USC CAD GUIDELINES

Table of Contents

1.0 Deliverables

1.1   CAD Files

Files should be submitted in the latest set of AutoCAD. The latest as of this revision is AutoCAD 2020. Files and their components (blocks, objects, etc..) should be able to be viewed with the regular AutoCAD software. Civil 3D supporting files should be included.

When submitting files all sheets should be arranged one file per sheet.

To ensure completeness, Xref files should be bound/inserted onto the sheet file before submittal.

Fonts: Text styles and fonts may vary, but the use of font ROMANS.shx for most applications is desirable. Special fonts which are not packaged with AutoCAD® are not allowed. Dimensions, labels and notes, should be not less than 1/8" height on printed. If there must be an exception all fonts used should be shipped with the files.

Pen settings: users should restrict themselves to the USC requirements. If exceptions must be made all supporting pen settings should be included.

The use of **Raster files** should be avoided at all times.

File naming standards: each file should be named according to a combination of its sheet number and sheet title as it appears in the title block. For example, if the sheet number is "C1.0" and the sheet title is "CIVIL KEY PLAN AND GENERAL NOTES" the file name for the file representing this sheet should be named "C1.0 Civil Key Plan and General Notes".

Care should be taken to make sure the files are not corrupted. Files should be audited and purged before being submitted. The drawing file should contain only those layers necessary for displaying and plotting the information and drawing entities contained in each drawing.

The best way to ensure a file is complete is to submit using eTransmit. All items should be labeled with project name, type of drawing package (i.e. bid set, construction drawings, record drawings), and date created.

1.2   Specifications

File in Microsoft Word format. Quality of files should be Object Character Recognition (OCR) capable.

2 Bound set of prints.

1.3   Plots/Prints

Provide two (2) printed copies of drawings, manuals, reports, and specifications.

All electronic CAD record (as-built) drawings must be accompanied with a complete matching set of Adobe PDF drawings.

In addition to the electronic CAD record drawings, hard copy as-built or record drawing submittals are to be provided at the time of final closeout. Two (2) copies are required.

Each final submitted drawing sheet shall have "As-Built" or "Record Drawing" clearly marked on every electronic and printed sheet. Survey drawings should contain Surveyor's name, Surveyor's seal, State of

California Registration Number, north arrow, drawing scale, survey date, and date drawing was completed. Surveyor's seal and signature must be reproducible for document scanning.

1.4   **"Operational" Floor plans** are plans drawn at a 4.5 feet high floor plate. Plans should include but not limited to walls, doors, windows, fixed furniture, plumbing fixtures, and stairs/ramps. They are drawn using the USC Layer Guidelines list and instructions

1.4   **USC Titleblock** - __.zip (link)

2.0 Layer Guidelines

Layer should be based on the AIA CAD Layer Guidelines from the United States National CAD Standard. Refer to the National CAD Standard for guidance.   The University has adopted a list below for internal space and asset management purposes.

Valid Disciplines

One-Letter Code	Two-Letter Code	Discipline Name
A	AR	Architecture
AG	AG	Architectural Graphics
C	CE	Civil
E	EL	Electrical
F	FP	Fire Protections
FC	FC	FamisCAD
G	GE	General
H		Hazardous Materials
I	IN	Interiors
L	LA	Landscape
M	ME	Mechanical
P	PL	Plumbing
Q	EQ	Equipment
QK		Kitchen Equipment
QV		Audiovisual Equipment
R		Resource
S	ST	Structural
T	TE	Telecommunications
X	OD	Other Disciplines
Z	CO	Contractor/Shop Drawings

2.1   Architectural Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH (mm)	LINE TYPE	DESCRIPTION
A-AREA	Blue	5	0.15	Dashed	Room outline polyline
A-AREA-IDEN	White	7	0.20	Continuous	Room number
A-AREA-OCCP	White	7	0.20	Continuous	Room occupant or employee/office name
A-CLNG-OPEN	Brown	9	0.20	Continuous	Vertical shafts/ceiling openings
A-ANNO-DIMS	Cyan/White	4/7	0.20	Continuous	Dimensions
A-DOOR	Yellow/Cyan	2/4	0.15	Continuous	Doors
A-Door-Swng	Cyan	4	0.05	Continuous/Center	Door Swing Plan/Elevation view
A-AREA-ROOM	White	7	0.20	Continuous	Room and summary area sq. ft. numbers
A-FLOR-EVTR	Brown	9	0.30	Continuous	Elevators
A-FLOR-HRAL	Cyan	4	0.05	Continuous	Handrails
A-AREA-OTLN	Magenta	6	0.15	Dashed Dot	Floor outline polylines
A-FLOR-STRS	Cyan	4	0.15	Continuous	Stairs
A-FURN	Gray	8	0.10	Continuous	Furniture
A-GLAZ	Gray	8	0.10	Continuous	Windows
A-GLAZ-SILL	CYAN	4	.10	Continuous	Windowsill
A-ANNO-TTLB-TEXT	Red/Varies	1	.25	Continuous	Title block text work
A-ANNO-TTLB-LINE	White/varies	7	.40	Continuous	Title block plotting line work
A-ANNO-TTLB-LOGO	Yellow	2	0.15	Continuous	Title block logo
A-ANNO-TTLB-NPLT	Gray	8	.10	Continuous	Title block non-plotting line works
A-WALL	White	7	.50	Continuous	Walls
A-WALL-MOVE	Gray	8	0.15	Continuous	Wall partitions, movable walls
A-WALL-PRHT	Yellow	2	0.15	Continuous	Partial walls
A-WALL-TPTN	Green	3	0.15	Continuous	Toilet wall partitions
L-SITE-FENC	Yellow	2	0.20	Continuous	Fencing
L-SITE-SPRT	White	7	0.25	Continuous	Sports Field
A-PFIX-CASE	Yellow	2	0.15	Continuous	Plumbing Casework/lavatories
A-PFIX-FIXT	Cyan	4	0.20	Continuous	Plumbing fixtures
S-GRID	Blue	5	0.25	Center	Structural grid

2.2 Civil Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
C-ANNO-TTLB-TEXT	Varies	-	Varies	Cont	Title block text work
C-ANNO-TTLB-LINE	Varies	-	Varies	Cont	Title block line work
C-ANNO-TTLB-LOGO	Yellow	2	.002	Cont	Title block logo
C-ANNO-TTLB-NPLT	Gray	8	.001	Cont	Title block non-plotting line work
C-BLDG	Red	1			Building outlines
C-BLDG-IDEN	White	7			Building letter code
C-BLDG-IDEN-NAME	White	7			Building name
C-BLDG-IDEN-NMBR	White	7			Building number code
C-PATH					Pathways and walkways
C-PATH-CONC					Concrete pathways or portions
C-PATH-BRCK					Brick pathways or portions
C-PKNG					Parking
C-PKNG-STRP					Parking Stripes
C-ROAD	Blue	5			a thoroughfare especially in a city, town, or village that is wider than an alley or lane and that usually includes sidewalks **b :** the part of a street reserved for vehicles
C-ROAD-CURB	Gray	8			
C-ROAD-IDEN	White	7			Road names
C-SDWK					Sidewalk
C-SITE-FENC	YELLOW				Fences
C-SITE-RAMP	GRAY				Exterior ramps
C-SITE-STRS	CYAN				Exterior Stairs
C-WALL-PRHT	WHITE				Exterior Bldg partial Height Walls.

2.3 Electrical Discipline Layers

NEW LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
E-LITE-CLNG					Ceiling mounted lighting
E-LITE-GRID					Lighting grid
E-LITE-SWCH					Lighting- - switches
E-POWR					Power
E-POWR-WALL					Power wall outlets and receptacles
E-LEGN					Legend of symbols
E-SITE					Site electrical substations, poles
E-SITE-LITE					Site lighting(poles)
E-SITE-UNDR					Underground electrical lines
E-SITE-UNDR-POWR					
E-SITE-UNDR-LITE					
E-SITE-POLE					Electric poles
E-SITE-OVHD					Overhead lines

2.4 Fire Protection Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
F-SPRN					Fire Protection Sprinkler System
F-STAN					Fire protection Standpipe System
F-PROT					Fire

2.5 Hazardous Materials Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
H-PLAN					Floor plan
H-SITE					Site plan

2.6 Interiors Discipline Layers

Layer Name	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
I-WALL-FULL					Full-height walls, stair and shaft walls, walls to structure.
I-DOOR					Doors
I-FURN					Furniture
I-ELEV					Interior and exterior elevations

2.7 Landscape Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
L-DONR-PLAQ					Donor Plaques
L-DONR-PLAQ-IDEN					Donor Plaque identifier number
L-DONR-PLAQ-TEXT					Donor plaque Identifying Text/Descriptions
L-SITE-BIKE					Bike Racks
L-SITE-FENC	YELLOW				Fences
L-SITE-FNTN					Fountains
L-SITE-FURN					Site Furnishings (benches, statues, plaques, ..)
L-SITE-POOL	5				Pool
L-SITE-SPRT	GRAY				Sports related facilities
L-SITE-WALL					Wall(exterior, partial height, block wall, retaining wall)
L-PLNT-FLWR	GREEN				Plant and land-Materials(flower beds)
~~L-PLNT-PLAN~~					Planting plants(ground level planters for trees/shrubs, ground covers, and vines)
L-PLNT-GRND					
~~L-PLNT-CONC~~					Above ground planters for trees/shrubs
L-PLNT-PLNT					
L-PLNT-BEDS					Rock, bark, and other landscaping beds
L-PLNT-TURF / ~~L-SITE-GREN~~					Lawn areas
L-IRRG	4	30	.18 MM	IRRIGATION	Irrigation
L-IRRG-PIPE					
L-IRRG-PIPE-ABAN					
L-IRRG-ANNO					
L-IRRG-SPKL					

2.8 Mechanical Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
M-HVAC-DUCT	BLUE		0.40		HVAC Ductwork
M-HVAC-TEXT	RED		0.25		HVAC general notes and specs.
M-HVAC-CDFF	BLUE		0.30		Supply diffusers
M-HVAC-COTH	GREEN		0.25		Thermostats
M-HVAC-RREG	GREEN		0.25		Return registers
M-HVAC-EQPM	BLUE		0.30		HVAC System equipment
M-EXHS-DUCT	GREEN		0.30		Exhaust system ductwork
M-EXHS-RREG	GREEN		0.25		Exhaust system registers
M-EXHS-TEXT	GREEN		0.25		Exhaust system notes and specs.
M-EXHS-EQPM	GREEN		0.30		Exhaust system equipment

2.9 Plumbing Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
P-FIXT	Cyan	4	0.20		Plumbing fixtures

2.10 Equipment Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION

2.11 Resource Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION

2.12 Structural Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION

2.13 Telecommunications Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
T-CABL					Cable plan
T-EQPM					Equipment plan
T-JACK-LEGN					Paperspace Telecomm Legend
T-JACK-SYMB					Telecommunications jack and Wi-Fi symbols
T-JACK-TEXT					Telecommunications annotation text
T-DIAG					Diagram

2.14 Other Disciplines Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION

2.15 Contractor/Shop Drawings Discipline Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION

2.16 GIS Layer: Site/Maps/Utilities/Themes

Chilled Water

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-CW U-CW-ABAN U-CW-NEWW					Chilled Water Abandoned lines New Work

Domestic Water

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-DW U-DW-ABAN U-DW-NEWW		170			Domestic Water Abandoned New Work

Electrical Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-EL U-EL-ABAN U-EL-NEWW		240			

Gas Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-GS U-GS-ABAN U-GS-NEWW		50			Gas Abandoned Lines New Work

Irrigation

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-IR U-IR-ABAN U-IR-NEWW		4			Irrigation

Sanitary Sewer

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-SS U-SS-TEXT U-SS-ABAN U-SS-MAIN U-SS-MAIN-TEXT U-SS-MHOL U-SS-CLEAN-OUT U-SS-FLOW-ARROW U-SS-NEWW		96			Sanitary Sewer Abandoned Main Lateral Main Lateral Manhole Clean Out Pipe flow arrow New work

Storm Drain Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-SD		170			Storm Drain
U-SS-MAIN					
U-SD-FLOW-ARROW					Pipe flow arrow
U-SD-AREA-DRAIN					
U-SD-SUMP-PUMP					
U-SD-MHOL					Manhole
U-SS-CTCH-BSIN					Catch basin

Steam Layers

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-ST					Steam
U_ST_ABND					Steam – Abandoned
U_ST_ABND_LBL					Steam – Abandoned labels
U_ST_ABND_STRU					Steam – Abandoned Structure
U_ST_LEADER					Steam – Pipe Leader
U_ST_PIPE_R					Steam – Steam Pipe Return
U_ST_PIPE_R_LBL					Steam – Steam Pipe Return Labels
U_ST_PIPE_S					Steam – Steam Pipe Supply
U_ST_PIPE_S_LBL					Steam – Structures
U_ST_STRU_LBL					Steam – Structure Labels
U_ST_TEMP					Steam – Temporary Layer
U_ST_VERIFY_R					Steam - Temp Return Layer
U_ST_VERIFY_S					Steam - Temp Supply Layer
U_ST_VERIFY_STRU					Steam - Temp Structure Layer
U_TN_TEMP					Tunnel – Temporary Layer
U_TN_TUNL_STEAM					Tunnel – Steam Tunnels

Telecommunications

LAYER NAME	COLOR (DESC.)	COLOR (#)	WIDTH	LINE TYPE	DESCRIPTION
U-TE		240			Telecommunications

Site Elements Demolished

C-____-DEMO
U-__-DEMO

Site Elements Added

C-___-NEWW   Site objects field measured by USC Staff, not by a licensed Surveyor.
U-__-NEWW   Site utilities field measured by USC, not a licensed surveyor. Corrections
U-__-ABAN   Abandoned

3.0 Drawing Object Guidelines

Text:

1. Room number, name, sq. ft. designation, scales, notes, and other dimensions to be 1/8" when plotted on an "E1" size or the specified paper at the pre-specified scale.

2. All building/floor and other drawing or detail title information such as gross sq. ft., net sq. ft., etc. to be 3/16" when plotted on an "E" size paper at the pre-specified scale and when possible to be located in the lower left corner of the sheet.

3. All building names in the graphical area to be 1/2" when plotted on an "E" size paper at the pre-specified scale.

4. In the graphical area, use font "romans" Use font file Romans. SHX at all times to specify:
    Dimensions,
    Room information,
    Summary sq. ft. information,
    and building name, scale, etc.

5. In the title block, use the designated fonts already in place. Simply "edit" the existing text and leave in the existing specifications.

6. As noted, text used for dimensioning should also be 3/32" when plotted at the pre-specified scale on an "E" size paper.

Title block:

1. Place the USC shield in the "logo" layer, turn the layer off, and freeze it. The USC shield, the logo layer, should be off and frozen as a default.

2. Color of objects in the title block varies, maintain the same colors as in the title block file.

3. Include street address and zip code in the title block.

Drawing Scale:

1. Acceptable scales are:
    1/16", 1/8", and 1/4"

2. All drawings (floor) for an individual building are to be drawn at the same scale.

General:
1. Center the building as whole in the paper as opposed to centering each individual floor.
2. Whenever possible, use the standard menu that comes with the AutoCAD software.
3. Note on how to label rooms:
    a. Use layer A-AREA-IDEN for the room number.
    b. Use layer A-AREA-OCCP for the name of the room.
    c. Use layer A-AREA-ROOM for the square feet numbers.
    d. The square feet numbers must be free of commas and have the square feet symbol.

4. The "N" used with the north arrow should be oriented to read horizontally at all times.

4.0 Building Area Definitions and Measurements

All measurements are taken to the face of the wall or mullion at a height of 4.5 feet.

Introduction
The following is a compilation of information from different sources, including:

1) AIA documents.

2) The Education Department's Postsecondary Education Facilities Inventory and Classification Manual, 1992.

3) Input from co-workers here at Facilities Management Services.

4) Comparison with other major universities in the country.

Definition of a Floor:
A floor shall be defined, and a corresponding floorplan drawn, when the above four criteria for a building are met in addition to the 6'-6" minimum height requirement.
>   **Include**: Roof plans.
>   **Exclude**: Exclude...

Definition of a Room:
A room shall be defined/measured to the interior faces of the space.

Other Plant Assets:
For management purposes, examples of assets not encompassed in the definition of a "building" include: uncovered swimming pools, athletic tracks, bleachers and additional playing fields that otherwise do not qualify as gross area. Institutions are also encouraged to itemize the infrastructure components. Examples include utility distribution systems (heating, cooling, power, water, and waste disposal) and support facilities which provide access or safety related services (roads, campus lighting, etc.).

Additionally, institutions may wish to maintain inventory data on land holdings, capital equipment, and movable equipment.

Gross Area:
The Gross Area is the sum of all areas on a floor of a building included within the outside faces of its exterior walls or from the center lines of walls separating buildings. It is also important to know that the Gross Area of a building is the floor area of a structure within the outside faces of the exterior walls. This value is either physically measured or scaled from as-built drawings. In summary (the following terms will be explained in detail below):

Gross Area = Usable Area + Structural Area

>   **Include:**

- Elements which extend beyond the exterior wall but are structurally integral to the building.

- Covered, enclosed walkways, such as tunnels and above-grade links between buildings are included. Assignment of connector square footage to specific buildings will be decided on a case by case basis.

- Elevator shafts, footprints of stairways, and ducts are to be included in the Gross Area calculation for each floor through which they pass.

- Mezzanine floors, square feet shall be measured to the exterior of the walls immediately adjacent to the mezzanine areas. Only these spaces shall be used in the calculation. No spaces that are labeled "open to below" and mechanical shafts shall be used. Stair and elevator shafts that service (stop at) this mezzanine level shall be included in the calculation.

Example:

◦Include interior balconies to double height spaces such as in the Annenberg building.
◦Example of a double height room: Bovard Auditorium, Annenberg lobby, and Davidson lobby.
◦Example of crawl spaces: Bovard Auditorium, Student Health Center.
◦Example of a mezzanine: Watt Hall, *POB, and POA.*

Exclude:

- Non-structural elements such as cornices, pilasters, and decorative exterior elements which extend beyond the primary exterior wall face.

- Exterior stairs and uncovered areaways of any sort outside the primary building exterior walls.

- Open areas such as adjacent parking lots, playing fields and exterior courts.

- Covered walkways, open roofed-over areas that are paved, covered porches and balconies, and all similar spaces.

- Roof mechanical areas that are unenclosed and uncovered.

- The upper part of a double height room. The square feet in this case shall only be counted on one of the floors, not both.

- Crawl spaces, less underground or at top levels, of a building that do not meet the minimum height requirement. Exceptions shall me made when these spaces are used for storage or a use other than mechanical purposes.

Assignable Area:

The amount of space that can be used for programs is known as the Assignable Area. The Assignable Area of a room is the area measured within the interior walls of the room. Total Assignable Area of a building or in an inventory is the sum of the space allocated to the ten major room use categories: classrooms, laboratory facilities, office facilities, study facilities, special use facilities, general use facilities, support facilities, health care facilities, residential facilities, and unclassified facilities. These categories are further identified below.

Assignable Area = Sum of the Ten Major Room Use Categories of Assignable Space

Measure Assignable spaces from interior wall face to interior wall face. Square feet data is always rounded off to the nearest foot for each room/space. In the case of doorways, polylines that define an area's square feet should be drawn to exclude the doorways. This is also conventionally referred to as Net Assignable Area or Net Assignable Square Feet (NASF).

Include:

- All interior spaces with a minimum height of 6'-6", assigned to or available for assignment to, an occupant or specific use.

- Classrooms, labs, offices, studies, administrative spaces, private washrooms attached to offices, general academic use spaces and residential living spaces.

> **Example:** Example of an assignable space: office, storage, a lounge, a waiting room, a private hallway (as opposed to a corridor which a more public)...

Exclude:

- Spaces which are assigned a specific purpose but fall under the category of Common or Other are not included. This would include spaces which are used in building services areas, circulation or mechanical support.

- Likewise, spaces which do not have a minimum height of 6'-6" are not included under Assignable, even if they may be used for storage or some other support purpose.

> **Example:** Example of A Non-assignable space: lobby, corridor, elevator lobby, entrance, mechanical rooms, janitor closets, telecommunications closets...

Non-Assignable:

There are various kinds of other spaces within a building that are essential but which are not assigned directly to support programs. Building Service Area is the sum of all areas of a building used to support its cleaning and public hygiene functions. Circulation Area is the sum of all areas required for physical access to floors or subdivisions of space within the building, whether directly bounded by partitions or not. Mechanical Area is that area of a building designed to house mechanical equipment and utility services, and shaft areas. The sum of Building Service Area, Circulation Area, and Mechanical Area is known as the Nonassignable Area of a building. The three major uses of this type are: Building Service Area, Circulation Area, and Mechanical Area.

Nonassignable Area = Building Service + Circulation + Mechanical Areas

Include:

- All spaces that fall under the above three room categories.

> **Example:** Men's and Women's bathrooms, Janitor's closets, Corridors, Lobbies, Elevator Lobbies, atrium (such as in CSC 2nd floor).

Exclude:

- Ceiling openings or space between walls not for mechanical use

> **Example:** Stair Shafts, Elevator Shafts, Mechanical shafts.

Net Usable Area:

The aggregate interior area of a building, known as the Net Usable Area, is the sum of Assignable Area and Nonassignable Area. Net Usable Area usually begins at the inner faces of the exterior walls and through the interior of the building. Usable Area can be further broken down into three primary elements: Assignable, Common and Other Interior Elements.

Net Usable Area = Assignable Area + Nonassignable Area + Other Interior Elements

Include:

- Included is basically everything within the exterior shell or walls of the building beginning at the interior face of the exterior wall or structure of the building.

Example: *Assignable from above,*

Exclude:

- Usable Area can be considered as Gross Area less all Exterior Structural Elements.

Example: *Spaces...*

Structural Area:

The difference between the exterior or Gross Area and the interior or Net Usable Area is the Structural Area, the floor area upon which the exterior and interior walls sit and the unusable areas in attics and basements. Structural area may be calculated as the difference between the net usable area and the gross area of a building. Doorways shall be included within the structural area of a floor/building.

Structural Area = Gross Area - Net Usable Area

Also:

Structural Area = Exterior Structural Area + Interior Structural Area

Include:

- Exterior Structural Elements include all components which are structurally integral to the exterior shell of the building.

- Windows, glazing or other surface treatments which are integral to the exterior wall should be included.

- Columns or other elements which are integral to the structure of the building but may stand apart from the principal exterior wall are also included.

Exclude:

- Non-structural elements such as cornices, pilasters and decorative exterior elements which extend beyond the primary exterior wall face are excluded.

Example: *Spaces...*

Exterior Structural Area:

The sum of all areas on all floors of a building that cannot be occupied or put to use because of the structural building features. The sum of all the cross-sectional areas of exterior walls. Example of Exterior Structural Area elements: the exterior wall of a building, exterior columns attached to the exterior wall, columns detached or offset to the outside of the exterior wall

Include:

- Exterior Structural Elements include all components which are structurally integral to the exterior shell of the building.

- Windows, glazing or other surface treatments which are integral to the exterior wall should be included.

- Columns or other elements which are integral to the structure of the building but may stand apart from the principal exterior wall are also included.

- All components which are structurally integral to the exterior shell of the building.

> **Example:** Include exterior columns adjacent or detached from the outer wall of the building

Exclude:

- Exterior elements of no structural value to the building

- Non-structural elements such as cornices, pilasters and decorative exterior elements which extend beyond the primary exterior wall face are excluded.

Interior Structural Area:

The sum of all areas on all floors of a building that cannot be occupied or put to use because of the structural building features. The sum of all the cross-sectional areas of interior walls/partitions. Examples of Interior Structural Area elements: all interior walls

Include:

- All components which are structurally integral to the exterior shell of the building.

> **Example:** All full-height or permanent interior walls

Exclude:

- Interior partial walls and movable partitions exclude the interior columns not attached to an interior wall.

Other Exterior Areas:

These are the areas that are not to be part of the building gross square feet, therefore not an essential structural element, nor are these part of the Net Usable Area. Identifying these spaces is optional, this data does not contribute to the main categories of square feet in a building, yet it may be usable for other purposes.

Include:

- Exterior courtyards and exterior stair wells.
- Covered Walkways
- Open roofed-over areas that are paved
- Covered porches and balconies

> **Example:** Exterior balconies, porches, porticos, verandas, exterior covered or partially covered walkways.

Exclude:

- All areas, with few exceptions, already included as part of the gross area or as part of a sub-category of this.

Other Interior Areas:

This category is meant to include that which is listed below.

Other Interior Areas = Net Usable Area - Assignable Area - Non- Assignable Area

Include:

- All residual areas once Assignable and Common are subtracted from Usable Area.
- All interior wall thickness', including doors, the total interior wall square footage
- Shafts and risers, open spaces on a floor plane which serve as part of a 2-story space on the floor.
- Miscellaneous spaces under 6'-6" and eaves beyond the knee wall, such as in an attic storage space.

> **Example:** Stair shafts, elevator shafts, ceiling openings for use by mechanical equipment.

Exclude:

- All the walls on the exterior of the building. Also, areas described above as "other exterior areas.

5.0 Geographic Information System (GIS) Standards (to be developed)

5.1 Drawing Units

Most CAD files should use the architectural units (feet and inches) report format.

Civil Engineering CAD files may use the engineering units (feet and tenths) report format.

GIS files should use Foot US length measure for Linear Units.

5.2 Coordinate System

All GIS Data must be provided in the same coordinate systems used by USC.

Projected Coordinate System: NAD 1983 StatePlane California V FIPS 0406 Feet

Geographic Coordinate System: GCS North American 1983 (NAD83)

5.3 File Types

All GIS data must be provided in ESRI compatible digital formats such as a geodatabase with all related feature classes contained within. The spatial topology should not contain any overshoots, slivers, open polygons, unlabeled polygons, or unresolved line segment intersections. Data should be topologically clean and error free.

5.4 Reference Points

At least two USC control monuments are to be incorporated into each survey

5.5 Reference Control Network

The USC Campus Mapping Control Survey has been recorded with the City of LA and can be requested from the University through the project Manager.

5.6 Other Resources

https://www.fgdc.gov/standards

5.7 Attributes

Line (pipe/conduit network)

   Project number, sheet number, size , material, install date

Points/Polygons(assets)

   USC Equipment Number, Project number, Sheet Number, install date