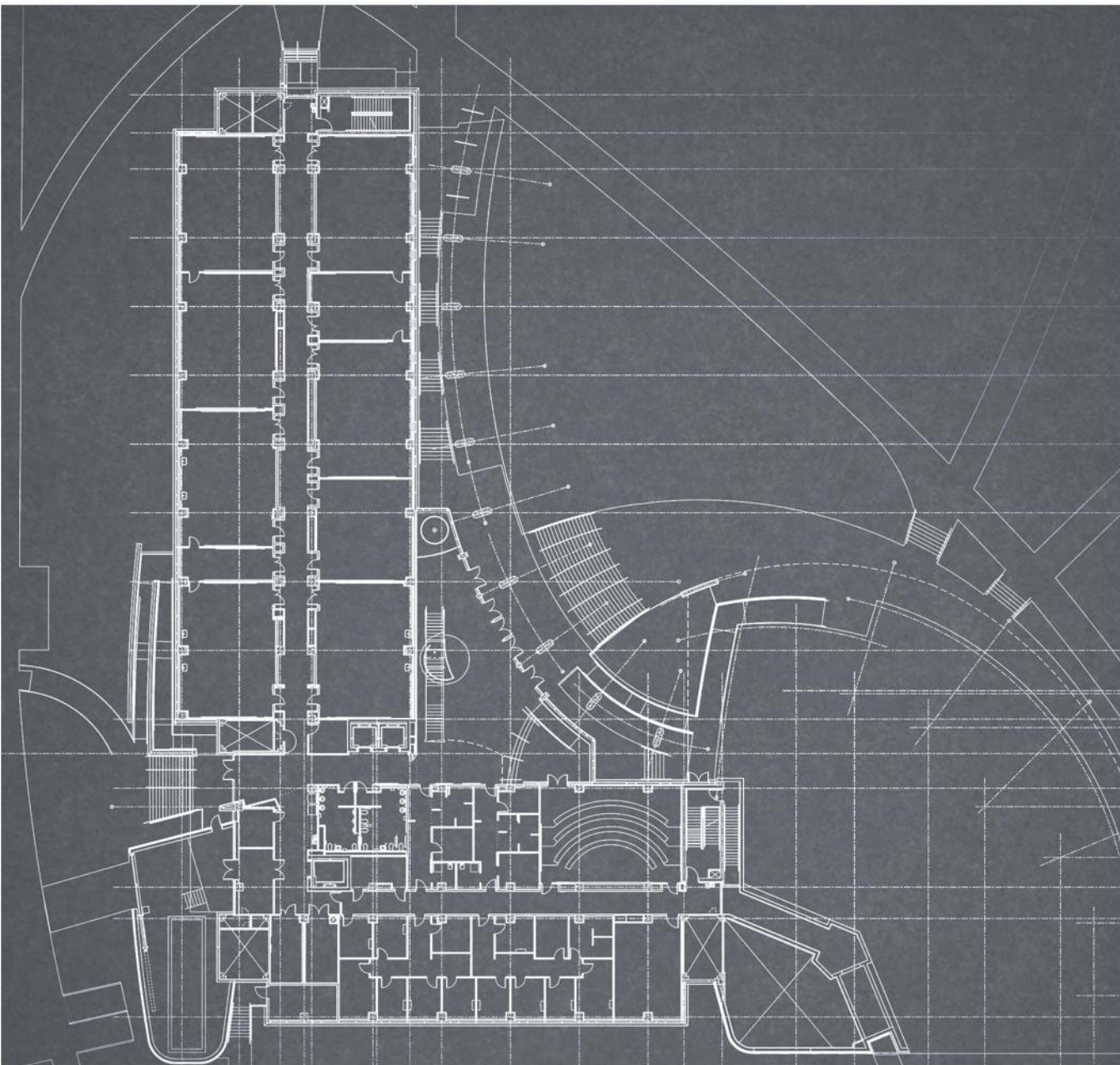




UNIVERSITY of  
**SOUTH FLORIDA**

# CAD Guidelines and Standards

For Architects, Engineers and Contractors



*THIS PAGE INTENTIONALLY LEFT BLANK*

# CAD Guidelines and Standards

## Table of Contents

<b>SECTION 1: THE PURPOSE OF USING CAD DATA STANDARDS</b> .....	<b>5</b>
1.1 Industry Standards.....	5
1.2 Standards, Organization and Benefits.....	5
1.3 Why the University has CAD Data Standards.....	5
1.4 Scope of the CAD Data Standards.....	6
1.5 Who Must Use the CAD Data Standards.....	6
1.6 CAD Data Standards Compliance.....	6
1.7 Ownership and Rights of Data.....	6
<b>SECTION 2: CAD ENVIRONMENT</b> .....	<b>7</b>
2.1 Basic CAD Software.....	7
2.2 CAD Application Software.....	7
2.3 Files Translation and Submission.....	7
2.4 Validation of Delivered Materials.....	7
<b>SECTION 3: REQUESTING CAD DATA FROM THE UNIVERSITY</b> .....	<b>8</b>
3.1 How to Request Data.....	8
3.2 Communication about the CAD Data Standards.....	8
3.3 Suggestions for the Standards.....	8
<b>SECTION 4: DELIVERABLES REQUIRED BY THE UNIVERSITY</b> .....	<b>9</b>
4.1 Deliverable Submittals.....	9
4.2 Letter of Transmittal.....	9
4.3 Delivery of Hardcopy Set.....	9
4.4 Delivery of CAD Files.....	9
4.5 Delivery of PDF Files.....	10
4.6 Project Manual & Specifications.....	10
4.7 Submittal Checklist.....	10
4.8 Digital Media Labeling.....	10
<b>SECTION 5: TYPES OF CAD FILES</b> .....	<b>11</b>
5.1 Model Files (AutoCAD Model Space).....	11
5.2 Sheet Files (AutoCAD Paper Space).....	11
<b>SECTION 6: ELECTRONIC FILE NAMES &amp; SHEET NUMERATION</b> .....	<b>12</b>
6.1 Electronic File Naming Guidelines.....	12
6.2 Drawing Type Chart.....	12
6.3 Sheet Numeration Method.....	13
6.4 Sheet Types.....	13
6.5 Sheet Order.....	14
6.6 Sheet Numeration Chart.....	14
<b>SECTION 7: DRAWING LAYER DESCRIPTION</b> .....	<b>16</b>
7.1 Layer Standards.....	16
7.2 Layering.....	16
7.3 Layer Format.....	16
7.4 Layer Format Chart.....	17
<b>SECTION 8: DRAWING SETUP</b> .....	<b>18</b>
8.1 Drawing Units.....	18
8.2 Accuracy.....	18
8.3 Scale.....	18
8.4 Origins and Registration of CAD Data Files.....	18

8.5	Entities and Graphic Representation .....	18
8.6	Saved State of CAD Model Files .....	19
8.7	Plotting.....	19
8.8	Drawing/Project Setup .....	19
8.9	Borders and Title Blocks.....	19
8.10	Sheet Sizes.....	19
8.11	Title Block Information .....	20
8.12	Cover/Title Sheet Information .....	20
<b>SECTION 9: SYMBOLOGY AND COMPOSITION .....</b>		<b>21</b>
9.1	Linetypes .....	21
9.2	Linetype Scale .....	21
9.3	Line Weight and Color .....	21
9.4	Text and Fonts.....	21
9.5	Annotation.....	22
9.6	Dimensions.....	22
9.7	External Reference (XREF) Files .....	22
9.8	Blocks .....	22
9.9	Fill and Hatch Patterns .....	22
<b>SECTION 10: ROOM NUMBERING GUIDELINES.....</b>		<b>23</b>
10.1	Room Number Matrix.....	23
10.2	Room Numbering Examples.....	23
10.3	Room Numbering Requirements .....	25
10.4	Floor Levels .....	25
10.5	Numbering Patterns.....	25
<b>SECTION 11: SIGNAGE.....</b>		<b>26</b>
11.1	Signage Requirements .....	26
<b>GLOSSARY .....</b>		<b>27</b>
<b>USF REFERENCE DOCUMENTS AND ABBREVIATIONS .....</b>		<b>29</b>
<b>EXHIBIT A: ELECTRONIC FILE SUBMISSION CHECKLIST .....</b>		<b>31</b>

## SECTION 1: THE PURPOSE OF USING CAD DATA STANDARDS

The University of South Florida has adopted a system of electronically cataloging information concerning the buildings on our campuses. This system requires the effective use of Computer Aided Design (CAD) in architecture, engineering and facility management and depends on the sharing of graphic information.

The intent of these standards is to serve as a guideline by which an information sharing system can be utilized and maintained. The absence of a standard would result in unrealized potential for sharing graphic information. The standards strive for a balance, providing a general framework for practice while allowing expansion and modification.

Computer-Aided Design (CAD) is an accepted tool for producing the documentation required for construction and management of facilities; it also provides for a common medium of information exchange. In fact, the true power and potential of CAD is the ability to re-use and share the information contained within the CAD document. The key to realizing this potential is common organizing principles and standards for the production and dissemination of CAD information.

### 1.1 Industry Standards

The University's CAD standards are based on industry standards. The guidelines and requirements of the standards are essential to the development of all University facilities. These standards ensure that the University receives data in a usable and uniform format. These standards are based on the broader scope of the following industry standards:

- United States National CAD Standard (NCS)
- American Institute of Architects (AIA), CAD Layer Guidelines
- The Construction Specifications Institute (CSI), Uniform Drawing System (UDS)

### 1.2 Standards, Organization and Benefits

The standard organization of files, layers and entities, as well as standardized software applications is essential for effective work and communication. Standards are necessary to ensure that:

- CAD drawings and data created in one phase (e.g., design) are readily usable in subsequent phases (e.g., facility management, space management)
- Drawings and data are applicable for their intended use
- Drawings and data are compatible with the available CAD equipment and software
- Drawings and data created for one project or project discipline are compatible with those created for others
- Drawings and data can be transferred and integrated with other applications, such as facility management and space management systems
- Drawings and data created in one department of the University are consistent with those developed by the other departments
- The compatibility of the University's CAD drawings and data with pertinent national, international and industry standards are maintained

### 1.3 Why the University has CAD Data Standards

CAD data standards are part of the University's comprehensive facilities and space management operations. Much of the CAD data created for the University of South Florida will be imported into the University's management system; this data must follow these CAD data standards to be readily useful within that system.

This document sets performance standards for CAD data delivered to the University. The University does not intend to influence the methods or means of practice of outside consultants.

The University is committed however, to enforcing the CAD data standards and information delivery to insure usability and reuse of information. As a result, these standards are part of and referenced in the contractual requirements for delivery of electronic information to the University of South Florida and its System's intuitions.

#### **1.4 Scope of the CAD Data Standards**

This data specification covers all construction documents prepared by or on behalf of the University of South Florida. The deliverable standards described in this document shall be utilized for all USF System's institutions projects.

When Building Information Modeling (BIM) is used on a USF project by the design or construction team, the BIMs (All models that are used on the project including phase, discipline and specialized models such as, MEP, Fabrication, Cost Estimation and Civil etc.) are required as a deliverable unlocked and ready for updates. BIM deliverables shall be submitted along with the CAD deliverables. (See Section 4 of this document) All projects using BIM are required to be developed using the **USF-CAD**, **USF-BIM-EP** and **USF-BIM** documents.

#### **1.5 Who Must Use the CAD Data Standards**

Anyone who prepares CAD data for the University, including USF Facilities Management staff, departments, contractors, and consultants, must read and become familiar with this document before proceeding to develop CAD drawings.

The term "consultant" used in this document refers to the person, organization or USF department who is preparing the CAD data, whether they are an out-side entity or part of the University.

#### **1.6 CAD Data Standards Compliance**

If there are any conflicts, differences, or lack of mention between the **USF-CAD** and the consultant's contract with USF, the **USF-CAD**, **USF-BIM-EP** and **USF-BIM** documents will supersede and take precedence.

#### **1.7 Ownership and Rights of Data**

The University of South Florida will have the ownership of all CAD files, Building Information Models (BIM), and facility data developed for all University projects. The University has a legal right to unrestricted ownership of all data received and/or to demand delivery of any data, designs, and materials used for USF projects.

*NOTE: This document contains document abbreviations as referenced above and throughout this document (Example: USF-BIM-EP), full names and the location of these documents can be found in the "USF Referenced Documents and Abbreviations" located at the end of this document.*

## SECTION 2: CAD ENVIRONMENT

### 2.1 Basic CAD Software

The designated CAD software for the University is Autodesk's AutoCAD 2014 and/or AutoCAD Architecture 2014 or current release as stated on the [www.autodesk.com](http://www.autodesk.com) website. AutoCAD 2011 is the earliest version that may be used by anyone providing CAD deliverables to the University, however prior approval must be granted by USF FM (Tampa Campus).

The current format for submission is subject to change as new products and technologies become available. Verify the current approved release with the USF FM (Tampa Campus). All CAD drawings are required to be delivered in AutoCAD .dwg file format.

The designated Building Information Model (BIM) software for the University is Autodesk's Revit as specified in the **USF-BIM-EP**, **USF-BIM** documents available on the <http://www.usf.edu/fm> website.

### 2.2 CAD Application Software

CAD application software packages operate on top of, or in conjunction with, the basic CAD software to extend its capabilities. The extensions enhance design, drafting and modeling productivity for discipline specific CAD production.

All CAD application packages used by USF FM, or its consultants, which modify or create CAD layers or other entities, must comply with these standards. Consultants must ensure that their drawing files are readable and usable in the approved AutoCAD version as stated above.

### 2.3 File Translation and Submission

It is the responsibility of the consultant, to provide all submissions and/or translations in the current approved formats and fully adhere to these standards.

If another CAD application or program is used, all drawings shall be translated and delivered in AutoCAD .dwg file format. All deliverables are to be compatible with the version of AutoCAD in use by the University at the time of submission.

When working with a CAD program other than AutoCAD, these standards shall be adhered to and files must be submitted in AutoCAD .dwg file format. (No other format will be accepted, DXF files will not be accepted as the final translation)

### 2.4 Validation of Delivered Materials

USF FM (Tampa Campus) will review and validate the CAD data and other materials submitted by consultants for all USF System's institutions. If submittals do not conform to the data standards, the University may return the materials to the consultant, for corrections. The submitter is responsible for revising the materials to make them conform to the standards. The Owner may withhold payments due and/or reject payment requests for failure to comply with the **USF-CAD**, **USF-BIM-EP** and **USF-BIM**.

## SECTION 3: REQUESTING CAD DATA FROM THE UNIVERSITY

CAD data request for University facilities shall only be accepted and provided, to consultants currently under contract for services and based on availability. Any provided data is for use of the recipient only and shall not be shared without prior USF FM approval.

The University's data has been gathered from a variety of sources, and it may or may not conform to the current **USF-CAD**. The data may be incomplete, or may not accurately reflect current facility conditions.

The University makes no representation as to the completeness or accuracy of CAD data. Consultants also should acknowledge that although CAD drawings appear to be extremely accurate because they have been computer-generated, it is possible that the accurate appearance of the drawings can be misleading and can represent incorrect data.

CAD data submitted to the University must be accurate and must conform to the current **USF-CAD**, even if reference data provided by the University was inaccurate or did not conform to the **USF-CAD**.

### 3.1 How to Request Data

CAD data requests shall be submitted to the USF Project Manager at the USF System's institution where the project is located. The USF Project Manager will review the request and forward it if necessary for approval; the requested files/data will be provided to the USF Project Manager for distribution.

### 3.2 Communication About The CAD Data Standards

The use of the **USF-CAD** will be most effective for the University and most usable for consultants if there is communication between consultants and the University.

- Consultants should ask questions about the **USF-CAD** before beginning work. Questions should be directed to the USF Project Manager.
- Questions are valuable because they help the University understand the real-world conditions of each project's design and construction process. Questions will raise issues that will result in continued improvement to the **USF-CAD**.
- Concerns regarding the impact of the **USF-CAD** on a particular project must be discussed with the USF Project Manager before beginning work.
- Consultants shall obtain prior written approval from USF FM for any exceptions to **USF-CAD**. Requests shall be directed to the USF Project Manager, The USF Project Manager will review the request and forward it if necessary for approval. The consultant must submit documentation showing the standards and files affected, and the proposed deviation from the standards for consideration.

### 3.3 Suggestions for the Standards

The University's data standards are intended to be, neither static nor all-inclusive, and thus will be updated and enhanced as appropriate. Suggestions for improvements are encouraged so that subsequent updates reflect the needs of the University.

- Consultants may submit suggestions, as well as any pertinent new information, which would enhance the **USF-CAD** to the USF Project Manager
- Because CAD guidelines relate to an area of technology that continues to change, it is important that they evolve and improve



## SECTION 4: DELIVERABLES REQUIRED BY THE UNIVERSITY

Document submittals for All USF institution projects at all geographic locations (including leased buildings/space) shall include one copy of each required submittal to USF Tampa Facilities Management Archive which will serve as the University's representative.

### 4.1 Deliverable Submittals

The University requires separate submittals for the, 100% Construction Documents and Conformed Final Record (As-Built) Documents. All project deliverable submittals and all drawing sheets within a drawing set shall include all data and associated supporting files used to produce the finished drawing sheets. Deliverable submittal types are as follows:

- 100% CD's shall be submitted after the issue of a "Letter of approval" from the USF Building Code official and at or before the start of construction
- Conformed Final Record Documents shall be submitted as follows:
  - The Construction Team shall submit to the Design Team the original Recorded Field Data in full size color .pdf scans at substantial completion (See **USF-BIM** document item 4.3 Final Deliverables in section 4 for documentation requirements)
  - The Design Team shall update the 100% CD's with contractor recorded in changes (Recorded Field Data) and submit to the University (Prior to final payment) due 45 days after substantial completion (BIM project requirements differ. See the **USF-BIM-EP**, **USF-BIM** documents)

### 4.2 Letter of Transmittal

Consultants shall include a letter of transmittal for each submittal and include as appropriate the following:

- (1) Full size hardcopy set for all drawing submittals
- (1) Full set of checked electronic files in both .dwg and .pdf formats for all drawing submittals including scans of the original contractor markups and project shop drawings on CD-ROM or DVD-ROM or USB Flash Drive(s) (Windows Formatted) that match the hardcopy set exactly.
- (1) Electronic copy of the project manual and specifications documents in Microsoft Word .docx and an Adobe .pdf format file. Each file format shall be submitted as a combined, single file.
- (1) Completed – Electronic File Submission Check List (last page of this document)

### 4.3 Delivery of Hardcopy

Project drawings and document hardcopies are required (for Tampa Campus projects only) for submittals to the USF Facilities Management Archive. Document hardcopies may be required for USF campus project locations other than the Tampa Campus and should be coordinated with the USF Project Manager. Dates shown on the hardcopies shall match the dates within the drawing title block and electronic file names exactly. The following shall be provided in hardcopy format:

- **100% CD's submittal:** provide a complete bound full-size set of the final drawings produced for construction using accepted line weights
- **Conformed Final Record Documents submittal:** provide a complete bound full-size set including any changes, deviations, additions or corrections as implemented during the construction process (Drawings shall contain no red lines, revision clouds or revision marks)

### 4.4 Delivery of CAD Files

All CAD drawing files shall be submitted as individual and separate CAD files for each sheet in the set (with only one sheet layout per drawing file) to the USF Facilities Management (Tampa Campus) Building Information Services group as follows:

- All deliverables must be submitted in the format supported by the current AutoCAD version, in use by the University. (See Section 2 of this document)
- Data is required to be delivered on acceptable media (Currently defined as CD-ROM or DVD-ROM Disks or USB Flash Drive(s) ) File compression and disk spanning is allowable, if it is necessary to compress and/or span disks, use a program that produces files with the “.ZIP” extension
- Submittals shall match exactly the final plotted drawings, use only electronic data generated with AutoCAD (Do not use hand notes or markings of any kind)
- File names must incorporate the sheet numbers and conform to the file naming matrix (See Section 6 of this document)
- All model drawings must be drawn “Life-size” (1:1 CAD Units) also referred to as “Full-size”
- Include all CAD design and supporting files such as: fonts, shape files, raster images, external references (xrefs) and databases including field collection data etc.
- The use of the AutoCAD “E-transmit” routine (Included in all versions of AutoCAD) is the preferred and strongly recommended method of packaging all AutoCAD drawing files and related supporting files for submittal. This routine will automatically create a folder or .zip file that includes the base or sheet files and all supporting files including the attached xrefs with the path intact (set for relative pathing is preferred) to maintain their linkages

#### **4.5 Delivery of PDF Files**

Adobe Portable Document File .pdf files shall be submitted that match exactly the final plotted hardcopy. Submit a set of full-size individual separate .pdf files for each sheet in the set that have been generated from the original authoring software in the native graphic format (submitted PDF sheet files should not be scans of the hard copy prints) and rotated to a plan readable state. File names shall incorporate the sheet numbers and conform to the file naming matrix. (See Section 6 of this document)

#### **4.6 Project Manual & Specifications**

Electronic documents shall be produced on 8.5”x 11” sheet size, portrait orientation. Provide one (1) each “Combined” electronic file containing all divisions/sections in both Microsoft Word .docx and Adobe Portable Document File .pdf file formats. The cover must also contain and be consistent with the drawing set cover sheet or title information. A separate title page may be omitted if the cover provides the prescribed content. The file name shall include the word “Specs” or “PM Manual” in place of the sheet number in the file name as appropriate and be prepared in accordance with the file naming matrix. (See Section 6.1 of this document).

#### **4.7 Submittal Checklist**

Refer to and complete the Electronic File Submission Checklist form provided at the end of this document. This checklist shall be signed by the responsible consultant’s project manager and must accompany all deliverable submittals.

#### **4.8 Digital Media Labeling**

Digital media labels shall contain the following information as a minimum:

- University project name and number
- Content description example: 100% CD’s set, Record Documents set, Shop Drawings, etc.
- Consultant name, telephone number and date of submittal
- Virus scanned (date and software used)
- The CD-ROM / DVD-ROM case and the CD-ROM / DVD-ROM itself shall be labeled. If a USB Flash Drive is utilized, it should be delivered in some sort of container e.g. a small envelope etc. with the information shown thereon.

## SECTION 5: TYPES OF CAD FILES

The University's CAD data will include two distinct types of CAD files, model files and sheet files. Model files contain the project's data, and sheet files are the vehicles used to present the data in different ways.

### 5.1 Model Files (AutoCAD Model Space)

Model files contain the graphics, which describes a subset of a building's geometry and its physical components: walls, doors, windows, columns, beams, outlets, ducts, etc. This information can be thought of as a computer "model" of the facilities involved in a project. Model files contain AutoCAD's model space information.

Model files must be created at "Full-size" (Real size of the object being drawn) also referred to as "Life-size". Most buildings are described by a series of two-dimensional models: plans, elevations, sections, and details drawn in AutoCAD's model space.

Model files are usually referenced by other files. Models can contain other models referenced in those files.

### 5.2 Sheet Files (AutoCAD Paper Space)

Sheet files are used to assemble model files, title blocks, and other information for plotting. A sheet file contains one or more scaled views of one or more models arranged within a border and title block. A sheet file is a 'ready-to-plot' CAD file with a 1=1 drawing scale.

Each sheet file contains the parameters that will produce its corresponding plotted drawing, such as scale, layer visibility, and graphic appearance. Sheet files contain AutoCAD's paper space information. They are never referenced by other files.

By organizing information into model and sheet files, plans and other drawings can be developed without concern for layout of the construction document set. Sheet files can also be developed later on in the project cycle.

Sheet files allow consistent plotting standards while also allowing different types of plots from the same CAD model. All AutoCAD viewports in sheet files must utilize a "per viewport" frozen or thawed state to reflect the extended view regardless of layer state in the drawing.

## SECTION 6: ELECTRONIC FILE NAMES & SHEET NUMERATION

Electronic file names shall be in a format that provides information and organization. The naming of project files is imperative to the effective use of the deliverables for USF’s file management and archiving methods.

### 6.1 Electronic File Naming Guidelines

Drawing file names are to use the following format: **“BBBB\_S-SS.S\_TT\_DD-DD-DD.dwg”**  
 (Format shown includes the maximum number of characters allowed. Underscore shall be used as separators between the data elements)

**BBBB** = 4 Digit USF building number (Provided by USF project manager)

**S-SS.S** = 3-4 Digit Drawing sheet number (See Section 6.3)

**TT** = 1-2 Alpha character Drawing type (Used to indicate the drawings purpose. See Section 6.2)

**DD-DD-DD** = Drawing date (Use date format “month-day-year”)

FILE NAME EXAMPLES	
<b>Example 1</b>	<b>0012_COVER_O_01-12-14.dwg</b> (Replace the word Cover with Title or Index as appropriate) This would be the file name for the Cover sheet in a set of New Construction Original documents for building 12 with a date of January 12, 2014.
<b>Example 2</b>	<b>0012_A-11_RO_01-12-14.dwg</b> This would be the file name for sheet A-11 (First floor, floor plan) in a set of Renovation Original documents for building 12 with a date of January 12, 2014.

File names shall be as follows:

- Sheet numbers within the file name shall match the title block and hardcopy exactly except for the cover, title sheet and Index.
- Use the words “COVER” or “TITLE” in the place of the sheet number regardless of what is shown on drawing, this is to easily locate these sheets
- If the drawing index is on a separate sheet from the cover or title sheets, use the words “INDEX” in the place of the sheet number shown on drawing
- The date for the 100% CD submittal shall match the date of the latest revision within the title block of each sheet
- The date for the Final Conformed Record submittal shall match the date indicated as Record or As-Built within the title block of each sheet
- Drawing files that are used only as External Reference (Xref) files are not required to conform to these file naming guidelines

### 6.2 Drawing Type Chart

DRAWING TYPE	DESCRIPTION
<b>O</b> = Original	Original drawing to build the building
<b>A</b> = Record Documents	Drawings showing changes that occurred during construction
<b>RO</b> = Renovation Original	Original drawing to build the renovation / remodeling
<b>RA</b> = Renovation Record Documents	Drawings showing changes during construction for a renovation / remodeling
<b>PR</b> = Permit Review	Documents submitted for permit review
<b>P</b> = Permit	Permitted documents with stamp and signature

Note: The “A” show in the table above originally was use to indicate (As-Built) a term that is no longer being used, and is now replaced by “Record Documents”.

### 6.3 Sheet Numeration Method

Drawing sheet names are to use the following format: **“D-TN.N”**

(Format shown includes the maximum number of characters allowed. A hyphen shall be used as a separator between the Discipline Code and Sheet Type.

**D** = Discipline Code, identifying the construction discipline that the sheet covers (Architectural, plumbing, structural, etc.)

**T** = Sheet Type, this number represents the type of drawings that are on the sheet. (Plans, sections, details, schedules, etc.)

**N** = Sheet number, is a sequence numbers and is used to simply place the sheets in order.

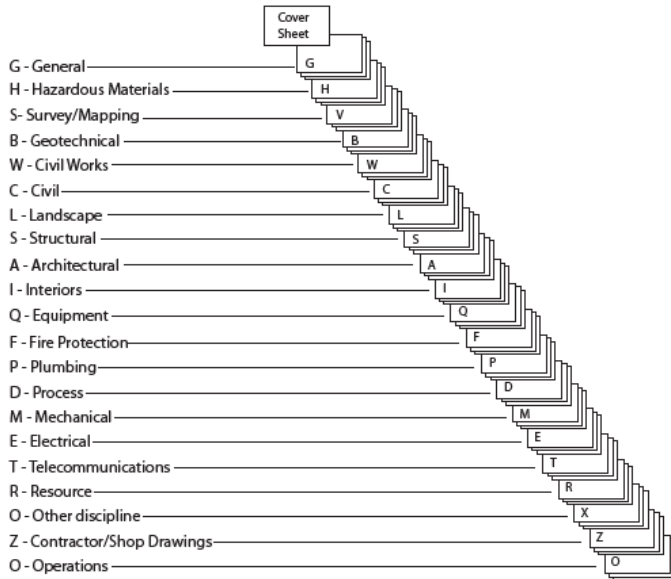
SHEET NUMERATION EXAMPLES	
Example 1	A-11 Floor plan (1st. Floor)
	A-12 Floor plan (2nd. Floor)
If additional floors are needed, increment the first Sequence Number by one.	
Example 2	Existing sheets C-51 & C-52 ... Site Details
	If another sheet of Site Details is required, and shall follow sheet C-51 a new sheet C-51.1 can be added without renumbering other existing sheets.

### 6.4 Sheet Types

Sheet types provide organization and identification within each discipline subset. Drawings are organized from general to specific. The chart below illustrates numbers used as sheet type designators in standard sheet identification within each subset.

DESIGNATOR	SHEET
0	General (Symbol legend, abbreviations, general notes, etc.)
1	Plans (Horizontal views)
2	Elevations (Vertical views)
3	Sections (Sectional views, wall sections)
4	Large Scale Drawings (Plans, elevations, sections (NOT details)
5	Details
6	Schedules and Diagrams
7	User Defined (For types that do not fall in other categories, including typical detail sheets)
8	User Defined (For types that do not fall in other categories)
9	3D drawings (Isometric, perspective, photos)

## 6.5 Sheet Order



## 6.6 Sheet Numeration Chart

The sheet numbering shown in the chart below shall be used as a guide and method of labeling sheets. Sheet numbers shall be arranged and used on a project by project basis as it pertains to the size and complexity of the project. The sheets shown provide an example of sheet order, smaller projects may not require all sheets and larger projects will require additional sheets.

Notes:

- **Sequence (N)umbers** will change if additional drawings are needed in any given Sheet Type. For example, when projects require additional Architectural floor plan sheets the Sequence Number of the reflected ceiling plan will increase to the next available number, similarly all plan view drawings after the floor plans will also increase to a higher number.
- If there is a need for additional sheets and the project is far enough developed that multiple existing sheets would require re-numbering to include additional sheets within a description category, the **Sequence (N)umbers**, can be followed by a decimal point and an additional **Sequence (N)umber** can be added. (See Example 2 in section 6.3)

NUMBER	DESCRIPTION
G-01	Cover sheet
G-02	Title sheet
G-03	Index sheet (Used when Index is not included on the Cover or Title Sheet)
G-11	Life safety information, Notes, etc.
G-12	Life safety plans
V-11	Topographic survey, General survey,
V-12	Existing site utilities
C-01	Civil information, Notes, etc.
C-12	Site plan, Site Utilities
C-13	Site grading & Paving
C-51	Site details
L-01	Landscape information, Notes, etc.
L-02	Irrigation information, Notes, Legend, etc.
L-11	Landscape plan
L-12	Irrigation plan
L-51	Landscape details
L-52	Irrigation details

<b>NUMBER</b>	<b>DESCRIPTION</b>
S-01	Structural information, Notes, etc.
S-11	Foundation, Framing plans
S-21	Frame elevations, Shear walls
S-31	Structural sections
S-41	Structural enlarged plans, Column details
S-51	Structural details
S-61	Structural diagrams, Schedules
A-01	General information, Notes, etc., Abbreviations, Symbols
A-10	Site plan
A-11	Floor plan (1st. Floor)
A-12	Floor plan (2nd. Floor) – if additional floors are needed, increment the first Sequence Number by one.
A-13	Reflected ceiling plan
A-14	Roof plans
A-21	Exterior elevations
A-31	Building sections, Wall sections, Miscellaneous sections
A-41	Enlarged plans
A-51	Details
A-61	Schedules
I-01	Interior finish, Notes, Legend, etc.
I-11	Interior finish plan
I-12	Furniture plan
I-21	Interior elevations
I-31	Interior sections
I-51	Interior details
Q-01	Equipment information, Notes, etc.
Q-11	Equipment plans
Q-51	Equipment details
F-01	Fire protection information, Notes, etc.
F-11	Fire protection plans (site, 1st., 2nd.,...)
F-61	Fire alarm riser diagrams
P-01	Plumbing information, Notes, etc.
P-11	Plumbing plans (site, 1st., 2nd. ...)
P-41	Plumbing enlarged plans, Toilet room plans
P-51	Plumbing details
P-61	Plumbing isometrics, Riser diagrams, Schedules, etc.
M-01	Mechanical information, Notes, etc.
M-11	Mechanical plans (site, 1st., 2nd. ...)
M-41	Mechanical enlarged plans, Mechanical room plans
M-51	Mechanical details
M-61	Mechanical Schedules
M-62	Mechanical Isometrics, Riser diagrams
M-71	Mechanical Controls
E-01	Electrical information, Notes, etc.
E-11	Electrical plans (site, 1st., 2nd., ...)
E-12	Electrical power plans (site, 1st., 2nd. ...)
E-61	Electrical isometrics, Riser diagrams
E-62	Electrical legend, Schedules, etc.
E-71	Lightning protection
T-11	Telecommunications plan, Data, Security
T-21	Telecommunications riser diagrams

## SECTION 7: DRAWING LAYER DESCRIPTION

The University has developed standards in part from the AIA CAD Layer Guidelines, and the U.S. National CAD Standard, both having major influence in the development of these standards. The University also utilizes Autodesk's AutoCAD Architecture where the built-in layer structure is based on these industry standards. Therefore, the following layer naming system is a direct derivation of these standards.

### 7.1 Layer Standards

The USF derivative of this layering standard simplifies the AutoCAD Architecture layering standard by elimination of the subcategories available in the Discipline Code. Likewise, the USF standard also does not utilize the AutoCAD Architecture Minor Group 2 field; therefore, they are not included in this document.

Because the University's layering standard differs slightly from AutoCAD Architecture, some alterations are necessary to the default layer settings in AutoCAD Architecture. The use of the "Layer Key Overrides" feature is necessary for compliance of these standards.

### 7.2 Layering

Drawing layers use a format that is organized as a hierarchy. This structure makes the list easier to use and accommodates future expansion. Layer names are alphanumeric and use easy to remember abbreviations such as "A-DOOR" for architectural doors, "A-WALL" for architectural walls and "E-POWR" for electrical power.

Graphic representations of related items shall be located on a single layer even when indicated on different drawings. For example, full height walls could be properly drawn on layer A-Wall or A-Wall-Full, but not both.

Graphic symbols connected to text and notes, (Leader lines, arrowheads, etc.) shall be located on the same layer as the corresponding text.

- **Do not draw any entities on layer "0" (Leave this layer clean and unused)**

### 7.3 Layer Format

Layer names shall be limited to 10 characters (Max.) subdivided into 4 sections using hyphens, these include: **Discipline Designator**, **Major Group**, **Minor Group**, and **Status Code** as shown below. Layer names will consist of 5 characters (Min.) using the **Discipline Code** and **Major Group** designations.

Discipline Designator   Major Group                      Minor Group                      Status Code  
■                      -                      ■ ■ ■ ■                      -                      ■ ■ ■ ■                      -                      ■

#### **Discipline Designator:**

The Discipline Designator denotes the category of subject matter contained on the specified layer and corresponds to the traditional discipline designations used in construction document sheet numbering; they are not intended to suggest which member of the design team draws which objects. For example, the column grid would be placed on layer "S-COLS-GRID" regardless of whether it was drawn by the architect or structural engineer.

#### **Major Group:**

The Major Group adds to the discipline code and identifies assemblies, building systems or major categories on the basis of construction or the type of information. For example, walls, doors, ceilings, lights, power, sanitary sewer, domestic water, storm drains, etc.



**Minor Group:**

A Minor Group may be added to a layer name for further additional information and differentiation. For example, walls “A-WALL” may be categorized as full height “A-WALL-FULL”, partial height “A-WALL-PRHT”.

**Status Code:**

A Status Code may be added to a layer name for further differentiation. Status Codes can be combined for projects that require phasing and differentiation of activity. When a project requires phasing (The action of dividing a large task or process into several stages) the phase shall be indicated first in the Status field. For example, “A-WALL-FULL-1” would be used for full height walls that are to be constructed in phase 1 of the project. If a project is phased, but also requires subtasks to be phased, multiple Status Codes are required. For example, “A-WALL-FULL-1-D2” would be used to indicate walls that are included in phase 1 of the project with the demolition to be completed as part of the phase 2 demolition.

**7.4 Layer Format Chart**

DISCIPLINE DESIGNATOR			
<b>A</b> –	Architectural	<b>O</b> –	Operations
<b>B</b> –	Geotechnical	<b>P</b> –	Plumbing
<b>C</b> –	Civil	<b>Q</b> –	Equipment
<b>D</b> –	Process	<b>R</b> –	Resource
<b>E</b> –	Electrical	<b>S</b> –	Structural
<b>F</b> –	Fire Protection	<b>T</b> –	Telecommunications
<b>G</b> –	General	<b>U</b> –	University
<b>H</b> –	Hazardous Materials	<b>V</b> –	Survey/Mapping
<b>I</b> –	Interiors	<b>W</b> –	Civil Works
<b>L</b> –	Landscape	<b>X</b> –	Other Disciplines
<b>M</b> –	Mechanical	<b>Z</b> –	Contractor / Shop Drawings
MAJOR GROUP EXAMPLES			
<b>Cing</b> –	Ceiling	<b>Powr</b> –	Power
<b>Domw</b>	Domestic Water	<b>Sswr</b> –	Sanitary Sewer
<b>Door</b> –	Doors	<b>Strm</b> –	Storm Drains
<b>Lite</b> –	Lighting Fixtures	<b>Wall</b> –	Walls
MINOR GROUP EXAMPLES			
<b>Brce</b> –	Braces	<b>Open</b> –	Openings
<b>Full</b> –	Full-Height	<b>Ovhd</b> –	Overhead
<b>Iden</b> –	Identification Tags	<b>Text</b> –	Text
<b>Prht</b> –	Partial Height	<b>SDFF</b> –	Supply Diffusers
STATUS CODE			
<b>1–9</b> –	Phase Numbers	<b>F</b>	Future Work
<b>A</b>	Abandoned	<b>M</b>	Items to be moved
<b>C</b>	Not in Contract	<b>N</b>	New Work
<b>D(X)</b>	Existing to Demolish (Phase)	<b>R</b>	Relocated
<b>E</b>	Existing to Remain	<b>T</b>	Temporary Work

*NOTE: Additional information and a full layer list are included in the "USF Layer Guidelines" (USF-LG). The location of this document can be found in the "USF Referenced Documents and Abbreviations" located at the end of this document.*

## SECTION 8: DRAWING SETUP

This section describes how to organize and set up CAD drawings and documents for the University, it has been developed in part from the CSI Uniform Drawing System. This standard is available from the United States National CAD Standard (NCS) web site. It is recommended that University employees and consultants obtain copies of these materials to supplement this document.

### United States National CAD Standard (NCS)

NCS version 5 contains both **CAD Layer Guidelines** and **Uniform Drawing System**

<http://www.nationalcadstandard.org/ncs5/index.php>

### 8.1 Drawing Units

Most CAD files should use the architectural (feet and inches) format. Civil engineering CAD files may use the engineering (feet and tenths) or decimal format.

### 8.2 Accuracy

All CAD drawings shall be created using precision input, employing the most accurate source of data available. Zero tolerance is required for all drawing entities and dimensions, all lines shall meet at intersections, straight lines are straight, blocks are inserted properly without overlap, etc.

Consultants are responsible for the accuracy of all CAD data delivered to the University, regardless of the accuracy of any CAD data provided to consultants from previous projects.

### 8.3 Scale

Model Space objects shall be created at full size. 1 AutoCAD unit = 1 foot for civil or engineering drawings and 1 AutoCAD unit = 1 inch for general and architectural drawings therefore a 100-foot wall will be drawn to 100 feet and a 36-inch column will be drawn to 36 inches. The following types of CAD drawings may be drawn to any scale: schedules, diagrams. All objects drawn in Paper Space shall be created at AutoCAD unit = 1" for plotting using standard sheet sizes.

### 8.4 Origins and Registration of CAD Data Files

The origins of CAD model files must be defined at coordinates 0,0,0, with the exception of Civil Engineering CAD model files, this is typically the lower left corner of the building. For non-rectilinear buildings, a logical origin point shall be established and used throughout the project by the entire design and construction team.

The origin point must remain consistent between all model files in a project. This is critical for correct registration of different model files when referenced together, aligning the various views of the facility. Registration of electronic data must be maintained, so the information will be usable in future applications.

The origin of each CAD sheet file shall be at the lower left-hand corner of the sheet border and set to coordinates 0,0,0.

#### Special Considerations for Site Plans:

- Civil Engineering site plans must use true geographic coordinates for their model files origins. The basis of coordinates used, shall be clearly identified and noted on the printed sheets.

### 8.5 Entities and Graphic Representation

#### a. Curved Entities:

Circles, arcs and ellipses shall be created as individual entities, not consist of line segments.

b. **Drawing Limits:**

Drawing and extents must be checked to ensure there are no objects outside the drawing limits. Objects outside the drawing limits will slow the regeneration and manipulation of the drawing. All drawings shall be submitted with the drawing display zoomed to the drawing extents.

c. **Entity Properties:**

Entity properties such as color and linetype shall be BYLAYER. For purposes of clarity, some symbols and block properties may not be set BYLAYER; this shall be avoided whenever possible.

### 8.6 Saved State of CAD Model Files

CAD files shall be delivered in the state described below:

- Blocks shall not be exploded
- Drawings shall be purged
- Drawings shall be zoomed to extents
- Drawing elements in model space shall be drawn at full size; Use paper space only for layout

### 8.7 Plotting

Each drawing sheet file generally represents a single plotted drawing. The sheet origin point is the lower left-hand corner of the sheet. The sheet border may be an xref file inserted at 0,0,0. No drawing entities shall reside outside of the sheet's border. When saving a sheet file, make only the layers needed for correct plotting of the sheet visible. Printing/plotting is done using sheet files and from AutoCAD paper space using a scale of AutoCAD unit = 1".

### 8.8 Drawing/Project Setup

All projects are required to have a Project Location Plan (showing on campus location). A Project overall Key Plan showing the entire footprint of the building is also required for large or renovation projects on plan view sheets, renovations shall depict the location of the project within the building. The inclusion of a relative north arrow is always required.

When preparing drawings for projects that involve multiple buildings the drawings shall be developed as separate sets by building. When a project or contract involves multiple buildings, it is the responsibility of the consultant to separate out the deliverables and submit as standalone drawings sets for each building. (Requests for exceptions will be limited, contact the USF Project Manager for consideration; all exceptions require prior approval by Facilities Management Tampa)

### 8.9 Borders and Title Blocks

USF project title blocks are provided on the <http://www.usf.edu/fm> website. Title blocks shall not be altered in any way, if a project requires an alteration special approval must be given by USF. (These standard title blocks shall be used on all USF projects)

The title blocks include replaceable information specify to each USF System's intuitions, USF Tampa (Main Campus), USF Sarasota-Manatee, USF St. Petersburg, and USF Heath. Consultants shall use the included logo, facilities departments' name, and campus address information as appropriate for projects produced for each intuition.

### 8.10 Sheet Sizes

AVAILABLE SHEET BORDERS WITH TITLE BLOCKS	
A Size sheet = 8.5" x 11"	D Size sheet = 24" x 36"
B Size sheet = 11" x 17"	E Size sheet = 30" x 42"
C Size sheet = 18" x 24"	

### 8.11 Title Block Information

Sheets within a document set shall include a title-block containing the information below:

TITLE BLOCK INFORMATION	
	Name of University (Example: University of South Florida, Tampa Campus)
	Project location - Building (P)re-fix and Building (N)umber (Indicted as: PPP-NNNN) (If not building related use other information -coordinate with USF Project Manager)
	State Project Number (Indicted as: USF### ) (Required If major project - coordinate with USF Project Manager)
	State University System of Florida
	Sheet Title/Name and Number
	Phase of development (As appropriate) (i.e. Conceptual Schematics, Advanced Schematics, Design Development, 50%, 100% Construction Documents, Record Documents)
	Drawing Scale (When multiple scale views are used on a sheet, each shall be noted and "As Shown" shall be reference in the Title Block)
	Name, Address & Telephone Number of Architect/Engineer
	Name, Address & Telephone Number of Consultant(s) (As appropriate)
	Date of publication - use the date format (month-day-year)
<b>Organization:</b>	The basic organization of the title block shall be the same for each drawing, changing the information on each sheet as appropriate. The sheet number shall always appear either on the lower right hand corner or along the right margin of the drawing.
<b>History:</b>	Revision Date & Number (All revisions shall be clouded and numbered within the drawing for all percentage (%) deliverables. The Final Record (As-Built) set shall not include revisions)
<b>Seal &amp; Signature:</b>	Required for final permit set, documents shall be signed, sealed and dated by the responsible professional for each sheet in the set. The location of the signature & seal shall be in the bottom right hand corner of the drawing space and not inside the title block area.

### 8.12 Cover/Title Sheet Information

The cover and/or title sheet for the drawing set shall include a drawing index for all drawings in the set, a separate index sheet may also be used. (For very small projects this information can be included on the first sheet in the set) All drawing sets shall include the following information:

COVER, TITLE, OR INDEX SHEETS	
	<b>Project Title</b>
	<b>Project Location:</b> Building (P)re-fix and Building (N)umber (Indicted as: PPP-NNNN) If not building related use other information - coordinate with USF Project Manager
	<b>University Name:</b> Example: University of South Florida, Tampa Campus
	<b>State Project Number:</b> Indicted as: USF### (Required If major project, coordinate with USF Project Manager)
	<b>Name, Address, and Telephone Number of Architect/Engineer</b>
	<b>Name, Address, and Telephone Number of Consultant(s)</b> (As appropriate)
	<b>Date of publication:</b> Use the date format (month-day-year)
	<b>Phase of development:</b> Example: Conceptual Schematics, Advanced Schematics, Design Development, 50% Construction Documents Permit Review, Final Permit Set, 100% Construction Documents, Record Documents
	<b>Drawing Index, Symbols Legend, Abbreviations, Project Location Plan</b> (showing on campus location)
	<b>Project Square Footage</b>
	<b>Life Safety Systems Information and NFPA Occupancy Type</b>
	<b>Building Height &amp; Number of Floors</b>

### 9.1 Linetypes

Use standard linetypes whenever possible. Contour lines, dashed lines and other lines that contain text shall be made of one continuous line segment, not a series of separate line segments. If the consultant is using basic CAD software other than AutoCAD, insure that linetypes translate correctly to the AutoCAD .dwg file format.

- Polylines with increased width may be used only to depict non-building drawing elements such as cut-lines or section lines. Use of toned or pchéd line weights to differentiate new or existing work is acceptable.
- Only one (1) linetype per layer and only one (1) color per layer are permitted, set linetype and color bylayer (See layer descriptions and the prototype drawing for additional information)
- Use only those linetypes provided with AutoCAD, if other linetypes are used the files must be included in the submittal (Non-AutoCAD linetypes shall be restricted when possible)

### 9.2 Linetype Scale

Linetype scale shall be set to 1.000 for all objects, so that each linetype is recognizable, easily identified, and distinguishable to individuals who are working in the model files and in final plotted output. Manipulation of the linetype scale shall be achieved by an AutoCAD system variable to adjust graphic representation of objects linetypes globally.

### 9.3 Line Weight and Color

All drawings shall be developed using the USF provided .ctb files available on the <http://www.usf.edu/fm> website. (If additional line weights or colors are required to effectively communicate project data, prior USF approval is required)

The plot style type typically used by the University is a color based plot-style (.ctb) file. Line weight and color affect the usability of CAD data in different ways. Line weight typically is most useful when working with plotted CAD drawings. Plots or reproductions of plots are usually monochrome and the thickness of lines is an important means of communicating information about the facility and the design. Color is most useful when working with CAD data on a computer screen. Colors allow users to readily identify systems and types of information. On a computer screen, line weight often gets in the way of effective communication.

### 9.4 Text and Fonts

Text size must be legible and appropriate for the graphic information presented and the intended plotted scale of the drawing. Text must be in all upper case letters throughout a drawing, except for electrical switch legs and symbols, which require lower case letters.

Text usually should not touch other graphic objects, and must be placed with enough space around it to be legible when the drawing is plotted and reproduced. “Background Masking” for text objects may be employed where emphasis on the text is needed or where there is too many objects to avoid text and object overlap.

Text may be placed at an angle. Horizontally oriented text should read from left to right and vertically oriented text from bottom to top. Generally text should be placed at an angle of 0°, 45°, or 90°. Text may be placed along (above or below) another element at an angle other than 0°, 45° or 90°. English (Architectural in AutoCAD) units shall be the standard system of measurement. The base unit shall be inches for architectural drawings and feet for all other disciplines.

- Use only those fonts or shape files provided with AutoCAD, if other files are used they must be included in the submittal (Non-AutoCAD fonts/shape files shall be restricted when possible)

## 9.5 Annotation

Annotation can be placed in either model space files or a paper space layout sheet files. Annotations related to model space data, such as dimensions, notes, and callouts must be included in the drawings model space file where they are easier to coordinate and revise.

Other annotations, such as drawing titles, legends, and sheet-specific notes, are more convenient to work with when placed in a paper space layout sheet file.

## 9.6 Dimensions

Only associative dimensions shall be used. Consultants shall insure that all dimensions are in a named dimension style for all dimensions in CAD files. This allows the parameters within the style to control and readily modify the dimensions as needed. Dimension overrides are only acceptable for visual elements and dimension line text. Overrides shall not be used to change the measurement of the dimension. Model space objects shall never be scaled to facilitate dimension measurements. The measurement scale factor shall be modified in the related dimension style to accommodate using multiple dimension scales within one drawing file.

## 9.7 External Reference (Xref) Files

Xrefs may be used to subdivide a large CAD drawing into several smaller, more efficient drawings. This will reduce drawing size, increase performance, and make coordination of disciplines easier. Avoid nested xrefs. All xrefs must be attached to the base drawing using a relative path and reside in the same directory as the base drawing files or within a subfolder of the parent folder where the base files are stored. Xref files shall be named appropriately to differentiate them from other base or sheet files. (As a suggestion, include Xref or appropriate equivalent within the name)

- All external references shall be inserted on layer "0"
- External references (xrefs) must not contain other nested blocks or external references. (Do not use the bind option for external references, use the insert option instead)

## 9.8 Blocks

Any graphic entity that occurs repeatedly in drawings shall be made into an AutoCAD block (symbol). Insertion points for blocks shall be consistent with its placement in the drawing. Use a logical insertion point (center of circle, bottom left corner of object, etc.). Keep names simple and descriptive.

The University excludes the use of Nested blocks; Nested blocks contain more than one block definition. Blocks that contain other blocks shall be un-nested before submission to the University.

- All block entities and their components shall be created on an appropriately named layer per the CAD standards

## 9.9 Fill and Hatch Patterns

Solid fills shall be created only by using AutoCAD solid hatch pattern. Using dense hatch patterns to create solid fill is not permitted. Hatches shall be associative were possible and shall be retained (not exploded) as drawn. Use only those hatch patterns provided with AutoCAD (Non-AutoCAD hatch patterns shall be restricted when possible) if other files are used they must be included in the submittal.

## SECTION 10: ROOM NUMBERING GUIDELINES

The University of South Florida’s Room Numbering Guidelines are based on requirements mandated by the Florida Board of Education and guidelines set by The Florida Building and Life Safety Code. The format is as follows:

- Room numbers shall be assigned at the 50% Construction Document phase. Coordinate all room numbers with the USF Space Coordinator (Tampa campus). The USF Project Manager will serve as the point of contact. (All room numbers must be approved by the USF Space Coordinator before 100% CD’s are issued for the project)
- When room use or function names (Not required) are shown on the drawings, coordinate with the USF department/client for which the project serves.
- USF requires prior approval to use an alpha prefix other than what is included in this document

All Room numbers shall use the following format: **“OONNNNA”**

(Format shown includes the maximum number of digits/characters allowed)

**OO** = 1-2 alpha character prefix (See Room Number Matrix for rooms that require a prefix)

**NNNN** = 4 Digit room number

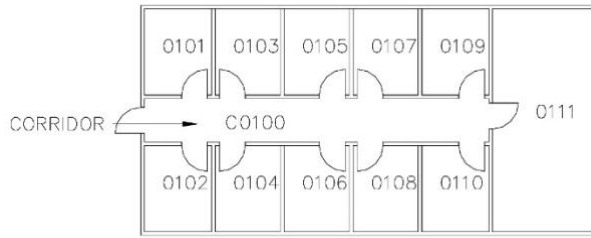
**A** = 1 Alpha character suffix (Used to further define the room number when a suite configuration is used)

### 10.1 Room Number Matrix

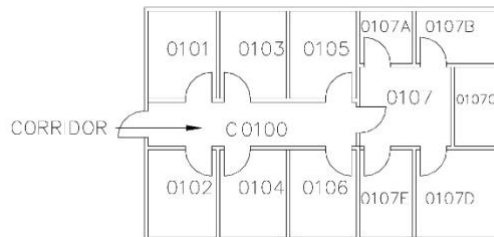
PREFIX	TYPE OF SPACE	TEXT	NUMBERING STANDARD
	Restrooms	<b>MEN, WOMEN or UNISEX</b>	Number in sequence with all rooms
	Custodial room	<b>JAN</b>	Number in sequence with all rooms
	Electrical room	<b>ELEC</b>	Number in sequence with all rooms
	Telephone Equip.	<b>TELE</b>	Number in sequence with all rooms
<b>E</b>	Elevators	<b>ELEV</b>	E0100, E0101 for 1st floor; E0200, E0201 for 2nd floor
<b>C</b>	Corridors	-none-	C0100, C0101 for 1st floor; C0200, C0201 for 2nd floor
<b>S</b>	Stairs	<b>STAIR</b>	S0100, S0101 for 1st floor; S0200, S0201 for 2nd floor
<b>M</b>	Mechanical Rooms	<b>MECH</b>	M0100, M0101 for 1st floor; M0200, M0201 for 2nd floor
<b>M</b>	Mechanical Chases	-none-	M0100, M0101 for 1st floor; M0200, M0201 for 2nd floor
<b>X</b>	External (covered) Circulation	-none-	X0100, X0101 for 1st floor; X0200 for 2nd floor
<b>B</b>	Bleachers / exterior seating	-none-	B0100, B0101 for 1st floor; B0200, B0201 for 2nd floor
<b>P</b>	Partition wall (Cubicles)	-none-	P0100, P0101 for 1st floor; P0200, P0201 for 2nd floor

### 10.2 Room Numbering Examples

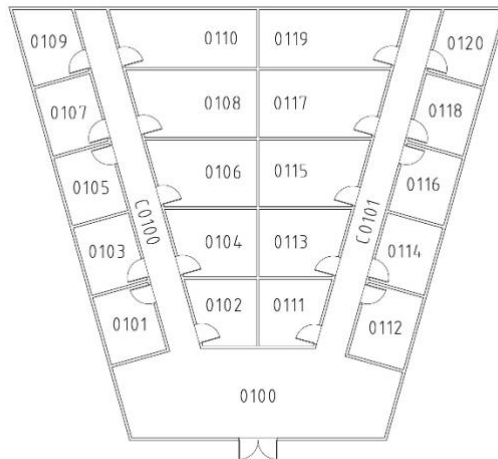
- All rooms must be designated with numbers in the hundreds or thousands. Numbers must contain four (4) digits, using 01## or 1### for first floor, 02## or 2### for the second floor, etc. If there are many rooms or many suites on a floor, number rooms in the thousands, using 1000s, 1100s, 1200s, etc. for different areas or suites on the floor. Room numbers in the hundreds shall always contain a zero in the thousands place, “0100”. The following are examples:



- Suite numbering, label any room that is accessible only through another room whose main entry is directly from the corridor or main public space with an alpha suffix of the room it is within. For example, if room number “0100” is accessible from the corridor, the room inside of it (accessible only by going into room “0100”) shall be designated “0100A”. If numbering in the thousands use “1100” for the main entry room and “1100A”, “1100B”, “1100C” etc.



- Facilities requiring room numbers in the thousands will vary, depending upon how many numbers are required or are skipped and the number of suites versus rooms requiring non-suffixed numbers
- Room numbers shall be coordinated so that even numbers are on one side of a corridor and odd numbers are on the other side. (In more complex designs, or where the availability of numbers is limited, the odd-even format can be abandoned if consecutive numbering results in a more logical scheme, although this shall be restricted were possible)



- In some instances, room numbers on one side of a corridor shall be skipped in order to maintain succession with the room numbers on the opposite side of the corridor. This may occur, for example, when a suite of rooms or large space is accessed through a single door and there are no other doors on that same side until further down the corridor. This will allow for future renovations that may convert suites or large spaces into separate or small rooms accessible from a corridor door



### 10.3 Room Numbering Requirements

- All spaces must have a unique number within the building and the number on the drawing floor plan must correspond with the room signage
- Do not use periods, hyphens, spaces, or any other non-alphanumeric character in room numbers. (Example: do not number a room as 1-16 or 01.14-A etc.)
- Corridors will change number when they change direction. Corridors will also change number where fire doors are constructed, even if the direction does not change
- Number all accessible spaces including, Stairwells, Elevators, Restrooms, Mezzanines & Penthouse spaces. Elevators are to receive a room number for each level they service; stairwells require room numbers at each floor level
- Rooms shall be numbered consecutively from one end of the hall to the other. Do not start numbering at one room and circle around the corridor
- Do not number internal courtyards and roof areas, unless covered. Exception: The top level of parking decks used for parking shall be assigned numbers
- Number all exterior covered spaces whether walled or not, including loading docks, connecting bridges and building roof overhangs that extend beyond 3 feet or more from the building exterior wall etc.
- Floor areas designed for Elevators, Stairwells, internal and covered external circulation, Restrooms, Electrical, Mechanical, Custodial, and Telephone Equipment require rooms numbers (See Room Number Matrix in this Section of this document)
- Total Gross Square Feet(1) and Total Net Square Feet(2) must be calculated and clearly indicated on the drawings

(1) Gross Square feet = the area of the building defined from the exterior face of the building wall. The Gross also includes all covered external areas.

(2) Net Square feet = All interior usable spaces excluding walls and mechanical chases. Do not include any exterior spaces in the Net SQ.FT.

### 10.4 Floor Levels

The lowest level of the building must be labeled “level 1”, not “ground floor” or “first floor”, whether it is below grade or not. The next levels above level 1 shall be labeled concurrently “level 2”, “level 3”, etc.

For buildings that are constructed with more than 9 levels, number rooms in the hundreds for levels 1-9 and starting with level 10 number in the thousands when possible. All attempts shall be made to restrict using more than 9 levels and 99 rooms per level (not including suites). If the facility requires more levels or rooms than this limit, (University approval will be required).

### 10.5 Numbering Patterns

All attempts shall be made to maintain consistency of the numbering scheme from floor to floor. Whenever consistency of numbering scheme cannot be maintained, rooms shall be numbered in a sequence that is consecutive and simple to locate from one end of the hall to the other.

When possible, rooms with the same usage type that are located directly above each other shall maintain the same organization with the number changing only to reflect the change in floor level.

NUMBERING PATTERN EXAMPLES	
Example 1	If the first floor <b>Men’s Restroom</b> is “0102”, then second floor <b>Men’s Restroom</b> would be “0202” and third floor <b>Men’s Restroom</b> would be “0302” etc.
Example 2	If a first floor <b>Apartment</b> is “1101”, then second floor <b>Apartment</b> would be “2101” and third floor <b>Apartment</b> would be “3101” etc.

## SECTION 11: SIGNAGE

Signage shall maintain a consistent look and shall comply with all appropriate codes and installation requirements. Font style, lettering size and placard dimension shall be designed in accordance to building use and customer's recommendation, coordinate with USF Project Manager.

### 11.1 Signage Requirements

- All signage must comply with ADA requirements
- All room numbers on signage shall be fixed, i.e., non-changeable, and tamper resistant
- If the first digit of a room number is "0", it shall be omitted (This applies only to signage)
- Buildings with more than 9 levels, rooms above the ninth level shall be numbered with a 4-digit number. Room signage above the ninth level will reflected the level on each placard's upper right hand corner. This number shall be done in the same font and one-third the size of the original number on the placard
- No office or room sign shall indicate the occupant or the room use except as follows:
  - The occupant name or room use indication can be changed or eliminated without replacement of room number signage
  - The room use will not change over the life of the building (restroom, mechanical, etc.) and the University deems it appropriate to indicate the room's usage
  - The room use is part of an officially named room. (An officially named room is a room that has been formally dedicated to honor a contribution to the University by an individual, group, or company)
- In large facilities or facilities with a large number of rooms, corridor or office suites, directional signs shall be used at all points where there is a choice of directions. Signs shall indicate the room number range with an arrow pointing towards the path of travel. Signs shall not contain names of rooms unless the name is an officially dedicated room and will be referenced by this name
- Building directory signage shall be located at the main entrance. However, because of the placement of many university facilities, secondary entrances are used as the primary entrance. In these situations, a directory shall be used at these entrances or, at minimum, provide directions to the location of the primary directory
- Corridors will not require signage except to facilitate floor identification on structures exceeding 3 levels. Determination of levels includes basement and penthouse if public access is possible. Signage shall be as simplistic as possible, i.e. 1st Level, 2nd Level, etc. The signs shall be placed as follows:
  - On the stair side of entrances to corridors, on the wall closest to the door handle
  - Where possible, directly across from elevator doors. (Where multiple elevators exist, one sign, centered between the elevators will suffice)
- Signage for elevators is only required if there are two or more, Signage shall reflect the elevator number only and not the room number. Signage shall be part of the ADA signage if separate elevator signs are required for each elevator. Where only one sign is required for ADA compliance, sign shall reflect the layout of the elevators. Example: Elevator 1 is on the left side and elevator 2 is on the right, signage would indicate 'Elevators 1 & 2'

## GLOSSARY

TERM	DEFINITION
3D/4D/5D	Descriptions of BIM implementation with increasing 'richness' of associated information.
A/E	<b>Architect and/or Engineer</b> -- Collective acronym for professions working in the creation/maintenance of the built environment.
ASF	<b>Assignable Square Feet (Assignable Areas)</b> -- The sum of all areas on all floors of a building assigned to, or available for assignment to, an occupant or specific use. (Includes: classrooms, labs, offices, study facilities, special use, general use, support, health care, residential, and unclassified – that are used to accomplish the institution's mission) Note: ASF calculations do not include wall thickness or space that is open to below. Also referred to as <b>Net Assignable Square Feet (Net Assignable Area) NASF</b> .
ASI	<b>Architect's Supplemental Instruction</b> -- The process used to resolve minor issues in the construction documents so long as they do not affect contract time or money.
BOD	<b>Basis of Design</b> -- The design parameters and subsequent design systems and materials incorporated into the project model(s). The BOD is owner provided functional requirements for the facility with expectations of use and operation. It may include project and design goals, budgets, limitations, schedules, owner directives and supporting information.
BEP	<b>BIM Execution Plan</b> -- Written plan to integrate the BIM tasks and information with all stakeholders and processes.
BIMs	<b>Building Information Model(s) - Product</b> -- An object-based digital representation of the physical and functional characteristics of a facility. The Building Information Model or Models serves as a shared knowledge resource for information about a facility, forming a reliable basis for decisions during its lifecycle from inception onward.
BIM	<b>Building Information Modelling - Process</b> -- A collection of defined model uses, workflows, and modeling methods used to achieve specific, repeatable, and reliable information results from the model. Modeling methods affect the quality of the information generated from the model.
BMP	<b>Best Management Practice</b> -- Is a method or technique that has consistently shown results superior to those achieved with other means, and that is used as a benchmark. In addition, a "best" practice can evolve to become better as improvements are discovered.
<b>BIM Authoring Tools / Software</b>	The software or tool used to create the models. (Design applications such as Autodesk Revit)
CAD	<b>Computer Aided Design</b> -- (Also known as 2D Drawings) A geometric/symbol based computer drawing system that replicated hand drawing techniques. The production of CAD documents are to be completely derived from the BIM model(s).
CAFM	<b>Computer-Aided Facilities Management</b> -- Includes the creation and utilization of Information Technology (IT)-based systems in the built environment. A typical CAFM system is defined as a combination of Computer-Aided Design (CAD) and/or relational database software with specific abilities for Facilities Management.
<b>Clash detection</b>	Process of identifying conflicts and issues using 3D collaboration and coordination software tools.
CMMS	<b>Computerized Maintenance Management Systems</b> -- A software package that maintains a computer database of information about an organization's maintenance operations, enabling the facility manager to track the status of maintenance work on their assets and the associated costs and manpower related to that work.
COBie	<b>Construction Operations Building Information Exchange</b> -- Information exchange standard/protocol for BIM projects - generally spreadsheet based progressively developed through construction process passed to building operator. The model and facility data for the commission, operations, and maintenance of the project expected from BIM for facility handover in formats suitable for integration into current and future CAFM systems.
<b>Construction Team</b>	A group of professionals working together for a common goal in utilizing techniques and industry involved in the assembly and erection of structures.
<b>Contracting Entity</b>	Is the party or company who enters into a binding agreement with the owner as the primary responsible entity that is awarded the contract.
<b>Design Team</b>	A group of design professionals working together for a common goal or purpose. It is made up of different individuals with different skills or talents. It may consist of architects, engineers, artists etc.
<b>Design/ Construction Team</b>	The term use when both the Design Team and Construction Team is referenced. (See Design Team, Construction Team)
<b>Fabrication</b>	The act or process of manufacturing, to make, build, or construct in reference to building systems or components. Usually means off site fabrication done within a controlled environment resulting in improved accuracy and efficiencies.

TERM	DEFINITION
FM	<b>Facilities Management</b> -- The University department that manages building design and construction. Each USF System's institution has a Facilities Department. FPC Tampa provides oversight for the entire USF System.
Geo-reference	To associate something with locations in physical space. The term is commonly used in geographic information systems to describe the process of association to spatial locations. Establishes control points, coordinate system and other projection parameters.
GSF	<b>Gross Area Square Feet</b> -- The sum of all areas on all floors of a building included within the outside faces of its exterior walls. Includes: exterior covered areas, and all vertical penetration areas, for circulation and shaft areas that connect one floor to another. Note: GSF calculations do not include space that is open to below.
HVAC	<b>Heating, ventilation, and air conditioning</b> -- The system used to provide heating and cooling services to building
Information model	Another name or reference to the Building Information Model.
IPD	<b>Integrated Project Delivery</b> -- Contractual form relevant to the BIM design and construction process. Not widely used outside of the USA at present.
LEED	<b>Leadership in Energy and Environmental Design</b> -- Is a green building certification program that recognizes best-in-class building strategies and practices. To receive LEED certification, building projects satisfy prerequisites and earn points to achieve different levels of certification.
LOD	<b>Level of development</b> -- Scales applied to provide a common understanding of information requirements at different stages of a project (A scale developed by the American Institute of Architects).
MEP	<b>Mechanical, Electrical and Plumbing</b> -- The professional engineers designing the building systems for Mechanical, Electrical and Plumbing disciplines.
Model	General term used to refer to the computer file or files that may contain BIM data.
NASF	<b>Net Assignable Square Feet (Net Assignable Area)</b> -- The sum of all areas on all floors of a building assigned to, or available for assignment to, an occupant or specific use. Excluding: public corridors, elevators, stairwells, and all types of mechanical rooms, public bathrooms, custodial rooms, and shaft spaces. Note: NASF calculations do not include wall thickness or space that is open to below.
Non-ASF	<b>Non Assignable Square Feet</b> -- The sum of all areas on all floors of a building not available for assignment to an occupant or for a specific use, but necessary for the general operation of a building. (Includes: building services, circulation, and mechanical that are used to support the building's general operation) Note: Non-ASF calculations do not include wall thickness or space that is open to below.
NSF	<b>Net Square Feet</b> -- The total square footage of all the rooms/areas on a floor. This includes assignable and non-assignable rooms. Note: NSF calculations do not include wall thickness or space that is open to below. Also referred to as <b>Net Usable Area (Net Usable Square Feet) NUSF</b>
O&M	<b>Operations &amp; Maintenance</b> -- Encompasses a broad spectrum of services required to assure that the built environment will perform the functions for which a facility was designed and constructed.
Parametric	A digital description of a physical object using parameters. Characteristics of components and the interactions between them. It maintains consistent relationships between elements as the model is manipulated.
PFD	<b>Program for Design</b> -- The development of a comprehensive and purposeful system or plan to achieve a specific goal.
RFI	<b>Request for Information</b> -- The process of requesting additional information, directive or clarification from the architect or client.
SSF	<b>Structural Square Feet</b> -- The sum of all areas on all floors of a building that cannot be occupied or put to use because of structural building features. (Exterior walls, fire walls, permanent parturitions, unusable areas in attics or basements, or comparable portions of a building with ceiling height restrictions. Gross Area minus Assignable and Non Assignable Area = Structural Area
USF	<b>University of South Florida</b> -- Identity or name of project owner.

## USF REFERENCE DOCUMENTS AND ABBREVIATIONS

DOCUMENT TITLE	DOCUMENT ABBREVIATION	LOCATION
USF CAD Guidelines and Standards	<b>USF-CAD</b>	All documents can be found on the <a href="http://www.usf.edu/fm">http://www.usf.edu/fm</a> web site.
USF BIM Guidelines and Standards	<b>USF-BIM</b>	
USF BIM Project Execution Plan (Template)	<b>USF-BIM-EP</b>	
USF BIM Equipment Asset Tags	<b>USF-BIM-EA</b>	
USF Layer Guidelines	<b>USF-LG</b>	

*THIS PAGE INTENTIONALLY LEFT BLANK*

## EXHIBIT A - ELECTRONIC FILE SUBMISSION CHECKLIST

(Complete, Sign and attach to deliverables)

Submission:  100% CD's  Final Record Documents

- All externally referenced drawings, images, databases and associated files are included in a .zip file created with e-transmit
- All nested blocks & external references (xref) have been un-nested
- Model Space objects are scaled at "Full-size" and all paper space objects are scaled 1=1
- Layers are consistent with USF CAD standards and unused layers have been purged
- Referenced font and shape files have been included with submission
- If needed, files have been translated into a version of AutoCAD compatible with the version currently being used by the University
- Matching set of Adobe .pdf files for each sheet in the set have been included with submission
- File names clearly indicate the drawing sheet number and follow the file naming matrix guidelines
- Drawing sets have been checked for missing and illegible sheets/drawings
- All consultants / discipline drawings are included with submission
- Room numbers adhere to USF room numbering standards and have been approved by USF
- CDs/DVDs or USB Flash Drives (non-returnable) have been clearly labeled with the project's information
- Full sized (24" x 36" or 30" x 42") hardcopy set (Tampa Campus Projects only) is included with submission
- Electronic copy of the Project Manual and Specifications documents (no hard copy required) are included with the Final Record Documents (As-Constructed) submittal

\_\_\_\_\_  
Project Name

\_\_\_\_\_  
Date

\_\_\_\_\_  
Company or Department Submitting Deliverables

\_\_\_\_\_  
USF Project Manager

\_\_\_\_\_  
Signature of Person Submitting

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
USF Facilities Management use only (below this line)

Accepted

Returned

\_\_\_\_\_  
Reviewed by

\_\_\_\_\_  
Date