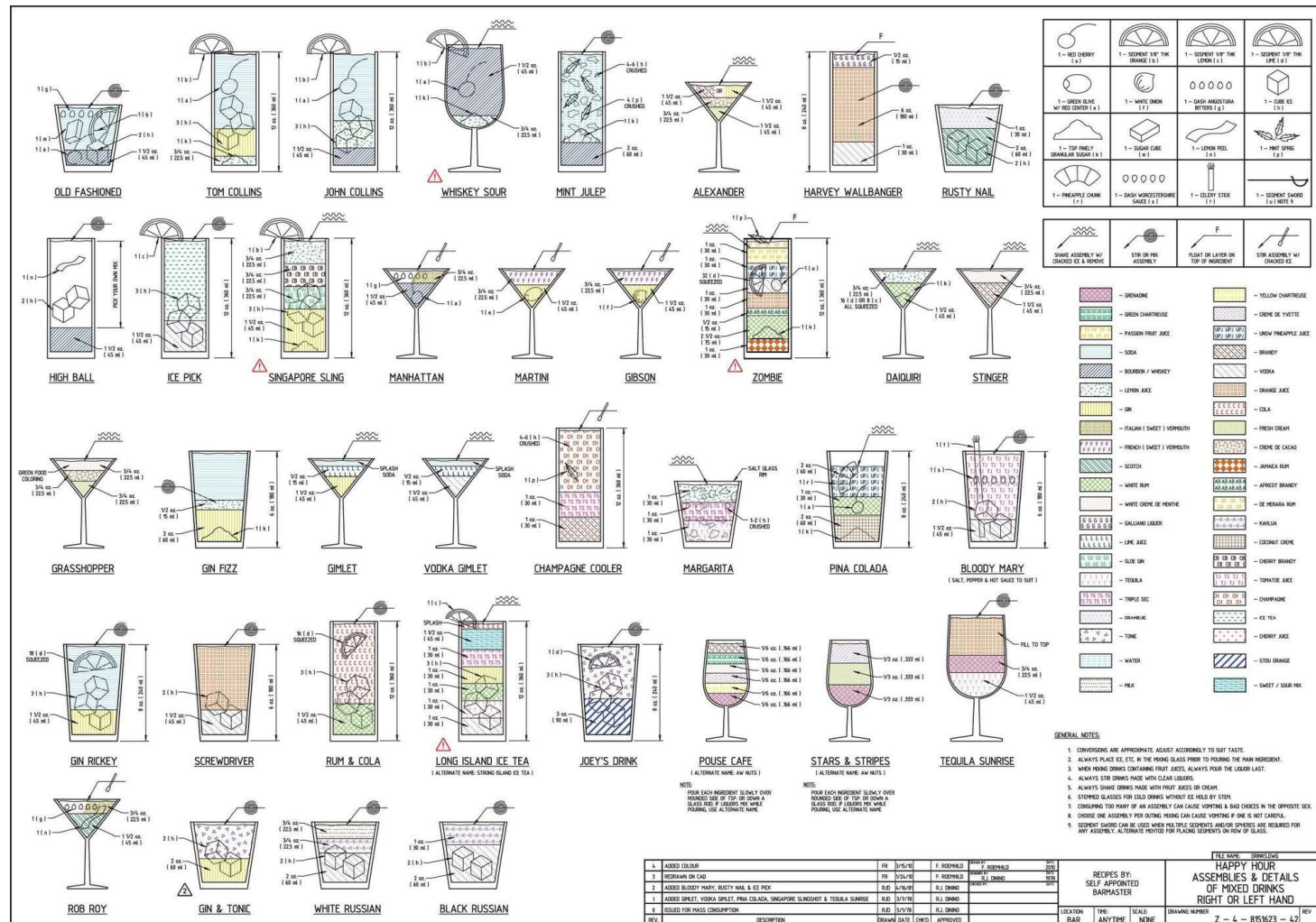


Working with Digital Technologies CAD

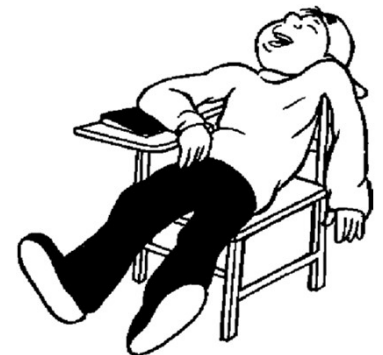


<http://www.arch2o.com/wp-content/uploads/2016/07/Architects-Guide-to-Drinks-Blueprint01.jpg>

Gavin M Traylor RIBA

Session 1:

- House Rules
- Introductions
- What is it all about?
- What am I expected to do?
- How will it be assessed?
- Module Introduction





< >

 Search (Ctrl+E)



Activity



Chat



Teams



Assignments



Calendar



Calls



OneDrive



mConnect



...



Apps

< All teams



ACBA 4019 Digital Tech CAD 2025-26_... ...

Home page

Class Notebook

Classwork

Assignments

Grades

Reflect

Insights

▼ Main Channels

General

Week 01

Week 02

Week 03

Week 04



General Posts Files 



Gavin Traylor Wednesday 13:05

Welcome to the Class

Some useful links:

[Mewngofnodi / Login](#)

For remote access to the Uni PCs.

[Autodesk Student Access to Education Downloads](#)

Download specialist CAD software for free onto your own laptop.



 Reply

About Me:

Gavin Traylor (Gavin is fine)

- **Subject Experience with Digital Technologies & BIM**
- Chartered Architect with over 20 years of experience, working within the public and private sector.
- Since April 2019, a Lecturer in Architecture & Construction
- Prior to working at uwtsd was Operational Manager for the multidiscipline 'in house' design and construction management for Cardiff Council. 45 staff consisted of, Architects, Architectural Technologists / Technicians, Structural engineers, Mechanical & Electrical Engineers, Construction Project Managers, Quantity Surveyors, Principal Designer (CDM), Clerk of Works and Business Support Team.
- Studied at the Welsh School of Architecture at undergraduate level (RIBA Part 1) and Birmingham School of Architecture at postgraduate level (RIBA Part 2 and Part 3)
- Former Chair of CLAW Design Group and client board member SEWSCAP Procurement Framework.
- Former Chair of Design Circle & RSAW Council Member
- Past President Royal Society of Architects in Wales.

.....but much more importantly.....



What experience do you have in producing Technical Construction Drawings?

- ☐ None at all.
- ☐ I draw construction drawings by hand.
- ☐ I can produced 2D CAD drawings for construction projects.
- ☐ I can produced 3D models using modelling software.
- ☐ I am a pro and should be running this class.

What is it all about?

Aim:

To provide learners with the skills needed to produce two dimensional drawings using industry-standard computer-aided design (CAD) software and to provide learners with an understanding of standards and collaborative practice in the construction industry.

Learning Outcomes

- interpret data and produce 2D drawings using industry-standard CAD software applications;
- understand Building Information Modelling (BIM) naming conventions.



NO CAD MONKEYS NO BIM ROBOTS

What am I expected to do?

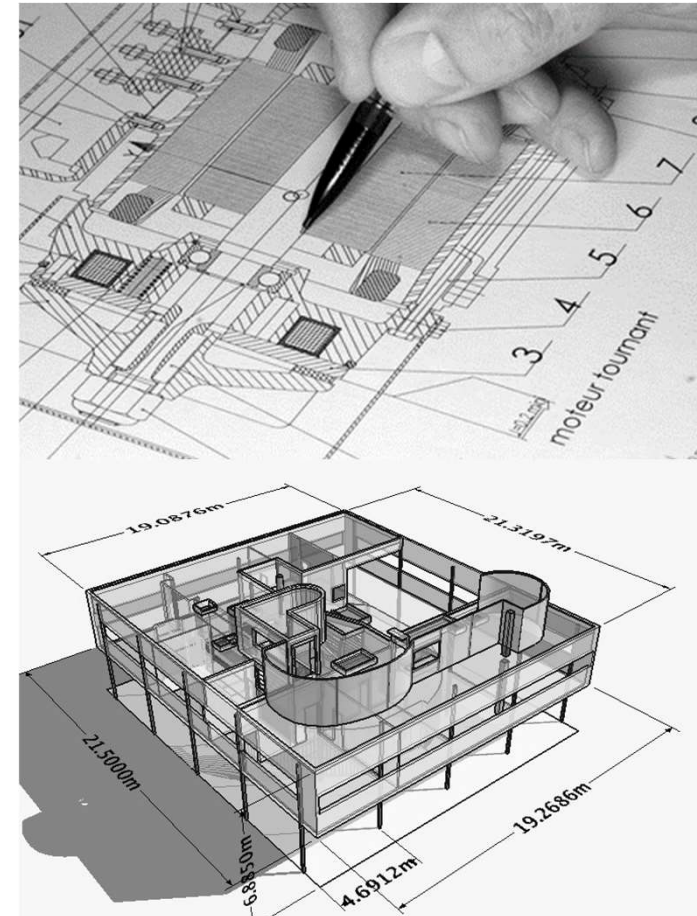
Predominately practical activities supplemented with lecture guidance over semester 1

General Overview (Me)

- Communication through draughting techniques
- Introduction to BIM process of naming/ filing conventions to International Recognised standards.
- 2D draughting
- Mix of taught lectures and workshops where feedback can be given.

General Overview (You)

- You need to know how to use the Library and Online resources
 - You need to attend all timetabled activities
 - You need to manage your time and meet deadlines
 - Ask Gavin if you have any problems regarding the module
-
- Learning new skills requires practice



How will it be assessed?

Module Credit 10

24% Scheduled Learning and 76% Independent Learning

Assessment Component 1		
Mode of Assessment	Word Limit	Weighting
Portfolio	2 elements (2,000 words equivalent with drawings)	100%



Moodle - Reading List



Course More ▾



You are viewing this course currently with the role: **Student**
Return to my normal role



Announcements



Online reading List



Assessment
Specification



Turnitin Links



Lecture Notes 25-26

+ Add

Manage sections

Filter

Search

Expanded view

Essential reading (7)

Material which is an essential part of the course and students are expected to draw on as a core part of their learning. Must be available from the library and should be available online.

**Architectural graphics**

Book | Ching, Francis D. K., Sixth edition., Hoboken :, John Wiley & Sons, 2015., Total pages 1 volume :

Essential

 Available at Swansea Campus Y Fforwm Library Main Collection: 720.284 CHI

**Architectural graphics**

E-book | Ching, Francis D. K., Great Britain :, Elsevier Science, 1975., Total pages 1 online resource

Essential

 View online

**Autocad for dummies**

Book | Grabowski, Ralph., Ralph Grabowski author, Nineteenth edition., Hoboken, NJ :, John Wiley and Sons, [2...

Essential

 View online *  Available at Swansea Campus Y Fforwm Library Main Collection: 620.00420285 GRA

**AutoCAD 2014 for dummies [electronic resource]**

E-book | Fane, Bill., Byrnes, David., Hoboken, NJ :, John Wiley & Sons, c2013., Total pages 1 online resource (93...



Note: Basic AutoCAD has not changed a great deal over the years. Although some features may change in later versions, the content in the free E book is very relevant to this module.

Essential



Supplementary Reading List.

Drawing:

Francis Ching (2015) *Architectural Graphics*

Chudley, Greeno, Merritt (2016) *Building Construction Handbook*

Reid, E (2016) *Understanding Buildings*

2D CAD:

Guide to AutoCAD (moodle)

AutoCAD for Dummies

<https://academy.autodesk.com/>

3D Modelling:

Guide to Revit (moodle)

<https://academy.autodesk.com/>

Revit Tutorials - Youtube.

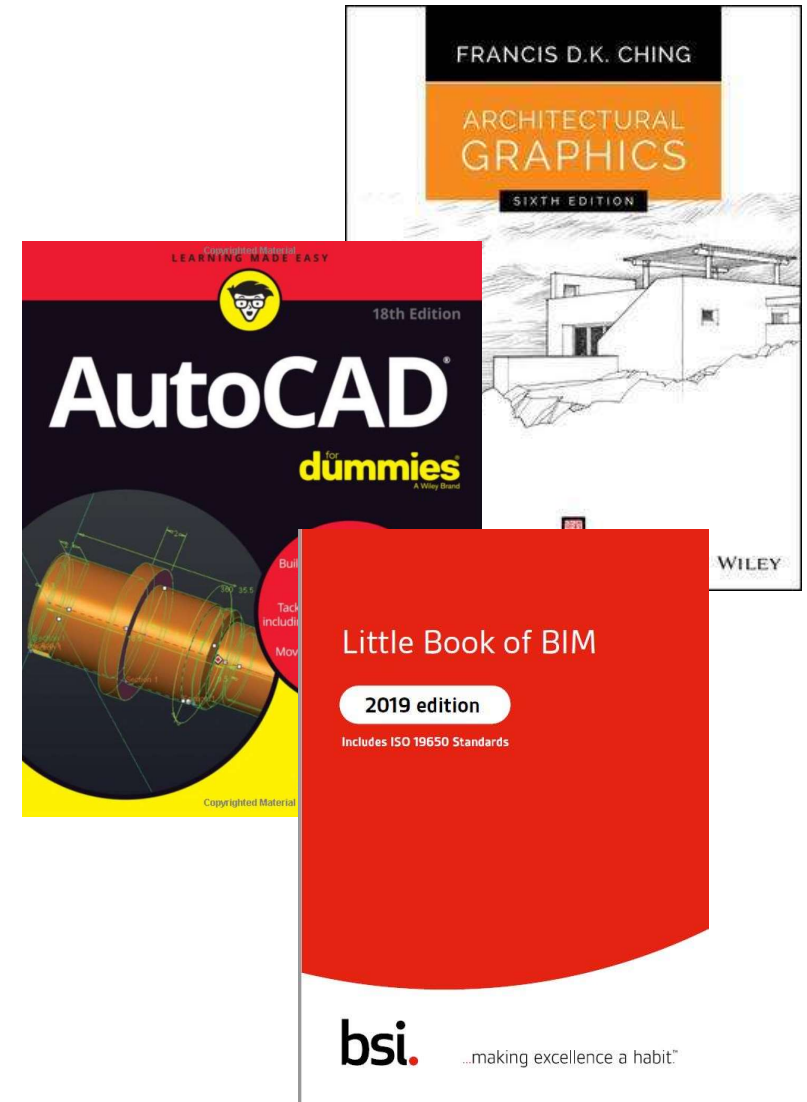
BIM:

Key BIM Standards, ISO and PAS – refer to 'Little Book of BIM' guide.

BSi (2019) *The Little Book of BIM* (later versions also appropriate)

BSi (2019) *Introduction to the New International Standard ISO 19650*

<https://bimblog.house/> Dan Rossiter (BSi)



Week 1:

Introduction to technical drawing techniques used within the Construction Industry and an overview of 2D Computer Aid Draughting with AutoCAD.



Cave Paintings Argentina

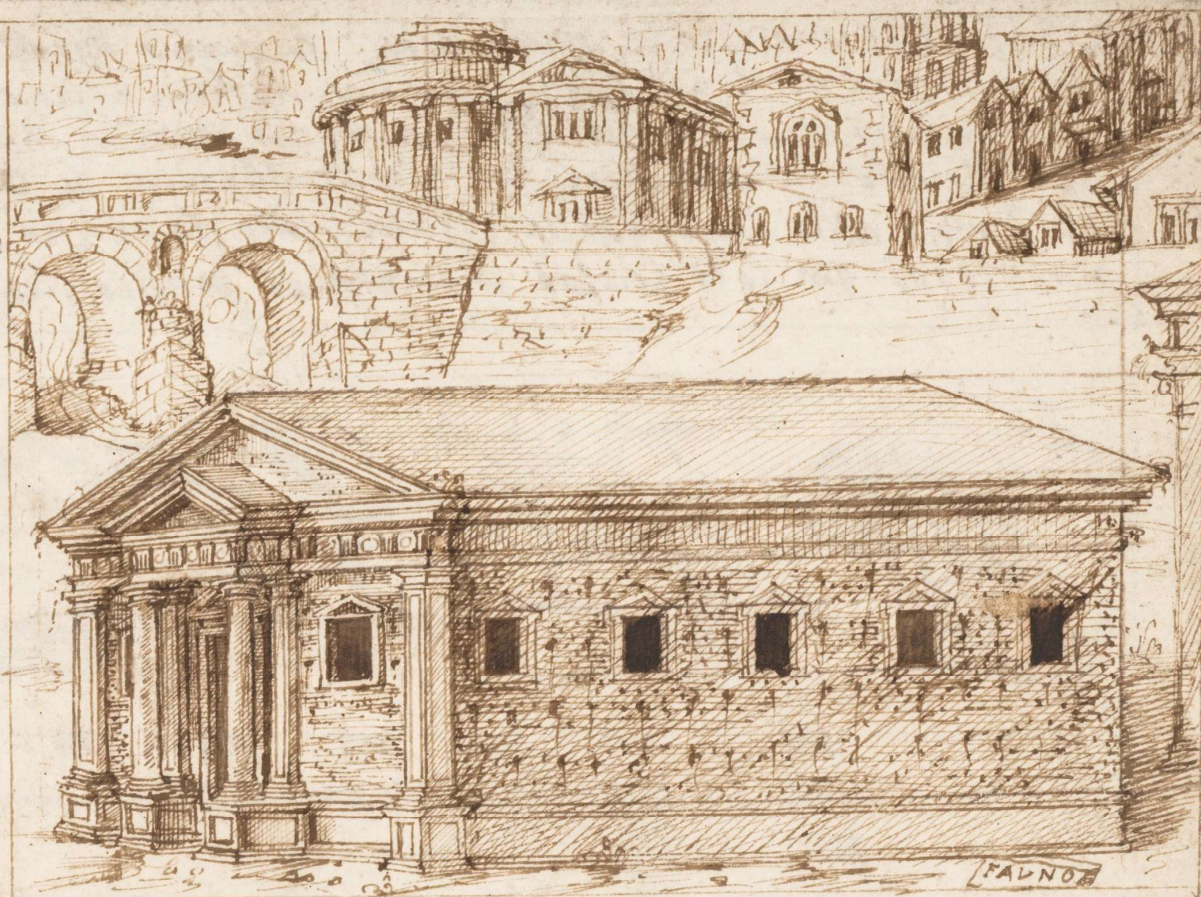
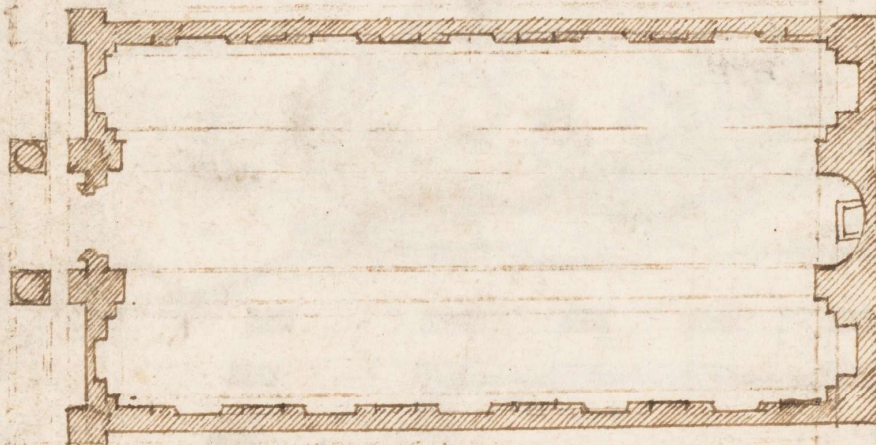


<http://4.bp.blogspot.com/-gMatGbF5jvU/ULzI3O5RigI/AAAAAAAAIA/MAhtlgnAUmI/s1600/argentina-cave-paintings-111006.jpg>

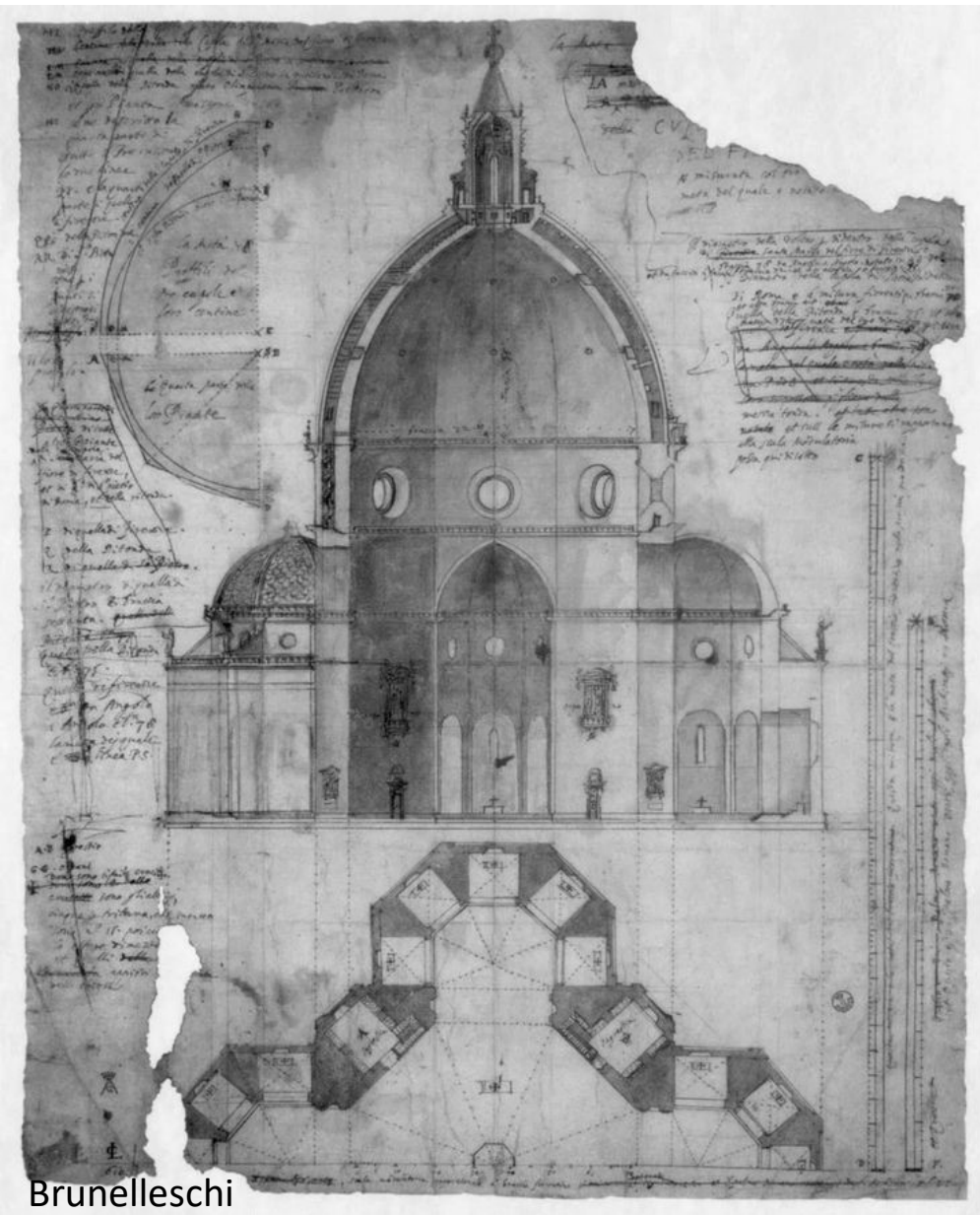
Cave Paintings France



In Antis. Sma quando hauea nella porta li An-
ti ouero facciate delle mura le quali erano
imorno la cella: e ha le Antis del mezzo so-
no due colonne e sopra la porta al mezzo gli
quella sinistra cio e sinistra la quale qui sotto
si uede la pianta e nel pro filo. E lo esempra
re di questo Tempio era alle tre forme
da tre parti la quale euuina: alla porta
Cesare rom

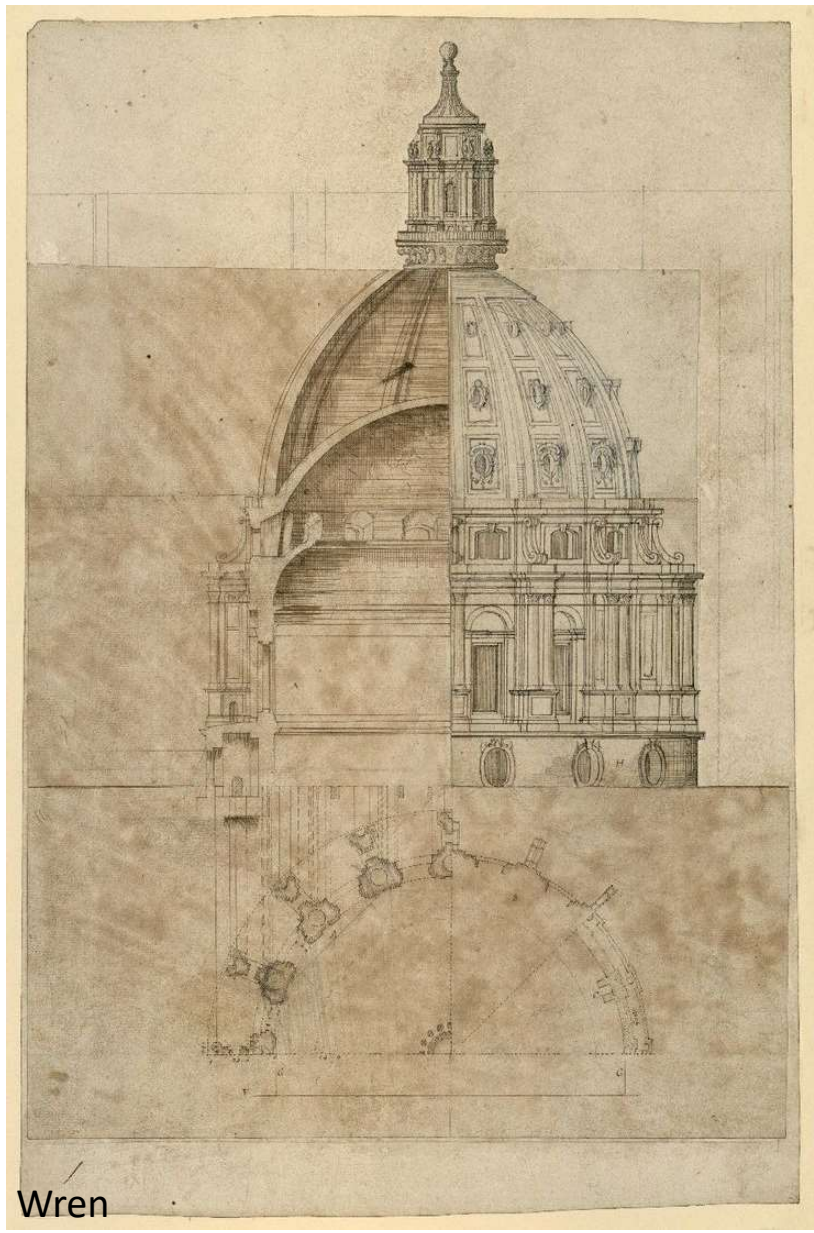


Prospilo: cio e chontra colonna ha ogni cosa chome in Antis ma le colonne erano le due ante an-
guale. E di sopra li i pilastri sicome ancora in Antis cio scema dalla destra e dalla sinistra
ma li angoli uisibili cio e nelli angoli della porta. Lo esempra re di questo e nelli sola ti uen-
na nel Tempio di Giove e di Fauno. Sicome qui sotto si uede la pianta e il pro-
filo alla foglia di diti Tempi.



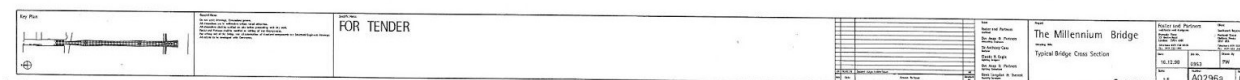
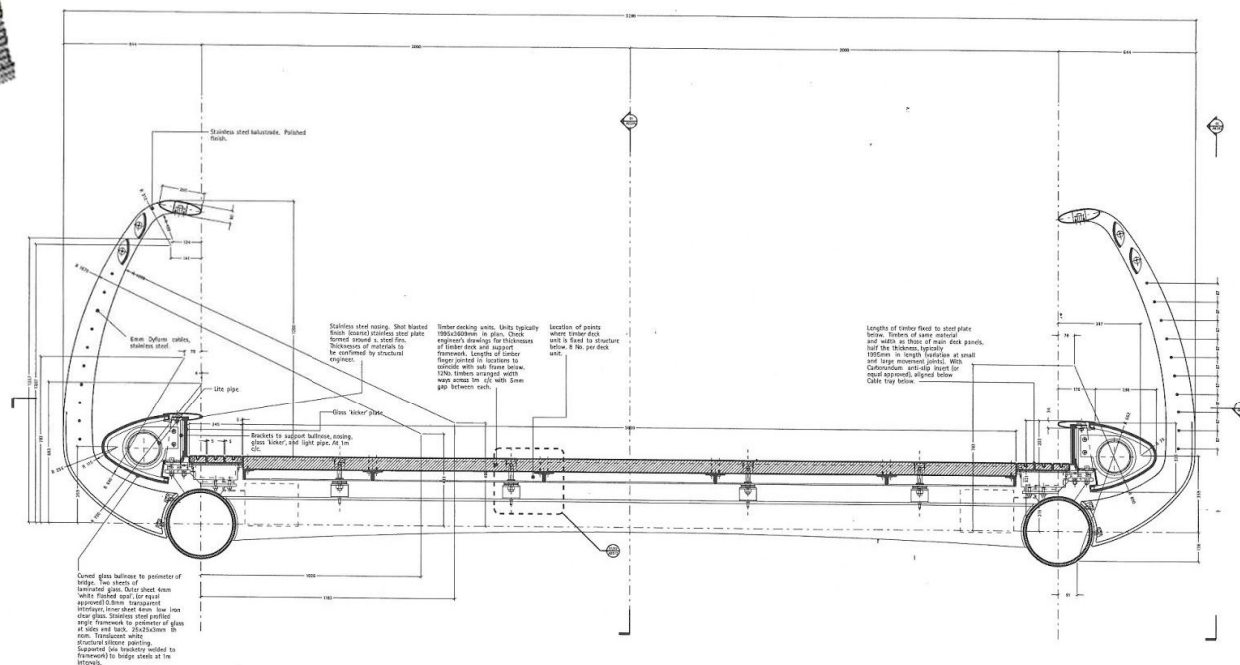
Brunelleschi

<https://i.pinimg.com/736x/01/8c/3c/018c3cd63084fa038882c6d9659dfff3.jpg>



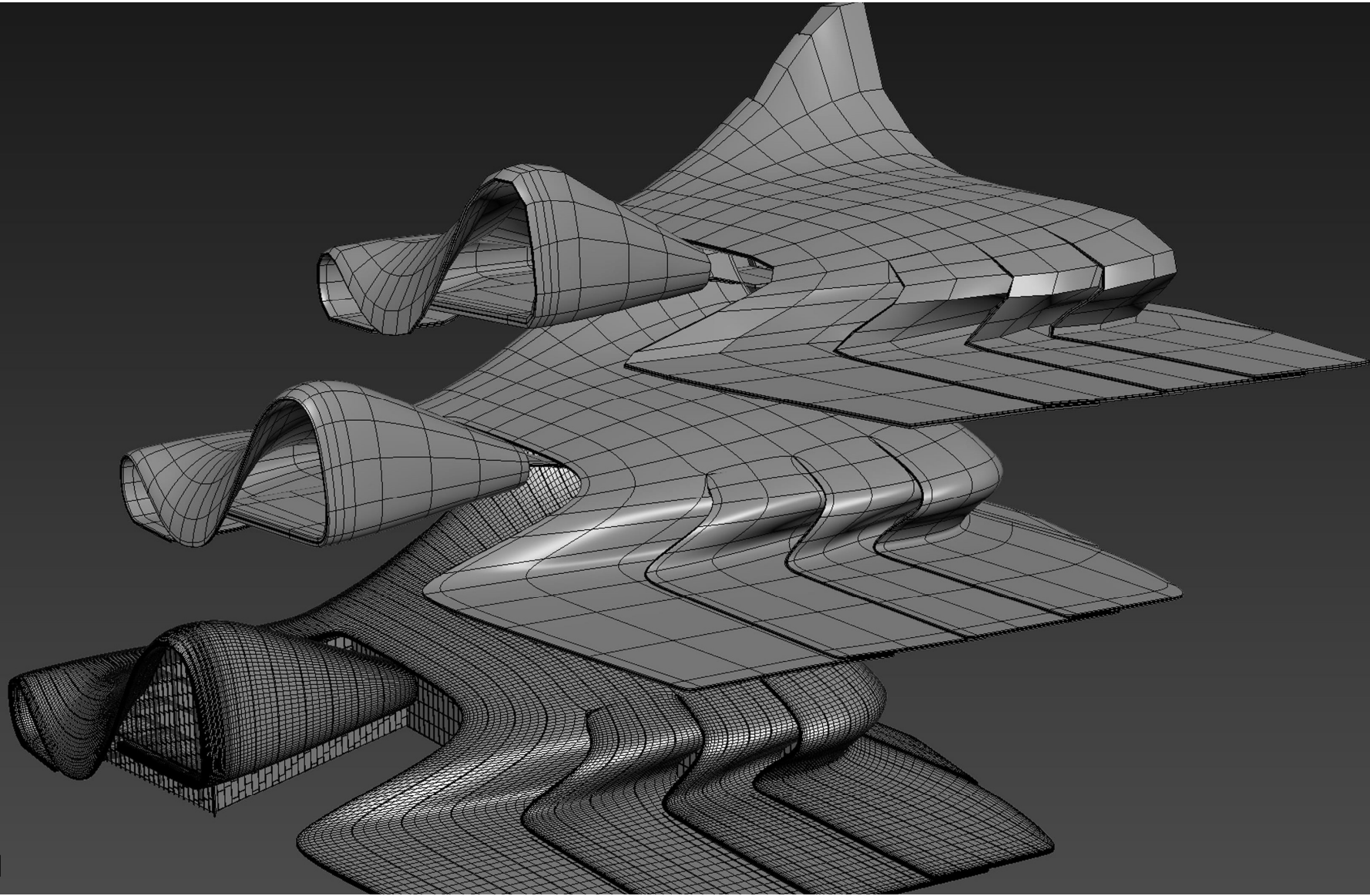
Wren

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<https://i.pinimg.com/originals/0a/a4/3c/0aa43c782465a1c10d92d8d1a70fe774.jpg>

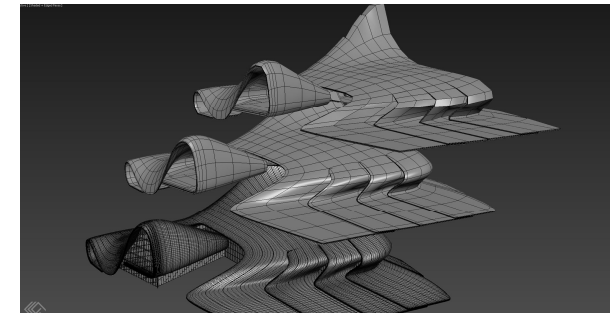
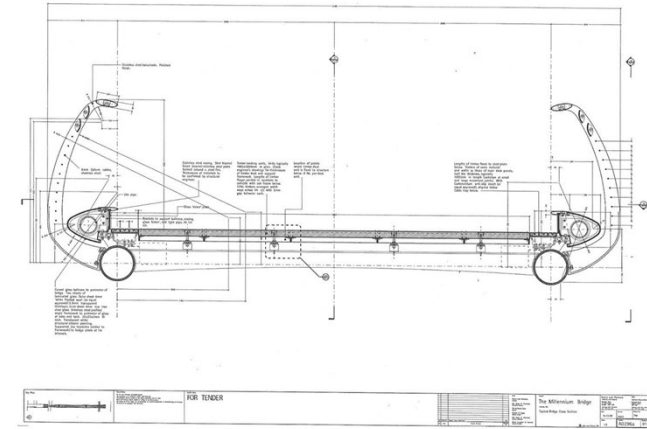
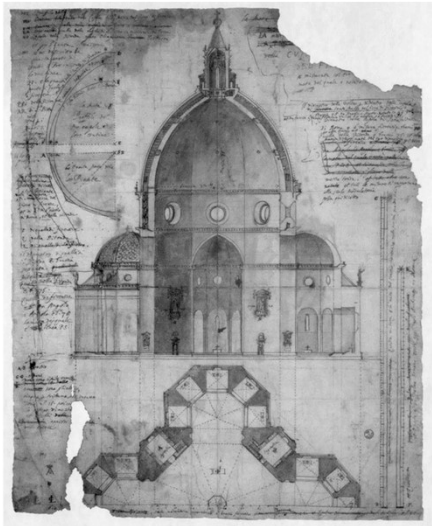
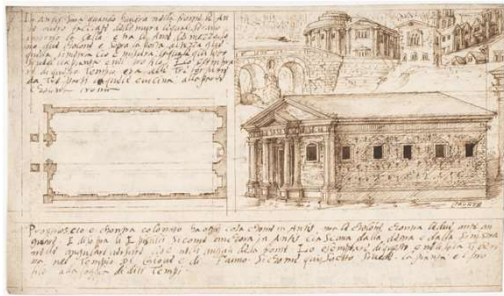
ctive] [Shaded + Edged Faces]

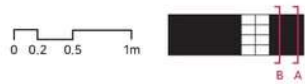


Zaha Hadid

https://evermotion.org/files/publications_images/nr_00414_9.jpg

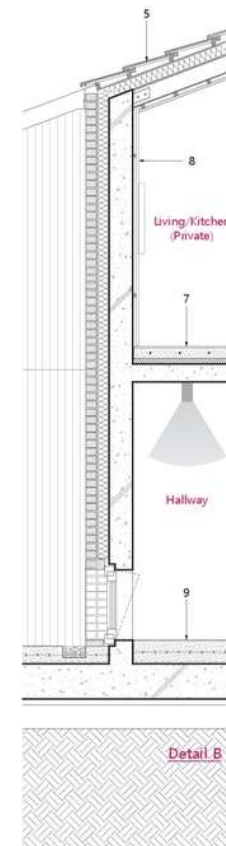
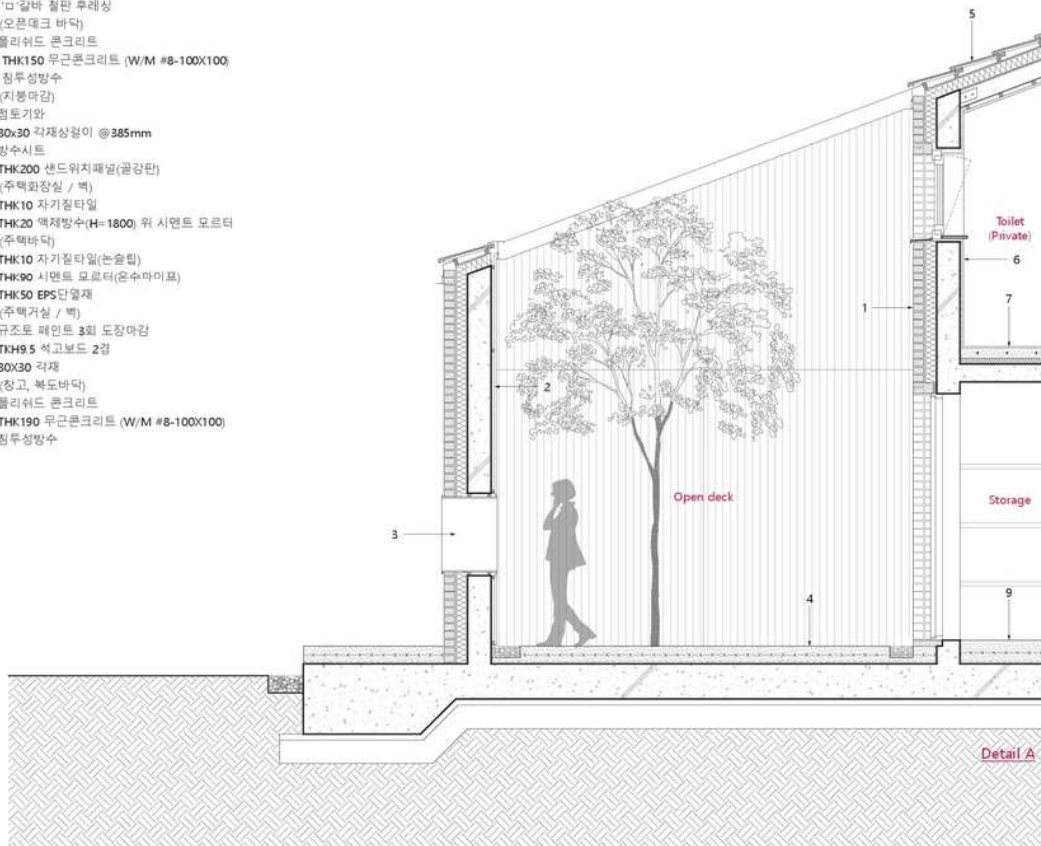
A picture is worth a thousand words





detail A, B

- 1 (외장재)
57X90X230 전벽돌 0.58쌓기
THK120 단열재
- 2 (오픈데크_벽)
알바우목재 마감
THK9.5 합판 1겹
30X30 각파이프 @600
- 3 (띠창마감)
폴소도창
'O'칼바 철판 후레싱
- 4 (오픈데크 바닥)
폴리워드 콘크리트
THK150 무근콘크리트 (W/M #8-100X100)
점투성방수
- 5 (지붕마감)
점토기와
30x30 각재상철이 @385mm
방수시트
THK200 샌드위치패널(열강판)
- 6 (주백화장실 / 벽)
THK10 자기질타일
THK20 액체방수(H=1800) 위 시멘트 모르타
- 7 (주백바닥)
THK10 자기질타일(눈솔집)
THK90 시멘트 모르타(운수타이포)
THK50 EPS단열재
- 8 (주백거실 / 벽)
규조토 페인트 3회 도장마감
TKH9.5 석고보드 2겹
30X30 각재
- 9 (창고, 복도바닥)
폴리워드 콘크리트
THK190 무근콘크리트 (W/M #8-100X100)
점투성방수



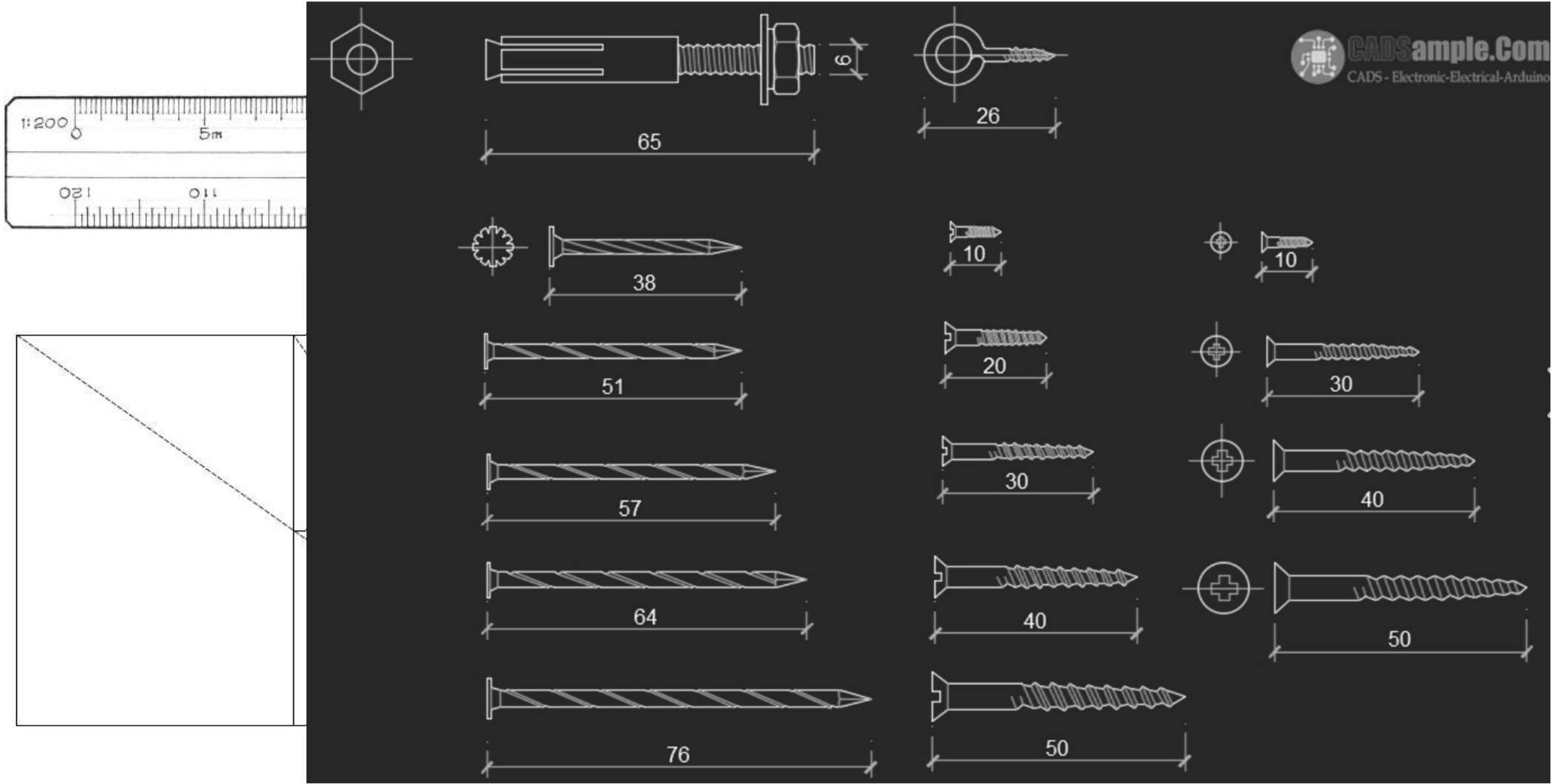
Drawings prepared in the Construction Industry

Must:

- Convey a message
- Read with understanding
- Demonstrate Knowledge
- Convey Ideas
- Explain a Narrative / Story

Industry conventions assist in the legibility of drawn information.

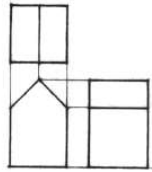
Appropriate Scale Drawings



Conventions

Projection Systems

Orthographic Projection



When we study how each projection system represents the same subject, we can see how different pictorial effects result. We categorize these pictorial systems into multiview drawings, parallel drawings, and perspective drawings.

Pictorial Systems

Multiview Drawings

- Multiview drawings consist of plans, sections, and elevations.
- The principal face in each view is oriented parallel to the picture plane.

Parallel Drawings

Isometrics: The three major axes make equal angles with the picture plane.

Dimetrics: Two of the three major axes make equal angles with the picture plane.

Trimetrics: All three major axes make different angles with the picture plane.

Axonometric Projection

Oblique Projection

Elevation obliques: A principal vertical face is oriented parallel to the picture plane.

Plan obliques: A principal horizontal face is oriented parallel to the picture plane.

Perspective Projection

Perspective Drawings

1-point perspectives: One horizontal axis is perpendicular to the picture plane while the other horizontal axis and the vertical axis are parallel with the picture plane.

2-point perspectives: Both horizontal axes are oblique to the picture plane and the vertical axis remains parallel with the picture plane.

3-point perspectives: Both horizontal axes as well as the vertical axis are oblique to the picture plane.

These pictorial views are available in most 3D CAD and modelling programs. The terminology, however, may differ from what is presented here.

Orthographic Projection

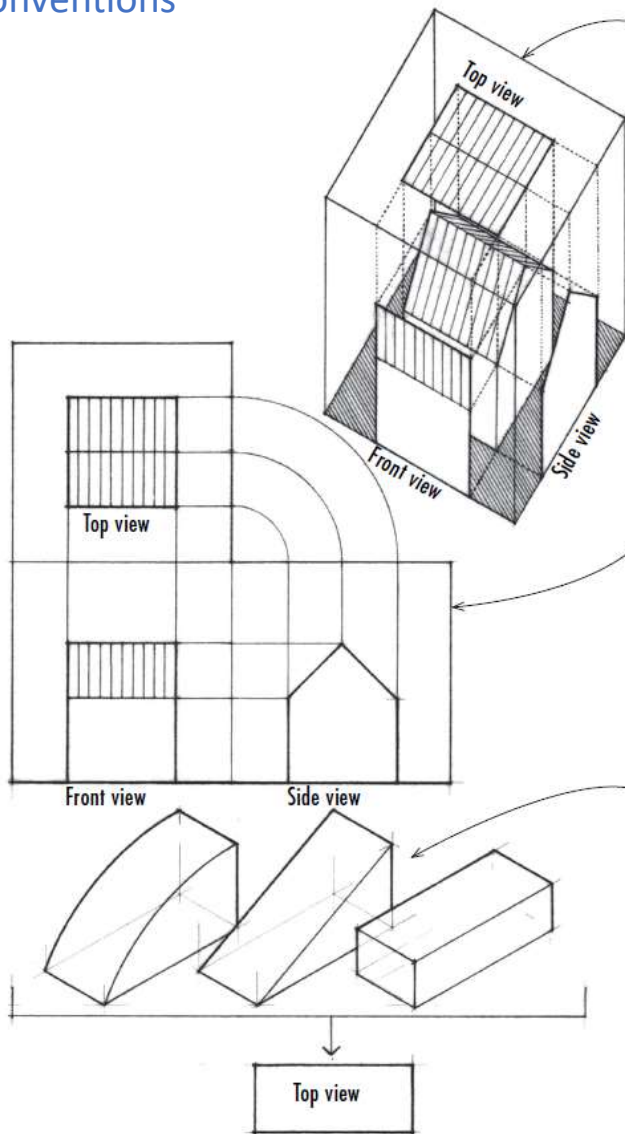
Drawings that can be prepared through orthographic projection to produce **WHAT?**

PLANS

SECTIONS

ELEVATIONS

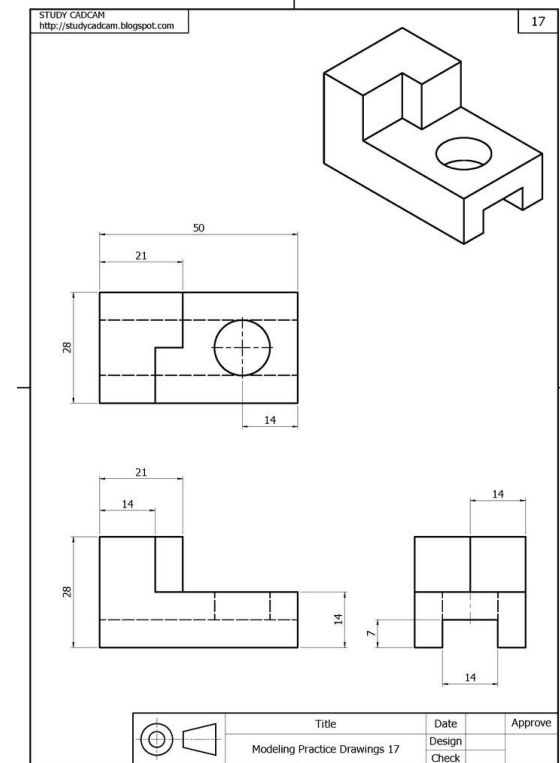
Conventions



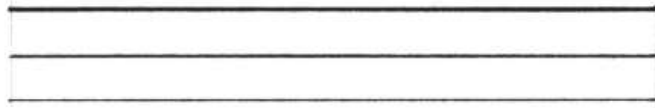
- If we enclose an object within a transparent picture-plane box, we can name the images projected orthographically onto the principal picture planes.
- Top views are orthographic projections cast onto the horizontal picture plane. In architectural drawing, top views are called plans.
- Front and side views are orthographic projections cast onto the vertical picture planes. In architectural drawing, front and side views are called elevations.
- See Chapter 4 for floor plans and sections, which are orthographic projections of cuts made through a building.
- To make it easier to read and interpret how a series of orthographic projections describe a three-dimensional whole, we arrange the views in an orderly and logical fashion.
- The most common layout results when we unfold the transparent picture-plane box into a single plane represented by the drawing surface. The top or plan view revolves upward to a position directly above and vertically aligned with the front or elevation view, while the side view revolves to align horizontally with the front view. The result is a coherent set of related orthographic views.
- Although these three objects have different forms, their top views appear to be identical. Only by looking at related orthographic projections are we able to understand the three-dimensional form of each object. We should therefore study and represent three-dimensional forms and constructions through a series of related orthographic projections.
- The mind must be able to read and assemble a set of multiview drawings to fully understand the nature of the three-dimensional subject.

Orthographic Projection

CAD Packages can assist us to create multiple view of the same object through projection



Conventions - Lines



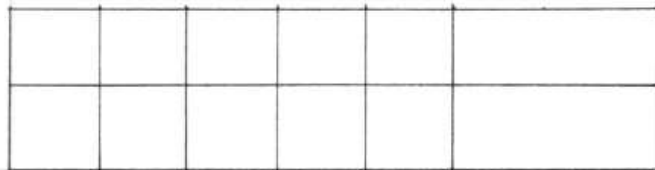
- Solid lines delineate the form of objects, such as the edge of a plane or the intersection of two planes. The relative weight of a solid line varies according to its role in conveying depth.



- Dashed lines, consisting of short, closely spaced strokes, indicate elements hidden or removed from our view.



- Centerlines, consisting of thin, relatively long segments separated by single dashes or dots, represent the axis of a symmetrical object or composition.



- Grid lines are a rectangular or radial system of light solid lines or centerlines for locating and regulating the elements of a plan.



- Property lines, consisting of relatively long segments separated by two dashes or dots, indicate the legally defined and recorded boundaries of a parcel of land.



- Break lines, consisting of relatively long segments joined by short zigzag strokes, are used to cut off a portion of a drawing.



- Utility lines consist of relatively long segments separated by a letter indicating the type of utility.

Line type conventions assist in the legibility of drawn information. The quality, thickness, scale and type of line can help communicate the importance of the line.

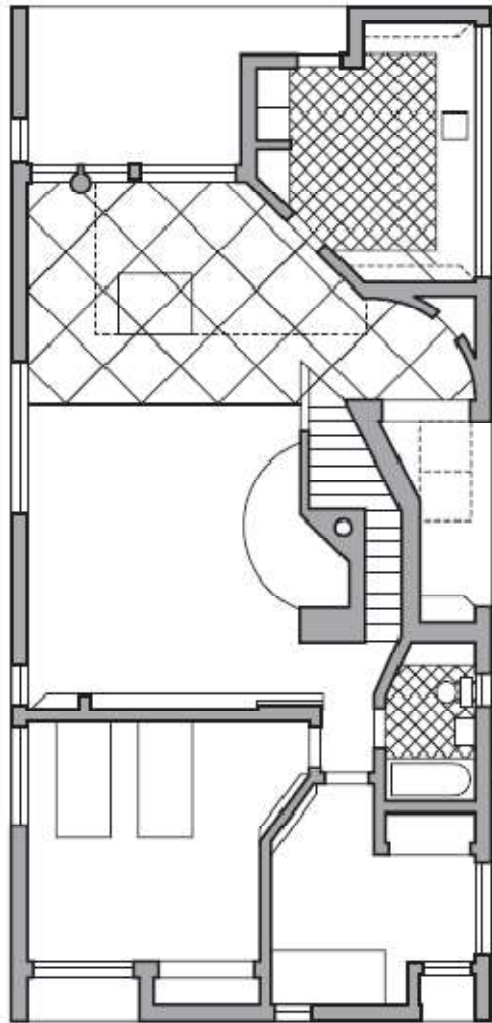
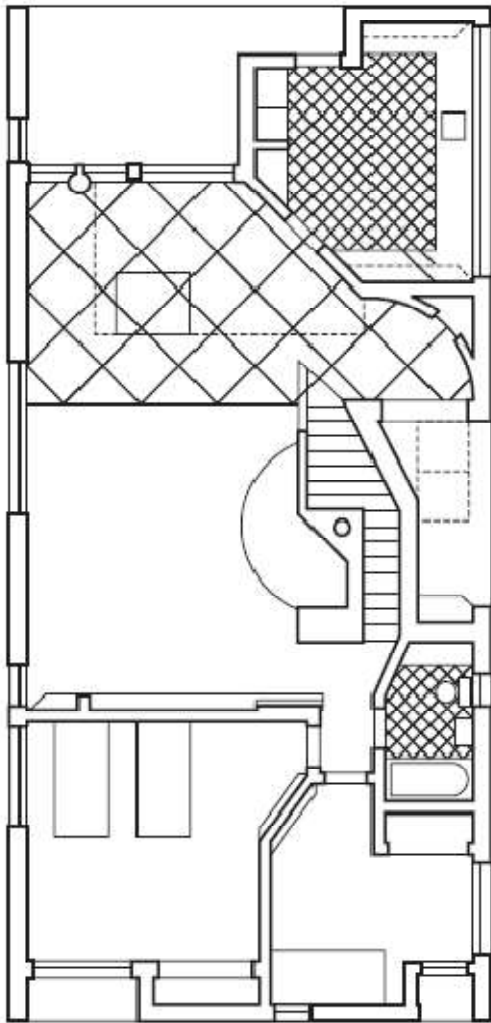
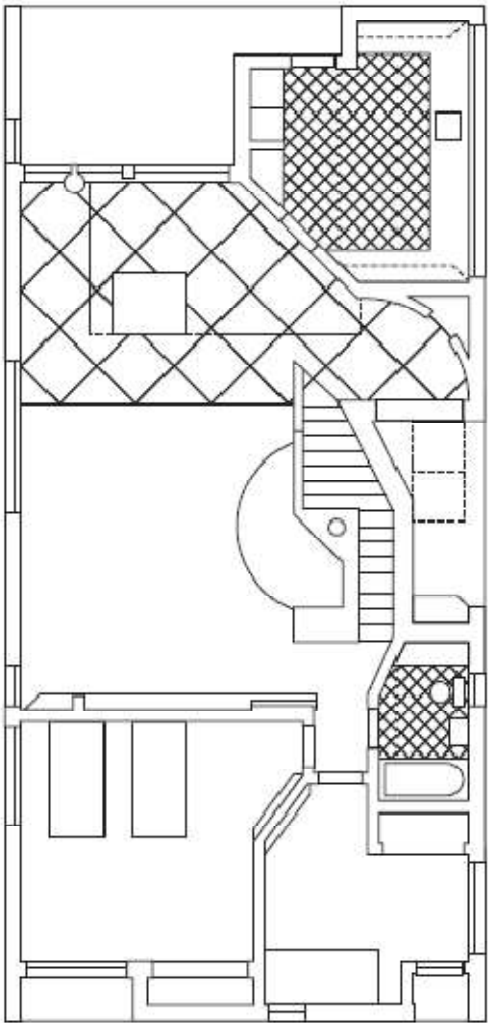
E.G

Thick Solid line depicting a section cut.

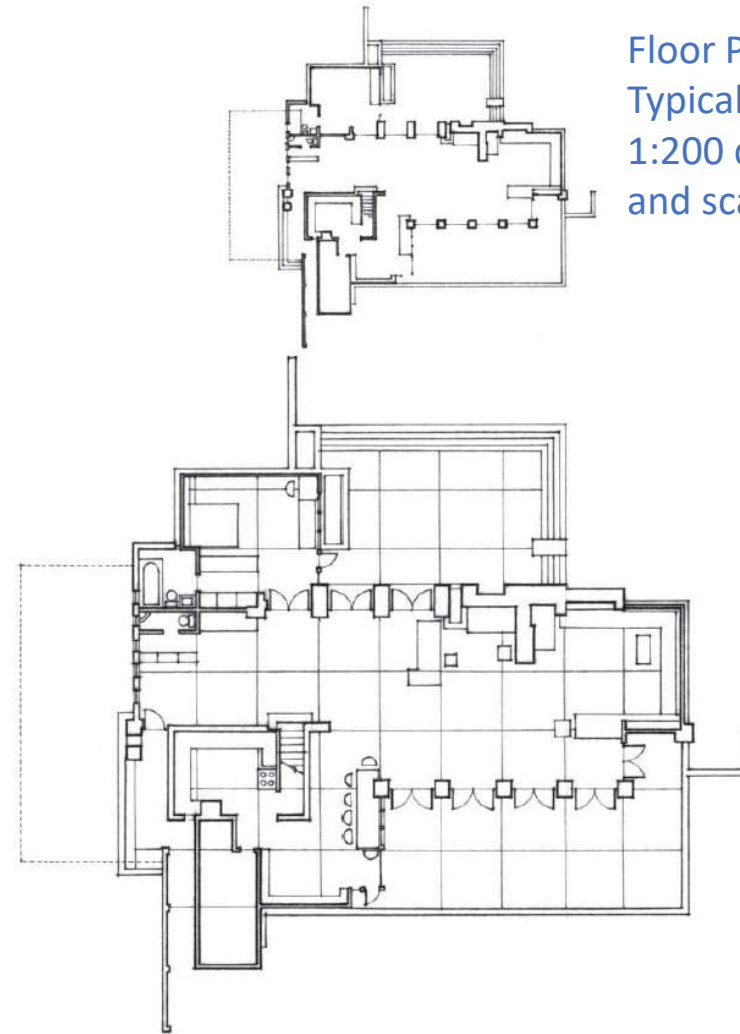
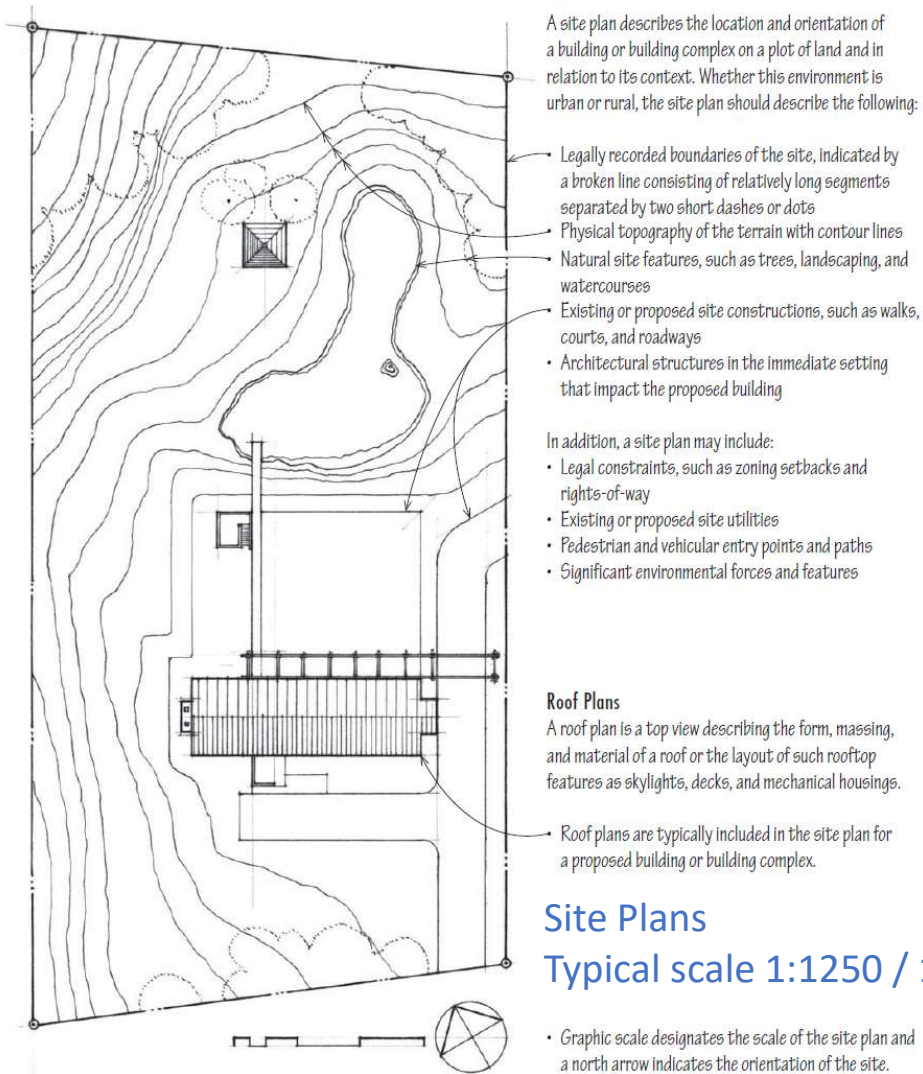
Dashed lines depicting something hidden from view.

Centerlines through steelwork allowing accuracy between column positions.

Conventions - Lines



Conventions - Plans

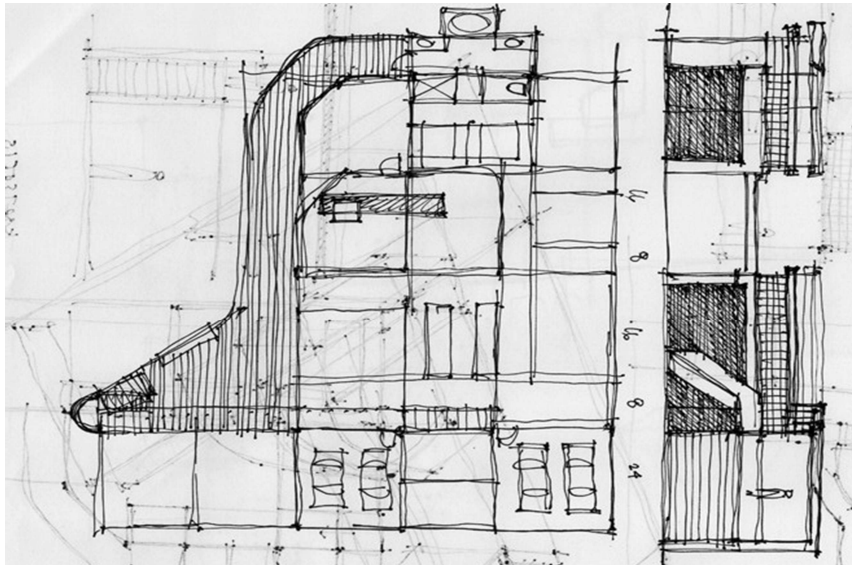


Floor Plans

Typical scales 1:100 / 1:200 depending on size and scale of the building.

Conventions – Plans

Plans may be produced by a Surveyor from measuring and / or in combination with Ordnance Survey Information.

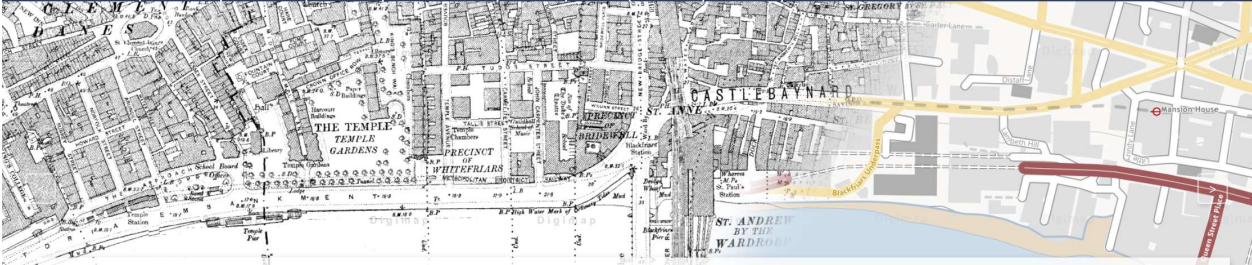


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What are we offering?

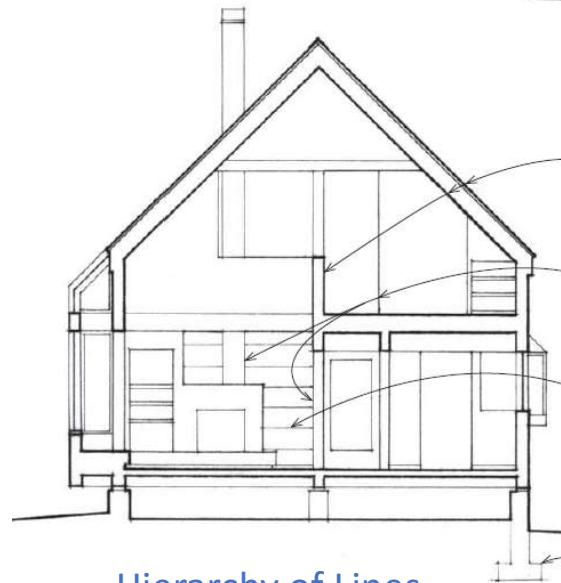
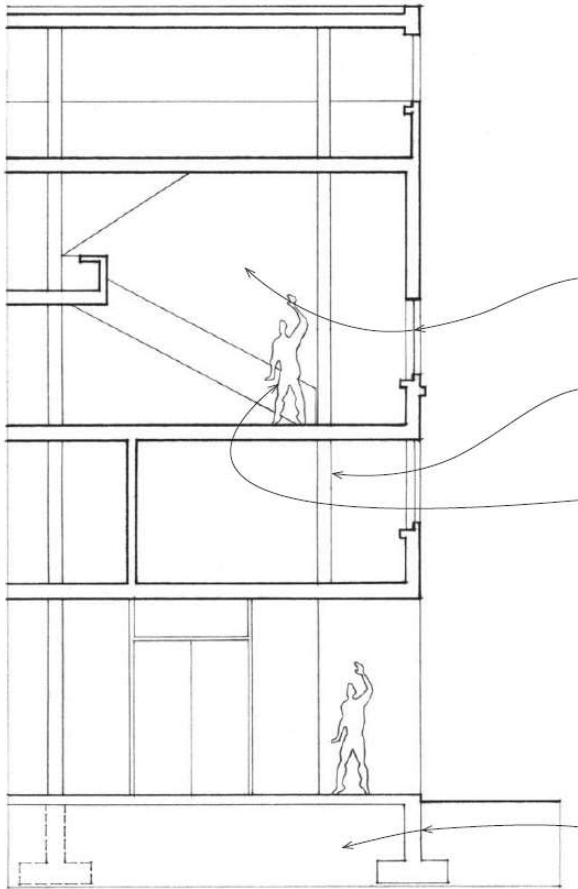
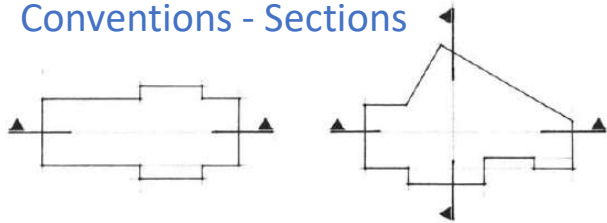
Digimap offers access to a range of datasets for the purposes of education and research. Create or interrogate a map online by selecting an appropriate base map, adding annotations and customising the content, use measurement and query tools to learn more about any study area. Download the raw spatial data in a wide range of formats for use in local GIS, CAD or image processing software.

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<https://digimap.edina.ac.uk/>

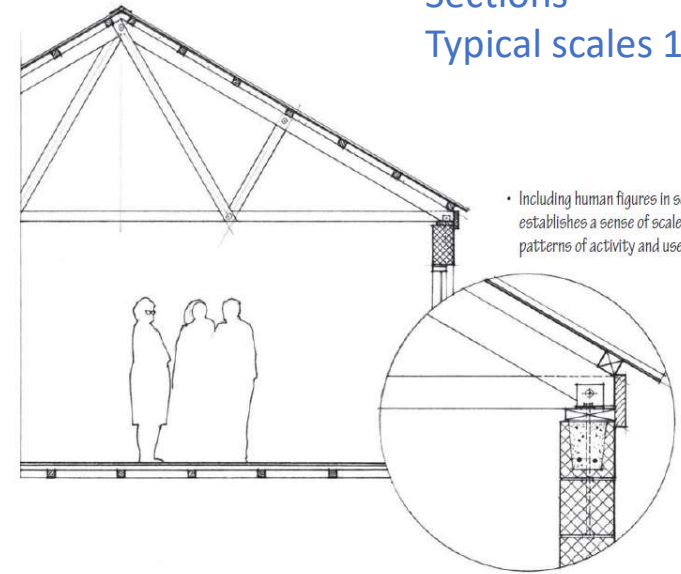
Conventions - Sections



Hierarchy of Lines

Sections

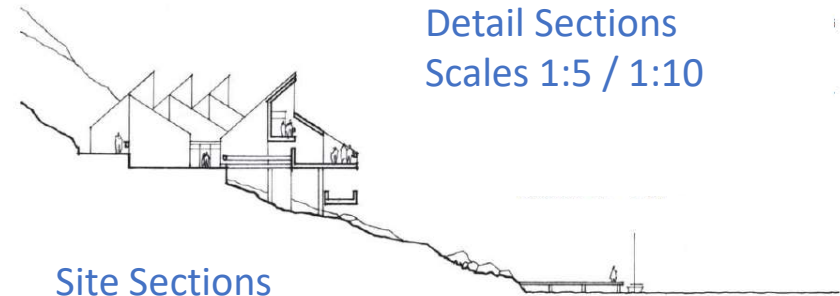
Typical scales 1:20 / 1:50



- Including human figures in section drawings establishes a sense of scale and reminds us of patterns of activity and use.

Detail Sections

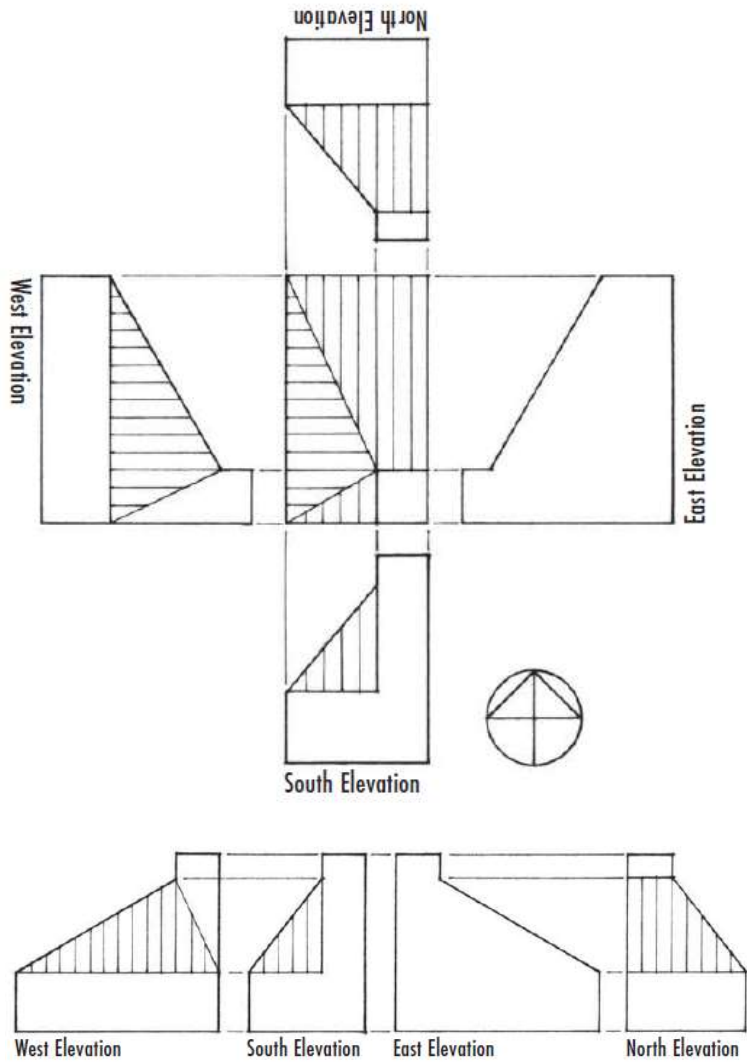
Scales 1:5 / 1:10



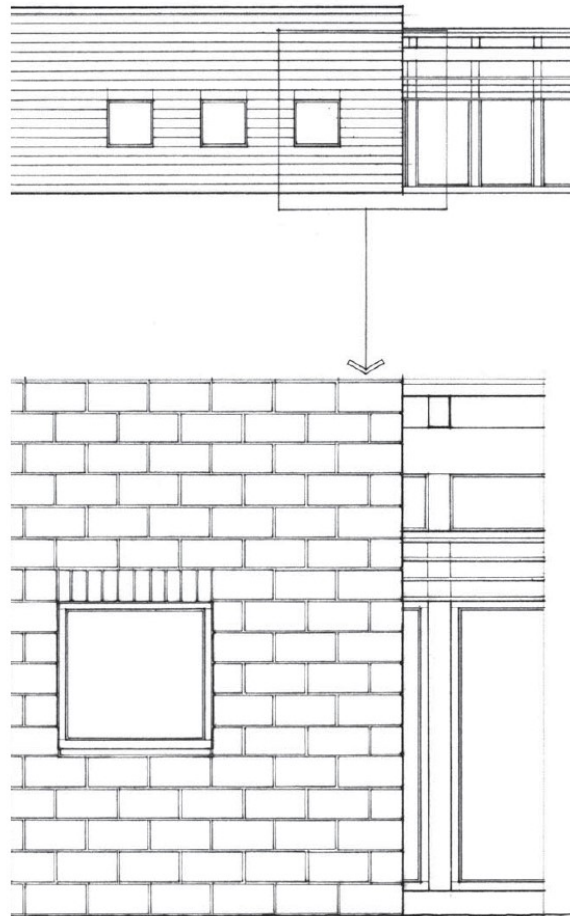
Site Sections

Scale 1:200 / 1:500

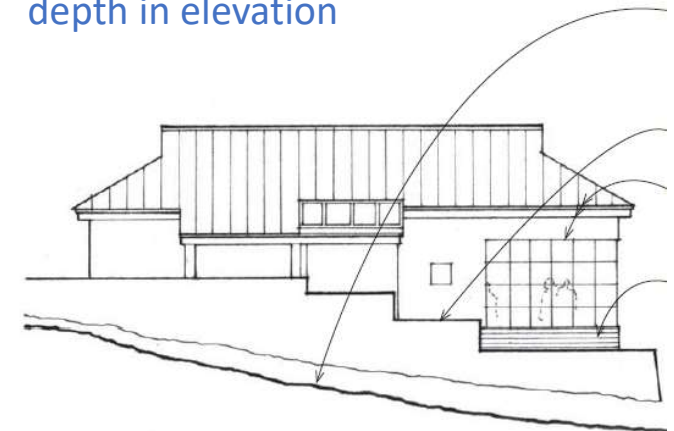
Conventions - Elevations



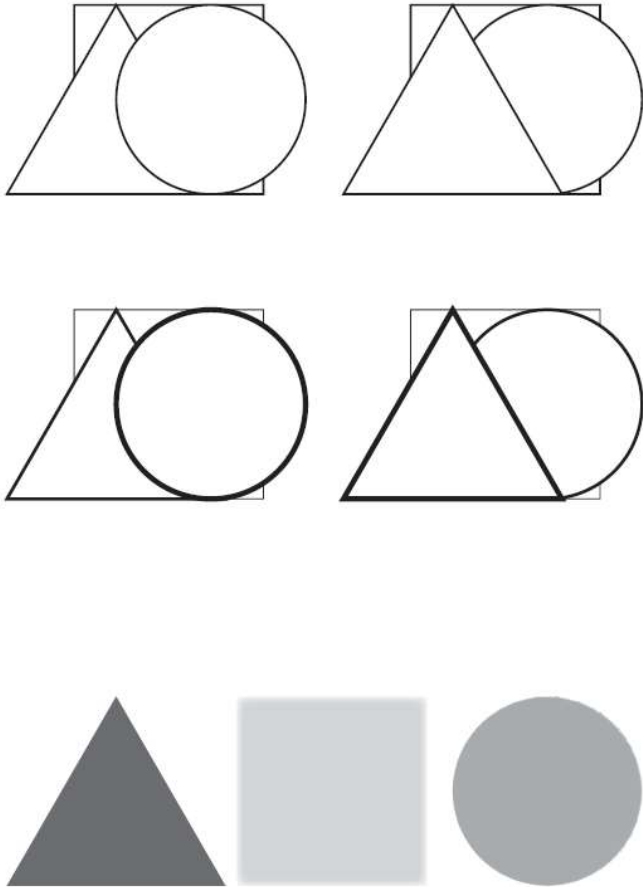
Elevations are normally drawn in a scale relative to the floor plans. 1:100
Further detail can be emphasised at a larger scale. (1:50)



Hierarchy of Lines, showing depth in elevation



Conventions - Depth

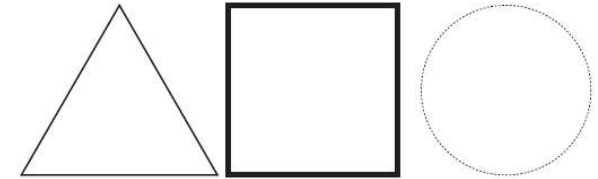


Spatial Depth Cues

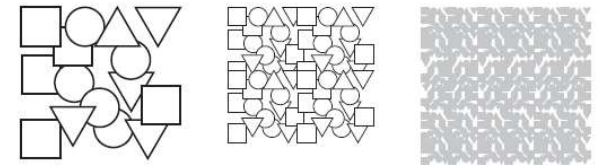
The examples on the previous two pages illustrate the use of varying line weights and detail to convey a sense of spatial depth in the drawing of building elevations. This series of drawings illustrates in a more discrete and abstract way how visual cues can enhance the sense of depth in any orthographic projection.

- **Continuity of Outline:** We tend to perceive a shape as being in front of another when it has continuity of outline and disrupts the profile of the other shape. Since this visual phenomenon relies on nearer objects overlaying or projecting in front of objects farther away, we often refer to this depth cue simply as overlap.
- **By itself, overlap tends to create relatively shallow intervals of space.** However, we can achieve a greater sense of intervening space and depth if we combine overlap with other depth cues, such as by varying the line weights of a pure-line drawing. Darker and thicker profile or contour lines tend to advance and appear to be in front of lighter and thinner outlines.
- **Atmospheric Perspective:** A progressive muting of hues, tonal values, and contrast occurs with increasing distance from the observer. Objects seen up close in the foreground of our visual field typically possess more saturated colors and sharply defined contrasts in value. As they move farther away, their colors become lighter in value and more subdued, and their tonal contrasts more diffuse. In the background, we see mainly shapes of grayed tones and muted hues.

- **Perspective of Blur:** This depth cue reflects the fact that we normally associate clarity of vision with nearness and blurring of outlines with farness. The graphic equivalent of perspective blur is a diminishing or diffusion of the edges and contours of more distant objects. We can use either a lightly drawn line or a broken or dotted line to delineate these edges of shapes and contours of forms that exist beyond the focus of a drawing.



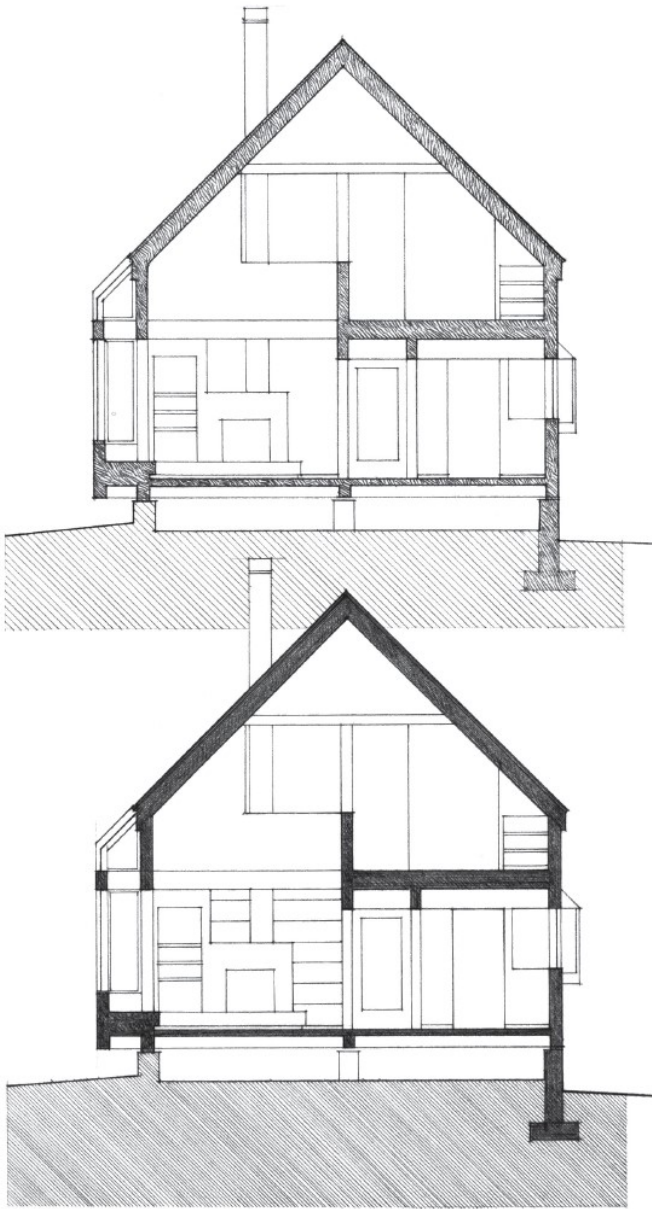
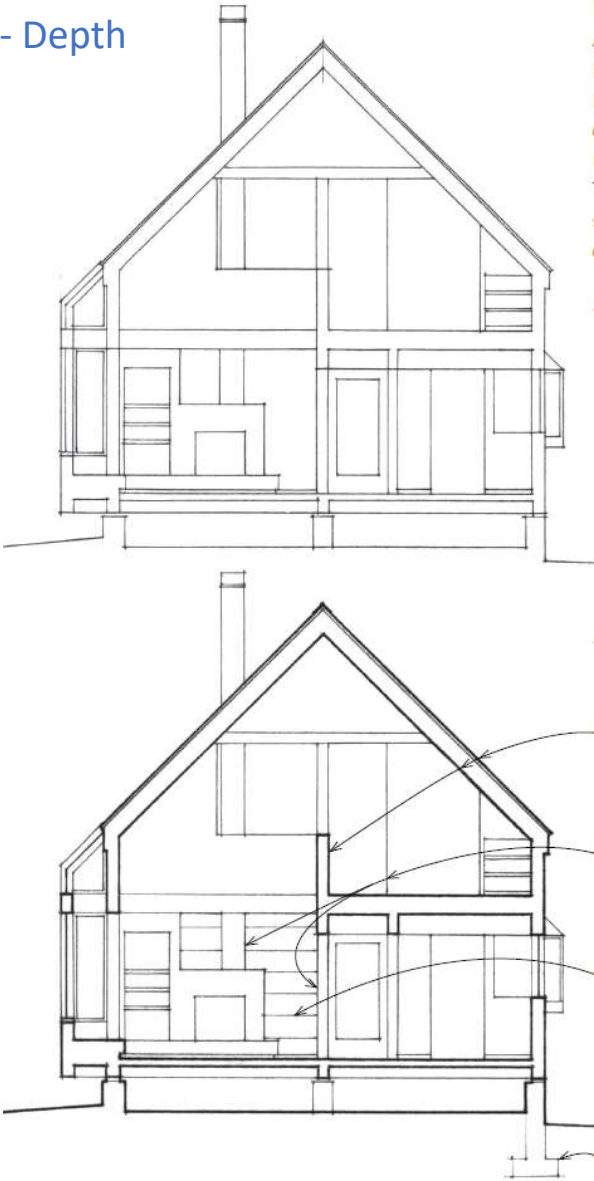
- **Texture Perspective:** The density of the texture of a surface gradually increases as it recedes into the distance. The graphic technique for depicting the visual phenomenon of texture perspective involves gradually diminishing the size and spacing of the graphic elements used to portray a surface texture or pattern, whether they be dots, lines, or tonal shapes. Proceed from identifying units in the foreground to delineating a textured pattern in the middleground and finally to rendering a tonal value in the background.



- **Light and Shade:** Any abrupt shift in brightness stimulates the perception of a spatial edge or profile separated from a background surface by some intervening space. This depth cue implies the existence of overlapping shapes and the use of contrasting tonal values in a drawing. See Chapter 7 for more information on the use of tonal values in architectural graphics.



Conventions - Depth



CAD Packages can assist in demonstrating spatial depth through hatching.

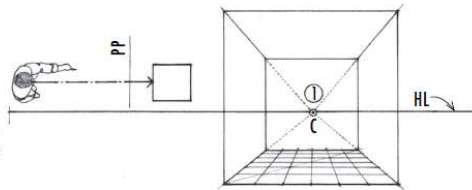
Other Drawing Types

TYPES OF PERSPECTIVE

In any rectilinear object, such as a cube, each of the three principal sets of parallel lines has its own vanishing point. Based on these three major sets of lines, there are three types of linear perspective: one-, two-, and three-point perspectives. What distinguishes each type is simply the observer's angle of view relative to the subject. The subject does not change, only our view of it, but the change of view affects how the sets of parallel lines appear to converge in linear perspective.

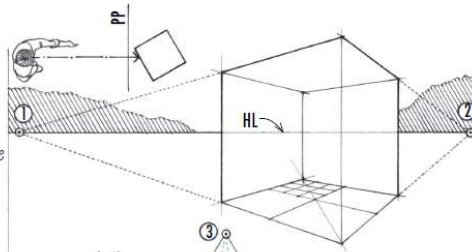
One-Point Perspective

If we view a cube with our central axis of vision (CAV) perpendicular to one of its faces, all of the cube's vertical lines are parallel with the picture plane (PP) and remain vertical. The horizontal lines that are parallel with PP and perpendicular to CAV also remain horizontal. The lines that are parallel with CAV, however, will appear to converge at the center of vision (C). This is the one point referred to in one-point perspective.



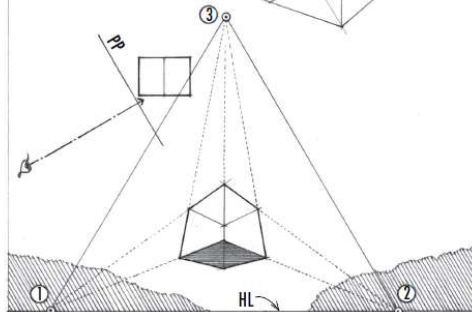
Two-Point Perspective

If we shift our point of view so that we view the same cube obliquely, but keep our central axis of vision (CAV) horizontal, then the cube's vertical lines will remain vertical. The two sets of horizontal lines, however, are now oblique to the picture plane (PP) and will appear to converge, one set to the left and the other to the right. These are the two points referred to in two-point perspective.

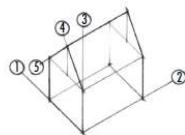


Three-Point Perspective

If we lift one corner of the cube off the ground plane (GP), or if we tilt our central axis of vision (CAV) to look down or up at the cube, then all three sets of parallel lines will be oblique to the picture plane (PP) and will appear to converge at three different vanishing points. These are the three points referred to in three-point perspective.



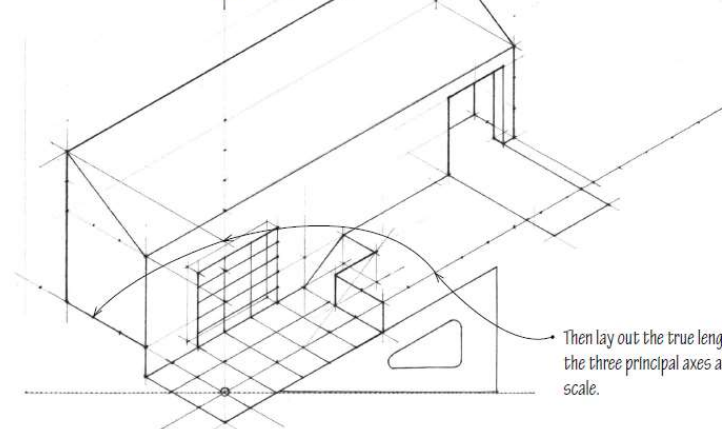
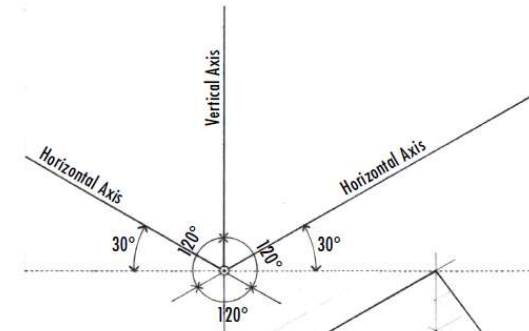
Note that each type of perspective does not imply that there are only one, two, or three vanishing points in a perspective. The actual number of vanishing points will depend on our point of view and how many sets of parallel lines there are in the subject being viewed. For example, if we look at a simple gable-roofed form, we can see that there are potentially five vanishing points, since we have one set of vertical lines, two sets of horizontal lines, and two sets of inclined lines.



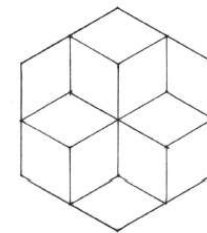
ISOMETRIC DRAWINGS

Isometric drawings establish a lower angle of view than plan obliques and give equal emphasis to the three principal sets of planes. They preserve the relative proportions of a subject or scene and are not subject to the distortion inherent in oblique views.

- To construct an isometric drawing, first establish the direction of the three principal axes. Because they are 120° apart on the picture plane, if we draw one axis vertically, the other two axes make a 30° angle with a horizontal on the drawing surface.



- Then lay out the true lengths of all lines parallel to the three principal axes and draw them to the same scale.



- Isometric drawings of forms based on the square can create an optical illusion and be subject to multiple interpretations. This ambiguity results from the alignment of lines in the foreground with those in the background. In such cases, a plan oblique might be a better choice.

CAD packages can assist in preparing views through snap grids and dynamic 3D modelling.



RIBA Plan of Work 2020

Stage Boundaries:

Stages 0-4 will generally be undertaken one after the other.

Stages 4 and 5 will overlap in the **Project Programme** for most projects.

Stage 5 commences when the contractor takes possession of the site and finishes at **Practical Completion**.

Stage 6 starts with the handover of the building to the client immediately after **Practical Completion** and finishes at the end of the **Defects Liability Period**.

Stage 7 starts concurrently with Stage 6 and lasts for the life of the building.

Planning Note:

Planning Applications are generally submitted at the end of Stage 3 and should only be submitted earlier when the threshold of information required has been met. If a **Planning Application** is made during Stage 3, a mid-stage gateway should be determined and it should be clear to the project team which tasks and deliverables will be required. See Overview guidance.

Procurement:

The RIBA Plan of Work is procurement neutral – See Overview guidance for a detailed description of how each stage might be adjusted to accommodate the requirements of the **Procurement Strategy**.

ER Employer's Requirements
CP Contractor's Proposals

The RIBA Plan of Work organises the process of briefing, designing, delivering, maintaining, operating and using a building into eight stages. It is a framework for all disciplines on construction projects and should be used solely as guidance for the preparation of detailed professional services and building contracts.

	0	1	2	3	4	5	6	7
	Strategic Definition	Preparation and Briefing	Concept Design	Spatial Coordination	Technical Design	Manufacturing and Construction	Handover	Use
	Projects span from Stage 1 to Stage 6; the outcome of Stage 0 may be the decision to initiate a project and Stage 7 covers the ongoing use of the building.							
Stage Outcome at the end of the stage	The best means of achieving the Client Requirements confirmed If the outcome determines that a building is the best means of achieving the Client Requirements , the client proceeds to Stage 1	Project Brief approved by the client and confirmed that it can be accommodated on the site	Architectural Concept approved by the client and aligned to the Project Brief The brief remains "live" during Stage 2 and is dropped in response to the Architectural Concept	Architectural and engineering information Spatially Coordinated	All design information required to manufacture and construct the project completed Stage 4 will overlap with Stage 5 on most projects	Manufacturing, construction and Commissioning completed There is no design work in Stage 5 other than responding to Site Queries	Building handed over, Aftercare initiated and Building Contract concluded	Building used, operated and maintained efficiently Stage 7 starts concurrently with Stage 6 and lasts for the life of the building
Core Tasks during the stage	Prepare Client Requirements Develop Business Case for feasible options including review of Project Risks and Project Budget Ratify option that best delivers Client Requirements Review Feedback from previous projects Undertake Site Appraisals	Prepare Project Brief including Project Outcomes and Sustainability Outcomes , Quality Aspirations and Spatial Requirements Undertake Feasibility Studies Agree Project Budget Source Site Information including Site Surveys Prepare Project Programme Prepare Project Execution Plan	Prepare Architectural Concept incorporating Strategic Engineering requirements and aligned to Cost Plan , Project Strategies and Outline Specification Agree Project Brief Derogations Undertake Design Reviews with client and Project Stakeholders Prepare stage Design Programme	Undertake Design Studies , Engineering Analysis and Cost Exercises to test Architectural Concept resulting in Spatially Coordinated design aligned to updated Cost Plan , Project Strategies and Outline Specification Initiate Change Control Procedures Prepare stage Design Programme	Develop architectural and engineering technical design Prepare and coordinate design team Building Systems information Prepare and integrate specialist subcontractor Building Systems information Prepare stage Design Programme Specialist subcontractor designs are prepared and reviewed during Stage 4	Finalise Site Logistics Manufacture Building Systems and construct building Monitor progress against Construction Programme Inspect Construction Quality Resolve Site Queries as required Undertake Commissioning of building Prepare Building Manual	Hand over building in line with Plan for Use Strategy Undertake review of Project Performance Undertake seasonal Commissioning Rectify defects Complete initial Aftercare tasks including light touch Post Occupancy Evaluation	Implement Facilities Management and Asset Management Undertake Post Occupancy Evaluation of building performance in use Verify Project Outcomes including Sustainability Outcomes Adaptation of a building (at the end of its useful life) triggers a new Stage 0
Project Strategies might include: - Conservation (if applicable) - Cost - Fire Safety - Health and Safety - Inclusive Design - Planning - Plan for Use - Procurement - Sustainability See RIBA Plan of Work 2020 Overview for detailed guidance on Project Strategies								
Core Statutory Processes during the stage	Strategic appraisal of Planning considerations	Source pre-application Planning Advice Initiate collation of health and safety Pre-construction Information	Obtain pre-application Planning Advice Agree route to Building Regulations compliance Option: submit outline Planning Application	Review design against Building Regulations Prepare and submit Planning Application See Planning Note for guidance on submitting a Planning Application earlier than at end of Stage 3	Submit Building Regulations Application Discharge pre-commencement Planning Conditions Prepare Construction Phase Plan Submit form F10 to HSE if applicable	Carry out Construction Phase Plan Comply with Planning Conditions related to construction	Comply with Planning Conditions as required	Comply with Planning Conditions as required
Procurement Route	Traditional Design & Build 1 Stage Design & Build 2 Stage Management Contract Construction Management Contractor-led	Appoint client team	Appoint design team	ER Appoint contractor	ER CP Tender Appoint contractor Pre-contract services agreement CP Appoint contractor	CP Appoint contractor		Appoint Facilities Management and Asset Management teams, and strategic advisers as needed
Information Exchanges at the end of the stage	Client Requirements Business Case	Project Brief Feasibility Studies Site Information Project Budget Project Programme Procurement Strategy Responsibility Matrix Information Requirements	Project Brief Derogations Signed off Stage Report Project Strategies Outline Specification Cost Plan	Signed off Stage Report Project Strategies Updated Outline Specification Updated Cost Plan Planning Application	Manufacturing Information Construction Information Final Specifications Residual Project Strategies Building Regulations Application	Building Manual including Health and Safety File and Fire Safety Information Practical Completion certificate including Defects List Asset Information If Verified Construction Information is required, verification tasks must be defined	Feedback on Project Performance Final Certificate Feedback from light touch Post Occupancy Evaluation	Feedback from Post Occupancy Evaluation Updated Building Manual including Health and Safety File and Fire Safety Information as necessary

Core RIBA Plan of Work terms are defined in the RIBA Plan of Work 2020 Overview glossary and set in **Bold Type**.

Further guidance and detailed stage descriptions are included in the RIBA Plan of Work 2020 Overview.

© RIBA 2020

Drawings prepared in the Construction Industry

Must:

- Convey a message
- Read with understanding
- Demonstrate Knowledge
- Convey Ideas
- Explain a Narrative / Story

Industry conventions assist in the legibility of drawn information.

Type and complexity of the drawings is dependant on the stage of the project.

Typical CAD packages that are used in the Industry.



AUTODESK
AUTOCAD



VECTORWORKS®
A NEMETSCHEK COMPANY

GRAPHISOFT®
ARCHICAD



RhinoCeros®



AUTODESK
CIVIL3D



SketchUp



AUTODESK®
REVIT®

Working with AutoCAD



AUTODESK
AUTOCAD

Download Education Version of AutoCAD



AUTODESK
AUTOCAD

https://www.autodesk.com/education/edu-software/overview?_ga=2.119678017.834319708.1600961686-1615692111.1593105833&sorting=featured&page=1

MFA setup guides & the RemotePC Dashboard are the following:

RemotePC Dashboard - <https://remotepc.uwtsd.ac.uk/>

MFA Setup Guides - <https://www.uwtsd.ac.uk/mfa/>

Connection Guides - <https://www.uwtsd.ac.uk/virtuallearning/>

A booking system is in the process of being developed which will allow dedicated slots to be booked in advance.

At present a default of 180mins is allowed per student, so make sure you save your work regularly as you may need to log back in.



AUTODESK
AUTOCAD

the basics



Interface



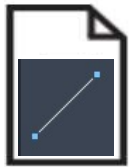
Ribbon



Command
Line



UNITS



Draw



Modify



Blocks



Images



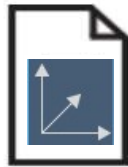
Layers



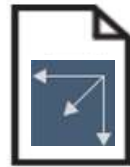
Properties



Linetype



WCS



UCS



Text



Dims



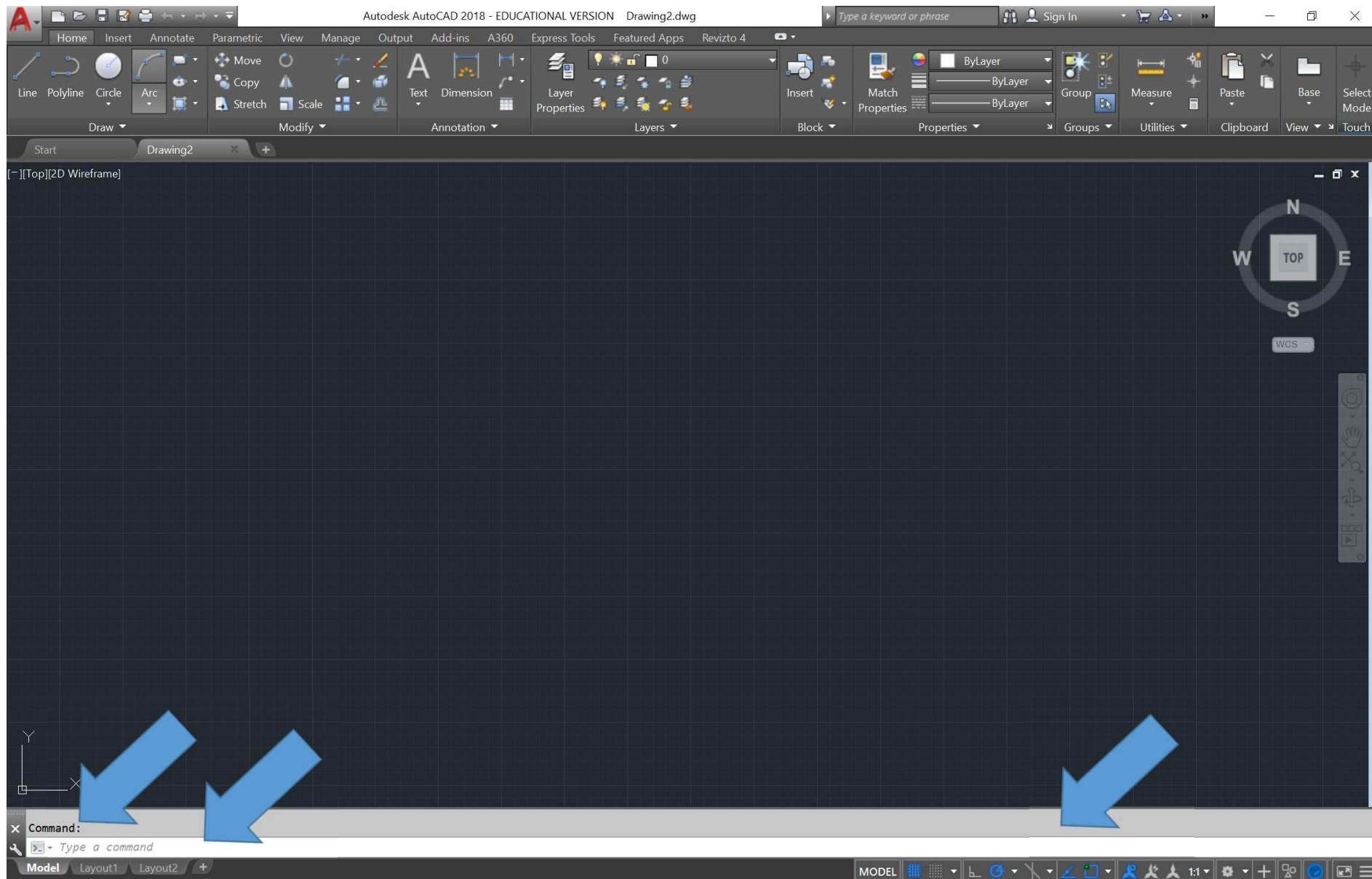
Titleblocks



Layouts



Plot



UNITS

BASIC
COMMANDS



Q QSAVE / Saves the current drawing.

A ARC / Creates an arc.

Z ZOOM / Increases or decreases the magnification of the view in the current viewport.

W WBLOCK / Writes objects or a block to a new drawing file.

S STRETCH / Stretches objects crossed by a selection window or polygon.

X EXPLODE / Breaks a compound object into its component objects.

E ERASE / Removes objects from a drawing.

D DIMSTYLE / Creates and modifies dimension styles.

C CIRCLE / Creates a circle.

R REDRAW / Refreshes the display in the current viewport.

F FILLET / Rounds and fillets the edges of objects.

V VIEW / Saves and restores named views, camera views, layout views, and preset views.

T MTEXT / Creates a multiline text object.

G GROUP / Creates and manages saved sets of objects called groups.

B BLOCK / Creates a block definition from selected objects.

N NEW / Create a new drawing

H HATCH / Fills an enclosed area or selected objects with a hatch pattern, solid fill, or gradient fill.

J JOIN / Joins similar objects to form a single, unbroken object.

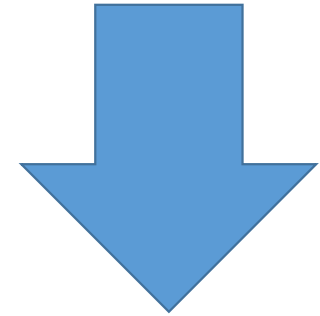
M MOVE / Moves objects a specified distance in a specified direction.

I INSERT / Inserts a block or drawing into the current drawing.

O OFFSET / Creates concentric circles, parallel lines, and parallel curves.

L LINE / Creates straight line segments.

P PAN / Adds a parameter with grips to a dynamic block definition.



<https://www.autodesk.com/shortcuts/autocad>

PL Polyline
CO Copy
REC Rectangle
MO/PR Modify Properties
Pallet
LA Layer Pallet

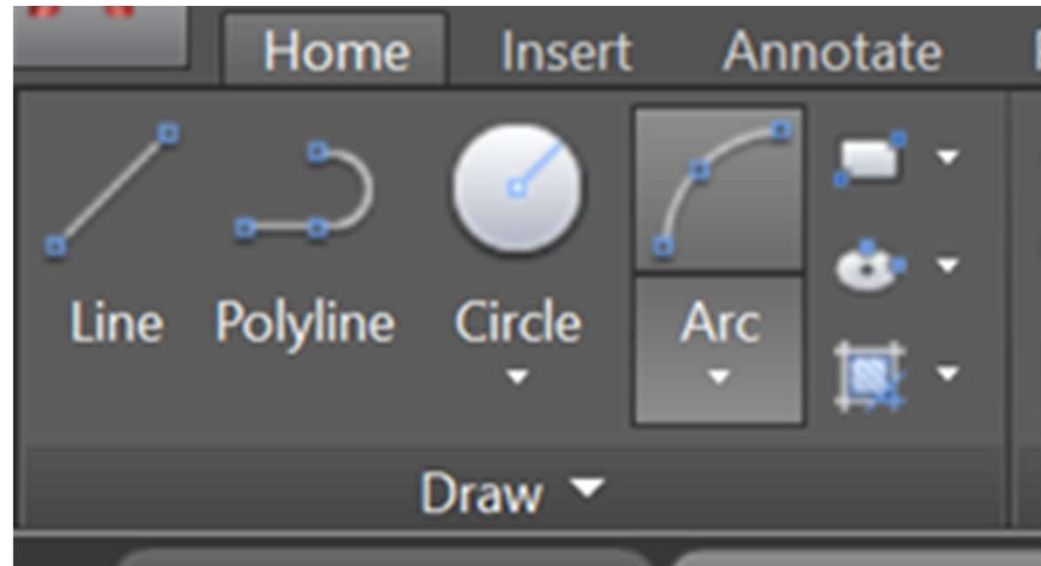
Warm Up

Explore the DRAW menu on the Ribbon:

Draw Line and shapes using the icons on the ribbon.

Look at the Command line.

Are there any prompts?



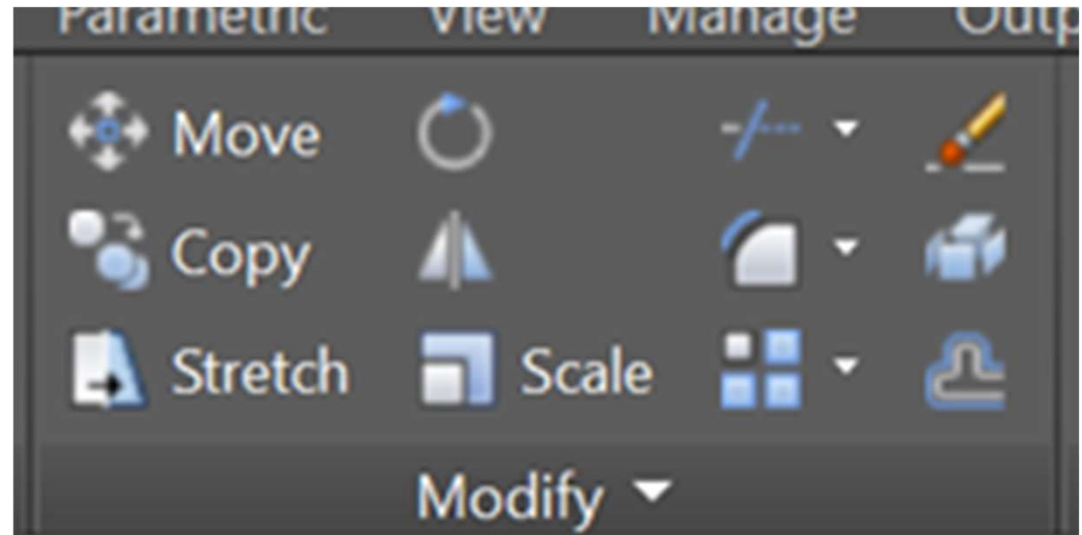
Warm Up

Explore the Modify menu on the Ribbon:

See what happens if you try and 'Modify' something that you have drawn.

Look at the Command line.

Are there any prompts?





AUTODESK
AUTOCAD

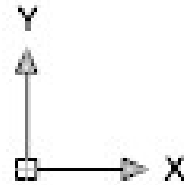
AutoCAD uses a Coordinates based system.

X and Y 2 Dimensional

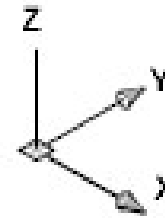
X Y Z 3 Dimensional

We can use the coordinates to accurately position buildings in space.

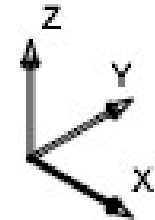
We can also use coordinates to draw



2D UCS Icon



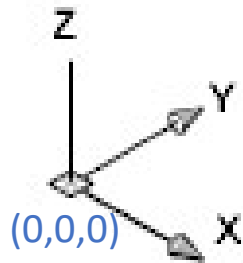
3D UCS icon



shaded UCS icon

AutoCAD uses a Coordinates Based system.

In the World Coordinate system WCS

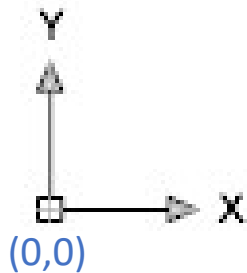


X axis is Horizontal on the screen

Y axis is Vertical on the screen

Z axis is the Elevation (Height)

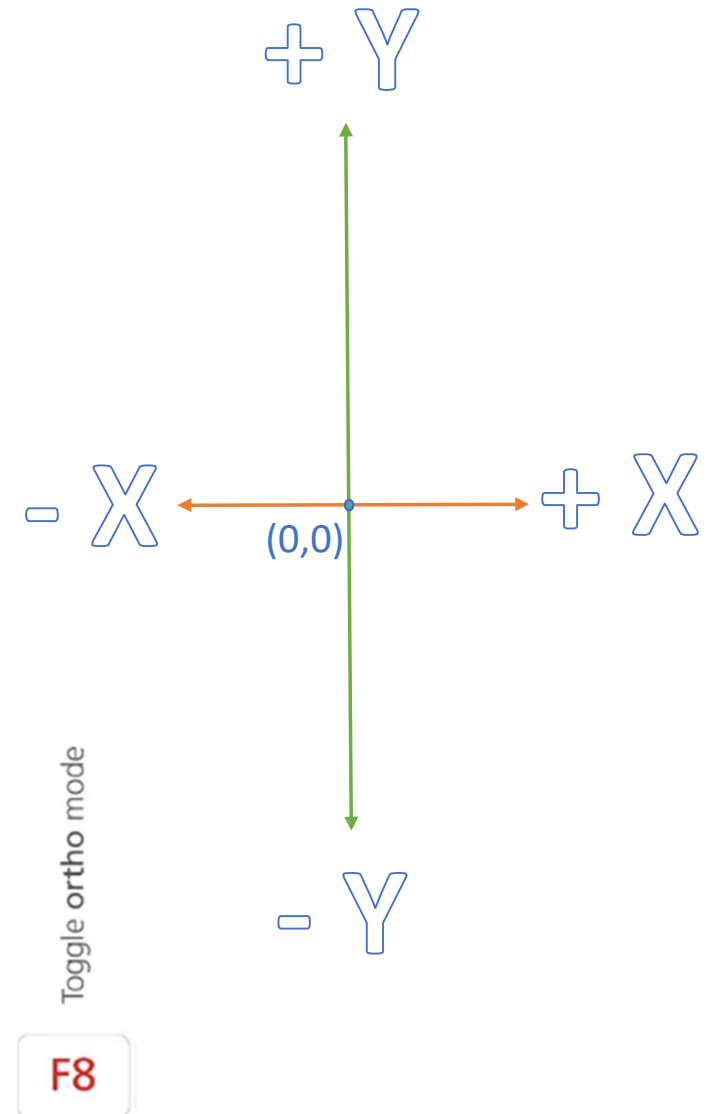
These values can be Positive + or Negative – depending on their relationship to the Origin Point. WCS origin = (0,0,0) = zero value in x y and z axis



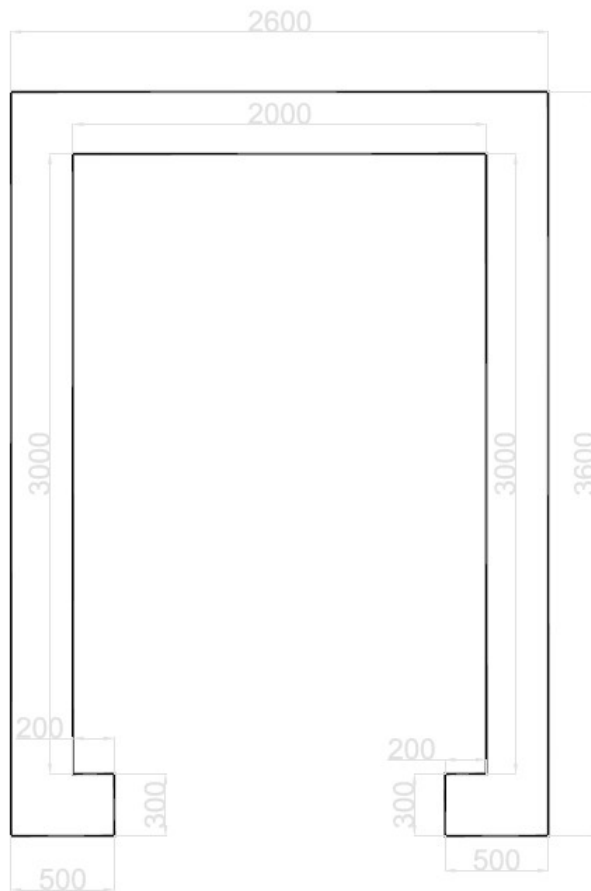
When drawing in 2D we do not need to consider the Z axis as we are drawing on a Flat plane where there is no Elevation (height) therefore the value of Z is 0

A 2D WCS icon is shown so we know that we are working in two dimensions using the x and y axis

Use can also use 'ORTHO' F8 to as a guide for Horizontal and Vertical distances in a directional manner.



Task 1



Starting from point 0,0 draw a Polyline to depict walls to the dimensions shown.

To start type PL or select Polyline from the Ribbon.

type 0,0 and press enter

now use the coordinates system to enter the next point (s) of the polyline pressing enter after each until you Close the polyline

@500,0 (enter)
@0,300 (enter)
@-200,0 (enter)

and so on.

remember the @ symbol means you are moving in a direction.

the first distance value before the comma are along the 'x' axis

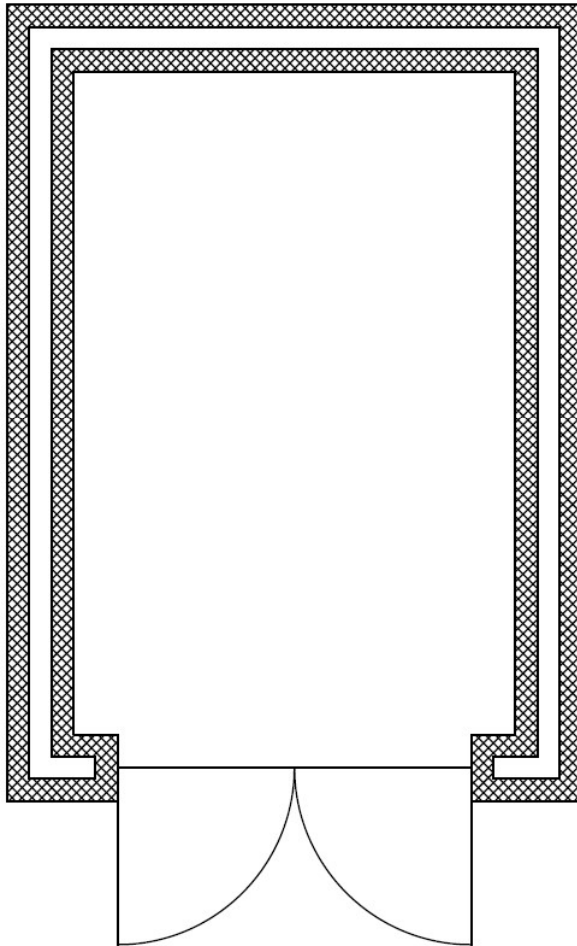
the second distance value after the comma are along the 'y' axis

adding a minus before an x distance will move a the line from right to left direction

adding a minus before a y distance will move the line down the Y axis.

TIP: AutoCAD also allows you to draw Directionally using the Ortho Mode and Curser.

Task 2



Find your way around the Draw and Modify options on the Ribbon.

Use 'Offset' command to offset the walls by 100mm (under Modify in the Ribbon or type 'o')

Use 'Hatch' command to hatch in the Blockwork change the scale in the hatch editor to 10

Draw a 'Line' from midpoint to midpoint of the doorway. (check your object snap settings)

Draw a 'Circle' from the midpoint of the door return to the midpoint of the doorway opening.

Use 'Trim' command to trim the circle to create a quarter circle (i.e single door)

Use 'Mirror' command to mirror the door leaf and create a double door. You must indicate the line / point of the axis to mirror.