BUILDING INFORMATION MODELING (BIM)
Design Standard

PART 1 GENERAL

1.1 BIM CONTRACT LANGUAGE

The following language is to be included in both Architect Agreement and Construction Contract.

A. Architect's Design and Initial Hosting of BIM

1. Architect shall develop a Building Information Model ("BIM") based on the architectural and structural designs throughout design development, including development of the Design Development Phase Drawings, the final Drawings and any modifications approved by Owner.

2. Architect shall develop the BIM based on best practices within applicable architectural and engineering disciplines, including without limitation the applicable level of development ("LOD") for each element of the Project, and shall provide Owner with a report identifying such matters and areas for further (or lesser) development. Following Owner approval, Architect shall develop the BIM as directed or approved by Owner.

3. Architect shall host and manage the BIM during development of the Project's design. Architect's hosting and managing responsibilities shall include without limitation: (i.) collecting, coordinating, and the usability of, incoming models from Project participants; (ii.) maintaining periodic record copies; (iii.) aggregating incoming models and making the BIM available for use and viewing by Project participants; (iv.) performing and assisting in performing clash detection in the model and/or with any Owner-approved modifications; (v.) issuing periodic clash detection reports; (vi.) managing access rights; and (vii.) updating the BIM to reflect current designs and revisions.

4. Architect shall correct and clarify any clashes, coordination or issues resulting from the BIM within Architect's Basic Services. Coordination and design corrections and clarifications resulting from such further modeling (whether performed by Architect, Contractor or sub-contractors) shall be within Architect's Basic Services.

B. BIM Workshop and Pre-Construction Phase BIM Activities

1. If directed by Owner, Contractor and all sub-contractors that will be interacting with or using BIM information will meet with Architect and its design team to develop protocols for developing, implementing, reviewing, and exchanging information through the BIM ("BIM Workshop"). Through the BIM Workshop, Contractor, major sub-contractors and Architect's design team will discuss, coordinate, test and adjust their BIM practices, to allow information to be used, to the greatest practical extent, by all parties for their respective purposes.

C. Transfer to and Hosting of BIM by Contractor

1. Upon the completion of Final Construction Document, Architect will provide the BIM to Contractor who will host and manage the BIM through construction and until completion of the Project. Contractor will use the BIM to assist Contractor in its work to coordinate the design and the implementation of the design by Contractor and its sub-contractors. Contractor will manage the clash detection and coordination process during the construction phase, through preparation of all shop drawings and submittals necessary for construction. Contractor will continue to accomplish clash detection.

D. General

1. Architect and Contractor and each major sub-contractor must be capable of

utilizing the BIM to perform the functions assigned to them in paragraph C above.

2. The BIM and any portion of the BIM is a work for hire for the benefit of Owner and will be provided to Owner as a contract deliverable that may be used by Owner without restriction for the use on this Project. Architect grants to Owner a license in perpetuity to use and reproduce the BIM and any portion of the BIM for any purpose whatsoever related to this Project. Contractor and its sub-contractors shall transfer to Owner copyrights or licenses necessary for Owner to use the BIM and supporting information.

3. The BIM is not a Construction Document or Contract Document, and does not supplement or supersede the final permitted Drawings or Specifications.

E. Subcontract Language. The BIMXP will be a part of all subcontractor bidding packages and subcontractor contracts. This is necessary to get accurate pricing from subcontracts at buyout and provide process expectations. In addition, the BIMXP will include the following language (or similar, subject to SMCCCD approval) for subcontractors:

1. Subcontractor agrees to participate in the use of digital/computer based three dimensional models and other related functionality, generally referred to as building information modeling, as SMCCCD and the GC may determine to be beneficial for use in facilitating coordination, estimating, scheduling and/or production of as-built records of the project and performance of the work and as hereafter provided. The subcontractor's costs of such participation are included in the price unless explicitly outlined herein.

2. Subcontractor's submissions shall be of sufficient detail to enable accurate and complete clash detection and shall be provided by Subcontractor at a point in time that is reasonably in advance of Subcontractor's shop drawing submittals and the subsequent on site construction of the Subcontractor's Work and such submissions shall contain such details and follow such procedures as the GC may require.

3. Subcontractor shall participate in such BIM coordination and review meetings as the GC may require and agrees that, as a result of the information exchanged at such meetings, both the digital submission and the work depicted in the Subcontractor's digital submission may be required to be changed by Subcontractor to achieve coordination with other elements of the Project being provided by others. Such changes shall be accomplished at no increase in the Price or Time of Completion. Subcontractor acknowledges that such meetings will require attendance of personnel that are familiar with both the data entry aspects of the BIM as well as an understanding of the work to be performed and its relation to other elements of the Project, and subcontractor therefore agrees that personnel conversant in both shall attend all such meetings.

4. Subcontractor agrees that neither the BIM nor the use of the BIM is in lieu of nor intended to relieve the Subcontractor of its responsibilities under the Subcontract, including to (i) coordinate its work with the work of others involved in the Project and (ii) strictly comply with the other requirements of the Subcontract Agreement and the Contract Documents. It is expressly understood and agreed that, notwithstanding the requirement for submittals in connection with the BIM, traditional shop drawings and other submissions shall be required of Subcontractor as required by the Contract Documents and no party shall be liable to the other for any claim, dispute, controversy, cost or expense arising solely out of the use of the BIM.

F. Subcontractor acknowledges that the BIM may require updating throughout the life of the Project to addresses any changes to the Work so that the BIM at the conclusion of the Project accurately depicts the work as actually performed and installed. Subcontractor agrees to promptly update and provide revised

submissions to the GC throughout the course of the Project so that the BIM at the conclusion of the Project accurately depicts the work as actually performed and installed.

G. The GC, at their sole discretion, has the right to remove subcontractor team members from the coordination process if those team members are not able to effectively coordinate or is in another way non-responsive, leading to a greater team inefficiency. This action will be communicated ahead of time. It is the subcontractor's responsibility to provide an effective team member for modeling and coordination, and the replacement will occur at the subcontractor's cost.

H. References

I. SMCCCD Design Standards Division 1: Building, Floor, Room, Stairway and Elevator Designations (naming conventions for building space).

J. The American Institute of Architects: E202.

K. Definitions. The following list of terms as used in this specification will be defined as follows:

L. BIM. Building Information Modeling is the process of creating a digital representation of physical and functional characteristics of a facility. The model then serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its lifecycle from inception onward.

M. Building Information Model, or Model. The Building Information Model is a parametric, data rich, digital virtualization of the Project design developed by the Architect, the Architect's consultants, the General Contractor (GC) and design-build subcontractors, and includes construction details developed by those parties. References to the Building Information Model, BIM, or the model, include the base architectural and structural design model(s), and all linked, related, affiliated or subsidiary system models developed for the design, detailing, estimating, fabrication, or construction of the Project, or of any portion or element of the Project.

N. Federated Model. The combined model containing all scopes and trade models to be coordinated, typically broken into levels or areas.

O. Level of Development, or LOD. The content of the models created using BIM are described by a number system consisting of five primary levels. These levels help define consistent expectations throughout the building lifecycle from planning to operations. The American Institute of Architects publishes E202, a BIM protocol document, which defines these levels. LOD 100 - 300 have a reference to the traditional 2D project delivery method while levels 400 and 500 are specific to the BIM process. Schematically, the levels are defined as follows:

1. LOD 100 - The equivalent of conceptual design, the LOD 100 model usually consists of overall building massing designed to perform whole building type analysis including volume, building orientation, square foot costs, etc.

2. LOD 200 - Similar to schematic design or design development, the model would consist of generalized systems including approximate quantities, size, shape, location and orientation. LOD 200 models are typically used for analysis of defined systems and general performance objectives.

3. LOD 300 - Model elements equivalent to traditional construction documents and shop drawings. LOD 300 models are well suited for estimating as well as construction coordination for clash detection, scheduling, and visualization. LOD models should include the attributes

and parameters defined by the owner in the BIM deliverable standard.

4. LOD 400 - This level of development is considered to be suitable for fabrication and assembly. This LOD is most likely to be used by specialty trade contractors and fabricators to build and fabricate project components including MEP systems.

5. LOD 500 - The final level of development represents the project as it has been constructed including as-built conditions. The model is configured to be the central data storage for integration into building maintenance and operations systems. LOD 500 models will include completed parameters and attributes specified in the owners BIM deliverable specification.

P. Project Stakeholders. Project stakeholders are individuals who have an interest or concern in the project, both prior to, during and after project completion. Project stakeholders are typically members of the campus community, including facilities managers, users in adjacent buildings and building end users.

Q. Contract Documents. The Contract Documents include the Building Information Model developed to describe the Project, together with 2D drawings and specifications. These documents are complementary and what is required by one is required by all. If there are any conflicting requirements between these documents, the SMCCCD Construction Manager will determine which requirements will control as necessary to achieve the owner's project goals.

R. Project Team. The Project Team includes the following groups or individuals:

1. Owner and Project Stakeholders.
2. Construction Management team.
3. Architect.
4. Architect's Consultants.
5. General Contractor.
6. Subcontractors.
7. Furnishings, Furniture and Equipment (FFE) vendors.
8. Others, as defined in the project specific BIMXP.

PART 2 DESIGN AND CONSTRUCTION PHASE BIM REQUIREMENTS

This Section includes general administrative and procedural requirements for the application of Building Information Modeling on San Mateo County Community College District (SMCCCD) projects.

2.1 BIM STANDARDS OVERVIEW

A. Purpose of the BIM Execution Plan (BIMXP). This document describes BIM Execution strategy, processes, responsibilities, and standard requirements for SMCCCD projects. The BIMXP is to be used to guide the design and construction teams in the best practices of implementing BIM on SMCCCD projects to maximize efficiency and return on the upfront BIM investment.

B. BIM Uses. SMCCCD requires the use of BIM for the following purposes:

1. Design Drawing Production (Architect-Engineer Teams)
2. Clash Detection of Mechanical/Electrical/Plumbing/Fire Protection (MEPF) systems (GC and Subcontractor Teams)
3. Shop Drawing Production (Subcontractor Teams)

4. As-built Model Production for Facilities Management (Architect, GC and Subcontractor Teams)

C. BIM Goals. The goals of this BIM strategy are:

1. Reduce rework, inefficiency and construction change orders due to coordination issues.

2. Expedite field installation through improved pre-construction planning and coordinated shop drawings.

3. Use BIM scope definition, proven BIM processes, and clear communication of expectations to achieve the BIM goals at a minimum cost and maximize ROI.

D. SMCCCD Definition and Procurement of BIM Deliverables.

1. Project teams will define their approach to achieve the project BIM goals. As a part of all RFP's, project teams will provide a BIM Execution Plan (BIMXP) to demonstrate their processes, methods, and timeframes for BIM delivery. Expertise in BIM is a part of the added value that project teams offer to SMCCCD and the BIMXP should demonstrate this expertise and delivery.

2. BIMXP's produced through this process will become a part of the project contract documents.

3. All BIM costs are to be included as a line item in the base contracts.

4. Project teams are to focus on achieving the above BIM uses in an efficient manner. Additional BIM uses, such as energy modeling, cost and schedule linking should only be included in BIMXP's as directed by SMCCCD.

E. Naming Conventions: See the SMCCCD Naming Conventions document Design Standard Building, Floor, Room, Stairway and Elevator Designations.

F. General Specification: Other sections of this specification and other supporting documents, such as a BIM Execution Plan (BIMXP), will include more specific project requirements. This is a general specification that outlines overall, programmatic requirements that would apply to any use of BIM on SMCCCD projects.

2.2 GENERAL BIM BENEFITS.

The use of BIM has defined benefits which vary by project. The following are some sample benefits achieved through the use of BIM.

A. Coordination of Design. To coordinate the major systems and elements of the project with the key metric of reducing or eliminating change orders related to the spatial fit of systems. The specific effort would be to coordinate architectural, structural and core trade (MEPF) systems that will occur in areas of new construction, seismic retrofit or significant tenant improvement.

B. Communication of Construction Impacts to Project Stakeholders. Provide to project stakeholders the ability to visualize construction impacts prior to the impacts occurring.

Resolution of Constructability Issues. Identify and facilitate the resolution of constructability related issues during the coordination process.

C. Schedule Planning and Communication. Increase the ability to plan and communicate schedules to the Project Team.

D. Cost Estimating. Provide to the project team rapid quantities and costs based on the modeled elements

2.3 BIM OBJECTIVES AND DELIVERABLES

A. Objectives: Building Information Modeling is a tool. Every project has unique challenges, the BIM deliverables are to be catered to the individual project to overcome its challenges and achieve SMCCCD's goals. This programmatic management of the BIM process creates the ability to achieve goals while managing project costs associated with BIM. The primary method of defining and communicating project specific BIM requirements and deliverables is through the creation of a project BIM Execution Plan.

B. Deliverables

1. BIM Execution Plan

a. Requirement. Every SMCCCD project that includes a BIM component requires a BIM Execution Plan (BIMXP).

b. Responsibility. The Architect will take primary responsibility for the creation and implementation of the BIMXP in the design phase (typically up to 100% DD) and the General Contractor will take primary responsibility for the customization and implementation of the BIMXP in the bidding and construction phase. The BIMXP will be submitted to SMCCCD for approval after initial creation by the architect and again prior to subcontractor buy-out and BIM activities by the GC.

c. BIMXP Review Meeting. The party responsible for the BIMXP will facilitate a meeting with SMCCCD to review the BIMXP, receive input and approval prior to roll out of the plan.

d. Living Document. The BIMXP will evolve over time and must be updated to include the latest information about processes, details and deliverables. Changes over time are to be submitted for approval to the Project Architect and SMCCCD

e. Required Components. At a minimum, the BIMXP must include the following components:

i Identification of project BIM goals, uses, and objectives.

ii Description of the process that supports each BIM use.

iii BIM Coordination schedule.

iv A Model Progression Specification will be in the form of an E202 Level of Detail (LOD) matrix defining LOD for all modeled scopes at each phase. SMCCCD requires LOD 300 for all projects unless directed otherwise.

v Description of infrastructure supporting BIM execution, including:

1) Hardware requirements for design and construction coordination meetings.

2) File sharing protocols.

3) Software and versions.

vi Colocation requirements, if any.

vii Key project contacts, organizational roles and staffing.

viii Facilities Management (FM) requirements.

ix Collaboration procedures.

x Model Quality Control (QC) procedures.

xi Model origin point.

xii Model standard colors.

xiii Model naming convention, by trade and area. Refer to Division 1 Building, Floor, Room, Stairway and Elevator Designations.

1) Naming convention example:

xiv Trade system order of priority as related to conflict resolution.

xv Strategy for field implementation of the coordinated model data.

xvi Project deliverables.

2. Fully coordinated Federated Models (as a result of Clash Detection) by level or area.

3. Model based Shop Drawings.

4. As-built Models.

C. BIM on the Project Schedule. The Architect will identify BIM milestones and deliverables for the design team. The GC will identify milestones, deliverables, and major meetings related to the BIM effort on the project schedule. At a minimum, these milestones will include:

1. Model deliveries from the design team at 100% DD, 50% CD & 100% CD.

2. BIMXP Review Meeting and Approval.

3. BIM Kickoff Meeting with Subcontractors.

4. Start of modeling by subcontractors.

5. Start and end of BIM coordination per project area, such as by floor.

6. Facilities Management deliverables, if applicable.

7. Final as-built model submission, review and acceptance.

2.4 QUALITY ASSURANCE

A. Contractor Qualifications. General contractor and subcontractors must have experience with BIM management and 3D coordination on similar project types.

B. Field Implementation Strategy. The GC is to provide a strategy and budget for making the coordinated models readily accessible to the field crews performing the installation.

C. BIM Metrics. Metrics are quantifiable measures that track processes to help show progress towards objectives and inform the project stakeholders if course corrections are needed. Architect and general contractor are to track and report monthly to SMCCCD on the following topics:

1. Model development and revision resource requirements.

2. Coordination progress tracking.

3. Impact on RFI count and Change Order amounts compared to similar projects.

4. Field issue tracking

2.5 BIM MEETINGS. THE FOLLOWING MEETING TYPES SHALL BE PLANNED BY THE ARCHITECT AND GC

Meeting Type	Project Stage	Frequency	Participants	Location
Design Coordination				
BIM Execution Plan Review				
BIM Kick off				
Construction Coordination				
BIM Handover				

2.6 FACILITY MANAGEMENT BIM DATA REQUIREMENTS

A. The Following Information Shall Be Provided Under SMCCCD Standard Format:

1. Provide Campus, Building and Room name/number according to SMCCCD standard. Refer to Division 1 Point Names.

2. Provide interior architectural finishes of rooms and spaces:

Floor		Base		Wainscot		Wall	Ceiling
Hard	Ceramic Tile	Hard	Ceramic Tile	Hard	Ceramic Tile	Gypbd	Structure exposed
Hard	Concrete	Hard	Concrete	Hard	Concrete	Concrete	Suspended ACPanels
Soft	Carpet	Soft	Rubber Base	Soft	Gypbd		Suspended Gypbd
Soft	Linoleum	Soft	Rubber Base	-	-	FRP	Directly attached ACTiles
Soft	Wood	Soft	Wood	Soft	Wood	Gyp	Suspended Panelized Wood

3. Major building component types, names and locations such as mechanical, electrical, plumbing, fire protection, security and fire alarm. Refer to division 1 point names.

4. Provide native format versions of all models for record and future use. The BIMXP will define model handover requirements.

END OF SECTION