Document Title
AutoCAD Drawing Standards

Reference Number	CAD 01
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Process Owner Job Title	Rob Jobber CAD Supervisor
Status	
Summary	This document provides the standard procedure for producing or amending AutoCAD drawings for the University of Southampton.

Approval List

Name	Job Title	Signature	Date

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1.0 INTRODUCTION

Estates and Facilities use AutoCAD software for the production and amendment of its drawings and currently operate AutoCAD 2016. Our CAD Record drawings drive the Estates and Facilities Database so it is therefore essential to adhere to this drawing standards document.

Prior to the final handover of any building project, the University require the CAD drawings (with space numbers and space polylines) in order to complete the following tasks:

- To ensure the drawings can be loaded successfully onto the University database.
- To enable maintenance issues to be logged to their location.
- To enable assets to be registered to their location. This is required prior to handover and occupation

This document provides the requirements of the University (based on the guidelines of BS1192) that must be followed by all Estates and Facilities CAD users, Project Managers, Architects, Consultants or Contractors and anyone else working on drawings for University projects. It is to be used in conjunction with the University approved Standard Room & Space numbering procedure document (Reference ES-030, Version C).

2.0 CURRENT BUILDING FLOOR PLANS

Current Building floor plans are the most recent set of CAD drawings available for each University building. They typically show walls, partitions, stairs, lifts and door and window openings. They also contain space information including space area polylines, space numbers and space names. These drawings are available on the Estates and Facilities J:\Drive or can be provided by e-mail or on CD by the CAD Team if required.

3.0 SUBMISSION OF RECORD/AS BUILT DRAWINGS

3.1 University Requirements

On the completion of any project or alteration, all Record drawings must be forwarded to the CAD team for inclusion onto the Estates and Facilities CAD system. It is the Project Managers responsibility to ensure all Record drawings are delivered to the CAD Team electronically.

- All drawings for any project including the Architects GA floor plans (required for inclusion onto the Estates and Facilities database), sections, elevations, details, schematics and services/M&E drawings must be produced and submitted in an un-locked **AutoCAD .DWG** format electronically with a relevant index/issue sheet. Estates and Facilities currently use AutoCAD 2016. Drawings supplied on CD should be clearly labelled with the Project details, date and version of AutoCAD used.

- Drawings produced using BIM software (such as Revit) must be exported into AutoCAD DWG format before issue. **The University will also require any original BIM files** (for example .RVT) for its records.

Please ensure that **all** drawings have been produced in accordance with the guidelines of this CAD document, where possible.
Please ensure that ALL spaces (with the exception of voids) have Area polylines before drawings are issued (See section 5.0).

Details of any revision history must be shown on any issued drawing.

3.2 External Reference

Please contact the E&F CAD Team prior to issuing any drawings that contain XRef attachments. Any drawings that do contain XRef's must have the attachments bound to the drawing before being issued. Any XRef which cannot be bound must be issued electronically in a folder containing the host drawing and any other relevant information/files required to successfully open and use the drawing.

4.0 DRAWING PRODUCTION

4.1 Layer naming convention

A standard CAD layering system is necessary to ensure consistent drawing production between various disciplines and users and enables the layering on drawings to be easily understandable and recognisable.
Estates and Facilities follow the layer naming guidelines of BS 1192, part 5 wherever possible.

However, the following table of layers are used specifically on all Estates and Facilities Building floor plans to ensure compliance with the estates and Facilities space database:

_A-210 EXTERNAL WALLS GENERAL	green
_A-220 INTERNAL WALLS PARTITIONS	yellow
_A-240 STAIRS	red
_A-270 ROOF	red
_A-314 EXTERNAL WINDOWS	red
_A-315 EXTERNAL DOORS	red
_A-324 INTERNAL WINDOWS	red
_A-325 INTERNAL DOORS	red
_A-350 CELINGS GENERAL	red
_A-661 LIFTS	red
_A-740 SANITARY FITTINGS	9
_AREA GIA	blue
_AREA NET	green
_DISPLAY INFO	red
_GIA POLYLINE	blue
_HEIGHTS	14
_SPACE INFO	14
_SPACE NO	red
_SPACE POLYLINE	cyan
_SURROUNDING BUILDINGS	9
_Title Block	white
_Z-280 BUILDING FRAMES	magenta
_Z-700 FITTINGS AND FURNITURE	9
_Z-730 KITCHEN UNITS - WORKTOPS	9
_Z-760 STORAGE FITTINGS	9

All layers should be coloured by layer, and all corresponding text, leaders and dimensions should be entered on the appropriate layer name. General text layers should only be used in the case of charts, titles, legends and notes column.
The layer should include the discipline code (eg A for Architectural) the three digit BS category code and the FULL layer description.
Additional layers may be created and used (eg for specialist services etc) following agreement with the CAD Team.
For any drawings created by Consultants or Contractors a list of layers, their reference numbers and content. must be provided with the final record drawing.

4.2 Pen Settings

Estates and Facilities use the following Pen settings for its drawings. This should be used wherever possible. However, if this is not possible, the .ctb plot style file that is used must be supplied with the drawing files.
The use of the colour, pen thicknesses and line types must be drawn By Layer.

Estates and Facilities Standard Pen Settings
(Estates and Facilities.ctb)

Colour No	Pen Thickness	Colour Plotted	Colour on Screen
9	0.075	Standard Colours 1-9 Plot Black	Grey
1	0.18		Red
6	0.18		Magenta
7	0.25		White/Black
8	0.25		Dark Grey
2	0.3		Yellow
3	0.35		Green
4	0.5		Cyan
5	0.7		Blue
200	0.075	Alternative Colours Plot Black	Purple
120	0.1		Aqua
202	0.13		Dark Purple
62	0.18		Dark Green
220	0.18		Pink
31	0.25		Orange
140	0.25		Blue
250	0.25		Dark Grey
252	0.25		Grey
30	0.35		Orange
50	0.35		yellow
44	0.5		Brown
78	0.5		Dark Green
241	1		Pink
40	0.25	Orange	Orange
86	0.25	Dark Green	Dark Green
180	0.25	Purple	Purple
201	0.25	Mauve	Mauve
221	0.25	Pink	Pink
253	0.25	Grey	Grey
10	0.7	Red	Red
34	0.7	Brown	Brown
80	0.7	Green	Green
130	0.7	Blue	Blue

4.3 Drawing Units

All drawings must be drawn in Model Space at a scale of 1:1 and in millimetres.
For drawing paper space layout, the preferred scales for use are: 1:1, 1:10, 1:20, 1:50, 1:100, 1:200, 1:250, 1:500 and 1:1250.

4.4 Line types

Standard AutoCAD line types should be used where possible. However, Site survey drawings indicating service supply routes may use custom line types such as:

GAS----GAS----
CCTV----CCTV----
LV----LV----
HV----HV----
BT----BT----

These custom line types must be supplied as a legend on the relevant drawings.

4.5 Text formatting, styles and heights

Georgia, Lucida, Verdana & Freight are the standard fonts of the University of Southampton visual identity guidelines and should be used for text on all drawings and documents.
All drawings are to have a standard text height of 2.5mm, 3.5mm, 5.0mm and 7.0mm and a width no greater than 1 at a scale of 1:1. For example a drawing drawn at 1:100 would have a text height (in Model Space) of 250mm, and the height of the text in Paper Space would be 2.5mm. A text height no less than 1.8mm should be used.

	Text Heights (mm)			
Drawing Scale (1:)	**2.5**	**3.5**	**5**	**7**
1	2.5	3.5	5	7
5	12.5	17.5	25	35
10	25	35	50	70
20	50	70	100	140
50	125	175	250	350
100	250	350	500	700
200	500	700	1000	1400
250	625	875	1250	1750
500	1250	1750	2500	3500
1250	3125	4375	6250	8750

MText should be used when adding or amending space numbers and names to a new or revised space. The Space number, Space information (Space/ Room name) and area text must be created on the correct individual layers as follows:

3001 (on layer _SPACE NO)
Office (on layer _SPACE INFO)
25m² (on layer _AREA NET)

The insertion basepoint for the Space Number and Space Information text must be within the space polyline of the space it refers to.

4.6 Dimensions

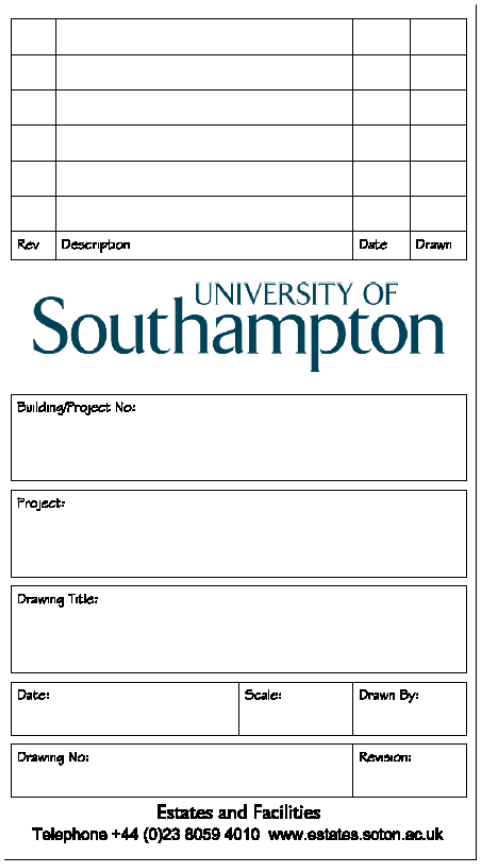
Leaders (arrows) and dimensions must have solid arrow heads. Text/dimensions must be centred above the dimension line. Dimensions and Leaders to be located on corresponding layer and are to be scaled relative to the scale of the drawing.
Angles shall be shown in decimal degrees.

4.7 Drawing Frame SetUp: Title Blocks

All drawings shall be drawn within the bounds of a Title block. Estates and Facilities drawing title blocks are available electronically by e-mail or on CD. All drawing frames are to be scaled at 1:1 and must comprise of an outline frame, title block with all project information completed, a revision block and an approved University of Southampton logo as follows:

UNIVERSITY OF Southampton

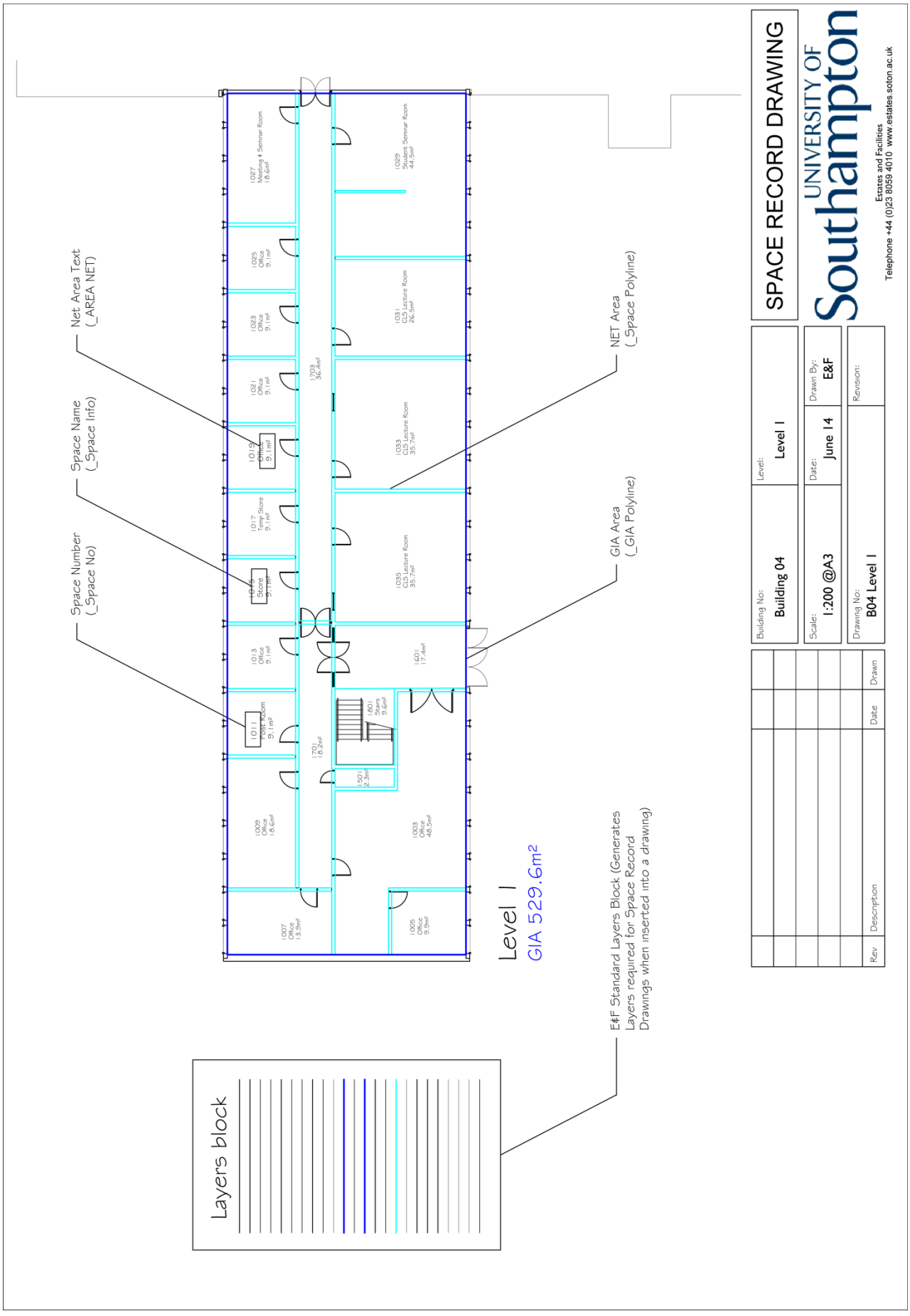
Title blocks shall be inserted into a drawing in Paper Space at an origin of 0,0. All title blocks will be in an attribute format with editing facility.
Example of a typical Estates and Facilities Title Block:



4.8 Drawing Revisions

Drawing revisions shall be given an alphabetic issue letter which appears in the title box. Revisions to drawings shall be clouded to clearly outline the changes, and this shall be placed on its own layer. Revisions shall be described in sufficient detail to enable the nature of the revision to be identified and shall be located clearly in a revision box above the drawing title block.

4.9 UoS Standard Drawing Example



5.0 AREAS

On any projects where a new space is created or an existing space is amended, the new or revised area (GIA & NET, in m²), space numbers and room/space usage are to be shown.
It is essential that the **GIA and NET areas are identified by polylines.** If the drawings is produced in Revit these are Room Area Boundaries. (The Export Setup must be modified to select Export Rooms and Areas as Polylines). These polylines are to be created on individual layers (see below).
Any Void areas within a building should not have a space polyline and must not be included in the GIA area polyline.

5.1 NET

Net Area is the usable area within a building measured to the internal face of the perimeter walls at each floor level.
It is an essential requirement of the E&F Space Database that ALL spaces (with the exception of voids) must have an area polyline.
The individual space area polylines are to be created on a unique layer _SPACE POLYLINE and the corresponding space number is to be created on layer _SPACE NO. The area text should be placed on layer _AREA NET.

5.2 GIA

Gross Internal Floor Area is the total area of a building owned, occupied or maintained by the University and is measured to the internal face of the perimeter walls at each floor level (ie the footprint of the building excluding the width of the outside walls). It includes areas occupied by internal areas and partitions, but must not include voids.
The GIA area polylines are to be created on layer _GIA POLYLINE and the corresponding text is to be created on layer _AREA GIA.

6.0 SPACE (ROOM) & BUILDING NUMBERING

All Space (Room) & Building numbering is managed by the Estates and Facilities Space Management team in accordance with the University approved Standard Room & Space numbering procedure document (Reference ES-030, Version C).
All requests for new/revised Space or Building names/ numbers must be made to the Estate Planning Administrator.

Contact the Estate Planning Administrator, for further assistance:

Phil Tillotson Ext. 24011 pgt@soton.ac.uk

7.0 MECHANICAL & ELECTRICAL SYMBOLS

British Standard M&E symbols should be used where possible.
No other symbol should be used, unless agreed with the Project Manager and the CAD Team.
All symbols must be inserted in model space and on the appropriate layer and a Legend should be provided.

8.0 HELP AND ADVICE

If after reading this document you require any further information or assistance using this document please do not hesitate to contact a member of the E&F CAD Team:

Rob Jobber Ext. 24036 raj@soton.ac.uk

Will Feilden Ext. 29337 wf@soton.ac.uk

Or the Estate Planning Administrator, for space and building number assistance:

Phil Tillotson Ext. 24011 pgt@soton.ac.uk