Model that is prudent for the Owner's use of the Model after construction.

G202–2013 Section 2.6.2

§ 2.6.2 Authorized Uses

Specific Authorized Uses of the Model Element developed to LOD 500, if any, are as follows:

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The Authorized Use of a final as-built Model will carry on into the future. Potential uses might include: the Project repository of existing conditions, specifications and approved product data; operation and maintenance of the building either through owner developed or third party operated facility management software; management of scheduled and reactionary maintenance programs that can be catalogued and archived throughout the life of the building; and future renovations using the Model as a baseline for designing future modifications, such as in a commercial building that may have a turnover of tenants.

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Article 3 Model Elements

G202–2013 Section 3.1.1

§ 3.1. Reliance on Model Elements

§ 3.1.1 At any particular Project milestone, a Project Participant may rely on the accuracy and completeness of a Model Element only to the extent consistent with the minimum data required for the Model Element's LOD for that Project milestone as identified below in the Model Element Table, even if the content of a specific Model Element includes data that exceeds the minimum data required for the identified LOD.

One of the primary objections to sharing Models (or even CAD drawings) is that they can appear to be at a higher Level of Development than the originator of the Model intends. See the discussion for G202–2013 Section 2.1 above.

Section 3.1.1 puts the Project Participants on notice that, regardless of whether a Model Element looks like it has been developed to a higher LOD, users of the Model Element can only rely on information at the LOD stated in the Model Element table. Thus, if the Model Element table states that the walls are at LOD 200, even though the detail of the Model Element exceeds the content requirement for an LOD 200, the engineer knows that they may change in type and location, and can defer final design of the ductwork in tight spaces until later.

G202–2013 Section 3.1.2

§ 3.1.2 Coordination and Model Refinement

Where conflicts are found in the Model, regardless of the phase of the Project or LOD, the Project Participant that identifies the conflict shall promptly notify the Model Element Authors and the Project Participant identified in AIA Document E203–2013 Section 4.8 as being responsible for Model management. Upon such notification, the Model Element Author(s) shall act promptly to evaluate, mitigate and resolve the conflict in accordance with the processes established in Section 1.7.7, if applicable.

Modeling has inherent coordination benefits over other design tools. As more Project Participants make use of shared Model data, potential conflicts are likely to be discovered by someone other than the person responsible for the Model Element. Section 3.1.2 addresses the process to be followed in such instances.

First, any Project Participant that identifies a conflict must promptly notify both the Model Element Author and whoever is providing overall Model management. A classic example is the above-ceiling conflict. The Model Element Author (perhaps the HVAC engineer) may seek to change the ceiling height when there are other Project consequences to consider. Both the entity managing the Model and the Model Element

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Author need to be part of the initial notification. The Model Element Author for other affected Model Elements may also need to be brought into the conversation.

Second, upon notification the Model Element Author (with assistance, or at least concurrence from the entity managing the Model) has a responsibility to promptly resolve the conflict consistent with the protocols established in G202–2013 Section 1.7.7 for design coordination and clash detection procedures.

G202–2013 Section 3.2

§ 3.2 Table Instructions

§ 3.2.1 The Model Element table in Section 3.3 indicates the LOD to which each Model Element shall be developed to at each identified Project milestone and the Model Element Author.

§ 3.2.2 Abbreviations for each Model Element Author to be used in the Model Element Table are as follows: *(Provide abbreviations such as "A—Architect," or "C—Contractor.")*

The Model Element Table is intended to be flexible and each Project will have its own unique requirements to identify the Model Element Author. If the table is used within a small firm, employee initials or indication of the consulting firm may be all that is needed. With greater complexity, other indications can be used.

G202–2013 Section 3.3

§ 3.3 Model Element Table

The Model Element Table is the heart of G202–2013 and will be of greatest value if it accurately reflects the input and expectations of the Project Participants. Sufficient time and effort should be allocated to the process of completing the Model Element Table because the interrelated activities and reliance are important to the success of the Project and the Project Participants.

Each horizontal row in the table corresponds to a Model Element—a building system, assembly, or component—i.e., physical objects in the building. Each major vertical column corresponds to a Project milestone. At the intersection of each Model Element line and Project milestone column are three cells of data. These are, in order, the Level of Development (LOD), Model Element Author (MEA), and Notes. Thus for each Model Element at the conclusion of a given Project milestone, the Project Participants will know who is doing what, when, and with any additional information included in the notes.

The table has two primary purposes:

a) To define reliance: to assure that users of Models do not infer more precision or information than the designer of the system or component intends at a given point in the design process, and
b) To coordinate between disciplines: to give the Project team an overview of who needs to provide what information at what time in order to meet milestones.

There are several approaches to the task of filling out the table. One that works well is to fill out the LOD and MEA cells with the Architect's in-house standards for phase completion, and then adjust as necessary for the requirements of other disciplines. Beginning with the Architect's standard has the advantage of minimizing changes to the usual workflow.

The identification of the MEA for each Model Element for each Project milestone is in many ways a communication tool. For conflicts it provides a map by which subsequent MEAs and the entity responsible for

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managing the Model can navigate back through Model development to identify the relevant MEA(s) to obtain the best resolution to the conflict. The MEA(s) may not be the ultimate decision makers on the resolution or the entities that actually change the model. That will be done by the individual or entity responsible for the change. In the example of an above-ceiling conflict, the MEA for the ductwork (HVAC engineer) may participate in the resolution that is ultimately decided by the responsible design entity (the architect).

Determining the Project Milestones. The first step in completing the Model Element Table is to determine the points in the Project's development at which the Model should reach a measurable condition. Traditionally, in architectural practice, these milestones correspond with the conclusion of the phases of the services—Schematic Design, Design Development, Construction Documents, etc.—and reflect the creation of deliverables and other materials that define the Project.

The Model Element Table allows the insertion of Project milestones that best fit the Project Participants' needs. For example, there might be an interim submittal during a phase of the work where the Model would be used to develop a Guaranteed Maximum Price cost estimate. It will be important for the Project Participants to understand the Level of Development and reliance characteristics of the Model at this Project Milestone. In this case the column headings might look like this:

§ 3.3 Model Element Table *Identify: (1) the LOD required for each Model Element at each Project milestone; (2) the Model Element Author (MEA); and (3) references to any applicable notes found in Section 3.4* *Insert abbreviations for each MEA identified in the table below, such as "A—Architect," or "C—Contractor."*	Conceptual Design			Criteria Design			Detailed Design			50% Implementation Drawings									Notes *(See Sec 3.4)*
Model Elements utilizing Uniformat™	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	

Carefully consider each Project milestone. The Model constantly evolves through the life of the Project and each unique milestone involves efforts that may or may not be adequately represented in the compensation structure.

Construction Classification System. Once the milestones have been established, the next step is to identify the Model Elements that will be represented by the Model. The Table in Section 3.3 can be created in three different formats. The first format utilizes the CSI UniFormat™ classification system as the default system to identify Model Elements.[4]

UniFormat is useful because it is based on locations, systems, and assemblies within a building. A Model Element can always be assigned a unique UniFormat code, while it may comprise multiple CSI MasterFormat® codes (which relate to the trades needed to produce the system or assembly). The breakdown for the line items, however, can be part of on any system-based scheme.

[4] CSI UniFormat™ is produced jointly by The Construction Specifications Institute (CSI) and Construction Specifications Canada (CSC). U.S. copyright is held by CSI and Canadian copyright by CSC. All Rights Reserved. For more information, visit csinet.org/uniformat.

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The second format utilizes OmniClass™ Table 21.[5] Table 21 is another system-based scheme consisting of a number of different elements. According to the OmniClass Web site, the OmniClass elements represent "a major component, assembly, or *"construction entity part which, in itself or in combination with other parts, fulfills a predominating function of the construction entity"* (ISO 12006-2). Predominating functions include, but are not limited to, supporting, enclosing, servicing, and equipping a facility. Functional descriptions can also include a process or an activity."

The final format available allows the user to create the Model Element Table without any pre-filled system for identifying the Model Elements. This allows the users to customize the list of Model Elements to fit their specific needs and utilize their own system of identifying Model Elements.

The selection of the classification scheme to be used is an important one that should consider the variables of the Project, such as the complexity of the classification system, the number of differing users, and their familiarity with the classification system. If much of the Model content will be evaluated by another use, such as a cost estimating program or energy model program, the right classification may be the one that translates well to other programs. In other words, there is no single best system for classification of the Model content. Project Participants should seek the best fit for the Project circumstances. It should also be noted that regardless of the classification system used, G202–2013 allows users to tailor the Model Elements in the Model Element Table to fit their specific needs.

The following is an example of a table that has been edited to add additional Model Elements to the preexisting UniFormat elements.

§ 3.3 Model Element Table *Identify: (1) the LOD required for each Model Element at each Project milestone, (2) the Model Element Author (MEA), and (3) references to any applicable notes found in Section 3.4.* *Insert abbreviations for each MEA identified in the table below, such as "A—Architect," or "C—Contractor."*				Schematic Design			Design Development			Construction Documents													Notes (See Sec 3.4)
Model Elements utilizing Uniformat™				LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	
B SHELL	B10 Superstructure	B1010	Floor Construction	100	A		300	S		300	S											
		B1020	Roof Construction	100	A																	
			FramingElements				200	S		300	S											
			RoofOpenings				200	A/M		300	S											

Another use of the Model Element Table is to define what will not be included in the Model to make clear to all Project Participants what they can expect to find in the Model, and what they will have to look for in other sources of information. The example below shows the initialism "NM" used to indicate Model Elements that are not intended to be modeled. Carefully consider the difference between construction elements that are to be included in the Project, but not modeled, versus elements that are not in the Project. Project elements may be adequately designed or specified in data such as specifications or non-model drawings, schedules or other data. The Model Element table is primarily intended to define and coordinate the progressive development of Model data over the Project Milestones. As such, it is a

[5] OmniClass™ is produced by CSI (hereinafter "The OmniClass Secretariat") in its role as Secretariat for the OmniClass Development Committee. U.S. copyright is held by The OmniClass Secretariat. All Rights Reserved. For more information on OmniClass, visit omniclass.org. OmniClass is intended to be an open standard; however, certain limitations to its use apply. For more information, visit omniclass.org/license.

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somewhat limited subset of all the Project data and this should be discussed with all the Project Participants. For example an estimator may rely on the LOD of the Model Elements but may also have to look outside the Model to complete the estimate.

§ 3.3 Model Element Table *Identify: (1) the LOD required for each Model Element at each Project milestone, (2) the Model Element Author (MEA), and (3) references to any applicable notes found in Section 3.4* *Insert abbreviations for each MEA identified in the table below, such as "A—Architect," or "C—Contractor."*				Conceptual Design			Criteria Development			Detailed Design			Implementation Drawings									Notes (See Art. 3.4)
Model Elements utilizing Uniformat[TM]				LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	
G BUILDING SITEWORK	G10 Site Preparation	G1010	Site Clearing	350			350			350			350									
		G1020	Site Demolition & Relocations	350			350			350			350									
		G1030	Site Earthwork	350			350			350			350									

Assigning the Level of Development. **With the milestones and construction classification system set in the Table, the Model Element Author and LOD can now be assigned.**

Some Model Elements may not be developed beyond a lower LOD simply because it is not useful to the Project. Door Hardware may not be modeled, fire extinguisher cabinets may never be modeled higher than LOD 200, and typical light fixtures may remain modeled as graphic symbols only. Careful coordination of the needed LOD in consideration of the reliance and Authorized Uses of all the Project Participants is the most important single task of completing the G202–2013.

At its core, the Model Element Table is intended as a communication tool to aid in the efficient development of the Model across disciplines and to facilitate Model sharing amongst the Project Participants. It should be noted that, for design professionals, the LOD designations in the Model Element Table are not intended to define, replace, or alter the applicable standard of care.

Further, users should understand that the AIA's LOD definitions are intended to reflect the generally accepted and current standards in the industry. It may be necessary to modify the AIA LOD definitions and/or to supplement them in order to fit the particular needs of the Project. For example, the BIMForum's Level of Development (LOD) Specification referenced above adopts the AIA's standard LOD definitions and suggests an additional LOD 350. According to BIMForum, LOD 350 can be used to define model elements sufficiently developed to facilitate coordination between disciplines—e.g., clash detection/avoidance, layout, etc. The requirements for this level are higher than those for 300, but not as high as those for 400. Thus it was designated LOD 350.[6] If users feel this interim LOD, or any other LOD definition, is appropriate for use on their Project, it can be easily inserted into G202–2013.

Adding Clarifying Notes to the Table. **In many instances additional information would be useful regarding some of the Model Elements. The Model Element table provides space to relate longer notes to a numerical or other key placed in the notes cells.**

There are two levels of notes contained within the table. On the far right, the notes column provides information for the Model Element, regardless of the Project phase or milestone point. For example, a preselected elevator manufacturer can be identified or a sustainable objective for daylighting can be noted in the windows line item.

[6] The LOD Specification is currently in draft form and is available to download (bimforum.org/lod).

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The notes columns for each individual milestone allow for modification of the specification for each Model Element for that milestone only. For example, a Model Element might have an LOD of 200, with a note that indicates that it may be used for LOD 300 cost estimating purposes. This is also a good place to identify the granularity at which the Model Element is represented. For example, at an early milestone, electrical conduit might be represented only where it is 2" or larger, whereas at a later milestone conduit 1" and larger might be represented.

G202–2013 Section 3.4

§ 3.4 Model Element Table Notes

Notes: *(List by number shown on table.)*

To the extent the Project Participants utilize the notes columns in the Model Element table, Section 3.4 provides a space to list the notes and their meaning.

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RESOURCES

The list and links below provide resources relevant to Building Information Modeling and Digital Practice. Suggestions for resources are welcome for subsequent editions of this Guide.

buildingSMART alliance. The buildingSMART alliance™ is a council of the National Institute of Building Sciences devoted to helping to make the North American real property industry more efficient by leading the creation of tools and standards that allow projects to be built electronically before they are built physically using Building Information Modeling. As part of its efforts, the buildingSMART alliance has developed a National Building Information Modeling Standard, which it is currently revising. For more information, visit buildingSMARTalliance.org.

BIMForum. The BIMForum is an organization formed to facilitate and accelerate the adoption of building information modeling in the design and construction industry. For more information, visit bimforum.org.

Penn State University's Computer Integrated Construction (CIC) Research Program. The CIC Research Program's goal is to develop and disseminate structured procedures for the adoption and implementation of BIM on Projects and in Organizations. In furtherance of this effort, the CIC Research Program has published significant amounts of research related to Modeling as well as a detailed BIM Execution Plan and a planning guide for owners interested in implementing BIM on projects. For more information, visit Penn State's BIM Planning Web site (bim.psu.edu).

General Services Administration's 3D-4D-BIM Program. According to GSA's Web site "the primary goal of the National 3D-4D-BIM Program is to promote value-added digital visualization, simulation and optimization technologies to increase quality and efficiency throughout GSA project lifecycles and beyond. The long-term objective is to use innovative 3D, 4D, and BIM technologies to complement, leverage, and improve existing technologies to achieve major quality and productivity improvements." For more information, visit GSA's 3D-4D-BIM Web site (gsa.gov/portal/category/21062).

AIA's Technology in Architectural Practice Knowledge Community (TAP). TAP serves as a resource for AIA members, the profession, and the public in the deployment of computer technology in the practice of architecture. Technology in Architectural Practice monitors the development of computer technology and its impact on architecture practice and the entire building life cycle, including design, construction, facility management, and retirement or reuse. For more information, visit the AIA's TAP Web site (network.aia.org/TechnologyinArchitecturalPractice).

AIA's Center for Integrated Practice (CIP). CIP is the AIA's online clearinghouse that contains useful reports, relevant industry events, contractual information, podcasts and discussion forums necessary to lead the industry toward collaborative design practices. The purpose of the CIP is to help remove barriers to collaboration, serve as a collector and conductor of project delivery outcomes and research, and develop resources and tools for AIA members, the profession, and the public. For more information, visit the AIA's CIP Web site (network.aia.org/CenterforIntegratedPractice).

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AIA® Document E203™ – 2013 Instructions

Building Information Modeling Protocol and Digital Data Exhibit

GENERAL INFORMATION

Purpose. AIA Document E203™–2013, Building Information Modeling Protocol and Digital Data Exhibit, is one of the AIA's 2013 Digital Practice documents, which also include AIA Documents G201™–2013, Project Digital Data Protocol Form, and G202™–2013, Project Building Information Modeling Protocol Form. AIA Document E203–2013 is not a stand-alone document, but is intended to be attached as an exhibit to an existing agreement for design services or construction on a project where the parties intend to utilize Digital Data and/or Building Information Modeling.

The primary purpose of E203–2013 is to allow the parties to document, at the outset of the project, their general expectations about how, and the extent to which, Digital Data and Building Information Modeling will be used and relied upon on the Project. Having set the baseline expectations regarding Digital Data and Building Information Modeling, E203–2013 then requires the Project Participants, "[a]s soon as practical" after execution of the agreement, to meet and decide upon the necessary and relevant protocols for the development and use of Digital Data and Models. Once agreed to, the protocols are memorialized in G201–2013 and G202–2013. AIA Document G201–2013 is used to document the agreed upon Digital Data protocols, while G202–2013 is used to document the Building Information Modeling protocols. Because these form documents are not part of the underlying agreements, they can be modified and adjusted as necessary, through the collaborative efforts of the Project Participants, without the need to formally amend the Parties' agreements. By the terms of the E203–2013, however, each Project Participant has agreed to follow the protocols once established and agreed upon, as well as any subsequently agreed upon revisions to the protocols.

AIA Document E203–2013 is intended to be used on any project that utilizes Digital Data and/or Building Information Modeling, whether the project is delivered by traditional methods or Integrated Project Delivery.

Related Documents. This document may be used as an exhibit to any agreement for design services or construction. Further, the document is intended to be used in conjunction with G201–2013 and G202–2013.

Why Use AIA Contract Documents. AIA Contract Documents are the product of a consensus-building process aimed at balancing the interests of all parties on the construction project. The documents reflect actual industry practices, not theory. They are state-of-the-art legal documents, regularly revised to keep up with changes in law and the industry—yet they are written, as far as possible, in everyday language. Finally, AIA Contract Documents are flexible: they are intended to be modified to fit individual projects, but in such a way that modifications are easily distinguished from the original, printed language.

Use of Non-AIA Forms. If a combination of AIA documents and non-AIA documents is to be used, particular care must be taken to achieve consistency of language and intent among documents.

Standard Forms. Most AIA documents published since 1906 have contained in their titles the words "Standard Form." The term "standard" is not meant to imply that a uniform set of contractual requirements is mandatory for AIA members or others in the construction industry. Rather, the AIA standard documents are intended to be used as fair and balanced baselines from which the parties can negotiate their bargains. As such, the documents have won general acceptance within the construction industry and have been uniformly interpreted by the courts. Within an industry spanning 50 states—each free to adopt different, and perhaps contradictory, laws affecting that industry—AIA documents form the basis for a generally consistent body of construction law.

Use of Current Documents. Prior to using any AIA Contract Document, users should consult www.aia.org or a local AIA component to verify the most recent edition.

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CHANGES FROM THE PREVIOUS EDITION

AIA Documents E203–2013, G201–2013, and G202–2013 are intended to update AIA Document E201™–2007, Digital Data Protocol Exhibit, and AIA Document E202™–2008, Building Information Modeling Protocol Exhibit. The updated 2013 Digital Practice documents include a substantial amount of content from E201–2007 and E202–2008. The content, however, has been restructured, edited and expanded upon in an effort to make the updated documents more useable and comprehensive. This process has resulted in a set of documents that are structurally different from their predecessors. For more detailed information on the structure and content of E203, G201 and G202, please consult the AIA Guide, Instructions and Commentary to the 2013 Digital Practice Documents.

USING E203–2013

Modifications. Particularly with respect to professional or contractor licensing laws, building codes, taxes, monetary and interest charges, arbitration, indemnification, format and font size, AIA Contract Documents may require modification to comply with state or local laws. Users are encouraged to consult an attorney before completing or modifying a document.

Using AIA software, modifications to insert information and revise the standard AIA text may be made as the software permits.

By reviewing properly made modifications to a standard AIA Contract Document, parties familiar with that document can quickly understand the essence of the proposed relationship. Commercial exchanges are greatly simplified and expedited, good faith dealing is encouraged, and otherwise latent clauses are exposed for scrutiny.

AIA Contract Documents may not be retyped or electronically scanned. Retyping can introduce typographic errors and cloud legal interpretation given to a standard clause. Furthermore, retyping and electronic scanning are not permitted under the user's limited license for use of the document, constitute the creation of a derivative work and violate the AIA's copyright.

Completing E203–2013. As a companion to the 2013 Digital Practice documents, the AIA has published the Guide, Instructions and Commentary to the 2013 Digital Practice Documents to assist you in fully understanding the scope and intent of the 2013 Digital Practice documents. The AIA Guide, Instructions and Commentary to the 2013 Digital Practice Documents provides an in-depth explanation of the 2013 Digital Practice documents on a section-by-section basis. Please consult the AIA Guide, Instructions and Commentary to the 2013 Digital Practice Documents for detailed instructions on how to complete the 2013 Digital Practice documents.

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AIA® Document E203™ – 2013

Building Information Modeling and Digital Data Exhibit

This Exhibit dated the _____ day of _____ in the year _____ is incorporated into the agreement (the "Agreement") between the Parties for the following Project:
(Name and location or address of the Project)

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TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 TRANSMISSION AND OWNERSHIP OF DIGITAL DATA

3 DIGITAL DATA PROTOCOLS

4 BUILDING INFORMATION MODELING PROTOCOLS

5 SPECIAL TERMS AND CONDITIONS

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be incorporated into an agreement between the Parties and used in conjunction with AIA Documents G201™–2013, Project Digital Data Protocol Form, and G202™–2013, Project Building Information Modeling Protocol Form. It is anticipated that other Project Participants will incorporate a project specific E203–2013 into their agreements, and that the Parties and other Project Participants will set forth the agreed-upon protocols in AIA Documents G201–2013 and G202–2013.

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 This Exhibit provides for the establishment of protocols for the development, use, transmission, and exchange of Digital Data for the Project. If Building Information Modeling will be utilized, this Exhibit also provides for the establishment of the protocols necessary to implement the use of Building Information Modeling on the Project, including protocols that establish the expected Level of Development for Model Elements at various milestones of the Project, and the associated Authorized Uses of the Building Information Models.

§ 1.2 The Parties agree to incorporate this Exhibit into their agreements with any other Project Participants that may develop or make use of Digital Data on the Project. Prior to transmitting or allowing access to Digital Data, a Party may require any Project Participant to provide reasonable evidence that it has incorporated this Exhibit into its agreement for the Project, and agreed to the most recent Project specific versions of AIA Document G201™–2013, Project Digital Data Protocol Form and AIA Document G202™–2013, Project Building Information Modeling Protocol Form.

§ 1.2.1 The Parties agree that each of the Project Participants utilizing Digital Data on the Project is an intended third party beneficiary of the Section 1.2 obligation to incorporate this Exhibit into agreements with other Project Participants, and any rights and defenses associated with the enforcement of that obligation. This Exhibit does not create any third-party beneficiary rights other than those expressly identified in this Section 1.2.1.

§ 1.3 Adjustments to the Agreement

§ 1.3.1 If a Party believes that protocols established pursuant to Sections 3.2 or 4.5, and memorialized in AIA Documents G201–2013 and G202–2013, will result in a change in the Party's scope of work or services warranting an adjustment in compensation, contract sum, schedule or contract time, the Party shall notify the other Party. Failure to provide notice as required in this Section 1.3 shall result in a Party's waiver of any claims for adjustments in compensation, contract sum, schedule or contract time as a result of the established protocols.

§ 1.3.2 Upon such notice, the Parties shall discuss and negotiate revisions to the protocols or discuss and negotiate any adjustments in compensation, contract sum, schedule or contract time in accordance with the terms of the Agreement.

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§ 1.3.3 Notice required under this Section 1.3 shall be provided within thirty days of receipt of the protocols, unless otherwise indicated below:
(If the Parties require a notice period other than thirty days from receipt of the protocols, indicate the notice period below.)

§ 1.4 Definitions

§ 1.4.1 **Building Information Model.** A Building Information Model is a digital representation of the Project, or a portion of the Project, and is referred to in this Exhibit as the "Model," which term may be used herein to describe a Model Element, a single model or multiple models used in the aggregate, as well as other data sets identified in AIA Document G202–2013, Project Building Information Modeling Protocol Form.

§ 1.4.2 **Building Information Modeling.** Building Information Modeling or Modeling means the process used to create the Model.

§ 1.4.3 **Model Element.** A Model Element is a portion of the Model representing a component, system or assembly within a building or building site.

§ 1.4.4 **Level of Development.** The Level of Development (LOD) describes the minimum dimensional, spatial, quantitative, qualitative, and other data included in a Model Element to support the Authorized Uses associated with such LOD.

§ 1.4.5 **Authorized Uses.** The term "Authorized Uses" refers to the permitted uses of Digital Data authorized in the Digital Data and/or Building Information Modeling protocols established pursuant to the terms of this Exhibit.

§ 1.4.6 **Model Element Author.** The Model Element Author is the entity (or individual) responsible for managing and coordinating the development of a specific Model Element to the LOD required for an identified Project milestone, regardless of who is responsible for providing the content in the Model Element. Model Element Authors are to be identified in Section 3.3, Model Element Table, of AIA Document G202–2013.

§ 1.4.7 **Digital Data.** Digital Data is information, including communications, drawings, specifications and designs, created or stored for the Project in digital form. Unless otherwise stated, the term Digital Data includes the Model.

§ 1.4.8 **Confidential Digital Data.** Confidential Digital Data is Digital Data containing confidential or business proprietary information that the transmitting party designates and clearly marks as "confidential."

§ 1.4.9 **Written or In Writing.** In addition to any definition in the Agreement to which this Exhibit is attached, for purposes of this Exhibit and the Agreement, "written" or "in writing" shall mean any communication prepared and sent using a transmission method set forth in this Exhibit, or the protocols developed pursuant to this Exhibit, that permits the recipient to print the communication.

§ 1.4.10 **Written Notice.** In addition to any terms in the Agreement to which this Exhibit is attached, for purposes of this Exhibit and the Agreement, "written notice" shall be deemed to have been duly served if transmitted electronically to an address provided in this Exhibit or the Agreement using a transmission method set forth in this Exhibit that permits the recipient to print the communication.

§ 1.4.11 **Party and Parties.** The terms "Party" and "Parties" refer to the signing parties to the Agreement.

§ 1.4.12 **Project Participant.** A Project Participant is an entity (or individual) providing services, work, equipment or materials on the Project and includes the Parties.

ARTICLE 2 TRANSMISSION AND OWNERSHIP OF DIGITAL DATA

§ 2.1 The transmission of Digital Data constitutes a warranty by the Party transmitting Digital Data to the Party receiving Digital Data that the transmitting Party is the copyright owner of the Digital Data, or otherwise has permission to transmit the Digital Data for its use on the Project in accordance with the Authorized Uses of Digital Data established pursuant to the terms of this Exhibit.

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§ 2.2 If a Party transmits Confidential Digital Data, the transmission of such Confidential Digital Data constitutes a warranty to the Party receiving such Confidential Digital Data that the transmitting Party is authorized to transmit the Confidential Digital Data. If a Party receives Confidential Digital Data, the receiving Party shall keep the Confidential Digital Data strictly confidential and shall not disclose it to any other person or entity except as set forth in Section 2.2.1.

§ 2.2.1 The receiving Party may disclose Confidential Digital Data as required by law or court order, including a subpoena or other form of compulsory legal process issued by a court or governmental entity. The receiving Party may also disclose the Confidential Digital Data to its employees, consultants or contractors in order to perform services or work solely and exclusively for the Project, provided those employees, consultants and contractors are subject to the restrictions on the disclosure and use of Confidential Digital Data as set forth in this Exhibit.

§ 2.3 By transmitting Digital Data, the transmitting Party does not convey any ownership right in the Digital Data or in the software used to generate the Digital Data. Unless otherwise granted in a separate license, the receiving Party's right to use, modify, or further transmit Digital Data is specifically limited to designing, constructing, using, maintaining, altering and adding to the Project consistent with the terms of this Exhibit, and nothing contained in this Exhibit conveys any other right to use the Digital Data.

§ 2.4 Where a provision in this Article 2 conflicts with a provision in the Agreement into which this Exhibit is incorporated, the provision in this Article 2 shall prevail.

ARTICLE 3 DIGITAL DATA PROTOCOLS

§ 3.1 Anticipated Types of Digital Data. The anticipated types of Digital Data to be used on the Project are as follows:
(Indicate below the information on the Project that shall be created and shared in a digital format. If the Parties indicate that Building Information Modeling will be utilized on the Project, the Parties shall also complete Article 4.)

Anticipated Digital Data	Applicability to the Project *(Indicate Applicable or Not Applicable)*	Location of Detailed Description *(Section 3.1.1 below or in an attachment to this exhibit and identified below)*
Project Agreements and Modifications		
Project communications		
Architect's preconstruction submittals		
Contract Documents		
Contractor's submittals		
Subcontractor's submittals		
Modifications		
Project payment documents		
Notices and claims		
Building Information Modeling		

§ 3.1.1 Insert a detailed description of the anticipated Digital Data identified in Section 3.1, if not further described in an attachment to this Exhibit.

§ 3.2 As soon as practical following execution of the Agreement, the Parties shall further describe the uses of Digital Data, and establish necessary protocols governing the transmission and Authorized Uses of Digital Data, in consultation with the other Project Participants that are expected to utilize Digital Data on the Project.

§ 3.2.1 Unless another Project Participant is identified below, the Architect shall prepare and distribute to the other Project Participants Digital Data protocols for review, revision and approval.
(If a Project Participant other than the Architect shall be responsible for preparing draft and final Digital Data protocols, identify that Project Participant.)

Sample

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§ 3.2.2 The agreed upon Digital Data protocols shall be set forth in AIA Document G201–2013 and each Project Participant shall memorialize their agreement in writing to such Digital Data protocols.

§ 3.2.3 The Parties, together with the other Project Participants, shall review and, if necessary, revise the Digital Data protocols at appropriate intervals as required by the conditions of the Project.

§ 3.3 The Parties shall transmit, use, store and archive Digital Data in accordance with the Digital Data protocols set forth in the latest version of AIA Document G201–2013 agreed to by the Project Participants.

§ 3.4 Unauthorized Use

§ 3.4.1 Prior to Establishment of Digital Data Protocols

If a Party receives Digital Data prior to the agreement to, and documentation of, the Digital Data protocols in AIA Document G201–2013, that Party is not authorized to use or rely on the Digital Data. Any use of, or reliance on, such Digital Data is at that Party's sole risk and without liability to the other Party and its contractors, consultants, agents and employees.

§ 3.4.2 Following Establishment of Digital Data Protocols

Following agreement to, and documentation of, the Digital Data protocols in AIA Document G201–2013, if a Party uses Digital Data inconsistent with the Authorized Uses identified in the Digital Data protocols, that use shall be at the sole risk of the Party using the Digital Data.

§ 3.5 Digital Data Management

§ 3.5.1 Centralized electronic document management system use on the Project shall be:

(Check the appropriate box. If the Parties do not check one of the boxes below, the default selection shall be that the Parties will not utilize a centralized electronic document management system on the Project.)

☐ The Parties intend to use a centralized electronic document management system on the Project.

☐ The Parties do not intend to use a centralized electronic document management system on the Project.

§ 3.5.2 If the Project Participants intend to utilize a centralized electronic document management system on the Project, the Project Participants identified in Section 3.5.3 shall be responsible for managing and maintaining such system. The Project Participants responsible for managing and maintaining the centralized electronic document management system shall facilitate the establishment of protocols for transmission, use, storage and archiving of the centralized Digital Data and assist the Project Participants identified in Section 3.2.1 above in preparing Digital Data protocols. Upon agreement to, and documentation of, the Digital Data protocols in AIA Document G201–2013, the Project Participants identified in Section 3.5.3 shall manage and maintain the centralized electronic document management system consistent with the management protocols set forth in the latest version of G201–2013 approved by the Project Participants.

§ 3.5.3 Unless responsibility is assigned to another Project Participant, the Architect shall be responsible for managing and maintaining the centralized electronic document management system. If the responsibility for management and maintenance will be assigned to another Project Participant at an identified Project milestone, indicate below the Project Participant who shall assume that responsibility, and the Project milestone.

(Identify the Project Participant responsible for management and maintenance only if the Parties intend to utilize a centralized electronic document management system on the Project.)

Responsible Project Participant	Project Milestone

ARTICLE 4 BUILDING INFORMATION MODELING PROTOCOLS

§ 4.1 If the Parties indicate in Section 3.1 that Building Information Modeling will be used on the Project, specify below the extent to which the Parties intend to utilize Building Information Modeling and identify the provisions of this Article 4 governing such use:

☐ The Parties shall utilize Building Information Modeling on the Project for the sole purpose of fulfilling the obligations set forth in the Agreement without an expectation that the Model will be relied upon by the other Project Participants. Unless otherwise agreed in writing, any use of, transmission of, or reliance

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on the Model is at the receiving Party's sole risk. The remaining sections of this Article 4 shall have no force or effect.

☐ The Parties shall develop, share, use and rely upon the Model in accordance with Sections 4.2 through 4.10 of this Exhibit.

§ 4.2 Anticipated Building Information Modeling Scope. Indicate below the portions of the Project for which Modeling will be used and the anticipated Project Participant responsible for that Modeling.

Project Portion for Modeling	Responsible Project Participant

§ 4.3 Anticipated Model Authorized Uses. Indicate below the anticipated Authorized Uses of the Model for the Project, which Authorized Uses will be agreed upon by the Project Participants and further described for each LOD in G202–2013.

§ 4.4 Ancillary Modeling Activities. Indicate additional Modeling activities agreed upon by the Parties, but not to be included in AIA Document G202–2013, if any.
(Describe any Modeling activities, such as renderings, animations, performance simulations, or other similar use, including the anticipated amount and scope of any such Modeling activities.)

§ 4.5 Modeling protocols. As soon as practical following execution of the Agreement, the Parties shall, in consultation with the other Project Participants that are expected to utilize Building Information Modeling on the Project, further describe the Authorized Uses of the Model and establish necessary protocols governing the development of the Model utilizing AIA Document G202–2013.

§ 4.5.1 The Modeling protocols shall address the following:

.1 Identification of the Model Element Authors;
.2 Definition of the various LOD for the Model Elements and the associated Authorized Uses for each defined LOD;
.3 Identification of the required LOD of each Model Element at each identified Project milestone;
.4 Identification of the construction classification systems to be used on the Project;
.5 The process by which Project Participants will exchange and share the Model at intervals not reflected in Section 3.3, Model Element Table, of AIA Document G202–2013;
.6 The process by which the Project Participants will identify, coordinate and resolve changes to the Model;
.7 Details regarding any anticipated as-designed or as-constructed Authorized Uses for the Model, if required on the Project;
.8 Anticipated Authorized Uses for facilities management or otherwise, following completion of the Project; and
.9 Other topics to be addressed by the Modeling protocols: *(Identify additional topics to be addressed by the Modeling protocols.)*

§ 4.5.2 Unless responsibility is assigned to another Project Participant identified below, the Architect shall prepare and distribute Modeling protocols to the other Project Participants for review, revision and approval.
(If a Project Participant other than the Architect shall be responsible for preparing draft and final Modeling protocols, identify that Project Participant.)

§ 4.5.3 The agreed upon Modeling protocols shall be set forth in AIA Document G202–2013 and each Project Participant shall memorialize their agreement in writing to such Modeling protocols.

Sample

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§ 4.5.4 The Parties, together with the other Project Participants, shall review, and if necessary, revise the Modeling protocols at appropriate intervals as required by the conditions of the Project.

§ 4.6 The Parties shall develop, use and rely on the Model in accordance with the Modeling protocols set forth in the latest version of AIA Document G202–2013, which document shall be included in or attached to the Model in a manner clearly accessible to the Project Participants.

§ 4.7 Unauthorized Use

§ 4.7.1 Prior to Establishment of Modeling protocols

If a Party receives any Model prior to the agreement to, and documentation of, the Modeling protocols in AIA Document G202–2013, that Party is not authorized to use, transmit, or rely on the Model. Any use, transmission or reliance is at that Party's sole risk and without liability to the other Party and its contractors, consultants, agents and employees.

§ 4.7.2 Following Establishment of Modeling protocols

Following agreement to, and documentation of, the Modeling protocols in AIA Document G202–2013, if a Party uses or relies on the Model inconsistent with the Authorized Uses identified in the Modeling protocols, such use or reliance shall be at the sole risk of the Party using or relying on the Model. A Party may rely on the Model Element only to the extent consistent with the minimum data required for the identified LOD, even if the content of a specific Model Element includes data that exceeds the minimum data required for the identified LOD.

§ 4.8 Model Management

§ 4.8.1 The requirements for managing the Model include the duties set forth in this Section 4.8. Unless assigned to another Project Participant, the Architect shall manage the Model from the inception of the Project. If the responsibility for Model management will be assigned to another Project Participant, or change at an identified Project milestone, indicate below the identity of the Project Participant who will assume that responsibility, and the Project milestone.

Responsible Project Participant	Project Milestone

§ 4.8.2 Model Management Protocol Establishment. The Project Participant responsible for managing the Model, in consultation with the other Project Participants that are expected to utilize Building Information Modeling on the Project, shall facilitate the establishment and revision of Model management protocols, including the following:

.1 Model origin point, coordinate system, precision, file formats and units
.2 Model file storage location(s)
.3 Processes for transferring and accessing Model files
.4 Naming conventions
.5 Processes for aggregating Model files from varying software platforms
.6 Model access rights
.7 Identification of design coordination and clash detection procedures.
.8 Model security requirements
.9 Other: *(Identify additional Model management protocols to be addressed.)*

§ 4.8.3 Ongoing Responsibilities. The Project Participant responsible for managing the Model shall do so consistent with the Model management protocols, which shall also include the following ongoing responsibilities:

.1 Collect incoming Models:
  .1 Coordinate submission and exchange of Models
  .2 Create and maintain a log of Models received
  .3 Review Model files for consistency with Sections 4.8.2.1 through 4.8.2.5
  .4 Maintain a record copy of each Model file received
.2 Aggregate Model files and make them available for Authorized Uses
.3 Maintain Model Archives and backups consistent with the requirements of Section 4.8.4 below
.4 Manage Model access rights
.5 Other: *(Identify additional responsibilities.)*

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§ 4.8.4 Model Archives. The individual or entity responsible for Model management as set forth in this Section 4.8 shall compile a Model Archive at the end of each Project milestone and shall preserve it without alteration as a record of Model completion as of that Project milestone.

§ 4.8.4.1 Additional Model Archive requirements, if any, are as follows:

§ 4.8.4.2 The procedures for storing and preserving the Model(s) upon final completion of the Project are as follows:

§ 4.9 Post Construction Model. The services associated with providing a Model for post construction use shall only be required if specifically designated in the table below as a Party's responsibility.
(Designate below any anticipated post construction Model and related requirements, the Project Participant responsible for creating or adapting the Model to achieve such uses, and the location of a detailed description of the anticipated scope of services to create or adapt the Model as necessary to achieve such uses.)

Post Construction Model		Applicability to Project *(Applicable or Not Applicable)*	Responsible Project Participant	Location of Detailed Description of Requirements and Services *(Section 4.10 below or in an attachment to this exhibit and identified below)*
§ 4.9.1	Remodeling			
§ 4.9.2	Wayfinding and Mapping			
§ 4.9.3	Asset/FF & E Management			
§ 4.9.4	Energy Management			
§ 4.9.5	Space Management			
§ 4.9.6	Maintenance Management			

§ 4.10 Insert a detailed description of the requirements for each Post Construction Model identified in Section 4.9 and the anticipated services necessary to create each Post Construction Model, if not further described in an attachment to this Exhibit.

ARTICLE 5 OTHER TERMS AND CONDITIONS
Other terms and conditions related to the transmission and use of Digital Data are as follows:

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AIA® Document G202™ – 2013 Instructions

Project Building Information Modeling Protocol Form

GENERAL INFORMATION

Purpose. AIA Document G202™–2013, Project Building Information Modeling Protocol Form, is one of the AIA's 2013 Digital Practice documents, which also include AIA Documents E203™–2013, Building Information Modeling and Digital Data Exhibit and G201™–2013, Project Digital Data Protocol Form. AIA Document G202–2013 is not a stand-alone document, and is intended to be used with E203–2013 to detail the agreed upon protocols relating to the development and creation of a Building Information Model for the Project. A Building Information Model is a digital representation of the Project, or a portion of the Project.

AIA Document E203–2013 allows the Parties to document, at the outset of the Project, their general expectations about how, and the extent to which, Digital Data and Building Information Modeling will be used and relied upon on the Project. Having set the baseline expectations regarding Digital Data and Building Information Modeling, AIA Document E203–2013 then requires the Project Participants, "[a]s soon as practical" after execution of the agreement, to meet and decide upon the necessary and relevant protocols for the development and use of Digital Data and Models. Once agreed to, the protocols are memorialized in AIA Documents G201–2013 and G202–2013. AIA Document G202–2013 is used to document the agreed upon Modeling protocols. Once agreed to and set forth in G202–2013, the Project Participants are required develop, use and rely on the Model in accordance with the Modeling protocols

Because AIA Document G202–2013 is a form document, and not part of the underlying agreements, it can be modified and adjusted as necessary, through the collaborative efforts of the Project Participants, without the need to formally amend the Parties' agreements. By the terms of the AIA Document E203–2013, however, each Project Participant has agreed to follow the protocols once established and agreed upon, as well as any subsequently agreed upon revisions to the protocols.

AIA Document G202–2013 is intended to be used on any project that utilizes Digital Data, whether the project is delivered by traditional methods or Integrated Project Delivery.

Related Documents. This document is intended to be used in conjunction with AIA Document E203–2013 and AIA Document G201–2013.

Why Use AIA Contract Documents. AIA Contract Documents are the product of a consensus-building process aimed at balancing the interests of all parties on the construction project. The documents reflect actual industry practices, not theory. They are state-of-the-art legal documents, regularly revised to keep up with changes in law and the industry—yet they are written, as far as possible, in everyday language. Finally, AIA Contract Documents are flexible: they are intended to be modified to fit individual projects, but in such a way that modifications are easily distinguished from the original, printed language.

Use of Non-AIA Forms. If a combination of AIA documents and non-AIA documents is to be used, particular care must be taken to achieve consistency of language and intent among documents.

Standard Forms. Most AIA documents published since 1906 have contained in their titles the words "Standard Form." The term "standard" is not meant to imply that a uniform set of contractual requirements is mandatory for AIA members or others in the construction industry. Rather, the AIA standard documents are intended to be used as fair and balanced baselines from which the parties can negotiate their bargains. As such, the documents have won general acceptance within the construction industry and have been uniformly interpreted by the courts. Within an industry spanning 50 states—each free to adopt different, and perhaps contradictory, laws affecting that industry—AIA documents form the basis for a generally consistent body of construction law.

Use of Current Documents. Prior to using any AIA Contract Document, users should consult www.aia.org or a local AIA component to verify the most recent edition.

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CHANGES FROM THE PREVIOUS EDITION

AIA Documents E203–2013, G201–2013, and G202–2013 are intended to update AIA Document E201™–2007, Digital Data Protocol Exhibit, and AIA Document E202™–2008, Building Information Modeling Protocol Exhibit. The updated 2013 Digital Practice documents include a substantial amount of content from E201–2007 and E202–2008. The content, however, has been restructured, edited and expanded upon in an effort to make the updated documents more useable and comprehensive. This process has resulted in a set of documents that are structurally different from their predecessors. For more detailed information on the structure and content of E203, G201 and G202, please consult the AIA Guide, Instructions and Commentary to the 2013 Digital Practice Documents.

USING G202–2013

Modifications. Particularly with respect to professional or contractor licensing laws, building codes, taxes, monetary and interest charges, arbitration, indemnification, format and font size, AIA Contract Documents may require modification to comply with state or local laws. Users are encouraged to consult an attorney before completing or modifying a document.

Using AIA software, modifications to insert information and revise the standard AIA text may be made as the software permits.

By reviewing properly made modifications to a standard AIA Contract Document, parties familiar with that document can quickly understand the essence of the proposed relationship. Commercial exchanges are greatly simplified and expedited, good faith dealing is encouraged, and otherwise latent clauses are exposed for scrutiny.

AIA Contract Documents may not be retyped or electronically scanned. Retyping can introduce typographic errors and cloud legal interpretation given to a standard clause. Furthermore, retyping and electronic scanning are not permitted under the user's limited license for use of the document, constitute the creation of a derivative work and violate the AIA's copyright.

Completing G202–2013. As a companion to the 2013 Digital Practice documents, the AIA has published the AIA Guide, Instructions and Commentary to the 2013 Digital Practice Documents. The AIA Guide, Instructions and Commentary to the 2013 Digital Practice Documents provides an in-depth explanation of the 2013 Digital Practice documents on a section-by-section basis. Please consult the AIA Guide, Instructions and Commentary to the 2013 Digital Practice Documents for detailed instructions on how to complete the 2013 Digital Practice documents.

NOTE: Users may select from three different options in creating the Model Element Table appearing in AIA Document G202–2013 Section 3.3. User may choose either the *UniFormat*™ or *OmniClass*™ classification system to identify the various Model Elements for the Project. If the parties intend to supplement the Model Element Table with Model Elements that are not part of *UniFormat* or *OmniClass*, those Model Elements should be set forth at the end of the table. Further, if users intend to provide a customized set of Model Elements in place of *Uniformat* or *OmniClass*, they may also choose to create the Model Element Table without a pre-set classification system.

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AIA® Document G202™ – 2013

Project Building Information Modeling Protocol Form

PROJECT: *(Name and address)*

PROTOCOL VERSION NUMBER:

DATE:

PREPARED BY:

DISTRIBUTION TO: *(List each individual to whom this protocol is distributed. Include individuals listed in Section 1.1, or reference Section 1.1, along with any additional recipients.)*

This document is intended to be used in conjunction with a Project specific AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, which the Parties will incorporate into their agreement for the Project, and a Project specific AIA Document G201™–2013, Project Digital Data Protocol Form.

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 LEVEL OF DEVELOPMENT

3 MODEL ELEMENTS

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 For each Project Participant that has incorporated the Project specific AIA Document E203™–2013, Building Information Modeling and Digital Data Protocol Exhibit, dated _____, into its agreement for the Project, identify and provide the contact information for individuals responsible for implementation of the Modeling protocols. If, for any Project Participant, more than one individual will be responsible for implementation of the Modeling protocols, list each individual separately and describe the unique Modeling Role assigned to each individual.

Modeling Role	Project Participant	Individual Responsible	Contact Information

§ 1.2 This document establishes the Modeling protocols for the Project. For purposes of these protocols, the Model is comprised of the following information and other data sets:
(Indicate disciplines, separate models, and other data that will be included within the Model and governed by the Modeling protocols.)

§ 1.3 Collaboration Protocols. The Project Participants' protocols for the collaborative utilization of the Model, if any, including communications protocols, a collaboration meeting schedule and colocation requirements, are as follows:

§ 1.4 Technical Requirements. The technical requirements relating to the utilization of Building Information Modeling, including specific software and hardware requirements are as follows:

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§ 1.5 Training and Support. The parameters for any training or support program(s) that will be implemented with respect to any collaboration strategy or technical requirements are set forth below:

§ 1.6 Model Standard. The Model shall be developed in accordance with the following Model Standard, if any:

§ 1.7 Model Management Protocols and Processes
The following Model Management Protocols and Processes shall apply to the Project only if specifically designated in the table below as being applicable.
(Designate the Model Management Protocols and Processes applicable to the Project in the second column of the table below. In the third column, indicate whether the detailed description of the Model Management Protocol or Process is located in Section 1.8 or in an attached exhibit. If in an exhibit, identify the exhibit.)

Model Management Protocols and Processes		Applicability to Project *(Applicable or Not Applicable)*	Location of Detailed Description *(Section 1.8 below or in an attachment to this exhibit identified below)*
§ 1.7.1	Model origin point, coordinate system, precision, file formats and units		
§ 1.7.2	Model file storage location(s)		
§ 1.7.3	Processes for transferring and accessing Model files		
§ 1.7.4	Naming conventions		
§ 1.7.5	Processes for aggregating Model files from varying software platforms		
§ 1.7.6	Model access rights		
§ 1.7.7	Design coordination and clash detection procedures.		
§ 1.7.8	Model security requirements		

§ 1.8 Insert a description of each Model Management Protocol and Process identified in Section 1.7, if not further described in an exhibit attached to this document:

§ 1.9 Terms in this document shall have the same meaning as those in AIA Document E203–2013.

ARTICLE 2 LEVEL OF DEVELOPMENT
§ 2.1 The Level of Development (LOD) descriptions, included in Section 2.2 through Section 2.6 below, identify the specific minimum content requirements and associated Authorized Uses for each Model Element at five progressively detailed levels of completeness. The Parties shall utilize the five LOD descriptions in completing the Model Element Table at Section 3.3.

§ 2.2 LOD 100
§ 2.2.1 Model Element Content Requirements. The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e., cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.

§ 2.2.2 Authorized Uses
§ 2.2.2.1 Analysis. The Model Element may be analyzed based on volume, area and orientation by application of generalized performance criteria assigned to other Model Elements.

§ 2.2.2.2 Cost Estimating. The Model Element may be used to develop a cost estimate based on current area, volume or similar conceptual estimating techniques (e.g., square feet of floor area, condominium unit, hospital bed, etc.).

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§ 2.2.2.3 Schedule. The Model Element may be used for Project phasing and determination of overall Project duration.

§ 2.2.2.4 Other Authorized Uses. Additional Authorized Uses of the Model Element developed to LOD 100, if any, are as follows:

§ 2.3 LOD 200

§ 2.3.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

§ 2.3.2 Authorized Uses

§ 2.3.2.1 Analysis. The Model Element may be analyzed for performance of selected systems by application of generalized performance criteria assigned to the representative Model Elements.

§ 2.3.2.2 Cost Estimating. The Model Element may be used to develop cost estimates based on the approximate data provided and quantitative estimating techniques (e.g., volume and quantity of elements or type of system selected).

§ 2.3.2.3 Schedule. The Model Element may be used to show ordered, time-scaled appearance of major elements and systems.

§ 2.3.2.4 Coordination. The Model Element may be used for general coordination with other Model Elements in terms of its size, location and clearance to other Model Elements.

§ 2.3.2.5 Other Authorized Uses. Additional Authorized Uses of the Model Element developed to LOD 200, if any, are as follows:

§ 2.4 LOD 300

§ 2.4.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

§ 2.4.2 Authorized Uses

§ 2.4.2.1 Analysis. The Model Element may be analyzed for performance of selected systems by application of specific performance criteria assigned to the representative Model Element.

§ 2.4.2.2 Cost Estimating. The Model Element may be used to develop cost estimates suitable for procurement based on the specific data provided.

§ 2.4.2.3 Schedule. The Model Element may be used to show ordered, time-scaled appearance of detailed elements and systems.

§ 2.4.2.4 Coordination. The Model Element may be used for specific coordination with other Model Elements in terms of its size, location and clearance to other Model Elements including general operation issues.

§ 2.4.2.5 Other Authorized Uses. Additional Authorized Uses of the Model Element developed to LOD 300, if any, are as follows:

§ 2.5 LOD 400

§ 2.5.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.

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Sample

§ 2.5.2 Authorized Uses

§ 2.5.2.1 Analysis. The Model Element may be analyzed for performance of systems by application of actual performance criteria assigned to the Model Element.

§ 2.5.2.2 Cost Estimating. Costs are based on the actual cost of the Model Element at buyout.

§ 2.5.2.3 Schedule. The Model may be used to show ordered, time-scaled appearance of detailed specific elements and systems including construction means and methods.

§ 2.5.2.4 Coordination. The Model Element may be used for coordination with other Model Elements in terms of its size, location and clearance to other Model Elements, including fabrication, installation and detailed operation issues.

§ 2.5.2.5 Other Authorized Uses. Additional Authorized Uses of the Model Element developed to LOD 400, if any, are as follows:

§ 2.6 LOD 500

§ 2.6.1 Model Element Content Requirements. The Model Element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements.

§ 2.6.2 Authorized Uses. Specific Authorized Uses of the Model Element developed to LOD 500, if any, are as follows:

ARTICLE 3 MODEL ELEMENTS

§ 3.1 Reliance on Model Elements

§ 3.1.1 At any particular Project milestone, a Project Participant may rely on the accuracy and completeness of a Model Element only to the extent consistent with the minimum data required for the Model Element's LOD for that Project milestone as identified below in the Model Element Table, even if the content of a specific Model Element includes data that exceeds the minimum data required for the identified LOD.

§ 3.1.2 Coordination and Model Refinement

Where conflicts are found in the Model, regardless of the phase of the Project or LOD, the Project Participant that identifies the conflict shall promptly notify the Model Element Authors and the Project Participant identified in AIA Document E203–2013 Section 4.8 as being responsible for Model management. Upon such notification, the Model Element Author(s) shall act promptly to evaluate, mitigate and resolve the conflict in accordance with the processes established in Section 1.7.7, if applicable.

Sample

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§ 3.2 Table Instructions

§ 3.2.1 The Model Element Table in Section 3.3 indicates the LOD to which each Model Element shall be developed at each identified Project milestone and the Model Element Author.

§ 3.2.2 Abbreviations for each Model Element Author to be used in the Model Element Table are as follows:
(Provide abbreviations, such as "A—Architect," or "C—Contractor.")

Abbreviation	Model Element Author (MEA)

§ 3.3 Model Element Table

Identify (1) the LOD required for each Model Element at each Project milestone, (2) the Model Element Author (MEA), and (3) references to any applicable notes found in Section 3.4.

Insert abbreviations for each MEA identified in the table below, such as "A—Architect," or "C—Contractor."

	Project Milestone 1			Project Milestone 2			Project Milestone 3			Project Milestone 4			Project Milestone 5			Project Milestone 6			Notes (See Sec 3.4)
Model Elements	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes	

§ 3.4 Model Element Table Notes

Notes:
(List by number shown on table.)

Sample

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NCARB

Legislative Guidelines and Model Law/Model Regulations

2018–2019

National Council of Architectural Registration Boards
Customer Service: 202-879-0520 | Main: 202-783-6500
www.ncarb.org

NCARB MISSION
The National Council of Architectural Registration Boards protects the public health, safety, and welfare by leading the regulation of the practice of architecture through the development and application of standards for licensure and credentialing of architects.

CORE VALUES
The National Council of Architectural Registration Boards believes in being:

OPEN
Our success depends upon working together. We earn the respect of others by actively partnering, engaging, and collaborating with them. By being transparent and sharing our expertise, approaches, and knowledge, we help create dynamic partnerships that achieve more.

RESPONSIVE
By being receptive and quick to react, we demonstrate our natural human desire to be helpful. Our dedication and determination to be straightforward and deliver outstanding service experiences give our customers confidence and drive satisfaction levels upward.

RESTLESS
We are sensitive to the diverse and changing needs of our stakeholders. By being proactively curious about new possibilities and the world around us, we advance our knowledge, simplify our processes, and refine our thinking for the benefit of all.

NCARB is a nonprofit corporation comprising the legally constituted architectural registration boards of the 50 states, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands as its members.

2018 - 2019 Legislative Guidlines and Model Law/Model Regulations
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2018-2019

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2018-2019 LEGISLATIVE GUIDELINES

HISTORICAL NOTE

At the June 1970 Annual Meeting, NCARB adopted five guidelines for legislation governing the registration of architects. A minor amendment was adopted the following year, and the guidelines were further amended at the Annual Meetings in 1976 and 1977. At the 1982 Annual Meeting, substantial changes to Guideline III were adopted to permit states to use the new NCARB Architect Registration Examination format (i.e., a single examination for all candidates), and, in response to the requests of a number of NCARB Member Boards, the Council added Guideline VI: "Classes and Characteristics of Structures with Respect to Which Persons Performing Building Design May Be Exempt from Registration Requirements," following extensive study of the question by NCARB's Committee on Procedures and Documents. At the 1985 Annual Meeting, Guideline VIII respecting "Regulation of Unregistered Persons Practicing Architecture" was adopted with corresponding minor adjustments in Guideline II and Guideline VI.

At the 1988 Annual Meeting, the Council amended Guideline I to recognize the conditions under which a design/build practice could be carried on. Substantial changes were made at the Annual Meeting in 1989, including Guideline VII, which required that an architect be engaged to furnish construction contract administration services.

Over the ensuing years, the guidelines have been modified from time-to-time. In 1999, the Council added Guideline IX, which describes a way in which foreign architects whose national registration standards vary from those in the United States may participate in U.S. architectural commissions. Also in 1999, the Council amended Guideline II by making specific reference to the Rule of Conduct (5.2) which requires that an architect have responsible control over all technical submissions not otherwise exempt.

INTRODUCTION

The NCARB *Legislative Guidelines* sets forth provisions adopted by the Member Boards of NCARB on nine significant areas of state regulation. Early in its consideration of state laws regulating the practice of architecture, NCARB reached the conclusion that guidelines were appropriate, rather than draft statutory language.

Guidelines were recommended because each of the existing state laws contained unique language, organization, and ancillary provisions; it might be disruptive and confusing to attempt to introduce, on a national basis, exact statutory language into existing state statutes. Nonetheless, in response to the requests of a number of state registration boards, NCARB has added to these guidelines a Model Law for the purpose of illustrating the way in which the guideline principles would fit into a statutory framework. The Model Law does not purport to cover all matters appropriate to a statute governing the registration of architects. Matters with respect to the appointment of board members, their relationship to umbrella state agencies, the compensation of board members, procedural issues, and the like are not included in the Model Law. In many states these largely administrative provisions are found in a section of the law preceding the laws specifically applicable to each registration board. In other states these administrative provisions are found in the architectural registration statute itself. The most important of the administrative provisions not found in the Model Law is the power to adopt rules and regulations. Once again it is typical to find that power in the general portions of the law applying to all registration boards. A draftsperson who is revising the state law and using the Model Law should carefully examine the statutory framework to be sure that the power to adopt rules and regulations exists somewhere.

To round out the matter of legislative guidelines, NCARB has also added to this document Model Regulations to illustrate how the Model Law interfaces with a set of board Rules and Regulations. The Model Regulations build upon the Model Law, the *Model Rules of Conduct* recommended by the Council, and the standards adopted by the Council for certification. They recommend that states have analogous standards for registration and provide details on definitions, fees, applications, registration standards, examination, registration, rules of professional conduct, and practice by firms.

NCARB also reached the conclusion that the guidelines should be limited in scope; such subjects as the organization and incorporation of a regulatory board, procedures to be followed by the board, penalties for violation of the board rules, and the like are not treated in these *Legislative Guidelines*. Rather than attempt to provide guidelines to the states on matters which they are clearly better able to decide than any national organization, NCARB has limited its concern to nine major areas, all of which have implications beyond the boundaries of an individual state.

In the development of these guidelines, NCARB has been concerned with the respective roles of statutory enactment on the one hand and board rules or regulations on the other. Through a statute granting the power to adopt rules and regulations, the legislature permits a regulatory agency to elucidate and define further its statutory authority by establishing regulations. Regulations cannot contradict the statute. Practically, statutory change requires time, the mobilization of professional bodies to seek legislative support, and often considerable frustration when for one reason or another, the legislature postpones enacting the proposed reform. Regulations, on the other hand, may typically be adopted by the state board after notice and appropriate hearings. Thus, insofar as the regulation of the profession involves likely future changes in professional practice, the rules should be found in the regulations rather than the statute. The decision entails a reasonable calculation as to what matters a state legislature will permit a regulatory board to decide and what matters, as a question of public policy, should be decided by the legislature.

The nature of sanctions which may be imposed (fines, probation, suspension, revocation, and the like) is a matter customarily left to the legislature itself, while the question of educational and experience qualifications, a matter subject to changing concepts, might well be left to the registration board.

A connected question is the degree to which boards may rely on national standards as the standards to be used in their states. These guidelines refer specifically to the National Council of Architectural Registration Boards at various points and suggest that these references to NCARB be found in the statute. This decision is based on a legal judgment made from a survey of a variety of cases in various states that a board's reliance on NCARB procedures may be put in doubt in a court challenge if there is no legislative expression on the board's right so to rely. On the other hand, the reliance on these standards is permissive but not mandatory and is, in all cases, to be decided by the board in the board's regulations. Here it was the view of NCARB that legislators would be reluctant to fix in a statute the mandatory requirement that a national organization set the standards for the state, subject only to legislative amendment.

In sum, the *Legislative Guidelines* leaves to the boards flexibility and discretion to bring their states in line with the developing national standards for architectural registration and regulation. Such flexibility is ensured by leaving much of the detail to regulations to be promulgated by the board, while the enabling statute contains the general policy of the legislature.

LEGISLATIVE GUIDELINES

I DEFINITION

A The practice of architecture, for purposes of the registration statute, should be defined as consisting of providing or offering to provide certain services hereafter described, in connection with the design and construction, enlargement or alteration of a building or group of buildings and the space within and the site surrounding such buildings, which have as their principal purpose human occupancy or habitation. The services referred to include pre-design; programming; planning; providing designs, drawings, specifications and other technical submissions; the administration of construction contracts; and the coordination of any elements of technical submissions prepared by others including, as appropriate and without limitation, consulting engineers and landscape architects. The practice of architecture shall not include the practice of engineering, but an architect may perform such engineering work as is incidental to the practice of architecture. No person not registered nor otherwise permitted to practice under the registration statute should be permitted to engage in the practice of architecture.

Except as provided in IV B and C, no person not registered should be permitted to acknowledge himself/herself as authorized to practice architecture or to use the title "architect" when offering to perform any of the services which the practice of architecture comprises or in circumstances which could lead a reasonable person to believe that such services were being offered; except that a person registered in another jurisdiction may use the title "architect" when identifying his/her profession in circumstances which would not lead a reasonable person to believe that the person using the title "architect" is offering to perform any of the services which the practice of architecture comprises.

A person currently employed under the responsible control of an architect and who maintains in good standing a National Council of Architectural Registration Boards Record may use the title "intern architect" or "architectural intern" in conjunction with his/her current employment, but may not engage in the practice of architecture except to the extent that such practice is excepted from the requirement of registration.

B A partnership or corporation offering a combination of architectural services together with construction services may offer to render architectural services only if (1) an architect registered in this state or otherwise permitted to offer architectural services participates substantially in all material aspects of the offering; (2) there is written disclosure at the time of the offering that such architect is engaged by and contractually responsible to such partnership or corporation; (3) such partnership or corporation agrees that such architect will have responsible control of the architectural work and that such architect's services will not be terminated prior to the completion of the project without the consent of the person engaging the partnership or corporation; and (4) the rendering of architectural services by such architect will conform to the provisions of the architectural registration law and the rules adopted thereunder.

C State statutes will continue to exempt various structures and special categories of persons from the purview of the statutes. Planning activities by planners and construction contracts by persons customarily engaged in contracting work are examples of activities which should be specifically exempted.

COMMENTARY

The guideline adopts a definition of the practice of architecture that covers the wide variety of services that architects currently furnish and that architects are specifically trained to provide and on which applicants for registration are examined. Architects are properly concerned with the design, construction and modification of buildings, and the space within and the site surrounding such buildings. The services that an architect may be expected to perform include pre-design services, programming, planning, preparing various technical submissions, administering construction contracts, and coordinating the work produced by other design professionals working on the project, including work designed by engineers, landscape architects, and other specialty

consultants. The prohibition in the statute is against a person, "not registered or otherwise permitted to practice," rendering or offering to render the services described. No person is permitted to use the title "architect" unless he/she is registered, or unless the circumstances would not lead a reasonable person to believe that architectural services are being offered.

It is contemplated that state statutes will continue to exempt various categories of related design professions from the purview of this statute to the extent that the exercise of their profession may incidentally involve them in the practice of architecture. The importance of these exemptions should not be minimized. They should be carefully thought out to serve as a means for setting off legitimate activities of other registered design professionals from the practice of architecture.

Both architects and engineers are permitted to design structures under their respective registration statutes, but by emphasizing "human occupancy or habitation," this guideline makes a sensible distinction between the practice of architecture and the practice of engineering.

Paragraph B allows design/build firms to offer to perform architectural services only under the condition that an architect is involved during the design and construction of the project. The requirement under Clause (2) of the written disclosure is to avoid any misapprehension by the client that the architect is in a fiduciary relationship to the client.

II REGULATION OF CONDUCT OF REGISTRANTS

A The state board should be authorized by statute to promulgate, as part of its regulatory function, rules of conduct governing the practice of registered architects. The statute should contain standards for the scope and content of such rules.

B The statute should include, as one of the enumerated grounds for revocation or suspension of registration or for the imposition of a civil fine, violation of rules of conduct promulgated by the board.

C The state board should review and adopt insofar as practicable the *Model Rules of Conduct* published by NCARB or equivalent rules. Some of those Rules serve as well as the foundation for regulatory legislation. For example, the Rule of Conduct (5.2) which restricts an architect's right to sign or seal technical submissions prepared by others and which sets out the requirements for "responsible control" should be part of the statutory framework of each state's regulation of practice.

COMMENTARY

Substantially all states, explicitly or by clear inference, authorize their registration boards to adopt rules or regulations governing the conduct of architects. States whose statutes provide a "clear inference" are typically those giving the board authority to adopt all regulations necessary to carry out the registration law and subsequently empowering the board to revoke or suspend registration for misconduct. (A board's rule-making power coupled with the power of revocation or suspension based on misconduct implicitly requires further description by the rule-making process of what will constitute misconduct.)

Because a matter as serious as revocation of registration may turn on a violation of board regulations, it is improper to adopt regulations governing conduct unless the power to do so is clear in the statute. This guideline urges that all states set out that clear authority.

The statute should also contain specific standards for the scope and content of such regulations in order to protect them from attack on the grounds that they are the results of an over-broad delegation of legislative authority. For example, the statute could explicitly empower the board to adopt regulations concerning "misrepresentations, conflicts of interest, disability, violations of law, or other unprofessional conduct."

Once the statute properly empowers a board to adopt such rules, the board should proceed in accordance with its local regulations (often found in the state administrative procedure act) governing the adoption of rules by the board. Once adopted, the rules will have the force of law in most states.

Obviously, the promulgation of rules of professional conduct will be ineffective, unless a violation of the rules results in a penalty. Accordingly, the guideline advises that a statute should explicitly make a violation of the rules of conduct a ground for suspension, revocation of registration, or civil fine.

In general, such rules of conduct should be in the regulations where they can be reviewed from time to time by the board to make sure that they are compatible with architecture as it is currently being practiced by competent and ethical professionals.

NCARB publishes, and revises from time to time, recommended *Model Rules of Conduct*. A majority of the state boards have adopted these Rules as their own *Model Rules of Conduct*.

III QUALIFICATION FOR REGISTRATION UNDER STATE PROCEDURE

INTRODUCTION

In 1982, this guideline was rewritten to afford state boards greater flexibility in dealing with changing national standards for education and examination. At the same time, NCARB decided to eliminate the minimum age requirement of 21, as it had earlier eliminated the citizenship or residency requirement. A short explanation is in order. In 1971, the 26th Amendment to the U.S. Constitution was ratified, extending the right to vote to 18 year olds. Many states responded by reducing the age of competency, for all purposes, to 18. In such states a minimum age requirement of 21 would run contrary to the prevailing law. Since it is inconceivable that a candidate could meet the requirements

of education and training at 21 (let alone 18), retaining a minimum age in the registration statute was meaningless.

As to the elimination, some years earlier, of a citizenship or residency requirement, court decisions have left no doubt that a citizenship requirement for entry into a profession is unconstitutional. While a requirement of actual residence may be acceptable, related court decisions established that it is unconstitutional to require a certain duration of residence as a condition of registration. NCARB considers that when educational and employment opportunities encourage young architects to move from state to state, it is no longer reasonable to insist that an applicant be a resident of the state administering the examination.

A An applicant for registration should be required to hold a professional degree in architecture from an NAAB-accredited program and to have had such practical training as the state board, by regulations, shall deem appropriate. In lieu of the requirement of an NAAB-accredited degree, the state board may register an applicant who demonstrates, in accordance with such standards and requirements as the state board adopts by regulation, that he/she has such other educational experience as the state board deems equivalent to a professional degree in architecture from an NAAB-accredited program. The statute should permit the state board to adopt, as its own regulations relating to practical training and education, those guidelines published from time to time by the National Council of Architectural Registration Boards, and should permit the state board to adopt the accreditation decisions of the National Architectural Accrediting Board.

B To be registered, the applicant should be required to pass examinations covering such subjects and graded on such basis as the state board shall, by regulations, decide. The statute should permit the state board to adopt the examinations and grading procedures of the National Council of Architectural Registration Boards.

COMMENTARY

In A and B, flexible standards for education and training are set out. It is assumed and strongly encouraged that jurisdictions will, by regulation, bring themselves in line with national standards as they are being developed. As was discussed in the introduction, this guideline (and Guideline IV) recommends that the statute contain language authorizing the use of NCARB and the National Architecture Accrediting Board (NAAB) standards for regulatory purposes in order to avoid any challenge to that procedure.

It is important that the details of the examination not be found in the statute. It would be a great setback to the regulatory system if states were inhibited by their statute from adopting changes in the examination which are expected to occur from time to time in the future. The same is true with respect to educational and training requirements. The recommended language permits boards to adopt the NCARB-recommended education, training, and examination standards. The reference to a degree in architecture from an accredited program or similar language is already found in most state statutes.

C If the state wishes to invest its state board with discretion to reject or take disciplinary action against an applicant who is not of "good moral character," the statute should specify only the aspects of the applicant's background germane to the inquiry, such as

(i) conviction for commission of a felony;
(ii) misstatement or misrepresentation of fact or other misconduct in connection with seeking registration, including without limitation misconduct involving violation of applicable rules protecting the integrity of the architect licensing process such as the Architect Registration Examination or the Architectural Experience Program (AXP), formerly known as the Intern Development Program (IDP);
(iii) violation of any of the rules of conduct required of registrants and set forth in the statutes or regulations (See Guideline II); and
(iv) practicing architecture without being registered in violation of registration laws of the jurisdiction in which the practice took place.

If the applicant's background includes any of the foregoing, the state board should be allowed, notwithstanding, to register the applicant on the basis of suitable evidence of reform.

COMMENTARY

Paragraph C sets out the NCARB recommendations in the event that the statute invests its board with discretion to consider "good moral character." These standards make clear that this test is not to be applied arbitrarily to keep out an applicant whose political views, for example, are distasteful to the board.

IV QUALIFICATION FOR REGISTRATION UNDER RECIPROCITY PROCEDURE

A Every person seeking to practice architecture in a state should be registered, if

1 the person holds a current and valid registration issued by a registration authority recognized by the state board; and
2 the person holds a current and valid National Council of Architectural Registration Boards Certificate; and
3 the person files his/her application with the state board, upon a form prescribed by the board, containing such information satisfactory to the board, concerning the person, as the board considers pertinent.

B A person seeking an architectural commission in a jurisdiction in which he/she is not registered should be admitted to the jurisdiction for the purpose of offering to provide architectural services, and for that purpose only, without having first been registered by the jurisdiction, if

1 the person holds a current and valid registration issued by a registration authority recognized by the state board; and
2 the person holds a current and valid National Council of Architectural Registration Boards Certificate; and
3 the person notifies the board of the jurisdiction in writing that (a) he/she holds an NCARB Certificate and is not currently registered in the jurisdiction, but will be present in the jurisdiction for the purpose of offering to provide architectural services and (b) he/she will deliver a copy of the notice referred to in (a) to every potential client to whom the person offers to provide architectural services; and
4 the person provides the board of the jurisdiction with a statement of intent that he/she will apply immediately to the board for registration, if selected as the architect for a project in the jurisdiction.

The person should be prohibited from actually providing architectural services until he/she has been registered.

C A person seeking an architectural commission by participating in an architectural design competition for a project in a jurisdiction in which he/she is not registered should be permitted to participate in the competition, if

1 the person holds a current and valid registration issued by a registration authority recognized by the state board; and
2 the person holds a current and valid National Council of Architectural Registration Boards Certificate; and
3 the person notifies the board of the jurisdiction in writing that he/she is participating in the competition and holds an NCARB Certificate; and
4 the person provides the board of the jurisdiction with a statement of intent that he/she will apply immediately to the board for registration, if selected as the architect for the project.

D The foregoing provisions for registration under the reciprocity procedure are to be in addition to the provisions found in the statute for registering applicants under the examination procedure (see Guideline III) and to any provisions in the statute providing other forms of reciprocity.

COMMENTARY

State statutes should acknowledge the procedure for interstate practice which is being followed throughout the United States; i.e., the registration of a non-resident holding the NCARB Certificate. This section of the guideline provides the mechanics by which the state board registers the Certificate holder. While this generally follows the practice of most states, to avoid any question as to the power of the board to honor the NCARB Certificate, it is advisable to set forth the procedure explicitly in the statute.

Even with the NCARB procedure accepted by most jurisdictions, the out-of-state architect has often faced a dilemma when he/she offers to render services in an initial interview with a prospective client or by entry in an architectural design competition. Technically, that interview or that entry in a design competition may violate the provisions of the local state law, in that the out-of-state architect is holding himself/herself out to be an architect (offering to render architectural services), in attempting to get the commission, without first having been registered in the jurisdiction.

Despite streamlining of the processing at NCARB Headquarters in Washington, a delay is inevitable between the time that an architect is first invited to be interviewed or is first notified of the design competition and the time that his/her Council Certificate can be forwarded to the local state board, be reviewed, and have the registration issued. To solve these problems, the guidelines adopt procedures whereby a qualified architect holding the NCARB certificate is admitted for the purpose of offering to render architectural services or for the purpose of participating in an architectural design competition without first having been registered. These procedures have worked well in the jurisdictions that have adopted them and have proved of great convenience to the architectural profession.

V FIRM PRACTICE

A A partnership (including a registered limited liability partnership), a limited liability company or a corpoation should be admitted to practice architecture in a state if (1) two-thirds (2/3) of the general partners (if a partership), two-thirds (2/3) of the mangers (if a limited liability company), or two-thirds (2/3) of the directors (if a corpoaion) are registered under the laws of any state to practice architecture or engineering; (2) one-third (1/3) of the general partners (if a partnership), one-third (1/3) of the managers (if a limited liability company), or one-third (1/3) of the directors (if a corporation) are registered under the laws of any state to practice architecture; and (3) the person having the practice of architecture in his/her charge is himself/herself a general partner (if a partnership), or a manager (if a limited liability company), or a director (if a corporation) and is registered to practice architecture in that state. The board should be empowered to require by regulation any partnership, limited liability company, or corporation practicing architecture in that state to file information concerning its officers, directors, managers, beneficial owners, and other aspects of its business organization, upon such forms as the board prescribes.

COMMENTARY

While a majority of states now permit the practice of architecture in the conventional corporate and partnership forms, and in the newer limited liability company form, the restrictions placed on corporate practice and limited liability company practice (and to a lesser degree on partnership practice) are often

onerous. Worse still, these restrictions are so varied among the several states as to require an architectural firm organized as a corporation or limited liability company to consult with legal counsel in all cases before accepting work in another state. The guidelines seek a reasonable, nationwide provision respecting firm practice.

The requirements are that two-thirds of the directors or managers be registered to practice architecture or engineering under the laws of any state; that one-third of the directors or managers (in other words, at least one-half of the architect and engineer directors or managers) be registered to practice architecture under the laws of any state; and that the person having the practice of architecture in his/her charge be a director or manager, and that such person be registered to practice architecture in the state of the project. (In the case of a limited liability company in which management of its business is vested in the members, the requirement is intended to apply to the members.) This guideline does not require that all the directors or managers be architects; there may be engineers sitting on the board of directors. Moreover, up to one-third of the total number of directors or managers may be laymen. For example, most states require that corporations have a minimum of three directors. Accordingly, the small closely-held corporation, having only the minimum number of directors, may have a business advisor, accountant, or other person sitting on the board with two design professionals. Larger firms may wish to have a banker, lawyer, accountant, business advisor, or real estate consultant, or several of the foregoing, sitting on the board. The guideline allows this flexibility.

The utility of a provision of the kind proposed by the guidelines is emphasized by the fact that present restrictions on firm practice have had the effect of promoting techniques for circumventing laws restricting firm practice which can be used equally by responsible and irresponsible firms. For example, it has become common for an architect associated with a corporate firm to take a contract in a restrictive state in his/her individual name, thus technically complying with the law although the work is being done by an out-of-state corporate entity. Under this practice, a construction company employing a single architect is as able to evade the restrictions as a reputable architectural firm whose entire board comprises architects. Strict enforcement to prevent such practices in order to ban the company not in control of design professionals proves impossible as a practical matter, because such enforcement would result in wholesale barring of responsible corporate architectural firms in many states. The type of rule set forth in Guideline V-A, in contrast, could be used successfully to bar entry to corporate or limited liability company firms not controlled by professionals while not forbidding practice by the vast majority of legitimate corporate or limited liability company firms that should be able to meet the requirements.

There is no requirement concerning the ownership of a firm (e.g., the stockholders of a corporation). This matter was carefully considered in drafting the guideline. There are a number of good reasons for not requiring that ownership be exclusively in the hands of design professionals. These range from a frequent situation in the small corporation where the principal of the firm wishes to bequeath his/her stock to his/her spouse or children, to the possibility of larger firms seeking public ownership in order to capitalize adequately their practice. Since there are strong reasons for not restricting ownership, these must be weighed in the balance against the reasons for imposing restrictions.

The principal, if not sole, argument for restricting ownership is that it ensures ultimate control of the firm in the hands of design professionals. But this argument is illusory. For example, a corporation, by statute, is managed by its board of directors. The role of stockholders is limited to electing and removing the directors in whom management is vested. While it is therefore true that laymen owning a majority of the shares may change the persons who constitute the board of directors, the laymen can never substitute laymen on the board of directors for professionals. Thus, the argument is reduced to the proposition that the laymen can find compliant architects more likely to do their bidding on the board of directors than the stubborn architect whom they discharged, a situation analogous to that currently existing between the owner and the architect. The architect has control over the design of a project only for so long as the owner keeps him/her under contract. If the owner is displeased with the architect or if the owner wants the architect to take action which the architect feels is unprofessional, the owner can discharge the architect and seek a more compliant architect to do his/her bidding.

Since much was to be gained by leaving the question of ownership to the discretion of the firm practitioners and very little was to be gained by imposing restrictions, it was decided that this guideline should confine itself to the composition of the firm's management.

It should be noted that the guidelines require merely that the design professionals be registered in any state and not necessarily in the state of the practice. One of the great problems confronting large firms practicing architecture is that several of the states require all directors (in the case of a corporation), all managers (in the case of a limited liability company [or all of the members in the case of a limited liability company in which management of its business is vested in the members]), and all partners (in the case of a partnership) to be registered in that state. Expense and unnecessary processing to achieve that goal is out of proportion to any useful purpose it serves.

The real protection for the public is that the person who has the project in his/her charge is a person who has qualified to practice architecture in the state. This guideline makes certain that that will always be the case. In order to make clear that the architect is to be a principal of the firm, this guideline requires that he/she also be a director (if a corporation), a manager (if a limited liability company), or a general partner (if a partnership). (In the case of a limited liability company in which management of its business is vested in the members, the guideline is intended to require

that he/she also be a member.) In the case of a corporation, it should be emphasized that the officers are mere employees of the corporation subject at all times to the direction of the board of directors. Thus, those present state laws requiring the architect practicing through the corporate firm to be an officer of the corporation too often find themselves dealing with a third vice president, who, except for that title, holds no position of importance in the corporate firm.

It is not the intent that a firm be registered, but only that a firm, complying with this guideline, may be a vehicle by which a registered architect may legally practice architecture.

The guidelines suggest that a state board may wish to have a special filing for firm practice so that the state will know at all times who the officers, directors, managers, and beneficial owners of the firm are. Many states have adopted such a practice.

B A firm otherwise qualified to practice in a state should be permitted to practice in that state under a name which does not include the names of every director (if a corporation), every manager (if a limited liability company), or every general partner (if a partnership) registered in any state to practice architecture, provided the firm complies with reasonable regulations of the state board requiring the firm to file the names, addresses, and other pertinent information concerning the directors (if a corporation), managers (if a limited liability company), or general partners (if a partnership) of the firm.

COMMENTARY

A handful of states still proscribe use of any firm name other than a name which includes the surnames of principals. This has yielded a curious anomaly. These names and those firms gained considerable reputations; but when they went into a state that proscribed generic names, they discarded the name under which they have developed a reputation and practiced as John C. Smith or Peter Jones. In such circumstances, the use of the surname is more misleading than the use of the assumed name under which the firm has developed its practice.

Again, the guidelines encourage the local state board to require the filing of a statement by firms operating under an assumed name so that the real names of principals will at all times be available.

VI CLASSES AND CHARACTERISTICS OF STRUCTURES WITH RESPECT TO WHICH PERSONS PERFORMING BUILDING DESIGN MAY BE EXEMPT FROM REGISTRATION REQUIREMENTS

INTRODUCTION

Most architectural registration statutes specify various kinds of structures which may, under special conditions, be designed by unregistered persons. In an effort to provide a basis for more uniformity among jurisdictions in establishing reasonable exemptions, NCARB, through its Committee on Procedures and Documents (P&D), in 1979 initiated a study of current statutory exemptions. While the results of this effort indicated almost as many variations as there are jurisdictions, it became apparent that there were five basic characteristics of buildings which, when used in varying combinations, formed the basis of establishing exemptions. These characteristics are:

- Cost of construction
- Area or volume
- Intended use or occupancy
- Number of stories or height
- Number of units or occupants

P&D decided to study how such exemptions affect the health, safety, and welfare of the public and then to fashion a legislative guideline in the light of its findings.

As a means of expanding the information base and of examining the impact and the roles of public building officials and licensed design professionals as they relate to the safety of the consumer, NCARB, in early 1981, organized a round-table discussion, including representatives of:

- Illinois Council of Code Administrators
- AIA Division of Codes and Standards
- National Society of Professional Engineers
- Victor O. Schinnerer and Company, Inc. (Professional liability insurance)
- International Conference of Building Officials
- U.S. Department of Housing and Urban Development

Building officials attending the meeting stated that the public may assume that the state or municipal building inspectors or code administrators are an effective means of assuring public health, safety, and welfare, but in practice this is rarely the case. A code administrator pointed out that while some of the building officials are indeed trained and registered as engineers and/or architects, they are a very small minority and that the majority has no professional academic background in engineering or architecture, although some do receive modest training in plan review for code compliance. The expectation that these dedicated and often overworked public servants can evaluate the technical adequacy of a complex building design is, in most instances, unrealistic.

While substantiating statistics are not available from public records, all participants at the round table agreed that their experiences would strongly support the concept that the public health, safety, and welfare can only be assured by requiring that licensed professionals design any significant improvements to real property. It was further established that few, if any, governmental building departments, inspectors, or code administrators have sufficient qualified staff to carry out their responsibilities; and that they must depend heavily upon licensed design professionals to deliver to the public safe structures designed within the limits of current codes. To demonstrate further potential for loss to the public, it was pointed out that errors and omissions insurance is not available from any source to unregistered persons.

In the summer of 1999, NCARB distributed a questionnaire to 9,450 building officials affiliated with the three major code organizations. One of the purposes of the questionnaire was to obtain from these officials their opinions (not necessarily the requirements of their existing laws) on what exemptions should be included within their statutes which would not impose overly restrictive standards, but which would reasonably protect the public health, safety, and welfare.

Of those responding, 95 percent agreed that a registered architect or engineer is essential on any "substantial" building project. Eighty-seven percent (87%) agreed that even well-staffed building departments must rely on registered design professionals to ensure that building designs meet performance standards of modern codes. Eighty-seven percent (87%) said that registered architects and engineers should be required to perform construction contract administration services. In response to a question asking what exemptions should be permitted in a model statute, 88 percent favored limiting the exemption only to one- and two-family dwellings and farm buildings. And a substantial minority favored deleting one- or two-family dwellings from the exemption.

While current statutes, with their broadly varying exemptions, attempt to limit risk to the public by limiting the building in some way (area, height, span, cost, function, etc.), it does not necessarily follow that these limitations will accomplish that goal.

It is assumed in the following guidelines that state registration laws begin with the requirement that plans and specifications for all buildings having a principal purpose of human occupancy or habitation shall be prepared and sealed by an architect registered in the state. The guideline then suggests principles upon which appropriate exemptions from the law may be developed. (Note, however, that some jurisdictions permit no exemptions.) In 1989, the Council deleted references to the engineering registration law from these guidelines because the Council believes that the public health, safety, and welfare is best protected by having architects and not engineers responsible for the design of buildings constructed for human occupancy or habitation. The scope of other structures that require the involvement of a registered engineer should be dealt with in the engineering registration law and not in the architectural registration law.

A Persons not registered under this registration law may design detached single- and two-family dwellings and any accessory buildings incidental thereto, unless an architect is otherwise required by law or by the building authority having jurisdiction over the project.

COMMENTARY

Single-and two-family dwellings have historically been designed by their owners and more recently by contractors and developers. In many instances, state statutes have continued to permit this exemption as a concession to the right of an individual to make risk decisions impacting primarily on his/her own family. As a practical matter, legislators have been unwilling to attempt to curtail the practice of an owner designing or purchasing a structure to house his/her own family.

While some statutes have attempted to limit the exemption to "designer occupied" structures, others have permitted a broader participation in the design of dwellings by omitting the limiting impact of designer occupancy. This less restrictive phrasing opens the field to contractors and developers on the premise that size and use do limit risk. On the other hand, limiting the exemption to "designer occupied" dwellings affords no protection to subsequent purchasers of the dwelling.

B Persons not registered under this registration law may design farm buildings, including barns, silos, sheds, or housing for farm equipment and machinery, livestock, poultry or storage, if such structures are designed to be occupied by no more than 10 persons.

COMMENTARY

States having particular occupations, whose participants have traditionally designed structures for their own use, may wish to continue to permit such buildings to be designed by non-licensed persons. This guideline recognizes the political reality that long-standing custom relating to occupations involving significant numbers of participants is unlikely to be changed by members of the state legislature. Farmers probably comprise the largest single group coming under this exemption. It would be appropriate, however, to consider limiting this and other traditionally "family" occupations when the magnitude of their individual operations requires involvement of significant numbers of non-family employees. Some non-agricultural states may support other occupations which, on the basis of history and custom, may require that buildings housing these occupations be exempt.

In any case, any effective statute attempting to limit risk to the public from failures in buildings must recognize that the only certain method is to limit the number of occupants permitted in that structure. Structural limitations in the building design (area, height, span, etc.) and building cost have no limiting effect on the numbers of people who may occupy the building and cannot be relied upon as effective means of protecting the public. Structural failures in tall single-story buildings erected on or near property lines or rights-of-way may compromise the safety of persons nearby. Limiting exempt structures to a single story, fixing maximum heights, and requiring substantial setbacks from property lines and rights-of-way will tend to localize the impact of any failure. It follows from the last restriction that, without engaging a registered design professional, no building may be built close to the property line.

The number of persons allowed to be put at risk is a judgment to be made by each jurisdiction.

C Persons not registered under this law may design particular features of a building when such features do not affect structural or other safety features of the building

and when the work contemplated by the design does not require the issuance of a permit under applicable building codes.

COMMENTARY

This exemption would apply to any structure, including dwellings, factories, offices, and other commercial buildings, and recognizes that in many circumstances, competent, skilled trades-people can do the work. The references to structural and life-safety aspects are particularly important in instances where codes have not been adopted.

VII REQUIRING THAT AN ARCHITECT BE ENGAGED DURING THE CONSTRUCTION OF A PROJECT

A An owner who proceeds to have constructed a project having as its principal purpose human occupancy or habitation and not exempted under Section VI shall be deemed to be engaged himself/herself in the practice of architecture unless he/she has employed an architect to perform at least minimum construction contract administration services, including (i) periodic site visits, (ii) shop drawing review, and (iii) reporting to the owner and building official any violations of codes or substantial deviations from the contract documents which the architect observed.

B It shall be the project design architect's obligation to report to the state board and to the building official if he/she is not engaged to provide construction contract administration services described in Paragraph A.

C A state board may waive these requirements with respect to a particular project or class of projects if it determines that the public is adequately protected without the necessity of an architect performing the services described in Paragraph A.

COMMENTARY

This guideline increases the required role of the design architect during construction to at least the listed minimum of construction contract administration services. By stating that an owner who fails to engage an architect to perform such services for a project having as its principal purpose human occupancy or habitation is deemed to be engaged in the practice of architecture, it gives the state board legal power to seek a remedy against the owner failing to meet the requirement.

The origin of this provision was the statement of a significant number of building officials taking part in a 1981 NCARB survey that contracts for professional services that terminate upon completion of construction documents, which do not then provide for professional administration during construction, often result in buildings that do not meet code requirements that were specified in the documents. (In a 1999 survey of building officials, 87 percent of the respondents favored requiring that architects and engineers perform on-site observation during construction.) The Council believes that in order to effectively protect the public health, safety, and welfare, statutes must include language requiring the retention of registered architects to provide responsible professional involvement throughout the construction process on all non-exempt structures.

The guideline suggests that the design architect be engaged for at least the minimum of construction phase professional services which include periodic site visits, shop drawing review, and reporting to the owner and the building official any violations of codes or substantial deviations from the contract documents which the architect observes. Most agreements between architects and their clients require that the architect report any observed code violations and defects in the work to the owner. The building codes of many jurisdictions require that a registered architect or engineer perform the other construction contract administration services listed in the guideline. For example, the city of Boston requires an architect or engineer to make at least one site visit per week, to be responsible for inspecting all phases of construction, and to notify the building official of any code violations, discrepancies between the design documents and the work in progress, and any condition constituting a hazard, which the architect observes. The International Building Code requires special inspections by a registered design professional.

Under legislation enacted pursuant to this guideline, if an architect is not engaged to perform the designated minimum construction phase services, then the owner is deemed to be himself/herself engaged in the unauthorized practice of architecture. This will allow the state board to seek an injunction, civil fines, and/or criminal complaints as appropriate to the circumstances and as permitted by the relevant state law. The enforcement role of the state board and local building official is aided by the design architect's obligation under the guideline to make both the state board and local building official aware of situations in which the design architect is not engaged to provide construction contract administration services. Presumably, the level of enforcement would be commensurate with the risk to the public health, safety, and welfare. For example, if an owner did not engage an architect to provide construction phase services in connection with the construction of a major downtown office building, the first course of action for a state board likely would be to seek an injunction to prevent the further construction of the building. A criminal complaint might be sought in circumstances where an owner has repeatedly disregarded this rule at peril to the public health, safety, and welfare. Civil fines might be imposed both to discourage transgressions of the law and to assist in funding enforcement efforts.

Of course, state boards should be free to waive these requirements for projects that do not require an architect to perform construction contract administration services in order to adequately protect the public. Structures that may be designed without the involvement of a registered architect under Section VI of the guidelines, for example, should also be exempted from the requirement that an architect be engaged to perform construction phase services. Where a public agency has its own

experienced construction contract administration staff, the state board may exempt the agency's projects from this requirement. The board should be able to exempt both specific projects and categories of projects.

VIII REGULATION OF UNREGISTERED PERSONS PRACTICING ARCHITECTURE

A While violation of the architectural registration law by unregistered persons should be a crime, the state board should also be authorized, after a hearing, to impose civil fines of up to a stated amount, such as $3,000, and to issue orders to cease against unregistered persons and persons aiding or abetting unregistered persons. The board, as well as the state attorney general and county or other local law enforcement authorities, should be authorized to seek injunctions against practice by unregistered persons and the aiding or abetting of such practice, and judicial enforcement of civil fines imposed by the board.

B All plans, specifications, and other technical submissions ("technical submissions") prepared in the course of practicing architecture (as defined in Guideline I) and required to be filed with state or local building or public safety officials should be sealed by an architect. If state law provides certain exceptions to the general requirement that technical submissions be sealed, then the person filing the technical submissions should specify on them the state law exempting the preparation of those technical submissions. Any permit issued on the basis of technical submissions not complying with these requirements shall be invalid.

COMMENTARY

Virtually all state laws make the unregistered practice of architecture a crime. Yet most state boards have found that busy public prosecutors are rarely persuaded to prosecute unregistered persons practicing architecture. Except where life or property may already have suffered, prosecutors have generally given priority to "more serious" crimes. Authorizing the board itself to impose a civil fine after a hearing will unburden busy prosecutors and at the same time provide a more fitting sanction for many cases of unregistered practice. New Jersey has long had such authority and has used it with great effect. Many other states also have legislative authorization to impose civil fines. Where a fine remains unpaid or where the board believes that a court injunction is necessary to halt continuing unregistered practice, the board itself, as well as other public law enforcement authorities, should be authorized to apply to courts to enforce the board's orders to pay the fine or to cease the unregistered practice.

Local and state building and public safety officials have historically relied on the professional expertise implied by professional seals affixed to plans filed to obtain governmental permits. Therefore, state boards should consider pressing for including the substance of Guideline VII B in statutes, building codes, and other codes applicable throughout their states. By placing the burden of certifying the applicability of exemptions on applicants, they as well as building officials can be expected to aid enforcement of the seal requirement. By providing that permits erroneously issued without the required seals are invalid, NCARB expects private enforcement of these provisions by owners and their lenders.

IX PRACTICE BY FOREIGN ARCHITECTS

A person duly registered as an architect outside of the United States and Canada should be allowed to practice architecture in affiliation with a local architect within a state under the following conditions:

A The foreign architect must show that he/she holds a current registration in good standing which allows him/her to use the title "architect" and to engage in the unlimited practice of architecture in his/her national jurisdiction.

B The foreign architect must show that a bilateral agreement exists between NCARB and the national registration authority of his/her national jurisdiction.

C The foreign architect must affiliate with an architect duly registered in the state, who shall take responsible control over all aspects of the architectural services for any project in which the foreign architect is involved, and who shall file a written statement with the state board identifying the foreign architect, describing the project, and describing the foreign architect's role.

D The [foreign] architect must use the title: "[X], a foreign architect, in consultation with [Y], an architect registered in [state]."

COMMENTARY

In 1998, the Council Board presented to the Annual Meeting a proposal by which foreign architects would be permitted to engage in architectural practice in the United States provided a U.S.-registered architect took responsible control over all aspects of the services to be performed. This proposal would require an agreement between NCARB, on the one hand, and the equivalent national registration body in the foreign country, on the other, before an architect registered in the foreign country would be permitted to engage in architectural practice in the United States. In contrast with inter-recognition agreements, such as the one between the U.S. and Canada, which accepts the two registration systems as sufficiently similar as to permit a registered architect in Canada and a registered architect in the United States freedom to practice in the other country, such agreements may be reached with countries whose registration requirements vary substantially from our own. State boards are encouraged to accept this procedure nonetheless because the public is protected by the role of the U.S. architect exercising responsible control over all aspects of the work.

Based on the 1998 report, the Council adopted the notion of bilateral accords in principle, asking that a legislative guideline be submitted to the 1999 Annual Meeting. That was done, and the Council adopted the new guideline without dissent.

SECTION 1 – DEFINITIONS

The following words as used in Sections 1 to 13 inclusive, unless the context otherwise requires, shall have the following meaning:

"Architect."
Any person who engages in the practice of architecture as hereinafter defined.

"Architect Emeritus."
Means an honorific title granted to a previously registered architect who has retired from the active practice architecture.

"Board."
The Board of Registration of Architects established by **[Here, make reference to statute establishing Board; if no separate statute exists which sets out the composition of Board, terms, compensation, etc., insert those provisions as "Section 2– Board" and renumber existing Section 2 and all subsequent sections.].**

"Good moral character."
Such character as will enable a person to discharge the fiduciary duties of an architect to his/her client and to the public for the protection of health, safety, and welfare. Evidence of inability to discharge such duties shall include the commission of an offense justifying discipline under Section 7.

"Practice of architecture."
Providing or offering to provide those services, hereinafter described, in connection with the design and construction, enlargement, or alteration of a building or group of buildings and the space within and the site surrounding such buildings, which have as their principal purpose human occupancy or habitation. The services referred to include pre-design, programming, planning, providing designs, drawings, specifications and other technical submissions, the administration of construction contracts, and the coordination of any elements of technical submissions prepared by others including, as appropriate and without limitation, consulting engineers and landscape architects; provided that the practice of architecture shall not include the practice of engineering as defined in **[Statute Reference]**, but a registered architect may perform such engineering work as is incidental to the practice of architecture.

"Prototypical building."
Any commercial building or space within a commercial building that is intended to be constructed in multiple locations, and in fact then has been constructed in multiple locations, and which conveys an owner's intended uniform business program, plan, or image.

"Prototypical building documents."
Technical submissions for prototypical buildings that are prepared by or under the responsible control of an architect then registered in any United States jurisdiction and holding a current and valid certification issued by the National Council of Architectural Registration Boards, that identify such architect together with the architect's registration number, jurisdiction of registration, and National Council of Architectural Registration Boards Certificate number and that are marked "Prototypical Design Documents Not for Construction." Prototypical building documents do not comprise a final, comprehensive set of design and construction documents because a prototypical building also requires adaptations for local conditions, including site conditions, and may require additional design as well.

"Registered architect."
An architect holding a current registration.

"Registration."
The certificate of registration issued by the Board.

"Responsible control."
That amount of control over and detailed professional knowledge of the content of technical submissions during their preparation as is ordinarily exercised by a registered architect applying the required professional standard of care, including but not limited to an architect's integration of information from manufacturers, suppliers, installers, the architect's consultants, owners, contractors, or other sources the architect reasonably trusts that is incidental to and intended to be incorporated into the architect's technical submissions if the architect has coordinated and reviewed such information. Other review, or review and correction, of technical submissions after they have been prepared by others does not constitute the exercise of responsible control because the reviewer has neither control over nor detailed professional knowledge of the content of such submissions throughout their preparation.

"Technical Submissions."
Designs, drawings, specifications, studies, and other technical documents prepared in the course of practicing architecture. All technical submissions shall be identified by date and by the name and address of the architect or the architect's firm.

SECTION 2 – FEES

[Here, set out fee structure for all matters for which a fee is set by statute, and/or identify procedure for establishing fees which are set other than by statute. Do not include examination fees.]

SECTION 3 – REGISTRATION QUALIFICATIONS

Every person applying to the Board for initial registration shall submit an application accompanied by the fee established in accordance with Section 2, with satisfactory evidence that such person holds an accredited professional degree in architecture or has completed such other education as the Board deems equivalent to an accredited professional degree. If an applicant is qualified in accordance with the preceding sentence, such person

shall then provide the Board with satisfactory evidence that such person has completed such practical training in architectural work as the Board requires and has passed an examination on such technical and professional subjects as are accepted by the Board. None of the examination materials shall be considered public records **[for purposes of state public records act]**. The Board may exempt from such written examination an applicant who holds a current and valid certification issued by the National Council of Architectural Registration Boards. The Board may accept as its own the requirements governing practical training and education published from time to time by the National Council of Architectural Registration Boards. The Board may also accept the examinations and grading procedures of the National Council of Architectural Registration Boards and the accreditation decisions of the National Architectural Accrediting Board. The Board shall issue its registration to each applicant who is found to be of good moral character and who satisfies the requirements set forth in this Section. Such registration shall be effective upon issuance.

Any person who holds a current and valid certification issued by the National Council of Architectural Registration Boards, who holds a current and valid registration issued by a registration authority recognized by the Board, who files his/her application with the Board on a form prescribed by the Board containing information pertinent to such person as is satisfactory to the Board, and who pays such fee as is prescribed by the Board shall have satisfied the basic education, experience, and national examination requirements of the Board for registration.

SECTION 3A – REGISTRATION OF MILITARY PERSONNEL

The board may, upon presentation of satisfactory evidence by an applicant for licensure, accept education, training, or service completed by an individual as a member of any branch of the military toward the qualifications to receive their license. The board shall promulgate rules to implement this section.

SECTION 4 – REGISTRATION RENEWAL

The Board shall mail yearly **[or state other time interval]** to every registered architect an application for renewal of registration. Such application, properly filled out and accompanied by the renewal fee established in accordance with Section 2, shall be returned to the Board on or before the date established by the Board. After review of the facts stated in the general renewal application, the Board shall issue a registration which shall be valid for one year **[or state other time interval]**. Any holder of a registration who fails to renew his/her application on or before the prescribed date shall, before again engaging in the practice of architecture within the state, be required to apply for reinstatement, pay the prescribed fee, and, in circumstances deemed appropriate by the Board, be required to be reexamined.

There is hereby created, for registration renewal purposes, a status to be known as "architect emeritus," which shall apply to architects who are retired and not practicing any aspects of Architecture and who are 65 years of age or older or have been registered for a minimum of "10" years [in their state].

[States requiring that each registered architect demonstrate continuing education should include the following] A registered architect must demonstrate completion of annual continuing education activities. The Board shall by regulation describe such activities acceptable to the Board and the documentation of such activities required by the Board. The Board may decline to renew a registration if the architect's continuing education activities do not meet the standards set forth in the Board's regulations.

SECTION 5 – CERTIFICATE OF REGISTRATION

Every registered architect having a place of business or employment within the state shall display his/her certificate of registration in a conspicuous place in such place of business or employment. A new certificate of registration, to replace a lost, destroyed or mutilated certificate, shall be issued by the Board upon payment of a fee established in accordance with Section 2 and such certificate shall be stamped or marked "duplicate."

SECTION 6 – SEAL

Every registered architect shall have a seal of a design authorized by the Board by regulation. All technical submissions, which are (a) required by public authorities for building permits or regulatory approvals, or (b) are intended for construction purposes, including all addenda and other changes to such submissions, shall be sealed and signed by the architect. The signature and seal may be electronic. By signing and sealing a technical submission the architect represents that the architect was in responsible control over the content of such technical submissions during their preparation and has applied the required professional standard of care. An architect may sign and seal technical submissions only if the technical submissions were: (i) prepared by the architect; (ii) prepared by persons under the architect's responsible control; (iii) prepared by another architect registered in the same jurisdiction if the signing and sealing architect has reviewed the other architect's work and either has coordinated the preparation of the work or has integrated the work into his/her own technical submissions; or (iv) prepared by another architect registered in any United States jurisdiction and holding a current and valid certification issued by the National Council of Architectural Registration Boards if (a) the signing and sealing architect has reviewed the other architect's work and has integrated the work into his/her own technical submissions and (b) the other architect's technical submissions are prototypical building documents. An architect may also sign and seal drawings, specifications or other work which is not required by law to be prepared by an architect if the architect has reviewed such work and has integrated it into his/her own technical submissions. No public official charged with the enforcement duties set forth in [statutory references for building officials] shall accept or approve any technical submissions involving the practice of architecture unless the technical submissions have been sealed as required by this Section or the applicant has certified thereon to the applicability of a specific exception under Section 11 permitting the preparation of such technical submissions by a

person not registered hereunder. A building permit issued with respect to technical submissions which do not conform with the requirements of this Section shall be invalid. Any registered architect signing or sealing technical submissions not prepared by that architect but prepared under the architect's responsible control by persons not regularly employed in the office where the architect is resident, shall maintain and make available to the board upon request for at least five years following such signing and sealing, adequate and complete records demonstrating the nature and extent of the architect's control over and detailed knowledge of such technical submissions throughout their preparation. Any registered architect signing or sealing technical submissions integrating the work of another architect into the registered architect's own work as permitted under clauses (iii) or (iv) above shall maintain and make available to the board upon request for at least five years following such signing and sealing, adequate and complete records demonstrating the nature and extent of the registered architect's review of and integration of the work of such other architect's work into his/her own technical submissions, and that such review and integration met the required professional standard of care.

SECTION 7 – DISCIPLINARY POWERS

The Board may revoke, suspend, or annul a registration, or impose a civil penalty in an amount not greater than [ ] thousand dollars for each violation, upon proof satisfactory to the Board that any person has violated the provisions of this Chapter or any rules promulgated by the Board under **[statutory reference giving Board authority to establish rules and regulations]**. In hearing matters arising under this Section, the Board may take into account suitable evidence of reform.

SECTION 8 – DISCIPLINARY PROCEDURES

Charges against any person involving any matter coming within the jurisdiction of the Board shall be in writing and shall be filed with the Board. Such charges, at the discretion of the Board, shall be heard within a reasonable time after being so filed. The accused person shall have the right at such hearing to appear personally with or without counsel, to cross-examine adverse witnesses, and to produce evidence and witnesses in his/her defense. The Board shall set the time and place for such hearing and shall cause a copy of the charges, together with a notice of the time and place fixed for the hearing, to be sent by registered mail to the accused person, at his/her latest place of residence or business known to the Board, at least [ ] days before such date. If after such hearing the Board finds the accused person has violated any of the provisions of this Chapter or any of the rules promulgated by the Board, it may issue any order described in Section 7. If the Board finds no such violation, then it shall enter an order dismissing the charges. If the order revokes, suspends or annuls an architect's registration, the Board shall so notify, in writing, the State Secretary and the Clerk of the city or town in the state wherein such architect has a place of business, if any.

The Board may re-issue a registration to any person whose registration has been revoked. Application for the reissuance of said registration shall be made in such a manner as the Board may direct, and shall be accompanied by a fee established in accordance with Section 2.

SECTION 9 – REGISTRATION *PRIMA FACIE* EVIDENCE

Every registration issued and remaining in force shall be *prima facie* evidence in all courts of the state that the person named therein is legally registered as an architect for the period for which it is issued, and of all other facts stated therein.

SECTION 10 – PROHIBITION

Except as hereinafter set forth in Section 11, no person shall directly or indirectly engage in the practice of architecture in the state or use the title "Architect," "Registered Architect," "Architectural designer," or display or use any words, letters, figures, titles, sign, card, advertisement, or other symbol or device indicating or tending to indicate that such person is an architect or is practicing architecture, unless he/she is registered under the provisions of this Chapter, except that a person registered in another jurisdiction or a person retired from the practice of architecture may use the title "architect" when identifying his/her profession in circumstances which would not lead a reasonable person to believe that the person using the title "architect" is offering to perform any of the services which the practice of architecture comprises. No person shall aid or abet any person, not registered under the provisions of this Chapter, in the practice of architecture.

SECTION 10A – CONSTRUCTION CONTRACT ADMINISTRATION SERVICES REQUIRED

1. The Owner of any real property who allows a Project to be constructed on such real property shall be engaged in the practice of architecture unless such Owner shall have employed or shall have caused others to have employed a registered architect to furnish Construction Contract Administration services with respect to such Project.

2. For purposes of this Section the following terms shall have the following meanings:

(a) "Owner" shall mean with respect to any real property any of the following persons: (i) the holder of a mortgage secured by such real property; (ii) the holder, directly or indirectly, of an equity interest in such real property exceeding 10 percent of the aggregate equity interests in such real property; (iii) the record owner of such real property; or (iv) the lessee of all or any portion of such real property when the lease covers all of that portion of such real property upon which the Project is being constructed, the lessee has significant approval rights with respect to the Project, and the lease, at the time the construction of the Project begins, has a remaining term of not less than 10 years.

(b) "Project" shall mean the construction, enlarge-ment, or alteration of a building, other than a building exempted by the provisions of Section 11.1, which has as its principal purpose human occupancy or habitation.

(c) "Construction Contract Administration Services" shall comprise at least the following services: (i) visiting the construction site on a regular basis as is necessary to determine that the work is proceeding generally in accordance with the technical submissions submitted to the building official at the time the building permit was issued; (ii) processing shop drawings, samples, and other submittals required of the contractor by the terms of construction contract documents; and (iii) notifying an Owner and the Building Official of any code violations; changes which affect code compliance; the use of any materials, assemblies, components, or equipment prohibited by a code, major or substantial changes between such technical submissions and the work in progress; or any deviation from the technical submissions which he/she identifies as constituting a hazard to the public, which he/she observes in the course of performing his/her duties.

(d) "Building Official" shall mean the person appointed by the municipality or state subdivi-sion having jurisdiction over the Project to have principal responsibility for the safety of the Project as finally built [**or use state statute or building code language]**.

3. If the registered architect who sealed the technical submissions which were submitted to the Building Official at the time the building permit was issued has not been e ployed to furnish Construction Contract Administration Services at the time such registered architect issued such technical submissions, he/she shall note on such technical submissions that he/she has not been so employed. If he/she is not employed to furnish Construction Contract Administration Services when construction of the Project begins, he/she shall file, not later than 30 days after such construction begins, with the Board and with the Building Official, on a form prescribed by the Board, a notice setting forth the names of the Owner or Owners known to him/her, the address of the Project, and the name, if known to him/her, of the registered architect employed to perform Construction Contract Administration Services. If he/she believes that no registered architect has been so employed, he/she shall so state on the form. Any registered architect who fails to place the note on his/her technical submissions or to file such notice, as required by this paragraph, shall have violated the provisions of this chapter and shall be subject to discipline as set forth herein.

4. If the Board determines, with respect to a particular Project or class of Projects, that the public is adequately protected without the necessity of a registered architect performing Construction Contract Administration Services, the Board may waive the requirements of this Section with respect to such Project or class of Projects.

SECTION 11 – EXCEPTIONS

Nothing in this chapter shall be construed to prevent:

1. The practice of architecture performed in connection with any of the following:

(a) A detached single- or two-family dwelling and any accessory buildings incidental thereto, unless an architect is otherwise required by law or by the building authority having jurisdiction over the project; or

(b) Farm buildings, including barns, silos, sheds, or housing for farm equipment and machinery, livestock, poultry, or storage, if such structures are designed to be occupied by no more than 10 persons; or

(c) Any construction of particular features of a building, if the construction of such features does not require the issuance of a permit under any applicable building code and does not affect structural or other life-safety aspects of the building.

2. The preparation of submissions to an architect by manufacturers, suppliers, installers, the architect's consultants, owners, contractors, or others of any materials, components, equipment, or other information incidental to the architect's design of the entire project that describe or illustrate the use of such submissions.

3. The preparation of any details or shop drawings required of the contractor by the terms of the construction documents.

4. The management of construction contracts by persons customarily engaged in contracting work.

5. The preparation of technical submissions or the administration of construction contracts by persons acting under the responsible control of a registered architect.

6. Officers and employees of the United States of America from engaging in the practice of architecture as employees of said United States of America.

7. The following entities: a partnership (including a registered limited liability partnership), limited liability company, or corporation (including a professional corporation) from performing or holding itself out as able to perform any of the services involved in the practice of architecture; provided, that two-thirds of the general partners (if a partnership), or two-thirds of the managers (if a limited liability company), or two-thirds of the directors (if a corporation) are registered under the laws of any United States jurisdiction as architects or engineers and that one-third are registered as architects; and further provided that any agreement to perform such services shall be executed on behalf of the entity by an officer of the entity with authority to contractually bind the entity, a general

partner, manager, or director, as the case may be, who holds registration in this state, and that an officer, general partner, manager, or director who holds registration in this state will exercise responsible control over the particular services contracted for by the partnership, limited liability company, or corporation; and provided further that the partnership, limited liability company, or corporation furnishes the Board with such information about its organization and activities as the Board shall require by regulation. "Managers" shall mean the members of a limited liability company in which management of its business is vested in the members, and the managers of a limited liability company in which management of its business is vested in one or more managers.

8. A partnership (including a registered limited liability partnership), limited liability company, or corporation (including a professional corporation) from offering a combination of (i) services involved in the practice of architecture and (ii) construction services; provided that
(a) a registered architect or person otherwise permitted under paragraph 9 of this Section to offer architectural services participates substantially in all material aspects of the offering;
(b) there is written disclosure at the time of the offering that a registered architect is engaged by and contractually responsible to such partnership, limited liability company, or corporation;
(c) such partnership, limited liability company, or corporation agrees that the registered architect will have responsible control of the work and that such architect's services will not be terminated without the consent of the person engaging the partnership, limited liability company, or corporation, and;
(d) the rendering of architectural services by such registered architect will conform to the provisions of the Chapter and the rules adopted hereunder.

9. A person, who holds a current and valid certification issued by the National Council of Architectural Registration Boards but who is not currently registered in the jurisdiction, from offering to provide the professional services involved in the practice of architecture; provided that he/she shall not perform any of the professional services involved in the practice of architecture until registered as hereinbefore provided; and further provided that he/she notifies the Board in writing that (i) he/she holds an NCARB Certificate and is not currently registered in the jurisdiction, but will be present in **[the State]** for the purpose of offering to provide architectural services; (ii) he/she will deliver a copy of the notice referred to in (i) to every potential client to whom the person offers to provide architectural services; and (iii) he/she will provide the Board with a statement of intent that he/she will apply immediately to the Board for registration, if selected as the architect for a project in **[the State]**.

10. A person, who holds a current and valid certification issued by the National Council of Architectural Registration Boards but who is not currently registered in the jurisdiction, from seeking an architectural commission by participating in an architectural design competition for a project in **[the State]**; provided that he/she notifies the Board in writing that (i) he/she holds an NCARB Certificate and is not currently registered in the jurisdiction, but will be present in **[the State]** for the purpose of participating in an architectural design competition; (ii) he/she will deliver a copy of the notice referred to in (i) to every person conducting an architectural design competition in which the person participates; and (iii) he/she will provide the Board with a statement of intent that he/she will apply immediately to the Board for registration, if selected as the architect for the project.

11. A person who is not currently registered in this state, but who is currently registered in another United States or Canadian jurisdiction, from providing uncompensated (other than reimbursement of expenses) professional services at the scene of an emergency at the request of a public officer, public safety officer, or municipal or county building inspector acting in an official capacity. "Emergency" shall mean earthquake, eruption, flood, storm, hurricane, or other catastrophe that has been designated as a major disaster or emergency by the President of the United States or **[the governor or other duly authorized official of the state].**

12. An individual, registered and practicing in a nation other than the United States or Canada (a "foreign architect") from practicing in this jurisdiction, so long as such practice is in strict accordance with the provisions of this subsection:
(a) The foreign architect must show that he/she holds a current registration in good standing which allows him/her to use the title "architect" and to engage in the "unlimited practice of architecture" (defined as the ability to provide services on any type building in any state, province, territory, or other political subdivision of his/her national jurisdiction).
(b) The foreign architect must show that a bilateral agreement exists between NCARB and the national registration authority of his/her national jurisdiction.
(c) An architect registered in this jurisdiction shall take responsible control over all aspects of the architectural services for said project.
(d) The foreign architect may not seek, solicit, or offer to render architectural services in this jurisdiction, except with the material participation of the architect referred to in (c) above.
(e) Promptly after the foreign architect has been selected to provide architectural services for a project within this jurisdiction, the architect referred to in (c) above must file a statement with the Board, (1) identifying the foreign architect, (2) describing the project, and (3) describing the foreign architect's role.

(f) In all aspects of offering or providing architectural services within this jurisdiction, the foreign architect must use the title "[X], a foreign architect in consultation with [Y], an architect registered in **[this jurisdiction]**."

13. A person currently employed under the responsible control of an architect, and who maintains in good standing a National Council of Architectural Registration Boards Record, from using the title "intern architect" or "architectural intern" **[some states allow both; some only one]** in conjunction with his/her current employment. Such person may not engage in the practice of architecture except to the extent permitted by other provisions of this Section 11.

SECTION 12 – ENFORCEMENT

The Board shall be charged with the enforcement of the provisions of Sections 1 through 11 inclusive and of the rules adopted hereunder. If any person refuses to obey any decision or order of the Board, the Board or, upon the request of the Board, the Attorney General or the appropriate District Attorney shall file an action for the enforcement of such decision or order, including injunctive relief, in the **[designate court with appropriate jurisdiction]**. After due hearing, the court shall order the enforcement of such decision or order, or any part thereof, if legally and properly made by the Board and, where appropriate, injunctive relief.

SECTION 13 – PENALTIES

Whoever violates any provisions of Sections 1 to 11, inclusive, shall be punished by a fine of not more than [ ] thousand dollars or by imprisonment in a jail or house of correction for not more than [ ] months, or both.

NOTE ON THE CONSTITUTIONAL LIMITS OF DELEGATION OF REGULATORY STANDARDS

The constitution of each state provides that the lawmaking power of the state shall be vested in its legislature. A state legislature may delegate its lawmaking power to administrative agencies as long as the legislature provides sufficient guidance for the proper exercise of that power. While lawmaking powers may not be delegated to non-governmental bodies, courts allow the incorporation of standards set by non-governmental bodies into statutes and regulations if the administrative agency, such as the architectural registration board, retains the discretion to approve or disapprove the standards. Madrid v. St. Joseph's Hosp., 928 P.2d 250, 257, 258 (N.M. 1996). In such a case, the legislature "does not give the outside entity the power to determine what the law will be". See id. at 256. See also Bd. of Trustees of the Employees' Ret. Sys. Of the City of Baltimore v. Mayor and City Council of Baltimore City, 562 A. 2d 720, 730 (Md. 1989), Sutherland v. Ferguson, 397 P.2d 335, 340 (Kan. 1964); Tain v. State Bd. of Chiropractic Exam'rs, 30 Cal.Rptr.3d 330, 347 (Cal. Ct. App. 2005).

For these reasons, the Model Law is permissive in allowing a state architectural registration board to adopt the education, training, and examination requirements promulgated by NCARB. ("The Board may adopt as its own regulations governing practical training and education those guidelines published from time to time by the National Council of Architectural Registration Boards. The Board may also adopt the examinations and grading procedures of the National Council of Architectural Registration Boards and the accreditation decisions of the National Architectural Accrediting Board.") The Model Regulations also permit the Board to accept NCARB education, training and examination requirements from time to time ("as accepted by the Board from time to time"). Also, the Model Regulations provide in Section 100.301(B) that an applicant may show that other experience is equivalent or better than that required by the NCARB standards.

Even if the NCARB standards were explicitly required by law or regulation, many courts have upheld such incorporation "where the standards are issued by a well-recognized, independent authority, and provide guidance on technical and complex matters within the entity's area of expertise". Bd. of Trustees, 562A. 2d at 731 and cases cited. While NCARB is a non-governmental body, its only members who set its policies are state and territorial boards of registration of architects.

2018-2019 MODEL REGULATIONS

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SCOPE; DEFINITIONS

100.001 Purpose
These rules and regulations are set forth for the purpose of interpreting and implementing **[cited statute]** establishing the Board, and conferring upon it responsibility for registration of architects and the regulation of the practice of architecture.

100.002 Citation
These rules and regulations shall be known, and may be cited, as **[popular name]**.

100.003 Board's Regulatory Authority
These rules and regulations are promulgated under authority of **[cited statute]**, and in conformity with applicable provisions of the state administrative procedure act. **[cited statute]**

100.004 Severability
If any provisions of these regulations or the application thereof to any person or circumstance is invalid, such invalidity shall not affect other provisions or the application of these regulations which can be given effect without the invalid provision or application, and to this end the provisions of these regulations are declared to be severable.

100.005 Terms Defined by Statute
Terms defined in **[cited statute]** shall have the same meanings when used in these regulations unless the context or subject matter clearly requires a different interpretation.

100.006 Terms Defined Herein
As used in these regulations, the following terms shall have the following meanings unless the context or subject matter clearly requires a different interpretation.

Applicant
An individual who has submitted an application for registration to the Board.

Architect
[Presumed to be defined in statute. If not, incorporate definition from Model Law.]

Education Requirements
The education requirements including equivalences established from time to time by NCARB as the education requirements for certification by NCARB, as accepted by the Board from time to time.

Examination
The Architect Registration Examination® (ARE®) prepared by and administered through NCARB, as accepted by the Board from time to time.

NCARB
The National Council of Architectural Registration Boards.

Practice of Architecture
[Presumed to be defined in statute. If not, incorporate definition from Model Law]

Prototypical Building
Any commercial building or space within a commercial building that is intended to be constructed in multiple locations, and in fact then has been constructed in multiple locations, and which conveys an owner's intended uniform business program, plan or image.

Prototypical Building Documents
Technical submissions for prototypical buildings that are prepared by or under the responsible control of an architect then registered in any United States jurisdiction and holding a current and valid certification issued by the NCARB, that identify such architect together with the architect's registration number, jurisdiction of registration and NCARB certificate number and that are marked "Prototypical Design Documents Not for Construction." Prototypical building documents do not comprise a final, comprehensive set of design and construction documents because a prototypical building also requires adaptations for local conditions, including site conditions, and may require additional design as well.

Responsible Control
That amount of control over and detailed professional knowledge of the content of technical submissions during their preparation as is ordinarily exercised by a registered architect applying the required professional standard of care, including but not limited to an architect's integration of information from manufacturers, suppliers, installers, the architect's consultants, owners, contractors, or other sources the architect reasonably trusts that is incidental to and intended to be incorporated into the architect's technical submissions if the architect has coordinated and reviewed such information. Other review, or review and correction, of technical submissions after they have been prepared by others does not constitute the exercise of responsible control because the reviewer has neither control over nor detailed professional knowledge of the content of such submissions throughout their preparation.

Technical Submissions
Designs, drawings, specifications, studies and other technical documents prepared in the course of practicing architecture. All technical submissions shall be identified by date and by the name and address of the registered architect or the registered architect's firm.

Training Requirements
The Architectural Experience Program (AXP), formerly known as the Intern Development Program (IDP), training requirements established from time to time by NCARB for certification by NCARB, as accepted by the Board from time to time.

[Boards requiring that each registered architect demonstrate continuing education should include the following definitions.]

Continuing Education (CE)
Continuing education is post-licensure learning that enables a registered architect to increase or update knowledge of and competence in technical and professional subjects related to the practice of architecture to safeguard the public's health, safety, and welfare.

Continuing Education Hour (CEH)
One continuous instructional hour (50 to 60 minutes of contact) spent in Structured Educational Activities intended to increase or update the architect's knowledge and competence in Health, Safety, and Welfare Subjects. If the provider of the Structured Educational Activities prescribes a customary time for completion of such an Activity, then such prescribed time shall, unless the Board finds the prescribed time to be unreasonable, be accepted as the architect's time for Continuing Education Hour purposes irrespective of actual time spent on the activity.

Health, Safety, and Welfare Subjects
Technical and professional subjects related to the practice of architecture that the Board deems appropriate to safeguard the public and that are within the following continuing education subject areas necessary for the proper evaluation, design, construction, and utilization of buildings and the built environment.

PRACTICE MANAGEMENT: This category focuses on areas related to the management of architectural practice and the details of running a business.

PROJECT MANAGEMENT: This category focuses on areas related to the management of architectural projects through execution.

PROGRAMMING & ANALYSIS: This category focuses on areas related to the evaluation of project requirements, constraints, and opportunities.

PROJECT PLANNING & DESIGN: This category focuses on areas related to the preliminary design of sites and buildings.

PROJECT DEVELOPMENT & DOCUMENTATION: This category focuses on areas related to the integration and documentation of building systems, material selection, and material assemblies into a project.

CONSTRUCTION & EVALUATION: This category focuses on areas related to construction contract administration and post-occupancy evaluation of projects."

Structured Educational Activities
Educational activities in which at least 75 percent of an activity's content and instructional time must be devoted to Health, Safety, and Welfare Subjects related to the practice of architecture, including courses of study or other activities under the areas identified as Health, Safety and Welfare Subjects and provided by qualified individuals or organizations, whether delivered by direct contact or distance learning methods.

GENERAL PROVISIONS

100.101 Board Meetings
[Reference any applicable provisions of state administrative procedure act, including provisions governing quorums, majority actions, etc.]

100.102 Board Seal
[Describe.] This seal shall be applied to all registrations issued by the Board.

100.103 Public Information
(A) The Board shall maintain a roster of duly registered architects **[and business entities subject to 100.901]** open to public inspection which shall show each registered architect's **[or entity's business]** name, registration or certificate or authorization number and last known mailing address.
(B) Each of the following documents relating to an application for registration as an architect **[and for a certificate of authorization or entities]** shall be treated as a public record: **[list]**.
(C) None of the following documents shall be treated as a public record pursuant to **[refer to state's public records law, or equivalent]** or otherwise disclosed to an applicant or any other member of the public: the ARE and all documents relating to the grading, content, administration or security thereof **[this must be modified if review or appeal is permitted pursuant to 100.602]** and **[list other documents which, if permitted by applicable law, may be excluded from 100.103(B) and otherwise deemed not to be public records].**

100.104 Prohibition of Improper Contacts
Prior to the filing of an application for registration or the commencement of any disciplinary action, and after final Board action on an application or disciplinary action, verbal and written communication with individual Board members or any member of the Board's staff shall be freely permitted; provided, however, that in no event is any member of the Board or its staff authorized to give any indication of what specific action the Board may take upon the merits of any application or disciplinary action. General advice, however, may be given as to the manner of completing or submitting applications, the procedures to be followed in processing applications or responding to disciplinary actions and the nature of the standards applied by the Board in evaluating applications or disciplinary actions. While an application for

registration or disciplinary action is pending before the Board, no one shall initiate any written or oral communication with individual Board members concerning the matter; but inquiries may be made orally or in writing to the Board staff or in writing to the Board.

100.105 NCARB

(A) The Board shall maintain membership in NCARB and pay the necessary costs thereof.

(B) The Board shall keep up-to-date information on the recommended policies adopted from time to time by NCARB.

(C) The Board shall cooperate with NCARB in establishing uniform standards of architectural registration throughout the United States.

100.106 Availability of Forms

Any forms prepared in accordance with these regulations shall be available upon request made in person or by writing to the Board. If any such forms are amended by the Board, a copy of each such amended form shall be mailed or electronically transmitted by the Board staff to all individuals whose applications are known to be pending and are affected by such amendment.

100.107 Fees

[Insert schedule of fees, with cross-references to statutory language permitting the Board to establish fees, or to any fees set by statute. This list should identify all categories of fees, including those to be established from time to time by the Board, and it should require the Board to maintain and provide to all individuals upon request a current and complete list of its fees.]

APPLICATION FOR REGISTRATION

100.201 Submission of Application

Every individual seeking a registration shall submit an application to the Board on a form prescribed by the Board, accompanied by **[a photograph and]** the filing fee **[cross-reference to 100.107].**

100.202 Refund of Fee

The Board, in its discretion and if otherwise allowed by law, may return the application fee paid by any applicant whose application has been rejected. No refund of the application fee shall be returned to any applicant who takes any portion of the Examination or who voluntarily withdraws after his/her application has been approved.

100.203 Appeals

[Insert any references to applicable law providing for administrative or judicial review of the Board's decisions respecting applicants.]

REGISTRATION STANDARDS

100.301 Initial Registration Standards

To be granted registration other than pursuant to 100.401, an applicant must meet the requirements set forth in 100.301–305.

(A) In evaluating qualifications, the Board may, prior to reaching its decision, require the applicant to substantiate his/her qualifications.

(B) Other experience may be substituted for the registration requirements set forth in 100.303 only insofar as the Board considers it to be equivalent to or better than such requirements. The burden shall be on the applicant to show by clear and convincing evidence the equivalency or better of such other experience.

100.302 Good Character

An applicant must be of good character as verified to the Board by employers and others.

100.303 Education

An applicant must meet the Education Requirements as accepted by the Board from time to time.

100.304 Training

An applicant must meet the Training Requirements as accepted by the Board from time to time.

100.305 Examination

An applicant must have passed the Examination in accordance with the NCARB pass/fail standards current at the time the applicant took the Examination, all as accepted by the Board from time to time.

[REGISTRATION STANDARDS FOR MILITARY PERSONNEL]

[100.401 Initial Registration Standards – Military Personnel

To be granted registration other than pursuant to 100.501, an applicant must meet the requirements set forth in 100.401-100.405.

(A) In evaluating qualifications, the Board may, prior to reaching its decision, require the applicant to substantiate his/her qualifications.

(B) Other experience may be substituted for the registration requirements set forth in 100.403 only insofar as the Board considers it to be equivalent to or better than such requirements. The burden shall be on the applicant to how by clear and convincing evidence the equivalency or better of such other experience.

100.402 Good Character – Military Personnel

An applicant must be of good character as verified to the Board by employers or by honorable discharge evidenced by copy of military discharge document (DD 214).

100.403 Education – Military Personnel
An applicant must meet the Education Requirements as accepted by the Board from time to time.

100.404 Training – Military Personnel
An applicant must meet the Training Requirements as accepted by the Board from time to time. The Board may accept "professional training while in active duty" as it deems acceptable and in keeping with the Training Requirements set forth by the National Council of Architectural Registration Boards.

100.405 Examination – Military Personnel
An applicant must have passed the Examination in accordance with the NCARB pass/fail standards current at the time the applicant took the Examination, all as accepted by the Board from time to time.]

RECIPROCAL REGISTRATION

100.501 Registration of NCARB Certificate Holders
An applicant who holds a current and valid certification issued by NCARB and submits satisfactory evidence of such certification to the Board shall be registered without the necessity of complying with the provisions of 100.301-305 or 100.401 - 405 if he/she:

(A) holds a current and valid registration as an architect issued by a registration authority of the United States or Canada, and submits satisfactory evidence of such registration to the Board, and

(B) files his/her application with the Board, upon a form prescribed by the Board, containing such information satisfactory to the Board concerning the applicant, as the Board considers pertinent, and pays the applicable fee established by the Board.

100.502
[Insert any other reciprocity provisions desired and permitted by statute.]

EXAMINATION

100.601 Examination Eligibility

(A) *[For the purpose of qualifying for the examination, an applicant shall present satisfactory evidence to the board that he/she:*

(i) *Holds a professional degree from a school whose curriculum has been accredited by the National Architectural Accrediting Board (NAAB), or*

(ii) *Is a student actively participating in a NCARB-accepted Integrated Path to Architectural Licensure (IPAL) option within a NAAB-accredited professional degree program in architecture, or*

(iii) *Has met the education and experience requirements outlined in {insert specific reference to applicable laws/rules}]*

(B) The Board will determine applicant eligibility and forward eligibility information to NCARB (or the Board may request NCARB to determine such eligibility subject to its approval thereof).

100.602 Conditions of Examination

(A) The Board will allow applicants to take the ARE at any NCARB-approved test center, whether or not it is located within this state.

(B) The Board will accept the ARE results as determined by NCARB and will report the results to the applicant, or the Board may request NCARB to report such results to the applicant.

(C) If there is any alleged misbehavior on the part of an applicant in connection with taking the examination, the board will investigate the allegation and take appropriate action. This behavior may include, without limitation, violation of NCARB's guidelines or policies, or an applicant's confidentiality agreements with respect to the examination.

[100.603 Appeal]
[NCARB recommends that an applicant not be permitted to review or appeal any division of the Examination which he/she fails, and thus does not recommend adoption of this section; if, however, the jurisdiction requires that such appeals be allowed, reference should be made here to the specific requirements of the jurisdiction to be followed:

(A) The Board will determine the time and place for each review of a failed examination. All reviews will take place at an NCARB approved test center.

(B) A Board member or a member of the Board's staff will be present during the review.

(C) The individual results on graphic vignettes may not be challenged.

(D) The individual test questions on multiple-choice divisions may be challenged. All challenges must be made at the time of the review, in accordance with NCARB standards and procedures.]

[Note that it is possible to allow reviews and not challenges. In such cases, strike (D) and reword (C) to read: "The individual results on multiple-choice questions and graphic vignettes may not be challenged."]

100.604 Transfer of Scores to and from Other Boards
The Board, in its discretion, may forward to any other United States or Canadian architectural registration board or NCARB, or may receive from any other such board or NCARB the grades achieved by an applicant in the various divisions of the ARE for the respective purposes of evaluating such applicant's eligibility for registration or permitting NCARB to evaluate such applicant's eligibility for NCARB certification. Any applicant making such a request shall state his/her reason for requesting transfer, and pay any applicable transfer fee established by the Board. Such transfer to another jurisdiction shall terminate the applicant's application pending before the Board or such other transmitting jurisdiction as the case may be.

REGISTRATION

100.701 Issuance
When the Board has determined that an applicant for registration has satisfied the registration standards set forth herein, the Board shall issue a registration containing the registered applicant's name and registration number.

100.702 Duration
Each registration issued by the Board shall be valid for **[state applicable period, e.g., one year or two years].**

100.703 Renewal
[Describe terms, including fee with cross-reference to 100.107, citing applicable statute.]

[The Board may require that each registered architect demonstrate continuing education by including the following provisions.]

Continuing Education Requirements. In addition to all other requirements for registration renewal, an architect must complete a minimum of 12 Continuing Education Hours each calendar year or be exempt from these continuing education requirements as provided below. Failure to comply with these requirements may result in non-renewal of the architect's registration.

(A) Continuing Education Hours. 12 Continuing Education Hours must be completed in Health, Safety, and Welfare Subjects acquired in Structured Educational Activities. Continuing Education Hours may be acquired at any location. Excess Continuing Education Hours may not be credited to a future calendar year.

(B) Reporting and Record keeping. An architect shall complete and submit forms as required by the Board certifying that the architect has completed the required Continuing Education Hours. Forms may be audited by the Board for verification of compliance with these requirements. Documentation of reported Continuing Education Hours shall be maintained by the architect for six years from the date of award. If the Board disallows any Continuing Education Hours the architect shall have 60 days from notice of such disallowance either to provide further evidence of having completed the Continuing Education Hours disallowed or to remedy the disallowance by completing the required number of Continuing Education Hours (but such Continuing Education Hours shall not again be used for the next calendar year). If the Board finds, after proper notice and hearing, that the architect willfully disregarded these requirements or falsified documentation of required Continuing Education Hours, the architect may be subject to disciplinary action in accordance with the Board regulations.

(C) Exemptions. An architect shall not be subject to these requirements if:

1. The architect has been granted emeritus or other similar honorific but inactive status by the Board; or
2. The architect otherwise meets all renewal requirements and is called to active military service, has a serious medical condition, or can demonstrate to the Board other like hardship, then upon the Board's so finding, the architect may be excused from some or all of these requirements.

(D) A registrant who lists his or her occupation as "Retired" or "inactive" on the Board approved renewal form and who further certifies that he or she is no longer practicing shall be exempt from the Continuing Education Hours required. In the event such a person elects to return to active practice, he/she shall document completion of 12 HSW CEH's before returning to active practice. Inactive or retired registrants returning to active practice must report CEH's earned prior to the request to reactivate.

(E) The Board adopts the forms [at the end of the Model Regulations] as the forms to be used for reporting compliance with these requirements.

100.704 Not Transferable
A registration shall not be transferable.

100.705 Revocation, Suspension, Cancellation or Non-Renewal of Registration
In the event of revocation, cancellation, suspension, or non-renewal of any registration, the architect shall be required immediately to return his/her registration to the Board.

[Add reference to any statutory provisions regarding an architect's rights to contest such action.]

100.706 Reissuance
[Describe terms, including fee with cross-reference to 100.107, citing applicable statute for reissuance of registrations revoked, suspended, cancelled or not renewed.]

100.707 Emeritus Status

(A) An architect whose registration is in good standing may apply for architect emeritus status if he or she meets the following criteria:

1. The applicant is retired from the active practice of architecture. "Retired" means the architect no longer engages in the active practice of architecture as defined in **[point to statute defining the practice of architecture],** and
2. The applicant has been registered for at least "10" years [in their state], or
3. The applicant is 65 years of age or older.

(B) An architect who can provide, to the Board's satisfaction, documentation that they are physically or mentally unable to participate in the active practice of architecture may also apply for architect emeritus status.

(C) Upon application to the Board, if all requirements are met, the architect shall be granted architect emeritus status.

(D) An individual granted architect emeritus status may use the title "Architect Emeritus" or "Emeritus Architect" on any letter, title, sign, card or device.

(E) If an emeritus architect wishes to return to the active practice of architecture, he/she may do so by submitting

a current renewal application form, the renewal fee, and documentation of completing the continuing education hours required by regulation.

RULES OF PROFESSIONAL CONDUCT

100.801 Competence

(A) In engaging in the practice of architecture, a registered architect's primary duty is to protect the public's health, safety, and welfare. In discharging this duty, a registered architect shall act with reasonable care and competence, and shall apply the knowledge and skill which are ordinarily applied by registered architects of good standing practicing in the same locality.

(B) In designing a project, a registered architect shall take into account all applicable state and municipal building laws and regulations. While a registered architect may rely on the advice of other professionals (e.g., attorneys, engineers and other qualified persons) as to the intent and meaning of such laws and regulations, once having obtained such advice, a registered architect shall not knowingly design a project in violation of such laws and regulations.

(C) A registered architect shall undertake to perform professional services only when he/she, together with those whom the registered architect may engage as consultants, is qualified by education, training, and experience in the specific technical areas involved.

(D) No individual shall be permitted to engage in the practice of architecture if, in the Board's judgment, such individual's professional competence is substantially impaired by physical or mental disabilities.

100.802 Conflict of Interest

(A) A registered architect shall not accept compensation in connection with his/her services from more than one party on a project (and never in connection with specifying or endorsing materials or equipment) unless the circumstances are fully disclosed to and agreed to (such disclosure and agreement to be in writing) by all interested parties.

(B) If a registered architect has any business association or direct or indirect financial interest which is substantial enough to influence his/her judgment in connection with the performance of professional services, the registered architect shall fully disclose in writing to his/her client or employer the nature of the business association or financial interest. If the client or employer objects to such association or financial interest, the registered architect will either terminate such association or interest or offer to give up the commission or employment.

(C) A registered architect shall not solicit or accept compensation from material or equipment suppliers in connection with specifying or endorsing their products. As used herein, "compensation" shall not mean customary and reasonable business hospitality, entertainment, or product education.

(D) When acting as the interpreter of building contract documents and the judge of contract performance, a registered architect shall render decisions impartially, favoring neither party to the contract.

100.803 Full Disclosure

(A) A registered architect making public statements on architectural questions shall disclose when he/she is being compensated for making such statements or when he/she has an economic interest in the issue.

(B) A registered architect shall accurately represent to a prospective or existing client or employer his/her qualifications and the scope of his/her responsibility in connection with work for which he/she is claiming credit.

(C) If, in the course of his/her work on a project, a registered architect becomes aware of a decision taken by his/her employer or client against such registered architect's advice which violates applicable state or municipal building laws and regulations and which will, in the registered architect's judgment, materially and adversely affect the safety to the public of the finished project, the registered architect shall:

1. report the decision to the local building inspector or other public official charged with the enforcement of the applicable state or municipal building laws and regulations; and
2. refuse to consent to the decision; and
3. in circumstances where the registered architect reasonably believes that other such decisions will be taken notwithstanding his/her objection, terminate his/her services with respect to the project unless the registered architect is able to cause the matter to be resolved by other means. In the case of a termination in accordance with this clause (3), the registered architect shall have no liability to his/her client or employer on account of such termination.

(D) A registered architect shall not deliberately make a materially false statement or fail deliberately to disclose accurately and completely a material fact requested in connection with his/her application for a registration or renewal thereof or otherwise lawfully requested by the Board.

(E) A registered architect shall not assist the application for registration of an individual known by the registered architect to be unqualified in respect to education, training, experience or character.

(F) A registered architect possessing knowledge of a violation of the provisions set forth in 100.801 through 100.806 by another registered architect shall report such knowledge to the Board.

100.804 Compliance with Laws

(A) A registered architect shall not in the conduct of his/her architectural practice knowingly violate any state or federal criminal law.

(B) A registered architect shall neither offer nor make any payment or gift to a government official (whether elected or appointed) with the intent of influencing the official's judgment in connection with a prospective or existing

project in which the registered architect is interested.

(C) A registered architect shall comply with the registration laws and regulations governing his/her professional practice in any United States jurisdiction. An architect may be subject to disciplinary action if, based on grounds substantially similar to those which lead to disciplinary action in this jurisdiction, the architect was disciplined in any other United States jurisdiction.

(D) An employer engaged in the practice of architecture shall not have been found by a court or an administrative tribunal to have violated any applicable federal or state law protecting the rights of persons working for the employer with respect to fair labor standards or with respect to maintaining a workplace free of discrimination. **[States may choose instead to make specific reference to the "Federal Fair Labor Standards Act of 1938, as amended," and "Equal Employment Opportunity Act of 1972, as amended," and to state laws of similar scope.]** For purposes of this rule, any registered architect employed by a firm engaged in the practice of architecture who is in charge of the firm's architectural practice, either alone or with other architects, shall be deemed to have violated this rule if the firm has violated this rule.

100.805 Professional Conduct

(A) Each office in [name of state] engaged in the practice of architecture shall have a registered architect resident and regularly employed in that office.

(B) All technical submissions, which are (a) required by public authorities for building permits or regulatory approvals, or (b) are intended for construction purposes, including all addenda and other changes to such submissions, shall be signed and sealed by the registered architect, which signature and seal may be electronic. The signature and seal shall mean that the registered architect was in responsible control over the content of such technical submissions during their preparation and has applied the required professional standard of care. A registered architect may sign and seal technical submissions only if the technical submissions were (i) prepared by such architect; (ii) prepared by persons under such architect's responsible control; (iii) prepared by another registered architect if the signing and sealing architect has reviewed the other architect's work and either has coordinated the preparation of the work or has integrated the work into his/her own technical submissions; or (iv) prepared by another architect registered in any United States jurisdiction and holding a current and valid certification issued by NCARB and (a) the signing and sealing architect has reviewed the other architect's work and has integrated the work into his/her own technical submissions and (b) the other architect's technical submissions are prototypical building documents. A registered architect may also sign and seal drawings, specifications, or other work which is not required by law to be prepared by an architect if the architect has reviewed such work and has integrated it into his/her own technical submissions. Any registered architect signing or sealing technical submissions not prepared by that architect but prepared under that architect's responsible control by persons not regularly employed in the office where the architect is resident, shall maintain and make available to the Board upon request for at least five years following such signing and sealing, adequate and complete records demonstrating the nature and extent of the architect's control over and detailed knowledge of such technical submissions throughout their preparation. Any registered architect signing or sealing technical submissions integrating the work of another architect into the registered architect's own work as permitted under clauses (iii) or (iv) above shall maintain and make available to the Board upon request for at least five years following such signing and sealing, adequate and complete records demonstrating the nature and extent of the registered architect's review of and integration of the work of such other architect's work into his/her own technical submissions, and that such review and integration met the required professional standard of care.

(C) A registered architect shall neither offer nor make any gifts, other than gifts of nominal value (including, for example, reasonable entertainment and hospitality), with the intent of influencing the judgment of an existing or prospective client in connection with a project in which the registered architect is interested.

(D) An architect possessing knowledge of an applicant's qualifications for registration shall cooperate with the applicant, the Board and/or NCARB by responding appropriately regarding those qualifications when requested to do so. An architect shall provide timely verification of employment and/or experience earned by an applicant under his or her supervision if there is reasonable assurance that the facts to be verified are accurate. An architect shall not knowingly sign any verification document that contains false or misleading information.

(E) A registered architect shall not engage in conduct involving fraud or wanton disregard of the rights of others.

(F) An architect shall not make misleading, deceptive or false statements or claims.

100.806 Design and Use of Architect's Seal

(A) Pursuant to [statutory reference] and subject to 100.705 and 100.805(B), each registered architect shall procure a seal, which shall contain the name of the registered architect; his/her registration number, and the words REGISTERED ARCHITECT—**[NAME OF STATE].** This seal shall comply in all respects, including size and format, with the seal shown below: [INSERT SPECIMEN SEAL IMPRINT.]

(B) As required by [statutory reference], the seal shall appear on all technical submissions, as follows: on each design and each drawing; on the cover and index pages identifying each set of specifications; and on the cover page (and index, if applicable) of all other technical submissions. Such seal and signature may be electronic.

(C) The seal appearing on any technical submission shall be prima facie evidence that said technical submission was prepared by or under the responsible control of the individual named on said seal.

(D) All technical submissions prepared by a registered architect shall contain the following legend wherever the architect's seal appears: "The professional services of the architect are undertaken for and are performed in the interest of [name of person employing architect]. No contractual obligation is assumed by the architect for the benefit of any other person involved in the project."

PRACTICE

[100.901 Permission to Practice Architecture as a Corporation, Limited Liability Company, or Partnership

(A) Any corporation (which term as used herein shall include any professional corporation), any limited liability company, and any partnership (which term as used herein shall include any limited liability partnership), whether organized under the laws of this or any other jurisdiction, may not offer to engage in or engage in the practice of architecture in [name of state] until such corporation, limited liability company, or partnership has obtained a certificate of authorization issued by the Board. A certificate of authorization shall be issued as of the date it is approved by the Board and shall be valid for one year from said date.

(B) The Board shall issue a certificate of authorization to a corporation, limited liability company, or partnership upon receipt of the materials listed below, and upon ascertaining that the conditions set forth in **[statutory reference]** have been met.

1. An application on a form approved by the Board.

(a) In the case of a corporation, the application shall be signed by the president and **[secretary or clerk]**, and shall include the following information: the jurisdiction under which such corporation is organized; the name and residential addresses, and state(s) of registration and registration number(s) (if applicable) of each director; and the identity of each director or officer engaging in the practice of architecture on behalf of such entity in **[name of state]**.

(b) In the case of a limited liability company, the application shall be signed by a manager (or by a member in the case of a limited liability company in which management of its business is vested in all of the members) who is a registered architect, and shall include the following information: the jurisdiction under which such limited liability company is organized; the name and residential addresses, and state(s) of registration number(s) (if applicable) of each manager (or each member in the case of a limited liability company in which management of its business is vested in the members); and the identity of each manager (or each member) or officer engaging in the practice of architecture on behalf of such entity in **[name of state]**.

(c) In the case of a partnership, the application shall be signed by a general partner who is a registered architect, and shall include the following information: the jurisdiction under which such partnership is organized; the name and residential addresses, and the state(s) or registration and registration number(s) (if applicable) of each general partner; and the identity of each general partner or officer engaging in the practice of architecture on behalf of such entity in **[name of state]**.

2. In the case of a corporation, a limited liability company, or a registered limited liability partnership, a copy of the articles of incorporation, registration statement, or similar charter document certified by the secretary of state of the jurisdiction in which the corporation, limited liability company, or registered limited liability partnership is organized; provided, however, that, subject to 100.901(C), such documents need not be resubmitted when seeking renewal of a certificate of authorization.

3. A fee of **[set forth fee] [cross-reference to 100.107].**

(C) If any change occurs in any of the information provided to the Board pursuant to 100.901(B)(1) or (2) during the period for which a certificate of authorization is granted, such change shall be reported to the Board within 30 days after the effective date of such change.

(D) The Board may revoke, suspend, or cancel a certificate of authorization granted pursuant to 100.901 if any officer, director, or employee of a corporation, or any manager or employee of a limited liability company (or any member in the case of a limited liability company in which management of its business is vested in the members), or any general partner or employee of a partnership violates any provision of **[cite statute]** or these regulations; provided, however, that it shall be an affirmative defense to show that such individual was not acting as an agent of the corporation, the limited liability company, or the partnership at the time such violation occurred.]

[100.902 Restricted and Prohibited Uses of Business Titles]

[Insert provisions regulating the use of business titles. Titles to be restricted or prohibited may include titles that include the names of non-architects, non-registered architects, related professionals, and deceased persons, as well as titles that do not include any individual names.]

100.903 Activities Involving the Practice of Interior Architecture

[Cited statute] provides that the practice of architecture includes services in connection with the design and construction, enlargement, or alteration of a building or group of buildings and "the space within" buildings, meaning interior architecture. Such interior space includes, without limitation, all areas, assemblies and components of buildings, whether new or existing, intended for human occupancy and with respect to which codes, laws and regulations intended to ensure the safety of building occupants are applicable in whole or in part. Examples of the foregoing codes, laws, and regulations are occupancy classification, use and zoning requirements, construction classification requirements,

ingress and egress requirements, accessibility requirements, fire-rated construction assembly and finish requirements, alarm and suppression system requirements, smoke control system requirements, environmental health requirements, electrical, structural and seismic requirements. Such examples would not include services rendered in selling, selecting or assisting in the selection of furnishings, furniture, decorative accessories, art work or other decorative materials, paint and color schemes, textiles, wall coverings, window treatments or floor coverings.