

CAD STANDARDS

Guidance & Support v 2.0



Estates Office

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<https://www.worc.ac.uk/facilities-staff/estates.html>

| Version Control | | | |
|-----------------|--------------------|----------|----------------------|
| Version | Author | Date | Changes |
| 1.0 | Christopher Abrams | Aug 2016 | First Draft |
| 2.0 | Matthew Hoper | Mar 2020 | Full document review |
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Introduction

Please ensure you are using the most recent version of this document. The latest version can be downloaded from <https://www2.worc.ac.uk/facilities-staff/288.html>

The CAD Standards are in place to create a unified effort and result through the adoption of a single conformed standard.

These CAD Standards are to be applied to the creation or editing of any CAD data/ files (.dwg), whether they are created by UoW internal staff or external contractors and consultants.

Support

- In the first instance all enquiries should directed to the Project Manager/Officer
- Technical enquires can be sent to the Space Management team at spacemanagement@worc.ac.uk

Definitions

CAD Data

- This document refers to CAD Data rather than drawings because that is what it is. A drawing is one element of CAD data and will usually be in the uncontrolled format of PDF or printed paper hard copy

CAD System

- The CAD System manages and develops anything to do with CAD and generally encompasses
 - a) CAD Standards
 - b) CAD Data (drawings)
 - c) CAD Software
 - d) CAD Procedures

CAD Data (drawings)

- Electronic drawings produced with CAD software.

Project Drawings

- CAD Drawings produced to illustrate proposed and intended work by internal or external sources throughout the design stages of a project.

As Built/Constructed /Fitted/Installed Drawings

- Drawings that represent exactly what has been physically built on a project.

Master Drawings

- Building record drawings produced in-house. These are assumed to be the most up to date version of a building and use As Built information from project drawings via the Operation and Maintenance Manual process. Master drawings are loaned as a basis for external or internal sources to produce CAD Drawings updates or gain space information.

External

- Any consultants, architects, contractors, or sub-contractors employed by, or working in conjunction with, and supplying CAD drawings to the University.

Internal

- Any CAD Drawing produced 'in-house' by University of Worcester Estates staff.

Drawing Updates

- Any CAD drawing data produced as a result of an update to existing, or creation of a new building or part of a building. This data can come from internal or external sources.

CAD Standards

- All CAD drawings, whether produced internally or externally, are to be produced to the University of Worcester CAD Standards.

UoW

- University of Worcester

Archibus

- The University of Worcester procured CAFM & Estates Software.

Polyline

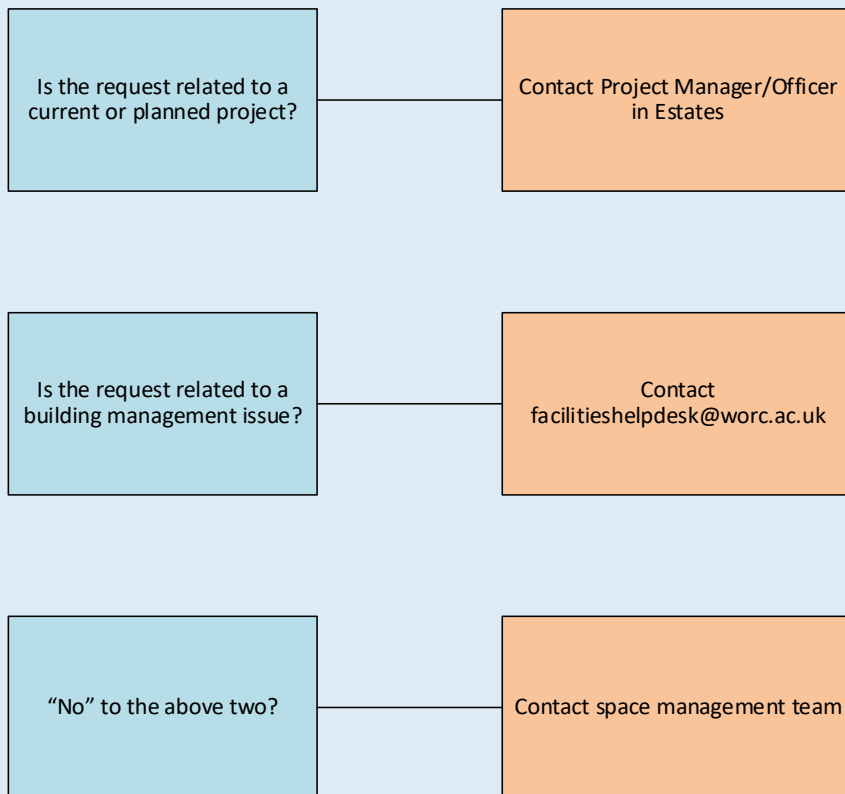
- A continuous line composed of one or more-line segments.

NUA / NIA

- Net useable area / Net internal area is the usable area within a building measured to the internal face of the perimeter walls at each floor level. NIA covers all areas which are used for a specific purpose.

How to request UoW CAD data & plans

In the interest of security, all University building plans, electronic data (CAD/PDF) or paper hard copies must be accessed through appropriate Estate channels (as set out below). This following guidance applies to University staff and external companies requesting access to this information.



Production

1. New Drawings

1. All drawings must be produced in AutoCAD (where possible) and be in 2D format. All drawings will be produced on the version (or as updated in the future) of AutoCAD that is currently in use within the Estates Office. This is currently 2018 format.
2. When a new CAD drawing is produced or revised it must be added to the project Drawing Register.
3. All drawings produced, either via internal or external means, are to be produced to the UoW CAD Standards. The UoW CAD Template File can be used to aid this process. To request a copy of The University of Worcester AutoCAD Template file please email Spacemanagement@worc.ac.uk
4. If available, Master Drawings should be used as the basis or background to create project drawings. If not available, the final As Built project drawings will become the basis for the new Master Drawing.
5. Data should not be relocated away from the original survey grid, as sometimes it is a requirement that all drawing files are to be positioned in the correct location over the OS Map. The setting out position should remain constant throughout the project. This can be achieved by creating a new UCS and then setting up named views. Please ask if you need help. If the external contractor or consultant moves their details from its original insertion/origin point, then these details should be corrected during production of revised Xrefs. UoW layouts should not be amended to suit these changes in location. Instead the external contractor or consultant's plan is moved back into its previous location, as initial issue.

6. All existing AEC or 3D CAD entities will be converted to 2D. Any extra reworking or redrawing will have to be undertaken as part of this process.

2. Archibus related guidance

- a) All new drawings, and any amendments to existing drawings must be polylined.
- b) The polyline must be drawn on a newly created layer, titled 'RM'. The colour of this layer should be CYAN.
- c) The polyline should be drawn on **all** spaces. I.e. offices, corridors, toilet areas, staircases, lifts, stores, risers and teaching spaces.
- d) The polyline is to be drawn on the *N/A room area basis*. For more information please use the link below:
https://www.hesa.ac.uk/collection/c16042/gia_and_nia
- e) The polyline should be drawn with a lineweight of 0.25MM.

3. General drawing & editing

1. All drawings will be drawn full size (1:1 scale (1 drawing unit =1mm)) in millimetres (model space); however, highways, mappings and surveys often need to be full size (1:1 scale (1drawing unit =1m)) in metres.
2. Where details are required on a drawing at various scales this must not be achieved by scaling in model space. Please use viewports within the layout/paper space. The drawing in model space should always be at 1:1.
3. To avoid problems with overlaying information the drawing rotation in model space must never be altered. Do not move, re-scale or rotate drawings.

4. If a drawing needs to show duplicated areas or more than one building level, therefore contain more than one background Xref, then these files should not be moved from their original insertion/origin point. The final result (plot) is to be accomplished by the correct use of layers, layer manager and view ports.
5. Drawings should be purged and audited regularly, note that only objects that are not being used on the drawing will be removed. **Do not purge UoW dimension or text styles.**
6. Delete all unused layout tabs when not required.
7. When exiting a drawing ensure that all required layers are turned on and ready for plotting with the full paperspace view displayed on the screen. This not only enables the viewer to see the drawing on the preview but also assists with batch plotting. It is also good practice to make full use of layer manager whenever possible.
8. When drawing files are to be closed, they must be saved to the default status, as follows: -
 - a. All completed drawings are to be purged
 - b. All unused layouts to be deleted
 - c. All required layers are turned on and layer '0' made current.
 - d. Zoomed to extent
 - e. Paper space view

4. Drawing naming

New Drawing Naming

The University of Worcester follow the British standards BS1192:2007+A2:2016 and PAS 1192-2:2013 when naming all new drawings and models. The naming convention for files is broken down into the following fields:

| Field | Description |
|---------------------|---|
| Project | The project identifier number (Architect tender ref) – If N/A use XXX |
| Originator | Code for organisation creating information |
| Volume or system | An identifier of which building, area, phase or zone of the project |
| Levels and location | The building level (floor) or location code. e.g. Lower Ground Floor: -01 Ground Floor: 00 First Floor: 01 Roof: RF Multiple Levels: ZZ No Level Applicable: XX |
| Type | To identify the type of information, e.g. drawing, model, document, etc. This should be exactly two characters long. For all 2D drawings, the type code is DR. (Further information here) |
| Role | To identify the organisations role assigned on the project. This should be exactly one character long. Please see layer naming section for list of these. |
| Number | A sequential number to identify the drawing. Standard coding should be four integer characters long (Further Information for drawings here) |

Type

| Codes for Drawings & Models | |
|--|---|
| AF | Animation File |
| CM | Combined Model |
| CR | Specific for the clash process |
| DR | 2d Drawing |
| M2 | 2D Model file |
| M3 | 3D Model file |
| MR | Model rendition file for other renditions (thematic analysis) |
| VS | Visualisation |

| Codes for Documents | |
|----------------------------|---------------------------|
| BQ | Bills of Quantities |
| CA | Calculations |
| CO | Correspondence |
| CP | Cost Plan |
| DB | Database |
| FN | File Note |
| HS | Health & Safety |
| IE | Information Exchange |
| MI | Minutes/Action Notes |
| MS | Method Statements |
| PP | Presentation |
| RD | Programme |
| RI | Request for information |
| RP | Report |
| SA | Schedule of accommodation |
| SH | Schedule |

| | |
|-----------|---------------|
| SN | Snagging List |
| SP | Specification |
| SU | Survey |

Number

The University of Worcester have adopted a number series to increase clarity of drawing types. The table below applies to drawings only.

| Number Series Range | Drawing Type |
|---------------------|-----------------------|
| 0000-9999 | Site Plans |
| 1000-1999 | Plans |
| 2000-2999 | External Elevations |
| 3000-3999 | Building Sections |
| 4000-4999 | Section Details |
| 5000-5999 | Plan Details |
| 6000-6999 | Schedules |
| 7000-7999 | Interior Elevations |
| 8000-8999 | Miscellaneous Details |
| 9000-9999 | Perspectives |

Example

| Project | Originator | Volume or system | Levels & Location | Type | Roles | Number |
|---------|------------|------------------|-------------------|------|-------|--------|
| UOW123 | UOW | HB | GF | DR | A | 1001 |

Example Drawing Number: UOW123-UOW-HB-GF-DR-A-1001

Master Drawing Naming

The UOW master drawings have a unique number to identify the type of drawing, which building code, floor level and drawing number. Any drawing numbers following this standard must not be altered. Example as follows:

| Master General Arrangement | Building Code | Floor Level | Drawing Number |
|----------------------------|---------------|-------------|----------------|
| MGA | HB | 00 | 001 |

Example Drawing Number: MGA-HB-00-001

| Field | Description |
|----------------------------|---|
| Master General Arrangement | Always MGA to show this is our Master drawing for this Building |
| Building Code | Building Code. Please obtain this from the Space Management Team. |
| Floor Level | The building level (floor) or location code. e.g. Lower Ground Floor: -01 Ground Floor: 00 First Floor: 01 Roof: RF |
| Drawing Number | A sequential number to identify the drawing. Standard coding should be three integer characters long. |

5. Text

Guidelines have been set up to determine the standard style and size of text used on University of Worcester drawings to ensure consistency throughout all drawings.

1. All text will be in model space and not added to the layout.
2. All text shall be UPPERCASE (except units of measurement) in Mtext and with 0.8 Width Factor. All title block text shall be in UPPERCASE.
3. All general notes, annotations, etc will be in Arial, 2mm high and justified according to usage.
4. All room numbers and room names shall be 2.0mm high, Arial and Middle Centre justified.
5. Blocks and title blocks should be left in the text style they were
6. With the exception of contours and chainage, all text should be readable from the bottom right hand side of the drawing.

6. Dimensions

1. The automatic dimensioning facility must be used for all dimensions
2. Do not explode dimensions into their constituent parts.
3. Dimensions can be annotated but should always be to scale.
4. Various Dimensioning Styles with different terminator styles will be brought in with the UoW template files.

7. Hatch

1. Hatch should not be used for internal or external walls
2. Do not explode hatches.
3. Only Standard AutoCAD hatch patterns should be used.
4. Do not associate hatch patterns to entities that are part of an Xref.
5. The hatch pattern `dots` is memory hungry and should be avoided.
6. To enable objects to keep they're by layer properties, place hatch patterns on a separate layer

8. Symbols library

Standard UoW Symbols and Blocks are accessible using tool palettes.

All symbols are inserted onto an appropriate BS 1192 Descriptive layer. Most symbols are drawn at 1:1 and will be placed at the Dimscale set for the drawing. Others are drawn full scale, e.g. luminaires, radiators.

9. Line weights

| <u>Line weight</u> | <u>Application</u> |
|--------------------|---|
| 0.10 | Fine hatching and hidden items |
| 0.13 | Architectural background / building outlines (xref) |
| 0.25 | Text and general notes – leaders and dimensions |
| 0.25 | General editing |
| 0.35 | Symbols and services |

10. Line Types

1. All users must keep to the line styles provided with AutoCAD and template file.
2. All objects in the drawings must keep they're by layer properties. Therefore, if more than one line type is required for a particular category, multiple layers for each can be created to suit.
3. Standard AutoCAD line types (acadiso.lin) must be used. Site survey drawings showing main service supply routes may use special line types such as: -

* GAS___GAS___GAS

* CCTV___CCTV___CCTV

These special line types must be supplied with the drawing files.

11. Layers

The University of Worcester, Estates Office follow the AEC (UK) CAD Standard, which is based on BS1192, with minor modifications and additions to suit the usages of the University. Please see section 19 which explains the layer naming.

The general default University of Worcester standard layers are contained within the standard XXXX-UoW-XX-XX-DR-X-XXXX_CAD Temp.dwt

To request a copy of The University of Worcester AutoCAD Template file please email spacemanagement@worc.ac.uk

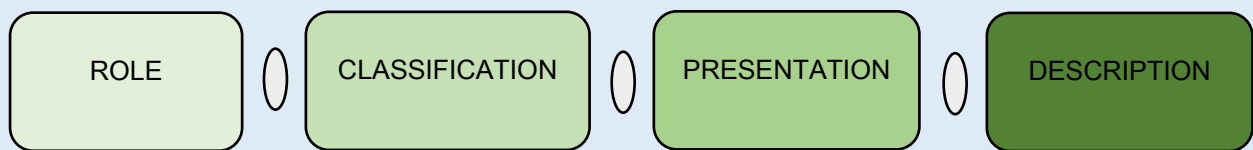
12. Layering

The layering convention will be used when creating all drawing files.

- All objects should be colour by layer
- Line type set to by layer
- Line weight set to by layer
- Plot Style set to full saturation
- All corresponding text and leaders should be on the correct services layer name.

13. Layer naming

The layering standard naming convention uses the following fields.



Example- A-Ef_30_20-M_Floor

(Role = Architect, Classification = Ef_30_20 Presentation= M & Description = Floor)



ROLE

The letters A to Z define the author, or owner, of the data. This allows various disciplines to use the same Classification codes.

A - Architect

B - Building Surveyor

C - Civil Engineer

D - Drainage

E - Electrical Engineer

F - Facilities Manager

G - GIS and Land Surveyor

H - Heating and Ventilation Designer

I - Interior Designer

K - Client

L - Landscape Architect

M - Mechanical Engineer

P - Public Health

Q - Quantity Surveyor

S - Structural Engineer

T - Town and Country Planner

W - Contractor

X - Subcontractor

Y - Specialist Designer

YF – Fire Engineer

Z - General (non-disciplinary)

CLASSIFICATION

The Classification code describes the design component and is the most important field in identifying the component. It uses a Uniclass 2015 value from the following tables:

SL - Spaces / Locations

Ee - Elements

Ss - Systems

Pr - Products

and the additional AEC (UK) table:

Zz - Non-physical Elements

PRESENTATION

Indicates the type of data associated with the layer.

| Code | Description |
|-------------|-------------------------------------|
| D | Dimensions |
| H | Hatching, Shading, Fill, Patterning |
| M | Model-related elements |

| | |
|---|------------------------|
| P | Paper-related elements |
| T | Text |
| X | Existing |

DESCRIPTION

Used to clarify the codes used in Field 2. It is advised to use “CamelCase” (i.e. each word begins with a single capital, the remainder in lowercase and any words are concatenated without spaces) for clarity and comprehension.

Note: Plurals - Only singular descriptions are used for consistency:

- Use Wall instead of Walls
- Lift instead of Lifts
- CommunicationCable instead of Communications Cables

For more information on the layer naming standard, please refer to the AEC (UK) Protocol for Layer Naming:

<https://aecuk.files.wordpress.com/2018/06/aecukprotocolforlayernaming-v4-1.pdf>

14. Plotting

To ensure that all paper information produced from the University of Worcester CAD system is of a consistent standard, all the following procedures should be followed. The Designer / CAD Technician is responsible for carrying out all necessary checks before committing the CAD file to the plotter/printer.

Check the drawing content carefully to ensure that all the changes have been carried out carefully.

15. Final check

All CAD data must be checked to ensure that all information corresponds to the CAD standards detailed in this document.

1. All data has been produced using the appropriate layers.
2. Check that the correct colour, line type, line weight and plot style have been used to represent each object.
3. Make sure that the latest layouts are being used from other disciplines. If incoming procedures are correctly followed, then this should always be the case.
4. Check that viewport(s) are zoomed to the correct scale.

Check all notes and dimensions

1. Make sure that correct English Grammar has been used.
2. Run a spell check.
3. Check the font and size of text.
4. Check that viewport boundary has not trimmed off any of the text/building; adjust the boundary to suit.
5. Check that the continuation notes (if any) are accurate and cross-referenced.

Check the title block in paper space.

1. Check that the title block has been filled in correctly.
2. The correct revision letter and date has been added.
3. The correct reason for issue has been added.
4. Have all the necessary notes been added to the notes column?
5. If required, is the legend correct?
6. Has the location plan been hatched in the correct area?

* Click [here](#) to return to top of document.

