

PART A: CAD PROCESS

Section A1. Overview – Adherence, Definition and Evolution

- 1.1 This standard is based in the National CAD Standard, Version 3.1. It is comprised of the National CAD Standard and specific requirements from RIT.
 - a) The National CAD Standard (NCS) is a collaboration of the American Institute of Architects (AIA), the Construction Specification Institute (CSI) and the Tri-Service CADD/GIS Technology Center, whose intended purpose is to streamline and simplify the exchange of building design, construction data and CAD graphic standards. The Uniform Drawing Standards (UDS) was developed by the Construction Specification Institute (CSI) to provide uniformity for graphical information in drawings.
 - b) NCS can be reached at <http://www.nationalcadstandard.org>.
- 1.2 **RIT** requires adherence to these specifications in all projects. Changes must be pre-approved by the Director of Campus Planning, Design & Construction Services.
- 1.3 Submitted work that does not adhere to this CAD specification will be returned and payment for services withheld until the work conforms.
- 1.4 This standard is subject to change and update as **RIT** needs or technological changes warrant.

Section A2. General Guidelines – CAD Version, Format and File Submittal Details

- 2.1 All CAD drawings submitted to **RIT** must be drawn in AutoCAD 2004 or later versions, as specified in contract or purchase order. All CAD drawings must use the title border supplied by **RIT**. All plan drawings must contain a North Arrow, with the North orientation to the top of the drawing, or to the right of the drawing.
- 2.2 Any use of CAD translation software must result in 100% compatibility with the **RIT** computer hardware and software.
- 2.3 Submittal Requirement /Quality Assurance:
 - a) The Architect/Engineer (consultant) must submit one copy of all facilities and construction AutoCAD drawing files on CD ROM, along with electronic PDF files of all record drawings and "as-built" drawings. Submitted drawings must follow the conventions and guidelines outlined in this specification.
 - b) The Consultant must submit a list in Word (.doc), Excel (.xls), of all documents included in the submittal package, including drawing numbers, titles and file names. The Consultant is responsible for including any copyright information or restrictions pertaining to these documents.
 - c) When a drawing file is complete and ready for submittal make the following settings:
 - 1) Use the "PURGE" command to un-reference from the drawing all non-utilized "BLOCKS, DIMSTYLES, LAYERS, LTYPES, SHAPES, STYLES, and MLINESTYLES".
 - 2) "SNAP" & "GRID" turned off.
 - 3) Change background color to black, if working in a background other than black.
 - 4) Set "Layouts" of the file as intended for printing and include drawing number in layout name.
 - 5) Bind all Xref files to drawing files.
- 2.4 File naming conventions described in Part B of this document are to be used for all drawing files.

Section A3. Graphic Standards – Layers and Entities

- 3.1 Layers will match those established by the National CAD Standard (NCS), and may be modified by **RIT** as specific project needs require. Existing CAD files will be adjusted accordingly on a per project basis. The RIT blank drawing template file is available via the RIT web site at [http://facilities.rit.edu/vendor/RIT/ CAD Standard](http://facilities.rit.edu/vendor/RIT/CAD%20Standard). (See Part B for technical specifications regarding layers.)
- 3.2 The naming convention for individual space blocks (polylined zone) is on layer A-Flor-Iden-Zone. Each interior space will have a unique room number and net area, to be placed on layer A-Flor-Iden-RoomNo using a Room Information Block provided for this purpose by the **RIT**. Fill in Attribute fields.
- 3.3 The assigned Room Information Block is placed so as to not overwrite other information in the drawing.
- 3.4 All room numbers, room names and square footages will be generated by **RIT** for internal reference and will be supplied to the Project Architect after the room numbering assignments are made. (See Section 4.7.) The architect will provide design development drawings to **RIT** for this purpose. Room numbers will be laid into the CAD file and supplied electronically to the consultant. These room numbers must then be used in all associated contract documents including drawings, specifications and schedules. Contract documents that have not come through this process by the time of issue will not be accepted. No revisions shall be made without approval.

Section A4. Space – Defining, Room Numbers, Boundary Placement (Zone Polyline)

- 4.1 Gross – the gross area of a building is the sum of the areas at each floor level included within the principal outside faces of exterior walls, provision to be made for architectural setbacks or projections. Include all stories of areas with floor surfaces with clear standing head room regardless of their use. Where a ground level or intermediate story, or part thereof, is left unenclosed, consider the gross area of the unenclosed story as the projected area of the story above. Exclude all unroofed areas and unenclosed roofed-over spaces. Each architectural floor plan will have a closed polyline outlining this area. This information will only change over the life of the building if there is a brick and mortar addition or demolition.
- 4.2 Core - Core (non-assignable) spaces are areas of a building which service the building(s) operation rather than the tenant. The core space of a building will normally not change its function over the life of the building or depend on the tenant occupying the building. Core space will include major vertical penetrations such as stairs, elevator shafts, flues, pipe shafts, vertical ducts and their enclosing walls. Examples of core areas include public rest rooms, janitorial closets containing plumbing, electrical transformer rooms, and mechanical rooms containing building heating, ventilation and air conditioning equipment, telecommunications and computer networking rooms, that service the building(s). NOTE: Administrative offices in core space such as a boiler room operator office or desk area in a telephone room should be considered core space, but are NOT non-assignable. Enclosed areas such as columns and mechanical shafts will be individually defined and measured with a polyline zone. The measurement of core area includes the space from the outside finished surface of the enclosing permanent walls. The appropriate person at **RIT** will determine if these spaces are to have room numbers. Contact the Space Inventory Coordinator's office.
 - a) These areas will be defined in a lump sum sq. ft. number by floor. Open space (for atriums etc.) will be defined according to the **RIT** standard.
 - b) Total core area will be defined in a single record per floor with a lump square footage.

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- 4.3 Circulation – Space required for physical access to some subdivision of space whether directly bounded by partitions or not; includes corridors, elevators, lobbies and interior stairs. Limitations: only horizontal spaces required for general access are included.-- not aisles used only for circulation within office suites, auditoriums or other work areas. Do not deduct building columns and projections.
- 4.4 Under normal conditions, the boundary (zone) line is to reflect conditions that exist four (4) feet and zero (0) inches above the finished floor.
- 4.5 Other conditions:
 - a) If an enclosed space is located between a room and a corridor (such as a pipe chase), it is not included in any room but treated as a wall.
 - b) For small enclosures built against the exterior wall, place the line on the interior face of the exterior wall.
- 4.6 Mechanical equipment and related piping and ductwork located inside walls will not be considered when locating polylines.
- 4.7 Space blocks (zone polylines) for corridors will be divided into definitive areas, such as major intersections, at fire doors, etc. These blocks will also be assigned a unique room number by **RIT** and included in the list of Room Numbers, Names, Sq. Ft. as part of the project package.
- 4.8 If a wall has been removed, making two rooms into one, the space is to be incorporated into the primary room, unless the main point of access to the room has changed.
- 4.9 Drawing Polylines
 - a) Core and Circulation areas are to be separate polylines. For the purpose of this section, the term “assignable space” is used to denote any space that is not core or circulation space.
 - b) The area of each polyline will be recorded in the Net Area section of the Room Information Block. Architectural floor plans that do not include this information will not be accepted as either Design, Contract or As-Built documents by **RIT**.
 - c) A polyline will be drawn around the net area of each room as follows:
 - 1. The polylines will be drawn to the inner surface of the exterior wall or window glass. The zone line will be placed on the dominant interior face of exterior wall and party walls, regardless of thickness or material type, and will be placed so as to maximize useable square footage. Do not include in the room net area floor area occupied by room heating units (radiators), custom-built furniture such as room length permanent bookcases, etc.
 - 2. All polylines must be closed.
 - 3. All polyline vertices must be accurately drawn using the “Close” command to finish the polyline.

Section A5. Architectural Drawing Content

- 5.1 Each architectural and interiors facilities drawing set will include, but is not limited to:
 - a) Wall and partition information, including all permanent and demountable walls, fire ratings and fire wall locations.
 - b) Floor information including load rating.
 - c) Reflected ceiling information including ceiling grid height.
 - d) Area polylines indicative of the gross area/footprint of the building/floor.
 - e) Area polylines indicative of the Net Square Footage of every internal space in the building.
 - f) Area specific information including room number, room name, net area in the format specified and provided by **RIT**.

Section A6. Structural Drawing Content

- 6.1 Structural Drawings will include, but are not limited to:
- a) Foundations and Footings, including pilings. Indicate outline dimensions, pile depth, type.
 - b) Slabs, indicate capacity, metal deck, reinforcing, load capacity, depressions, slab thickenings, openings, and expansion joints.
 - c) Soil Boring Reports.

Section A7. Electrical Engineering Drawing Content

- 7.1 Electrical Drawings will include, but are not limited to:
- a) Security Systems shall have dedicated drawings, including motion sensors, door sensor/switches, door lock releases, key card readers, central stations, indicate zones.
 - b) Access Systems shall have dedicated drawings, including motion sensors, door sensor/switches, door lock releases, key card readers, central stations, indicate zones.

Section A8. Fire Protection Drawing Content

- 8.1 Fire Protection Drawings will typically include, but are not limited to:
- a) Fire Alarm Systems shall have dedicated drawings.
 - b) Sprinkler Systems shall have dedicated drawings.
 - c) Special Fire Systems shall have dedicated drawings (halon, foam, other), indicate system type, area served, component locations, discharge nozzles, detectors, connections to alarm/power/HVAC.

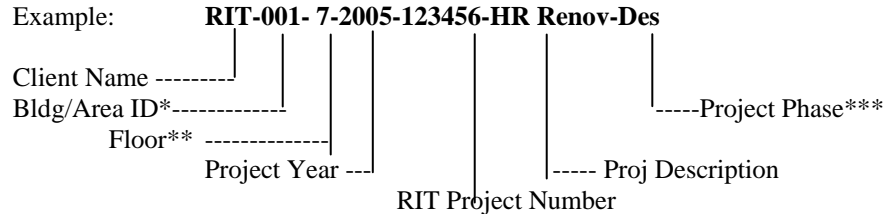
END OF PART A.

PART B – TECHNICAL INFORMATION

Note: For projects that do not fit these specific formats, consult the Manager of Planning and Design Services.

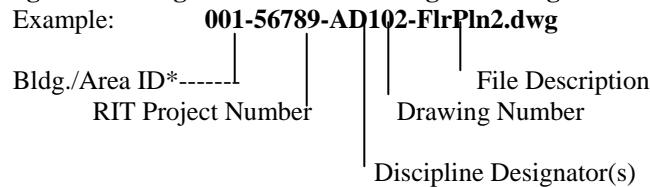
Section B1. Folder & File Naming and Drawing Numbering Conventions

- 1.1 **Project Folder Naming Convention:** Reference UDS Module #1, pages 01.13 – 01.53. (specifically pages 01.51 – 01.53).

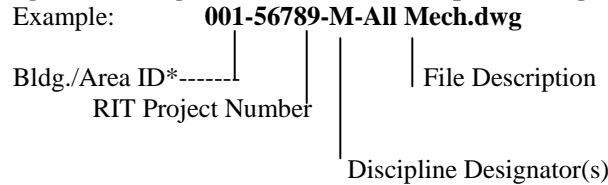


- * Building Numbers or Area ID will be obtained from the **RIT** Space Inventory Coordinator.
- ** Valid floor indicators include numbers 01 to 12, A or B = Basements, R = Roof.
- *** Project Phases: PRE = Preliminary, DES = Design (contract documents), ASB = As-built

- 1.2 **Drawing File Naming Convention: For Single drawing files:**



- 1.3 **Drawing File Naming Convention: For Multiple drawing files:**



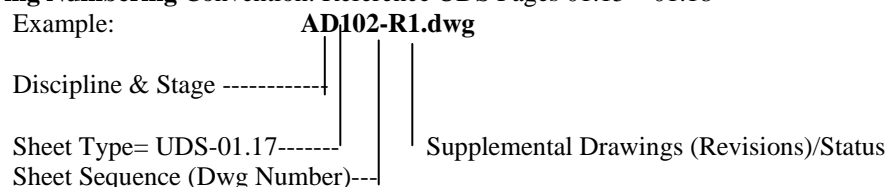
Note: For small jobs where the entire project is contained in one file, the File Description should read – **Full Project**. Each drawing Layout **tab** should be labeled to reflect the drawing(s) it contains.

- 1.4 **ZIP files of Contract or As-Built documents Naming Convention:**

Example: 09-01-123456.zit (Extension ZIP will be rejected by the RITemail server.)

Where: **XX**-01-123456.zip = Bldg. #
 09-**XX**-123456.zip = Floor #
 09-01-**XXXXXXXX**.zit = **RIT** Project #

- 1.5 **Drawing Numbering Convention:** Reference UDS Pages 01.15 – 01.18



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Drawing numbers are comprised of their discipline designator, sheet type designators plus the sequential sheet number (e.g. AD103, M-104, E-106, S-201, etc.) with any revision (#'s) or special designators for phasing. If the second discipline designator field, or modifier character, is not used substitute a hyphen. One such "modifier character" is D = Demo.

1.6 Discipline Designators. Reference UDS-01.15

A	Architectural	L	Landscape	X	Other
C	Civil	M	Mechanical	Z	Contractor/ Shop
E	Electrical	P	Plumbing		
F	Fire Protection	Q	Equipment		
G	General	R	Resource		
H	Hazardous Materials	S	Structural		
I	Interiors	T	Telecommunications		

1.7 The valid one-digit indicators for sheet type are as follows: Reference UDS-01.15

0	General	5	Details
1	Plans	6	Schedules & Diagrams
2	Elevations	7	User Defined
3	Sections	8	SK Drawings
4	Large Scale Views	9	3D Representations

1.8 Supplemental Drawing indicators: Some typical indicators are as follows: Reference UDS-01.18

R	Partially revised floor plan (used with revision number, e.g. R1 or R2).
X	indicates a totally revised floor plan.
A	Indicates the first phase of a multi-phased construction project (hence B = phase 2, etc.)
RD	Record Drawing
AB	As-Built

Section B2. Drawing Sheet Size, Scale, Format and Title Border

- 2.1 Floor plans shall not be less than 1/8"=1'0". All final drawings shall conform to 24"x36" plot size.
- 2.2 Title Border - All drawings shall use the RIT Title Border file available at the FMS Website – <http://facilities.rit.edu/vendor>.

Section B3. Drawing Accuracy and Consistency

- 3.1 The following guidelines establish accuracy requirements and drawing consistency issues:
 - a) The "0,0,0" coordinate is used as the prime reference point for connecting various drawing sections together, as well as merging drawings from various disciplines. Do not change the drawing's base (insertion) point. If it needs to change temporarily, make certain that it is reset back to the default "0,0,0" coordinate point prior to submitting drawings.
- 3.2 Abbreviations: Refer to UDS Module 5.

Section B4. Layers

- 4.1 The following are basic layers guidelines.
 - a) The layering of the drawings must always match the standard specified. The Layer Convention utilizes the NCS Standard (AIA CAD Layer Standard). Variations from or additions to the NCS Standard will be documented for and approved by **RIT**.

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- b) No drawing objects will be stored on layer zero.
 - c) All blocks will be (created and) inserted on a layer specific to that block.
- 4.2 Layer Convention
- a) Prefix Classifications will adhere to the National CAD Standard.

Section B5. Line Widths – Colors & Line Conventions

- 5.1 Dwg's must be plotted using the RIT CTB(s) which are available at the FMS Website <http://facilities.rit.edu/vendor>.

Section B6. Lettering

- 6.1 The following list of standards will be used in order to maintain text readability and consistency:
- a) Text must be at least 1/8" high.
 - b) Use AutoCAD provided fonts only.

Section B7. Symbols

- 7.1 The following list of standards will be used to maintain continuity and consistency in symbol use:
- a) Refer to Module 6 of the UDS for Standard Reference Symbols.
 - b) Insert symbols on the proper layers.
 - c) Size designator symbols in relation to the drawing plot scale. Example: when plotting at 1/8"=1', the symbol insertion scale factor would be 96 (12"/ 1/8").
 - d) Fill in any attribute fields that are included in the symbols.
 - e) Do not mirror blocks. (Mirrored blocks cannot be exploded nor have their attributes modified.)
 - f) Temporary blocks used in drawing creation should be exploded and purged out of the drawing. (This includes entities that are Edit/Copy-Pasted within or between drawing files.)