University of California San Diego

TRANSITION TO OPERATIONS and BIM GUIDELINES

Version 2.0: March 7, 2022

BIM PACKAGE

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Credits and Acknowledgements

A team within the UC San Diego Capital Program Management (CPM) developed these Guidelines with the support of an external consultant, VueOps. Input and needs were gathered from three facilities operations and maintenance groups within the University: Campus FM, Housing, Dining, and Hospitality (HDH), and the Medical Center. Additional needs by Campus Planning were also incorporated into this Guidelines.

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1. Transition-to-Operations (T2O) Program Overview

1.1 Intent

The T2O and BIM Guidelines are part of an initiative for the University of California San Diego ("UC San Diego" or "University") to develop standards for data-centric processes and the application of BIM that impact the facility life cycle for design, construction, and operations activities. This document is meant to describe the goals of the University for delivering quality data into the University's life cycle management systems ("LCM"), e.g. Computerized Maintenance Management System ("CMMS"), space management, Geographic Information System ("GIS"), and the University's Facility Information Management ("FIM") system. Beyond goals, the Guidelines define the baseline expectations for facility data delivery and BIM practices, protocols, and modeling quality with a specific focus on managed assets critical to the life cycle management process based on industry best practices and the current capabilities of available software applications. The University expects consultants, contractors, and the entire project team to be committed to the delivery of facility data, regardless of project size or delivery method. The use and delivery of CAD and/or BIM as primary design, documentation, coordination, collaboration, and visualization tools should also be implemented for larger and more complex projects.

For purposes of these Guidelines, "digital data" is defined as information, including communications, drawings, specifications, and designs, created or stored for a project in digital form, including those developed by the project team, and the University and its consultants, for use in preparation of two-dimensional (2D) printed hard-copy construction documents using Computer Aided Design (CAD) and Building Information Modeling (BIM) software, three-dimensional (3D) model deliverables, and facility data deliverables as specified by the UC San Diego Facility Data Specification (FDS). Digital data will be used for planning, design, construction, commissioning, turnover, and operations and maintenance purposes.

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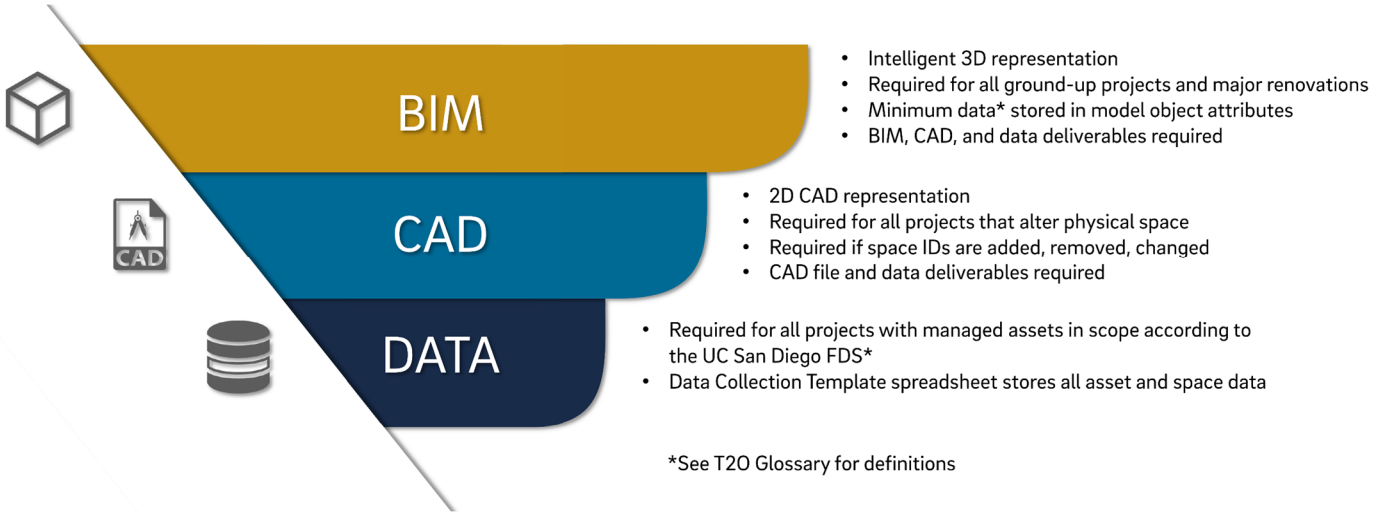
1.2 T2O and BIM Guidelines Applicability



Asset and location (space) data sits at the foundation of all T2O and BIM design and construction projects at the University. Every project regardless of size or complexity requires the project team to analyze the project scope against the "managed assets" type list found within the Facility Data Specification (FDS). If the scope of the project involves the removal, modification, or installation of "managed assets", the project team will be required to follow the **Data Requirements** package. The data requirements consist of the submission of two spreadsheets or tables: one containing a full list of rooms involved in the project and another containing a full list of managed assets in the project. Both tables contain additional columns of data, or "attributes", which are described in **Attachment 3 – University Facility Data Specification**. The master asset table is commonly aggregated from multiple discipline-specific asset tables which are submitted with increasing amounts of attribute data over the life of the project. See **Table 1.2.1** for a summary of the required planning and data deliverable submissions contained in the Data Requirements package.

All projects impacting space including addition, demolition, consolidation, reconfiguration, renaming or renumbering of spaces will require a minimum of 2D CAD for design documentation of all involved design disciplines. Project teams are required to use the **CAD Requirements** package which incorporates all deliverables from the Data Requirements package with additional CAD deliverables. The CAD files required for submission are for the architectural floorplans at 100% CD (or equivalent design issuance) and all discipline CAD files for the record set submission. Regardless of whether the CAD files are exported from a BIM application or they are created directly in AutoCAD® software, the Project Team should follow the **Attachment 6 – CAD Standards and Attachment 6.1 – CAD Exports – Layer Mapping and Modeling Guidance** when preparing the CAD files. Additionally, the project architect should follow the **Attachment 2 – Space ID Guidelines** when designing and numbering spaces. The Space ID Guidelines require review submissions throughout the project to ensure adequate review and approval of the space ID scheme by the University.

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The Building Information Modeling (BIM) process and related submissions are required on all ground-up construction projects and major additions and renovations contracted by the University. Project teams must use the **BIM Requirements** package for projects meeting these criteria. The BIM Requirements package incorporates the requirements contained within the Data and CAD Requirements packages with additional BIM deliverables. Use of BIM is highly encouraged for all other smaller projects.

Any questions as to the applicability of this Guidelines to a project or the comprehensiveness of the Guidelines should be directed to UC San Diego Capital Program Management. **Table 1.2.1** summarizes the main required deliverables that are relevant to each requirements package.

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	Plan Deliverable
	Data Deliverable

		Project Timing	Data Package	CAD Package	BIM Package
Facility Data Deliverables					
Deliverable Name	**Related Requirement Doc**				
Maintenance Responsibility Documentation	Sec 2.1.g	Design 100% CD	●	●	●
Project-Specific FDS	Sec 2.1.g, Att. 3	Design 100% CD	●	●	●
Facility Data Deliverables Schedule	Sec 2.1.g, Appx A2	Design 100% SD	●	●	●
Data Submissions (Data Drops) - Asset Tables (.XLSX)	Att. 3	Multiple[1]	●	●	●
Data Submissions (Data Drops) - Location Table (.XLSX)	Att. 3	Design 100% CD	●	●	●
Consolidated Asset and Location Table(s) (.XLSX)	Sec 2.2e, Att. 3	Closeout	●	●	●
CAD Deliverables					
Deliverable Name	**Related Requirement Doc**				
Space ID Review - Arch floorplans (.PDF)	Att. 2	Design 100% SD		●	●
Space ID Review and Space Management Full 100% CD Drawing Set (.PDF)	Att. 2, Att. 6	Design 100% CD		●	●
Space Management Floorplans (.DWG)	Att.1, Att. 6	Design 100% CD		●	●
Space Management Floorplans (.DWG)	Att.1, Att. 6	Closeout		●	●
Record Drawing Full Set (.PDF)	Att. 6	Closeout		●	●
Record Drawings Full Set (.DWG)	Att. 1, Att. 6, Att. 6.1	Closeout		●	●
BIM Deliverables					
Deliverable Name	**Related Requirement Doc**				
BIM Execution Plan (BEP)	S3, App. A	Multiple[2]			●
BEP - BIM Deliverables Schedule	S3.7, App. A	Design 100% SD			●
BEP - LOD Matrix	App. A, App. B, App. C	Design 100% SD			●
Design model submissions (throughout project)	App. A, Att 1, App. C, Att. 5	Multiple[3]			●
Trade model submissions (throughout project)	App. A, Att 1, App. C	Multiple[3]			●
Architectural models with rooms (.RVT)	S3.4, Att 1, Att. 2	Design 100% CD			●
Arch models with 2D space mgmt. floorplan views (.RVT)	Att 5	Design 100% CD			●
Design record models (.RVT)	App. A, Att 1, App. C, Att. 5	Closeout			●
Trade as-built models (.RVT or .DWG)	App. A, Att 1, App. C	Closeout			●

Table 1.2.1 Summary table of requirements package definitions

Project closeout submittals including O&M manuals, as-built drawings and product data, warranty documentation, photos, spares and attic stock, service maintenance agreements, and other miscellaneous submittals are critical digital data for the efficient operation and maintenance of University facilities. See the UCSD Division 1 Specifications (**01 77 00 Closeout Procedures** and **01 78 00 Closeout Submittals**) for requirements on closeout submittals.

This Guidelines document uses intentional graphics to highlight 1) when there is a deliverable related to a section and 2) when a deliverable requires a specific and University-provided format or template be used by the responsible party. The graphics are as follows:

1.3 Organizational Roles

The University understands the need for intentional organizational roles to ensure the successful implementation of T2O and BIM practices at the project level. On the University side, the focus is on specification, oversight, and validation of data delivery and BIM usage, while on the project consultant and contractor side, the focus is on planning and execution of project data and BIM deliverables.

The term "**project team**" will be used to refer to the collection of contracted firms involved in the planning, design, construction, commissioning, and turnover of the Project inclusive of the following: the Architect, General Contractor, and all University consultants providing input to deliver a project, including trade partners and third-party consultants preparing information intended to become part of the Contract Documents.

Data and model submissions for the overall project are typically divided according to their design discipline or trade, depending on the stage of the submission. Model submission needs for design and coordination will be determined by a combination of the requirements listed in the **Appendix C: BIM LOD Matrix – University Minimum Requirements** and the project team **BIM Execution Plan.** Project team members responsible for either design or trade models deliverables for their firm will be referred to generically as "**model authors**". Each firms' named model author will act as the firm point-of-contact for model submissions and modeling practices and should be identified in the project BIM Execution Plan. As part of the T2O requirements, model authors must identify the modeled managed assets in their scope and for those model elements, include "minimum model data" in their model submissions. For more information on model data requirements and minimum model data, see **Section 2.4 Minimum Model Requirements**.

Similar to model submissions, data submission tables are divided according to discipline and trade. Project team members responsible for data submissions will be referred to as "**data authors**". Data submissions occur cumulatively over the project lifecycle in a sequence of data drops and may be worked on by one or multiple project team firms. Data authors for each data submission should be identified through the facility data deliverables schedule and the Authors worksheet of the Data Collection Template.

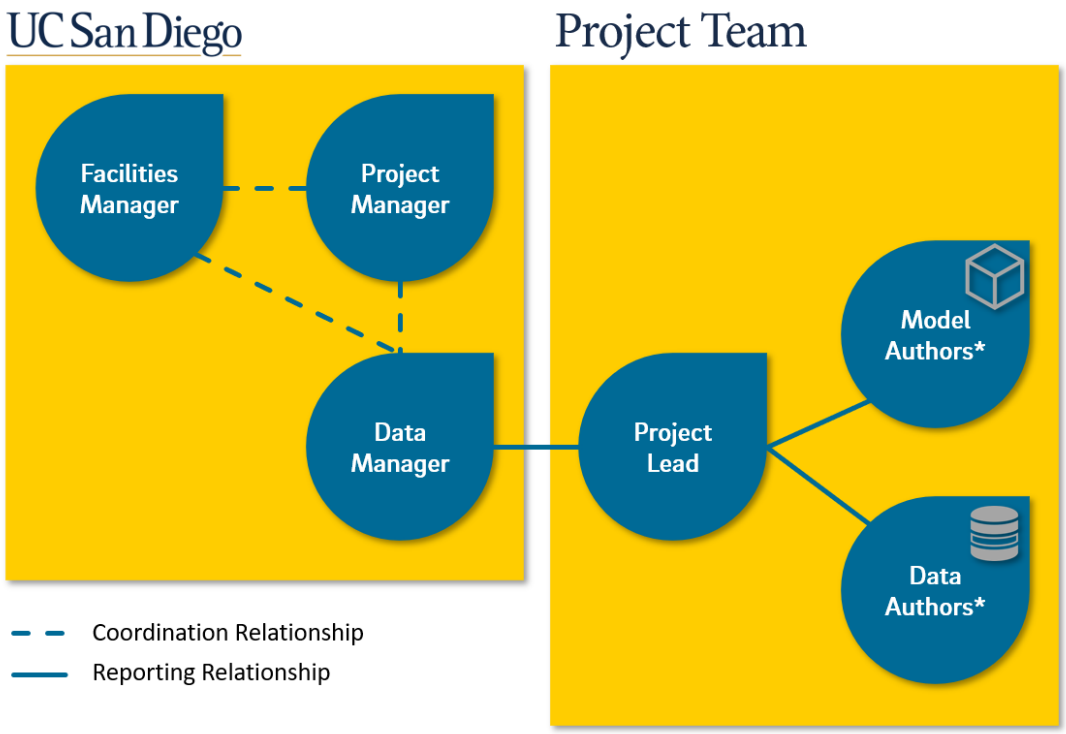
Facility data submission contents are determined by the **Attachment 3 – University FDS**. For information on data submission planning, responsibility, and timing, see **Section 2 Facility Data Requirements for Project Execution.**

At the discretion of each project team firm, both the **model author** and **data author** functions are roles that may be filled by one or more project team member(s) with another primary function within the project team and need not be on their own a full-time, dedicated position.

The project team will designate one representative to coordinate data and model submissions, track submission dates for all project team submissions, and hold data and model authors accountable for meeting their deliverable requirements. This representative will be referred to as the "**Project Team Lead**". The project team lead is typically the construction manager or general contractor, however, the Team may designate any project team member to act in this role.

The University will have multiple stakeholders involved in the specification, oversight, and management of the T2O and BIM-related work. The University will appoint a representative or a team of representatives who will support the University Project Manager in facilitating the implementation of the Guidelines at the project level. The term "**data manager**" will be used to refer to this representative throughout this document. This University representative will be identified at the project outset by the University Project Manager. The data manager will oversee and guide the facility data collection process, help clarify facility data requirements as it relates to the project by liaising with the required University facilities groups, and review and comment on CAD submissions (if applicable). The data manager will also guide BIM usage, review the project BIM Execution Plan, and advise on model element Level of Development ("LOD"). The data manager will coordinate the scheduling of T2O deliverables with the project team lead and will perform quality control checks for each set of data and model submissions (if applicable).

The University may also involve a facilities management representative, referred to as "**facilities manager**" or "**Owner (FM)**", to provide guidance on facility data needs. The facilities manager will work closely with the data manager to resolve any questions and clarifications on facility data requirements that arise from the project team if they are not answered by this Guidelines document.



*Data and Model Author may be the same person for data and model submissions of the same scope or discipline

Figure 1.3.1 Project roles summary diagram.

1.4 University T2O and BIM Goals

a. Create and maintain world-class facilities

In alignment with UC San Diego's vision to grow leaders to drive innovation, the University is committed to creating and maintaining world-class facilities for their students, faculty, and the community at-large. UC San Diego acknowledges that managing world-class facilities starts with a strategy to plan, design, specify, construct, commission, operate and maintain its' assets and asset data in a standardized and structured manner. Incorporating BIM practices and efficiently transitioning digital design and construction data to facilities LCM systems are critical elements to achieving this goal. The University aims to aggregate and maintain "as-managed" models for new construction and renovations/additions as well as an associated facility data set for managed assets across these facilities.

As-managed models typically start as record and/or as-built models delivered at project completion by the design team and trade contractors. As-managed models are maintained and kept up to date as a virtual facility by the University facility owner or manager as maintenance, work orders, renovations, and other projects are carried out in the physical facility such that the two are continuously aligned. The University aims to develop processes to manage changes to existing facilities data and As-Managed models as work orders and renovations are performed over time.

b. Use BIM processes to inform and direct team collaboration and development during a project.

The project team shall use BIM processes and virtual design and construction methodologies to engage University stakeholders to visualize, coordinate, schedule, document, and analyze design intent and constructability throughout projects, including closeout. The project team will identify and implement uses of BIM as described in this Guidelines document to be communicated through the project BIM Execution Plan.

c. Create and manage models that reflect as-built conditions.

In addition to the as-managed models, which may be developed from a combination of record and as-built models, the University also aims to store a full set of detailed as-built models with features that are dimensionally accurate for construction and robust enough to serve as a reference post-occupancy. The University wants to have confidence the as-built models will exist as a highly detailed digital representation for locating all building and system elements with enough all-discipline scope (supports, hangers, etc.) to determine remaining clearances and space constraints within the as-built facility. The as-built models will supplement the as-managed models as the authoritative source of truth for dimensional accuracy of the as-built condition at project closeout.

d. Achieve day one operational readiness by implementing a facilities information strategy to support the overall goal for efficient turnover of digital data to facilities operations systems.

The University aims to specify and incrementally collect and validate data to meet their goals for operational readiness on Day 1 of occupancy. Prior to project closeout, the validated facility data set will be transferred into the relevant LCM systems to support operations and maintenance functions. To meet this objective, it is important that the guidelines presented in this document be followed. Housing Dining Hospitality (HDH), UC San Diego Facilities Management (FM), and UC San Diego Health will be the primary users of the project digital data. Digital data will be translated from the project team deliverables into file formats that are compatible with CMMS applications. Digital data will also be used to update the University's GIS dataset (ArcGIS) and space management system (Tririga). Additional departments may express interest in working with project digital data on specific University projects and may provide additional model or data requirements to the project that are not contained in the Guidelines.

Transfer of information between project digital data deliverables and LCM software will be tested by the University data manager at milestone intervals planned with the Project Team Lead to validate the deliverables (Section 2 of this Guide). Incremental data collection and transfer of project digital data to LCM systems will be one of several ways the University will assess and validate acceptability of deliverables from the Project Team over the project lifecycle.

1.6 Ownership

The University has ownership and all rights to all digital data including all models and facility data created or developed by consultants, subconsultants, contractors, subcontractors, and vendors in relation to a project under which this Guideline or portion of this Guideline applies to. The University may make use of this data following any deliverable.

In contributing content to data deliverables or models, model authors, and data authors do not convey any ownership right in the content provided or in the software used to generate the content. Unless otherwise granted in a separate license, any subsequent model or data authors and model users right to use, modify, or further transmit the model(s) or data is specifically limited to the design, construction, and turnover of the Project, and nothing contained in this Guideline conveys any other right to use the model(s) or data for another purpose.

2. Facility Data Requirements for Project Execution

The next section discusses what is expected of project teams through the facility data planning and collection activities.

2.1 Facility Data Introduction and Planning

The University's goal to achieve day one operational readiness of its' facilities post-construction provides the motivation to develop practices to efficiently transfer project digital data from design and construction to the University's LCM systems. During design and construction, project teams collect a wealth of facility data that is incredibly valuable to the University's facility operations and maintenance processes.

a. What is an asset?

The University aims to collect facility data in a structured format as documented in the facility data specification (FDS). The University defines an in-scope managed asset that falls within the governance of the FDS, referred to as "**managed asset**", as any installed item that physically resides within or servicing a facility and fulfills any of the following:

a. Requires routine maintenance or has a preventive maintenance schedule
b. Has attributes a facility engineer would need to reference in performing a work order
c. Is not consumable or otherwise replaced on a predetermined schedule
d. Identified as an asset category by a UC San Diego Facilities group as requiring asset data

Due to the changing nature of building technology, there may be cases where new types of equipment or systems are in a project that do not exist in the FDS. Any assets in a project not specified in the FDS as a managed asset category but falling within the above criteria should be brought to the attention of

the data manager. The data manager will work with the facilities manager to determine if the assets are in-scope and the required facility data to be collected.

b. What is the Facility Data Specification?

The Facility Data Specification (FDS) is a document describing the University information requirements for managed assets. It documents the asset attributes project teams must collect and submit for each asset category on capital projects.

See **Attachment 3** for the full UC San Diego facility data specification. An accompanying **"UCSD FDS and Data Collection Template"** spreadsheet is also available as a working version of the FDS.

The asset categories of interest for facilities maintenance are listed in the FDS format. The format is a spreadsheet that utilizes the **OmniClass™ Description** to normalize the naming of the asset categories, (1) in the figure below. Project teams work using varying language and vocabulary and the FDS format requires Teams to create a project-specific mapping in the (2) "**Asset Category Project Name**" column, so the project team can work using the terminology of their choosing. The term "**category**" is used to refer to this project team asset type name and what is entered in the asset table deliverables. The FDS also indicates data requirements related to the asset categories such as the preferred tag format (Column I), which facilities group requires the asset category (column J), and if certain additional attributes are required for submission, such as serial number or barcodes (columns M through P).

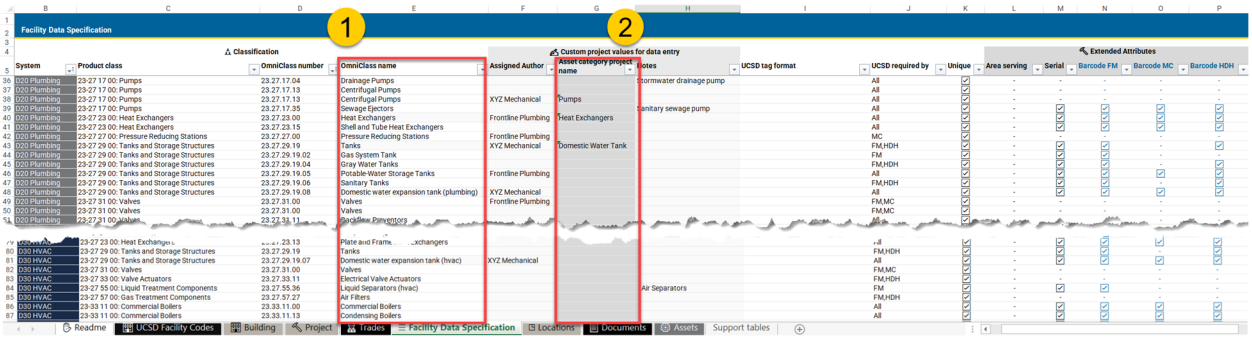


Figure 2.1.1 Excerpt of the University FDS highlighting the asset category names using OmniClass™ and the mapped project-specific asset category names. See the "**UCSD FDS and Data Collection Template**" Excel file for full FDS.

c. What is facility data?

Every unique asset and location (space) requires collection of a set of attributes. Each managed asset is grouped into its general functional grouping (**category**). All assets within or serving a facility belong to that facility. The category that an asset belongs, and the managing facilities department for the asset, will determine the other attributes that must be collected.

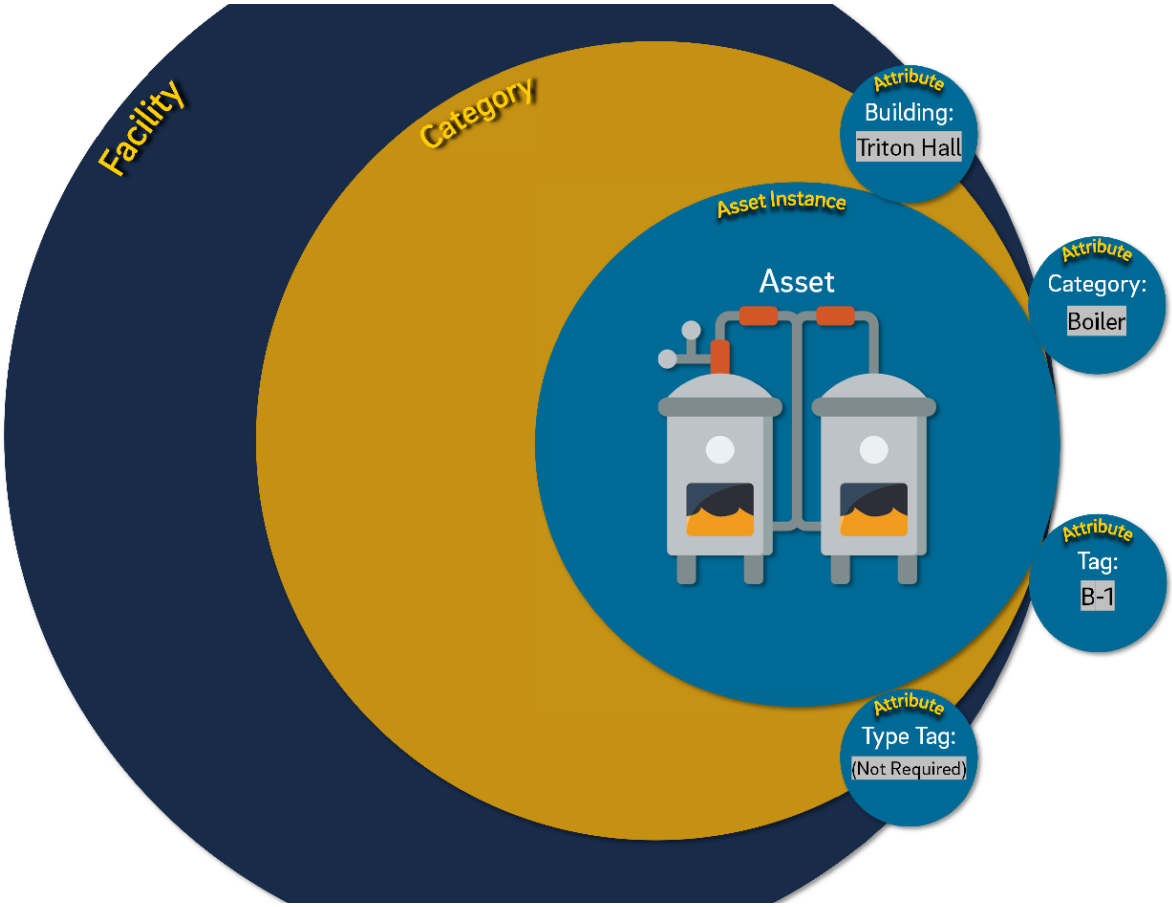


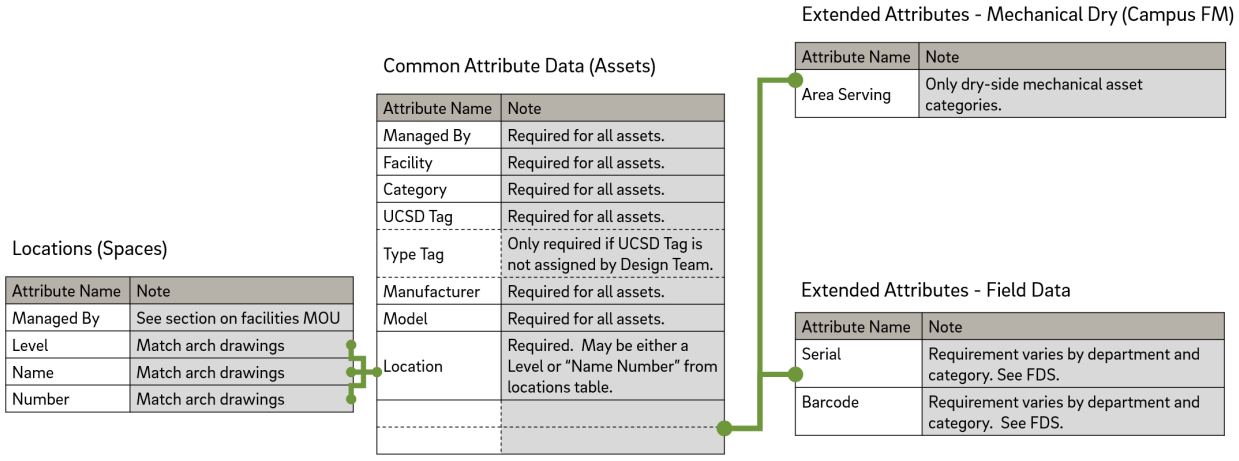
Figure 2.1.2 Facility data concept with Facility-Category-Asset hierarchy. Not all required attributes are shown for visual simplification.

Facility data is collected for all instances of managed assets and locations. Facility data are the attributes that describe various design, dimensional, functional, performance, and business characteristics about each managed asset.

The figure below lists the full scope of possible attributes for any specific managed asset and location at UC San Diego including the "**common attribute data**", required for **all** managed assets, and the category-dependent "**extended attributes**". The **University FDS** lists the extended attributes that must be collected by project teams on a category basis.

In addition to asset data, the project team must also assemble a table of locations or spaces. The locations table is a master list of spaces within the project facility. The full location list of spaces is created as an input for the asset data since asset "**Location**" must exactly match a "**Level**" or space "**Name Number**" location attribute value.

The compilation of all project location and asset data comprises the "**facility data**".



Attribute Name	Note
Area Serving	Only dry-side mechanical asset categories.

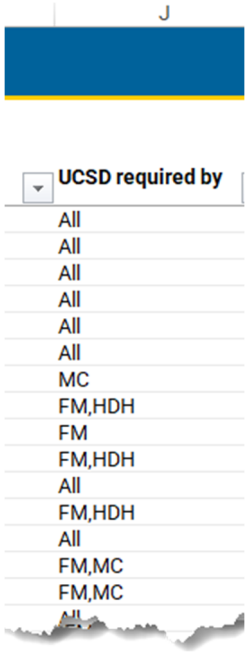
Attribute Name	Note
Managed By	Required for all assets.
Facility	Required for all assets.
Category	Required for all assets.
UCSD Tag	Required for all assets.
Type Tag	Only required if UCSD Tag is not assigned by Design Team.
Manufacturer	Required for all assets.
Model	Required for all assets.
Location	Required. May be either a Level or "Name Number" from locations table.

Attribute Name	Note
Managed By	See section on facilities MOU
Level	Match arch drawings
Name	Match arch drawings
Number	Match arch drawings

Attribute Name	Note
Serial	Requirement varies by department and category. See FDS.
Barcode	Requirement varies by department and category. See FDS.

Figure 2.1.3 Facility Data requirements for project teams including location and asset data.
Note: There are some exceptions for "Field Data". HDH requires barcode numbers for all asset categories, but no serial number for some. See FDS worksheet for specific cases where this occurs.

d. Who is the data for?



Facility data is collected for each facilities department; HDH, Campus FM, and UC San Diego Health (Med Center). The FDS column J (left) indicates if one or more of these departments requires asset data to be collected for each listed asset category.

The data will be received from each data author and compiled across all data drops and trades/disciplines for the facility by the Project Team Lead or delegated responsible party. The data manager is responsible for taking compiled data deliverables and formatting into the necessary Maximo or other CMMS format(s). Both asset and location (space) data are needed to setup the work order structure and maintenance schedules for managed assets so the facilities can be operated efficiently and with minimal interruption to users and occupants.

Note that each facilities department has their own list of required categories. Some categories may require serial numbers and barcodes for one department while another department may not require them. See the **Attachment 3 - University Facility Data Specification** for a comprehensive list of all differences between department facility data requirements.

e. Planning Facility Data Delivery

Facility data is delivered through use of the **University Data Collection Template**. The Template is a Microsoft Excel spreadsheet that has two functional components:

1) an FDS worksheet that allows the Team to review data requirements and identify project asset categories and responsible data authors

2) asset and location tables that standardize the input of facility data by each data author

The Data Collection Template can be found combined with the FDS in the spreadsheet working file "**UCSD FDS and Data Collection Template**". One spreadsheet file should be prepared per facility in the case of projects with multiple facilities. Data authors typically submit one data collection template file for each data drop.

Assets Table 

Asset data is submitted by data authors incrementally to allow for adequate review and cycle time by the data manager if there are questions that arise from the project team. These incremental submissions are referred to as "**data drops**". Each data drop is further segmented by trade or discipline, so the relevant data author is preparing only the facility data for the scope that has been assigned to them. Each data drop should be timed in alignment with a project task that releases data for incorporation into the asset and location tables.

Data drop one is commonly prepared after design has been completed (100% CD's or equivalent). This timing is recommended to allow for the full design intent to develop including asset tag values and location. Most assets are assigned a unique tag value by the design team and the data author should enter the tag as it appears on drawings and schedules. Some assets only receive a "type tag", such as drinking fountains and light fixtures. In these cases, the data author should enter the type tag value in the asset table and discuss with the data manager and project team lead the unique tag format to be applied. The unique tag should incorporate the type tag as a prefix if possible. The data author may choose to assign unique tags at data drop one or may wait until data drop two.

Once unique tag (UCSD Tag) values are assigned to assets that only received type tags from the design team, the data author should either incorporate the unique tags into the design drawings or provide a marked-up PDF plan showing the specific location of these assets with their unique tags along with the asset table deliverable.

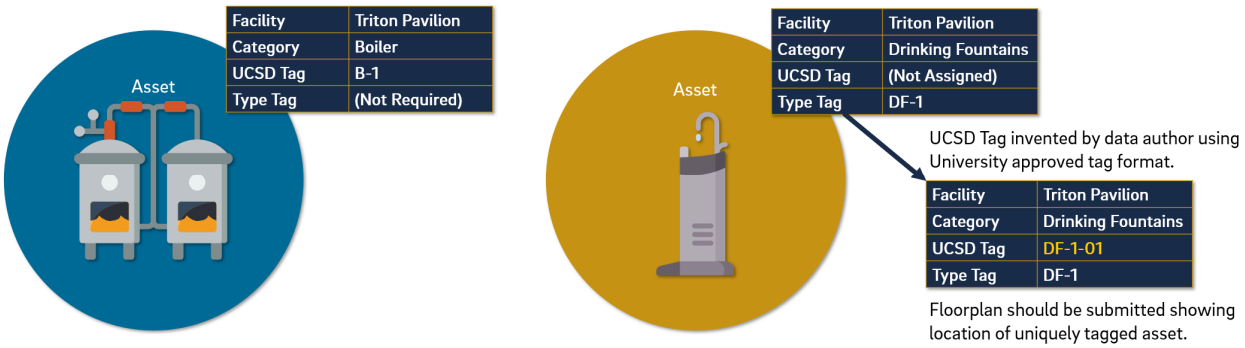


Figure 2.1.4 Some assets are given unique tags by the design team and some are only given type tags. Assets with type tags must be assigned a unique tag by the data author, and location marked up on drawings or incorporated back into design.

Data drop two is recommended to be timed in alignment with the end of the product data submittals phase for the related trade. Drop two should incorporate only approved product data by the data author. As a result, it is recommended the deliverable be prepared after the last anticipated round of resubmissions and approvals for that trade. If a data author has a large window of time for all product data submittals in their scope, they should plan a phased submission for drop two with the project team lead. Location is typically entered at data drop two but may be entered later if a BIM-enabled process is used to associate locations to assets.

Data drop three is typically timed to align with the availability of asset data related to commissioning activity. Serial numbers may either be extracted from startup reports, if they exist for the asset in question, or they may need to be taken from placards affixed to the physical asset. Barcode values are the barcode numbers taken from barcode labels that are provided by the facilities group responsible for maintenance of the specific asset. Barcode labels are typically applied during the commissioning process prior to project closeout.

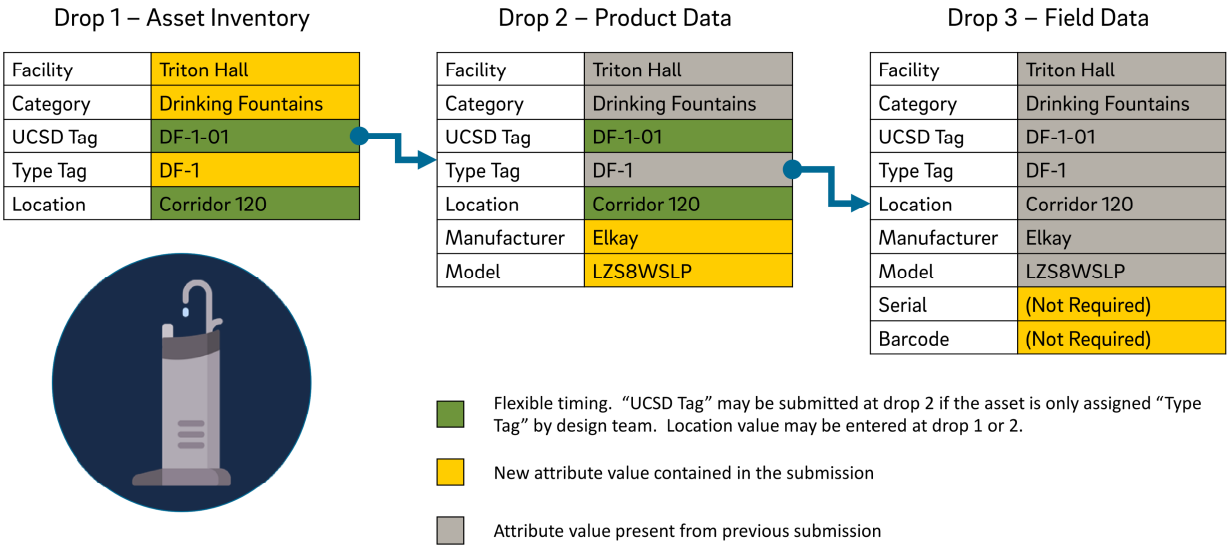


Figure 2.1.5 Asset data submission timing occurs sequentially at different data drops. The above diagram shows example facility data over three data drops for one drinking fountain asset.

The project team lead and data manager should decide if all data drops for a given set of assets should be delivered by one data author or if a handoff between two or more authors is required, due to factors such as timing of trade onboarding and if there is any trade BIM process involved.

Locations Table

Location (space) data is submitted by the project architect around the 100% CD or equivalent design issuance. It is important for the Project Team Lead to obtain the locations table prior to the entering of location values in the assets table. The locations table format in the **Data Collection Template** should be used by the data author providing this information.

The locations table submission should coincide with the Space Management review process that occurs at 100% CDs. See **Attachment 2 Space ID Guidelines** and **Attachment 6 CAD Standards** for more information on space-related design deliverables and review. The outcomes from the space ID review process should be reflected in the locations table. Facility space "**Name**" and "**Number**" in the locations table should match room names and numbers as shown on architectural floorplans, unless otherwise discussed and agreed upon with UC San Diego Space Management and Planning. In some cases, it may be preferable to use signage room numbers if they differ from numbers shown on architectural floorplans.

The Project Team Lead should ensure that the Data Collection Template starting file provided to data authors contains the reviewed and approved list of locations prior to the data drop where authors are expected to submit location values in the assets table. The list of locations should be entered in the Locations worksheet in the Template spreadsheet file.

For projects involving existing facilities with existing space, the University Project Manager should obtain records of space management floorplans and space numbers (identifiers) from Space Management and Planning at the start of the project to provide to the Project Team. The data author assigned responsibility for the locations table should incorporate existing spaces into the table if space numbers will change due to the project or when space numbers will remain but new managed assets will be installed in the existing space. The data manager should work with the facilities manager(s) to ensure alignment of space names and numbers between records already establish in the CMMS and the project locations table.

f. Facility Data Source and Formatting Requirements

Attribute values for facility data must be entered with specific data types to be accepted for use by University LCM systems. **Table 2.1.6** and **2.1.7** lists the constraints around facility data values that may be entered into asset and location tables for each attribute and the expected source of the asset data.

Free Text Attributes

Attributes with a data type of "text" may be any free text value except for those that have parenthetical qualifiers. The "Facility" attribute may be any free text value, however, the value must be approved by the University and be the same for all assets within the same facility. The "Tag" attribute may be any free text value as shown on design documents and the value must be unique (not repeated) for assets within the same category.

Constrained Attributes

Attributes with a data type of "picklist" must match the list of values that they are derived from. For example, the "Category" attribute must match the project-specific asset category list from the project-specific FDS (see University FDS).

The "Barcode" attribute is always a number and must match the barcode label number applied to the physical asset. Each managing department has their own barcoding system and will supply barcode labels through coordination with the data manager.

Attribute Name	Data Type	Attribute Description and Data Source
UCSD Managing Department (Managed By)	Picklist	HDH, FM, MC, or a combination of the three. FM group at the University having maintenance responsibility. See FDS for differing data requirements for each department.
Facility ("UCSD HDH Description" or "UCSD FM Description")	Text (Fixed)	Facility name. Decided by UC San Diego. Same value for all assets within each facility. These attributes are entered on the **"UCSD Facility Codes"** worksheet.
Asset Category Project Name	Picklist	Term used to refer to asset or equipment type from project design documents (drawings, equipment schedules, or specifications). Entered in the FDS worksheet which links to the dropdown on the Assets sheet.
UCSD Tag	Text (Unique)	Unique asset identifier value as defined on design docs. If no unique tag is assigned, data manager to prescribe a pattern for data authors to implement, incorporating type tag.
Type Tag	Text	Non-unique asset identifier defined on design docs for assets of the same type (e.g. light fixtures, fire extinguishers). Only required if "UCSD Tag" is not defined by design team.
Location	Picklist	From architectural floor plans. Value may either be a Level or the concatenation of space "Name Number" from locations table.
Manufacturer	Text	Manufacturer company name from approved product data submittals.
Model	Text	Model number for the product from approved product data submittals.
Serial	Text	Asset serial number from startup reports or physical placards. A unique identifier for an installed product generated by the product manufacturer. Extended attribute (not required for all assets).
Barcode (**)	Number	Barcode number matching HDH, FM, or Med Center barcode label values. Extended attribute (not required for all assets).
Area Serving	Text	From single-line, riser diagram, or design plans. Location or list of locations (level or space "Name Number" from locations table) that the asset provides its service to, for mechanical dry-side assets only. Extended attribute (not required for all assets).

Table 2.1.6 Asset data type and source

**** is a placeholder for either "FM", "MC", or "HDH" barcode. See Data Collection Template.**

Attribute Name	Data Type	Attribute Description and Data Source
Managed By	Picklist	HDH, FM, MC, or a combination of the three. FM group at the University having primary maintenance responsibility for the space.
Level	Text	From architectural floor plans. See Space ID Guidelines for level numbering convention. Format with the word "Level" followed by the level number.
Name	Text	Space name in capital case as they appear on architectural floor plans record documents.
Number	Text	Space number as they appear on signage. If no signage, use architectural floor plan space number. Ensure this column is formatted as text in Data Collection Template to avoid formatting errors.

Table 2.1.7 Location data type and source

g. Project Startup Planning Tasks

There are four main facility data planning tasks that should be completed by the project team before the start of data collection. These tasks are:

1) Determine and document maintenance responsibility (UCSD managing department)

2) Create the project-specific FDS
3) Document the data authors to data drops assignments
4) Create the facility data deliverables schedule

Determine Maintenance Responsibility

Since each facilities group has their own unique list of required asset categories, the first step for a Team is to identify through the University Project Manager which facilities group the project will be turned over to for operations and maintenance. Most projects have only one involved facilities group, however, some have multiple groups involved.

For projects involving multiple facilities groups, the University project manager may work with representatives from each facilities group to describe in a narrative format, the responsibility breakdown for each group. This narrative may be organized by building or system and include marked up or colorized floorplans to communicate physical boundaries of responsibility. This package of documentation should be considered by the Project Team when determining if assets within spaces and systems managed by each facilities group will be required or not in the facility data deliverables.

Prior to developing the project-specific FDS, the University FDS should be filtered by the asset categories that are of interest for the project according to the facilities groups who will be maintaining the facilities.

Create the Project-Specific FDS

After the FDS category list has been filtered according to the managing facilities group(s), the project team will need to identify the managed asset categories that fall within the scope of their project. The **UC San Diego Facility Data Specification** (FDS) contains all possible asset categories that are currently being maintained by each facilities group. The Project Team must cull down this master list to a "project-specific" FDS using a mapping process which is setup in the FDS spreadsheet. See the **Readme** section of the **Facility Data Specification and Data Collection Template** worksheet for instructions on creation of the project-specific FDS.

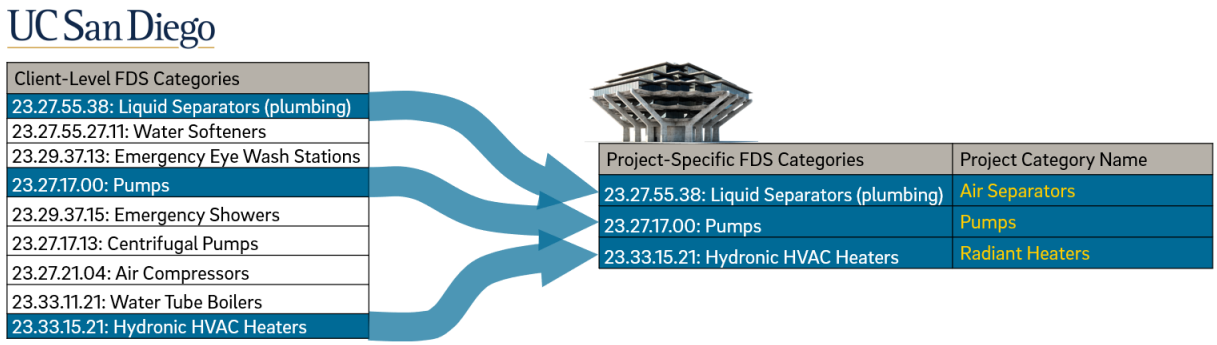


Figure 2.1.8 Conceptual graphic representing the process of creating the project-specific FDS from the UC San Diego FDS. The project-specific FDS is based on a review of the asset categories that occur within the project as shown on construction drawings and a review of project building systems.

Document the assignment of data authors to data drops

The Project Team Lead will work with the data authors to determine the full scope of asset categories contained within the project, which is documented in the project-specific FDS. The assignment of data authors by data drop should be entered in the "**Authors**" worksheet , then assigned to each respective asset category in the project-specific FDS ("**FDS**" worksheet). The first batch of data collection template files should indicate the data drop one Authors. See FDS figure 2.1.9 below.

Note the "**Assigned Author**" column list pulls from a drop-down of project data authors entered in the "**Authors**" worksheet, which should be populated first.

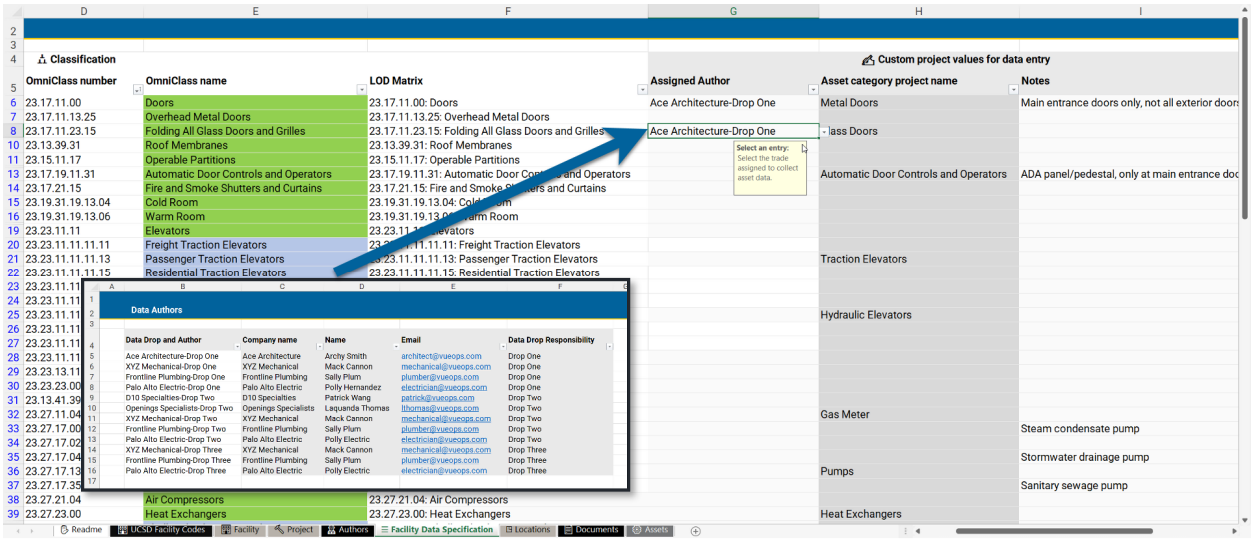


Figure 2.1.9 FDS worksheet showing the connection between the "**Assigned Author**" field and the **Authors** worksheet table (inset).

UC San Diego

Create the facility data deliverables schedule

The Project Team Lead should populate the facility data deliverables schedule spreadsheet, which can be found in the Guidelines companion working documents ("**UCSD Deliverables Schedules**"). The deliverables schedule is a master list of all facility data submissions including planning deliverables and data drop submissions. Items one through five below should be planned at the start of the project and completed no later than end of design (100% CD or equivalent).

1) **Project milestone descriptions** (row 3). Create additional columns if more milestones need to be added.
2) **Project milestone dates** (row 4). Enter dates or estimated dates for the completion of design issuances and the start of construction-related milestones.
3) **Responsible Party** (column C). Pick from drop-down the responsible data author. To modify the data author list, update the pick-list values in "**Lookup**" worksheet. The list of authors should match the same list in the project-specific FDS.
4) **Planned Date** (column varies). Enter the planned date for the submission.
5) **Tool** (column D). Enter the tool or platform where the team will submit the deliverable.
6) **Actual Date** (column varies). Enter the actual date the file was submitted after completion.

Names of data authors can be entered generically (e.g. specialties contractor) if company names are not yet known. When buy-out is complete, the Project Team Lead should update data author names in the deliverables schedule and ensure the file is made available to all data authors. If additional rows are required to further break down data drops or to track resubmissions, the Project Team Lead may add rows as needed. If additional columns for more phases or milestones are needed, the Project Team Lead may add columns.

As data drop files are submitted, the Project Team Lead should track submission dates in the **"Actual"** columns. The facility data deliverables schedule should be stored in a location where the University project manager and data manager can always review the most recent version.

				100% SD		100% DD		100% CD		Product Data Submittals Phase 1		Product Data Submittals Phase 2		Startup Reports		Commissioning		Substantial Completion	
				6/15/2021		9/15/2021		12/15/2021		2/1/2022		3/15/2022		12/5/2022		1/15/2023		3/20/2023	
Planned Completion Date	Responsible Party	Tool		Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Facility Data Plan	Project Team Lead							1/5/2022											
Project-Specific FDS	Project Team Lead							12/6/2021											
Facility Data Deliverables Schedule	Project Team Lead					10/15/2021													
Locations Table	Architect																		
Data Drop 1 - *Enter Data Author Here*	*Enter Data Author Here*							12/8/2021	12/7/2021										
Data Drop 1 - *Enter Data Author Here*	*Enter Data Author Here*																		
Data Drop 1 - *Enter Data Author Here*	*Enter Data Author Here*																		
Data Drop 2 - *Enter Data Author Here*	*Enter Data Author Here*									1/21/2022									
Data Drop 2 - *Enter Data Author Here*	*Enter Data Author Here*									1/25/2022									
Data Drop 2 - *Enter Data Author Here*	*Enter Data Author Here*									1/25/2022									
Data Drop 2 - *Enter Data Author Here*	*Enter Data Author Here*									1/18/2022									
Data Drop 2 - *Enter Data Author Here*	*Enter Data Author Here*											3/15/2022							
Data Drop 2 - *Enter Data Author Here*	*Enter Data Author Here*											3/15/2022							
Data Drop 3 - *Enter Data Author Here*	*Enter Data Author Here*													12/15/2022					
Data Drop 3 - *Enter Data Author Here*	*Enter Data Author Here*													12/15/2022					
Data Drop 3 - *Enter Data Author Here*	*Enter Data Author Here*													12/15/2022					
Data Drop 3 - *Enter Data Author Here*	*Enter Data Author Here*													12/15/2022					
Data Drop 4 - Barcode *Enter Data Author Here*	*Enter Data Author Here*															1/25/2023			
HDH Maximo Asset Table	*Enter Data Author Here*																	3/1/2023	
HDH Maximo Location Table	*Enter Data Author Here*																	1/5/2023	
FM Maximo Asset Table	*Enter Data Author Here*																	3/1/2023	
FM Maximo Location Table	*Enter Data Author Here*																	1/5/2023	

eBuilder
BIM 360 Docs
Procore
Bluebeam Studio
VueOps

Fig 2.1.10 Facility data deliverables schedule

The University data manager will review and approve all milestones deliverables from the Project Team throughout the project according to the planned dates and will notify the data authors if deliverables are satisfactory or need to be revised and resubmitted.

The Project Team must establish meetings and other supporting communication strategies to sufficiently collect and deliver the facility data deliverables as required by this Guideline and the FDS.

h. Project Collaboration and Meetings

In addition to the facility data planning tasks, Project Teams should also hold meetings to review planning and data collection deliverables. The intent of the review meetings is to provide a forum for discussion for more complex questions related to the facility data requirements as they apply to the specific project and to drive accountability within the Team to complete planning tasks according to the schedule. The Project Stage column lists a general timeframe for when the meeting should occur, however, the Team should plan specific dates for these meetings as part of the overall planning effort. The data manager and project team lead should be co-leading the meetings. Data authors relevant to the meeting agenda should also be invited.

MEETING TYPE	GOALS	PROJECT STAGE	FREQUENCY
FDS Planning – Design Phase	• Review project-specific FDS • Review any input/questions for facilities	Construction Documents	Once
FDS Planning – Construction Phase	• Decide responsibility for asset inventory (drop 1) by trade/discipline • Review facility data deliverables schedule • Decide barcoding responsibility • Review any input/questions for facilities	Preconstruction	Once
Data Deliverable Checks	• Data manager review and clarify any issues with any data drop or locations table for each data author	Design/Construction	Each Data Milestone (if required)
Barcode Planning	• Review scope for assets requiring barcode labels • Walk through process, tools, timing, deliverables	Pre-Commissioning	Once

Table 2.1.11 Facility data planning and review meetings

2.2 Facility Data Collection

a. Prerequisite tasks

Prior to collecting facility data, the Project Team Lead should guide the data authors through the planning tasks described in **Section 2.1.g**. In addition, the Project Team Lead should ensure data authors and the data manager understand how to access, submit, and review deliverables using the planned tools or platform for submission.

b. Platform for deliverables submission

Facility data deliverables should be collected using a web-based, digital document management or project management system, determined by the Project Team Lead, with input from the data authors and approved by the University project manager. The tool or platform may be in use by the Team for other functions, such as submittal workflow, or general document management. The platform must be capable of tracking file upload/transfer date, version of file, and username associated with the submitted files. The platform must have a method to track status of review or, at minimum, be able to create a folder structure to facilitate a review process. The project team should identify the platform for data deliverables submission in the **facility data deliverables schedule**.

c. Roles and Responsibilities

The project team should understand their role and the related roles (Owner, Data Manager, Project Team Lead, and Data Authors) when planning and delivering facility data. Roles are defined in Section 1.3 of this Guideline and the role tasks and responsibilities are discussed throughout Section 2.

d. Data Collection Template

The project team should use the **Data Collection Template** to store and submit location and asset data.

Locations Table

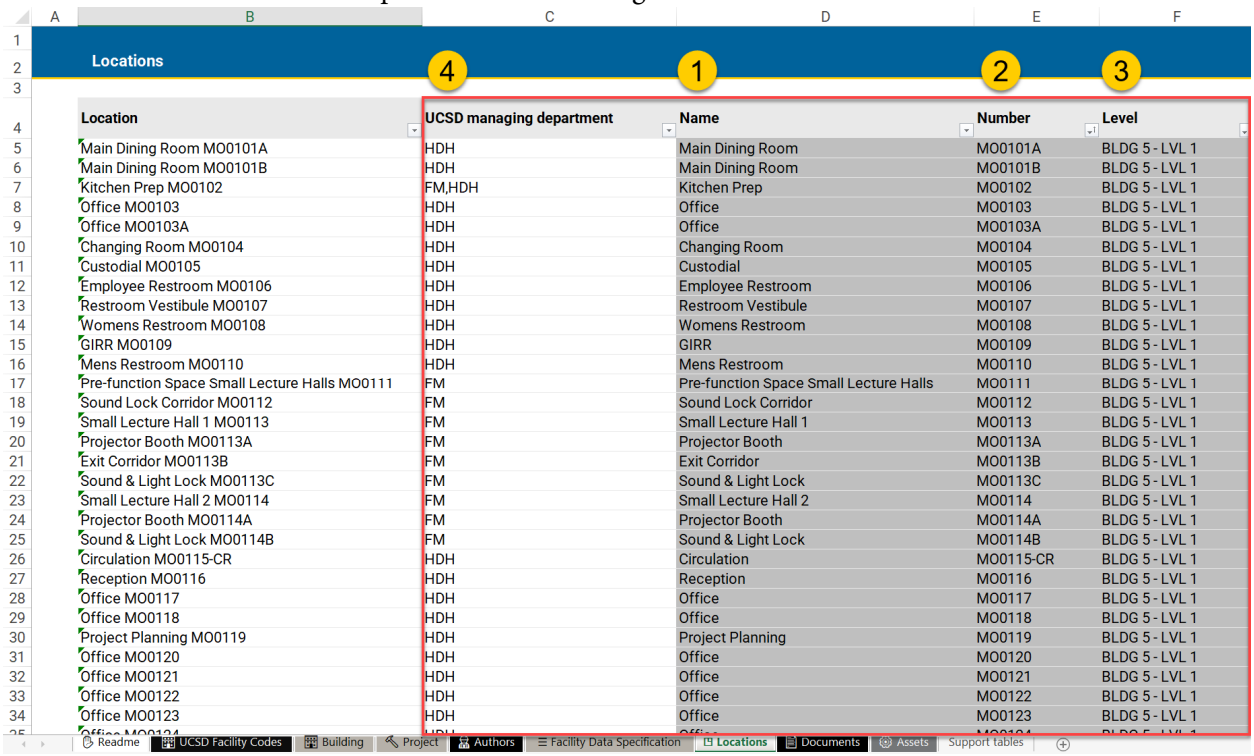
The Template locations table format requires the data author to indicate the following for all functional spaces (rooms) within the facility:

1) **Name**
2) **Number**
3) **Level** (building level the space resides on)
4) **UCSD Managing department** (facilities group with maintenance responsibility)

The data author should work with the University PM and data manager to include any additional rooms where managed assets are located if they are not shown on architectural floorplans, such as exterior equipment yards. All spaces containing managed assets should have location attributes as shown in the numbered list above.

Room numbers (space ID) and Level naming conventions, should conform to the requirements specified in the **Attachment 2 – Space ID Guidelines**. The "**Location**" column in the locations table template is calculated by formula and should equal the concatenation of the space name and number.

For projects involving existing spaces, such as tenant improvement and renovation, only spaces with managed assets need to be entered in the locations table for spaces where the space number (identifier) will remain the same. If space numbers will change, the responsible data author should enter the space in the locations table whether the space contains a managed asset or not.



Locations

Location	UCSD managing department	Name	Number	Level
Main Dining Room MO0101A	HDH	Main Dining Room	MO0101A	BLDG 5 - LVL 1
Main Dining Room MO0101B	HDH	Main Dining Room	MO0101B	BLDG 5 - LVL 1
Kitchen Prep MO0102	FM,HDH	Kitchen Prep	MO0102	BLDG 5 - LVL 1
Office MO0103	HDH	Office	MO0103	BLDG 5 - LVL 1
Office MO0103A	HDH	Office	MO0103A	BLDG 5 - LVL 1
Changing Room MO0104	HDH	Changing Room	MO0104	BLDG 5 - LVL 1
Custodial MO0105	HDH	Custodial	MO0105	BLDG 5 - LVL 1
Employee Restroom MO0106	HDH	Employee Restroom	MO0106	BLDG 5 - LVL 1
Restroom Vestibule MO0107	HDH	Restroom Vestibule	MO0107	BLDG 5 - LVL 1
Womens Restroom MO0108	HDH	Womens Restroom	MO0108	BLDG 5 - LVL 1
GIRR MO0109	HDH	GIRR	MO0109	BLDG 5 - LVL 1
Mens Restroom MO0110	HDH	Mens Restroom	MO0110	BLDG 5 - LVL 1
Pre-function Space Small Lecture Halls MO0111	FM	Pre-function Space Small Lecture Halls	MO0111	BLDG 5 - LVL 1
Sound Lock Corridor MO0112	FM	Sound Lock Corridor	MO0112	BLDG 5 - LVL 1
Small Lecture Hall 1 MO0113	FM	Small Lecture Hall 1	MO0113	BLDG 5 - LVL 1
Projector Booth MO0113A	FM	Projector Booth	MO0113A	BLDG 5 - LVL 1
Exit Corridor MO0113B	FM	Exit Corridor	MO0113B	BLDG 5 - LVL 1
Sound & Light Lock MO0113C	FM	Sound & Light Lock	MO0113C	BLDG 5 - LVL 1
Small Lecture Hall 2 MO0114	FM	Small Lecture Hall 2	MO0114	BLDG 5 - LVL 1
Projector Booth MO0114A	FM	Projector Booth	MO0114A	BLDG 5 - LVL 1
Sound & Light Lock MO0114B	FM	Sound & Light Lock	MO0114B	BLDG 5 - LVL 1
Circulation MO0115-CR	HDH	Circulation	MO0115-CR	BLDG 5 - LVL 1
Reception MO0116	HDH	Reception	MO0116	BLDG 5 - LVL 1
Office MO0117	HDH	Office	MO0117	BLDG 5 - LVL 1
Office MO0118	HDH	Office	MO0118	BLDG 5 - LVL 1
Project Planning MO0119	HDH	Project Planning	MO0119	BLDG 5 - LVL 1
Office MO0120	HDH	Office	MO0120	BLDG 5 - LVL 1
Office MO0121	HDH	Office	MO0121	BLDG 5 - LVL 1
Office MO0122	HDH	Office	MO0122	BLDG 5 - LVL 1
Office MO0123	HDH	Office	MO0123	BLDG 5 - LVL 1

Figure 2.2.1 Example locations table format within the Data Collection Template.

Assets Table

The Template asset table format requires the data author to indicate the asset data for each managed asset as defined in the University FDS and discussed in Section 2.1. The asset table format does not associate attributes to data drops. It is the responsibility of the project team and data authors to plan which attributes will be collected and delivered at specified data drops. In the graphic below, for convenience, the University has highlighted in red the attributes typically submitted at **drop one**, in purple the attributes typically submitted at **drop two**, and in green the attributes typically submitted in **drop three**.

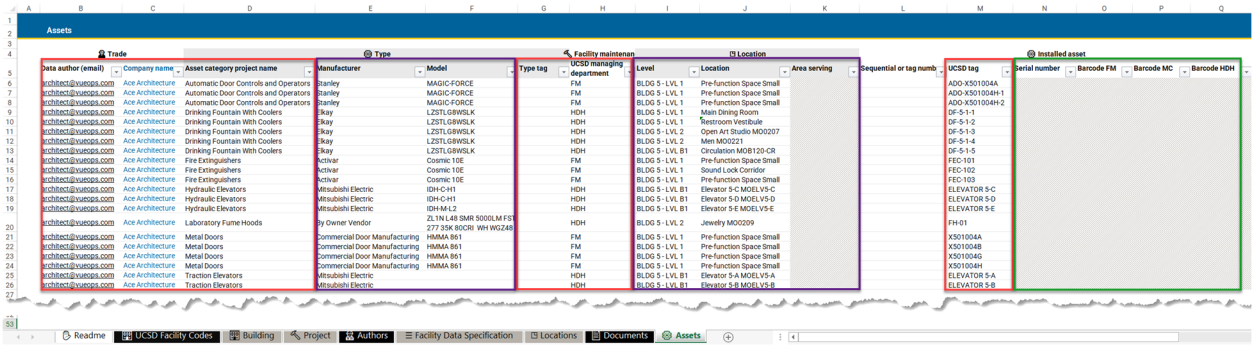


Figure 2.2.2 Example assets table format within the Data Collection Template.

e. Data Collection Progression – Data Drops and Final Submission

Project team lead with data authors defined in the **Facility Data Deliverables Schedule** should determine the full schedule of data drops and responsible data authors. After each drop is submitted, the data manager will review and comment, if required, on any errors, omissions, or other revisions needed. Data authors are expected to review data manager markups and revise and resubmit data drop tables as needed.

The Project Team Lead is accountable for ensuring all data authors submit their respective asset table deliverables and any resubmissions by data authors to address corrections or clarifications requested by the data manager.

After a data deliverable has been approved by the data manager, the Project Team Lead should ensure the approved file is made available to subsequent data authors for the same scope of assets to use as a starting point for the subsequent data drop. At the end of the project, the Project Team Lead should compile all approved data from each author and data drop into one assets table deliverable per facility for review and approval by the Data Manager.

Change Management

If attribute data in submitted and approved data drops change as a result of design or construction changes, the last data author submitting a data drop deliverable for the impacted assets is expected to revise and resubmit the asset table to reflect the change. The data author may wait to batch submit the revised deliverable file if many changes are expected that impact multiple assets within their scope.

Data authors should be attuned to and have a plan for handling the following scenarios that potentially change facility data deliverables:

1) **Design changes that affect spaces (locations)**
2) **Design changes or substitutions that affect product data (manufacturer, model)**
3) **Design changes that add or remove managed assets**
4) **Assets change location (space) after trade models have been signed off for coordination**

Barcoding

Asset categories requiring barcode labels are identified in the University FDS.

The project team may decide to assign full responsibility of all barcode labeling and collection of barcode numbers to multiple data authors or to an individual project team member, such as the commissioning agent. The project team lead should plan the process and tools necessary to efficiently track barcode label numbers in the field and to associate them with their related managed assets. The project team member performing barcode labeling ("**barcoder**") will position labels on assets in a manner that the barcode is visible and accessible to a facility engineer performing maintenance on the asset in the final facility condition.

It is recommended that the barcoder use a mobile device with barcode scanning capability to ensure accuracy of data entered from the field into the asset table. It is also highly recommended for the barcoder to maintain digital photo documentation of the barcode labels application to assets. The data manager and University project manager will facilitate obtaining barcode labels from the facilities group(s) having maintenance responsibility.

f. Data Translation and Delivery to Facilities

The Data Manager is responsible for translating asset and location data from the consolidated asset tables in the Data Collection Template format into the required CMMS file formats for each of the facilities groups.

g. Data Collection – Data Quality

Data authors should ensure that facility data submitted in asset and location tables comply with formatting requirements as described in **Section 2.1.f – Facility Data Source and Formatting Requirements**. Data authors should ensure that no typos exist in attribute values in their facility data deliverables and repetitious attribute values such as "Manufacturer" and "Level" have the same case and spelling across multiple assets and locations that share values.

At each facility data deliverable milestone, according to the facility data deliverables schedule, the data manager will conduct facility data quality checks. The University will maintain facility data quality checking procedures, both manual and automated, and may require the project team to make use of software tools or add-in's to conduct periodic checking of data to be delivered to the University over the course of the project. The University will provide feedback to the project team if revisions and resubmissions to the facility data deliverables are needed based on the outcome of data quality checks.

UC San Diego

3. Building Information Modeling Guidelines for Project Execution

The next section discusses what is expected of an individual project team through the BIM Execution planning activities and provides guidance on BIM uses that are important to the University.

3.1 BIM Execution Planning

a. Development of the BIM Execution Plan 

The Project Team is responsible for developing a **BIM Execution Plan** (BEP) for every project where BIM will be used. Responsibility for development of the BEP typically starts with the architect during the design phases and transitions to the construction manager/general contractor as the project enters construction. The architect and/or construction manager/general contractor is responsible for authoring, storing all versions of, and updating the project BEP. The project team, with the approval of the University Project Manager, should determine who will update and maintain the BEP for a specific project based on project delivery method and other factors. The timing, responsibility, and storage location of the latest BEP should be made known to the University and all project consultants, subconsultants, and contractors who will be a party to any of the requirements prescribed in the BIM Guidelines and actions planned in the BEP.

The project BEP should be maintained and revised as project team members are brought on-board and should be incorporated into all subconsultant and trade partner contracts who have model authoring responsibility. The latest version and versions from major project milestones should be saved in a location that is always accessible by the University and all Project Team members. The BIM Manager representing a firm contracted directly with the University should identify and give adequate reasoning for any deviations from the BIM Guidelines for themselves and their subconsultants and receive express written approval from the University Project Manager for these deviations with ample notice prior to the commencement or anticipated commencement of work related to the specific model deliverable.

b. BIM Level of Development (LOD) Matrix 

The University uses the industry standard LOD definitions as defined by the AIA document G202-2013 and BIMForum LOD Specification 2021 (see **Appendix B** for summary LOD definitions). A project BIM Level of Development (LOD) Matrix that specifies University minimum element LOD required by system will be provided as a starting point to the Project Team prior to start of model authoring. Identification of model element author (MEA) at each major phase of design and construction in the BIM LOD Matrix is a critical component of completing each version of the BEP. Any deviation from the University's minimum LOD requirement for each system should be reviewed and approved by the University Data Manager prior to model authoring (or expectation of the start of model authoring).

In **Appendix C – BIM LOD Matrix**, the University has provided a high-level mapping of modeled systems in Uniformat to asset categories in OmniClass™ format when there is an asset data requirement for the relevant modeled system component. This mapping should aid the Project Team when completing the LOD matrix in identifying potential objects that will require minimum model data (see Section 3.4). It is the responsibility of the Project Team and model authors to cross reference their modeling scope against the full FDS list of asset categories requiring asset data to determine which of their model elements will require attribution of asset data.

c. BIM Execution Plan Section Requirements

A project BEP outline is provided in **Appendix A – BIM Execution Plan Guidelines** . The template outline serves as a basis for the project BIM Execution Plan structure and sections that project teams should include. The BEP should be developed with input from the University during the initial design phase to provide groundwork for continued coordination throughout the BIM process. It will detail how BIM will be used throughout the design and construction process of the project into turnover and closeout.

3.2 BIM Uses Matrix

UC San Diego recognizes the industry standard Uses of BIM to align the purpose for implementing BIM on projects to specific BIM deliverables. The University expects project teams to implement the BIM uses listed in the table below. The BEP must outline how the required and chosen model uses will be incorporated into the BIM process. Other BIM uses not listed in the table may be implemented at the discretion of the project team based on project-specific goals and the capability of the individual project team members.

Project Phase	Model Use
Design	Design Authoring
	Design Reviews / Visualization / Rendering
	3D Coordination
Construction	Construction Modeling & 3D Coordination
	Record Modeling
	As-Built Modeling
Operations	Building Maintenance Scheduling
	Asset Management
	Space Management
	As-Managed Modeling

Table 3.2.1 Highest priority BIM uses for UC San Diego

3.3 Technology Requirements

All Project Team model element authors are required to use the software listed in the table below to participate in the University BIM design and construction process. CAD and BIM software should be a version agreed upon by the project team with approval from the University Project Manager. BIM tools should be documented in the project BEP. Upgrades to newer versions of software should be planned for and agreed upon by all affected project team members prior to implementation in the project. As a general rule, UC San Diego expects all project team members to work in authoring applications no older than two versions prior to the latest commercially available version.

BIM Use	Discipline/Role	Software
Design Authoring	Architecture	Revit®* or other
Design Authoring	MEP	Revit®* or other
Design Authoring	Structure	Revit®* or other
Design Authoring	Civil	Civil 3D® or other
Design Authoring	Landscape	Revit®* or other
3D Coordination	CM, All Trades	Navisworks® Manage or other
Construction Modeling, Digital Fabrication	All Trade Disciplines	Revit®*, 3D CAD, or other
Record Modeling	All	Revit®* and Navisworks® Manage or other
As-Built Modeling	All	Revit* and Navisworks® Manage or other
Asset Management	UC San Diego Facilities Mgmt.	IBM Maximo® and/or TMA Systems®**
Space Management	UC San Diego Space Mgmt.	IBM Tririga®*

Table 3.3.1 Technology requirements by BIM use

* Revit® refers to Autodesk® Revit® software, the University's preferred authoring tool. 3D AutoCAD®-based modeling packages or other BIM authoring tools must be reviewed and approved on a project basis by the University data manager.

** Shown for reference. Digital data conveyed in model deliverables or tabularly will be transferred to these systems by the University.

UC San Diego

3.4 Model Data Requirements and Modeling Practices

a. Attribution of Minimum Model Data

The University expects Project Teams to plan for the attribution of a minimum amount of facility data to model objects representing managed assets and locations (Rooms).

Assets

The minimum model data (MMD) for assets should be attributed to model elements in their native authoring applications. The MMD should match the asset data values for their asset table equivalents except in cases where the managed assets are not modeled. When managed assets are not modeled, the Project Team only needs to submit asset data in spreadsheet format.

The MMD for modeled managed assets are:

1. **Facility** – Helps to identify the object as a managed asset.
2. **Category** – Identifies the asset category that the object represents.
3. **Tag** - Unique asset identifier within the category. Matches value from design drawings. If no unique tag exists, enter **Type Tag** and develop **Tag** value later on.
4. **Type Tag** (optional) – Entered for assets without a unique tag and only a type-level tag (i.e. a tag that is repeated throughout the project, such as for a light fixture). Type tag usually becomes a prefix for the **Tag** value later on.

In many cases, the design team will not assign a unique tag to an asset on design drawings and will only assign a non-unique "type" tag. An example of this is shown in the diagram below in the case of drinking fountains.

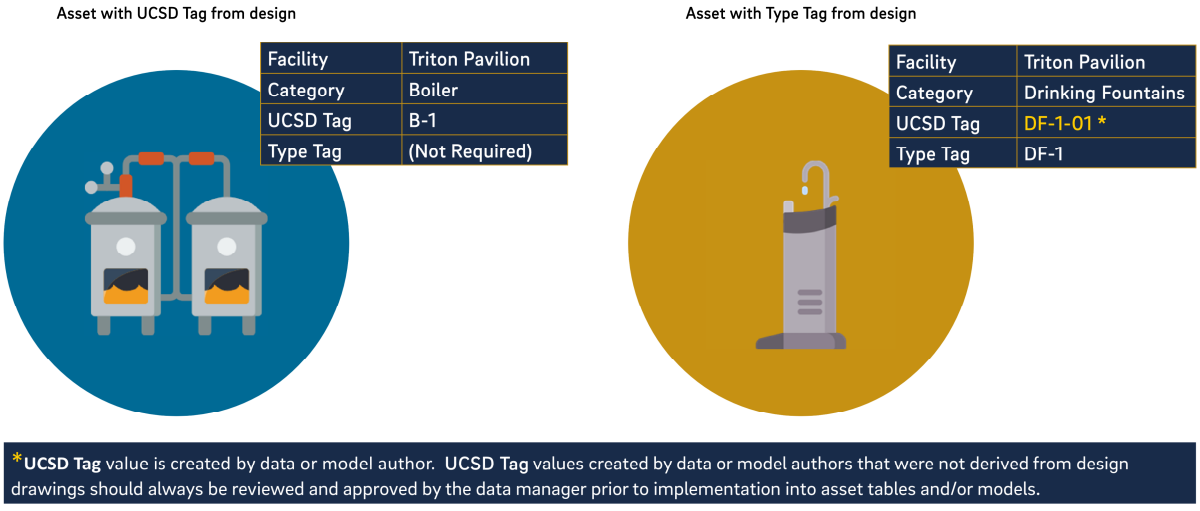


Figure 3.4.1 Examples of assets provided a unique tag and type tag only by the design team

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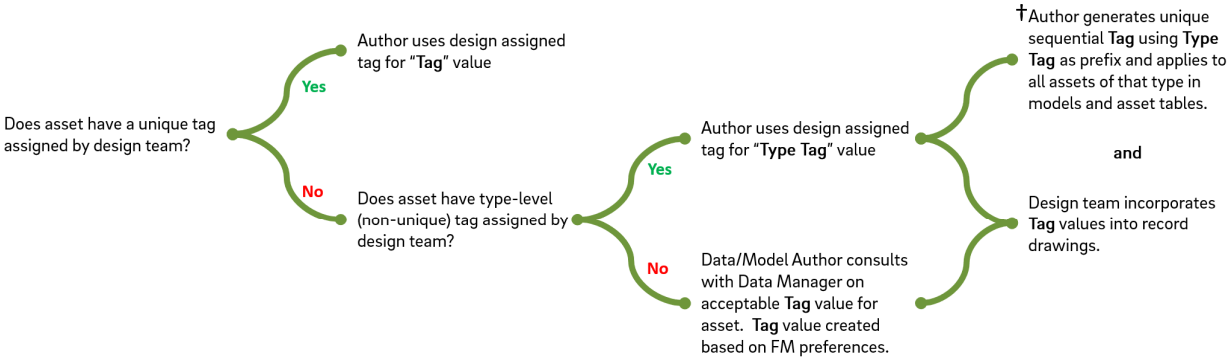
All drinking fountains in a project may be shown on plans as "DF-1". The "DF-1" value should be stored as the attribute "**Type Tag**", however, the facilities team still needs to have a unique identifier for each individual drinking fountain for maintenance tracking. The model author should work with the data manager to create **Tag** values in these cases. The **Tag** value should typically start with the **Type Tag** as a prefix followed by a sequential number, with a dash in between. The sequential number should typically be entered as a two-digit value (e.g. "01","02", etc.) for types with less than 100 instances. For types with more than 100 instances or where it is helpful to indicate the level in the number, the author may enter the leading digit as the level number followed by a two-digit sequential number (e.g. "101" would be the first asset of the type on Level 1).

Drinking Fountain Example

- All fountains tagged "DF-1" on floorplans
- Model author stores "DF-1" in the **Type Tag** attribute for all drinking fountains
- Model author gets approval through data manager to use format "DF-1-##" for **Tag** (## is a sequential two digit number)
- Model author applies approved **Tag** convention for each fountain in model
- Design team incorporates **Tag** values into record drawings and models

The general decision process shown in the diagram below can be used to determine when it is necessary to enter a **Type Tag** value for assets. In all cases, the model author should enter a (unique) **Tag** value for each managed asset, whether they are derived from design drawings or created by the model author. Any "invented" **Tag** values should be documented on relevant floorplans; preferably on record drawings but, at a minimum, as markups on PDF floorplans.



†Tag values created by data or model authors that were not derived from design drawings should always be reviewed and approved by the data manager prior to implementation into asset tables and/or models.

Figure 3.4.2 Decision tree for use of existing unique tags or creation of unique tags

Model Parameter Naming for Assets

To ensure consistency of named parameters across discipline models on each project, model authors should implement the following model parameter names when setting up models with minimum model data. The generic attribute name, which matches the Asset Table attribute name, is in the left column while the model parameter name is in the right column. The "Asset_" prefix is used to prevent duplication of already existing parameter names.

Attribute Name	Model Parameter Name
Facility	Asset_Facility
Category	Asset_Category
UCSD Tag	Asset_Tag
Type Tag	Asset_TypeTag

Table 3.4.3 Minimum model data parameter naming in native models

Minimum model data values for each object representing a managed asset must match exactly the attribute values conveyed in asset tables for its' equivalent managed asset. See **Section 2.1.f Facility Data Source and Formatting Requirements** for allowable values for MMD parameters and asset attributes.

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Locations

The minimum model data (MMD) for locations should be attributed to room objects in Revit® by the Architect. If Revit® software is not being used as the authoring application, an equivalent element type to room objects should be used to represent facility locations.

The MMD should match the asset data values for their location table equivalents. All locations in the location table should appear in the architectural model except for the generic "Site" or "Area" locations.

The MMD for modeled locations are:

1. **Facility** – Helps to identify the object as an in-scope location.
2. **Name –** Room name as it appears on architectural floorplans.
3. **Number** – Room number ("ID") as it appears on architectural floorplans.

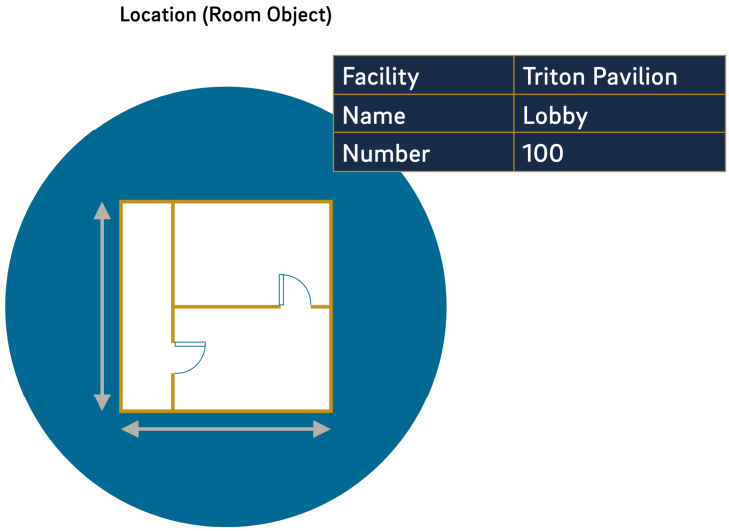

Figure 3.4.4 Location minimum model data

It is important for the locations model author to attribute the minimum data in their model since many times rooms are modeled that are not "in-scope", such as for design options. Attributing minimum model data helps the end user quickly filter to the set of room objects that are part of the official set of rooms in the project. The rooms model is also typically used to create the locations table

For additional requirements for room (space) numbering, see **Attachment 2 – Space ID Guidelines.**

Model Parameter Naming for Locations

Similar to model parameter naming for assets, parameter names for room objects should be established to enter minimum model data. Room objects (spaces) are typically represented in the Architect's model. One or multiple models may be used to store the full set of room objects for the project. The "Facility" attribute should be setup for room model objects as "Asset_Facility". The "Name" and "Number" parameters may use the out-of-the-box Revit® parameters to store these attributes unless UC San Diego Space Management has requested a different room numbering scheme than what is shown on drawings. In this case, the model author may create a different parameter ("Asset_Number") to store the Space Management room number (Space ID).

Attribute Name	Model Parameter Name
Facility	Asset_Facility
Name	Name
Number	Number

Table 3.4.5 Minimum model data for room objects

b. Minimum Model Data – Design vs. Trade Model

In most cases, trade models should be used to store minimum model data, if they exist for the given discipline.

Most projects where BIM is used by the Project Team will involve a progression of multiple models from design to construction, increasing in level of detail and development. Trade models created for the purpose of 3D coordination are typically created separately and discontinuously from their design model counterparts. As a result, projects end up with a set of design models at a lower level of detail and development than trade models for the same discipline. While these models may contain the same assets, design models may lag in their accuracy of object location and orientation if substantial changes have occurred through the 3D trade coordination process. In addition, design models may not contain as many managed assets as their trade model counterparts.

Project Teams do not need to submit minimum model data in both design and construction models for the same assets. During BIM Execution Planning, the Team should identify if design or trade model will store the minimum model data for each discipline. The Team should consider the following factors when choosing the model to store minimum data for each discipline:

1. **Level of Development** – Which model is most accurate when it comes to location of managed assets? (Location of assets closer to actual field location is preferred).
2. **Level of Detail** – Which model has more managed assets from the assets table? (Model containing more asset representations is preferred).
3. **Is there a model created later in the project that will show the same scope of assets**? – If there is no construction or trade model, then minimum model data should be stored in the

design model.

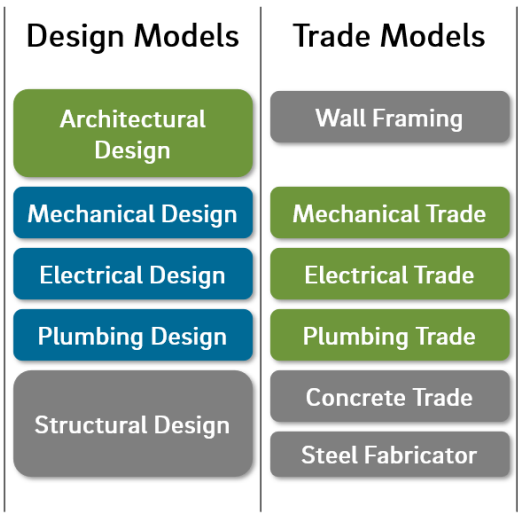

Fig. 3.4.6 The diagram lists a subset of commonly created project models and their trade or discipline. Design models in the left column have scope that typically is found in trade models to the immediate right. The University recommends Project Teams use the model highlighted in green to store minimum model data, if they exist on the project, for the given discipline. The Project Team should decide with the data manager which model will store minimum data and consider each projects unique circumstances.

Model does not contain managed assets, no minimum data required

Model has managed assets but does not store minimum model data

Model has managed assets and stores minimum model data

c. Modeling Practices

This section outlines some of the modeling requirements and best practices that have been deemed important by the University.

a. Project teams should determine a strategy for setting up models adequately if project is to be delivered in phases. Phased projects should develop a phased digital data milestone deliverables schedule that aligns with University needs for using project data as determined by the University Data Manager.

b. The project team must determine the progression of the model from a design-intent model to a digital fabrication model and ultimately the record and as-built models. The hand-off of models and data between team members and storage location for the model at each phase of the project should be documented in the BEP.

c. Project teams should store minimum model data in model element parameters for objects representing managed assets as described in sections 3.4a and 3.4b of this Guidelines.

d. Model element authors should make appropriate use of Revit® model element categories for their modeled scope according to industry best practices. University may provide and require Revit® shared parameter files or equivalent to be used by project teams to facilitate storage of minimum model data.

e. Model element authors should include all system components as specified by the project BIM LOD matrix including all connections to utilities. University may request a project team member to insert and/or maintain owner-furnished assets in a team members model for space planning and locating assets within the planned facility.

f. Project team should ensure that clearance zones, "no-fly" zones, access zones for serviceability requirements, and additional layers for each component (e.g. insulation) is modeled to communicate necessary space needs for all systems. For above-ceiling assets, clearance and access zones shall extend from the asset it belongs all the way to the floor.

g. Model setup for managing large models is at the discretion of the project team. Due to large file sizes of design authoring and construction models, model structure should be created in a logical manner determined by project scope. A reasonable effort must be taken to keep model sizes to a minimum file size.

h. Project team should follow the file naming convention as defined in **Attachment 1: File Naming Conventions**. Project team should request written approval from the University Data Manager for any proposed deviations from the file naming convention.

i. Model authors should regularly audit their models as defined by industry standard best practices for the software of choice (e.g. in Revit® models, review and resolve excessive warnings, purge unused, compact the model file on a regular basis, etc).

j. Annotation tags in the models must be setup in a way that equipment lists can be extracted from the Revit® or CAD models at any time during the project. For models to be useful for data collection, it is important that annotation tags pull data from model element parameters. It is also critical that the tag naming convention established in the design documentation is carried through in other project documentation and deliverables including, but not limited to, submittals, construction models, and data deliverables.

k. All models should be created using the University standard coordinate system. For horizontal and vertical control, use benchmark description corresponding to California Coordinate System–North American Datum (NAD) 1983 and vertical description based on National Vertical Geodetic Datum (NGVD) 1929. Project coordinate system for 2D sheets and drawings should orient the major gridlines or project features orthogonal to primary floor plan sheet views. Imperial measurement system will be used for all modeling.

3.5 Project Collaboration and Meetings

The BIM modeling and management processes will be executed by the Model Authors to be designated by each project team firm and outlined in the BIM Execution Plan (BEP). Their responsibilities will include, but are not limited to, the managing of BIM model development from initial design through the as-managed and/or as-built model turnover. The Model Authors will work closely with the University Data Manager and University Project Manager, inclusive of key Facilities Management personnel, to identify and implement successful integration of the record model into life cycle management systems and ensure the models accuracy according to the processes outlined in this document and project BIM Execution Plan.

A minimum meeting schedule is provided below. The BEP should incorporate the below meeting types as needed to accomplish the goals and BIM uses of each project.

MEETING TYPE	PACKAGE	PROJECT STAGE	FREQUENCY
BIM Requirements Design Kick-off	BIM	Programming	Once
BIM Execution Plan Review	BIM	Programming	As-needed
Design Coordination/QC	CAD	SD/DD/Bidding	Once per Stage
Design Coordination/QC	CAD	CD	Monthly
BIM Requirements CM Kick-off	BIM	CM Award	Once
BIM Execution Plan Review	BIM	Post-Award	As-needed
Trade Coordination/QC	CAD	Construction	Monthly
Model Deliverable Checks	BIM	Design/Construction	Each Model Milestone (with Min Model Data)
Lifecycle BIM Planning	BIM	Construction	As-needed

Table 3.5.1 Recommended meeting schedule to support minimum BIM uses

3.6 University Naming Standards

The following table of attachments should be referenced by data and model authors when creating and entering design and construction information for the listed topics in the left column. Naming standards should be implemented into project documentation starting with the phase noted in the "Project Phase Implemented" column.

Naming Standard Addressed	Project Phase Implemented	Relevant Attachment
File Naming for PDF drawings, 2D CAD files, and model files.	Schematic Design	Attachment 1 – File Naming Conventions
Space identifiers (room numbers)	Design Development	Attachment 2 – Space ID Guidelines
Asset category values (for MMD)	**Design Models:** Prior to 100% CD; **Trade Models:** Prior to end of coordination	Attachment 3 – Facility Data Specification
Model parameter naming (MMD)	**Design Models:** Prior to 100% CD**; Trade Models:** Prior to end of coordination	BIM Guidelines – Section 3.4a
Sheet and View Naming (in Revit®)	Design Development	Attachment 5 – Sheet and View Requirements for Revit® Models
CAD Layering for Space Management Floorplans	Record Drawings	Attachment 6.1 – CAD Exports – Layer Mapping and Modeling Guidance

Table 3.6.1 Naming standards addressed in the Guidelines and their related section or attachment number

3.7 BIM Deliverables Schedule

Project teams must submit plans, reports, models, and other deliverables as described in **Table 3.7.1** below. Any project-specific BIM uses and associated deliverable dates should be discussed with and approved by the data manager and added to the BIM deliverables schedule.

As part of the BIM Execution Plan (BEP), the project team should develop a BIM deliverables schedule using the template found in the "**UCSD Deliverables Schedules**" spreadsheet, as a part of the BIM Execution Plan submissions (see **Appendix A – BIM Execution Plan Guidelines** for additional detail). The Template contains the same deliverable items as shown in **Table 3.7.1** and has additional columns for the Team to populate project-specific details around timing, responsibility, and file types.

The University will be responsible for the use of any non-Revit® model deliverables provided by the members of the project team. UC San Diego will make the necessary provisions for working with these models including procuring necessary software and services to work with these models for the purposes of preparing them for use post-construction by user groups in the University.

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BIM Submittal Item	BIM Submittal Item	Submitted or Available	Stage	Frequency of Occurrence	Notes
BIM Execution Planning	BIM Execution Plan (Design)	Submitted	Schematic Design	Once	BEP should be reviewed with UCSD PM Team and Data Manager.
	BIM Execution Plan (Construction)	Submitted	Preconstruction	Once	Review BEP plan with UCSD PM and Data Manager, updated by the CM/GC and trade partners model authors.
Design Authoring	Schematic Design Phase Models for Review	Available	Schematic Design	Biweekly	Current RVT or native model files uploaded to model collaboration platform or University system-of-record at major SD milestone reviews.
	Design Development Models for Review	Available	Design Development	Biweekly	Current RVT or native model files uploaded to model collaboration platform or University system-of-record at major DD milestone reviews.
	Construction Document Models for Review	Available	Construction Documents	Biweekly	Current RVT or native model files uploaded to model collaboration platform or University system-of-record at major CD milestone reviews.
3D Coordination	Design Coordination Reports (DD)	Submitted	Design Development	Monthly	Reports should indicate major areas of design coordination issues, issue status, action required by when, team member(s) issue assignment.
	Design Coordination Reports (CD)	Submitted	Construction Documents	Monthly	Reports should have more detailed coordination items organized by discipline compared to the high-level DD coordination reports.
	Construction Models (for Coordination)	Available	Construction	Weekly	Native models developed for coordination and shop drawings and any exports required for the coordination process.
Space Management	Construction Documents Drawing Sets	Submitted	Construction Documents	Once	PDF drawing sets. See UCSD CAD Standard (Attachment 6).
	Space Management Floorplans (CD)	Submitted	Construction Documents	Once	CAD exports from space management views stored in architectural models. See BIM Guidelines Attachment 1, 5, and 6.
	Space Management Floorplans (Closeout)	Submitted	Closeout	Once	CAD exports from space management views stored in architectural models. See BIM Guidelines Attachment 1, 5, and 6.
Model Data Quality	Design Models with MMD for Review	Submitted	Construction	Once	Design models from design authoring, if identified as storing min model data (MMD) based on LOD Matrix, will be reviewed by Data Author for completeness of MMD at some point after 100% CD's or equivalent.
	Trade Models with MMD for Review	Submitted	Construction	Once	Trade models from trade coordination, if identified as storing min model data (MMD) based on LOD Matrix, will be reviewed by Data Author for completeness of MMD at some point after trade coordination.

Record Modeling	Record Documents Drawing Sets	Submitted	Closeout	Once	PDF drawing sets. See UCSD CAD Standard (Attachment 6).
	Record Models	Submitted	Closeout	Once	The record model will become the University as-managed model. All assets identified in the FDS should be represented within UCSD-specified tolerances for record models. Facility data deliverables should align back to record models. Revit® highly preferred.
As-Built Modeling	As-Built Models	Submitted	Closeout	Once	As-built models will be used for reference in facility operations to represent the most accurate location of distribution and routings.

Table 3.7.1 BIM Deliverables Submission Requirements by BIM Use

3.8 Model Quality

Design and Construction BIM Uses

The BIM process is suited to improve coordination of the design and construction process, as well as deliver improved information for facilities management. Building information models are expected to be reviewed with coordination analysis tools such as Navisworks® Manage, BIM 360® Glue, or Solibri® Office, to identify clashes between elements, clashes of required clearances and other tolerances. Design team, construction manager, subcontractors, and vendors are required to coordinate models between disciplines to verify clearance, analyze conflicts/clashes and deliver quality documentation to reduce RFI and change order submissions. Models should include all appropriate dimensioning as needed for design intent, analysis, and construction.

Minimum Model Data

In addition to BIM practices within the Project Team that support model quality, model submissions to the University will be reviewed by the data manager for completeness and accuracy according to this Guidelines document. Model authors should plan and document their intent to store minimum model data through use of the **Appendix C: University BIM LOD Matrix.**

The data manager will primarily be checking for the presence of managed assets within models and completeness and accuracy of minimum model data (MMD) at model submission milestones. Model authors are expected to review data manager model quality feedback and, if requested, resubmit models with corrections to missing or insufficient model elements and/or minimum model data.

Record and As-Built Modeling

Model authors responsible for record and as-built models at project completion should also setup processes to revise models according to final design intent and field conditions, respectively. As the University progresses with BIM implementation, specific procedures around field validation for record and as-built models may be requested of model authors. On some occasions, the University may request laser scanning be used to verify existing conditions or as-built conditions against the design and/or signed-off coordination models for accuracy if deemed necessary.

The project team will provide the University with copies of model files for archive after each phase of design and construction, per the deliverables schedule and models must be of the same model date for when formal issuances of drawing sets were published such that they are both consistent with one another. Project drawings and schedules required for agency review, bidding, and construction will be extracted from this model. The University will assemble the final as-managed model from record and as-built project models and is what will be integrated to the University LCM systems.

The project team should document all model quality related practices in the project BIM Execution Plan. See **Appendix A – BIM Execution Plan Guidelines**.

UC San Diego

4. Definitions

A

As-Built Documents

As-Built Documents are the collection of paper drawings or electronic drawings that typically reside in the contractor's onsite trailer that contain mark-ups, annotations, and comments about changes that have been made to the contract documents during the construction phase.

As-Built Model

Construction models that have been updated throughout the construction process to reflect as-built conditions. These changes and updates have been communicated from the Contractor to the Design Team through the comments, annotations, and mark-ups from the As-Built Documents. These typically, but not always, are discipline specific models.

As-Managed Model

The set of models that represent an accurate depiction of a facility post-construction and allows the facility manager to make regular updates to reflect the current state of the facility. The as-managed models are updated as a result of any major or minor work performed on a facility that adds, removes, or otherwise changes managed facility data and functional aspects of spaces and assets within the facility. As-managed models typically originate from a project's record models and/or as-built models and are provided in a format that can be updated and maintained as a digital asset by the facility owner or manager. Record and as-built model detail may be simplified to focus the as-managed models on assets that will be regularly maintained and accessed by the facility manager. **The creation of the as-managed model set from project models at UC San Diego is the responsibility of the University.**

B

BIM Execution Plan (BEP)

The BEP helps to define roles and responsibilities within a project team as it relates to BIM and BIM uses.

BIM LOD Matrix

A matrix that communicates the required level of development of model elements by building system, the planned model element LOD and the model element author at each stage of the project.

C

CMMS (Computerized Maintenance Management System)

A software that centralizes maintenance information and facilitates the processes of maintenance operations. It helps optimize the utilization and availability of physical equipment like machinery, communications, plant infrastructures, and other assets. CMMS have a database and a data model that organizes information about the assets a maintenance organization is charged with maintaining, as well as the equipment, materials, and other resources to do so.

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D

Design Team

The Design Team is considered to be the Architect and all of the consultants that provide design services for a project. These design services can be rendered at any time during the project.

DWG

DWG is the native AutoCAD® file format. It is a widely used file format for exchanging drawing information and 3D information to different programs. While not a database file type, it still has many uses for exchanging information.

F

Facility Data Manager

Project team member responsible for collecting and submitting facility data for their firms scope as required by the University Facility Data Specification.

Facility Data Specification (FDS)

Document describing the University information requirements for managed assets. Lists the attributes required to be submitted according to asset class by the project team on capital projects.

I

Industry Foundation Classes (IFC)

A neutral and open model specification that is not controlled by a single vendor or group of vendors. It is an object-based file format.

L

Lifecycle management systems (LCM)

Suite of software applications and tools that make up the University's management suite for facilities maintenance and operations including CMMS (Computerized Maintenance and Management System), space management, GIS, among others.

Level of development (LOD)

Used to define the increasing level of reliability of model element definition and location through the design and construction process. Allows model authors to define what their models can be relied on for and allows downstream users to clearly understand the usability and the limitations of models they are receiving.

M

(IBM) Maximo

A web-based computerized maintenance management system (CMMS) and enterprise asset management solution. Maximo provides inventory and asset management, predictive and preventive maintenance, analytic reporting, and work order management in one application suite. Maximo is the CMMS used by Housing, Dining, and Hospitality, Campus FM, and the Med Center at UC San Diego.

N

Navisworks®

Navisworks® software is an application that allows viewing and aggregation of multiple model formats. This ability to view these files allows Navisworks® software to simulate the interaction between model files from different design disciplines or trade contractors. That includes collision detection, 4D construction sequencing, and coordination.

No-fly Zones

No-fly Zones are areas identified in the BIM with semi-transparent massing rectangles that represent zones necessary for maintenance and repair of equipment, access to valves, access above and below ceiling/wall access panels, access in front of electrical panels, etc.

.NWC

An .NWC file is a Navisworks® Cache File that is used by Navisworks® to quickly read many other file types. NWC stores both geometry from the native authoring application and parameter data in a highly compressed file size. All linked files in Navisworks® software have an .NWC file created automatically. In addition, many common BIM and CAD tools will export directly to .NWC for quick access by Navisworks® software.

.NWD

A much larger file than the .NWC, the .NWD file allows a snapshot in time of a Navisworks® file. No link to the original file exist, but all geometry, parameter data, saved views, clash tests, and other Navisworks® application data is packaged into the NWD.

.NWF

The .NWF file is a native Navisworks® file which references all linked files and stores data on clashes, markups, animations, schedules, etc. An .NWF is lightweight and typically transmitted with all linked design and construction model files which contain the overall models geometry and element attribute data.

R

Record Drawing

The production of Record Drawings is the capturing of the As-Built Document's annotation, comments, and mark-ups in a drawing format only. This does not typically include the updating of any models.

Record Model

The Record Model is a final model incorporating all changes throughout the construction process. Record Models consist of Record design intent models (by the design team) and incorporates facility data into object parameters.

Revit

Autodesk® Revit® software is a building information modeling (BIM) application used by architects, engineers, and detailers to create design authoring models, trade models for coordination and fabrication, and 2D architectural and engineering drawings.

RVT

An RVT file is a Revit® native file type. It is also the deliverable file format for all projects for design model authoring.

S

Shop Drawing(s)

Shop Drawings are produced from the coordinated models of each trade and include all dimension and labeling. Submitted for approval by the Project team. These drawings are then used in the field for fabrication and erection.

Signoff Model

A signoff model is a coordination model that has been completed and signed off for construction.

T

TMA

TMA or webTMA is a computerized maintenance management system used to manage campus physical assets and streamline operations for facility services. TMA allows users to setup and manage facilities, buildings, technicians, and vehicles. Users can produce schedules, book facilities and assets, assign dates for repairs and maintenance, and perform inventory checks. TMA is one of the CMMS' in use by the UC San Diego Medical Center.

(IBM) Tririga

An integrated workplace management solution (IWMS) developed by IBM. Enables users to perform space planning and optimization functions and allows occupants to make service requests and book rooms.

UC San Diego

Appendix A – BIM Execution Plan Guidelines

The project team should follow the BIM Execution Plan (BEP) outline below when creating their project BEP. The Team may re-order and expand on the below list of topics, however, each topic in the outline should be addressed regardless of the BEP format used.

The Plan should be reviewed with the UC San Diego PM and Data Manager at least twice during the project; once at the beginning of design and once after the CM/GC has been brought on-board and updated the initial design phase BEP.

For more instruction and examples for each topic section, see the accompanying **UCSD BEP Reference Template**.

BIM Execution Plan

Cover Page

1) **Project Information**
    a. General Project Info
    b. Project BIM contacts table
    c. Project Schedule Summary – Design stage and construction phase start and end dates
2) **Project Goals (Supported by BIM Uses)**
    a. Goal description
    b. Responsible team member(s) and actions to accomplish goal
    c. Goal metrics
    d. Team member measurable objectives
3) **BIM Uses**
    a. BIM Use Description – Software/technology, version, team members
    b. Other software/technology –Non-BIM tools to support improved project outcomes, the purpose or function, team members
    c. Training (if required) –External training and procedural documentation for BIM Use and other tools
4) **Collaboration**
    a. Document management system(s)
    b. Model collaboration and exchange platform(s)
    c. Collaboration methods and tools
    d. Coordinate system and model units
    e. Meetings required to accomplish BIM uses – See **T2O/BIM Guidelines Section 3.5** for base list of meetings expected
    f. Information Exchanges
    g. Model File Naming Convention – See **Attachment 1 – File Naming Conventions**

5) **BIM Deliverables Schedule**
    a. Itemized list of all major BIM submissions – See **UCSD Deliverables Schedules** spreadsheet.
6) **Model Quality**
    a. Model quality strategies at each deliverable
    b. Model quality tools
    c. Checklists used to ensure model quality
7) **BIM Use Instructions**
    a. BIM use description
    b. Team members involved
    c. BIM use process information
    d. BIM use procedural documentation
8) **BIM LOD Matrix**
    a. Table of building systems, model authors by project phase and planned LOD – **See Appendix C – BIM LOD Matrix**
9) **Record Modeling**
    a. Record modeling process and timing
    b. Record modeling responsibility by discipline
10) **As-Built Modeling**
    a. As-Built modeling process and timing
    b. As-Built modeling responsibility by trade

The University requests Project Teams use the **UCSD Deliverables Schedules** spreadsheet and **BIM LOD Matrix** spreadsheet provided to complete the following BEP-related sections:

BIM Deliverables Schedule (Item 5) — Documents all model deliverables from each team member and timing so the University can ensure adequate project information from BIM is available to inform project actions and decisions.

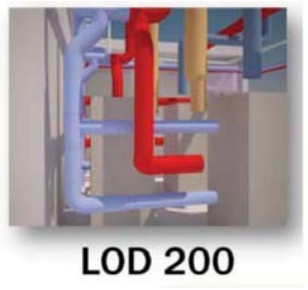
BIM LOD Matrix (Item 8) — Spreadsheet matrix used for the project team to plan model element level of development and responsibility by project phase and for each building system. The UC San Diego BIM LOD Matrix has a minimum expected LOD pre-populated for the Team to build on. The Matrix also contains a column for the Team to plan and document the specific project model for each system that will store the minimum model data (MMD). See **Appendix C – BIM LOD Matrix** of this Guidelines for the pre-populated table. Additional process, tools, and sections of the project-specific BEP are welcomed. Project Teams are encouraged to push innovation at UC San Diego to enhance the process and project outcomes.

UC San Diego

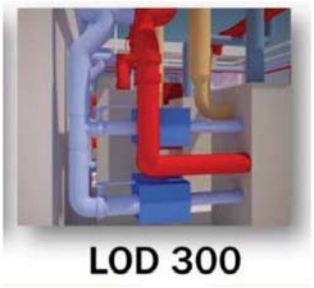
Appendix B – BIM LOD Definitions

The following outlines University's definition of Level of Development (LOD) for BIM deliverables. The University follows LOD definitions as defined by the AIA document G202-2013 Project BIM Protocol Form and BIMForum LOD Specification 2021.

LOD 100- The model element is graphically represented within 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.



LOD 200- 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.

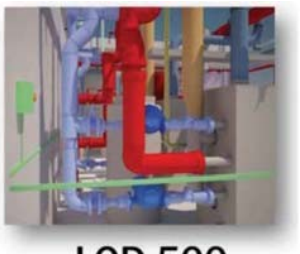


LOD 300- The model element is graphically represented within the model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the model element.

LOD 350- The model element is graphically represented within the model as a specific system, object, or assembly in terms of quantity, size, shape, location, orientation and interfaces with other building systems. Non-graphic information (e.g. facility data) may also be attached to or associated with the model element.

LOD 400

LOD 400- 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 (e.g. facility data) may also be attached to or associated with the model element.



LOD 500

LOD 500 - The model element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information (e.g. facility data) may also be attached to or associated with the model element.

Appendix C – BIM LOD Matrix details model components and their required minimum LOD for record and as-built model deliverables.

UC San Diego

Appendix C – BIM LOD Matrix – University Minimum Requirements

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1																			
2	Classifications		Client	MMD	Design								Construct		Operate				
3	Systems	FDS Product Class (Minimum Model Data Requirement)		Model Storing MMD	Schematic Design		Design Development		Construction Documents		Design Intent		Trade Coordination		Record Modeling		As-Built Modeling		
4	CSI UniFormat 2010	OmniClass Table 23	UCSD Client	Author	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD Notes
5	**A Substructure**																		
6	**A10 Foundation**																		
7	A1010 – Standard Foundations																		
8	A1010.10 – Wall Foundations										300				300				
9	A1010.30 – Column Foundations										300				300				
10	A1010.90 – Standard Foundation Supplementary Components																		
11	A1020 – Special Foundations																		
12	A1020.10 – Driven Piles										300				300				
13	A1020.15 – Bored Piles										300				300				
14	A1020.20 – Caissons										300				300				
15	A1020.30 – Special Foundation Walls										300				300				
16	A1020.40 – Foundation Anchors																		
17	A1020.50 – Underpinning																		
18	A1020.60 – Raft Foundations																		
19	A1020.70 – Pile Caps										300				300				
20	A1020.80 – Grade Beams										300				300				
21	**A20 Subgrade Enclosure**																		
22	A2010 – Walls for Subgrade Enclosures																		
23	A2010.10 – Subgrade Enclosure Wall Construction										300				300				
24	A2010.20 – Subgrade Enclosure Wall Interior Skin Plaster and Gypsum Board										300				300				
25	A2010.90 – Subgrade Enclosure Wall Supplementary Components																		5
26	**A40 Slabs-on-Grade**																		
27	A4010 – Standard Slabs-on-Grade										300				300				
28	A4020 – Structure Slabs-on-Grade										300				300				
29	A4030 – Slab Trenches										300				300				
30	A4040 – Pits and Basses										300				300				
31	A4090 – Slab-On-Grade Supplementary Components																		
32	A4090.10 – Perimeter Insulation																		5
33	A4090.20 – Vapor Retarder																		5
34	A4090.30 – Waterproofing																		5
35	A4090.50 – Mud Slab																		5
36	A4090.60 – Subbase Layer																		5
37	**A60 Water and Gas Mitigation**																		
38	A6010 – Building Subdrainage																		
39	A6010.10 – Foundation Drainage										300				300				
40	A6010.20 – Underslab Drainage										300				300				
41	A6020 – Off-Gassing Mitigation																		
42	A6020.10 – Radon Mitigation																		
43	A6020.50 – Methane Mitigation																		
44	**A90 Substructure Related Activities**																		
45	A9010 – Substructure Excavation																		
46	A9010.10 – Backfill and Compaction																		
47	A9020 – Construction Dewatering																		
48	A9030 – Excavation Support																		
49	A9030.10 – Anchor Tiebacks																		
50	A9030.20 – Cofferdams																		
51	A9030.40 – Cribbing and Walers																		
52	A9030.60 – Ground Freezing																		
53	A9030.70 – Slurry Walls																		
54	A9040 – Soil Treatment																		
55	**B: Shell**																		
56	**B10 Superstructure**																		
57	B1010 – Floor Construction																		
58	B1010.10 – Floor Structural Frame										300				300				
59	B1010.20 – Floor Decks, Slabs, and Toppings										300				300				

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
2	**Classifications**		**Client**	**MMD**	**Design**								**Construct**		**Operate**				
3	**Systems**	**FDS Product Class (Minimum Model Data Requirement)**		Model Storing MMD	**Schematic Design**		**Design Development**		**Construction Documents**		**Design Intent**		**Trade Coordination**		**Record Modeling**		**As-Built Modeling**		
4	**CSI UniFormat 2010**	**OmniClass Table 23**	**UCSD Client**	**Author**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD Notes**
60	B1010.30 – Balcony Floor Construction										300				300				
61	B1010.40 – Mezzanine Floor Construction										300				300				
62	B1010.50 – Ramps										300				300				
63	B1010.90 – Floor Construction Supplementary Components																		5
64	B1020 – Roof Construction																		
65	B1020.10 – Roof Structural Frame										300				300				
66	B1020.20 – Roof Decks, Slabs, and Sheathing										300				300				
67	B1020.30 – Canopy Construction										300				300				
68	B1020.90 – Roof Construction Supplementary Components																		5
69	B1080 – Stairs																		
70	B1080.10 – Stair Construction										300				300				
71	B1080.30 – Stair Soffits										300				300				
72	B1080.50 – Stair Railings										300				300				
73	B1080.60 – Fire Escapes										300				300				
74	B1080.70 – Metal Walkways										300				300				
75	B1080.80 – Ladders										300				300				15
76	**B20 Exterior Vertical Enclosures**																		
77	B2010 – Exterior Walls																		
78	B2010.10 – Exterior Wall Veneer										300				300				16
79	B2010.20 – Exterior Wall Construction										300				300				16
80	B2010.30 – Exterior Wall Interior Skin										300				300				16
81	B2010.40 – Fabricated Exterior Wall Assemblies										300				300				16
82	B2010.50 – Parapets										300				300				16
83	B2010.60 – Equipment Screens										200				200				
84	B2010.80 – Exterior Wall Supplementary Components																		5
85	B2010.90 – Exterior Wall Opening Supplementary Components																		5
86	B2020 – Exterior Windows																		
87	B2020.10 – Exterior Operating Windows										300				300				
88	B2020.20 – Exterior Fixed Windows										300				300				
89	B2020.30 – Exterior Window Wall										300				300				
90	B2020.50 – Exterior Special Function Windows										200				200				
91	B2050 – Exterior Doors and Grilles																		
92	B2050.10 – Exterior Entrance Doors	23-17 11 00: Doors (Main Entrance Doors Only)	FM,MC								300				350				
93	B2050.20 – Exterior Utility Doors	23.17.11.13.25: Overhead Metal Doors	FM								300				350				
94	B2050.30 – Exterior Oversize Doors										300				350				
95	B2050.40 – Exterior Special Function Doors	23.17.11.23.15: Folding All Glass Doors and Grilles	FM								300				350				
96	B2050.60 – Exterior Grilles										200				200				
97	B2050.70 – Exterior Gates										200				200				
98	B2050.90 – Exterior Door Supplementary Components																		5, 8
99	B2070 – Exterior Louvers and Vents																		
100	B2070.10 – Exterior Louvers										300				300				
101	B2070.50 – Exterior Vents										300				300				
102	B2080 – Exterior Wall Appurtenances																		
103	B2080.10 – Exterior Fixed Grilles and Screens										200				200				
104	B2080.30 – Exterior Opening Protection Devices										200				200				
105	B2080.50 – Exterior Balcony Walls and Railings										300				300				
106	B2080.70 – Exterior Fabrications										200				200				
107	B2080.80 – Bird Control Devices																		
108	B2090 – Exterior Wall Specialties										200				200				
109	**B30 Exterior Horizontal Enclosures**																		
110	B3010 – Roofing																		
111	B3010.10 – Steep Slope Roofing										300				300				
112	B3010.50 – Low-Slope Roofing										300				300				
113	B3010.70 – Canopy Roofing										300				300				
114	B3010.90 – Roofing Supplementary Components	23-13 39 00: Roof Coverings, Claddings, Linings	MC								300				350				5, 8

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
2	Classifications		Client	MMD	Design								Construct		Operate				
3	Systems	FDS Product Class (Minimum Model Data Requirement)		Model Storing MMD	Schematic Design		Design Development		Construction Documents		Design Intent		Trade Coordination		Record Modeling		As-Built Modeling		
4	CSI UniFormat 2010	OmniClass Table 23	UCSD Client	Author	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD Notes
115	B3010.90 – Roofing Supplementary Components	23.13.39.31: Roof Membranes	FM,HDH								300				350				5, 8
116	B3020 – Roof Appurtenances																		
117	B3020.10 – Roof Accessories										300				300				
118	B3020.30 – Roof Specialties										300				350				
119	B3020.70 – Rainwater Management										200				200				
120	B3040 – Traffic Bearing Horizontal Enclosures																		
121	B3040.10 – Traffic Bearing Coatings																		
122	B3040.30 – Horizontal Waterproofing Membrane																		5, 8
123	B3040.50 – Wear Surfaces										200				200				
124	B3040.90 – Horizontal Enclosures Supplementary Components																		5, 8
125	B3060 – Horizontal Openings																		
126	B3060.10 – Roof Windows and Skylights										200				200				
127	B3060.50 – Vents and Hatches										200				200				
128	B3060.90 – Horizontal Opening Supplementary Components																		5, 8
129	B3080 – Overhead Exterior Enclosures																		
130	B3080.10 – Exterior Ceilings										300				300				16
131	B3080.20 – Exterior Soffits										300				300				16
132	B3080.30 – Exterior Bulkheads										300				300				16
133	**C: Interiors**																		
134	**C10 Interior Construction**																		
135	C1010 – Interior Partitions	23-17 21 00: Protection of Openings																	
136	C1010.10 – Interior Fixed Partitions										300				300				1, 16
137	C1010.20 – Interior Glazed Partitions										300				300				
138	C1010.40 – Interior Demountable Partitions										300				300				16
139	C1010.50 – Interior Operable Partitions	23.15.11.17: Operable Partitions	FM								300				300				16
140	C1010.70 – Interior Screens										300				300				
141	C1010.90 – Interior Partition Supplementary Components																		5
142	C1020 – Interior Windows																		
143	C1020.10 – Interior Operating Windows										300				300				
144	C1020.20 – Interior Fixed Windows										300				300				
145	C1020.50 – Interior Special Function Windows										300				300				
146	C1020.90 – Interior Window Supplementary Components																		5, 8
147	C1030 – Interior Doors	23-17 11 00: Doors																	
148	C1030.10 – Interior Swinging Doors	23-17 11 00: Doors	MC								300				350				
149	C1030.20 – Interior Entrance Doors	23-17 11 00: Doors	MC								300				350				
150	C1030.25 – Interior Sliding Doors	23-17 11 00: Doors	MC								300				350				
151	C1030.30 – Interior Folding Doors	23-17 11 00: Doors	MC								300				350				
152	C1030.40 – Interior Coiling Doors	23.17.11.13.25: Overhead Metal Doors	FM,MC								300				350				
153	C1030.50 – Interior Panel Doors	23-17 11 00: Doors	MC								300				350				
154	C1030.70 – Interior Special Function Doors	23-17 11 00: Doors	MC								300				350				
155	C1030.70 – Interior Special Function Doors	23.17.21.15: Fire and Smoke Shutters and Curtains	FM								300				350				
156	C1030.80 – Interior Access Doors and Panels	23-17 11 00: Doors	MC								300				350				
157	C1030.90 – Interior Door Supplementary Components	23-17 19 11 31: Automatic Door Controls and Operators	FM,MC								300				350				5
158	C1040 – Interior Grilles and Gates																		
159	C1040.10 – Interior Grilles										200				200				
160	C1040.50 – Interior Gates										200				200				
161	C1060 – Raised Floor Construction																		
162	C1060.10 – Access Flooring										300				300				
163	C1060.30 – Platform/Stage Floor										300				300				
164	C1070 – Suspended Ceiling Construction																		
165	C1070.10 – Acoustical Suspended Ceilings	23.15.19.15.11: Ceiling Tiles	MC								300				300				16
166	C1070.20 – Suspended Plaster and Gypsum Board Ceilings										300				300				16
167	C1070.50 – Specialty Suspended Ceilings										300				300				16
168	C1070.70 – Special Function Suspended Ceiling										300				300				16

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
2	**Classifications**		**Client**	**MMD**	**Design**								**Construct**		**Operate**				
3	**Systems**	**FDS Product Class (Minimum Model Data Requirement)**		Model Storing MMD	**Schematic Design**		**Design Development**		**Construction Documents**		**Design Intent**		**Trade Coordination**		**Record Modeling**		**As-Built Modeling**		
4	**CSI UniFormat 2010**	**OmniClass Table 23**	**UCSD Client**	**Author**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD Notes**
169	C1070.90 – Ceiling Suspension Components																		5, 8
170	C1090 – Interior Specialties	23-19 00 00: Specialty Products																	
171	C1090.10 – Interior Railings and Handrails										300				300				
172	C1090.15 – Interior Louvers										300				300				
173	C1090.20 – Information Specialties										200				200				
174	C1090.25 – Compartments and Cubicles										200				200				
175	C1090.30 – Service Walls										300				300				
176	C1090.35 – Wall and Door Protection										300				300				
177	C1090.40 – Toilet, Bath, and Laundry Accessories										300				300				
178	C1090.45 – Interior Gas Lighting																		
179	C1090.50 – Fireplaces and Stoves										200				200				
180	C1090.60 – Safety Specialties	23.29.37.13: Emergency Eye Wash Stations	All								300				350				
181	C1090.60 – Safety Specialties	23.29.37.15: Emergency Showers	All								300				350				
182	C1090.60 – Safety Specialties	23.29.37.16: Combination Eye Wash Emergency Showers	All								300				350				
183	C1090.70 – Storage Specialties										300				300				
184	C1090.90 – Other Interior Specialties										200				200				
185	**C20 Interior Finishes**																		
186	C2010 – Wall Finishes																		
187	C2010.10 – Tile Wall Finish																		2
188	C2010.20 – Wall Paneling																		2
189	C2010.30 – Wall Coverings																		2
190	C2010.35 – Wall Carpeting																		2
191	C2010.50 – Stone Facing																		2
192	C2010.60 – Special Wall Surfacing																		2
193	C2010.70 – Wall Painting and Coating																		2
194	C2010.80 – Acoustical Wall Treatment																		2
195	C2010.90 – Wall Finish Supplementary Components																		3, 8
196	C2020 – Interior Fabrications										200				200				
197	C2030 – Flooring																		
198	C2030.10 – Flooring Treatment																		2
199	C2030.20 – Tile Flooring																		2
200	C2030.30 – Specialty Flooring																		2
201	C2030.40 – Masonry Flooring																		2
202	C2030.45 – Wood Flooring																		2
203	C2030.50 – Resilient Flooring																		2
204	C2030.60 – Terrazzo Flooring																		2
205	C2030.70 – Fluid-Applied Flooring																		2
206	C2030.75 – Carpeting																		2
207	C2030.80 – Athletic Flooring																		2
208	C2030.85 – Entrance Flooring																		2
209	C2030.90 – Flooring Supplementary Components																		3, 8
210	C2040 – Stair Finishes																		
211	C2040.20 – Tile Stair Finish																		2
212	C2040.40 – Masonry Stair Finish																		2
213	C2040.45 – Wood Stair Finish																		2
214	C2040.50 – Resilient Stair Finish																		2
215	C2040.60 – Terrazzo Stair Finish																		2
216	C2040.75 – Carpeted Stair Finish																		2
217	C2050 – Ceiling Finishes																		
218	C2050.10 – Plaster and Gypsum Board Finish																		2
219	C2050.20 – Ceiling Paneling																		2
220	C2050.70 – Ceiling Painting and Coating																		2
221	C2050.80 – Acoustical Ceiling Treatment																		2
222	C2050.90 – Ceiling finish Supplementary Components																		3, 8
223	C2090 – Interior Finish Schedules																		2
224	**D: Services**																		
225	**D10 Conveying**																		
226	D1010 – Vertical Conveying Systems																		
227	D1010.10 – Elevators	23-23 11 11: Elevators	All								300				300				
228	D1010.10 – Elevators	23-23 11 11 21: Elevator Equipment and Controls	FM,HDH								300				300				

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
2	Classifications		Client	MMD	Design								Construct		Operate				
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4	CSI UniFormat 2010	OmniClass Table 23	UCSD Client	Author	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD Notes
229	D1010.20 – Lifts	23.23.13.11.25: Wheel Chair Lifts	FM								300				300				
230	D1010.30 – Escalators										300				300				
231	D1010.50 – Dumbwaiters										300				300				
232	D1010.60 – Moving Ramps										300				300				
233	D1030 – Horizontal Conveying																		
234	D1030.30 – Turntables										200				200				
235	D1050 – Material Handling																		
236	D1050.10 – Cranes										200				200				
237	D1050.20 – Hoists										200				200				
238	D1050.30 – Derricks										200				200				
239	D1050.40 – Conveyors										200				200				
240	D1050.60 – Chutes										300				300				
241	D1050.70 – Pneumatic Tube Systems										300				300				
242	D1080 – Operable Access Systems																		
243	D1080.10 – Suspended Scaffolding																		
244	D1080.20 – Rope Climbers										200				200				
245	D1080.30 – Elevating Platforms										300				300				
246	D1080.40 – Powered Scaffolding																		
247	D1080.50 – Building Envelope Access										200				200				
248	**D20 Plumbing**																		
249	D2010 – Domestic Water Distribution																		
250	D2010.10 – Facility Potable-Water Storage Tanks	23.27.29.19: Tanks	FM,HDH								300		350		350		400		18
251	D2010.10 – Facility Potable-Water Storage Tanks	23.27.29.19.05: Potable-Water Storage Tanks	All																
252	D2010.20 – Domestic Water Equipment										300		350		350		400		18
253	D2010.20 – Domestic Water Equipment	23.27.17.00: Pumps	All								300		350		350		400		18
254	D2010.20 – Domestic Water Equipment	23.27.23.00: Heat Exchangers	All								300		350		350		400		18
255	D2010.20 – Domestic Water Equipment	23.31.29.00: Hot Water Heaters	All								300		350		350		400		18
256	D2010.20 – Domestic Water Equipment	23.31.29.02: Water Heater Booster	HDH								300		350		350		400		18
257	D2010.20 – Domestic Water Equipment	23.27.29.19.08: Expansion Tanks (plumbing)	All								300		350		350		400		18
258	D2010.40 – Domestic Water Piping										300		350		350		400		18
259	D2010.60 – Plumbing Fixtures										300		350		350		400		18
260	D2010.60 – Plumbing Fixtures	23.31.11.00: Faucets	MC								300		350		350		400		18
261	D2010.60 – Plumbing Fixtures	23.31.19.00: Toilets	MC								300		350		350		400		18
262	D2010.60 – Plumbing Fixtures	23.31.31.00: Drinking Fountains	All								300		350		350		400		18
263	D2010.90 – Domestic Water Distribution Supplementary Components	23.27.31.11: Backflow Preventors	All								300		350		350		400		11
264	D2010.90 – Domestic Water Distribution Supplementary Components	23.27.31.29: Mixing Valves	FM,MC								300		350		350		400		11
265	D2010.90 – Domestic Water Distribution Supplementary Components	23.27.33.11: Electrical Valve Actuators	FM								300		350		350		400		11
266	D2010.90 – Domestic Water Distribution Supplementary Components	23.27.31.00: Valves	FM,MC								300		350		350		400		11
267	D2020 – Sanitary Drainage																		
268	D2020.10 – Sanitary Sewerage Equipment										300		350		350		400		18
269	D2020.10 – Sanitary Sewerage Equipment	23.27.17.35: Sewage Ejectors	All								300		350		350		400		18
270	D2020.10 – Sanitary Sewerage Equipment	23.27.29.19.06: Sanitary Tanks	FM,HDH								300		350		350		400		18
271	D2020.10 – Sanitary Sewerage Equipment	23.39.33.17: Oil and Grease Separation and Removal Equipment	FM								300		350		350		400		18
272	D2020.30 – Sanitary Sewerage Piping										300		350		350		400		18
273	D2020.30 – Sanitary Sewerage Piping	23.31.27.00: Floor Drains	MC								300		350		350		400		18
274	D2020.30 – Sanitary Sewerage Piping	23.13.41.39: Roof Drains	FM								300		350		350		400		18
275	D2020.90 – Sanitary Drainage Supplementary Components	23.27.31.00: Valves	FM,MC								300		350		350		400		11
276	D2030 – Building Support Plumbing Systems																		
277	D2030.10 – Stormwater Drainage Equipment	23.27.17.04: Drainage Pumps	All								300		350		350		400		18
278	D2030.20 – Stormwater Drainage Piping										300		350		350		400		18
279	D2030.30 – Facility Stormwater Drains	23.39.29.11.13: Waste Water Storm Drain	FM,HDH								300		350		350		400		18
280	D2030.60 – Gray Water Systems										300		350		350		400		18
281	D2030.60 – Gray Water Systems	23.27.29.19.04: Gray Water Tanks	FM,HDH								300		350		350		400		18
282	D2030.90 – Building Support Plumbing System Supplementary Components	23-27 37 00: Liquid Traps	MC								300		350		350		400		11
283	D2030.90 – Building Support Plumbing System Supplementary Components	23.27.55.11: Liquid Filters	MC								300		350		350		400		11
284	D2030.90 – Building Support Plumbing System Supplementary Components	23.27.55.27.11: Water Softeners	FM,MC								300		350		350		400		11
285	D2030.90 – Building Support Plumbing System Supplementary Components	23.27.55.38: Liquid Separators (plumbing)	FM								300		350		350		400		11

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286	D2050 – General Service Compressed-Air										300		350		350		400		
287	D2050 – General Service Compressed-Air	23.27.21.04: Air Compressors	All								300		350		350		400		
288	D2060 – Process Support Plumbing Systems																		
289	D2060.10 – Compressed-Air Systems										300		350		350		400		18
290	D2060.10 – Compressed-Air Systems	23.27.21.04: Air Compressors	All								300		350		350		400		18
291	D2060.10 – Compressed-Air Systems	23.33.47.00: Air Dryers	FM,MC								300		350		350		400		18
292	D2060.20 – Vacuum Systems										300		350		350		400		18
293	D2060.30 – Gas Systems										300		350		350		400		18
294	D2060.30 – Gas Systems	23.27.27.00: Pressure Reducing Stations	MC								300		350		350		400		18
295	D2060.30 – Gas Systems	23.27.29.19.02: Gas System Tank	FM								300		350		350		400		18
296	D2060.30 – Gas Systems	23.27.11.27: Gas Instrument and Controls	FM								300		350		350		400		18
297	D2060.40 – Chemical-Waste Systems										300		350		350		400		18
298	D2060.50 – Processed Water Systems										300		350		350		400		18
299	D2060.90 – Process Support Plumbing System Supplementary Components	23.27.33.11: Electrical Valve Actuators	FM								300		350		350		400		11
300	D2060.90 – Process Support Plumbing System Supplementary Components	23.39.41.13: Demineralization Equipment	FM								300		350		350		400		11
301	D2060.90 – Process Support Plumbing System Supplementary Components	23.27.31.00: Valves	FM,MC								300		350		350		400		11
302	D2060.90 – Process Support Plumbing System Supplementary Components										300		350		350		400		11
303	**D30 HVAC**																		
304	D3010 – Facility Fuel Systems																		
305	D3010.10 – Fuel Piping										300		350		350		400		18
306	D3010.30 – Fuel Pumps										300		350		350		400		18
307	D3010.50 – Fuel Storage Tanks										300		350		350		400		18
308	D3020 – Heating Systems																		
309	D3020.10 – Heat Generation	23-33 11 00: Commercial Boilers	All								300		350		350		400		17, 18
310	D3020.10 – Heat Generation	23-37 23 00: Heat Exchangers	All								300		350		350		400		17, 18
311	D3020.30 – Thermal Heat Storage	23.27.29.19: Tanks	FM,HDH								300		350		350		400		17, 18
312	D3020.70 – Decentralized Heating Equipment	23.33.15.21: Hydronic HVAC Heaters	All								300		350		350		400		17, 18
313	D3020.70 – Decentralized Heating Equipment	23-33 43 00: HVAC Condenser Units	All								300		350		350		400		17, 18
314	D3020.70 – Decentralized Heating Equipment	23-33 17 00: Heat Pumps	All								300		350		350		400		17, 18
315	D3020.70 – Decentralized Heating Equipment	23.33.33.11: Fan Coil Units	All								300		350		350		400		17, 18
316	D3020.70 – Decentralized Heating Equipment	23.33.35.00: HVAC Coils	FM,HDH								300		350		350		400		17, 18
317	D3020.90 – Heating System Supplementary Components										300		350		350		400		17, 18
318	D3020.90 – Heating System Supplementary Components	23.33.15.21: Hydronic HVAC Heaters	All								300		350		350		400		17, 18
319	D3020.90 – Heating System Supplementary Components	23.27.29.19.07: Expansion tanks (hvac)	All								300		350		350		400		17, 18
320	D3030 – Cooling Systems																		
321	D3030.10 – Central Cooling										300		350		350		400		17, 18
322	D3030.10 – Central Cooling	23.33.21.00: Chillers	All								300		350		350		400		17, 18
323	D3030.10 – Central Cooling	23.33.39.11: Air Conditioners	All								300		350		350		400		17, 18
324	D3030.10 – Central Cooling	23.33.39.15: Make Up Air Units	FM,HDH								300		350		350		400		17, 18
325	D3030.10 – Central Cooling	23.33.39.17: Packaged Air Conditioners	FM,HDH								300		350		350		400		17, 18
326	D3030.10 – Central Cooling	23.33.39.19: Packaged Terminal Air Conditioning Units	FM,HDH								300		350		350		400		17, 18
327	D3030.10 – Central Cooling	23.33.39.21: Split System Air Conditioning Units	All								300		350		350		400		17, 18
328	D3030.30 – Evaporative Air-Cooling	23.27.55.31: Liquid Chemical Feeders	FM,MC								300		350		350		400		17, 18
329	D3030.30 – Evaporative Air-Cooling	23-33 23 00: Cooling Towers	FM,MC								300		350		350		400		17, 18
330	D3030.50 – Thermal Cooling Storage										300		350		350		400		17, 18
331	D3030.70 – Decentralized Cooling	23-33 43 00: HVAC Condenser Units	All								300		350		350		400		17, 18
332	D3030.70 – Decentralized Cooling	23-33 17 00: Heat Pumps	All								300		350		350		400		17, 18
333	D3030.70 – Decentralized Cooling	23.33.33.11: Fan Coil Units	All								300		350		350		400		17, 18
334	D3030.70 – Decentralized Cooling										300		350		350		400		17, 18
335	D3030.90 – Cooling System Supplementary Components										300		350		350		400		
336	D3030.90 – Cooling System Supplementary Components	23.27.29.19.07: Expansion tanks (hvac)	All								300		350		350		400		
337	D3050 – Facility HVAC Distribution Systems																		
338	D3050.10 – Facility Hydronic Distribution										300		350		350		400		17, 18
339	D3050.10 – Facility Hydronic Distribution	23.27.31.00: Valves	FM,MC								300		350		350		400		17, 18
340	D3050.10 – Facility Hydronic Distribution	23.27.33.11: Electrical Valve Actuators	FM								300		350		350		400		17, 18
341	D3050.10 – Facility Hydronic Distribution	23.27.17.00: Pumps	All								300		350		350		400		17, 18
342	D3050.30 – Facility Steam Distribution										300		350		350		400		17, 18
343	D3050.50 – HVAC Air Distribution										300		350		350		400		17, 18

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344	D3050.50 – HVAC Air Distribution	23.33.49.27.11: Gravity Ventilators	All								300		350		350		400		17, 18
345	D3050.50 – HVAC Air Distribution	23-33 41 00: HVAC Air Terminals	All								300		350		350		400		17, 18
346	D3050.50 – HVAC Air Distribution	23.33.25.00: Air Handling Units	All								300		350		350		400		17, 18
347	D3050.90 – Facility Distribution Systems Supplementary Components										300		350		350		400		
348	D3050.90 – Facility Distribution Systems Supplementary Components	23.35.17.15: Variable Frequency Drives	FM,MC								300		350		350		400		
349	D3050.90 – Facility Distribution Systems Supplementary Components	23.27.55.36: Liquid Separators (hvac)	FM								300		350		350		400		
350	D3050.90 – Facility Distribution Systems Supplementary Components	23.27.11.04: Gas Meters	FM								300		350		350		400		
351	D3050.90 – Facility Distribution Systems Supplementary Components	23.27.57.27: Air Filters	FM,HDH								300		350		350		400		
352	D3060 – Ventilation																		
353	D3060.10 – Supply Air										300		350		350		400		17
354	D3060.10 – Supply Air	23.33.31.19: Fans	All								300		350		350		400		17
355	D3060.20 – Return Air										300		350		350		400		17
356	D3060.20 – Return Air	23.33.31.19: Fans	All								300		350		350		400		17
357	D3060.30 – Exhaust Air										300		350		350		400		17
358	D3060.30 – Exhaust Air	23.33.31.15: Exhaust Hoods	FM,HDH								300		350		350		400		17
359	D3060.30 – Exhaust Air	23.33.31.19: Fans	All								300		350		350		400		17
360	D3060.40 – Outside Air										300		350		350		400		17
361	D3060.40 – Outside Air	23.33.31.19: Fans	All								300		350		350		400		17
362	D3060.60 – Air-to-Air Energy Recovery										300		350		350		400		17
363	D3060.70 – HVAC Air Cleaning	23.27.57.31: Electronic Air Cleaners	FM								300		350		350		400		17
364	D3060.90 – Ventilation Supplementary Components										300		350		350		400		
365	D3060.90 – Ventilation Supplementary Components	23.33.29.19: Dampers	FM,HDH								300		350		350		400		
366	D3060.90 – Ventilation Supplementary Components	23.33.29.23: Fire Dampers	FM								300		350		350		400		
367	D3060.90 – Ventilation Supplementary Components	23.33.29.24: Combination Fire Smoke Dampers	FM								300		350		350		400		
368	D3060.90 – Ventilation Supplementary Components	23.33.29.25: Smoke Dampers	FM								300		350		350		400		
369	D3060.90 – Ventilation Supplementary Components	23.33.29.37: Volume Control Dampers	FM,HDH								300		350		350		400		
370	D3060.90 – Ventilation Supplementary Components										300		350		350		400		
371	D3070 – Special Purpose HVAC System																		
372	D3070 – Special Purpose HVAC System										300		350		350		400		
373	D3070 – Special Purpose HVAC System	23.33.27.13: Dehumidifiers	FM								300		350		350		400		
374	D3070 – Special Purpose HVAC System	23.33.27.15: Air Humidifiers	FM,MC								300		350		350		400		
375	D3070 – Special Purpose HVAC System	23.39.35.11.17.04: Fuel-Gas Detection and Alarm	FM,HDH								300		350		350		350		
376	**D40 Fire Protection**																		
377	D4010 – Fire Suppression																		
378	D4010.10 – Water-Based Fire-Suppression										300		350		350		400		4, 18
379	D4010.50 – Fire-Extinguishing										300		350		350		400		4, 18
380	D4010.90 – Fire Suppression Supplementary Components										300		350		350		400		4
381	D4010.90 – Fire Suppression Supplementary Components	23.27.17.06: Fire Pumps	FM,HDH								300		350		350		400		4
382	D4010.90 – Fire Suppression Supplementary Components	23.29.29.15: Fire Switches	MC								300		350		350		350		4
383	D4010.90 – Fire Suppression Supplementary Components	23.29.33.13.13: Carbon Dioxide Suppression Equipment	FM								300		350		350		400		4
384	D4010.90 – Fire Suppression Supplementary Components	23.29.31.13: Fire Alarm Control Panels	All								300		350		350		350		4
385	D4030 – Fire Protection Specialties																		
386	D4030.10 – Fire Protection Cabinets										200				300				
387	D4030.30 – Fire Extinguishers										300				300				
388	D4030.30 – Fire Extinguishers	23.29.25.19: Fire Extinguishers	FM,MC								300				300				
389	D4030.50 – Breathing Air Replenishment Systems										200				300				
390	D4030.70 – Fire Extinguisher Accessories	23-29 29 15: Fire Switches	MC								300				300				
391	**D50 Electrical**																		
392	D5010 – Facility Power Generator																		
393	D5010.10 – Packaged Generator Assemblies										300		350		350				
394	D5010.10 – Packaged Generator Assemblies	23.35.11.00: Electrical Generators	All								300		350		350				
395	D5010.20 – Battery Equipment	23-35 19 00: Batteries	FM,HDH								300		350		350				
396	D5010.20 – Battery Equipment	23.35.23.21: Uninterrupted Power Supply (UPS) Units	All								300		350		350				

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397	D5010.30 – Photovoltaic Collectors										200		300		300				
398	D5010.30 – Photovoltaic Collectors	23.35.11.17.15: Photovoltaic Collectors	FM,HDH								200		300		300				
399	D5010.40 – Fuel Cells										200		300		300				
400	D5010.60 – Power Filtering and Conditioning										200		300		300				
401	D5010.70 – Transfer Switches										200		300		300				
402	D5010.90 – Facility Power Generation Supplementary Components										300		350		350				5
403	D5020 – Electrical Service and Distribution																		
404	D5020.10 – Electrical Service										300		300		300				
405	D5020.30 – Power Distribution										300		350		350				14
406	D5020.30 – Power Distribution	23.35.31.13: Distribution Panel Boards	All								300		350		350				14
407	D5020.30 – Power Distribution	23.35.31.17: Electrical Panel Boards	All								300		350		350				14
408	D5020.30 – Power Distribution	23.35.31.23: Motor Control Centers	All								300		350		350				14
409	D5020.30 – Power Distribution	23.35.31.29: Switchboards	FM,HDH								300		350		350				14
410	D5020.30 – Power Distribution	23.35.31.29.02: Substation Switchboards	All								300		350		350				14
411	D5020.30 – Power Distribution	23.35.31.31: Switchgear	All								300		350		350				14
412	D5020.30 – Power Distribution	23.35.37.11: Automatic Transfer Switches	All								300		350		350				14
413	D5020.30 – Power Distribution	23-35 13 00: Transformers	All								300		350		350				14
414	D5020.30 – Power Distribution	23.35.37.11: Automatic Transfer Switches	All								300		350		350				14
415	D5020.70 – Facility Grounding																		5
416	D5020.90 – Electrical Service and Distribution Supplementary Components										300		350		350				5
417	D5020.90 – Electrical Service and Distribution Supplementary Components	23.35.17.15: Variable Frequency Drives	FM,MC								300		350		350				5
418	D5030 – General Purpose Electrical Power																		
419	D5030.10 – Branch Wiring System										300		350		350				6, 14
420	D5030.50 – Wiring Devices										200		200		200				
421	D5030.90 – General Purpose Electrical Power Supplementary Components										300		350		350				5, 14
422	D5030.90 – General Purpose Electrical Power Supplementary Components	23.35.43.37: Voltage Relays	MC								300		350		350				5, 14
423	D5030.90 – General Purpose Electrical Power Supplementary Components	23.35.25.11: Electrical Meters	FM,HDH								300		350		350				5, 14
424	D5030.90 – General Purpose Electrical Power Supplementary Components	23.35.27.11: Electrical Receptacles	MC								300		350		350				5, 14
425	D5030.90 – General Purpose Electrical Power Supplementary Components	23-35 29 00: Circuit Breakers	MC								300		350		350				5, 14
426	D5040 – Lighting																		
427	D5040.10 – Lighting Control	23.27.15.21: Building Lighting Controls	FM								300		350		350				
428	D5040.20 – Branch Wiring for Lighting										200		200		200				6, 14
429	D5040.50 – Lighting Fixtures	23.35.47.11.04: Task Lighting	MC								300		350		350				
430	D5040.50 – Lighting Fixtures	23.35.47.13: Emergency Lighting	FM,MC								300		350		350				
431	D5040.50 – Lighting Fixtures	23.35.47.15: Exit Illuminated Signs	FM,MC								300		350		350				
432	D5040.90 – Lighting Supplementary Components										300		350		350				5
433	D5080 – Miscellaneous Electrical Systems																		
434	D5080.10 – Lightning Protection																		7
435	D5080.40 – Cathodic Protection																		5
436	D5080.70 – Transient Voltage Suppression																		5
437	D5080.90 – Miscellaneous Electrical Systems Supplementary Components																		5
438	**D60 Communications**																		
439	D6010 – Data Communications																		
440	D6010.10 – Data communications Network Equipment										300		350		350				19
441	D6010.20 – Data Communications Hardware										300		350		350				19
442	D6010.30 – Data communications Peripheral Data Equipment										300		350		350				19
443	D6010.60 – Data Communication Program and Integration Services																		
444	D6020 – Voice Communications																		
445	D6020.10 – Voice Communications Switching and Routing Equipment										300		350		350				19
446	D6020.20 – Voice Communications Terminal Equipment																		19
447	D6020.30 – Voice Communications Messaging																		19
448	D6020.40 – Call Accounting																		19
449	D6020.50 – Call Management										200		200		200				19
450	D6030 – Audio-Video Communications																		
451	D6030.10 – Audio-Video Systems										300		350		350				19
452	D6030.50 – Electronic Digital Systems										300		350		350				19

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453	D6060 – Distributed Communications and Monitoring																		
454	D6060.10 – Distributed Audio-Video Communications Systems										200		200		200				19
455	D6060.30 – Healthcare Communications and Monitoring										200		200		200				19
456	D6060.50 – Distributed Systems										200		200		200				
457	D6090 – Communications Supplementary Components																		
458	D6090.10 – Supplementary Components										200		200		200				13
459	**D70 Electronic Safety and Security**																		
460	D7010 – Access Control and Intrusion Detection																		
461	D7010.10 – Access Control										200		200		200				20
462	D7010.50 – Intrusion Detection										200		200		200				20
463	D7030 – Electronic Surveillance																		
464	D7030.10 – Video Surveillance										300		300		300				20
465	D7030.50 – Electronic Personal Protection										200		200		200				20
466	D7050 – Detection and Alarm																		
467	D7050.10 – Fire Detection and Alarm										300		350		350				20
468	D7050.20 – Radiation Detection and Alarm										300		300		300				20
469	D7050.30 – Fuel-Gas Detection and Alarm	23.39.35.11.17.04: Fuel-Gas Detection and Alarm	FM,HDH								300		350		350				20
470	D7050.40 – Fuel-Oil Detection and Alarm										300		300		300				20
471	D7050.50 – Refrigeration Detection and Alarm										300		300		300				20
472	D7050.60 – Water Intrusion Detection and Alarm										300		300		300				20
473	D7070 – Electronic Monitoring and Control																		
474	D7070.10 – Electronic Detention Monitoring and Control										200		200		200				20
475	D7090 – Electronic Safety and Security Supplementary Components																		
476	D7090.10 – Supplementary Components										200		200		200				13
477	**D80 Integrated Automation**																		
478	D8010 – Integrated Automation Facility Controls	23-27 15 00: Building Automation and Control																	
479	D8010.10 – Integrated Automation Control of Equipment																		
480	D8010.20 – Integrated Automation Control of Conveying Equipment																		
481	D8010.30 – Integrated Automation Control of Fire-Suppression Systems										300		350		350				
482	D8010.40 – Integrated Automation Control of Plumbing Systems																		
483	D8010.50 – Integrated Automation Control of HVAC Systems	23.27.15.23: HVAC Controls	FM								300		350		350				
484	D8010.50 – Integrated Automation Control of HVAC Systems	23.27.11.15: Flow Measuring Instrument and Controls	FM								300		350		350				
485	D8010.60 – Integrated Automation Control of Electrical Systems																		
486	D8010.70 – Integrated Automation Control of Communication Systems																		
487	D8010.80 – Integrated Automation Control of Electronic Safety and Security Systems																		
488	D8010.90 – Integrated Automation Supplementary Components																		13
489	**E: Equipment & Furnishings**																		
490	**E10 Equipment**																		
491	E1010 – Vehicle and Pedestrian Equipment																		
492	E1010.10 – Vehicle Servicing Equipment										200				200				
493	E1010.30 – Interior Parking Control Equipment										200				200				
494	E1010.50 – Loading Dock Equipment	23.23.23.00: Loading Dock Equipment	FM								200				200				
495	E1010.70 – Interior Pedestrian Control Equipment										200				200				
496	E1030 – Commercial Equipment																		
497	E1030.10 – Mercantile and Service Equipment										200				200				
498	E1030.20 – Vault Equipment										200				200				
499	E1030.25 – Teller and Service Equipment										200				200				
500	E1030.30 – Refrigerated Display Equipment	23-21 21 00: Food Service Equipment and Furnishings	HDH								300				350				
501	E1030.35 – Commercial Laundry and Dry Cleaning Equipment										200				200				
502	E1030.40 – Maintenance Equipment										300				350				

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
2	Classifications		Client	MMD	Design								Construct		Operate				
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4	CSI UniFormat 2010	OmniClass Table 23	UCSD Client	Author	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD Notes
503	E1030.50 – Hospitality Equipment										200				200				
504	E1030.55 – Unit Kitchens										200				200				
505	E1030.60 – Photographic Processing Equipment										200				200				
506	E1030.70 – Postal, Packaging, and Shipping Equipment																		
507	E1030.75 – Office Equipment										200				200				
508	E1030.80 – Foodservice Equipment	23-21 21 00: Food Service Equipment and Furnishings	HDH								300				350				
509	E1040 – Institutional Equipment																		
510	E1040.10 – Educational and Scientific Equipment										200				200				
511	E1040.10 – Educational and Scientific Equipment	23.25.69.11.15: Laboratory Fume hoods	FM,MC								300				300				
512	E1040.20 – Healthcare Equipment										300				300				
513	E1040.20 – Healthcare Equipment	23-25 33 00: Medical Gas Products	MC								300				300				
514	E1040.20 – Healthcare Equipment	23.25.31.11.11.13: Blood Freezers	MC								300				300				
515	E1040.20 – Healthcare Equipment	23.25.57.11.31: Steam Autoclaves	MC								300				300				
516	E1040.20 – Healthcare Equipment	23.25.65.11: Biological Safety Cabinets	FM,MC								300				300				
517	E1040.20 – Healthcare Equipment	23.25.65.11.17: Cryogenic Freezers	MC								300				300				
518	E1040.40 – Religious Equipment										200				200				
519	E1040.60 – Security Equipment										200				200				
520	E1060 – Residential Equipment																		
521	E1060.10 – Residential Appliances										200				200				
522	E1060.10 – Residential Appliances	23.21.23.33.13.11: Residential Upright Refrigerators	HDH								300				300				
523	E1060.50 – Retractable Stairs										200				200				
524	E1060.70 – Residential Ceiling Fans										200				200				
525	E1070 – Entertainment and Recreational Equipment																		
526	E1070.10 – Theater and Stage Equipment										200				200				
527	E1070.20 – Musical Equipment										200				200				
528	E1070.50 – Athletic Equipment										200				200				
529	E1070.60 – Recreational Equipment										200				200				
530	E1090 – Other Equipment																		
531	E1090.10 – Solid Waste Handling Equipment										200				200				
532	E1090.10 – Solid Waste Handling Equipment	23.27.59.15.19: Trash Compactors	FM,MC								300				300				
533	E1090.30 – Agricultural Equipment										200				200				
534	E1090.40 – Horticultural Equipment										200				200				
535	E1090.60 – Decontamination Equipment										200				200				
536	**E20 Furnishings**																		
537	E2010 – Fixed Furnishings																		
538	E2010.10 – Fixed Art										200				200				
539	E2010.20 – Window Treatments										200				200				
540	E2010.30 – Casework	23.21.19.15.15.11: Hospital Specialty Casework	MC								300				300				
541	E2010.70 – Fixed Multiple Seating										200				200				
542	E2010.90 – Other Fixed Furnishings										200				200				
543	E2050 – Movable Furnishings																		
544	E2050.10 – Movable Art										200				200				
545	E2050.30 - Furniture										200				200				
546	E2050.40 – Accessories										200				200				
547	E2050.60 – Movable Multiple Seating										200				200				
548	E2050.90 – Other Movable Furnishings										200				200				
549	**F: Special Construction & Demolition**																		
550	**F10 Special Construction**																		
551	F1010 – Integrated Construction																		
552	F1010.10 – Building Modules										300				300				
553	F1010.50 – Manufactured/Fabricated Rooms	23.19.31.19.13.04: Cold Room	FM,HDH								300				300				
554	F1010.50 – Manufactured/Fabricated Rooms	23.19.31.19.13.06: Warm Room	FM								300				300				
555	F1010.50 – Manufactured/Fabricated Rooms	23.33.37.00: Refrigerant Condensing Units	FM,HDH								300				300				
556	F1010.70 – Modular Mezzanines										300				300				
557	F1020 – Special Structures																		
558	F1020.10 – Fabric Structures																		
559	F1020.20 – Space Frames																		
560	F1020.30 – Geodesic Structures																		
561	F1020.40 – Manufacturer-engineered Structures																		
562	F1020.60 – Manufactured Canopies																		

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4	CSI UniFormat 2010	OmniClass Table 23	UCSD Client	Author	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD Notes
563	F1020.65 – Rammed Earth Construction																		
564	F1020.70 – Towers																		
565	F1030 – Special Function Construction																		
566	F1030.10 – Sound and Vibration Control																		
567	F1030.30 – Seismic Control																		
568	F1030.50 – Radiation Protection																		
569	F1050 – Special Facility Components																		
570	F1050.10 – Pools										300				300				
571	F1050.20 – Interior Fountains										200				200				
572	F1050.30 – Interior Water Features										200				200				
573	F1050.40 – Aquariums										200				200				
574	F1050.60 – Ice Rinks										200				200				
575	F1050.70 – Animal Containment										200				200				
576	F1060 – Athletic and Recreational Special Construction																		
577	F1060.10 – Indoor Soccer Boards										200				200				
578	F1060.20 – Safety Netting										200				200				
579	F1060.30 – Arena Football Boards										200				200				
580	F1060.40 – Floor Sockets										200				200				
581	F1060.50 – Athletic and Recreational Court Walls										200				200				
582	F1060.60 – Demountable Athletic Surfaces										200				200				
583	F1080 – Special Instrumentation																		
584	F1080.10 – Stress Instrumentation																		
585	F1080.20 – Seismic Instrumentation																		
586	F1080.40 – Meteorological Instrumentation																		
587	F1080.60 – Earth Movement Monitoring																		
588	**F20 Facility Remediation**																		
589	F2010 – Hazardous Materials Remediation																		
590	F2010.10 – Transportation and Disposal of Hazardous Materials																		
591	F2010.20 – Asbestos Remediation																		
592	F2010.30 – Lead Remediation																		
593	F2010.40 – Polychlorinate Biphenyl Remediation																		
594	F2010.50 – Mold Remediation																		
595	**F30 Demolition**																		
596	F3010 – Structure Demolition																		
597	F3010.10 – Building Demolition										200								
598	F3010.30 – Tower Demolition																		
599	F3010.50 – Bridge Demolition																		
600	F3010.70 – Dam Demolition																		
601	F3030 – Selective Demolition																		
602	F3030.10 – Selective Building Demolition										200								
603	F3030.30 – Selective Interior Demolition										200								
604	F3030.50 – Selective Bridge Demolition																		
605	F3030.70 – Selective Historic Demolition																		
606	F3050 – Structure Moving																		
607	F3050.10 – Structure Relocation										300				300				
608	F3050.30 – Structure Raising										300				300				
609	**G: Building Sitework**																		
610	**G10 Site Preparation**																		
611	G1010 – Site Clearing																		
612	G1010.10 – Clearing and Grubbing																		
613	G1010.30 – Tree and Shrub Removal and Trimming																		
614	G1010.50 – Earth Stripping and Stockpiling																		
615	G1020 – Site Elements Demolition										300				350				
616	G1020.10 – Utility Demolition																		9
617	G1020.30 – Infrastructure Demolition																		9
618	G1020.50 – Selective Site Demolition																		9
619	G1030 – Site Element Relocation										300				350				
620	G1030.10 – Utility Relocation																		9
621	G1050 – Site Remediation										-								
622	G1050.10 – Physical Decontamination																		
623	G1050.15 – Chemical Decontamination																		

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3	**Systems**	**FDS Product Class (Minimum Model Data Requirement)**		Model Storing MMD	**Schematic Design**		**Design Development**		**Construction Documents**		**Design Intent**		**Trade Coordination**		**Record Modeling**		**As-Built Modeling**		
4	**CSI UniFormat 2010**	**OmniClass Table 23**	**UCSD Client**	**Author**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD**	**MEA**	**LOD Notes**
624	G1050.20 – Thermal Decontamination																		
625	G1050.25 – Biological Decontamination																		
626	G1050.30 – Remediation Soil Stabilization																		
627	G1050.40 – Site Containment																		
628	G1050.45 – Sinkhole Remediation																		
629	G1050.50 – Hazardous Waste Drum Handling																		
630	G1050.80 – Water Remediation																		
631	G1070 – Site Earthwork										300				300				
632	G1070.10 – Grading																		9
633	G1070.20 – Excavation and Fill																		9
634	G1070.30 – Embankments																		9
635	G1070.35 – Erosion and Sedimentation Controls																		9
636	G1070.40 – Soil Stabilization																		9
637	G1070.45 – Rock Stabilization																		9
638	G1070.50 – Soil Reinforcement																		9
639	G1070.55 – Slope Protection																		9
640	G1070.60 – Gabions																		9
641	G1070.65 – Riprap																		9
642	G1070.70 – Wetlands																		9
643	G1070.80 – Earth Dams																		9
644	G1070.90 – Site Soil Treatment																		9
645	**G20 Site Improvements**																		
646	G2010 – Roadways										300				300				
647	G2010.10 – Roadway Pavement																		9
648	G2010.20 – Roadway Curbs and Gutters																		9
649	G2010.40 – Roadway Appurtenances																		9
650	G2010.70 – Roadway Lighting																		9
651	G2010.80 – Vehicle Fare Collection																		9
652	G2020 – Parking Lots										300				300				
653	G2020.10 – Parking Lot Pavement																		9
654	G2020.20 – Parking Lot Curbs and Gutters																		9
655	G2020.40 – Parking Lot Appurtenances																		9
656	G2020.70 – Parking Lot Lighting																		9
657	G2020.80 – Exterior Parking Control Equipment																		9
658	G2030 – Pedestrian Plazas and Walkways										300				300				
659	G2030.10 – Pedestrian Pavement																		9
660	G2030.20 – Pedestrian Pavement Curbs and Gutters																		9
661	G2030.30 – Exterior Steps and Ramps																		9
662	G2030.40 – Pedestrian Pavement Appurtenances																		9
663	G2030.70 – Plaza and Walkway Lighting																		9
664	G2030.80 – Exterior Pedestrian Control Equipment																		9
665	G2040 – Airfields										-								
666	G2050 – Athletic, Recreational, and Playfield Areas										300				300				
667	G2050.10 – Athletic Areas																		9
668	G2050.30 – Recreational Areas																		9
669	G2050.50 – Playfield Areas																		9
670	G2060 – Site Development										300				300				
671	G2060.10 – Exterior Fountains																		9
672	G2060.20 – Fences and Gates																		9
673	G2060.25 – Site Furnishings																		9
674	G2060.30 – Exterior Signage																		9
675	G2060.35 – Flagpoles																		9
676	G2060.40 – Covers and Shelters																		9
677	G2060.45 – Exterior Gas Lighting																		9
678	G2060.50 – Site Equipment																		9
679	G2060.60 – Retaining Walls																		9
680	G2060.70 – Site Bridges																		9
681	G2060.80 – Site Screening Devices																		9
682	G2060.85 – Site Specialties																		9
683	G2080 – Landscaping										300				300				
684	G2080.10 – Planting Irrigation																		9

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4	CSI UniFormat 2010	OmniClass Table 23	UCSD Client	Author	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD Notes
685	G2080.20 – Turf and Grasses																		9
686	G2080.30 – Plants																		9
687	G2080.50 – Planting Accessories																		9
688	G2080.70 – Landscape Lighting																		9
689	G2080.80 – Landscape Activities																		9
690	**G30 Liquid and Gas Site Utilities**																		
691	G3010 – Water Utilities																		
692	G3010.10 – Site Domestic Water Distribution										300		350		350				12
693	G3010.10 – Site Domestic Water Distribution	23.27.31.11: Backflow Preventors	All								300		350		350				12
694	G3010.30 – Site Fire Protection Water Distribution										300		350		350				12
695	G3010.30 – Site Fire Protection Water Distribution	23.27.31.43: Post Indicator Valves	FM								300		350		350				12
696	G3010.30 – Site Fire Protection Water Distribution	23.27.31.11: Backflow Preventors	All								300		350		350				12
697	G3010.30 – Site Fire Protection Water Distribution	23.29.25.15.19: Fire Hose Connectors	FM								300		350		350				12
698	G3010.50 – Site Irrigation Water Distribution										300		350		350				12
699	G3020 – Sanitary Sewerage Utilities																		
700	G3020.10 – Sanitary Sewerage Utility Connection										300		350		350				12
701	G3020.20 – Sanitary Sewerage Piping										300		350		350				12
702	G3020.40 – Utility Septic Tanks										300		350		350				12
703	G3020.50 – Sanitary Sewerage Structures	23.39.33.17: Oil and Grease Separation and Removal Equipment	FM,HDH								300		350		350				12
704	G3020.50 – Sanitary Sewerage Structures										300		350		350				12
705	G3020.60 – Sanitary Sewerage Lagoons										300		350		350				12
706	G3030 – Storm Drainage Utilities										300				350				
707	G3030.10 – Storm Drainage Utility Connection										300		350		350				12
708	G3030.20 – Storm Drainage Piping										300		350		350				12
709	G3030.30 – Culverts										300		350		350				12
710	G3030.40 – Site Storm Water Drains	23.39.29.11.13: Waste Water Storm Drain	FM,HDH								300		350		350				12
711	G3030.40 – Site Storm Water Drains	23.39.29.13.19: Surface Water Drainage Systems	FM,HDH								300		350		350				12
712	G3030.50 – Storm Drainage Pumps										300		350		350				12
713	G3030.60 – Site Subdrainage										300		350		350				12
714	G3030.70 – Storm Drainage Ponds and Reservoirs										300		350		350				12
715	G3050 – Site Energy Distribution																		
716	G3050.10 – Site Hydronic Heating Distribution										300		350		350				12
717	G3050.20 – Site Steam Energy Distribution										300		350		350				12
718	G3050.40 – Site Hydronic Cooling Distribution										300		350		350				12
719	G3060 – Site Fuel Distribution																		
720	G3060.10 – Site Gas Distribution										300		350		350				12
721	G3060.20 – Site Fuel-Oil Distribution										300		350		350				12
722	G3060.30 – Site Gasoline Distribution										300		350		350				12
723	G3060.40 – Site Diesel Fuel Distribution										300		350		350				12
724	G3090 – Liquid and Gas Site Utilities Supplementary Components										300		350		350				12
725	G3090.10 – Supplementary Components										300		350		350				12
726	**G40 Electrical Site Improvements**																		
727	G4010 – Site Electric Distribution Systems										300				350				
728	G4010.10 – Electrical Utility Services										300		350		350				10
729	G4010.20 – Electric Transmission and Distribution										300		350		350				10
730	G4010.30 – Electrical Substations										300		350		350				10
731	G4010.40 – Electrical Transformers	23-35 13 00: Transformers	All								300		350		350				10
732	G4010.50 – Electrical Switchgear and Protection Devices	23.35.31.31: Switchgear	All								300		350		350				10
733	G4010.50 – Electrical Switchgear and Protection Devices	23.35.31.29.02: Substation Switchboards	All								300		350		350				10
734	G4010.70 – Site Grounding										300		350		350				
735	G4010.90 – Electrical Distribution System Instrumentation										300		350		350				
736	G4050 – Site Lighting										300				350				
737	G4050.10 – Area Lighting										300		350		350				
738	G4050.10 – Area Lighting	23.35.47.13: Emergency Lighting	FM,MC								300		350		350				
739	G4050.20 – Flood Lighting										300		350		350				
740	G4050.50 – Building Illumination										300		350		350				
741	G4050.50 – Building Illumination										300		350		350				

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2	**Classifications**		**Client**	**MMD**	**Design**								**Construct**		**Operate**				
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742	G4050.90 – Exterior Lighting Supplementary Components										300		350		350				
743	**G50 Site Communications**																		
744	G5010 – Site Communications Systems										300				350				
745	G5010.10 – Site Communications Structures										300				300				
746	G5010.30 – Site Communications Distribution										300				300				
747	G5010.50 – Wireless Communications Distribution										300				300				
748	**G90 Miscellaneous Site Construction**																		
749	G9010 - Tunnels																		
750	G9010.10 – Vehicular Tunnels										300				300				
751	G9010.20 – Pedestrian Tunnels										300				300				
752	G9010.40 – Service Tunnels										300				300				
753	G9010.90 – Tunnel Construction Related Activities																		

Appendix C: BIM LOD Matrix

LOD Notes

Note	Description
1	Although standard wall and ceiling individual framing members are not modeled through LOD 300, any atypical framing features required for tiered ceilings, soffits, curved walls, arched ceilings, etc. should be modeled at a minimum for LOD 350 to ensure there is enough available space for the additional framing/bracing for these components.
2	At LOD 100 Wall, Floor and Ceiling Finishes will be represented with text via a Room object.
3	Wall, ceiling and/or floor furring along with other required sheathing/underlayments to be included with wall, ceiling and/or floor finish elements above as appropriate.
4	The Plumbing Engineer will be responsible for defining the performance of the Fire Suppressions System as well as modeling; the location of fire service to the building, major equipment, standpipes and major piping runs and sprinkler hear locations in accordance with the defined LOD. Ancillary and secondary piping from the major piping runs to the sprinkler head locations to be design and modeled by the Fire Protection Contractor in accordance with the defined LOD.
5	These categories will be represented by typical details and notes that have been developed with text and/or 2D supplementation in addition to or in lieu of model geometry for items called defined at LOD 100.
6	The Electrical Engineer will exclude branch wiring from this category. During Trade Coordination the Electrical Contractor will be expected to model all conduits larger than ¾", and large groups of conduit ¾" (or less) in a particular location shall be modeled to reflect the overall space requirements.
7	Performance specification (with supporting 2D Supplementation) to be developed at LOD 100 by the Electrical Engineer.
8	These components are typically modeled as part of other assemblies listed in the tables above and will assume those LOD and MEA designations.
9	Section G: Building Sitework items are typically designed and documented in two dimensional applications and are typically owned by CE but may be modeled for reference by LA or A. Any deviation from this reference model will be documented in the project specific BIM Execution Plan.
10	This category is typically owned by the utility company and will be modeled for reference and coordinated accordingly by the EE.
11	In addition to the defined Level of Development for this category the PE will also provide typical details and notes that have been developed with text and/or 2D supplementation.
12	The Mechanical, Plumbing and Electrical Engineers will be responsible for modeling their respective engineering systems up to 5' outside the building, from that point on ownership of the Model Elements will transition to the Civil Engineer.
13	In addition to the defined Level of Development for this category the Technology Engineer will provide typical details and notes that have been developed with text and/or 2D supplementation. This will be inclusive of this category with the exception of cable trays and bundled conduits which will be modeled.
14	Branch wiring to be excluded as Model Elements by the Design Team.
15	If systems are pre-egineered they can be modeled at LOD 200.
16	Although standard wall and ceiling individual framing members are not modeled, any atypical framing features required for tiered ceilings, soffits, curved walls, arched ceilings, etc. should be modeled to ensure there is enough available space for the additional framing/bracing for these components.
17	All ducts and air handling equipment shall be modeled to the outside face dimension.
18	All piping shall be modeled to the outside diameter of the pipe adding insulation as its own entity where applicable or the pipe insulation, whichever is greater.
19	For telecommunication systems, at a minimum, all cable tray, wire managements hooks, conduit larger than ¾", and communication racks and cabinets shall be modeled. Large groups of conduit ¾" (or less) in a particular location shall be modeled to reflect the overall space requirements.
20	All components of the fire alarm system shall be modeled including all panels and devices with access zones and conduit larger than ¾". Large groups of conduit ¾" (or less) in a particular location will be modeled to reflect the overall space requirements.

UC San Diego

Attachment 1 – File Naming Conventions

2D PDF

The format for PDF files for drawing sets should follow the naming convention below. PDF drawing sets should be submitted as a singular PDF file for each discipline and each volume (if applicable).

Format of File: AAAA- B-C.ext
Example: 5171-Hillcrest Redevelopment-Architectural Volume I.pdf

SIGNIFIER AREA	SIGNIFIER DESCRIPTION	VALUE	VALUE DESCRIPTION
			*Example values shown below. Not intended as complete list of values.
AAAA-B-C.ext	**Project Identifier**		Four digit project number assigned by UC San Diego CPM
	Example:	5171	
AAAA-B-C.ext	**Project Name**		Project name commonly used by the Project Team
	Example:	Hillcrest Redevelopment	
AAAA-B-C.ext	**Discipline**		Discipline description and volume description (if applicable)
	Example:	Architectural Volume I	

2D CAD (.dwg)

2D CAD file (.dwg) deliverables have no specific file naming requirement, however, file authors should incorporate sheet numbers into the file name.

Model File Format

Full building model files, such as those authored in Revit®, may follow any naming convention of the project teams choosing, however, it is recommended to incorporate the CPM project number, a facility or project abbreviation, and the model discipline or trade.

Additional considerations for 3D CAD files – For file types such as AutoCAD® models which are typically organized by level, area, or zone, the Project Team may choose to include an additional file name segment ($$$$ in table below) that designates the additional location breakdown information.

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Format of File: AAA- BBBB-CC-$$$$.ext
Example: FAH-5088-PL-01A.dwg

SIGNIFIER AREA	SIGNIFIER DESCRIPTION	VALUE	VALUE DESCRIPTION
			*Example values shown below. Not intended as complete list of values.
AAA-BBBB-CC-$$$$.ext	**Facility Identifier**		Facility abbreviation assigned by University
	Example:	FAH	
AAA-BBBB-CC-$$$$.ext	**Project Number**		Project number assigned by University
	Example:	5088	
AAA-BBBB-CC-$$$$.ext	**Discipline**		Two-character discipline abbreviation
		AR	Architecture
		CI	Civil
		CO	Concrete
		PR	Process
		EP	Electrical Power
		EL	Electrical Lights
		FP	Fire Protection
		DW	Drywall
		LS	Landscape
		MD	Mechanical Duct
		MP	Mechanical Pipe
		PL	Plumbing
		ST	Structural
		SS	Structural Steel
		TC	Telecommunications
AAA-BBBB-C-$$$$.ext	**Floor/Area/Zone**		Level, zone, area designator. Number of characters may vary as needed.
	Example:	UG	Underground
		LL	Lower Level
		01	Level One
		02	Level Two
		RF	Roof
		LLA	Lower Level, Zone A
		LLB	Lower Level, Zone B
		1A	Level One, Zone A
		1B	Level One, Zone B
AAA-BBBB-C-$$$$.ext	File Extension		
		.dwg	AutoCAD® Drawing File

		.nwc	Navisworks® Cache File Format
		.nwd	Navisworks® Published File Format
		.nwf	Navisworks® File Format
		.rvt	Revit® File Format (if broken down by level/area)
		.rcp, .rcs	Autodesk® Recap® File Format (Point Cloud)

UC San Diego

Attachment 2 – Space ID Guidelines

University of California San Diego

UCSD Space ID Guidelines

Version 1.0: May 16, 2019

UC San Diego

1. Space ID Guidelines Overview

To better leverage common facilities information across departmental functions, these space ID guidelines are applied to the entire campus for space and asset management activities. These activities involve planning, analysis, maintenance, operations, and especially first responder wayfinding throughout UC San Diego. These guidelines apply to all spaces where the University has a need to understand its operational footprint or maintains physical assets.

All accessible spaces at UC San Diego related to a building enclosure must have space identifiers (space numbers) assigned according to established guidelines and in consultation with Campus Planning. Space boundaries must be defined by discrete, individual polylines or similar bounding objects within graphic models such as BIM, CAD, GIS, photo-mesh model, etc.

- Initial room uses will be confirmed by Campus Space Planning for initial load.
- Boundaries, room separation, and/or polylines are measured paint to paint, not centerlines.

These space identification guidelines will most often be applied for new design-construction projects. For existing buildings with spaces not conforming to this guideline, project teams may use ID's that fit within the existing buildings naming and numbering pattern.

2. Coordination of Space ID Guidelines

Representatives from the three areas below must coordinate, review and agree on the final numbering outcome for all construction activity that modifies space geometry (usually walls, windows, and doors, but may include exterior areas such as parking or tennis courts):

A. The architectural and/or engineering design consultant (A/E)
B. The UC San Diego project manager (PM) or contact, usually from
    a. Capital Program Management for most major projects
    b. Facilities Management for most campus renovations
    c. Facilities Engineering for Healthcare (Med Center) projects
    d. Facilities Management for Housing, Dining, and Hospitality (HDH)
    e. Real Estate for most lease Tenant Improvements (TIs).
C. Campus Planning

(B) and/or (C) will confirm the final plan with the intended post-construction/renovation occupant(s) of the space. For all projects, review of space numbering and adherence to the numbering standard is mandatory. Space ID milestones are tied to the following project milestones:

- **100% Schematic Design** – Preliminary validation. Campus Planning will engage with a preliminary review of space IDs and Bluebeam comment process.
- **100% Construction Documents** – Final validation and sign-off.

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3. Non-Building Spaces

A non-building space ID framework is under development. There is a need to locate assets not enclosed by a facility. Further details on this topic are forthcoming.

4. Floor and Space ID - Syntax and Assignment

1. Room numbers/space IDs should not exceed seven alphanumeric characters in total, including below grade prefixes, to allow prorating (subdividing) space allocations.
    a. Space IDs must be unique within each building, with only one number per space.
    b. The leading characters indicate the floor (such as 1, 2, 14, 15, P1, L3, etc)

Intermediate or mezzanine levels will be designated with an alphabetic character after the floor level below the intermediate level. For example, a floor between floors 3 and 4 will be designated "3A."

        i. Numbered levels below grade prefixed with L or P, will increase with depth away from the ground plane. For example, descending below grade: L1, L2, L3, etc.
        ii. In the case of additions to an existing building, the new structure's floor nomenclature should match the existing floor nomenclature.

    c. The remaining 5 characters indicate the space. Use the least possible number of characters to indicate unique spaces for a floor. For example, 99 spaces would entail 2 characters plus the floor prefix.

2. **Subspaces** - Spaces typically include all rooms and corridors within a building, but are also individuated further in at least two cases:
    a. **Lab bench spaces** – Lab benches will have poly-lined subdivisions and space ids as needed by the managing department.
    b. **Open office workstations** – all cubicles and bench work points must have an individual, non-overlapping boundary or polyline and a unique space id, using centerlines delineated by furniture or similar features.
        i. The architect/designer shall provide an initial list and layout for open office areas.
        ii. Typically, final open office designs will be provided by furniture vendors, and may be omitted from final room/space IDs provided by the architect/designer
        iii. In cases of smaller renovations, or when the furniture design will not be provided by another vendor, the designer shall provide the IDs.
3. In order to keep numbers available for later use, openings in the numbering scheme should be left where future rooms or renovations are most likely to occur.
    a. For example, for rooms 12 feet or longer, presume the possibility they may be subdivided at a later date. Leave room for number expansion (plus the floor prefix) when numbering.

1120 (8')	1122 (8')	1128 (24')	1130 (8')

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5. Sequence logic within building, floor, and suite

1. Begin numbering sequences at the main entrance of a floor or suite. If the entrance opens into the middle of a long hallway with many rooms, start numbering at the end of the hallway closest to the entrance. The main entrance may be located at any level but should be the predominant public entrance to the building.
2. Numbering sequences should follow consistent logical patterns throughout the building. Sequence path variations are discouraged but permitted when necessary due to building geometry.
    a. Preferred sequences within a floor are:
        i. Circular, moving clockwise or counterclockwise,
        ii. Ascending (such as along a corridor) and either alternating evens and odds or following a sequence up one side and returning on the other.
    b. Examples
        i. Alternate even and odd on opposite sides of a corridor
        ii. Numbers increase clockwise or counterclockwise from the main entrance
3. "Stack" rooms in multi-floor buildings both above and below where the geometry is similar.
    a. For example, 101, 201, and 301, etc., might be vertically aligned if in the same corner of the building.
4. When renovating an area on a floor, and not the whole floor, number uniformity on the floor shall be maintained. If this means that a room not within the renovation area is re-numbered, the cost of signage is rolled into the contingency costs of the renovation project.

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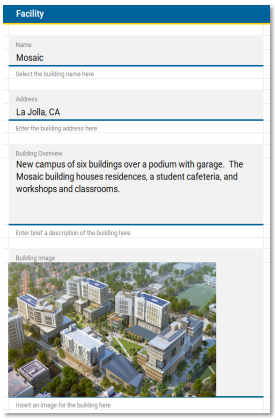
Attachment 3 – University Facility Data Specification (FDS) and Data Collection Template

Includes the following files with noted worksheets:

UCSD FDS and Data Collection Template v2.01.xlsx

- Readme
- Facility Data Specification
- Authors
- Locations
- Assets



The Data Collection Template is be used to provide facility data from design and construction projects. The Template is the primary method project teams should use to submit facility data required according to the Facility Data Specification (FDS). Each project team, represented by the Project Team Lead, should plan and agree upon the required facility data, how, and when it will be submitted with the University PM and Data Manager. Each project team should develop a facility data deliverables schedule with review by the data manager. The deliverables schedule will lay out the timing of when completed Templates are due by each data author. See the T2O/BIM Guidelines for more details on facility data deliverables.

The process of developing project data using the Template is organized in three sections:

① The "**UCSD Facility Codes**" table needs to be filled out by the data manager with the facilities group(s) involved in the project as the first step. The values entered in the UCSD Facility Codes table must be entered exactly since they directly transfer into Maximo. The "**Facility**" and "**Project**" tables capture general information after that.
② The "**Facility Data Specification**" and "**Authors**" tables require data be entered before data collection can begin. The "**Custom project values for data entry**" section of the "**Facility Data Specification**" needs to be completed by the Project Team with approval by the Data Manager before the next steps of inputting project data. The Project Team Lead should review the project design and list all "**Asset category project name**" values next to the appropriate Omniclass row to indicate that the asset category is found in the project. "**Assigned authors**" with the data drop they are responsible for are pulled into the Facility Data Specification sheet from the "**Authors**" sheet. Project team lead should ensure the "**Authors**" table is filled in with the Company Name, Data author name, Author email, and Data Drop so the author can be assigned to their respective asset categories in the FDS sheet.
③ Data Collection: The "**Locations**" table must be populated with all of the space (room) names, numbers, levels, and the FM department that manages them ("UCSD Managing Department"). Populating the locations table is ideally performed at the end of the design process when space names and numbers have been fixed. The "**Assets**" table references multiple data fields input from the previous steps which is why it is important to complete sections ① and ② before proceeding with adding data in the "**Assets**" table. The "location" attribute in the "**Assets**" table also pulls from the list of locations in the "Locations" table, if they are present. If all steps are followed in sequence, the "**Assets**" table serves as an effective support tool for Teams to interpret the UCSD facilty data requirements.

For additional instructions, refer to the "**Notes**" next to the tables on each worksheet and the following field descriptions for additional details.
Do not leave the attribute blank on the form, as this will indicate an omission of information.

Assets worksheet data entry information. If there is no value for an attribute that is required, then use "NA" to denote "not applicable".

Assets Table Field name (Not in Table below)	**Description**
Data author (email)	Choose your email from the dropdown list. To enter additional rows, copy-paste into the next available row or right-click on the table and choose "Add row".
Company name	Calculated value based on data author picking a value in "Data author (email)" field.
Notes	Describe any unique conditions or exceptions.

Attribute Name	Data Type	Attribute Description and Data Source	**Additional Note**
UCSD Managing Department	Picklist	HDH, FM, MC, or a combination of the three. FM group at the University having maintenance responsibility. See FDS for differing data requirements for each department.	
Facility ("UCSD HDH Description" or "UCSD FM Description")	Text (Fixed)	Facility name. Decided by UC San Diego. Same value for all assets within each facility. These attributes are entered on the "UCSD Facility Codes" worksheet.	The"**UCSD Required By**" field in the "**Facility Data Specification**" worksheet indicates if the managing department tracks the asset category for any "**UCSD managing department**" assignment in the "**Locations**" worksheet indicates which FM department will manage the space, which may inform asset maintenance responsibility.
Asset Category Project Name	Picklist	Term used to refer to asset or equipment type from project design documents (drawings, equipment schedules, or specifications). Entered in the FDS worksheet which links to the dropdown on the Assets sheet.	Dropdown values are filtered by "**Company Name**"
UCSD Tag	Text (Unique)	Unique asset identifier value as defined on design docs. If no unique tag is assigned, data manager to prescribe a pattern for data authors to implement, incorporating type tag.	
Type Tag	Text	Non-unique asset identifier defined on design docs for assets of the same type (e.g. light fixtures, fire extinguishers). Only required if "UCSD Tag" is not defined by design team.	
Location	Picklist	From architectural floor plans. Value may either be a Level or the concatenation of space "Name Number" from locations table.	
Manufacturer	Text	Manufacturer company name from approved product data submittals.	
Model	Text	Model number for the product from approved product data submittals.	
Serial	Text	Asset serial number from startup reports or physical placards. A unique identifier for an installed product generated by the product manufacturer. Extended attribute (not required for all assets).	
Barcode (**)	Number	Barcode number matching HDH, FM, or Med Center barcode label values. Extended attribute (not required for all assets).	Add department-specific barcode if the cell is non-shaded.
Area Serving	Text	From single-line, riser diagram, or design plans. Location or list of locations (level or space "Name Number" from locations table) that the asset provides its service to, for mechanical dry-side assets only. Extended attribute (not required for all assets).	

Table 2.1.6 Asset data type and source.
** is a placeholder for either FM, MC, or HDH

Table 2.1.6 from T2O/BIM Guidelines main document

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Facility Data Specification Version 2.01

	Classification				Custom project values for data entry				Extended Attributes				
System	Product class	OmniClass number	OmniClass name	LOD Matrix	Assigned Author	Asset category project name	Notes	UCSD required by	Unique	Area serving	Serial	Barcode FM	Barcode MC	Barcode HDH
B20 EXTERIOR VERTICAL ENCLOSURES	23-17 11 00: Doors	23.17.11.00	Doors	23.17.11.00: Doors			Main entrance doors only, not all exterior doors	FM,MC	☑	-	-	-	☑	-
B20 EXTERIOR VERTICAL ENCLOSURES	23-17 11 00: Doors	23.17.11.13.25	Overhead Metal Doors	23.17.11.13.25: Overhead Metal Doors				FM,MC	☑	-	-	-	☑	-
B20 EXTERIOR VERTICAL ENCLOSURES	23-17 11 00: Doors	23.17.11.23.15	Folding All Glass Doors and Grilles	23.17.11.23.15: Folding All Glass Doors and Grilles				FM,MC	☑	-	-	-	☑	-
B30 EXTERIOR HORIZONTAL ENCLOSURES	23-13 39 00: Roof Coverings, Claddings, Linings	23.13.39.00	Roof Coverings, Claddings, Linings	23.13.39.00: Roof Coverings, Claddings, Linings				MC	-	-	-	-	☑	-
B30 EXTERIOR HORIZONTAL ENCLOSURES	23-13 39 00: Roof Coverings, Claddings, Linings	23.13.39.31	Roof Membranes	23.13.39.31: Roof Membranes				FM,HDH	-	-	-	-	-	☑
C10 INTERIOR CONSTRUCTION	23-17 11 00: Doors	23.15.11.17	Operable Partitions	23.15.11.17: Operable Partitions				FM	☑	-	-	-	-	-
C10 INTERIOR CONSTRUCTION	23-17 11 00: Doors	23.17.11.00	Doors	23.17.11.00: Doors				MC	☑	-	-	-	☑	-
C10 INTERIOR CONSTRUCTION	23-17 19 00: Hardware for Openings	23.17.19.11.31	Automatic Door Controls and Operators	23.17.19.11.31: Automatic Door Controls and Operators			ADA panel/pedestal, only at main entrance doors	FM,MC	☑	-	-	-	☑	-
C10 INTERIOR CONSTRUCTION	23-17 21 00: Protection of Openings	23.17.21.15	Fire and Smoke Shutters and Curtains	23.17.21.15: Fire and Smoke Shutters and Curtains				FM	☑	-	-	-	-	-
C10 INTERIOR CONSTRUCTION	23-19 31 00: Room Units	23.19.31.19.13.04	Cold Room	23.19.31.19.13.04: Cold Room				FM,HDH	☑	-	-	-	-	☑
C10 INTERIOR CONSTRUCTION	23-19 31 00: Room Units	23.19.31.19.13.06	Warm Room	23.19.31.19.13.06: Warm Room				FM	☑	-	-	-	-	-
C10 INTERIOR CONSTRUCTION	23-21 19 00: Casework	23.21.19.15.15.11	Hospital Specialty Casework	23.21.19.15.15.11: Hospital Specialty Casework				HDH	☑	-	-	-	-	☑
C20 INTERIOR FINISHES	23-15 19 00: Ceiling Coverings, Claddings, and Linings	23.15.19.15.11	Ceiling Tiles	23.15.19.15.11: Ceiling Tiles				MC	-	-	-	-	☑	-
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11	Elevators	23.23.11.11: Elevators				All	☑	-	-	-	☑	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.11.11	Freight Traction Elevators	23.23.11.11.11.11: Freight Traction Elevators				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.11.13	Passenger Traction Elevators	23.23.11.11.11.13: Passenger Traction Elevators				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.11.15	Residential Traction Elevators	23.23.11.11.11.15: Residential Traction Elevators				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.11.17	Service Traction Elevators	23.23.11.11.11.17: Service Traction Elevators				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.13.11	Freight Hydraulic Elevators	23.23.11.11.13.11: Freight Hydraulic Elevators				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.13.13	Passenger Hydraulic Elevators	23.23.11.11.13.13: Passenger Hydraulic Elevators				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.13.15	Residential Hydraulic Elevators	23.23.11.11.13.15: Residential Hydraulic Elevators				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.13.17	Service Hydraulic Elevators	23.23.11.11.13.17: Service Hydraulic Elevators				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 11 00: Vertical Transportation Equipment	23.23.11.11.21	Elevator Equipment and Controls	23.23.11.11.21: Elevator Equipment and Controls				FM,HDH	☑	-	-	-	-	☑
D10 Conveying	23-23 13 00: Lifting Equipment	23.23.13.11.25	Wheel Chair Lifts	23.23.13.11.25: Wheel Chair Lifts				FM	☑	-	-	-	-	-
D10 Conveying	23-23 23 00: Loading Dock Equipment	23.23.23.00	Loading Dock Equipment	23.23.23.00: Loading Dock Equipment				FM	☑	-	-	-	-	-
D20 Plumbing	23-13 41 00: Roof Specialties and Accessories	23.13.41.39	Roof Drains	23.13.41.39: Roof Drains				FM	☑	-	-	-	-	-
D20 Plumbing	23-13 41 00: Roof Specialties and Accessories	23.13.41.39	Roof Drains	23.13.41.39: Roof Drains				FM	☑	-	-	-	-	-
D20 Plumbing	23-27 11 00: Gas Instrument and Controls	23.27.11.04	Gas Meters	23.27.11.04: Gas Meters				FM	☑	-	-	-	-	-
D20 Plumbing	23-27 17 00: Pumps	23.27.17.00	Pumps	23.27.17.00: Pumps			Duplex Pumps	All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 17 00: Pumps	23.27.17.02	Vacuum Pumps	23.27.17.02: Vacuum Pumps				FM,MC	☑	-	☑	☑	☑	-
D20 Plumbing	23-27 17 00: Pumps	23.27.17.04	Drainage Pumps	23.27.17.04: Drainage Pumps				All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 17 00: Pumps	23.27.17.13	Centrifugal Pumps	23.27.17.13: Centrifugal Pumps				All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 17 00: Pumps	23.27.17.35	Sewage Ejectors	23.27.17.35: Sewage Ejectors				All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 21 00: Compressors	23.27.21.04	Air Compressors	23.27.21.04: Air Compressors				All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 23 00: Heat Exchangers	23.27.23.00	Heat Exchangers	23.27.23.00: Heat Exchangers				All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 23 00: Heat Exchangers	23.27.23.13	Plate and Frame Heat Exchangers	23.27.23.13: Plate and Frame Heat Exchangers				All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 23 00: Heat Exchangers	23.27.23.15	Shell and Tube Heat Exchangers	23.27.23.15: Shell and Tube Heat Exchangers				All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 27 00: Pressure Reducing Stations	23.27.27.00	Pressure Reducing Stations	23.27.27.00: Pressure Reducing Stations				MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 29 00: Tanks and Storage Structures	23.27.29.19	Tanks	23.27.29.19: Tanks			Receiver Tank	FM,HDH	☑	-	☑	☑	-	☑
D20 Plumbing	23-27 29 00: Tanks and Storage Structures	23.27.29.19.02	Gas System Tank	23.27.29.19.02: Gas System Tank				FM	☑	-	☑	☑	-	-
D20 Plumbing	23-27 29 00: Tanks and Storage Structures	23.27.29.19.04	Gray Water Tanks	23.27.29.19.04: Gray Water Tanks				FM,HDH	☑	-	☑	☑	-	☑
D20 Plumbing	23-27 29 00: Tanks and Storage Structures	23.27.29.19.05	Potable-Water Storage Tanks	23.27.29.19.05: Potable-Water Storage Tanks			Storage Tank	All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 29 00: Tanks and Storage Structures	23.27.29.19.06	Sanitary Tanks	23.27.29.19.06: Sanitary Tanks				FM,HDH	☑	-	☑	☑	-	☑
D20 Plumbing	23-27 29 00: Tanks and Storage Structures	23.27.29.19.08	Expansion Tanks (plumbing)	23.27.29.19.08: Expansion Tanks (plumbing)			Expansion Tank	All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-27 31 00: Valves	23.27.31.00	Valves	23.27.31.00: Valves				FM,MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 31 00: Valves	23.27.31.00	Valves	23.27.31.00: Valves				FM,MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 31 00: Valves	23.27.31.00	Valves	23.27.31.00: Valves				FM,MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 31 00: Valves	23.27.31.11	Backflow Preventors	23.27.31.11: Backflow Preventors				All	☑	-	-	-	☑	☑
D20 Plumbing	23-27 31 00: Valves	23.27.31.29	Mixing Valves	23.27.31.29: Mixing Valves				FM,MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 33 00: Valve Actuators	23.27.33.11	Electrical Valve Actuators	23.27.33.11: Electrical Valve Actuators				FM,HDH	☑	-	-	-	-	☑
D20 Plumbing	23-27 37 00: Liquid Traps	23.27.37.11	Grease Traps	23.27.37.11: Grease Traps				MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 37 00: Liquid Traps	23.27.37.15	Steam Traps	23.27.37.15: Steam Traps				MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 55 00: Liquid Treatment Components	23.27.55.11	Liquid Filters	23.27.55.11: Liquid Filters				MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 55 00: Liquid Treatment Components	23.27.55.27.11	Water Softeners	23.27.55.27.11: Water Softeners				FM,MC	☑	-	-	-	☑	-
D20 Plumbing	23-27 55 00: Liquid Treatment Components	23.27.55.38	Liquid Separators (plumbing)	23.27.55.38: Liquid Separators (plumbing)			Air Separators	FM	☑	-	☑	☑	-	-
D20 Plumbing	23-29 37 00: Occupational Safety and Health Equipment	23.29.37.13	Emergency Eye Wash Stations	23.29.37.13: Emergency Eye Wash Stations				All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-29 37 00: Occupational Safety and Health Equipment	23.29.37.15	Emergency Showers	23.29.37.15: Emergency Showers				All	☑	-	-	-	☑	☑
D20 Plumbing	23-29 37 00: Occupational Safety and Health Equipment	23.29.37.16	Combination Eye Wash Emergency Showers	23.29.37.16: Combination Eye Wash Emergency Showers				All	☑	-	-	-	☑	☑
D20 Plumbing	23-31 11 00: Faucets	23.31.11.00	Faucets	23.31.11.00: Faucets				MC	☑	-	-	-	☑	-
D20 Plumbing	23-31 19 00: Toilets	23.31.19.00	Toilets	23.31.19.00: Toilets				MC	☑	-	-	-	☑	-
D20 Plumbing	23-31 27 00: Floor Drains	23.31.27.00	Floor Drains	23.31.27.00: Floor Drains				MC	☑	-	-	-	☑	-
D20 Plumbing	23-31 29 00: Hot Water Heaters	23.31.29.00	Hot Water Heaters	23.31.29.00: Hot Water Heaters			Tanks Heaters, Instantaneous hot water heaters	All	☑	-	☑	☑	☑	☑
D20 Plumbing	23-31 29 00: Hot Water Heaters	23.31.29.02	Water Heater Booster	23.31.29.02: Water Heater Booster				HDH	☑	-	-	-	-	☑
D20 Plumbing	23-31 31 00: Drinking Fountains	23.31.31.00	Drinking Fountains	23.31.31.00: Drinking Fountains				All	☑	-	-	-	☑	☑
D20 Plumbing	23-33 47.00: Air Dryers	23.33.47.00	Air Dryers	23.33.47.00: Air Dryers				FM,MC	☑	-	☑	☑	☑	-
D20 Plumbing	23-39 29 00: Waste Water Collection and Removal	23.39.29.11.13	Waste Water Storm Drain	23.39.29.11.13: Waste Water Storm Drain				FM,HDH	☑	-	-	-	-	☑
D20 Plumbing	23-39 29 13: Waste Water Subdrainage	23.39.29.13.19	Surface Water Drainage Systems	23.39.29.13.19: Surface Water Drainage Systems				FM,HDH	☑	-	-	-	-	☑
D20 Plumbing	23-39 29 13: Waste Water Subdrainage	23.39.29.13.19	Surface Water Drainage Systems	23.39.29.13.19: Surface Water Drainage Systems				FM,HDH	☑	-	-	-	-	☑
D20 Plumbing	23-39 33 00: Water and Waste Water Preliminary Treatment Equipment	23.39.33.17	Oil and Grease Separation and Removal Equipment	23.39.33.17: Oil and Grease Separation and Removal Equipment				FM		-	-	-	-	-
D20 Plumbing	23-39 41 00: Water and Wastewater Advanced Treatment Equipment	23.39.41.13	Demineralization Equipment	23.39.41.13: Demineralization Equipment			Reverse Osmosis skid	FM		-	-	-	-	-
D30 HVAC	23-27 11 00: Gas Instrument and Controls	23.27.11.15	Flow Measuring Instrument and Controls	23.27.11.15: Flow Measuring Instrument and Controls			Flow Measuring Instrument and Controls	FM	☑	-	-	-	-	-
D30 HVAC	23-27 11 00: Gas Instrument and Controls	23.27.11.27	Gas Instrument and Controls	23.27.11.27: Gas Instrument and Controls			Oxygen Monitor	HDH,MC	☑	-	-	-	☑	☑
D30 HVAC	23-27 17 00: Pumps	23.27.17.00	Pumps	23.27.17.00: Pumps				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-27 17 00: Pumps	23.27.17.13	Centrifugal Pumps	23.27.17.13: Centrifugal Pumps				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-27 17 00: Pumps	23.27.17.13	Centrifugal Pumps	23.27.17.13: Centrifugal Pumps				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-27 23 00: Heat Exchangers	23.27.23.00	Heat Exchangers	23.27.23.00: Heat Exchangers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-27 23 00: Heat Exchangers	23.27.23.13	Plate and Frame Heat Exchangers	23.27.23.13: Plate and Frame Heat Exchangers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-27 29 00: Tanks and Storage Structures	23.27.29.19	Tanks	23.27.29.19: Tanks				FM,HDH	☑	-	☑	☑	-	☑
D30 HVAC	23-27 29 00: Tanks and Storage Structures	23.27.29.19.07	Expansion tanks (hvac)	23.27.29.19.07: Expansion tanks (hvac)				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-27 31 00: Valves	23.27.31.00	Valves	23.27.31.00: Valves				FM,MC	☑	-	-	-	☑	-
D30 HVAC	23-27 31 00: Valves	23.27.31.00	Valves	23.27.31.00: Valves				FM,MC	☑	-	-	-	☑	-
D30 HVAC	23-27 33 00: Valve Actuators	23.27.33.11	Electrical Valve Actuators	23.27.33.11: Electrical Valve Actuators				FM	☑	-	-	-	-	-
D30 HVAC	23-27 55 00: Liquid Treatment Components	23.27.55.31	Liquid Chemical Feeders	23.27.55.31: Liquid Chemical Feeders				FM,MC	☑	-	-	-	☑	-
D30 HVAC	23-27 55 00: Liquid Treatment Components	23.27.55.36	Liquid Separators (hvac)	23.27.55.36: Liquid Separators (hvac)				FM	☑	-	☑	☑	-	-
D30 HVAC	23-27 57 00: Gas Treatment Components	23.27.57.27	Air Filters	23.27.57.27: Air Filters				FM,HDH	☑	-	-	-	-	☑
D30 HVAC	23-27 57 00: Gas Treatment Components	23.27.57.31	Electronic Air Cleaners	23.27.57.31: Electronic Air Cleaners				FM	☑	-	-	-	-	-
D30 HVAC	23-33 11 00: Commercial Boilers	23.33.11.00	Commercial Boilers	23.33.11.00: Commercial Boilers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 11 00: Commercial Boilers	23.33.11.13	Condensing Boilers	23.33.11.13: Condensing Boilers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 11 00: Commercial Boilers	23.33.11.17	Flexible Tube Boilers	23.33.11.17: Flexible Tube Boilers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 11 00: Commercial Boilers	23.33.11.21	Water Tube Boilers	23.33.11.21: Water Tube Boilers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 11 00: Commercial Boilers	23.33.11.22	Electric Boilers	23.33.11.22: Electric Boilers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 15 00: HVAC Heating Units	23.33.15.21	Hydronic HVAC Heaters	23.33.15.21: Hydronic HVAC Heaters			Baseboard/radiant heaters	None	-	-	-	-	-	-
D30 HVAC	23-33 17 00: Heat Pumps	23.33.17.13	Split System Heat Pumps	23.33.17.13: Split System Heat Pumps				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 21 00: Chillers	23.33.21.13	Chillers	23.33.21.13: Chillers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 21 00: Chillers	23.33.21.13.11	Central Package Unit Chillers	23.33.21.13.11: Central Package Unit Chillers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 21 00: Chillers	23.33.21.13.13	Centrifugal Chillers	23.33.21.13.13: Centrifugal Chillers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 21 00: Chillers	23.33.21.13.15	Reciprocating Chillers	23.33.21.13.15: Reciprocating Chillers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 21 00: Chillers	23.33.21.13.17	Rotary Chillers	23.33.21.13.17: Rotary Chillers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 21 00: Chillers	23.33.21.13.19	Rotary Screw Chillers	23.33.21.13.19: Rotary Screw Chillers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 21 00: Chillers	23.33.21.13.21	Screw Chillers	23.33.21.13.21: Screw Chillers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 21 00: Chillers	23.33.21.13.23	Scroll Chillers	23.33.21.13.23: Scroll Chillers				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 23 00: Cooling Towers	23.33.23.11	Mechanical Draft Cooling Towers	23.33.23.11: Mechanical Draft Cooling Towers				FM,MC	☑	-	☑	☑	☑	-
D30 HVAC	23-33 23 00: Cooling Towers	23.33.23.13	Natural Draft Cooling Towers	23.33.23.13: Natural Draft Cooling Towers				FM,MC	☑	-	☑	☑	☑	-
D30 HVAC	23-33 25 00: Air Handling Units	23.33.25.00	Air Handling Units	23.33.25.00: Air Handling Units				All	☑	☑	☑	☑	☑	☑
D30 HVAC	23-33 27 00: Air Humidity Control Equipment	23.33.27.13	Dehumidifiers	23.33.27.13: Dehumidifiers				FM	☑	☑	-	-	-	-
D30 HVAC	23-33 27 00: Air Humidity Control Equipment	23.33.27.15	Air Humidifiers	23.33.27.15: Air Humidifiers				FM,MC	☑	☑	-	-	☑	-
D30 HVAC	23-33 29 00: HVAC Dampers	23.33.29.19	Dampers	23.33.29.19: Dampers				FM,HDH	☑	-	-	-	-	☑
D30 HVAC	23-33 29 00: HVAC Dampers	23.33.29.23	Fire Dampers	23.33.29.23: Fire Dampers				FM	☑	-	-	-	-	-

Notes
Assign values in **Asset type project name**, and
UCSD tag format with facility owner
Asset type project name: duplicates are highlighted
UCSD required by departments: HDH, FM, MC

Asset Category found in LOD Matrix table
Asset Category covered by higher level category

UC San Diego

		Classification			Custom project values for data entry				Extended Attributes				
System	Product class	OmniClass number	OmniClass name	LOD Matrix	Assigned Author	Asset category project name	Notes	UCSD required by	Unique	Area serving	Serial	Barcode FM	Barcode MC	Barcode HDH
D30 HVAC	23-33 29 00: HVAC Dampers	23.33.29.24	Combination Fire Smoke Dampers	23.33.29.24: Combination Fire Smoke Dampers			Fire Dampers	FM	☑	-	-	-	-	-
D30 HVAC	23-33 29 00: HVAC Dampers	23.33.29.25	Smoke Dampers	23.33.29.25: Smoke Dampers				FM	☑	-	-	-	-	-
D30 HVAC	23-33 29 00: HVAC Dampers	23.33.29.37	Volume Control Dampers	23.33.29.37: Volume Control Dampers				FM,HDH	☑	-	-	-	-	☑
D30 HVAC	23-33 31 00: Air Circulators	23.33.31.15	Exhaust Hoods	23.33.31.15: Exhaust Hoods				FM,HDH	☑	☑	-	-	-	☑
D30 HVAC	23-33 31 00: Air Circulators	23.33.31.19	Fans	23.33.31.19: Fans				All	☑	☑	☑	☑	☑	☑
D30 HVAC	23-33 31 00: Air Circulators	23.33.31.19	Fans	23.33.31.19: Fans			Exhaust Fan	All	☑	☑	☑	☑	☑	☑
D30 HVAC	23-33 31 00: Air Circulators	23.33.31.19	Fans	23.33.31.19: Fans			Supply Fan	All	☑	☑	☑	☑	☑	☑
D30 HVAC	23-33 31 00: Air Circulators	23.33.31.19	Fans	23.33.31.19: Fans			Booster Fan	All	☑	☑	☑	☑	☑	☑
D30 HVAC	23-33 31 00: Air Circulators	23.33.31.19	Fans	23.33.31.19: Fans			Return Fan	All	☑	☑	☑	☑	☑	☑
D30 HVAC	23-33 33 00: HVAC Fan Coil Units	23.33.33.11	Fan Coil Units	23.33.33.11: Fan Coil Units				All	☑	☑	☑	☑	☑	☑
D30 HVAC	23-33 35 00: HVAC Coils	23.33.35.00	HVAC Coils	23.33.35.00: HVAC Coils			Reheat coils	FM,HDH	☑	-	-	-	-	☑
D30 HVAC	23-33 37 00: Refrigerant Condensing Units	23.33.37.00	Refrigerant Condensing Units	23.33.37.00: Refrigerant Condensing Units				FM,HDH	☑	-	☑	☑	-	☑
D30 HVAC	23-33 39 00: Air Conditioning Equipment	23.33.39.11	Air Conditioners	23.33.39.11: Air Conditioners				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 39 00: Air Conditioning Equipment	23.33.39.15	Make Up Air Units	23.33.39.15: Make Up Air Units				FM,HDH	☑	☑	☑	☑	-	☑
D30 HVAC	23-33 39 00: Air Conditioning Equipment	23.33.39.17	Packaged Air Conditioners	23.33.39.17: Packaged Air Conditioners				FM,HDH	☑	☑	☑	☑	-	☑
D30 HVAC	23-33 39 00: Air Conditioning Equipment	23.33.39.19	Packaged Terminal Air Conditioning Units	23.33.39.19: Packaged Terminal Air Conditioning Units				FM,HDH	☑	☑	☑	☑	-	☑
D30 HVAC	23-33 39 00: Air Conditioning Equipment	23.33.39.21	Split System Air Conditioning Units	23.33.39.21: Split System Air Conditioning Units				All	☑	-	☑	☑	☑	☑
D30 HVAC	23-33 41 00: HVAC Air Terminals	23.33.41.17.11	Constant Volume Air Terminal Units	23.33.41.17.11: Constant Volume Air Terminal Units				All	☑	☑	-	-	☑	☑
D30 HVAC	23-33 41 00: HVAC Air Terminals	23.33.41.17.13	Variable Air Volume Terminal Units	23.33.41.17.13: Variable Air Volume Terminal Units				All	☑	☑	-	-	☑	☑
D30 HVAC	23-33 43 00: HVAC Condenser Units	23.33.43.11	Air Cooled Condenser Units	23.33.43.11: Air Cooled Condenser Units				All	☑	-	-	-	☑	☑
D30 HVAC	23-33 43 00: HVAC Condenser Units	23.33.43.13	Evaporative Condenser Units	23.33.43.13: Evaporative Condenser Units				All	☑	-	-	-	☑	☑
D30 HVAC	23-33 43 00: HVAC Condenser Units	23.33.43.15	Refrigeration Condenser Units	23.33.43.15: Refrigeration Condenser Units				All	☑	-	-	-	☑	☑
D30 HVAC	23-33 43 00: HVAC Condenser Units	23.33.43.17	Water Cooled Condenser Units	23.33.43.17: Water Cooled Condenser Units				All	☑	-	-	-	☑	☑
D30 HVAC	23-33 49 27: Ventilators	23.33.49.27.11	Gravity Ventilators	23.33.49.27.11: Gravity Ventilators				All	☑	☑	☑	☑	☑	☑
D30 HVAC	23-35 17 00: Variable Speed Drives	23.35.17.15	Variable Frequency Drives	23.35.17.15: Variable Frequency Drives				FM,MC	☑	-	☑	☑	☑	-
D30 HVAC	23-39 35 00: Water and Wastewater Chemical Feed Equipment	23.39.35.11.17.04	Fuel-Gas Detection and Alarm	23.39.35.11.17.04: Fuel-Gas Detection and Alarm				FM,HDH		-	-	-	-	☑
D40 Fire Protection	23-27 17 00: Pumps	23.27.17.06	Fire Pumps	23.27.17.06: Fire Pumps				FM,HDH	☑	-	☑	☑	-	☑
D40 Fire Protection	23-29 25 00: Fire Fighting Equipment	23.29.25.15.19	Fire Hose Connectors	23.29.25.15.19: Fire Hose Connectors				FM	☑	-	-	-	-	-
D40 Fire Protection	23-29 25 00: Fire Fighting Equipment	23.29.25.19	Fire Extinguishers	23.29.25.19: Fire Extinguishers				FM,MC	☑	-	-	-	☑	-
D40 Fire Protection	23-29 29 00: Fire Detection Devices	23.29.29.15	Fire Switches	23.29.29.15: Fire Switches				MC	☑	-	-	-	☑	-
D40 Fire Protection	23-29 31 00: Fire Notification Appliances	23.29.31.13	Fire Alarm Control Panels	23.29.31.13: Fire Alarm Control Panels				All	☑	-	-	-	☑	☑
D40 Fire Protection	23-29 33 00: Fire Suppression System Components	23.29.33.13.13	Carbon Dioxide Suppression Equipment	23.29.33.13.13: Carbon Dioxide Suppression Equipment				FM	☑	-	-	-	-	-
D50 Electrical	23-27 15 00: Building Automation and Control	23.27.15.21	Building Lighting Controls	23.27.15.21: Building Lighting Controls				FM	☑	-	-	-	-	-
D50 Electrical	23-35 11 00: Electrical Generators	23.35.11.00	Electrical Generators	23.35.11.00: Electrical Generators				All	☑	-	☑	☑	☑	☑
D50 Electrical	23-35 11 00: Electrical Generators	23.35.11.15	Engine Generator Sets	23.35.11.15: Engine Generator Sets				All	☑	-	☑	☑	☑	☑
D50 Electrical	23-35 11 00: Electrical Generators	23.35.11.17.15	Photovoltaic Collectors	23.35.11.17.15: Photovoltaic Collectors			One asset per array	FM,HDH	☑	-	-	-	-	☑
D50 Electrical	23-35 13 00: Transformers	23.35.13.04	Low Voltage Transformers	23.35.13.04: Low Voltage Transformers				All	☑	-	-	-	☑	☑
D50 Electrical	23-35 13 00: Transformers	23.35.13.06	Medium Voltage Transformers	23.35.13.06: Medium Voltage Transformers				All	☑	-	-	-	☑	☑
D50 Electrical	23-35 13 00: Transformers	23.35.13.08	Substation Transformers	23.35.13.08: Substation Transformers				All	☑	-	-	-	☑	☑
D50 Electrical	23-35 17 00: Variable Speed Drives	23.35.17.15	Variable Frequency Drives	23.35.17.15: Variable Frequency Drives				FM,MC	☑	-	-	-	☑	-
D50 Electrical	23-35 19 00: Batteries	23.35.19.00	Batteries	23.35.19.00: Batteries				FM,HDH	☑	-	-	-	-	☑
D50 Electrical	23-35 19 00: Batteries	23.35.19.11	Battery Racks	23.35.19.11: Battery Racks				FM,HDH	☑	-	-	-	-	☑
D50 Electrical	23-35 23 00: Power Conditioning Equipment	23.35.23.21	Uninterrupted Power Supply (UPS) Units	23.35.23.21: Uninterrupted Power Supply (UPS) Units				All	☑	-	-	-	☑	☑
D50 Electrical	23-35 25 00: Electrical Instrumentation and Controls	23.35.25.11	Electrical Meters	23.35.25.11: Electrical Meters			Electric meters	FM,HDH	☑	-	-	-	-	☑
D50 Electrical	23-35 27 00: Electrical Terminals	23.35.27.11	Electrical Receptacles	23.35.27.11: Electrical Receptacles				MC	-	-	-	-	☑	-
D50 Electrical	23-35 29 00: Circuit Breakers	23.35.29.21	Vacuum Circuit Breakers	23.35.29.21: Vacuum Circuit Breakers				MC	☑	-	-	-	☑	-
D50 Electrical	23-35 31 00: Electrical Power Distribution Devices	23.35.31.13	Distribution Panel Boards	23.35.31.13: Distribution Panel Boards				All	☑	-	☑	☑	☑	☑
D50 Electrical	23-35 31 00: Electrical Power Distribution Devices	23.35.31.17	Electrical Panel Boards	23.35.31.17: Electrical Panel Boards				All	☑	-	-	-	☑	☑
D50 Electrical	23-35 31 00: Electrical Power Distribution Devices	23.35.31.23	Motor Control Centers	23.35.31.23: Motor Control Centers				All	☑	-	-	-	☑	☑
D50 Electrical	23-35 31 00: Electrical Power Distribution Devices	23.35.31.29	Switchboards	23.35.31.29: Switchboards				FM,HDH	☑	-	☑	☑	-	☑
D50 Electrical	23-35 31 00: Electrical Power Distribution Devices	23.35.31.29.02	Substation Switchboards	23.35.31.29.02: Substation Switchboards				All	☑	-	☑	☑	☑	☑
D50 Electrical	23-35 31 00: Electrical Power Distribution Devices	23.35.31.31	Switchgear	23.35.31.31: Switchgear				All	☑	-	☑	☑	☑	☑
D50 Electrical	23-35 37 00: Electrical Switches	23.35.37.11	Automatic Transfer Switches	23.35.37.11: Automatic Transfer Switches				All	☑	-	-	-	☑	☑
D50 Electrical	23-35 43 00: Electrical Relays	23.35.43.37	Voltage Relays	23.35.43.37: Voltage Relays				MC	☑	-	-	-	☑	-
D50 Electrical	23-35 47 00: Electrical Lighting	23.35.47.11.04	Task Lighting	23.35.47.11.04: Task Lighting				MC	☑	-	-	-	☑	-
D50 Electrical	23-35 47 13: Emergency Lighting	23.35.47.13	Emergency Lighting	23.35.47.13: Emergency Lighting				FM,MC	☑	-	-	-	☑	-
D50 Electrical	23-35 47 15: Exit Illuminated Signs	23.35.47.15	Exit Illuminated Signs	23.35.47.15: Exit Illuminated Signs				FM,MC	☑	-	-	-	☑	-
D80 Integrated Automation	23-27 15 00: Building Automation and Control	23.27.15.23	HVAC Controls	23.27.15.23: HVAC Controls				FM	☑	-	-	-	-	-
E10 Equipment	23-21 11 00: Food Service Equipment and Furnishings	23.21.21.11	Commercial Food Services Cabinets	23.21.21.11: Commercial Food Services Cabinets				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.11.11	Commercial Hot Cabinets	23.21.21.11.11: Commercial Hot Cabinets				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.15	Commercial Broilers	23.21.21.13.15: Commercial Broilers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.15.15	Commercial Gas Broilers	23.21.21.13.15.15: Commercial Gas Broilers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.17.17	Commercial Rice Cookers	23.21.21.13.17.17: Commercial Rice Cookers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.21.11	Commercial Deep Fryers	23.21.21.13.21.11: Commercial Deep Fryers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.25	Commercial Griddles	23.21.21.13.25: Commercial Griddles				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.27	Commercial Grills	23.21.21.13.27: Commercial Grills				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.29	Commercial Kettles	23.21.21.13.29: Commercial Kettles				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.31	Commercial Ovens	23.21.21.13.31: Commercial Ovens				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.31.13	Commercial Combination Convection Ovens	23.21.21.13.31.13: Commercial Combination Convection Ovens				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.31.15	Commercial Convection Ovens	23.21.21.13.31.15: Commercial Convection Ovens				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.35	Commercial Ranges	23.21.21.13.35: Commercial Ranges				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.39	Commercial Food Steamers	23.21.21.13.39: Commercial Food Steamers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.41.11	Commercial Tilt Skillets	23.21.21.13.41.11: Commercial Tilt Skillets				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.13.45.11	Commercial Toaster Conveyors	23.21.21.13.45.11: Commercial Toaster Conveyors				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.15.13	Commercial Food Warmer Stations	23.21.21.15.13: Commercial Food Warmer Stations				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.15.17	Commercial Steam Tables	23.21.21.15.17: Commercial Steam Tables				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.17.11	Commercial Refrigerated Tables	23.21.21.17.11: Commercial Refrigerated Tables				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.19	Commercial Dishwasher Equipment	23.21.21.19: Commercial Dishwasher Equipment				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.19.11	Commercial Dishwashers	23.21.21.19.11: Commercial Dishwashers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.21	Commercial Food Disposal Equipment	23.21.21.21: Commercial Food Disposal Equipment				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.21.13	Commercial Garbage Disposals	23.21.21.21.13: Commercial Garbage Disposals				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.21.15	Commercial Garbage Pulpers	23.21.21.21.15: Commercial Garbage Pulpers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.23.11	Commercial Food Display Coolers	23.21.21.23.11: Commercial Food Display Coolers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.23.11.11	Commercial Freezer Food Display Cases	23.21.21.23.11.11: Commercial Freezer Food Display Cases				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.23.11.15	Commercial Refrigerated Food Display Cases	23.21.21.23.11.15: Commercial Refrigerated Food Display Cases				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.25.45	Commercial Milk Dispensers	23.21.21.25.45: Commercial Milk Dispensers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.27.13.23	Commercial Upright Freezers	23.21.21.27.13.23: Commercial Upright Freezers				HDH,MC	☑	-	-	-	☑	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.27.15.23	Commercial Upright Reach In Refrigerators	23.21.21.27.15.23: Commercial Upright Reach In Refrigerators				HDH,MC	☑	-	-	-	☑	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.27.19.11	Commercial Walk In Coolers	23.21.21.27.19.11: Commercial Walk In Coolers				All	☑	-	-	-	☑	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.29	Commercial Ice Machines	23.21.21.29: Commercial Ice Machines				HDH,MC	☑	-	-	-	☑	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.29.13	Commercial Cube Ice Makers	23.21.21.29.13: Commercial Cube Ice Makers				HDH,MC	☑	-	-	-	☑	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.31	Commercial Food Preparation Equipment	23.21.21.31: Commercial Food Preparation Equipment				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.31.11	Commercial Food Mixers	23.21.21.31.11: Commercial Food Mixers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.31.13	Commercial Food Peelers	23.21.21.31.13: Commercial Food Peelers				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.31.21.11	Commercial Refrigerated Food Preparation Tables	23.21.21.31.21.11: Commercial Refrigerated Food Preparation Tables				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 21 00: Food Service Equipment and Furnishings	23.21.21.35.11.13	Commercial Salad Bars	23.21.21.35.11.13: Commercial Salad Bars				HDH	☑	-	-	-	-	☑
E10 Equipment	23-21 23 00: Residential Furniture and Equipment	23.21.23.33.13.11	Residential Upright Refrigerators	23.21.23.33.13.11: Residential Upright Refrigerators				HDH	☑	-	-	-	-	☑
E10 Equipment	23-25 31 00: Hematology Products	23.25.31.11.11.13	Blood Freezers	23.25.31.11.11.13: Blood Freezers				MC	☑	-	-	-	☑	-
E10 Equipment	23-25 33 00: Medical Gas Products	23.25.33.11	Medical Air Pressure Control Cabinets	23.25.33.11: Medical Air Pressure Control Cabinets				MC	☑	-	-	-	☑	-
E10 Equipment	23-25 33 00: Medical Gas Products	23.25.33.13	Medical Gas Alarm Modules	23.25.33.13: Medical Gas Alarm Modules				MC	☑	-	-	-	☑	-
E10 Equipment	23-25 33 00: Medical Gas Products	23.25.33.25	Medical Gas Outlets	23.25.33.25: Medical Gas Outlets				MC	☑	-	-	-	☑	-
E10 Equipment	23-25 33 00: Medical Gas Products	23.25.33.33	Medical Gas Valve Boxes	23.25.33.33: Medical Gas Valve Boxes				MC	☑	-	-	-	☑	-
E10 Equipment	23-25 57 00: Sterilization Medical Products	23.25.57.11.31	Steam Autoclaves	23.25.57.11.31: Steam Autoclaves				MC	☑	-	-	-	☑	-
E10 Equipment	23-25 69 00: Laboratory and Scientific Products	23.25.65.11	Biological Safety Cabinets	23.25.65.11: Biological Safety Cabinets				FM,MC	☑	-	-	-	☑	-
E10 Equipment	23-25 65 00: Biological Protection and Preservation Products	23.25.65.11.17	Cryogenic Freezers	23.25.65.11.17: Cryogenic Freezers				MC	☑	-	-	-	☑	-
E10 Equipment	23-25 69 00: Laboratory and Scientific Products	23.25.69.11.15	Laboratory Fume Hoods	23.25.69.11.15: Laboratory Fume Hoods				FM,MC	☑	-	-	-	☑	-
E10 Equipment	23-27 59 00: Recycling Equipment	23.27.59.15.19	Trash Compactors	23.27.59.15.19: Trash Compactors				FM,MC	☑	-	-	-	☑	-
G30 Site Civil/Mechanical Utilities	23-27 31 00: Valves	23.27.31.11	Backflow Preventors	23.27.31.11: Backflow Preventors				All	☑	-	-	-	☑	☑
G30 Site Civil/Mechanical Utilities	23-27 31 00: Valves	23.27.31.43	Post Indicator Valves	23.27.31.43: Post Indicator Valves				FM	☑	-	-	-	-	-
G30 Site Civil/Mechanical Utilities	23-39 29 13: Waste Water Subdrainage	23.39.29.13.19	Surface Water Drainage Systems	23.39.29.13.19: Surface Water Drainage Systems				FM,HDH	☑	-	-	-	-	☑

UC San Diego

Data Authors

Data Drop and Author	Company name	Name	Email	Data Drop Responsibility
Architectural-Drop One	Architectural	First Last Architect	architect@vueops.com	Drop One
Mechanical-Drop One	Mechanical	First Last Mechanical	mechanical@vueops.com	Drop One
Plumbing-Drop One	Plumbing	First Last Plumber	plumber@vueops.com	Drop One
Electrical-Drop One	Electrical	First Last Electrician	electrician@vueops.com	Drop One
Civil-Drop One	Civil	First Last Civil	civil@vueops.com	Drop One

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Locations

Location	UCSD managing department	Name	Number	Level
Room Name 0123A	FM,HDH	Room Name	0123A	Level 1

Notes
Location: name + number, duplicates are highlighted
Locations are sorted by level and number
Number: duplicates are highlighted
UCSD managing departments: HDH, FM, MC

Check that there are no duplicate Location values. Remove any duplicates to prevent issues downstream in Assets.
Sort the Location list by Level and Number before using in Assets

Assets

Trade		Type				Facility maintenance	Location			Installed asset					Document	
Data author (email)	Company name	Asset type project name	Manufacturer	Model	Type tag	UCSD managing department	Level	Location	Area serving	Sequential or tag number UCSD tag	Serial number	Barcode FM	Barcode MC	Barcode HDH	Notes	Product data source document
mechanical@vueops.com	Mechanical-Drop One															
plumber@vueops.com	Plumbing-Drop One															
electrician@vueops.com	Electrical-Drop One															
civil@vueops.com	Civil-Drop One															
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Notes
UCSD managing departments: HDH, FM, MC. Data author
to determine with University asset responsibility for maintenance.

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Attachment 4 – Deliverables Schedule

Includes the following files with noted worksheets:

UCSD Deliverables Schedules.xlsx

- Facility Data Deliverables Schedule
- BIM Deliverables Schedule

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BIM Deliverables Schedule

Project:_____

BIM Submittal Item	BIM Submittal Item	File Sender/ Author	File Received/ Location	Submitted or Available	Stage	Frequency of Occurrence	Deliverable Due/Start Date	Finish Date	File type	Notes
		Use company names here, if available.	Indicate the model exchange tool, document management system, or CDE name. Provide a hyperlink if possible.	Available		Once, weekly, monthly, or other frequency of occurance.	Start date for recurring deliverables or due date for one-time deliverables.	Finish data for recurring deliverables. Leave blank for one-time deliverables.	Ex. RVT, DWG, XLS, DOC	
BIM Execution Planning	BIM Execution Plan (Design)			Submitted	Schematic Design	Once				BEP should be reviewed with UCSD PM Team and Data Manager.
	BIM Execution Plan (Construction)			Submitted	Preconstruction	Once				Review BEP plan with UCSD PM and Data Manager, updated by the CM/GC and trade partners model authors.
Design Authoring	Schematic Design Phase Models for Review			Available	Schematic Design	Biweekly				Current RVT or native model files to be uploaded to model collaboration platform or University system-of-record at major SD milestone reviews.
	Design Development Models for Review			Available	Design Development	Biweekly				Current RVT or native model files to be uploaded to model collaboration platform or University system-of-record at major DD milestone reviews.
	Construction Document Models for Review			Available	Construction Documents	Biweekly				Current RVT or native model files to be uploaded to model collaboration platform or University system-of-record at major CD milestone reviews.
3D Coordination	Design Coordination Reports (DD)			Submitted	Design Development	Monthly				Reports should indicate major areas of design coordination issues, issue status, action required by when, team member(s) issue assignment.
	Design Coordination Reports (CD)			Submitted	Construction Documents	Monthly				Reports should have more detailed coordination items organized by discipline compared to the high-level DD coordination reports.
	Construction Models (for Coordination)			Available	Construction	Weekly				Native models developed for coordination and shop drawings and any exports required f the coordination process.
Space Management	Schematic Design Drawing Sets			Submitted	Schematic Design	Once				PDF drawing sets. See UCSD CAD Standard (Attachment 6).
	Construction Documents Drawing Sets			Submitted	Construction Documents	Once				PDF drawing sets. See UCSD CAD Standard (Attachment 6).
	Space Management Floorplans (CD)			Submitted	Construction Documents	Once				CAD exports from space management views stored in architectural models. See BIM Guidelines Attachment 3, 5, and 6.
	Space Management Floorplans (Closeout)			Submitted	Closeout	Once				CAD exports from space management views stored in architectural models. See BIM Guidelines Attachment 3, 5, and 6.
Model Data Quality	Design Models with MMD for Review			Submitted	Construction	Once				Design models from design authoring, if identified as storing min model data (MMD) based on LOD Matrix, will be reviewed by Data Author for completeness of MMD at som point after 100% CD's or equivalent.
	Trade Models with MMD for Review			Submitted	Construction	Once				Trade models from trade coordination, if identified as storing min model data (MMD) based on LOD Matrix, will be reviewed by Data Author for completeness of MMD at som point after trade coordination.
Record Modeling	Record Documents Drawing Sets			Submitted	Closeout	Once				PDF drawing sets. See UCSD CAD Standard (Attachment 6).
	Record Models			Submitted	Closeout	Once				The record model will become the University as-managed model. All assets identified in the FDS should be represented within UCSD-specified tolerances for record models. Facility data deliverables should align back to record models. Revit highly preferred.
As-Built Modeling	As-Built Models			Submitted	Closeout	Once				As-built models will be used for reference in facility operations to represent the most accurate location of distribution and routings.
Other BIM Use	BIM Submission Item 1									*Use this row to add other BIM submissions for BIM Uses that are specific to the project.
	BIM Submission Item 2									*Use this row to add other BIM submissions for BIM Uses that are specific to the project.
	BIM Submission Item 3									*Use this row to add other BIM submissions for BIM Uses that are specific to the project.

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Facility Data Deliverables Schedule

Project:_____

Delete This Column After Completion	Deliverable Description	Responsible Party	Tool	100% SD		100% DD		100% CD		Product Data Submittals Phase 1		Product Data Submittals Phase "N"		Startup Reports		Commissioning		Substantial Completion	
				1/1/2030		1/1/2030		1/1/2030		1/1/2030		1/1/2030		1/1/2030		1/1/2030		1/1/2030	
				Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	Project-Specific FDS	Project Team Lead																	
	Facility Data Deliverables Schedule	Project Team Lead																	
	Locations Table	Architect																	
	Data Drop 1 Inventory - Architect	Architect																	
	Data Drop 1 Inventory - Mechanical Trade Partner	Mechanical Trade Partner																	
	Data Drop 1 Inventory - Plumbing Trade Partner	Plumbing Trade Partner																	
	Data Drop 1 Inventory - Electrical Trade Partner	Electrical Trade Partner																	
	Data Drop 1 Inventory - Curtain Wall and Glazing Trade	Curtain Wall and Glazing Trade																	
	Data Drop 1 Inventory - Plumbing Trade Partner	Plumbing Trade Partner																	
	Data Drop 2 Product - Electrical Trade Partner	Electrical Trade Partner																	
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Delete row if not needed	FM Maximo Asset Table	*Enter Data Author Here*																	
Delete row if not needed	FM Maximo Location Table	*Enter Data Author Here*																	
Delete row if not needed	MC CMMS Asset Table	*Enter Data Author Here*																	
Delete row if not needed	MC CMMS Location Table	*Enter Data Author Here*																	

UC San Diego

Attachment 5 – Sheet and View Requirements for Revit® Models

Project teams should use sheet names as specified in the University CAD Standards (Attachment 6), which utilizes the National CAD Standard.

View names used on sheets should conform to the naming convention shown below:

Format	[UC San Diego Project Number] Space [Discipline Designator] Space [Sheet Sequence Number] Space [-] Space [Sheet Title]
Example	11456 A0101 – First Floor Plan

Space Management Floorplan Views

To facilitate the use of CAD exports from BIM for use in space management applications, architect should store a set of overall 2D floorplan views in their model which show building elements needed for space management. These floorplans need not be issued as part of any drawing issuance. Space management floorplan views should be created starting at the beginning of construction documents or equivalent design phase.

Architect should reference **Attachment 6.1 –CAD Exports Layer Mapping and Modeling Guidance** to identify the list of elements to appear on the space management floorplans and their related layer mapping requirements.

Architect should reference **Attachment 2 – Space ID Guidelines** and **Attachment 6 – CAD Standards** for timing of submissions and additional requirements.

Facilities 3D Views

To facilitate the use of BIM into facility operations, design authors should store a set of 3D views in their model which show only their discipline or trade by level.

1. There should be no overlap in scope between these 3D views (e.g. no duplicate elements found between multiple views).
2. Each view should use the Revit® section box or similar feature (if other authoring tool is used) to isolate level-specific scope in each view.
3. Each view should use a section box that cuts just below the finish floor at the level below and just above the underside of slab at the level above.
4. For levels with ramps or changes in finish-floor elevation, model author should use the closest elevation that represents the primary elevation for the floor in question and the same section box limits should be used across all project team members' models.
5. Model authors should avoid cutting through any element that is a managed asset with a section box plane.
6. Any supports, brackets, hangers, and other LOD 400 and greater objects should be hidden, frozen, or otherwise turned off in the views.
7. Linework, annotations, points, and other non-3D elements should be turned off in the views.

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Attachment 6 – CAD Standards

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CAD Standards

Version 3.1: March 7, 2022

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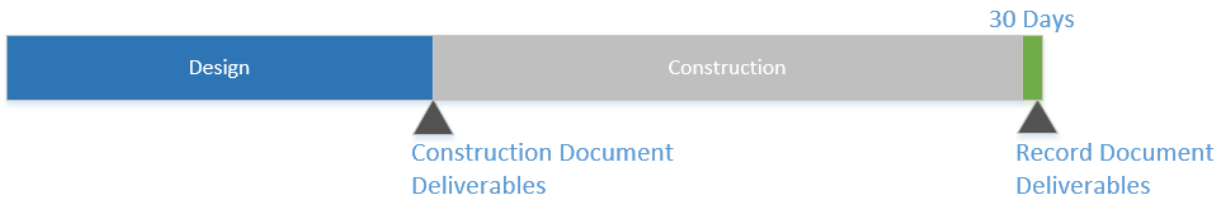
1. University CAD Standards

1.1 Summary and Intent

Two-dimensional CAD files are produced and used by the University and its business partners for a wide variety of facilities planning and management purposes throughout the building lifecycle. To this end, UC San Diego has established campus-wide standards for the creation and maintenance of CAD facility drawings. These standards are based on delivering a minimally viable product (MVP) at the appropriate points in the design and construction process to enable the efficient transition of the building to an operational state.

1.2 Deliverables

a. Timeline



b. Construction Document Deliverables

At the completion of Construction Documents the following deliverables shall be submitted:

- Space Management Floorplans - One overall architectural floor plan export (.DWG format) per floor illustrating fixed building elements (fixed casework, furniture, fixed floor or roof mounted equip, major medical equip, walls, doors, windows) and room numbers/names. See **Attachment 6.1** for additional guidance on element types to appear on space management floorplans and layer requirements.
    - Plans shall include an overall site plan and roof plan
    - Plans shall include one floor plan for every floor, above or below grade
    - Unique room identifiers are required, on a separate layer
    - Include closed polyline space boundaries if available
    - Include power/data locations if available
    - Unused CAD Layers shall be purged.
    - If produced in Revit, export according to the layer mapping specified in Attachment 6.1 of this CAD Standard
    - If not produced in Revit, general conformance to AIA Layer Guidelines is acceptable. At a minimum the following elements must be on a separate individual layer
        - Room Identifiers
        - Space Boundaries (if available)
- PDF equivalent of the Construction Documents

  - File naming per T2O and BIM Guidelines **Attachment 1 – File Naming Conventions**
  - Subfolder organization shall align with the physical organization of the documents.
- **Projects using BIM for design:** RVT model file(s) for architecture with sheets and views required to plot full 100% construction documents architectural floor plans
  - Any reference or linked RVT model files from sub-consultants required to fully and accurately print 100% construction documents architectural floor plans

c. Record Document Deliverables

Within thirty (30) days of Substantial Completion, the following deliverables shall be submitted:

- Space Management Floorplans - One overall architectural floor plan export (.DWG format) per floor illustrating fixed building elements (fixed casework, furniture, fixed floor or roof mounted equip, major medical equip, walls, doors, windows) and room numbers/names. See **Attachment 6.1** for additional guidance on element types to appear on space management floorplans and layer requirements.
  - Plans shall include an overall site plan and roof plan
  - Plans shall include one floor plan for every floor, above or below grade
  - Unique room identifiers are required, on a separate layer
  - Include closed polyline space boundaries if available
  - Include power/data locations if available
  - Unused CAD Layers shall be purged
  - If produced in Revit, export according to the layer mapping specified in **Attachment 6.1** of this CAD Standard. If not produced in Revit, general conformance to AIA Layer Guidelines is acceptable. At a minimum the following elements must be on a separate individual layer
    - Room Identifiers
    - Space Boundaries (if available)
- DWG equivalent of the Record Documents (NO LAYER CONVERSION REQUIRED)
  - One DWG per sheet
  - File naming per T2O and BIM Guidelines **Attachment 1 – File Naming Conventions**
  - Subfolder organization shall align with the physical organization of the documents
- PDF equivalent of the Record Documents
  - File naming per T2O and BIM Guidelines **Attachment 1 – File Naming Conventions**
  - Subfolder organization shall align with the physical organization of the documents.
- **Projects using BIM for design:** RVT model file(s) for architecture with sheets and views required to plot full record set drawings for architectural floor plans
  - Any reference or linked RVT model files from sub-consultants required to fully and accurately print record drawings architectural floor plans

d. File Organization and Naming for Record Documents

Master Folder

- Master folder name shall include the UCSD project number and project name.

Subfolder organization shall consist of the following folders:

- Record Documents-PDF
- Record Documents-DWG
- Space Management Floor Plans-DWG

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Attachment 6.1
CAD Exports Layer Mapping and Modeling Guidance

The list of element categories below indicates element types that the University anticipates may appear on floor plans that will be transmitted by the project team to the University in DWG and PDF formats at a frequency described in the CAD Standards document. These floor plan deliverables are referred to as **space management floorplans**.

The categories indicated below list the CAD layer that Revit element categories should be mapped to in the exported DWG deliverable files. These layer mappings should match the provided UC San Diego CAD Layer Export Revit template file **(UCSD CAD Export Template.rvt)**, from which the team can transfer project standards from to expedite the configuration of layer mapping. The project team member having responsibility to create and deliver the CAD exports should verify layer mappings have been set up according to this document. This document will govern if there are any conflicting mapping specifications between the Revit template and this document.

In addition to the mapping, this document also clarifies the intent behind the usage of certain Revit categories and how those categories impact the representative linework that appears on the specified and required layers in CAD exports. In some cases, modeling strategies must be undertaken to accomplish the intended CAD layer mappings. The project team should review these requirements carefully to properly configure their Revit content to meet the needs of these CAD layer requirements at export to avoid design rework.

Element Categories

Casework
Layer mapping: A-FLOR-CASE
Color ID: 11

Casework should appear on this layer. For millwork mapping, see "Other".

Columns
Layer mapping: A-COLS
Color ID: 1

For structural column enclosures made from drywall and wall framing and for architectural representation of columns use A-COLS. See structural columns for additional information.

Curtain Wall Panels, Mullions, Curtain Wall Systems
Layer mapping: A-GLAZ
Color ID: 4

All glazed walls should be mapped to the major layer A-GLAZ.

Doors
Layer mapping: AIA Default (A-DOOR)
Color ID: 6

Include toilet partition doors. Glass doors may require a minor grouping into project implementation. Check with UCSD Planning for latest guidance for layer mapping of glass doors.

Electrical Fixtures
Layer mapping: E-POWR
Color ID: 1

All electrical power devices (receptacles and outlets, etc.), excluding telecommunications devices.

Communication Devices
Layer mapping: E-DATA
Color ID: 4

Telecommunication and data devices (data/network jacks, telecom outlets).

Floors
Layer mapping: AIA Default (A-FLOR)
Color ID: 3

All floor finish boundaries and patterns for floor finish should map to A-FLOR.

UC San Diego is in the process of developing asset registers and layer mapping for assets in this category is subject to change and different project specific requirements. Check with UC San Diego Campus Planning for latest guidance for layer mapping of floors.

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Furniture
Layer mapping: A-FURN
Color ID: 8

Non-owner furnished furniture purchased as part of the project budget should be modeled for space planning purposes and mapped to the A-FURN layer.

The table below lists representative types of building components that may be found on the A-FURN layer.

Element type
Chairs
Tables
Work Surfaces
Cubicle partitions
Modular offices

Generic Models
The use of the generic models category should be limited and when used, the type of element should be evaluated against the tables in this guideline to see if the element should fall within a different category first.

If the element will be modeled as a generic model, the model author should check with UC San Diego Campus Planning to determine an appropriate sub-category to model as. A related sub-category CAD layer mapping to associate with the element should be applied after loading in the UC San Diego Standard CAD Export Template settings, for the purpose of CAD exports. Any project-specific CAD layer mappings should be documented using the Project-Specific CAD layer mapping sheet at the end of this document.

Plumbing fixtures
Layer mapping: A-FLOR-PFIX
Color: 3

The table below lists representative types of building components that may be found on this layer.

Element type
Sinks
Toilets
Urinals
Shower heads

Floor Sinks
Grab bars
Shower surround
Soap/Hand sanitizer dispenser
Toilet accessories
Toilet and urinal partitions
Floor Drains

Railings
Layer mapping: AIA Default (A-FLOR-HRAL)
Color ID: 1

All handrails except those in bathrooms.

Roofing
Layer mapping: AIA Default (A-ROOF and A-ROOF-PATT)
Color ID: 5

Roof cut and surface patterns will be mapped to A-ROOF-PATT. All other components of roof map to A-ROOF except for roof drains and parapets.

Site
Layer mapping: C-SITE
Color ID: 127

All civil site features (sidewalks, pathways, etc.).

Mechanical Equipment, Electrical Equipment, Specialty Equipment
Layer mapping: AIA Default (A-EPQM)
Color ID: 6

UCSD is in the process of transitioning layer standards and project teams may encounter the use of A-EQPM in CAD files received from the University. All new CAD files should follow the layer naming standard as defined in this guide.

The table below lists representative types of building components that may be found on the A-EPQM layer.

Element type
Mechanical equipment
Electrical panels
Electrical equipment
Medical equipment
Monitors
Waste bins
Elevators
Computers
Fume Hood
Fire Extinguisher Cabinet
Patient Bed
Examination equipment
Control panels
Kitchen equipment
Moveable and folding partitions

UC San Diego is in the process of developing asset registers and layer mapping for assets in this category is subject to change and different project specific requirements. Check with UC San Diego Campus Planning for latest guidance for layer mapping of floors.

Stairs
Layer mapping: A-FLOR-STRS
Color ID: 3

Structural Beams
Layer mapping: AIA Default (S-BEAM)

Walls
Layer mapping: A-WALL-FULL
Color ID: 7

All walls, both interior and exterior, except glass, curtainwall, storefront, moveable or operable partitions, toilet partitions, and walls that are part of a furniture system, should be mapped to A-WALL.

Windows
Layer mapping: AIA Default (A-GLAZ)
Color ID: 4

All interior and exterior glazing, glass partition, and windows will map to A-GLAZ.

Annotation Categories

Text Notes (General Annotations not assigned to other layers)
Layer mapping: A-ANNO
Color ID: 7
E.g. “Ramp”, “Stair”, “Spaces Below”, “Open to Below”

Dimensions
Layer mapping: AIA Default (A-ANNO-DIMS)
Color ID: 1

Any dimensioning created on plan for the purposes of construction documentation should be mapped to A-ANNO-DIMS. No additional dimensioning should be created for the purposes of CAD deliverables.

Room tags
Layer mapping: AIA Default (A-AREA-CAFM)
Color ID: 7

Room tags should contain room numbers and square footages. Construction room names are not required but may be included as a separate text annotation element. *At the time of writing, it is not possible in Revit to map separate components of the room tag to different layers with out-of-the-box features.*

Grids
Layer mapping: A-GRID
Color ID: 8

All gridlines and bubbles.

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Other and Non-Category Based Mapping

Room/Space Boundary
Layer mapping: A-AREA
Color ID: 9

Room/space boundary should appear as closed polylines in the CAD export. For open floor plan and non-partitioned space such as lab benches, each assignable space for one user should be represented by one closed polyline. Polyline should be to inside face of wall.

In Revit, to enable export of room boundaries, check the box in the "**General**" tab of the DWG export setup settings labeled "Export rooms, spaces and areas as polylines".

Area Boundary
Layer mapping: A-AREA-EGRS, A-AREA-IGRS (copy of same linework to each layer)
Color ID: 0,0,255

Closed polyline representing the gross area of floor plate.

Room tags
Layer mapping: A-AREA-ROOM
Color ID: 7

Room number copy without square footages. This can be a copy of the room numbers from the A-AREA-CAFM layer.

Millwork
Layer mapping: A-FLOR-WDWK
Color ID: 11

All field-built counters and millwork. No casework.

Toilet Partitions
Layer mapping: A-FLOR-TPTN
Color ID: 11

Subset of Revit category "Walls". May also be modeled as "Generic Models" or "Specialty Equipment". Linework needs to be reassigned to layer mapping indicated above after export.

Moveable Walls and Operable Partitions
Layer mapping: A-WALL-MOVE
Color ID: 5

Subset of Revit category "Walls". May also be modeled as "Specialty Equipment" or "Furniture Systems". Linework needs to be reassigned to layer mapping indicated above after export.

Partial Height Walls and Parapets
Layer mapping: A-WALL-PRHT
Color ID: 5
Subset of Revit category "Walls". Linework needs to be reassigned to layer mapping indicated above after export.

Fire-Rated Walls
UC San Diego is in the process of developing asset registers and layer mapping for assets in this category is subject to change and different project specific requirements. Check with UC San Diego Campus Planning for latest guidance for layer mapping of fire-rated wall assemblies.

Building Envelope (Level Below)
Layer mapping: A-FLOR-OTLN
Color ID: 8; Line type: HIDDEN2
Closed polyline around the building's exterior for level below

Building Envelope (Level Above)
Layer mapping: A-FLOR-OVHD
Color ID: 122; Line type: HIDDEN2
Closed polyline around the building's exterior for level above including any trellis, sunshades, and other structures. Dripline of level overhead.