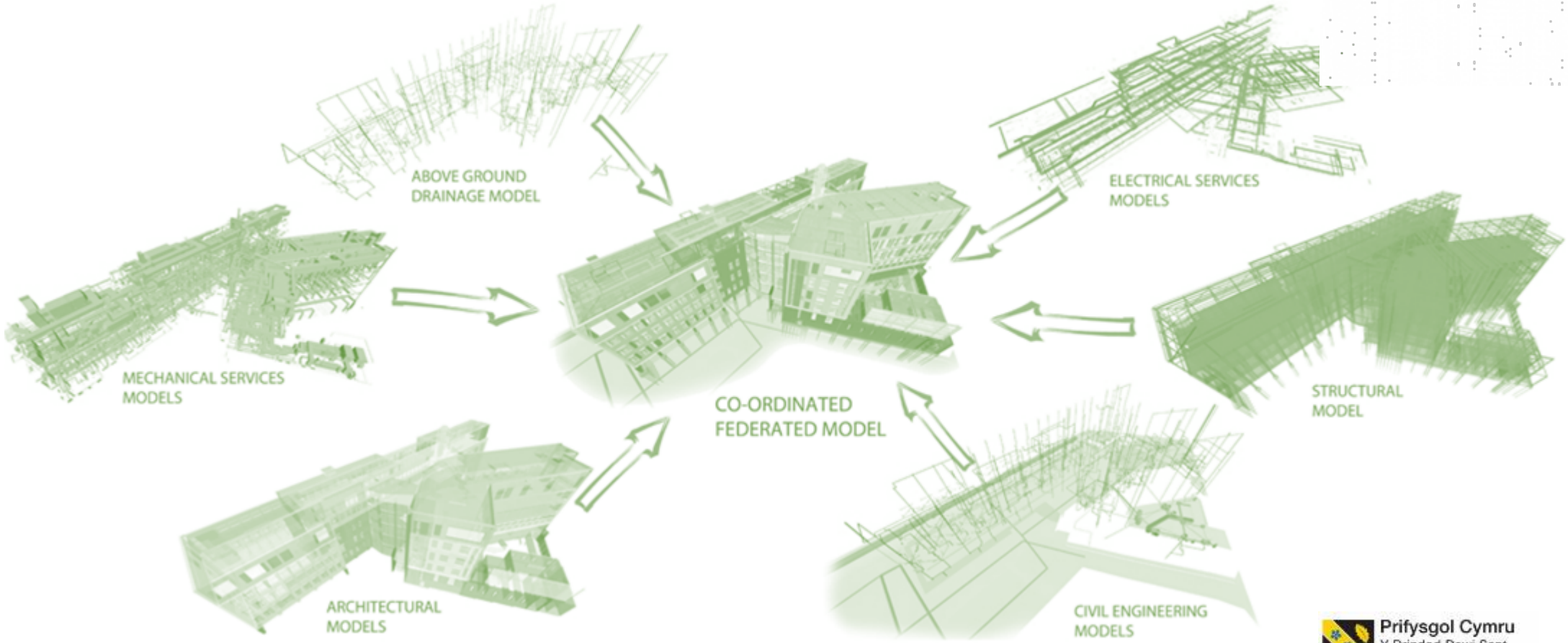
ACBA 5010
BIM : LEVEL 5

Building Information Modelling

NEW



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

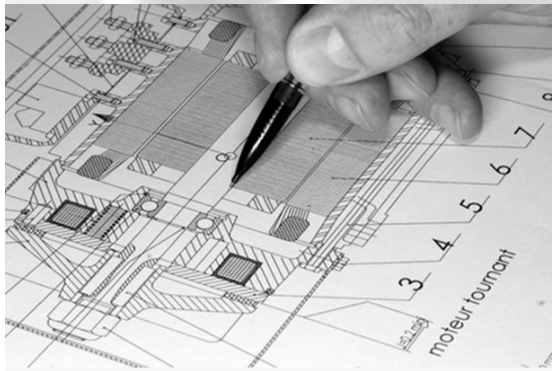
www.onecreativeenvironment.com

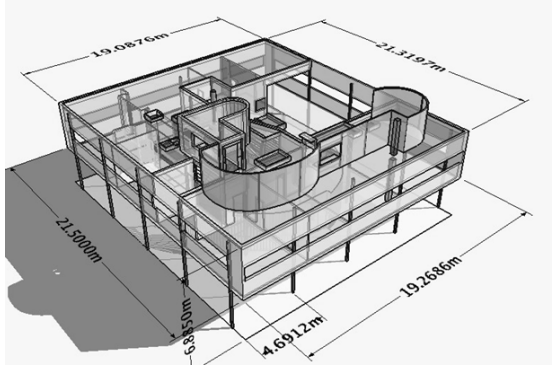
Gavin M Traylor RIBA

Week 8:

- Recap BIM for Lifecycle & Collaboration in Revizto.
- Assessments
- Visualisation in Revit
- Enscape

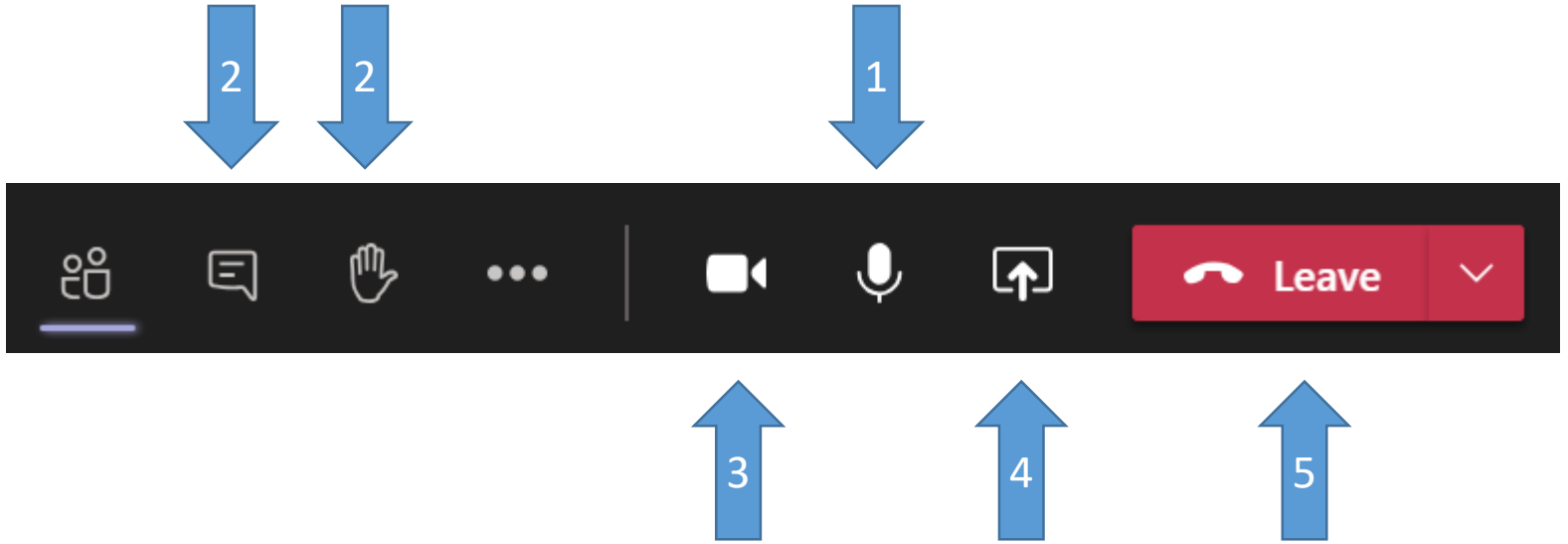


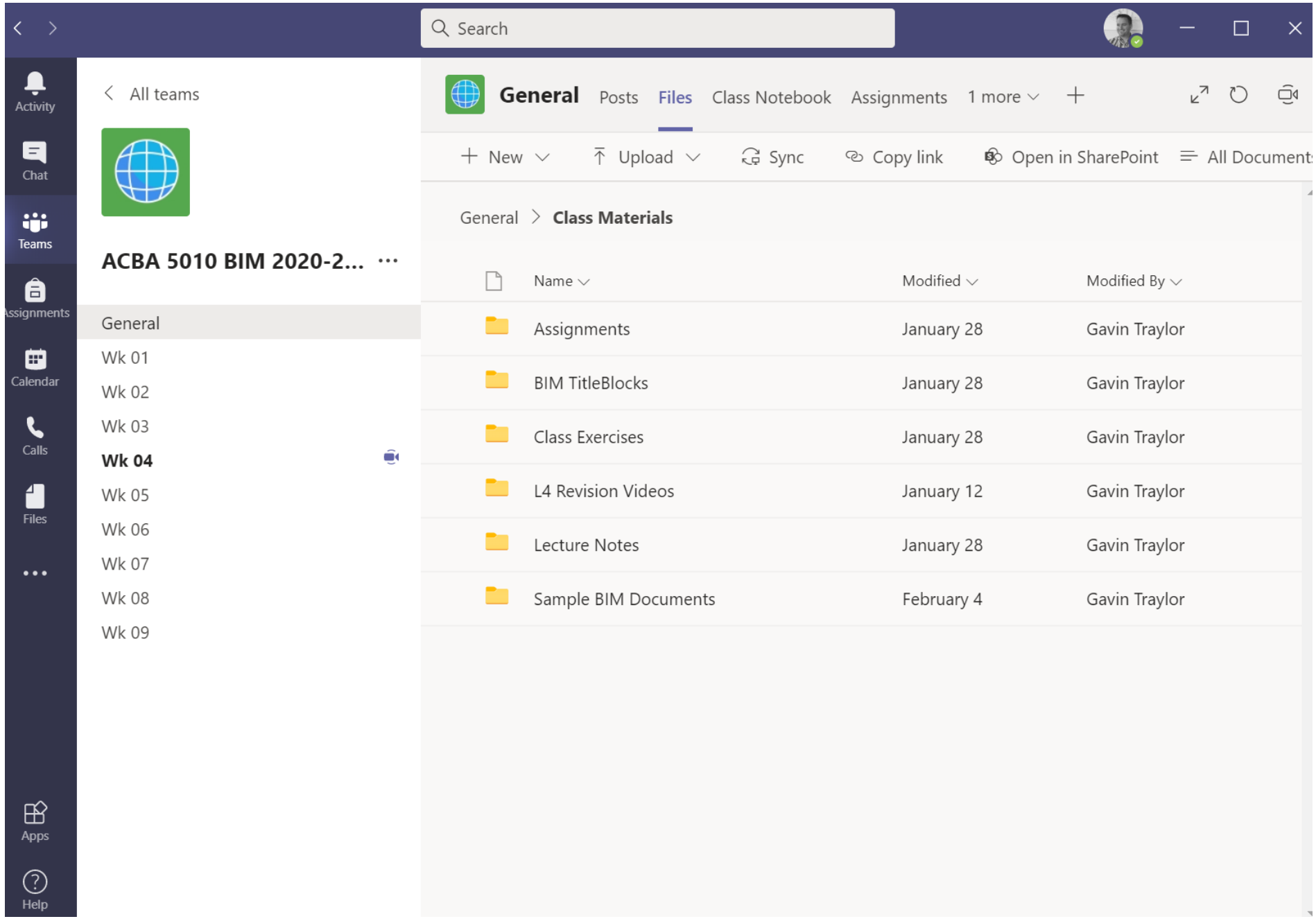




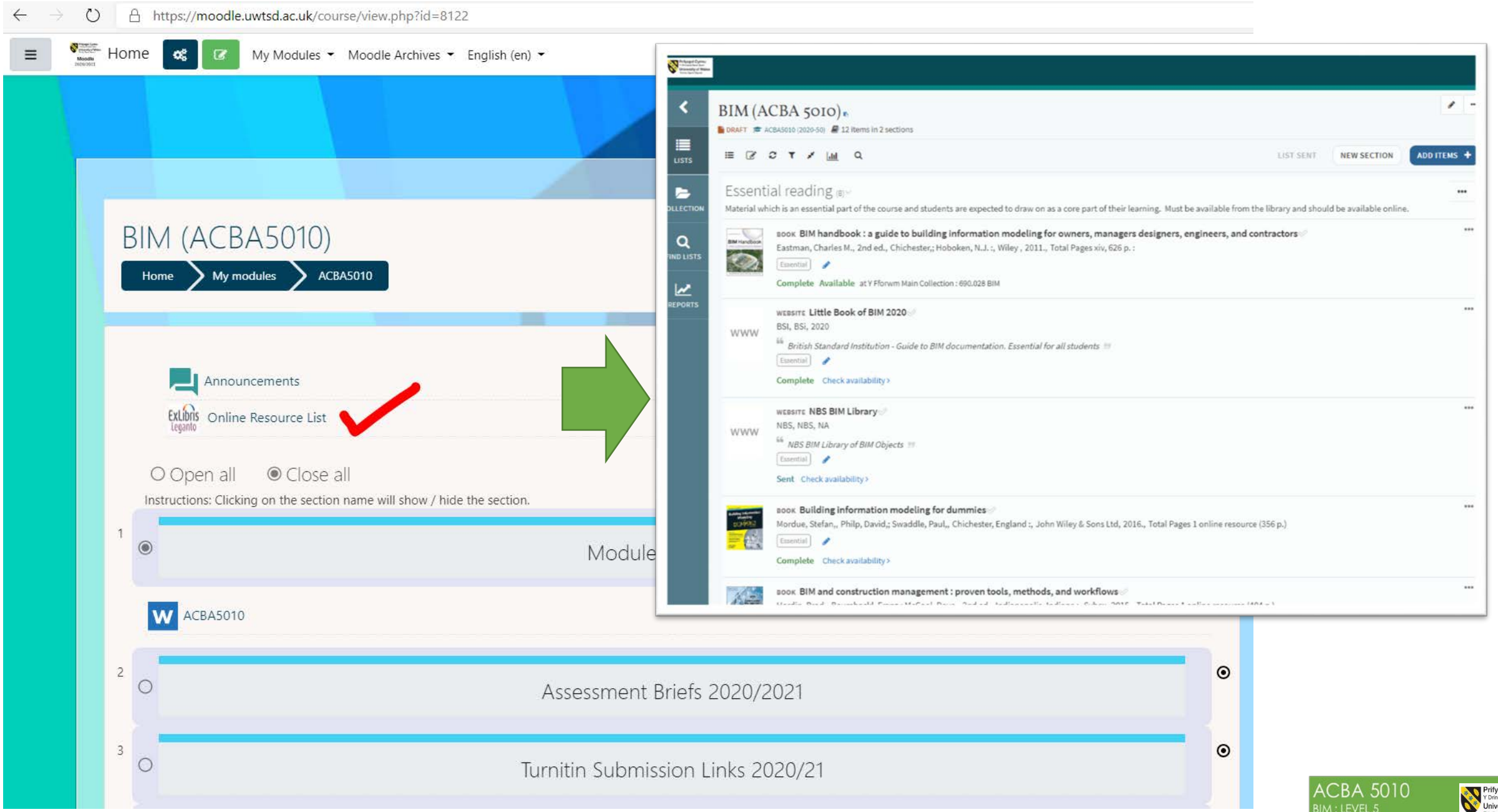
MS TEAMS HOUSEKEEPING

1. Mute your Microphone
2. Use Chat to Ask Questions or Put your hand Up
3. If you have a poor connection switch off Camera
4. I may ask you to share your screen.
5. When the lecture ends please hang up




Search
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ACBA 5010 BIM 2020-2...
General
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Wk 02
Wk 03
Wk 04
Wk 05
Wk 06
Wk 07
Wk 08
Wk 09
General
Posts
Files
Class Notebook
Assignments
1 more
New
Upload
Sync
Copy link
Open in SharePoint
All Documents
General
Class Materials
Name
Modified
Modified By
Assignments
January 28
Gavin Traylor
BIM TitleBlocks
January 28
Gavin Traylor
Class Exercises
January 28
Gavin Traylor
L4 Revision Videos
January 12
Gavin Traylor
Lecture Notes
January 28
Gavin Traylor
Sample BIM Documents
February 4
Gavin Traylor

Moodle - Reading List



Suggested Reading List

Francis Ching (2015) *Architectural Graphics*

BSi (2019) *The Little Book of BIM*

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

Eastman C, Teicholz P, Sacks R and Liston K (2011)
BIM Handbook: A Guide to BIM for Owners, Managers, Designers, Engineers & Contractors. Hoboken: John Wiley & Sons Inc.

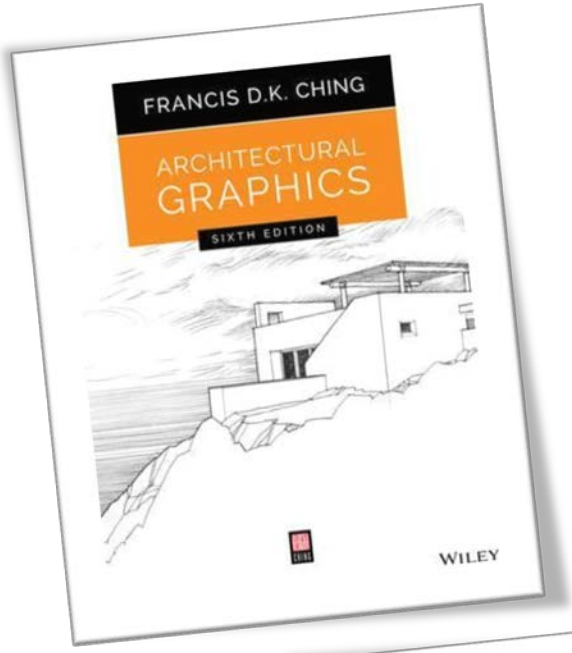
Mordue S Swaddle P and Philp D (2015). *Building Information Modelling for Dummies. Chichester:* John Wiley & Sons Ltd.

NBS National BIM Library

The BIM HUB: BIM Journal

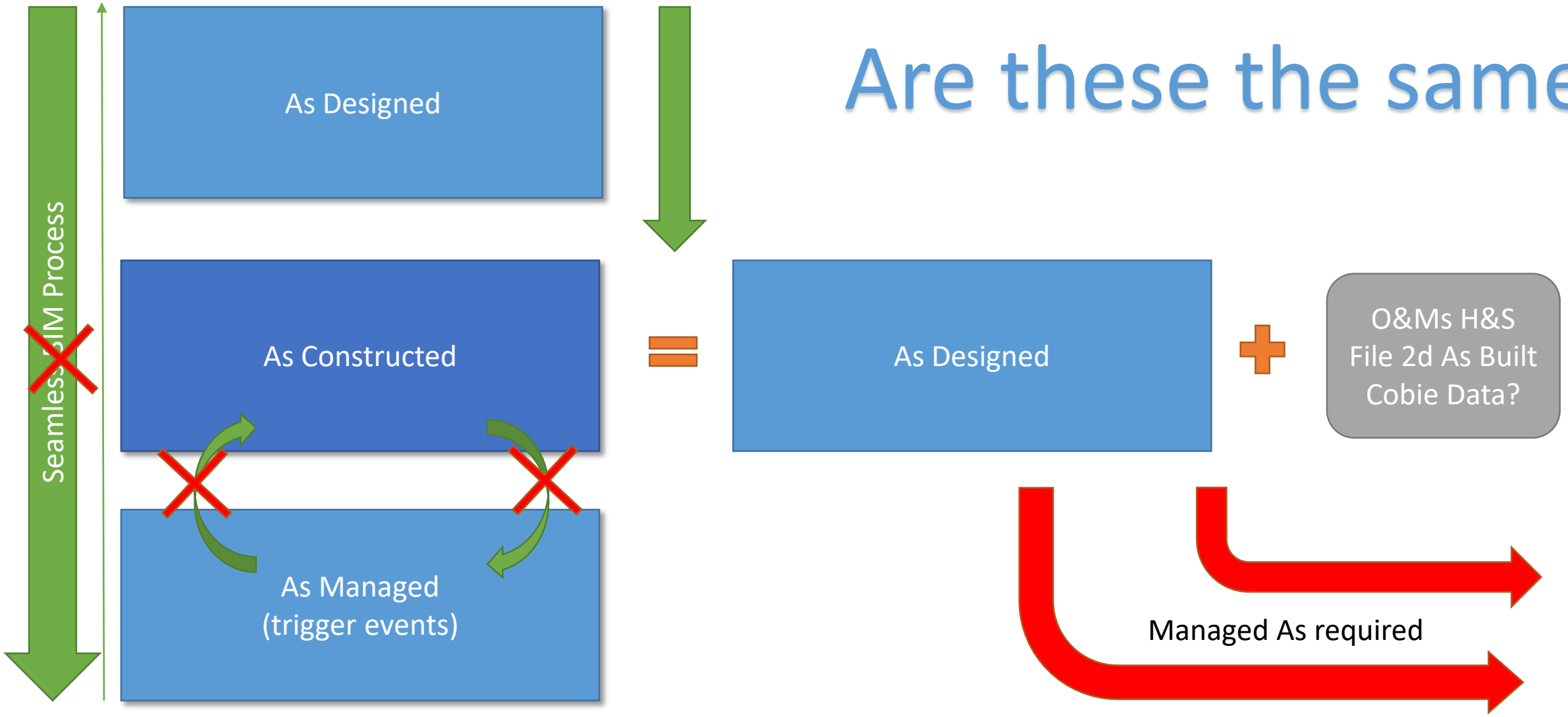
https://academy.autodesk.com/
Revit Tutorials - Youtube.

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





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



Are these the same?

Design, Construct, Operate and Maintain? **One Truth?**

How do we evaluate?

Post-Occupancy Evaluation (POE)

Many buildings do not perform as planned - in some cases this can impact on running costs, staff and client satisfaction and performance, health, safety and comfort. For repeat construction clients, learning from and correcting past mistakes in design and commissioning of buildings can be extremely cost-effective and greatly improve workplace productivity.

Stewart Brand ‘How Buildings Learn’ 6 part series.

https://youtu.be/AvEqfg2sIH0



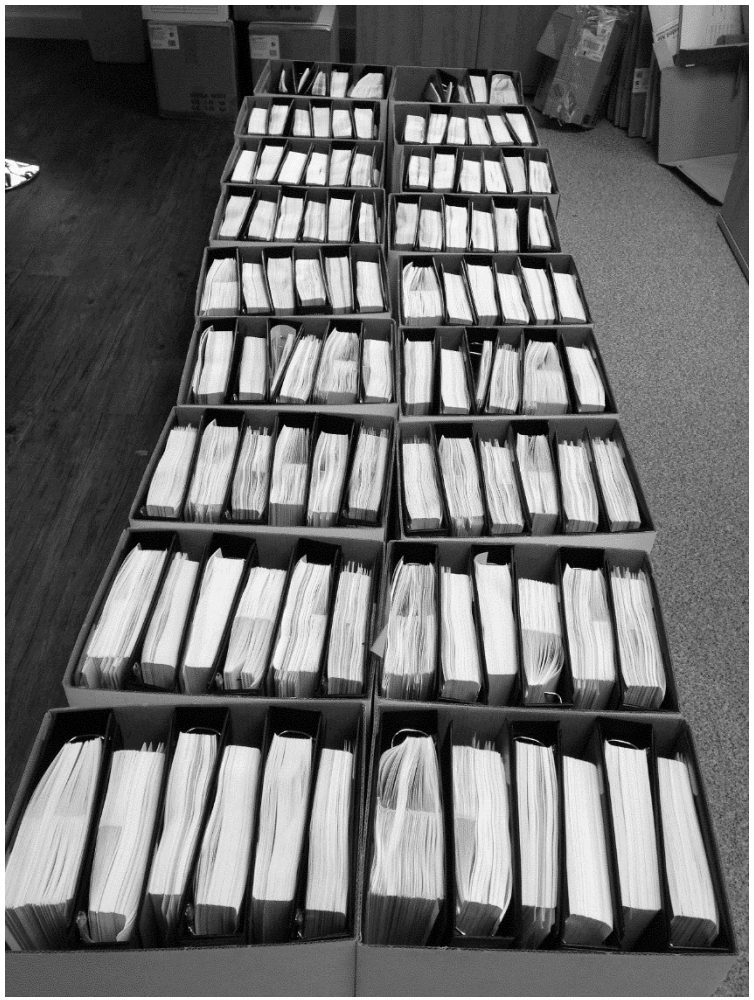


https://www.architecture.com/-/media/GatherContent/Post-Occupancy-Evaluation/Additional-Documents/RIBAPOEBPEPrimerpdf.pdf

How do we evaluate?

Manual Survey & Observations





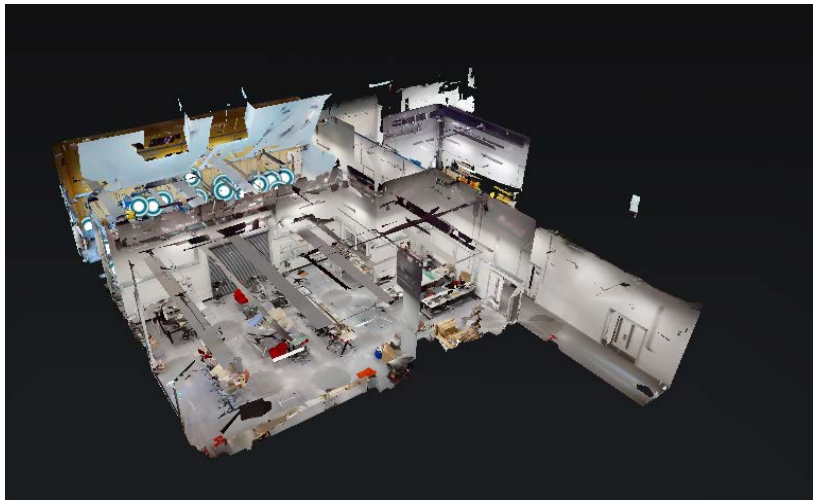
- As built drawings
- Building File / O&M Manuals

How do we evaluate?

Digital Surveys:

- Thermal Imaging
- Drones
- Point Cloud





https://my.matterport.com/show/?m=6NoRsYdFY4Y





How do we evaluate?

Laser Scanners

Requires: Tripod, detail pole, prism, reflected target and scanner.

Laser scanners undertake highly accurate detailed surveys, through to production of basic point cloud and rendered photographic imagery.

Typically used for to check as designed against as constructed.

Data can be downloaded and digitally transferred for use in industry software.



How do we evaluate?

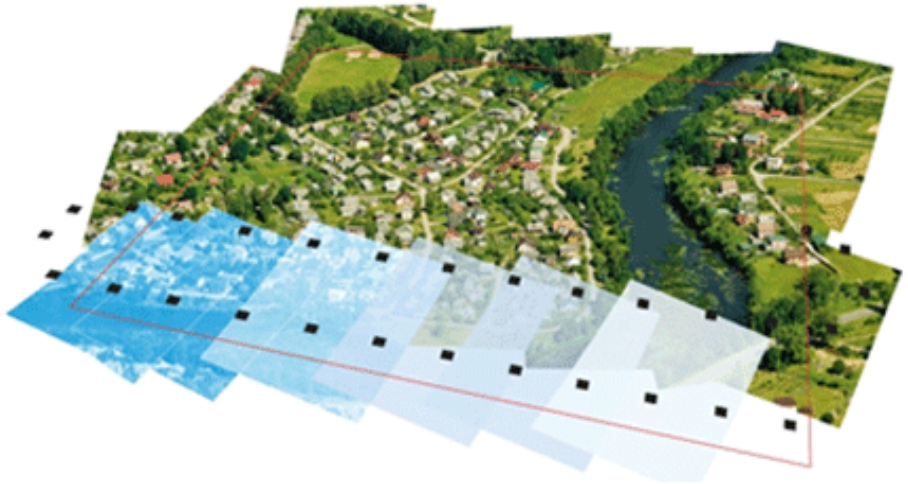
Photogrammetry

Aircraft mounted photographic system, with GPS and inertial navigation system.

Photogrammetry requires ground control and ground markers produced by a conventional surveying.
Fixed patterns of flight are used to produce overlapping photographs.

Stereoscopic images are produced from the photography to produce a 3D image of the site.

With the rise of the use of Drone technology photogrammetry is now becoming a more favourable and affordable option.





How do we evaluate?

Use collaborative digital tools

revizto™

Single Source of Truth for Any Project

Central Hub for All Models

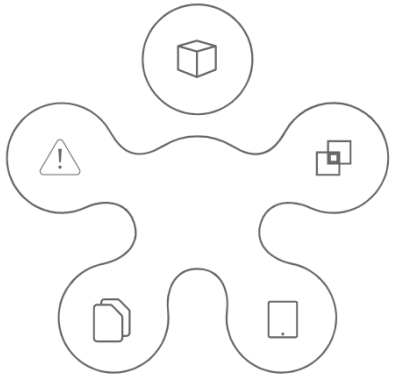
View the entire project by federating all intelligent BIM data including reality capture into a centralized user-friendly location and get all teams in-sync.

Real-time Issue Tracker

Easily standardize the way data moves through the project and effectively communicate model-based tasks with the team.

2D/3D Model Synergy

Leverage a unique 2D/3D combined view, easily compare 2D sheets and work with live CDE documentation seamlessly from inside Revizto.



Revizto Total Solution

VR Immersive Experience

Explore real-model data and coordination issues by leveraging Revizto's immersive, true-to-scale VR experience within seconds!

Clash free projects

Import and manage all your clashes inside Revizto. View issues in native modeling software, assign accountability and track changes to ensure all clashes are quickly and fully resolved.

Collaboration from Anywhere

Contribute from the office or on-site. Keep all trades on task and monitor their progress in the field and access all the project data on a mobile device.

Our Compatibilities

Plugins

- ArchiCAD
- AutoCAD
- CADmep
- Civil 3D
- Inventor
- MicroStation
- Navisworks
- OpenBuildings
- OpenRoads
- Revit
- Rhinoceros
- SketchUp
- Tekla
- Vectorworks

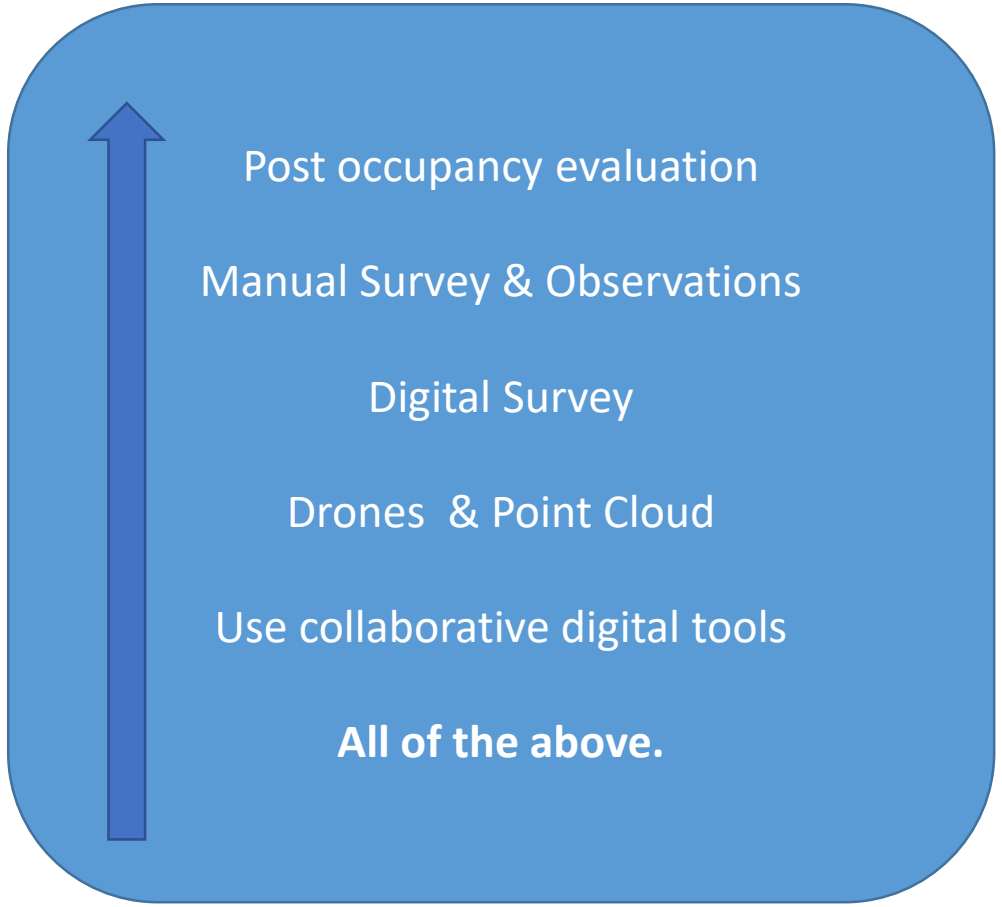
Supported Formats

- BCF
- DWF
- Faro
- FBX
- IFC
- LAS
- OBJ
- PDF
- Solibri
- ReCap

Integrations

- BIM360
- Box
- Procore

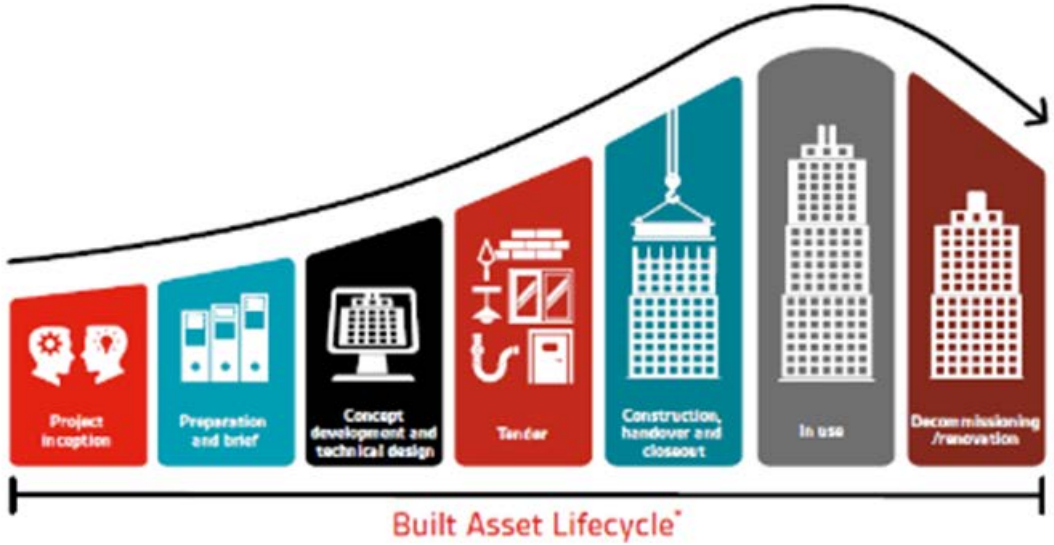
How do we evaluate?



How is this managed?

Life Cycle of the Asset that considers:

- Management and Controls for Maintenance
- Introduction of Sustainability Measures
- Monitoring Energy Performance
- Health and Safety - Statutory Observations
- Management of Alterations, Adaptations and Refurbishment
- Introduction of New Technologies



How is this managed?







Planned 'Preventative' Maintenance and Cyclical Testing

How is this managed?



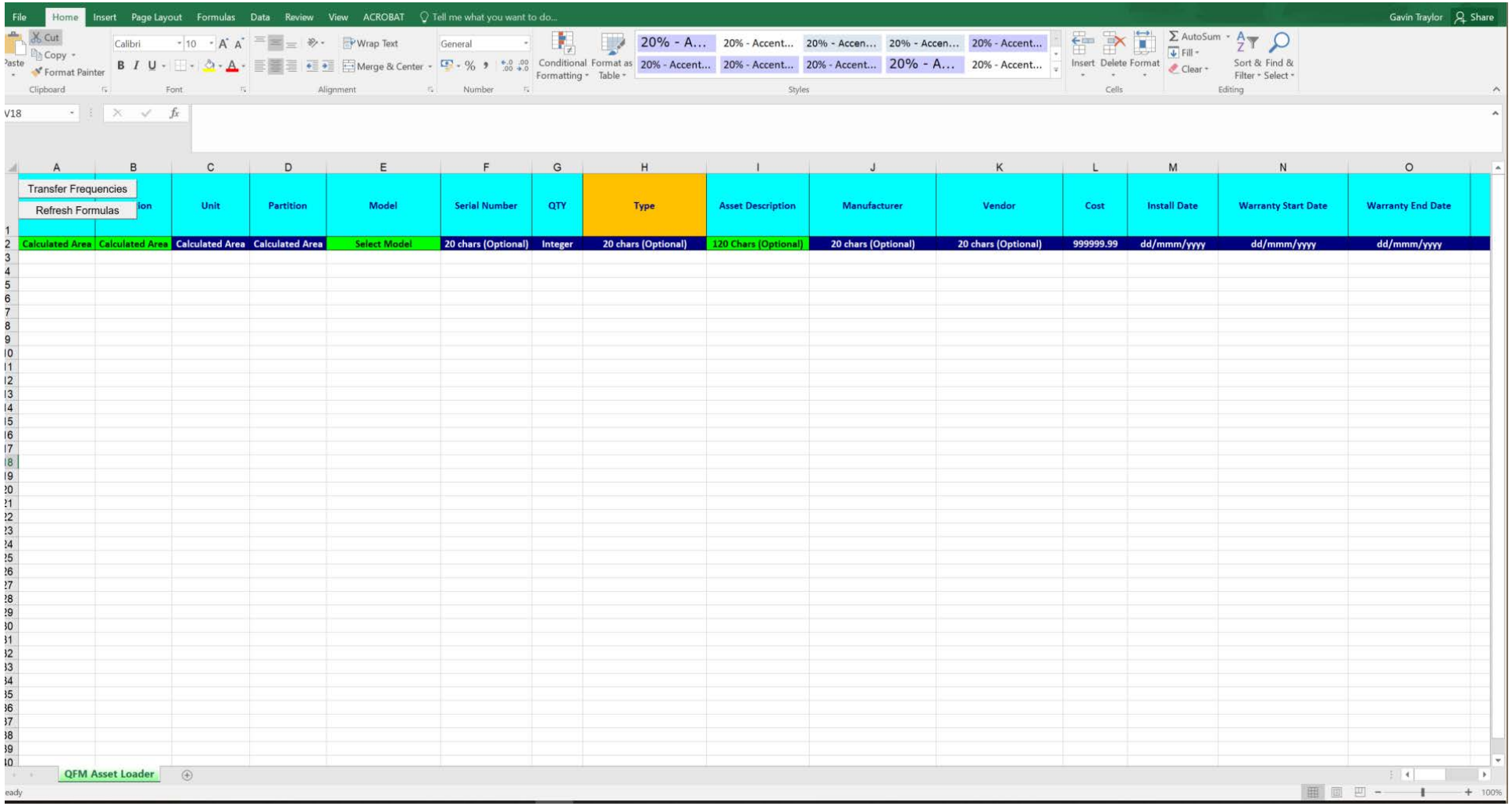
Data Base



Old School Data Base

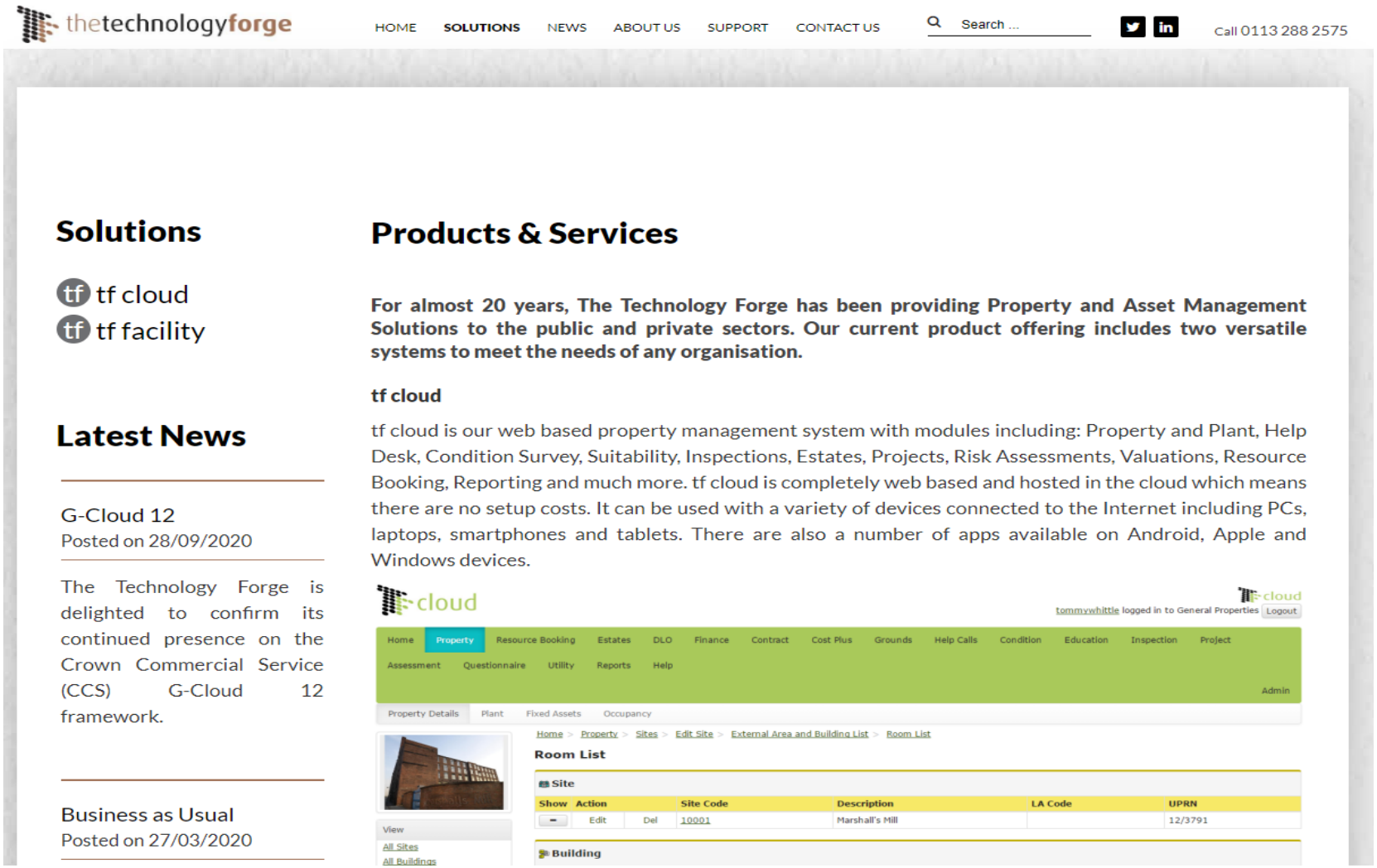
Basic CAFM

How is this managed?



Cloud Based CAFM

How is this managed?

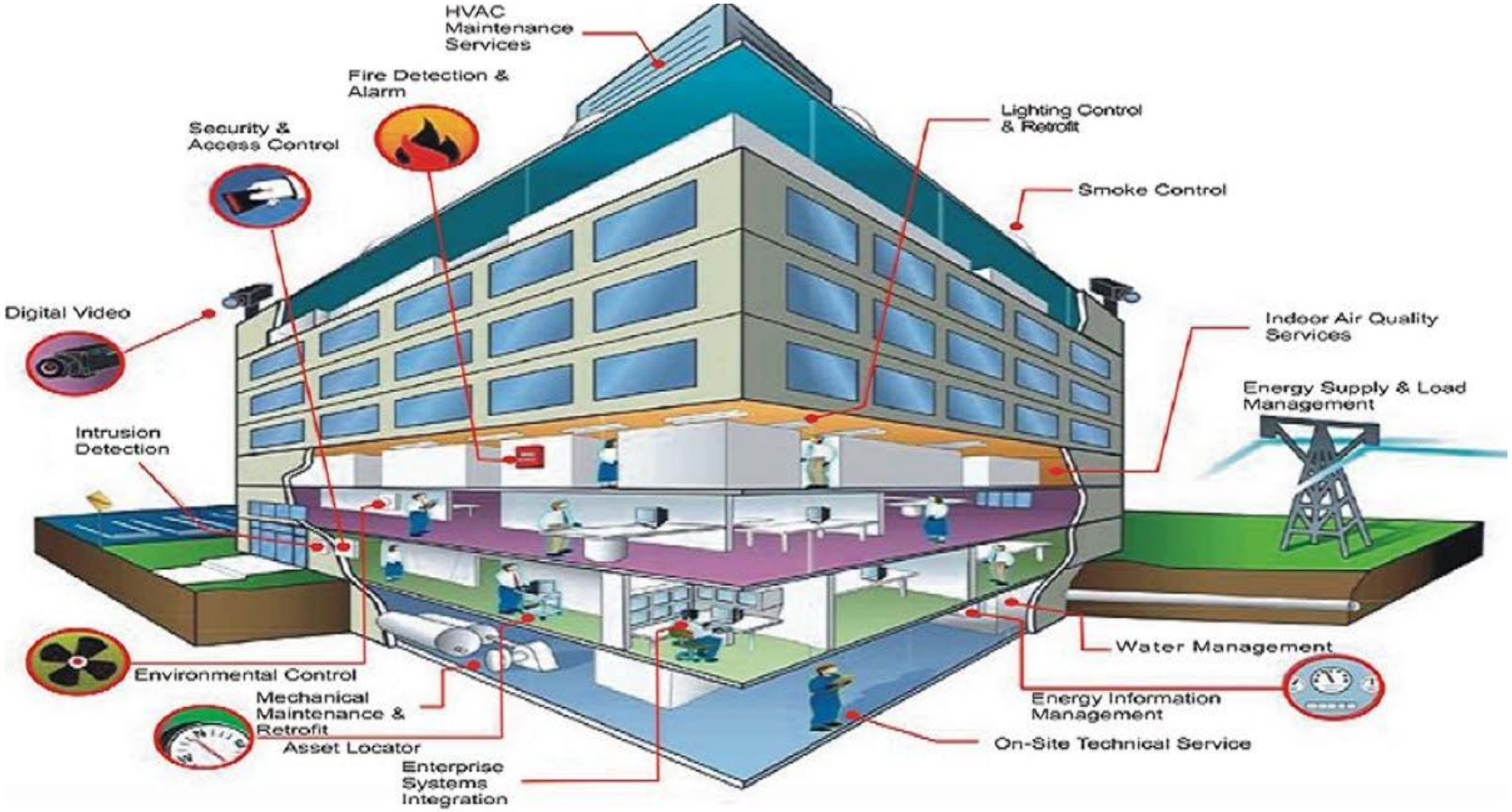


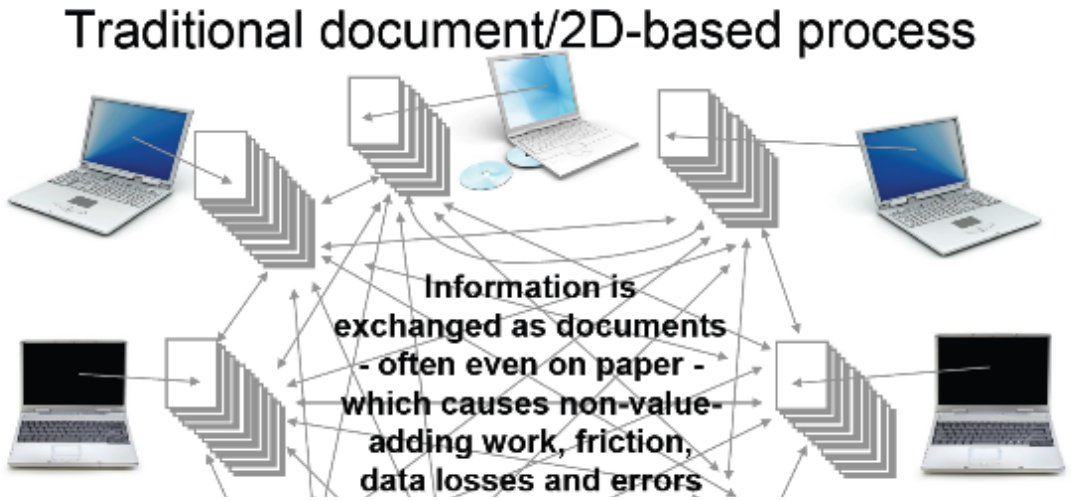
DATA IN

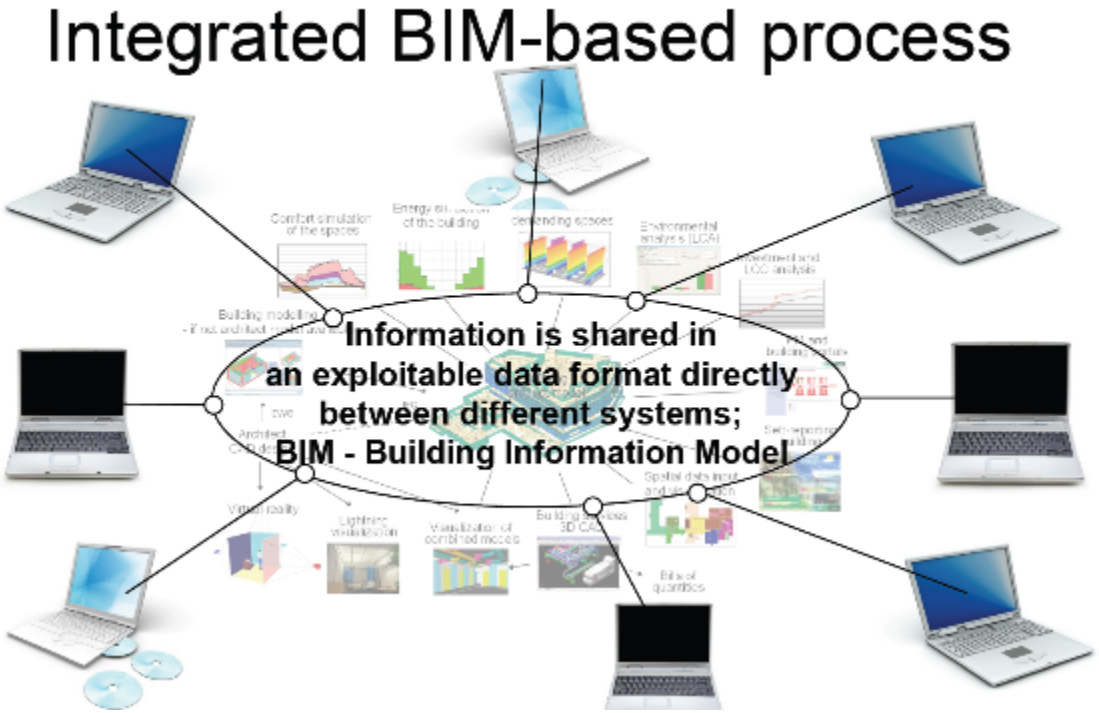
DATA OUT

Building Management Systems BMS

How is this managed?







How is this managed?

Interoperability

Cobie

Trigger events

How can we improve?

What can we learn?

1 The accelerating pace of change ...

Agricultural Revolution ← 8,000 years → Industrial Revolution ← 120 years → Light-bulb ← 90 years → Moon landing

← 22 years → World Wide Web ← 9 years → Human genome sequenced

2 ... and exponential growth in computing power ...

Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 90 years

COMPUTER RANKINGS
By calculations per second per $1,000

Analytical engine
Never fully built, Charles Babbage's invention was designed to solve computational and logical problems

Colossus
The electronic computer, with 1,500 vacuum tubes, helped the British crack German codes during WW II

UNIVAC I
The first commercially marketed computer, used to tabulate the U.S. Census, occupied 943 cu. ft.

Hollerith Tabulator
IBM Tabulator
National Ellis 3000
Zuse 2
Zuse 3
ENIAC
IBM SSEC
BINAC
EDVAC
Whirlwind
Datamatic 1000
IBM 1620
DEC PDP-4
DEC PDP-10
IBM 1130
Data General Nova
Intellec-8
IBM PC
Compaq Deskpro 386
Pentium PC
Pentium II PC
Dell Dimension 8400
Mac Pro
Nvidia Tesla GPU & PC

ELECTROMECHANICAL — RELAYS — VACUUM TUBES — TRANSISTORS — INTEGRATED CIRCUITS

1900 1920 1940 1960 1980 2000 2011 2020

10^{26} 10^{20} 10^{15} 10,000,000,000 100,000 1 0.00001

3 ... will lead to the Singularity

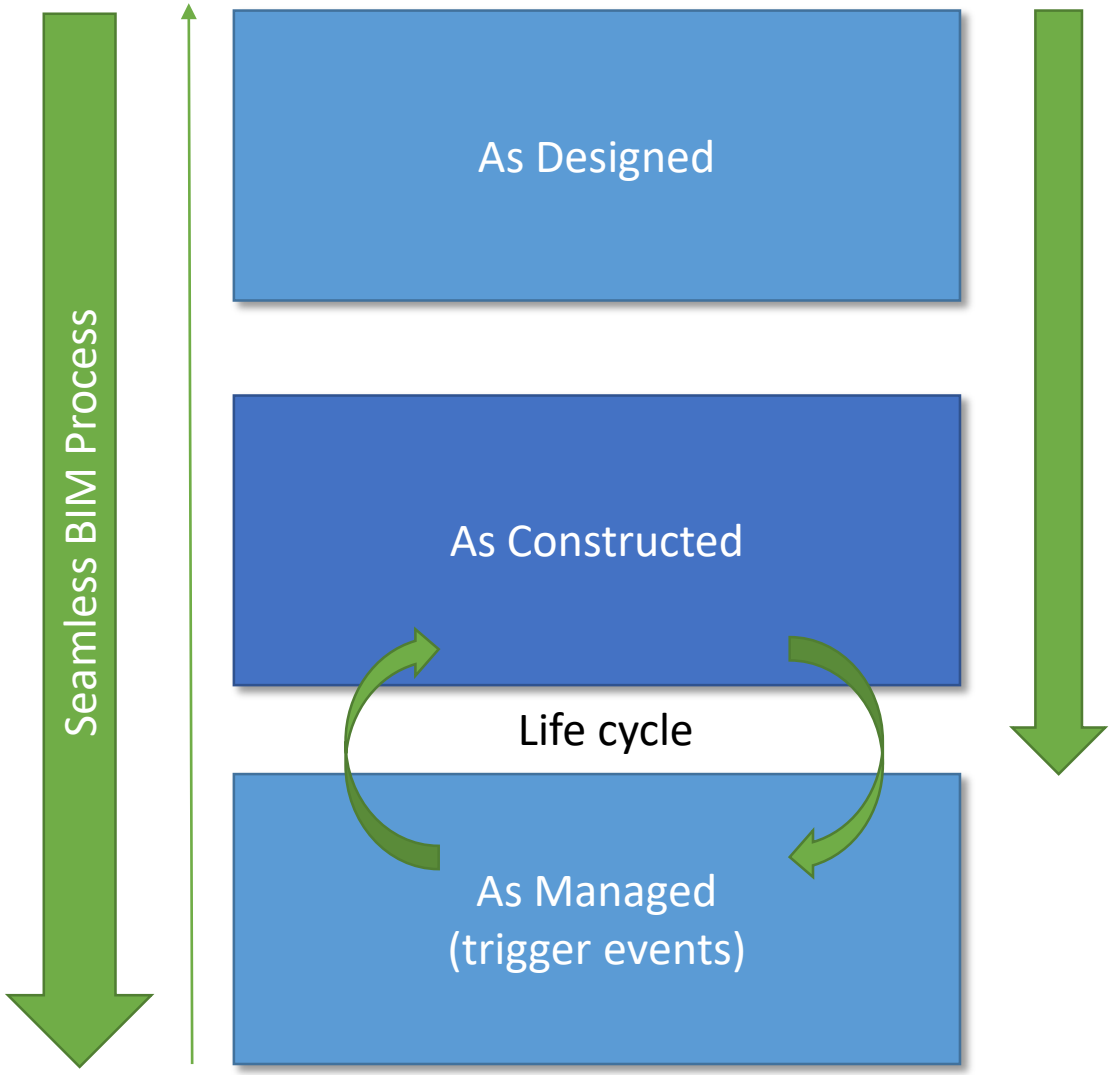
Apple II
At a price of $1,298, the compact machine was one of the first massively popular personal computers

Power Mac G4
The first personal computer to deliver more than 1 billion floating-point operations per second

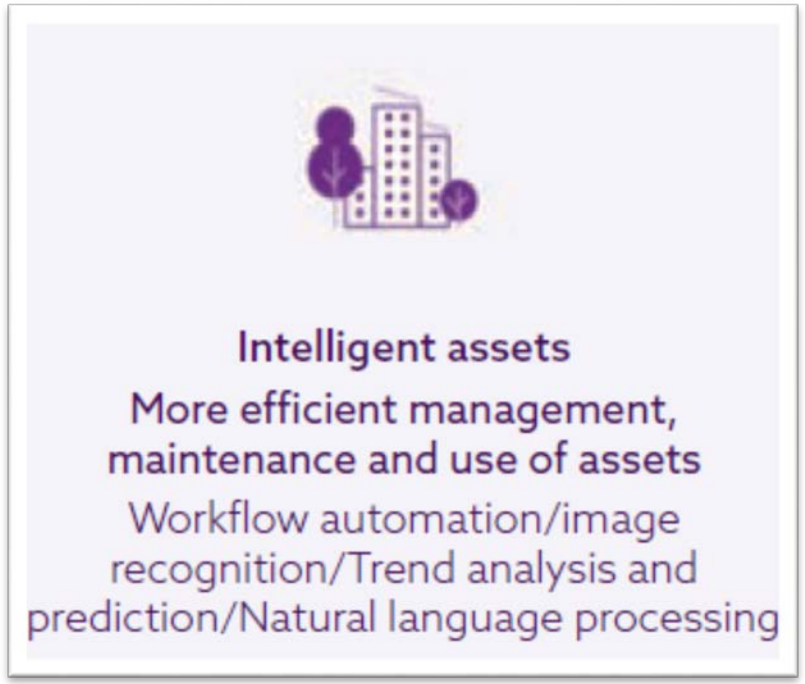
2045
Surpasses brainpower equivalent to that of all human brains combined

Surpasses brainpower of human in 2023

Surpasses brainpower of mouse in 201



Ensure these the same



Design, Construct, Operate and Maintain **One Truth.**

What about existing building stock?

Challenges of Decarbonisation

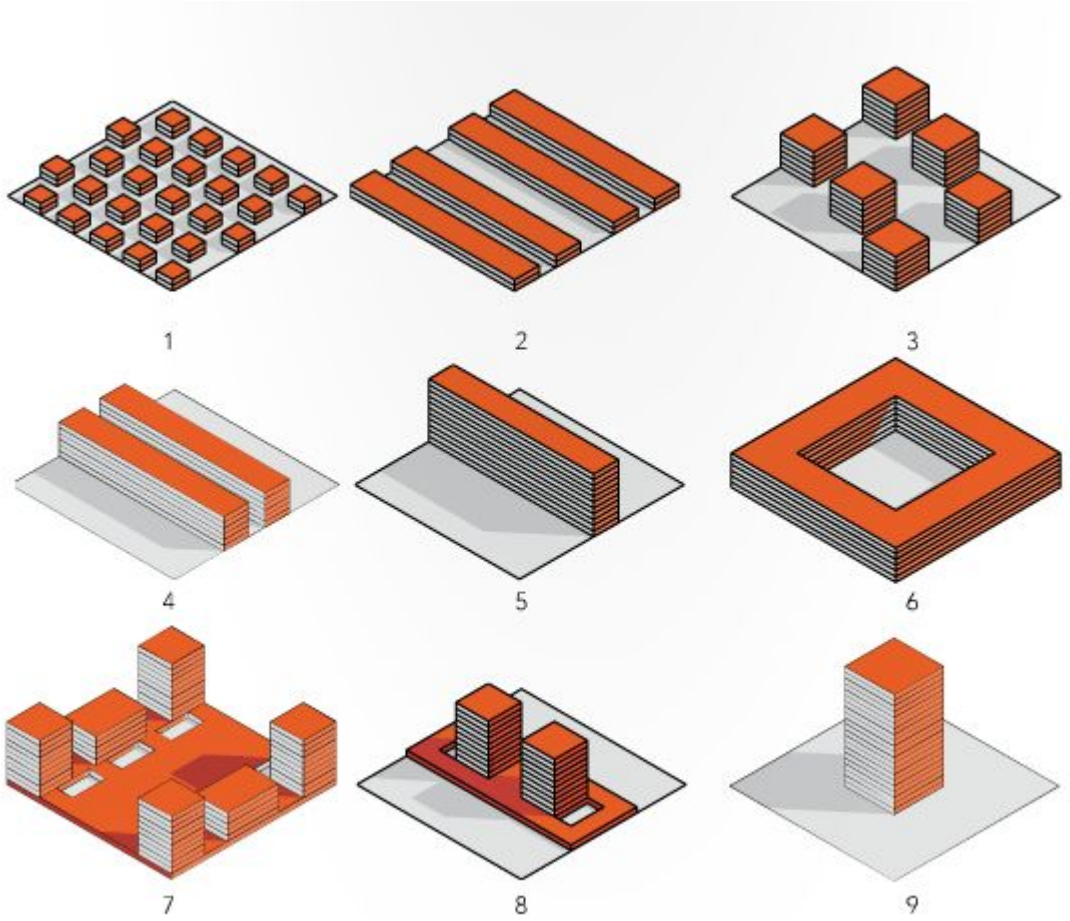
Speaking at the CN Decarbonising Construction conference, Sonal Jain warned viewers that the UK Government's target of a net-zero carbon economy by 2050 is at risk because 80 per cent of the buildings that will be around in that year have already been built.

Jain said: "Because 80 per cent of the building stock for 2050 already exists, we cannot deliver on our net-zero goal without fully upgrading this. There is a limited time to upgrade the existing building stock, and delivering net-zero will require deep retrofits of these buildings."

https://www.constructionnews.co.uk/sustainability/consultant-urges-delivery-of-mass-retrofit-programme-30-09-2020/



Challenges of Building Typologies



Functions of Buildings

Why do we Build?

The use of buildings as protective structures or enclosures.

Since fire was first used by primitive people to provide light and heat, the use of energy to aid in environmental moderation has developed internal environments that reduce the effects and extremes in the external climate.

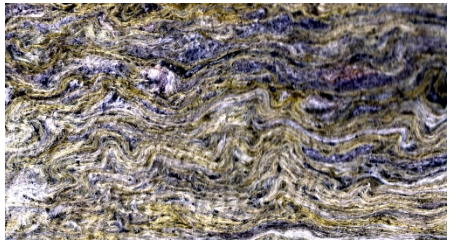
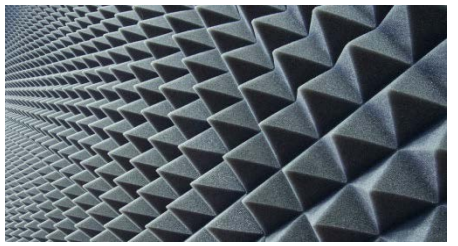


https://i.dailymail.co.uk/i/pix/2015/07/03/14/2A338A5800000578-3148511-image-a-21_1435930837225.jpg

The use of buildings to house people, equipment and processes have resulted in the development of buildings that can control these internal environments with greater accuracy.

As well as protection and enclosure we can now consider:

- Thermal Insulation and temperature control
- Acoustic insulation
- Provision of Light (natural and artificial)
- Controls for humidity and ventilation
- Exclusion of contaminants.





Performance Requirements of the Building Fabric

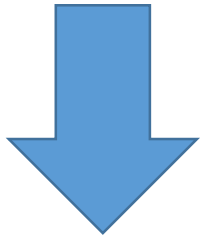
What are the key drivers in providing a building that is suitable for the need?

- Structurally Stable
- Durability
- Thermal insulation
- Protection from weather and exclusion of moisture
- Acoustic performance
- Flexibility to change to changing needs
- Aesthetics
- Buildability
- Sustainability

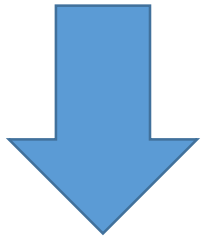


Trigger events?

Flexibility to change to changing needs



How Buildings Learn



How Digital Technologies can Assist

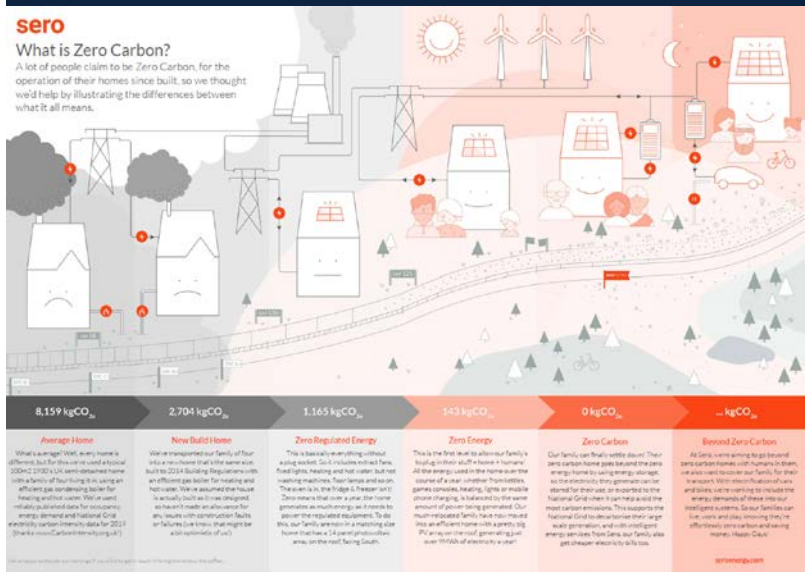
Challenges and Opportunities



New Technology (Early Adopters – Driving Change)

https://www.seroprojects.com/





https://www.activebuildingcentre.com/

Active Building Centre

OUR CHALLENGE

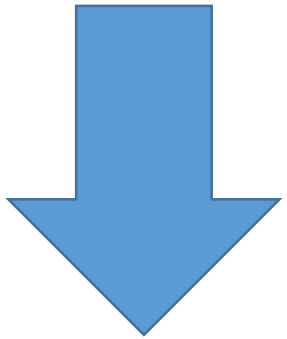
The UK Government is committing to ambitious targets for the UK to reach net zero carbon emissions by 2050.

Funded through the Transforming Construction Challenge, the Active Building Centre seeks to transform the way the UK designs, constructs and operates buildings.

Active Buildings have the potential to substantially reduce both the operational costs of buildings and their demand on the UK energy infrastructure.



There is a limited time to upgrade the existing building stock, and delivering net-zero will require deep retrofits of these buildings.



Can BIM help us evaluate our Building Stock?

Use of Digital Technology and Interoperable collaborative platforms

Creating a Data Rich Building Stock

FOCUS ON NEW BUILD

Other methods are useful for digitizing an estate

Data Availability

New Build

- Accurate geometry
- Asset data available



Laser Scan and Model

- Accurate geometry
- Very limited data available



Conversion of Existing 2D information

- Inaccurate geometry
- Data limited to drawing notes



UWE Bristol University of the West of England



https://youtu.be/dSLZVfrKgRs

“Many in the Facility Management industry have struggled to make use of information from BIM. Is it surprising? Not really, as a sector, we’re all as diverse and different as the buildings we manage’ Mike Ford BIM Manager UWE

Project Edit Sync Share 2D 3D Issue Tracker Preferences Help Gavin

Group by

Objects

Levels

Links

Filter by Discipline

Mechanical

Electrical

Pipes

Architecture

Structure

ALL

Building06.rvt

N7177-BOF-02-ZZ-M3-X1-0001.ifc

UWTSD-JUB-01-XX-M3-S-0004.ifc

UWTSD-JUB-04-XX-M3-S-0003.ifc

UWTSD-JUB-06-XX-M3-S-0003.ifc

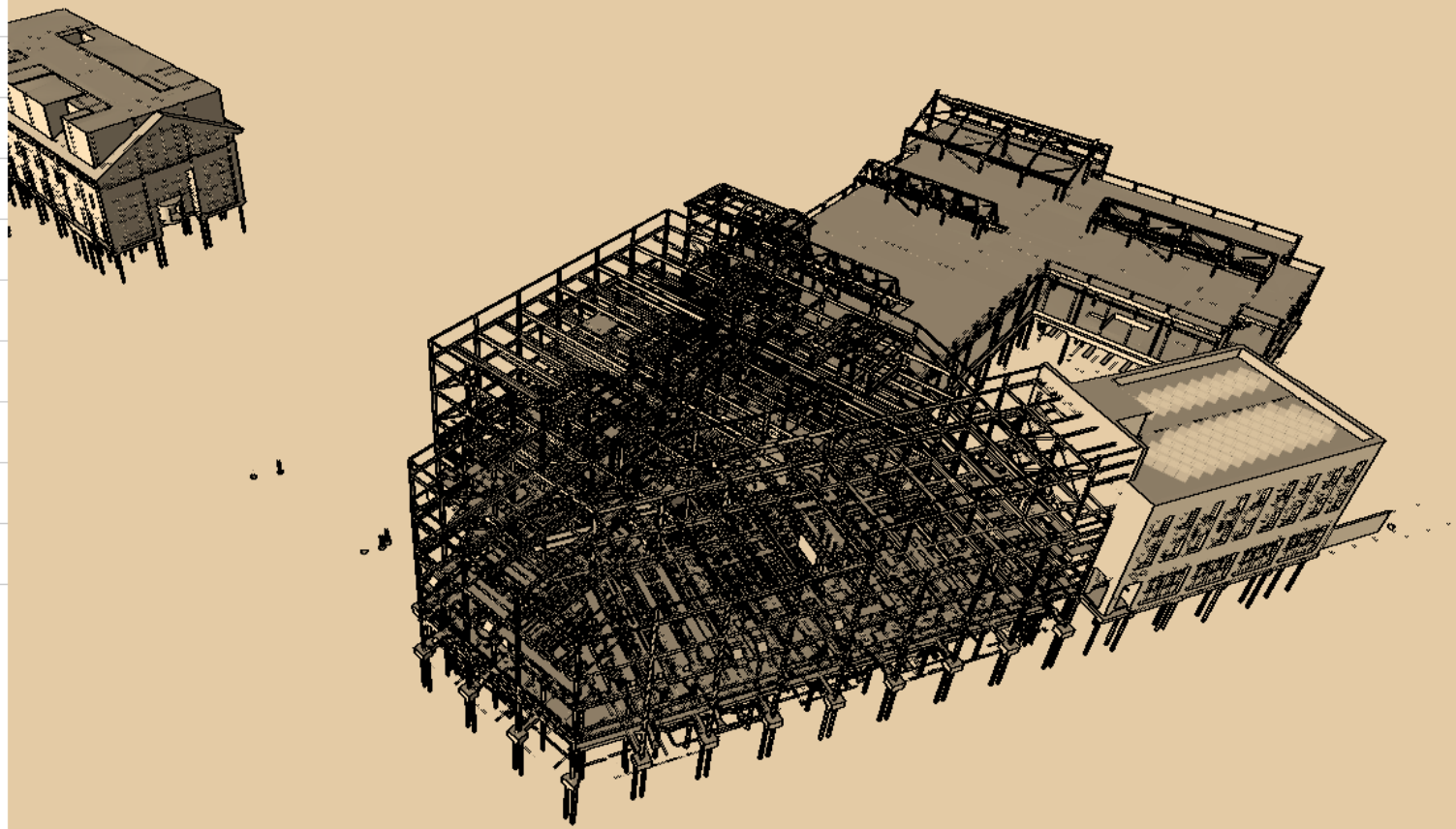
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UWTSD-WBS-01-XX-M3-E-001.ifc

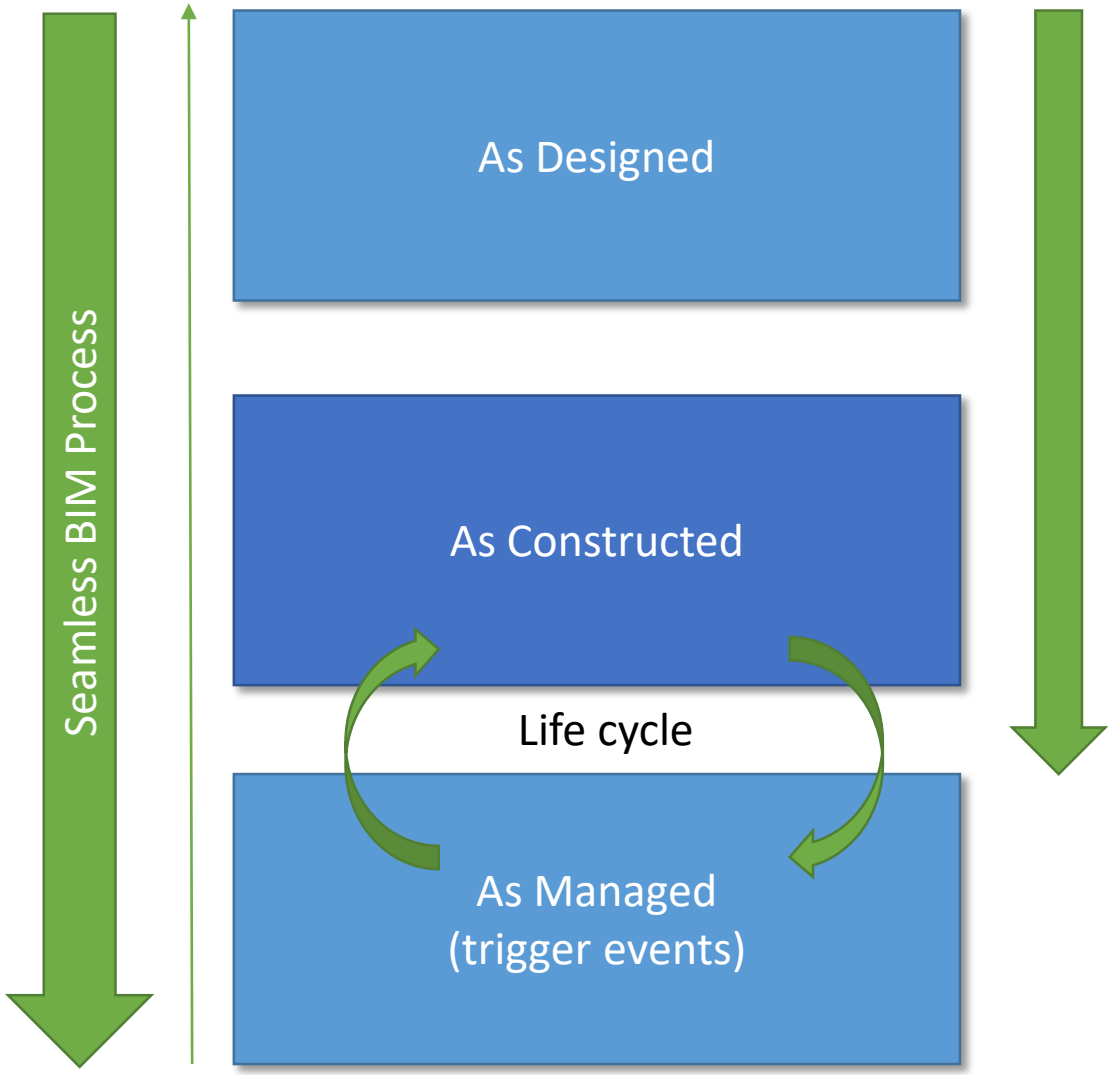
UWTSD-WBS-01-XX-M3-M-001.ifc

UWTSD-WBS-04-XX-M3-ME-001.ifc

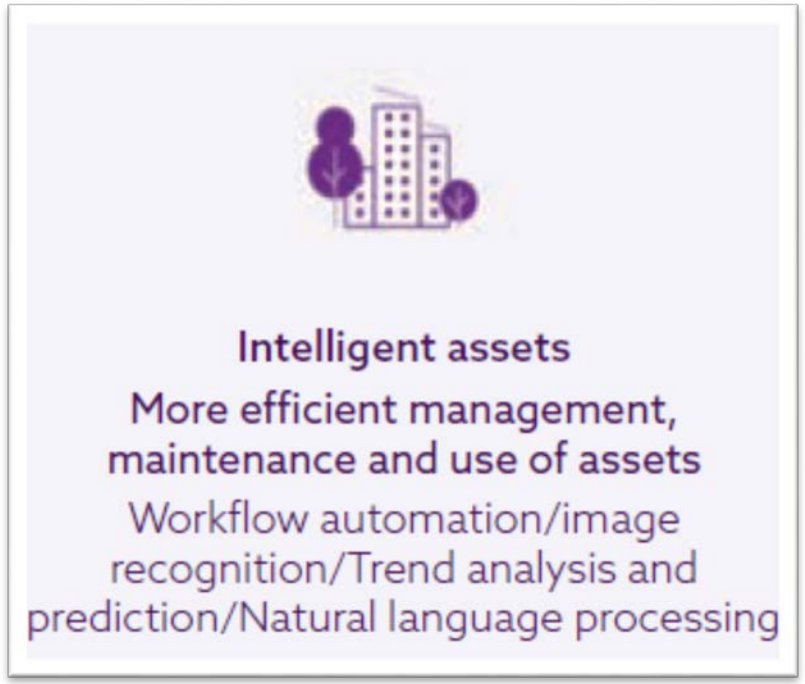
UWTSD-WBS-06-XX-M3-ME-001.ifc



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David



Ensure these the same

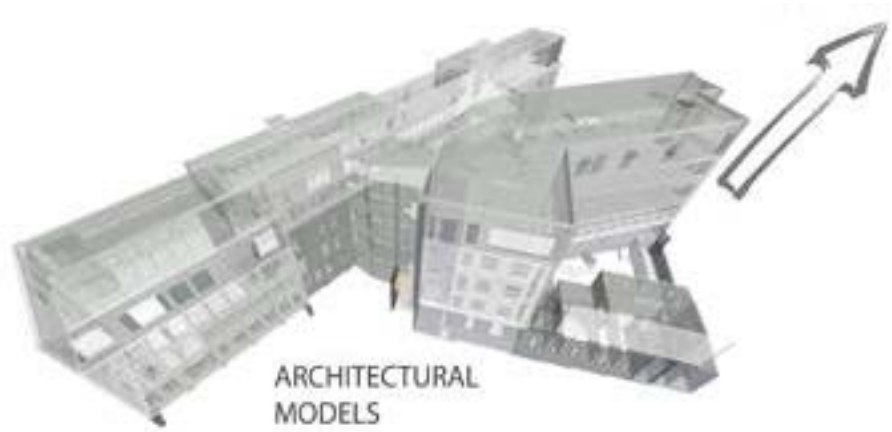


Design, Construct, Operate and Maintain **One Truth.**

How can we create data rich intelligent models?

Tools such as Revit enable intelligent 3D Modelling
that can be linked into a BIM Process.

AUTODESK®
REVIT®



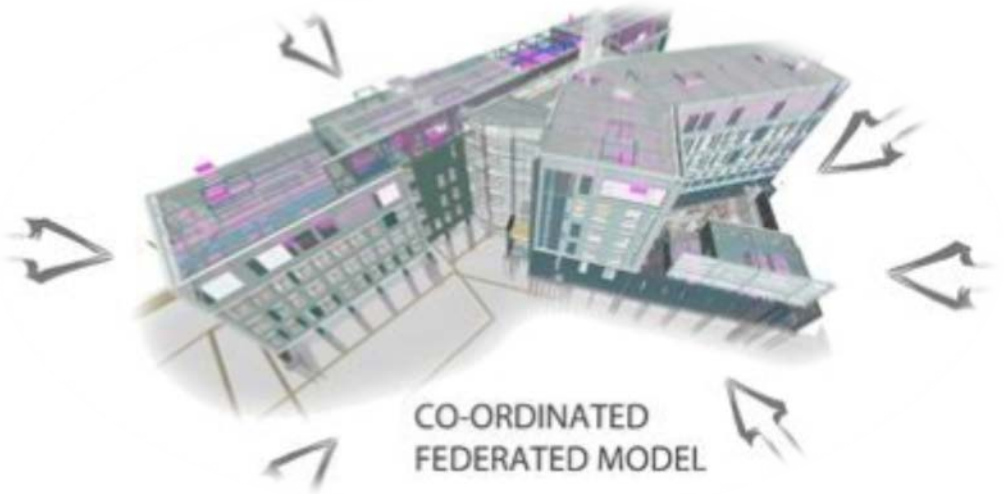
Remember a Revit Model alone is not BIM

Collaboration

How can we collaborate?

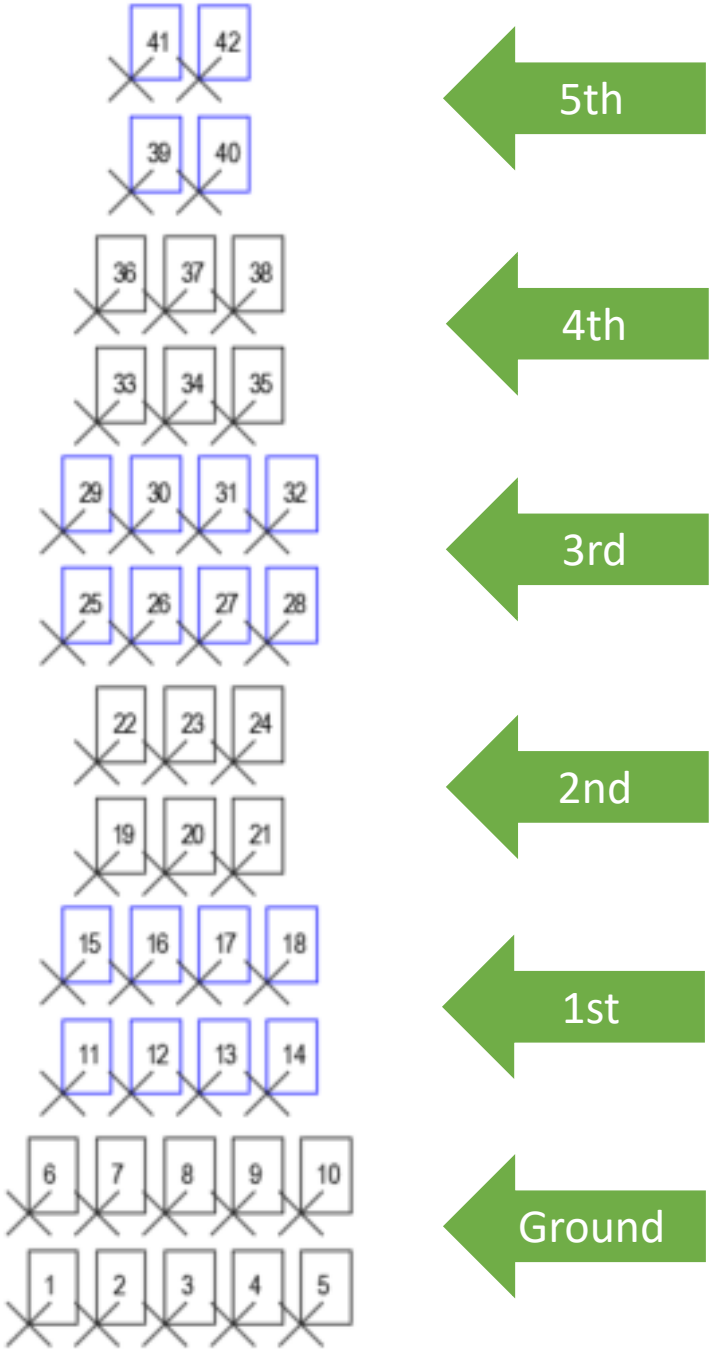
Tools such as Revizto enable a collaborative process using 2D and 3D Modelling with Intelligent Data

revizto™



https://revizto.com/en/

https://youtu.be/OnG3-0NqLr4



Collaboration Exercise

Number	Name		Northings	Eastings	Level	Level Height (above 0)
1	Gavin	Traylor	0	0	Ground Floor	0
2	TOBIAS	ADAMSON	0	11000	Ground Floor	0
3	RHYS	BOLTON	0	22000	Ground Floor	0
4	OWEN STEPHEN	BROWN	0	33000	Ground Floor	0
5	NATHAN ALEXANDER	CAMERON	0	44000	Ground Floor	0
6	MORGAN LLOYD	DAVIES	18000	0	Ground Floor	0
7	STEFFAN	DAVIS	18000	11000	Ground Floor	0
8	EMILIE	DRISCOLL	18000	22000	Ground Floor	0
9	CAMERON NIALL	EVANS	18000	33000	Ground Floor	0
10	TEIFION	EVANS	18000	44000	Ground Floor	0
11	CAI	GIBBONS	0	5500	First Floor	3000
12	SAMUEL JAMES	GRIFFITHS	0	16500	First Floor	3000
13	ADAM	HASSAN	0	27500	First Floor	3000
14	DAVID ANDREW	WHITECROSS	0	38500	First Floor	3000
15	AL DAVID	IKETE	18000	5500	First Floor	3000
16	BENJAMIN JOSEPH	KNEESHAW	18000	16500	First Floor	3000
17	JACK RICHARD	LLEWELLYN	18000	27500	First Floor	3000
18	RHYS JAMES	MATHIAS	18000	38500	First Floor	3000
19	DYLAN MARK PRESTON	MATTHEWS	0	11000	2nd Floor	6000
20	CHRISTOPHER MARK	MCINTOSH	0	22000	2nd Floor	6000
21	ELLIS	MOORE	0	33000	2nd Floor	6000
22	SOPHIE CHERYL ANN	MORGAN	18000	11000	2nd Floor	6000
23	RICHARD	MURRAY	18000	22000	2nd Floor	6000
24	RHYDIAN JOHN	PREECE	18000	33000	2nd Floor	6000
25	STEFFAN	PRYCE-GRIFFITHS	0	5500	3rd Floor	9000
26	MERLIN MEURIG RHYS	RATNER	0	16500	3rd Floor	9000
27	BRETT OMRI	THOMAS	0	27500	3rd Floor	9000
28	JACOB	THOMAS	0	38500	3rd Floor	9000
29	JONATHAN ANDREW	TRIGGS	18000	5500	3rd Floor	9000
30	SIAN MARIE	WALKEY	0	16500	3rd Floor	9000
31	RHYS	WHITEMAN	0	27500	3rd Floor	9000
32	ELIS ARON	WILLIAMS	18000	38500	3rd Floor	9000
33	ANTHONY THOMAS	WILLIAMS-LLOYD	0	11000	4th Floor	12000
34	TIMOTHY OWEN GUEST	REES	0	22000	4th Floor	12000
35	CHELBIE ELIZABETH ANN	JONES	0	33000	4th Floor	12000
36	OLIVER RHYS	HEARNE	18000	11000	4th Floor	12000
37	LUKAS MARK	MOLNAR RIIS	18000	22000	4th Floor	12000
38	DANIEL	LEWIS-EDWARDS	18000	33000	4th Floor	12000
39	CIERAN	STEPHENS	0	16500	5th Floor	15000
40	NEIL ALAN	GADD	0	27500	5th Floor	15000
41	CHRISTOPHER JACK	REES	0	16500	5th Floor	15000
42	STEVEN ASHLEY	COX	0	27500	5th Floor	15000

Collaboration Exercise

Create a new project from the Architectural Template.

Design a unit with the external dimensions of 8m x 12m.

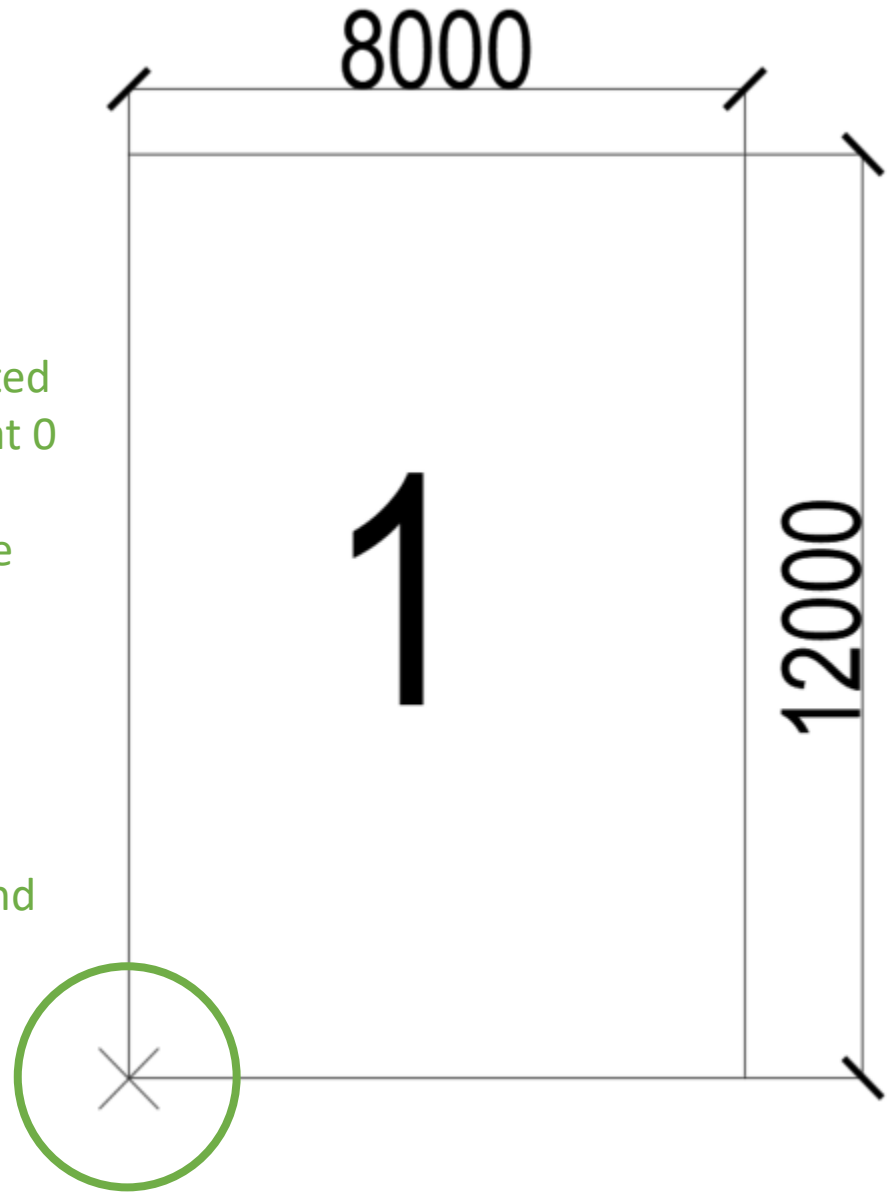
Your unit must be position to the correct Project Base Point and located on the appropriate Level. NB your project base point should remain at 0 elevation. (Refer to table for Northings and Eastings)
Note there are six storeys in this building so make sure you are on the right level.

Wall types / windows / doors / internal arrangement is up to you. A generic 200mm floor and 200mm flat roof should be used.

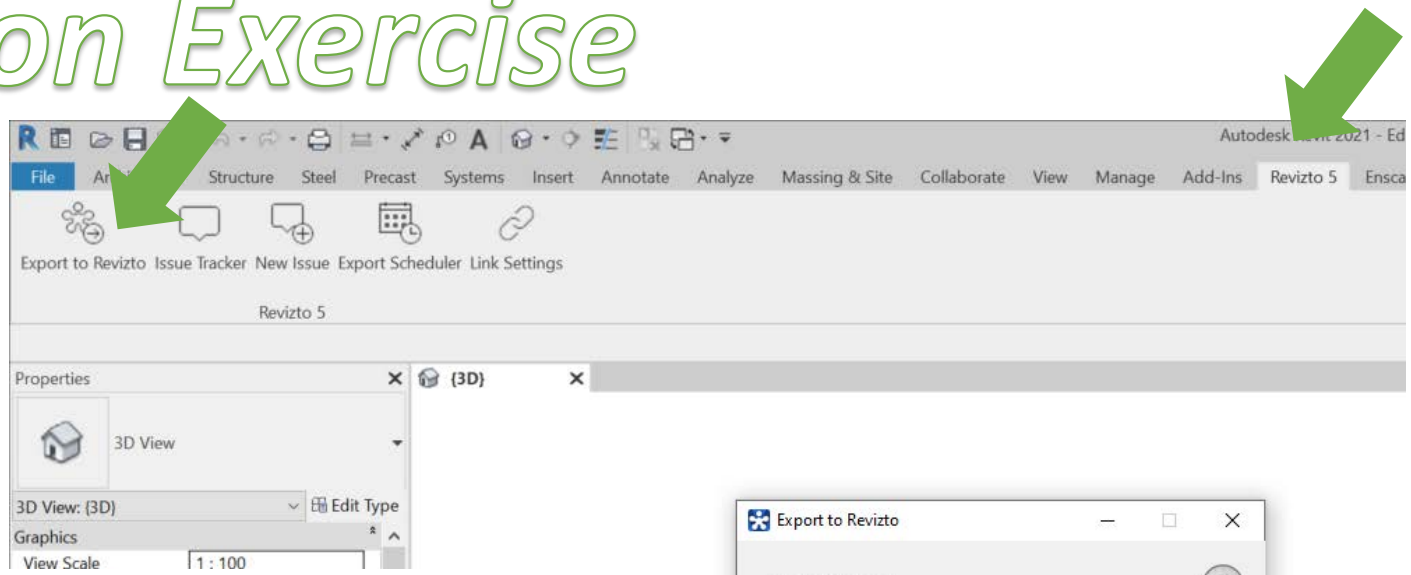
Create a Sheet using the UWTSD Title Block showing the floor plan and section at 1:50 scale.

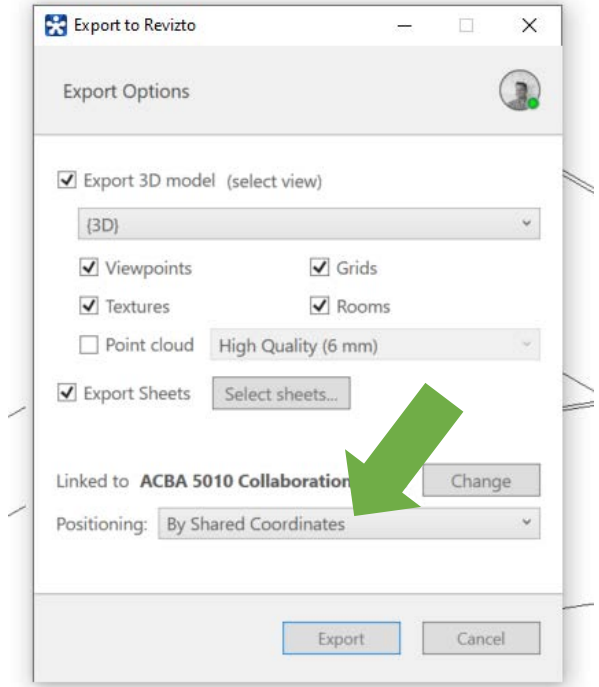
Create a standard 3D View.

Save your project (add your name to the title)



Collaboration Exercise





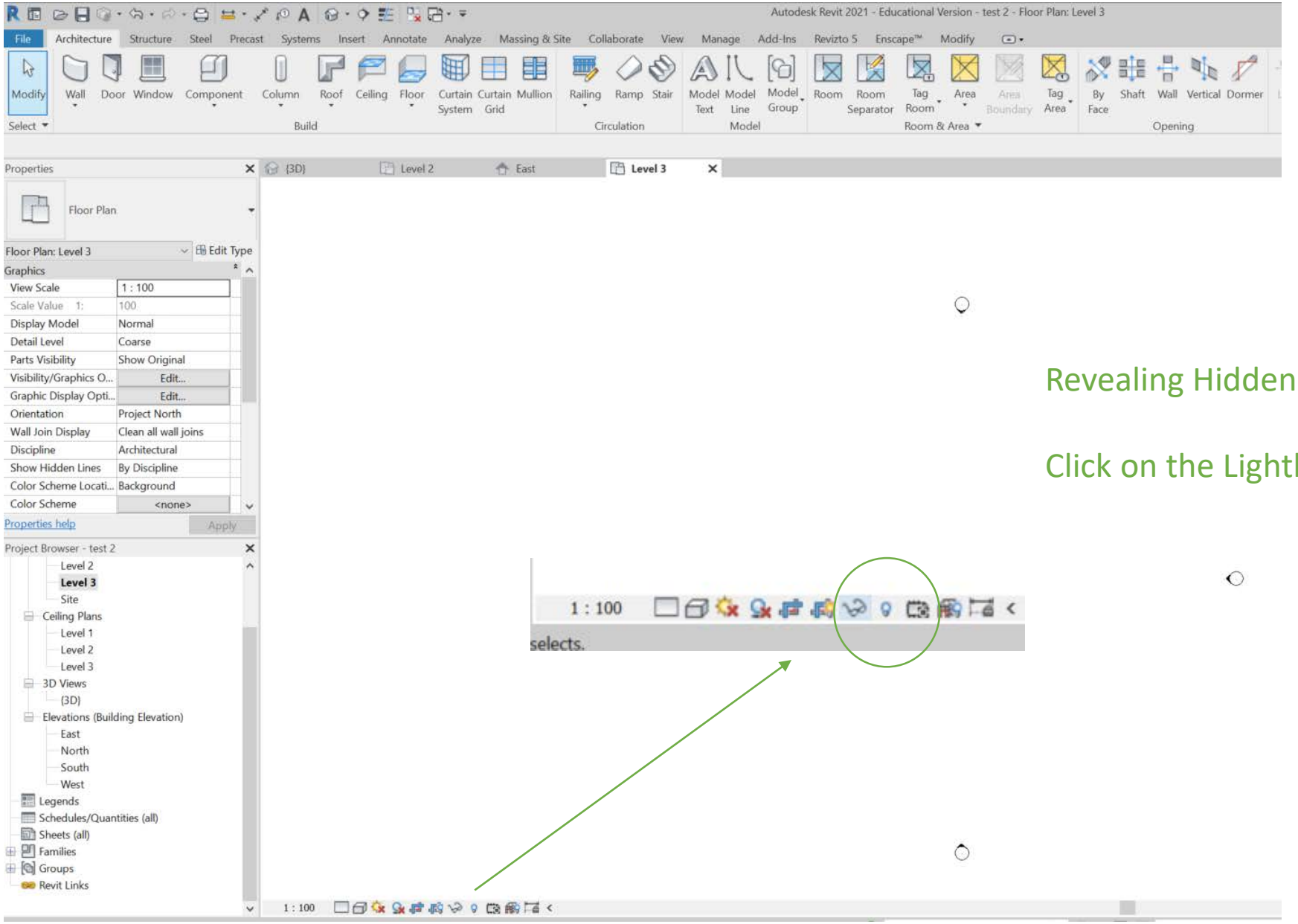
Exporting your Project to Revizto.

Open your 3D view.

From the Revizto Plug in Menu Select EXPORT TO REVIZTO

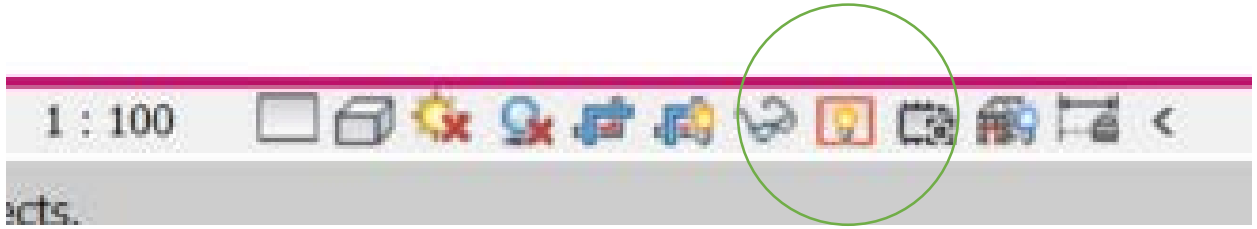
Append to an existing Model ‘ACBA 5010 Collaboration Class Exercise’

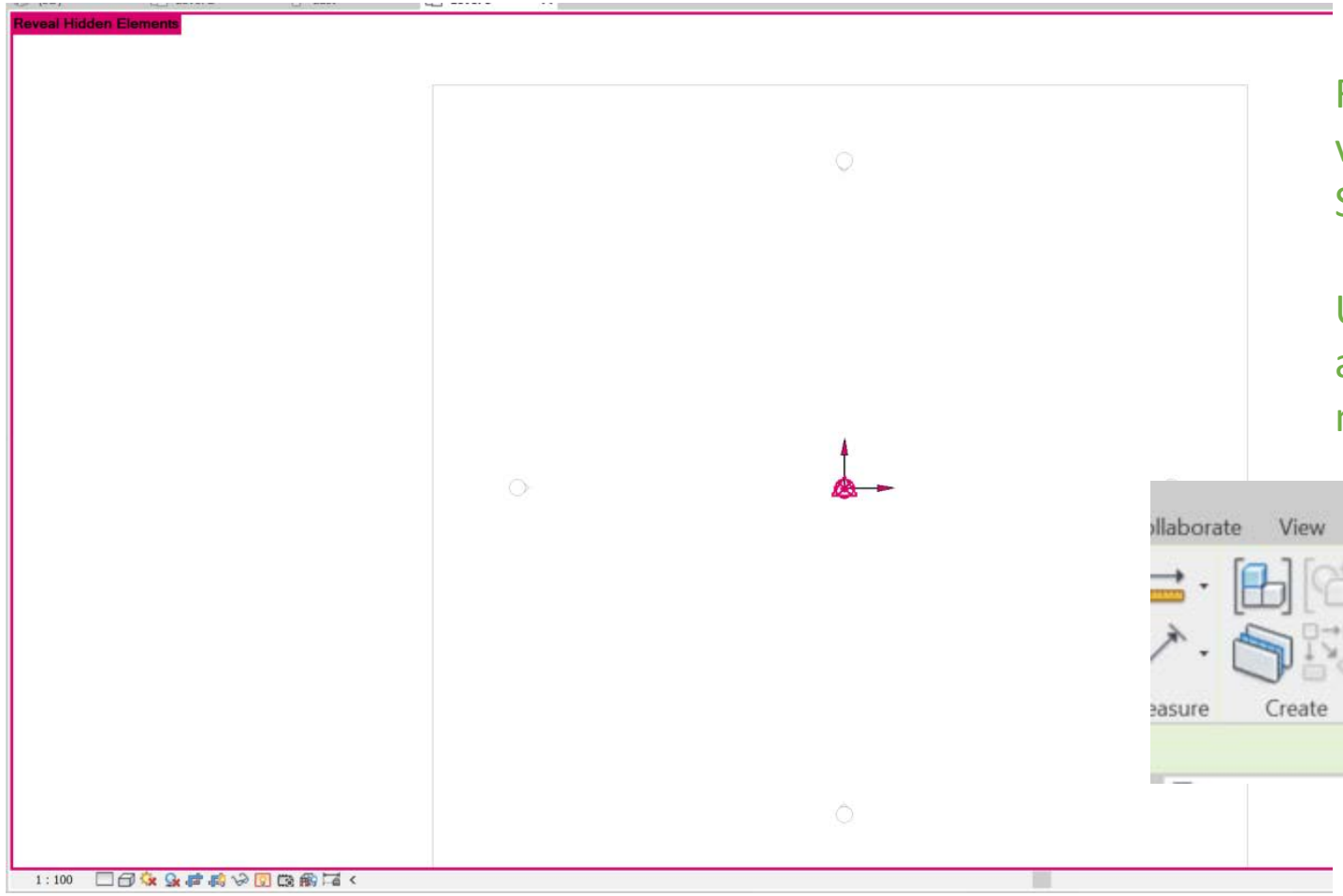
NB: Make sure the Positioning Settings are Set to ‘Shared Coordinates’



Revealing Hidden Items and Objects in Revit.

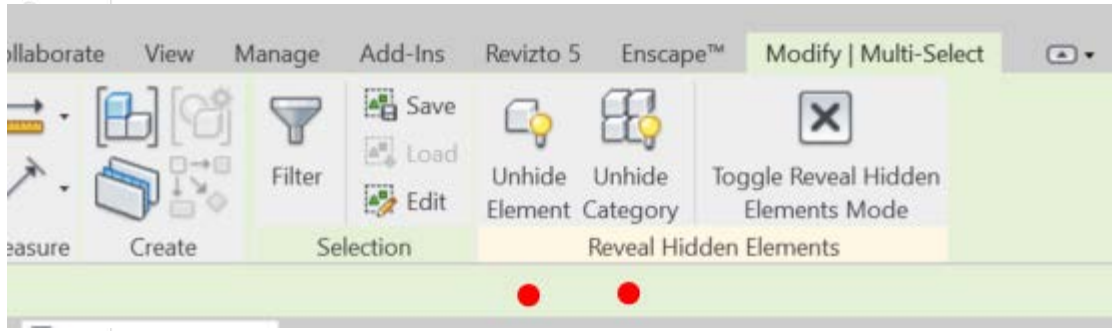
Click on the Lightbulb to activate the Reveal View.





Reveal Mode, shows hidden elements in the view, including the Project Base Point and Survey Point.

Unhide Elements (on the Ribbon) to Reveal and Click the Lightbulb to return to the normal view.



ACBA 5010 Collaboration Class Exercise

Project Edit Sync Share 2D 3D Issue Tracker Docs Preferences Help Gavin





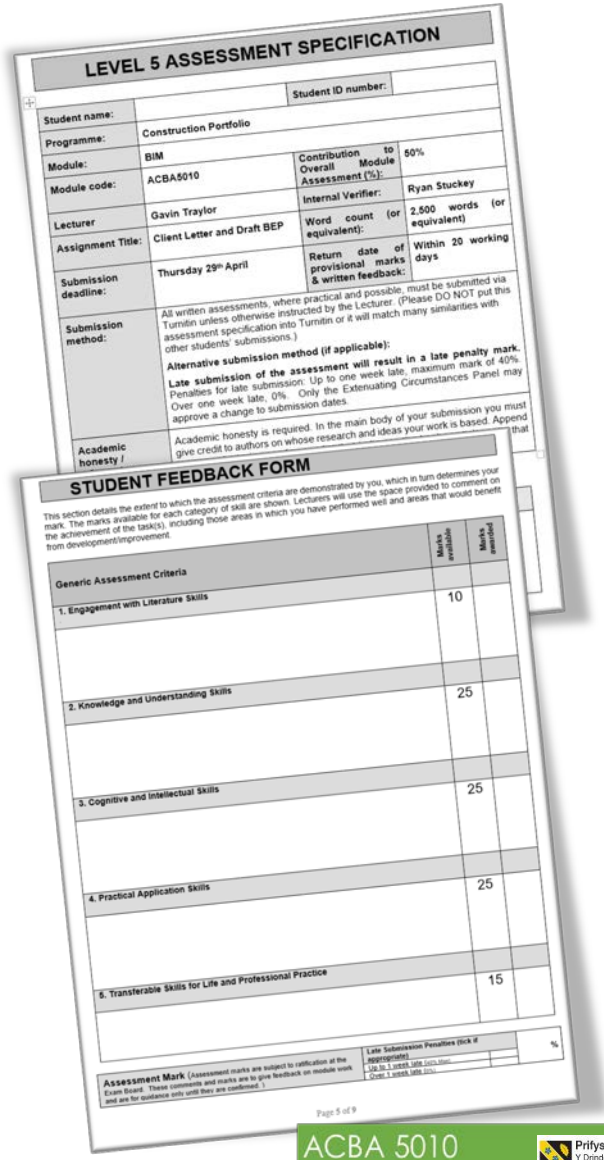
Assessment 1

Submission deadline:	29th April 2021

Module Learning Outcomes
(from module syllabus)

Learning Outcomes:

Comprehend and apply the functions and processes needed to manage the life cycle of a built structure in a Building Information Modelling environment and subsequently to produce digital data.



LEVEL 5 ASSESSMENT SPECIFICATION

Student name:		Student ID number:	
Programme:	Construction Portfolio		
Module:	BIM	Contribution to Overall Module Assessment (%):	50%
Module code:	ACBA5010	Internal Verifier:	Ryan Stuckey
Lecturer	Gavin Traylor	Word count (or equivalent):	2,500 words (or equivalent)
Assignment Title:	Client Letter and Draft BEP	Return date of provisional marks & written feedback:	Within 20 working days
Submission deadline:	Thursday 29th April		
Submission method:	All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) **Alternative submission method (if applicable):** **Late submission of the assessment will result in a late penalty mark.** Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.		
Academic honesty /	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append		that

STUDENT FEEDBACK FORM

This section details the extent to which the assessment criteria are demonstrated by you, which in turn determines your mark. The marks available for each category of skill are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills	10	
2. Knowledge and Understanding Skills	25	
3. Cognitive and Intellectual Skills	25	
4. Practical Application Skills	25	
5. Transferable Skills for Life and Professional Practice	15	

Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.) %

Late Submission Penalties (tick if appropriate)
Up to 1 week late (w/c Mon)
Over 1 week late (w/c Mon)

Page 5 of 9

Assessment 1

Submission deadline:	29th April 2021

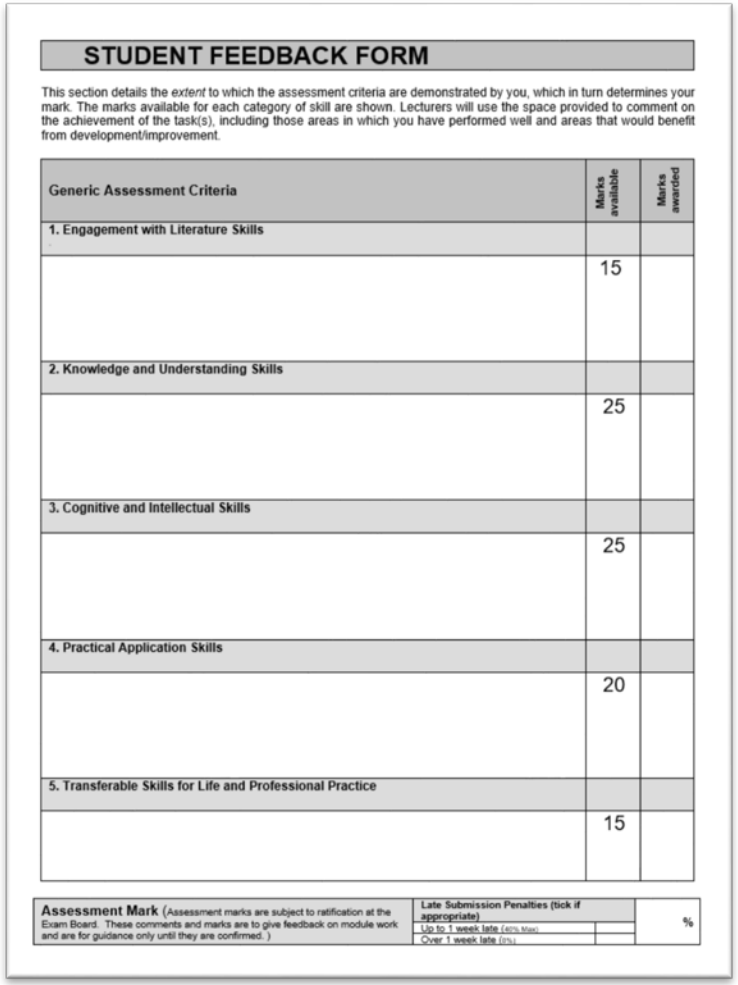
Scenario:

You are the lead consultant in charge of delivering a ‘state of the art' infant school in Swansea. The project is a joint funded venture with the Welsh Government, under the 21st Century schools programme and is required to meet the standards of BIM level 2.

Your client Swansea Council has asked you to outline measures that will be taken to show competency of the project team in reaching with BIM level 2.

Assessment 1 (50%) 2500 words

Draft a letter to the client that highlights your understanding of the requirements of BIM level 2 for this project giving details on how information will be shared, coordinated and managed through the appropriate standards.



STUDENT FEEDBACK FORM

This section details the *extent* to which the assessment criteria are demonstrated by you, which in turn determines your mark. The marks available for each category of skill are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills		
	15	
2. Knowledge and Understanding Skills		
	25	
3. Cognitive and Intellectual Skills		
	25	
4. Practical Application Skills		
	20	
5. Transferable Skills for Life and Professional Practice		
	15	

Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)

Late Submission Penalties (tick if appropriate)

Up to 1 week late (40% Max)

Over 1 week late (0%)

%

Assessment 1 cont..

Submission deadline:	29th April 2021

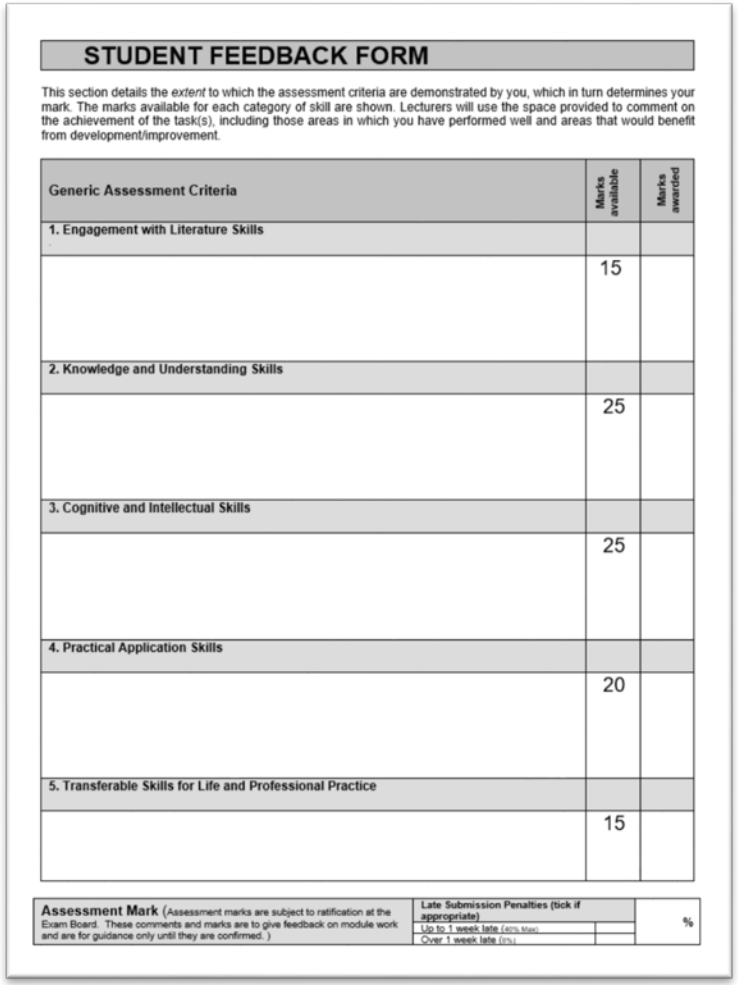
Appended to your letter, prepare an outline BIM Execution plan which should include and the following
5 sections:

- Project Information
- Management
- Planning and Documentation
- Standards, Methods, and Procedures
- IT Solutions

<u>Appropriate naming conventions should be applied for the BEP.</u>

Assumptions:

Project Number: 5010
Project Title: Ysgol Bae Abertawe
Description: 1 form entry infant school for 90 pupils.
Site location plan attached



STUDENT FEEDBACK FORM

This section details the *extent* to which the assessment criteria are demonstrated by you, which in turn determines your mark. The marks available for each category of skill are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills		
	15	
2. Knowledge and Understanding Skills		
	25	
3. Cognitive and Intellectual Skills		
	25	
4. Practical Application Skills		
	20	
5. Transferable Skills for Life and Professional Practice		
	15	

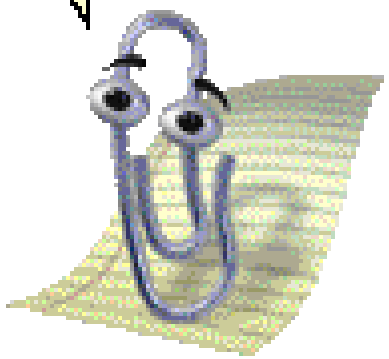
Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)	Late Submission Penalties (tick if appropriate)		%
	Up to 1 week late (40% Max)		
	Over 1 week late (0%)		

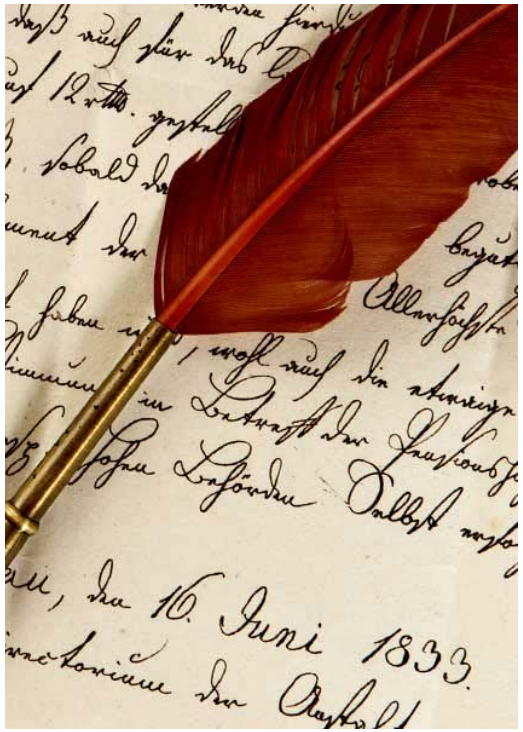
It looks like you're writing a letter.

Would you like help?

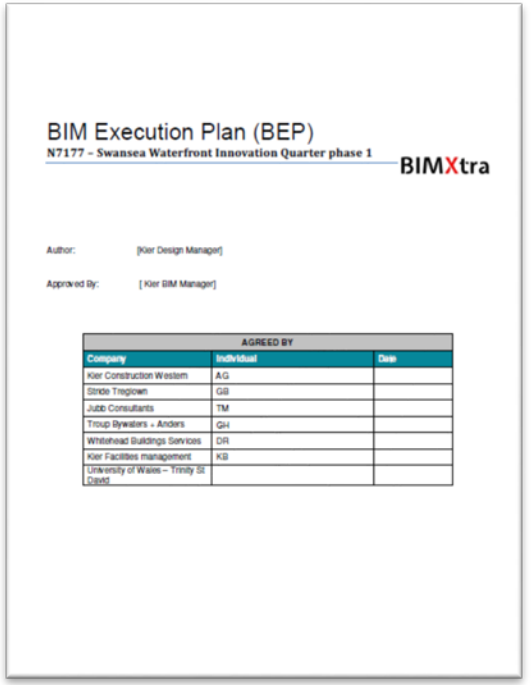
- Get help with writing the letter
- Just type the letter without help

☐ Don't show me this tip again





ent that highlights your
equirements of BIM level
; details on **how**
ared, coordinated and
appropriate standards.



BIM Execution Plan (BEP)

N7177 – Swansea Waterfront Innovation Quarter phase 1

BIMXtra

Author: [Kier Design Manager]

Approved By: [Kier BIM Manager]

AGREED BY		
Company	Individual	Date
Kier Construction Western	AG	
Stride Treglown	GB	
Jubb Consultants	TM	
Troup Bywaters + Anders	GH	
Whitehead Buildings Services	DR	
Kier Facilities management	KB	
University of Wales – Trinity St David		

- What is the project?
- Who is doing what, when will it be done, what is required?
- The documents and forms outlining the who, what and when.
- The rules of play.
- What IT format/systems will be used.

Appended to your letter, prepare an outline BIM Execution plan which should include and the following 5 sections:

- **Project Information**
- **Management**
- **Planning and Documentation**
- **Standards, Methods, and Procedures**
- **IT Solutions**

Assessment 2

Submission deadline:	6th May 2021

Module Learning Outcomes (from module syllabus)

Learning Outcomes:

Demonstrate an ability to analyse, classify and produce 2D and 3D drawings using industry-standard CAD software applications.
Demonstrate an ability to render drawings to various scales and media and export drawings to different formats.

LEVEL 5 ASSESSMENT SPECIFICATION

Student name:		**Student ID number:**	
Programme:	**Construction Portfolio**		
Module:	**BIM**		
Module code:	**ACBA5010**	**Contribution to Overall Module Assessment (%):**	**50%**
Lecturer	**Gavin Traylor**	**Internal Verifier:**	**Ryan Stuckey**
Assignment Title:	**Federated Models (Architectural & Structural)**	**Word count (or equivalent):**	**2,500 words (or equivalent)**
Submission deadline:	**Thursday 6th May**	**Return date of provisional marks & written feedback:**	**Within 20 working days**
Submission method:	All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) **Alternative submission method (if applicable):** **Late submission of the assessment will result in a late penalty mark.** Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.		
Academic honesty / referencing:	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.		

Module Learning Outcomes (from module syllabus)
• Demonstrate an ability to analyse, classify and produce 2D and 3D drawings using industry-standard CAD software applications. • Demonstrate an ability to render drawings to various scales and media and export drawings to different formats.

Assessment 2

Submission deadline:	6th May 2021

Scenario:

Assessment 2 (50%)

You are the lead consultant in charge of delivering a ‘state of the art’ infant school in Swansea. The project is a joint funded venture with the Welsh Government, under the 21st Century schools programme and is required to meet the standards of BIM level 2.

Prepare a federated concept Model at RIBA stage One for your first Information Exchange with the client. Your federated model shall consist of architectural and structural models that are linked in Revit using shared coordinates.

The design and construction of the school should be inspiring to create a vibrant facility for the pupils.
The schedule of accommodation shall be in accordance with BB99.

Assessment 2

Submission deadline:	6th May 2021

Digital Submission:

Architectural Model with Architectural drawings:

- Site location plan
- Existing site plan and demolition
- Works plan
- Proposed General arrangement floor plan.
- Proposed Principal elevations
- Proposed Long and Short Section
- Proposed Materials Take off schedule
- Proposed Visualisations

Structural Model with Structural Drawings:

- Foundations Plan
- Primary Structure Plan
- Structural Visualisation

The project must include. Project Base point, survey point. True North/ Project North, Room names, Legends, Tags & Annotations, Dimensions, Levels, North Point.

All Drawings must be appropriately scaled at A1 size and presented in the uwtsd BIM titleblock format with the appropriate naming conventions for all sheets and models.

Digital Submission required in RVT and PDF format.

Assessment 2

Submission deadline:	6th May 2021

Assumptions:

Project Number: 5010
Project Title: Ysgol Bae Abertawe
1 form entry infant school for 90 pupils.

The site plan attached, shows the proposed location of the school adjacent to the existing observatory within the residential district south of the Maritime Quarter in Swansea. There are remains of warehouse retaining walls and foundations on the site which are to be removed. The boat shed and sculpture on the site are to be demolished.

The school is to be single storey though the hall space should be double height.
Schedule of accommodation at BB99 opposite.
Each classroom should have access the outside.
Car parking for 5 vehicles including 2 disabled bays
Drop off point for deliveries and minibuses.
Hard surface playground
Soft landscaped playground

pupil places number of classes Forms of Entry (FE) and type			90 pupils 3 classes 1 FE infants	
	max. group size	average area (m^2)	no. of rooms	total area (m^2)
basic teaching				
reception class	30	66	1	66
infant classbase	30	60	2	120
junior classbase	30	60		
specialist practical				
food/science/D&T	8	24	1	24
food/science/D&T	8	38		
ICT/ group room: (no. of computers)				
ICT suite: (no. of computers)			(8)	38
halls				
main hall (used for dining)	30		1	125
small hall	30	80		
studio	30	50		
learning resource areas				
Library resource centre	15 to 30		1	18
small group room (SENco)	5 to 8	12	1	12
small group rooms	5 to 8	9		
TOTAL TEACHING AREA				403
staff and admin.				
head's office/meeting room			1	10
senior management offices		8		
staff room			1	18
general office			1	8
sick bay (adjacent)		3	1	3
entrance/reception			1	2
copier/reprographics				2
SENco/MI/group room		12	1	12
interview/social services		8		
storage				
class storage (reception)		3	1	3
class storage (infant and junior)		1.5	2	3
specialist stores		6 or 8	2	12
PE store (adjacent to hall)		12	1	12
PE store (external)		4	1	4
non-teaching storage				
central stock		8	1	6
cloakrooms/lunch box storage		3		9
dining chair/table store (no. of sittings)			(2)	7
staging/appliance store			1	4
community store		4	1	4
caretakers /maintenance store			1	4
cleaner's store		1.5	2	3
TOTAL NET AREA				529
recommended net area				529
non-net area				
kitchen (full-service)			1	28
servery				6
toilets (and personal care)				
reception toilets			2	8
other pupil toilets				10
accessible toilets/hygiene facilities				7
staff toilets				3.5
circulation		**net x 23%**		**122**
plant (incl. server)		**net x 3%**		**17**
partitions		**net x 5%**		**26**
TOTAL GROSS AREA				
recommended gross area (net at 70% of gross)				

Assessment 2

Submission deadline:	6th May 2021

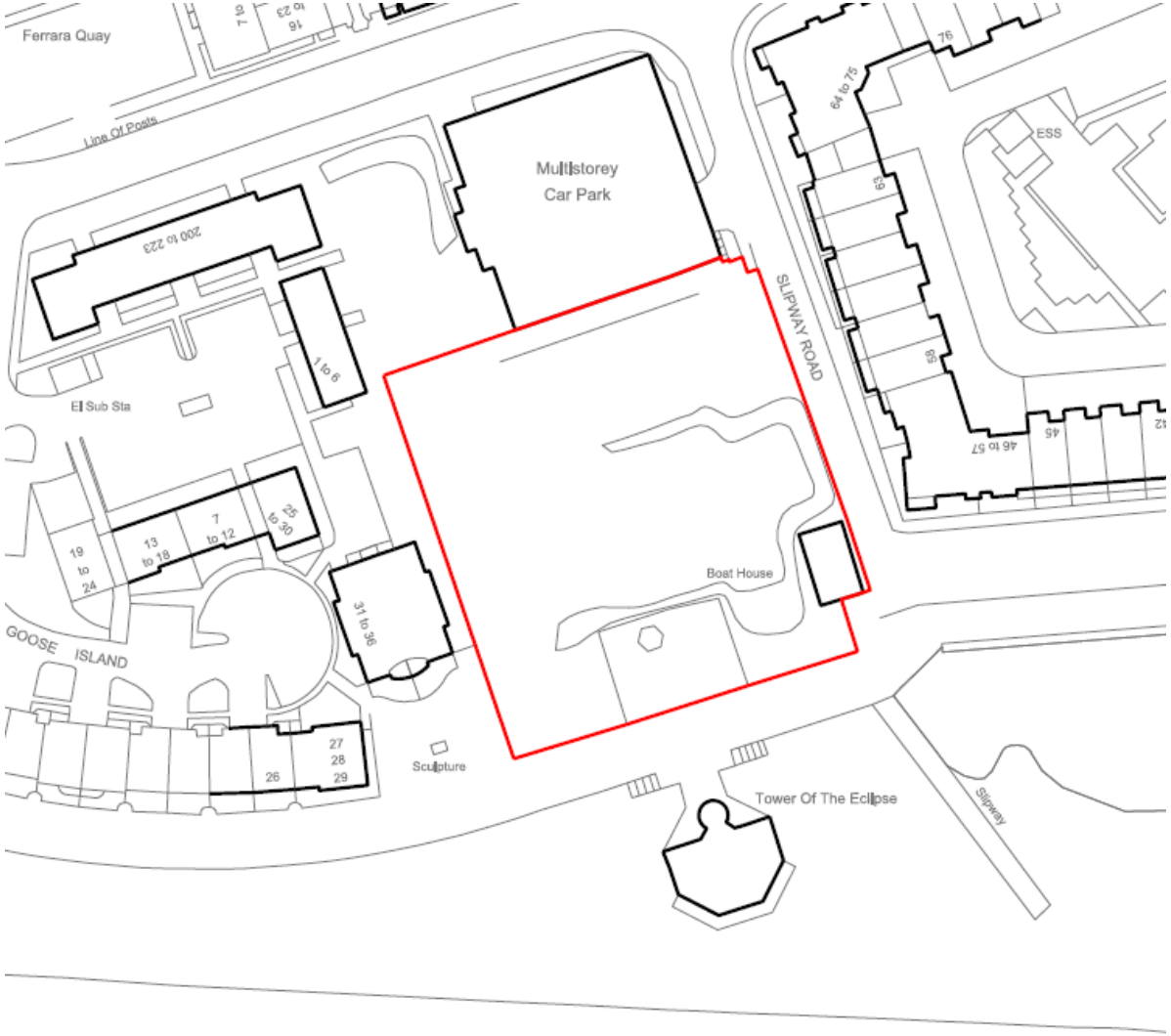
Assessment 2 (Revit Practical)		
•	Use of the BIM naming and format, including completion of splash page and all titleblocks. Revit Link files interlinked	20
•	Demonstrating skills in Revit, and organise your work accordingly – views and sheets, PDF outputs	20
•	Drawings provided at an appropriate scale, detail and presentation format.	25
•	Project Base point, Survey Point. True North / Project North, Room names, Legends, Tags & Annotations, Dimensions, Levels, North Point. Project Phasing	25
•	Adherence to brief and Design intent. In accordance with the requirements in the brief and BB99 table.	10



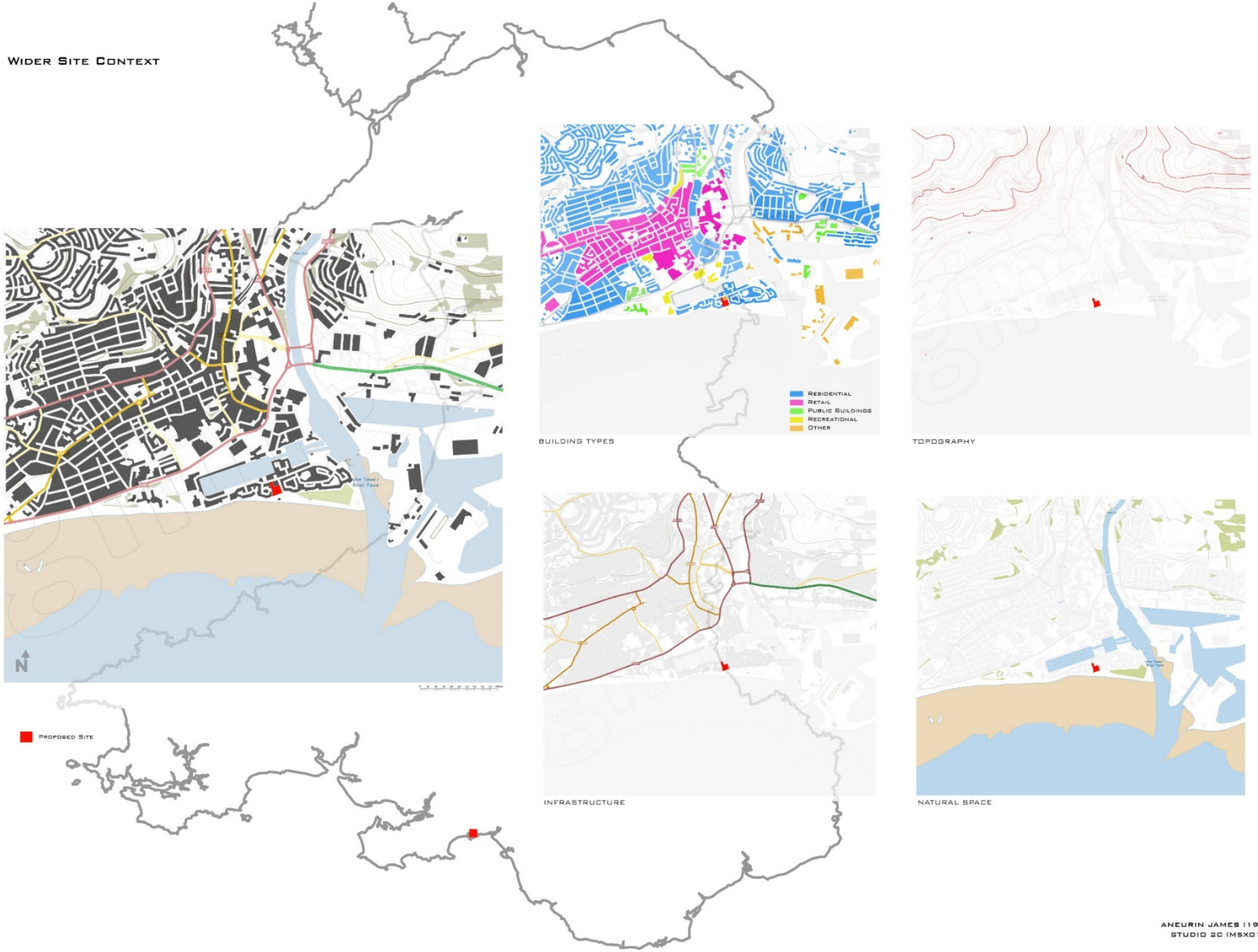
4. Practical Application Skills		
	100	

The Site


The Slipway
Swansea
Observatory


Ferrara Quay
Line Of Posts
Multistorey
Car Park
SLIPWAY ROAD
El Sub Sta
GOOSE ISLAND
Boat House
Sculpture
Tower Of The Eclipse
Slipway
ESS

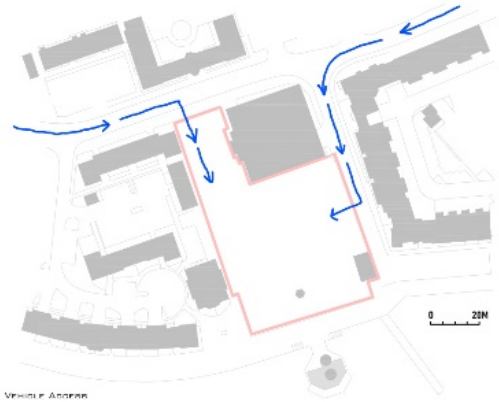
Site Analysis

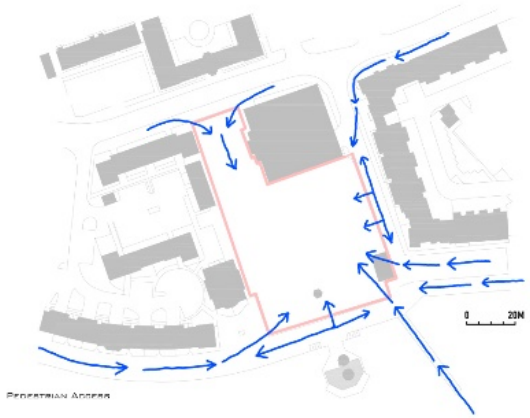


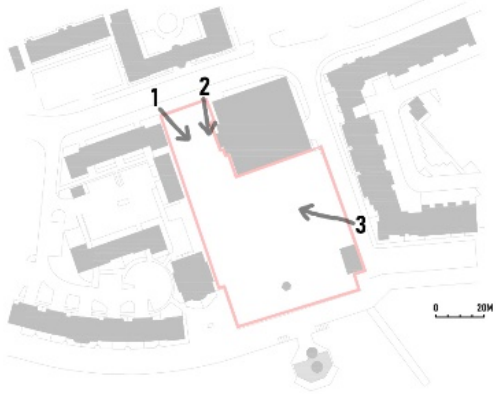
Example Site Analysis:

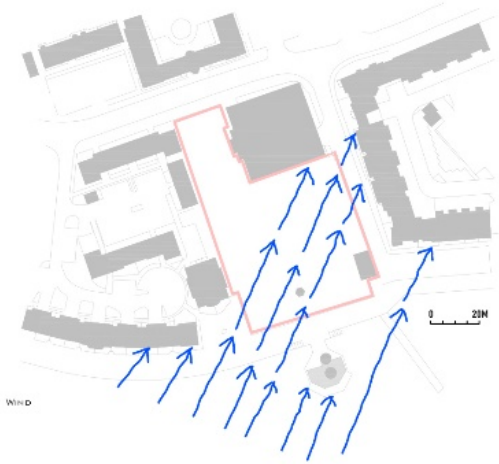
Wider Context

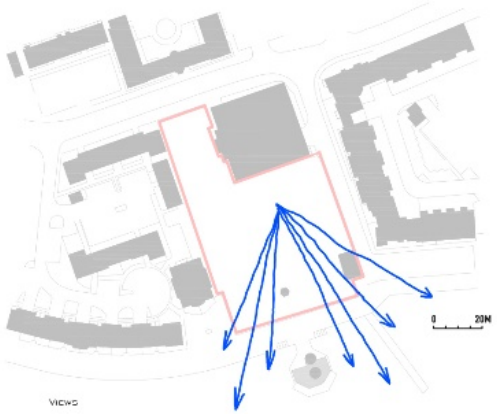
Courtesy of
Studio 2C (Architecture)





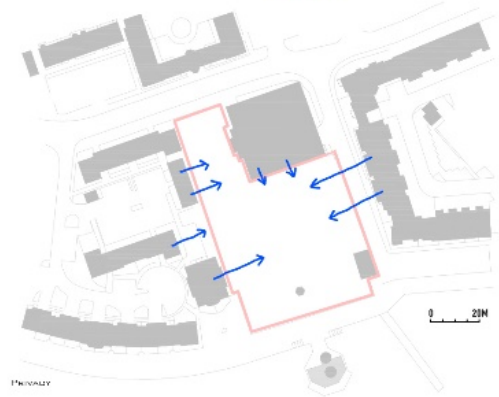


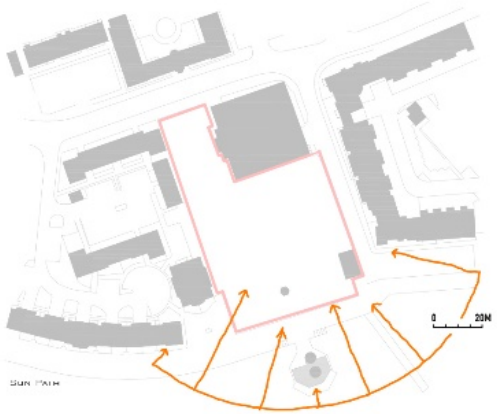














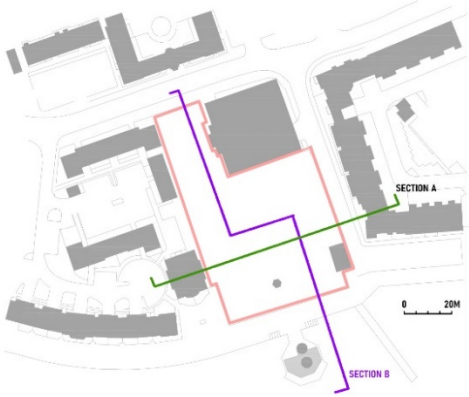
ANEURIN JAMES (1501128)
STUDIO 2C (MSX01975)

Example Site Analysis:

Micro Climate

Courtesy of
Studio 2C (Architecture)





Example Site Analysis:

Site Sections

Courtesy of
Studio 2C (Architecture)



The Brief

	max. group size	average area (m²)	90 pupils 3 classes 1 FE infants: no. of rooms	90 pupils 3 classes 1 FE infants: total area (m²)
basic teaching				
reception class	30	66	1	66
infant classbase	30	60	2	120
junior classbase	30	60		
specialist practical				
food/science/D&T	8	24	1	24
food/science/D&T	8	38		
ICT/ group room: (no. of computers)				
ICT suite: (no. of computers)			(8)	38
halls				
main hall (used for dining)	30		1	125
small hall	30	80		
studio	30	50		
learning resource areas				
Library resource centre	15 to 30		1	18
small group room (SENco)	5 to 8	12	1	12
small group rooms	5 to 8	9		
TOTAL TEACHING AREA				**403**
staff and admin.				
head's office/meeting room			1	10
senior management offices		8		
staff room			1	18
general office			1	8
sick bay (adjacent)		3	1	3
entrance/reception			1	2
copier/reprographics				2
SENco/MI/group room		12	1	12
interview/social services		8		
storage				
class storage (reception)	3		1	3
class storage (infant and junior)	1.5		2	3
specialist stores	6 or 8		2	12
PE store (adjacent to hall)	12		1	12
PE store (external)	4		1	4
non-teaching storage				
central stock	8		1	6
cloakrooms/lunch box storage	3			9
dining chair/table store (no. of sittings)			(2)	7
staging/appliance store			1	4
community store	4		1	4
caretakers /maintenance store			1	4
cleaner's store	1.5		2	3
TOTAL NET AREA				**529**
recommended net area				**529**
non-net area				
kitchen (full-service)			1	28
servery				6
toilets (and personal care)				
reception toilets			2	8
other pupil toilets				10
accessible toilets/hygiene facilities				7
staff toilets				3.5
circulation	**net x 23%**			**122**
plant (incl. server)	**net x 3%**			**17**
partitions	**net x 5%**			**26**
TOTAL GROSS AREA				**757**
recommended gross area (net at 70% of gross)				**756**

Design

https://gov.wales/21st-century-schools-and-colleges-building-bulletins

GUIDANCE

21st Century Schools and Colleges: building bulletins

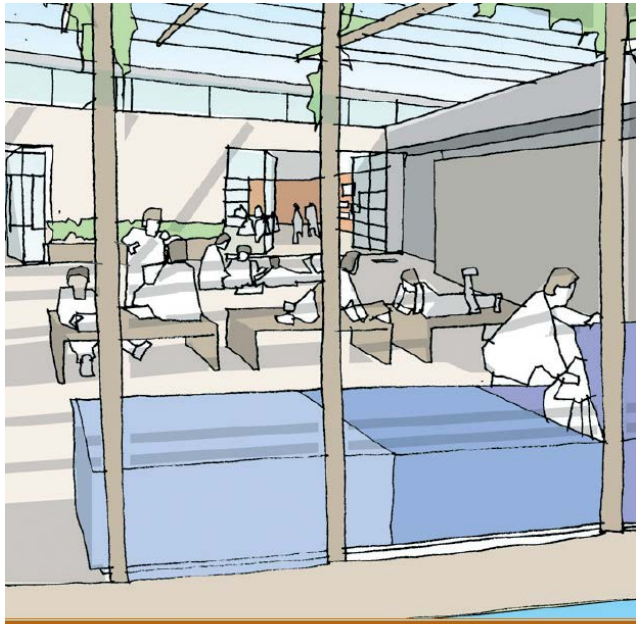
Guidance for the design and maintenance of school buildings and land.

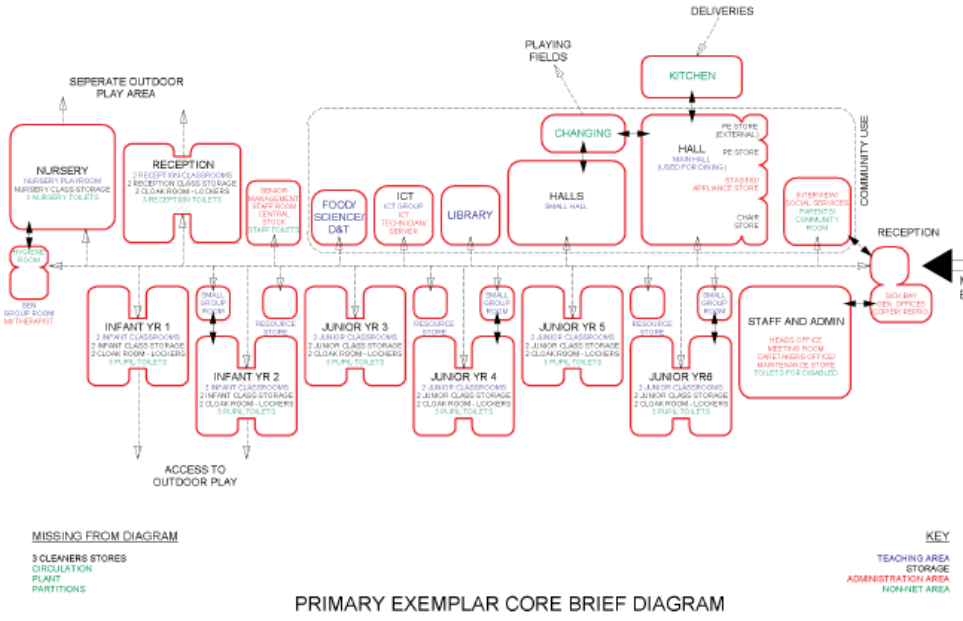
Read details

Part of: 21st Century Schools and Colleges Programme

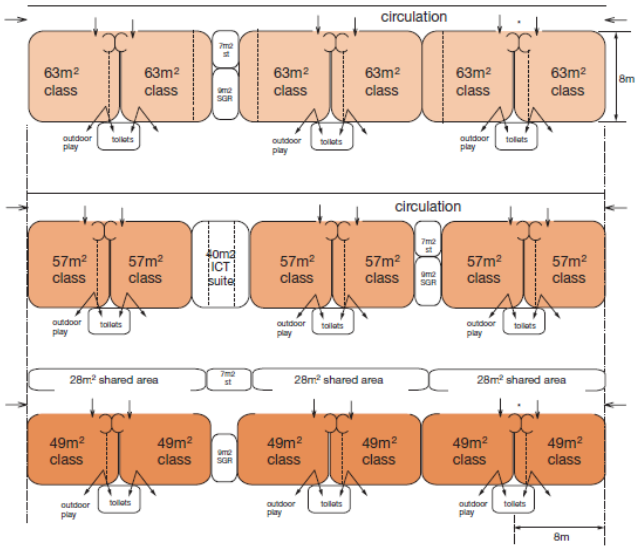
First published: 19 June 2019

Last updated: 19 June 2019

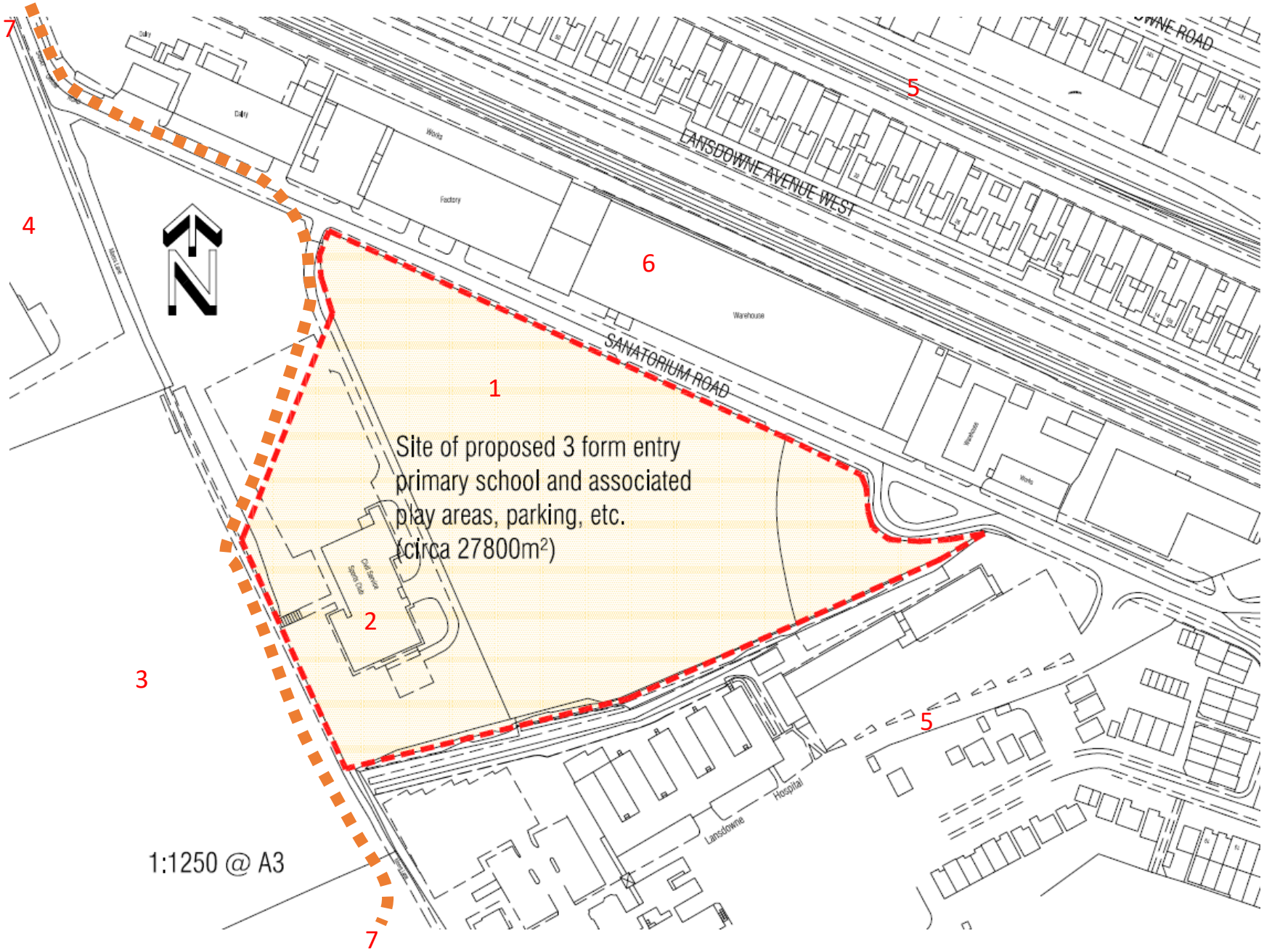




PRIMARY EXEMPLAR CORE BRIEF DIAGRAM



Site and Context:





1. Site of former football pitch
2. Location of demolished Sports Club
3. Adjacent Rugby pitches
4. Ely Mill (future residential site)
5. Existing residential development
6. Industrial units
7. Ely trail public right of way.

The Design Process: POW 2007

It is always essential to understand the condition and limitations of the site and any buildings within.

Services and Survey requirements:

- Site ownership, development boundaries.
- Existing services: Gas, Electricity, Water, Telecoms & Cable
- Topographical Survey
- Tree Survey and Constraints
- Drainage Survey
- Geotechnical Survey
- Historic As Built information
- FCA
- UXO
- EIA Screening
- Ecology Biodiversity Management Plan
- Ecology Mitigation Strategy
- Translocation Plan
- Traffic Survey Data
- Transport Assessment
- Acoustic Survey











Design Challenges:

- Limitations to the Site
- Drainage
- Ecology
- Japanese Knotweed

AREA BRIEF



Ysgol Treganna

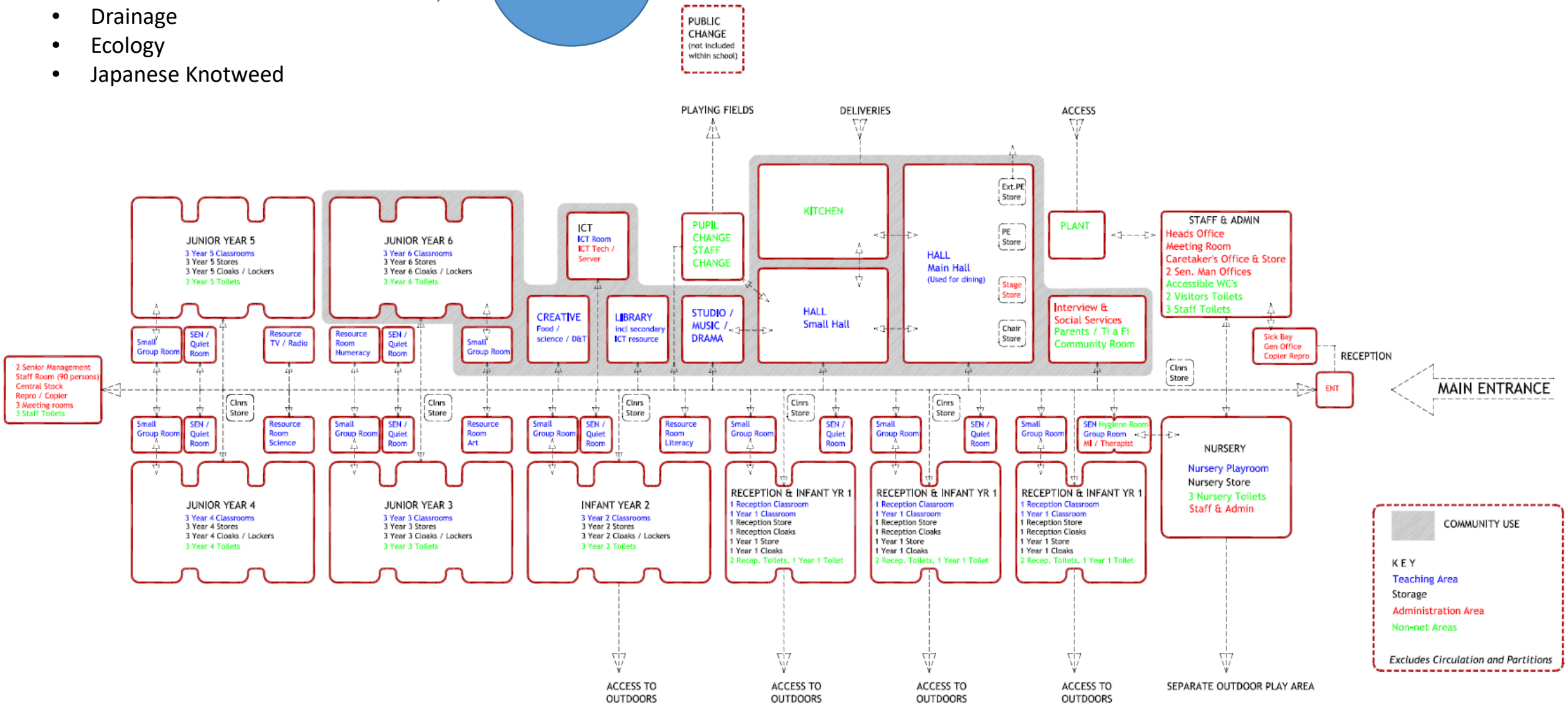
Accommodation - BB99
630 5-11

	max. group size	average area (m^2)	number of rooms	Total area for each type of space: basic teaching halls	learning resources	teaching storage	other storage	staff & admin.	supplementary	non-net area
Reception	30	66	3	198		9		9		21
Reception class		3	3							
Class storage		3	3							
cloakrooms/ lunch box storage		3.5	6							
Reception toilets										
Infant Y1	30	60	3	180		4.5		9		12
Infant classbase		1.5	3							
Class storage	6 to 8	8	1							
Small group room		3	3							
cloakrooms		4	3							
Pupil toilets										
Infant Y2	30	60	3	180		4.5		9		12
Infant classbase		1.5	3							
Class storage		8	1							
specialist store: literacy		3	3							
cloakrooms		4	3							
Pupil toilets										
Junior Y3										

Design Challenges:

- Limitations to the Site
- Drainage
- Ecology
- Japanese Knotweed

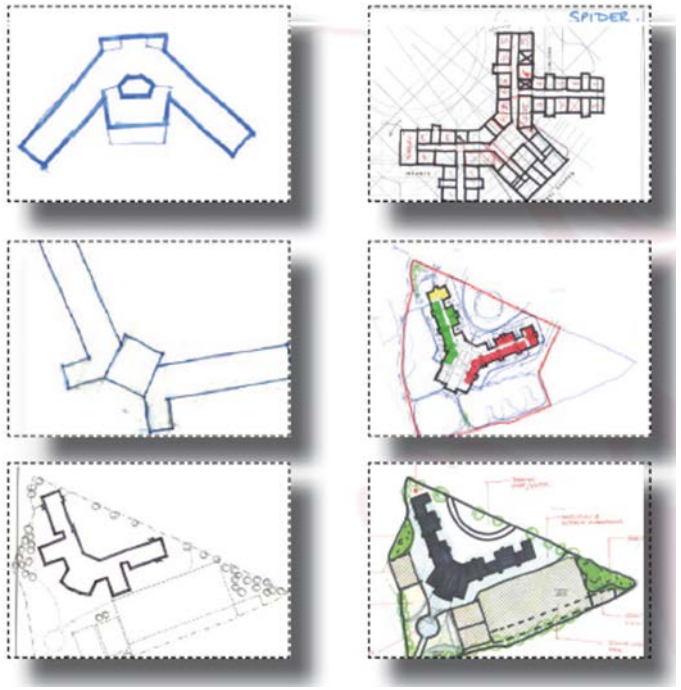
CORE BRIEF



Design Challenges:

- Limitations to the Site
- Drainage
- Ecology
- Japanese Knotweed

BRIEF & CONCEPT



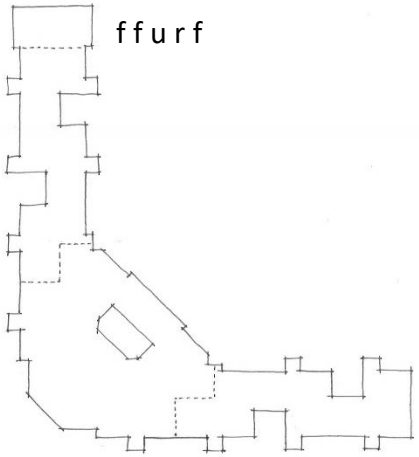


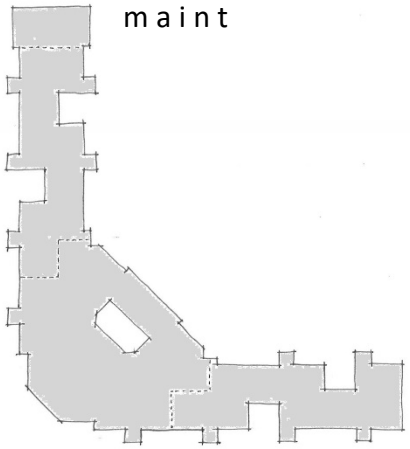


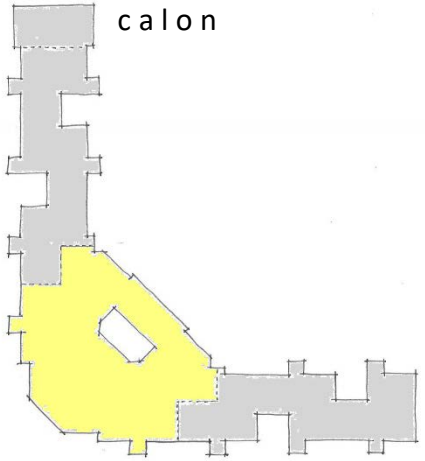


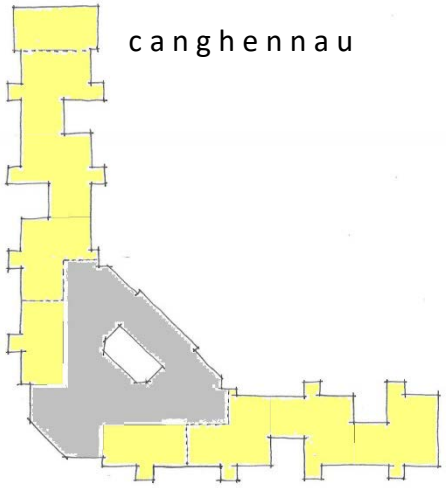
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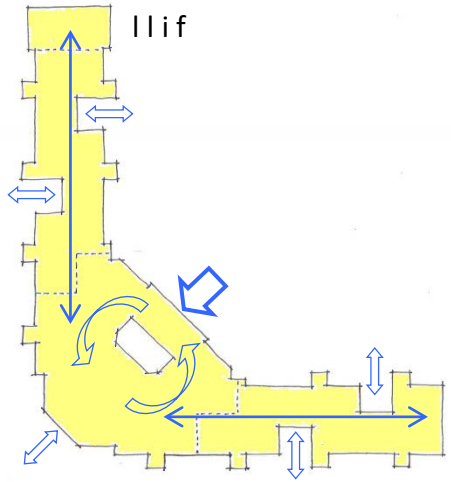
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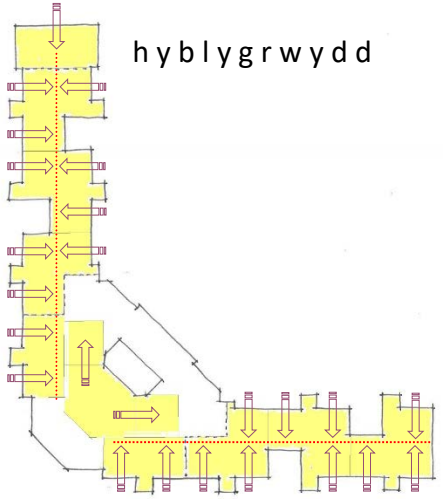




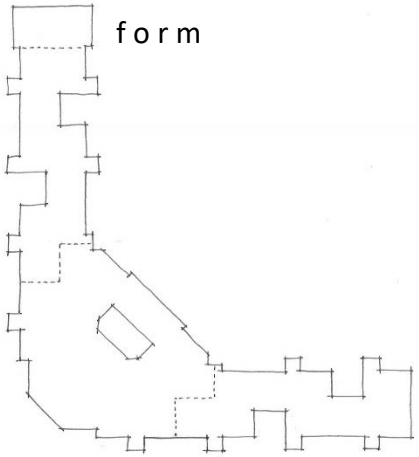


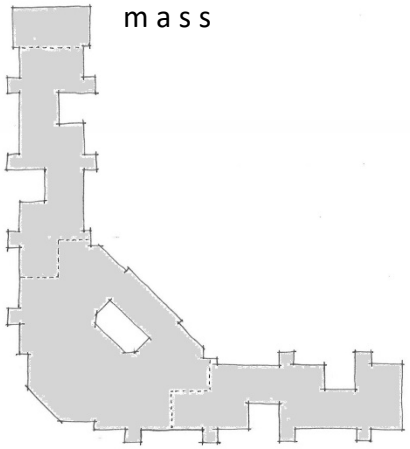


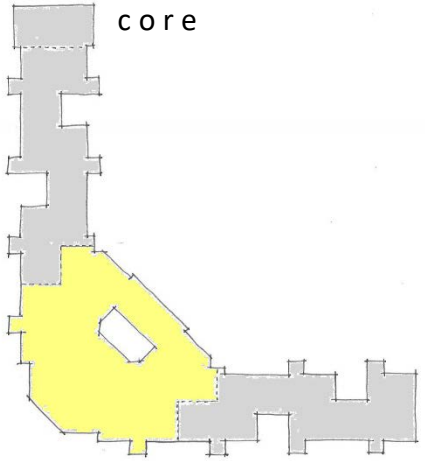


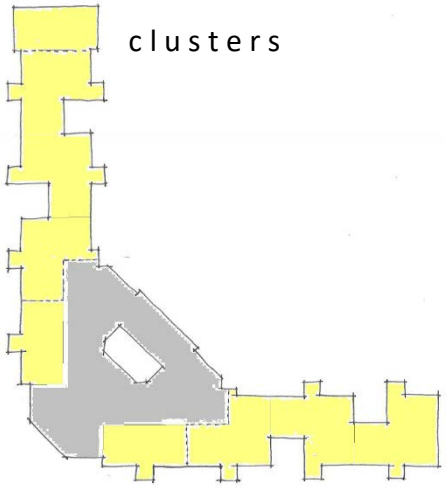


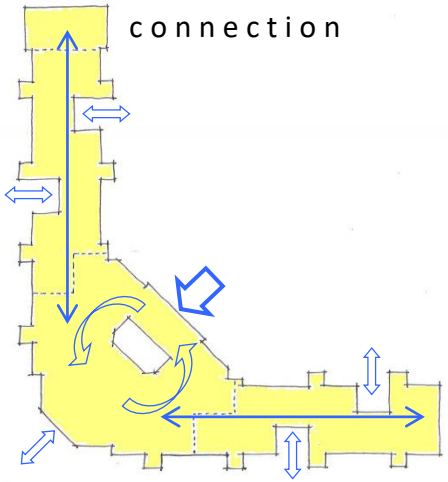
Ysgol Treganna: brasluniau cysyniadol

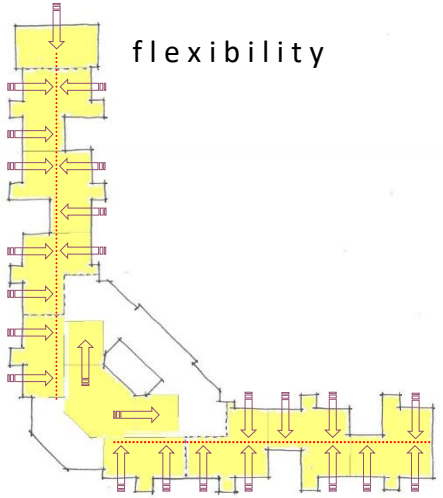




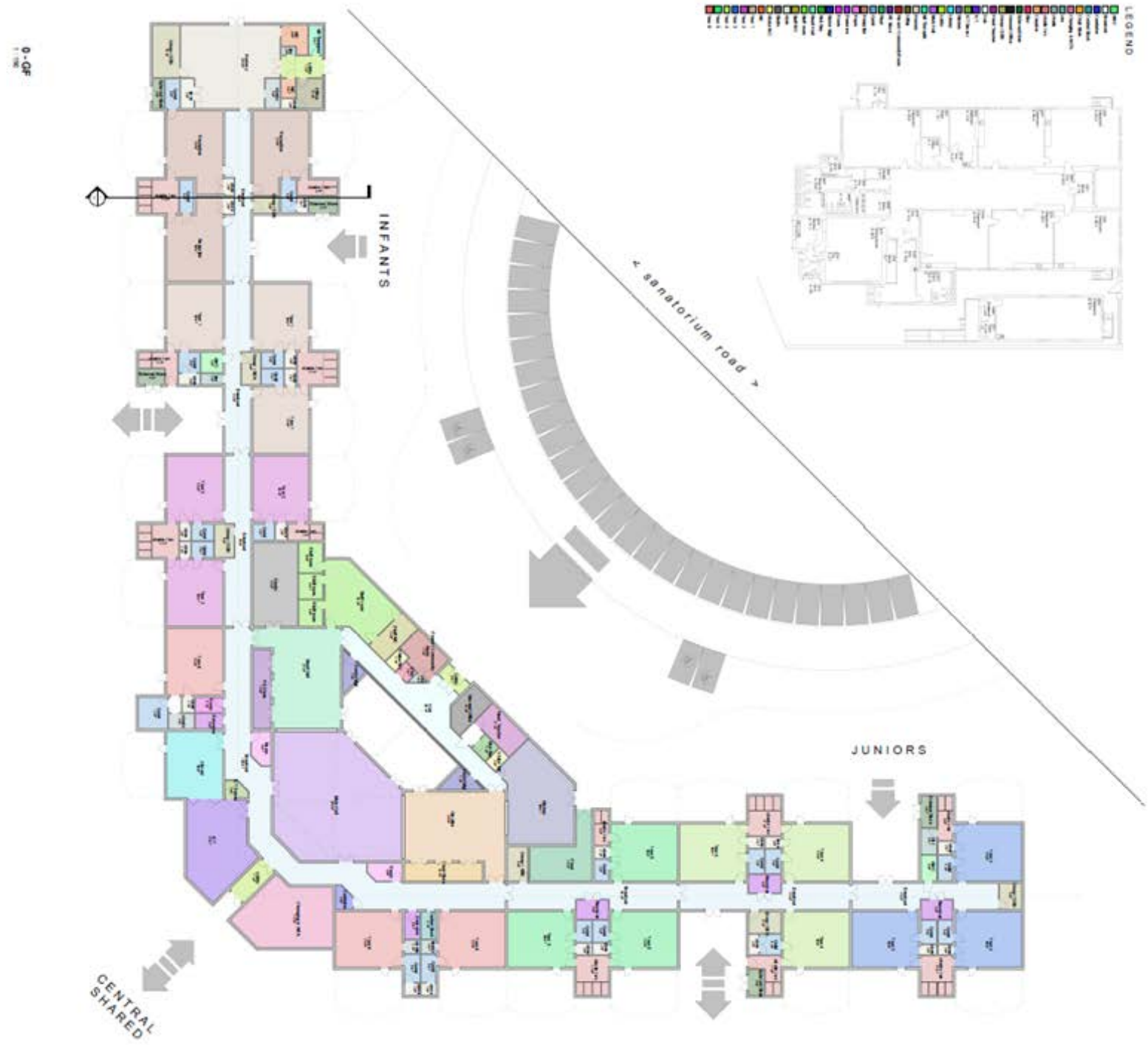


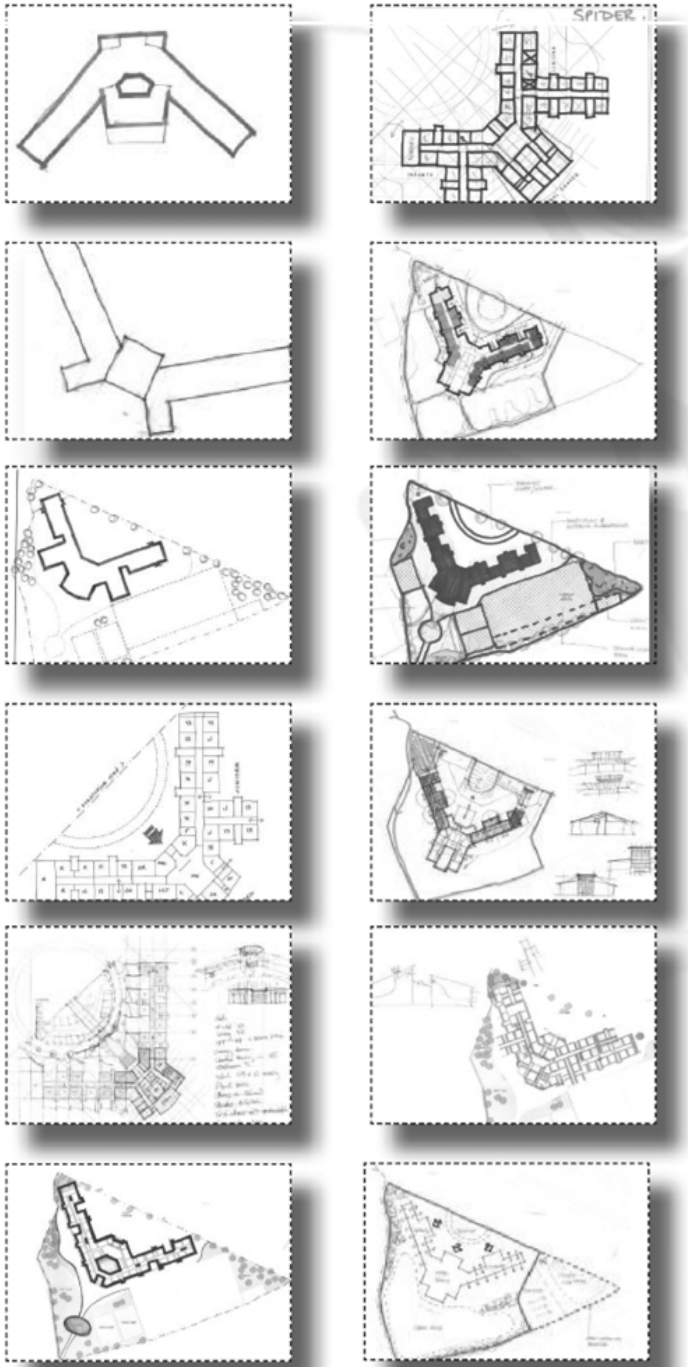


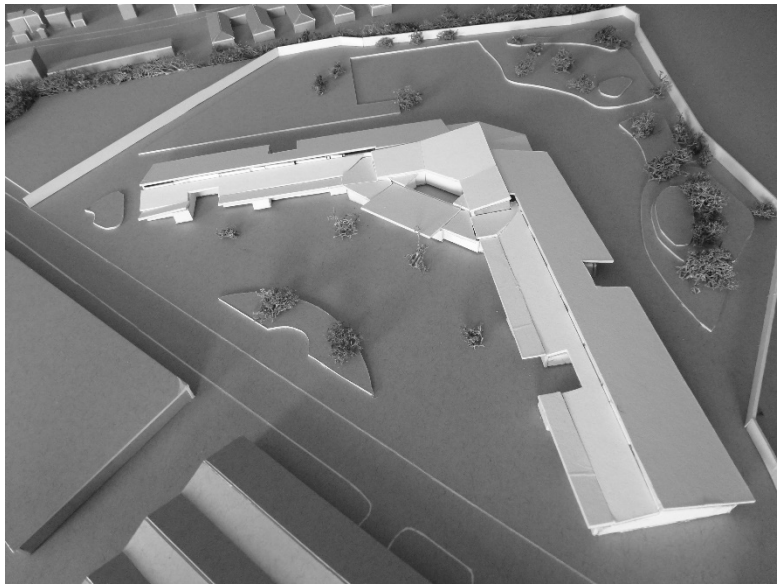




Ysgol Treganna: concept sketches


INFANTS
< sanatorium road >
JUNIORS
CENTRAL SHARED
LEGEND



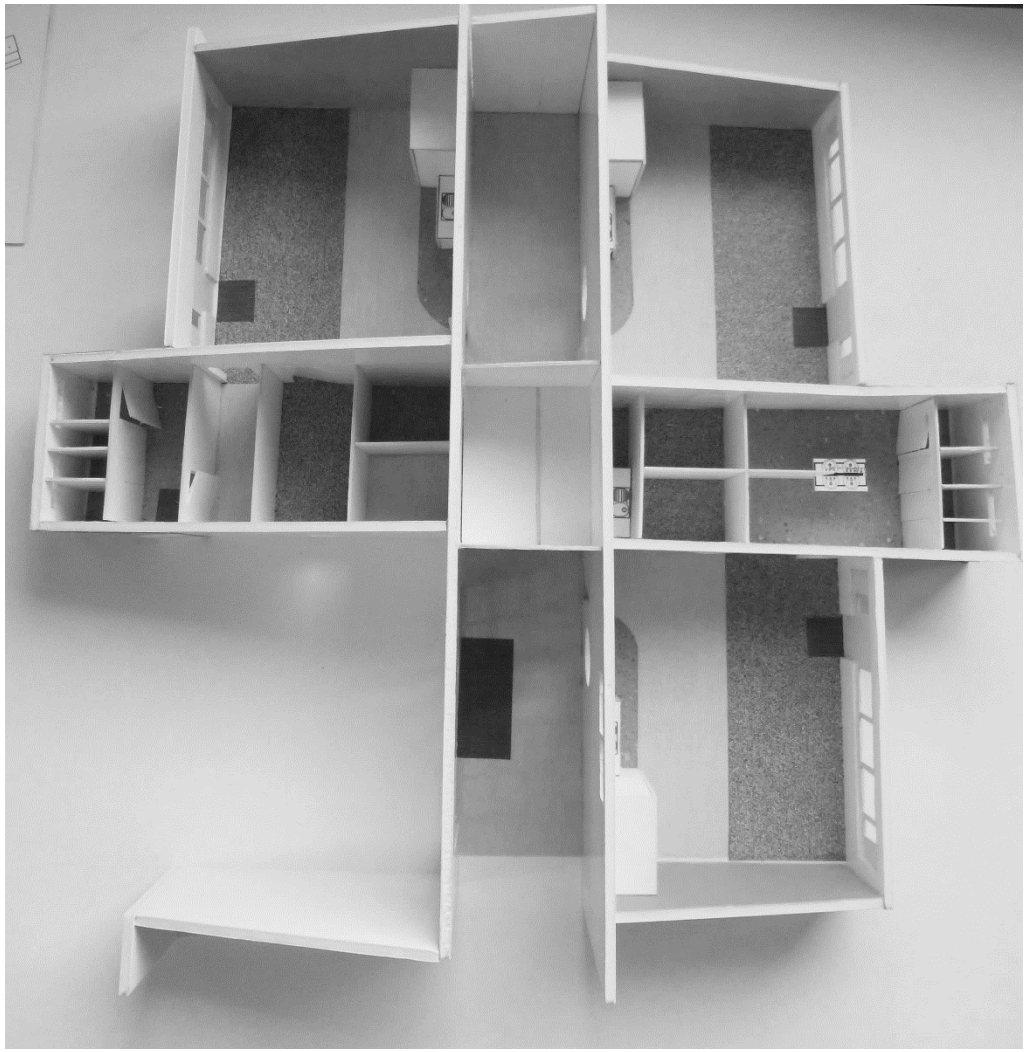




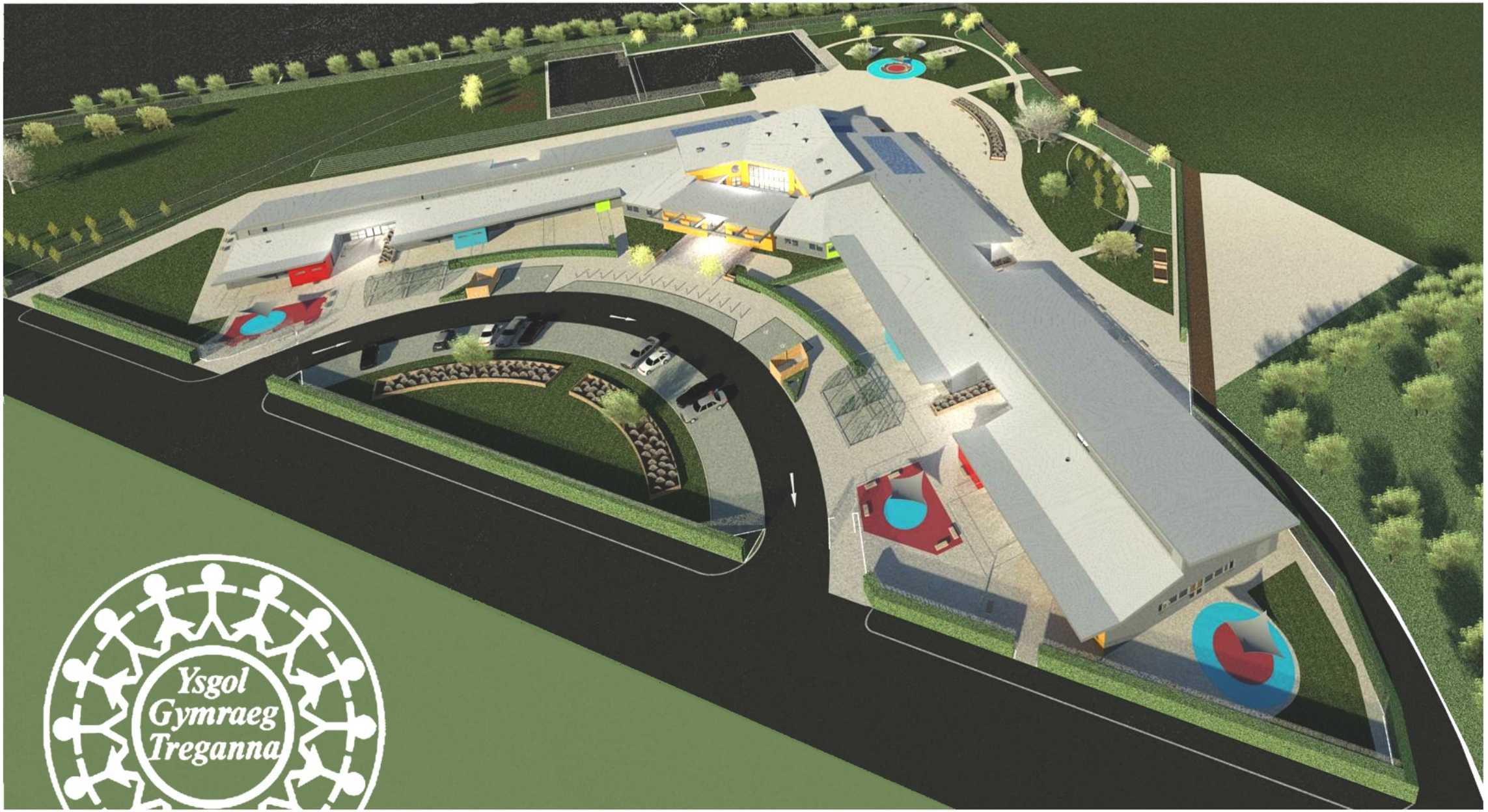
Ysgol Treganna: development sketches & models





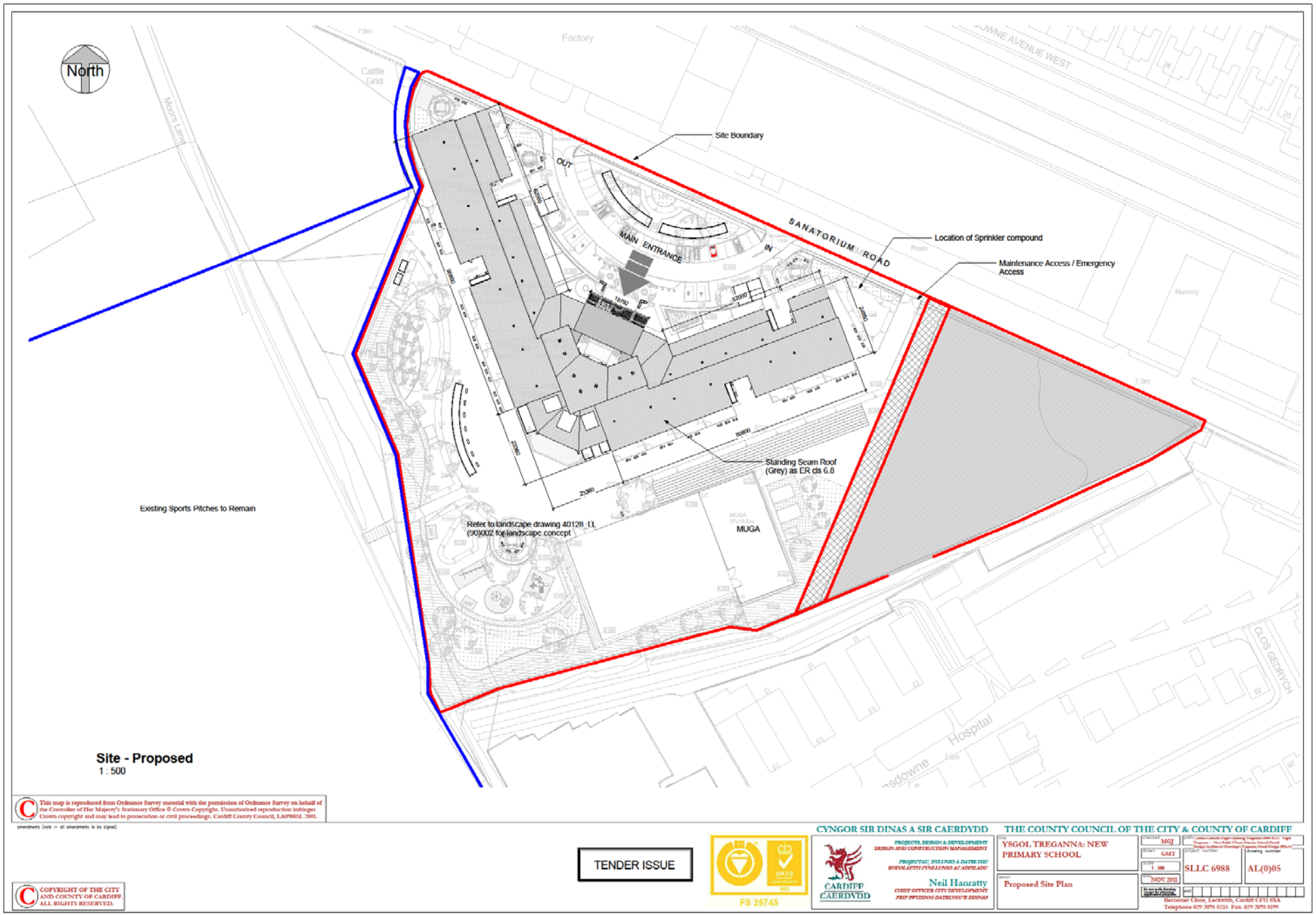


The Design Section became critical in realising the strategy for natural lighting, natural ventilation and distribution of services.


Ysgol
Gymraeg
Treganna


Ysgol
Treganna
Reception Classroom


BACK
TO
SCHOOL



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TENDER ISSUE

CYNGOR SIR DINAS A SIR CAERDYDD
THE COUNTY COUNCIL OF THE CITY & COUNTY OF CARDIFF

PROJECTS, DESIGN & DEVELOPMENT
DESIGN AND CONSTRUCTION MANAGEMENT

Neil Hanratty
CHIEF OFFICER CITY DEVELOPMENT

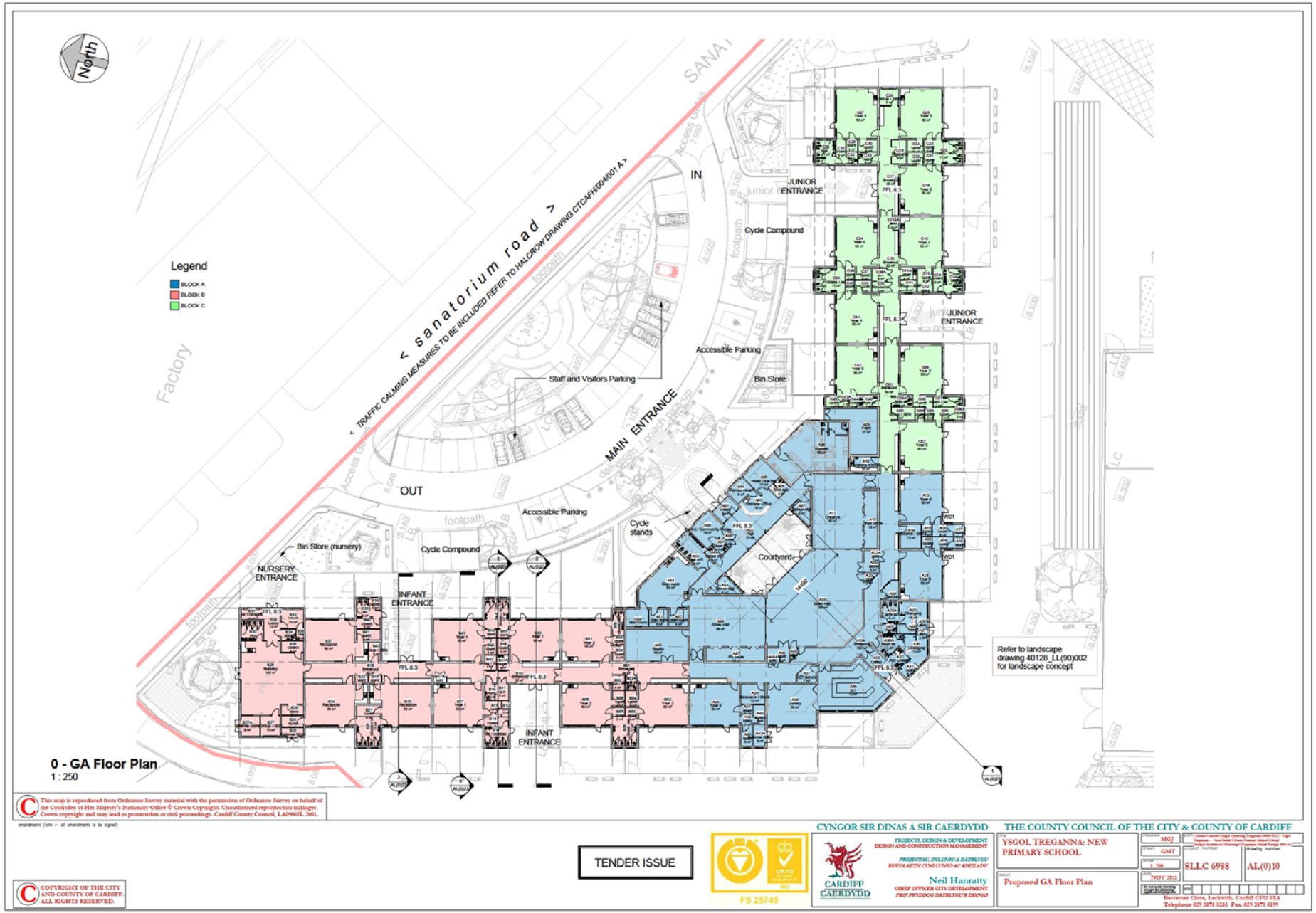
FS 25745

YSGOL TREGANNA: NEW PRIMARY SCHOOL

Proposed Site Plan

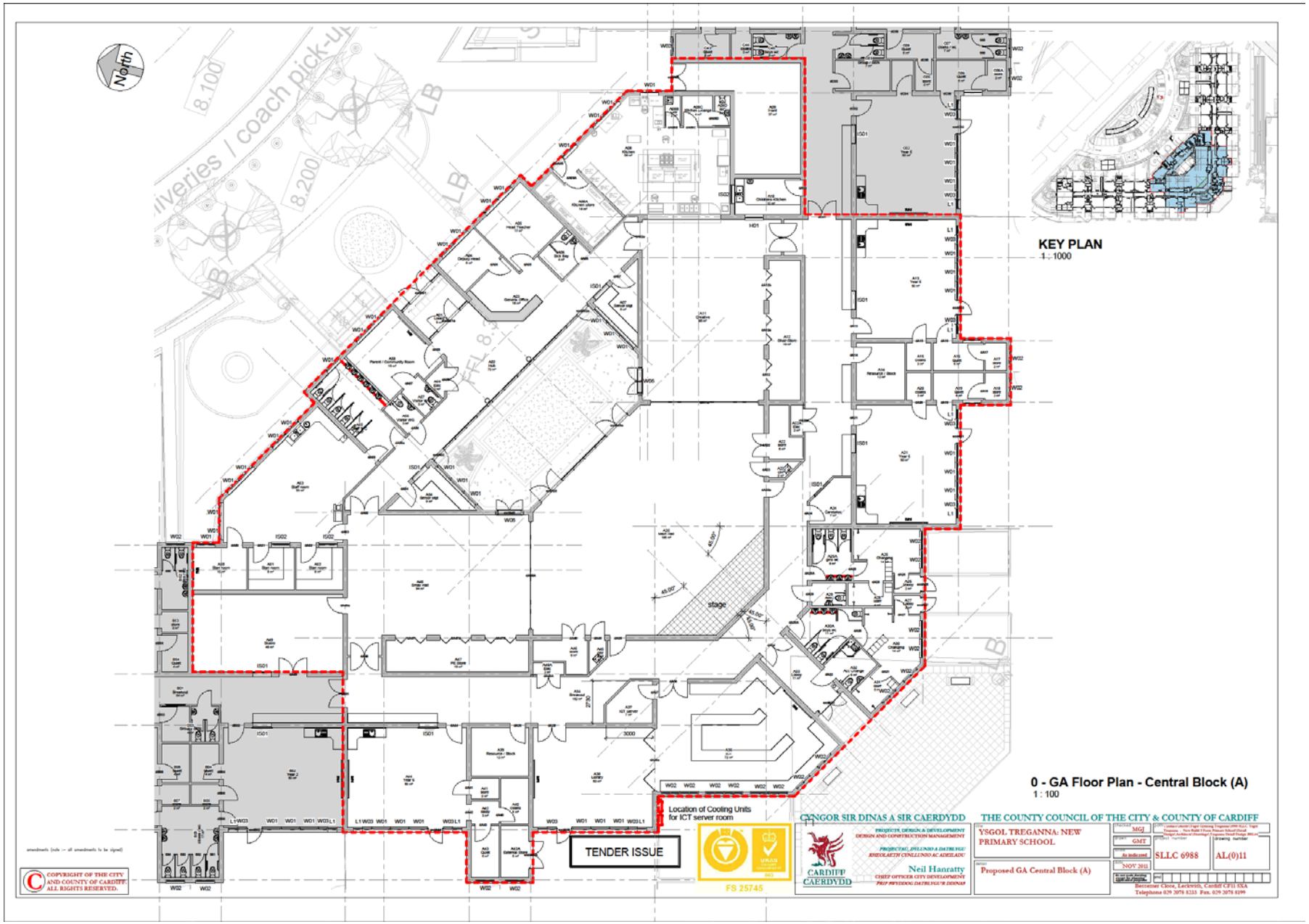
MGJ | GMT | 1 : 500 | NOV 2011 | SLLC 6988 | AL(0)05

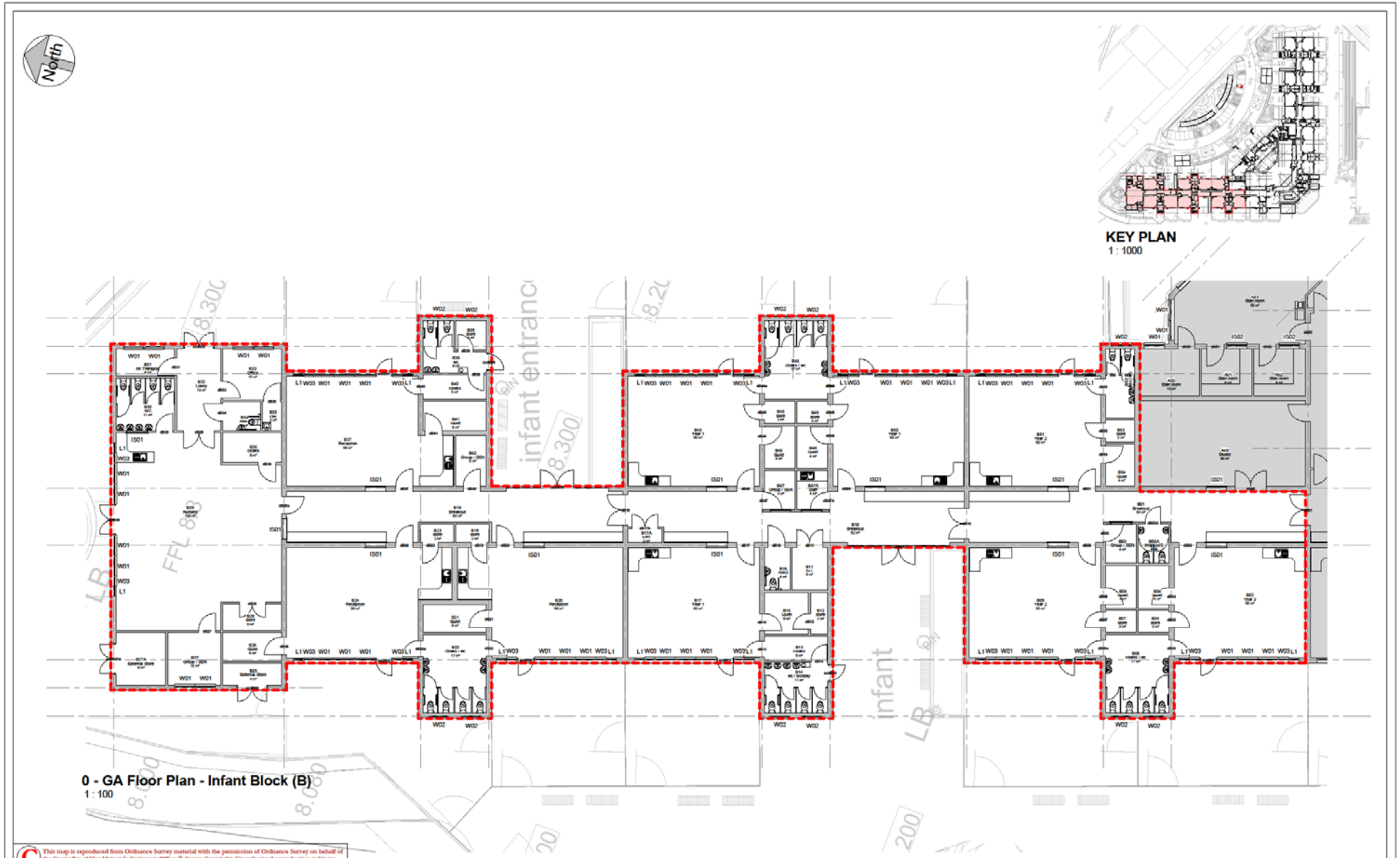
Bacheser Close, Lecterston, Cardiff CF11 8XA
Telephone 029 2078 8235 Fax. 029 2078 8199



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North
KEY PLAN
1 : 1000
0 - GA Floor Plan - Central Block (A)
1 : 100
TENDER ISSUE
Location of Cooling Units for ICT server room
stage
CYNGOR SIR DINAS A SIR CAERDYDD
THE COUNTY COUNCIL OF THE CITY & COUNTY OF CARDIFF
YSGOL TREGANNA: NEW PRIMARY SCHOOL
Proposed GA Central Block (A)
SLLC 6988
AL(0)11
Neil Hanratty
FS 25745
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amendments (note :- all amendments to be signed)

TENDER ISSUE

FS 25745

CYNGOR SIR DINAS A SIR CAERDYDD
CARDIFF CAERDYDD
PROJECTS, DESIGN & DEVELOPMENT
DESIGN AND CONSTRUCTION MANAGEMENT
PROJECTAU, DYLUNIO A DATBLYGU
RHEOLAETH CYNLLUNIO AC ADEILADU
Neil Hanratty
CHIEF OFFICER CITY DEVELOPMENT
PRIF WEITHIWR DATBLYGU'R DDINAS

THE COUNTY COUNCIL OF THE CITY & COUNTY OF CARDIFF

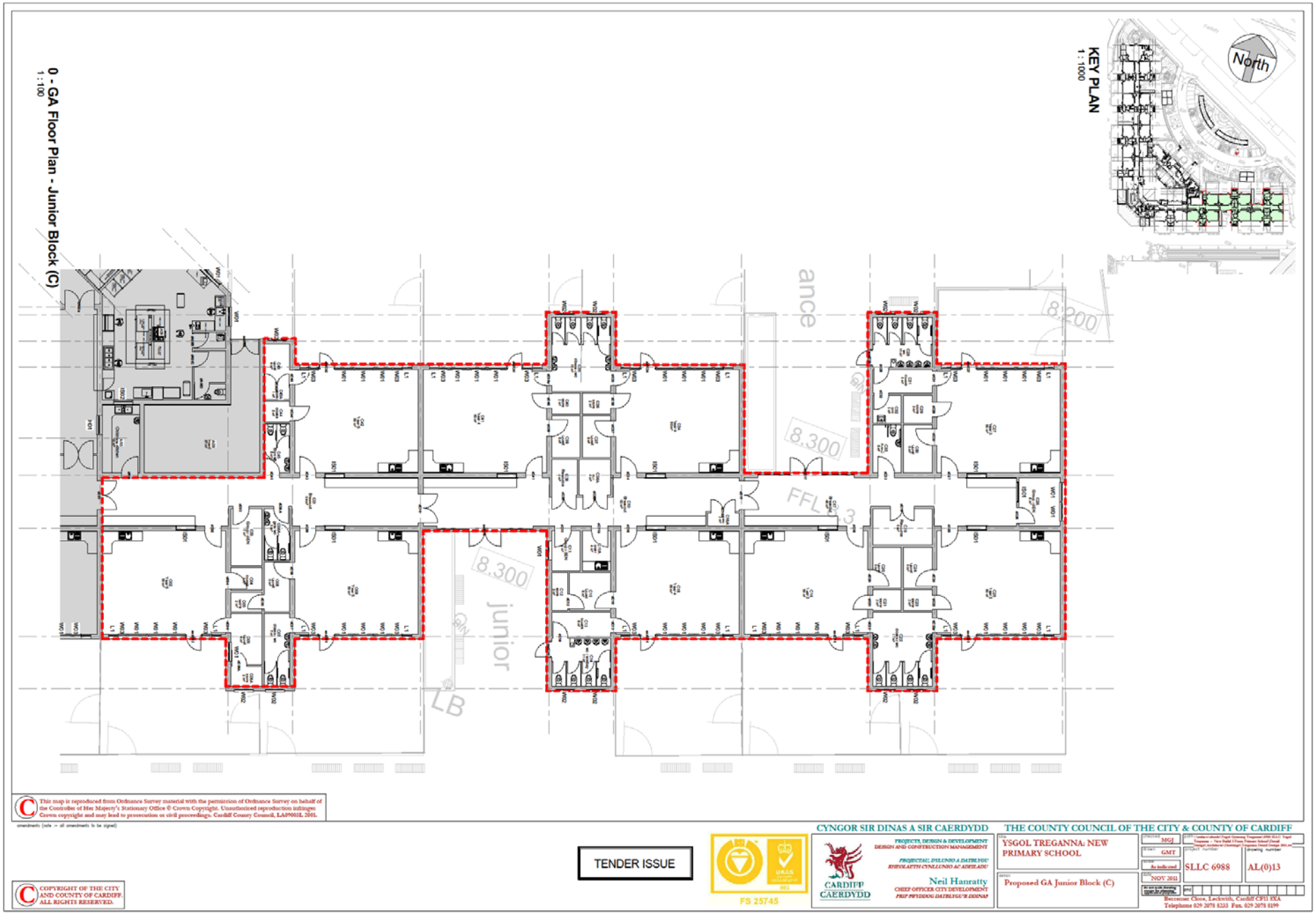
YSGOL TREGANNA: NEW PRIMARY SCHOOL

Proposed GA Infant Block (B)

MGJ	
GMT	
As indicated	
NOV 2011	
SLLC 6988	AL(0)12

Bessemer Close, Leckwith, Cardiff CF11 8XA
Telephone 029 2075 8255 Fax. 029 2075 8199

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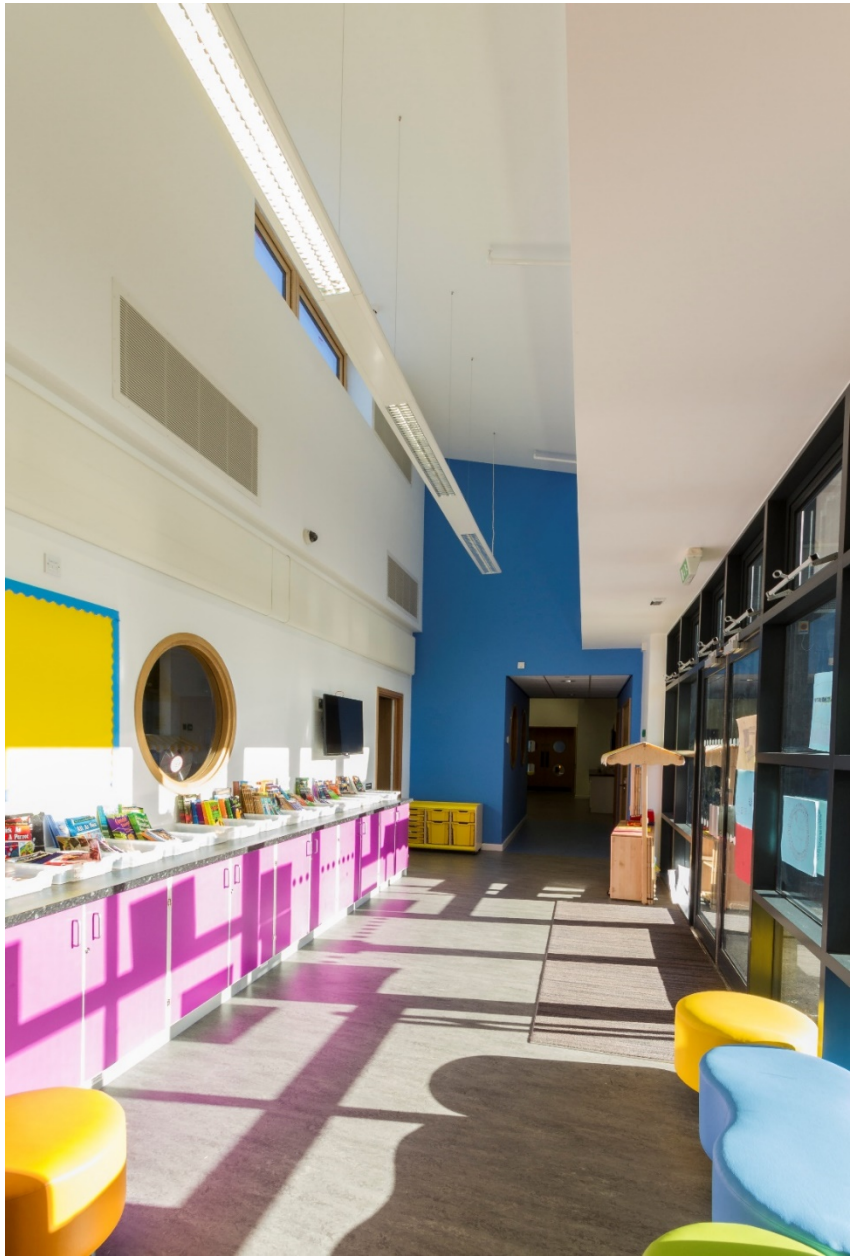
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Handover August 2013



Handover August 2013








Ein hysgol ni
Dyma ni
Dyma fi


Allanfa dân
Fire exit

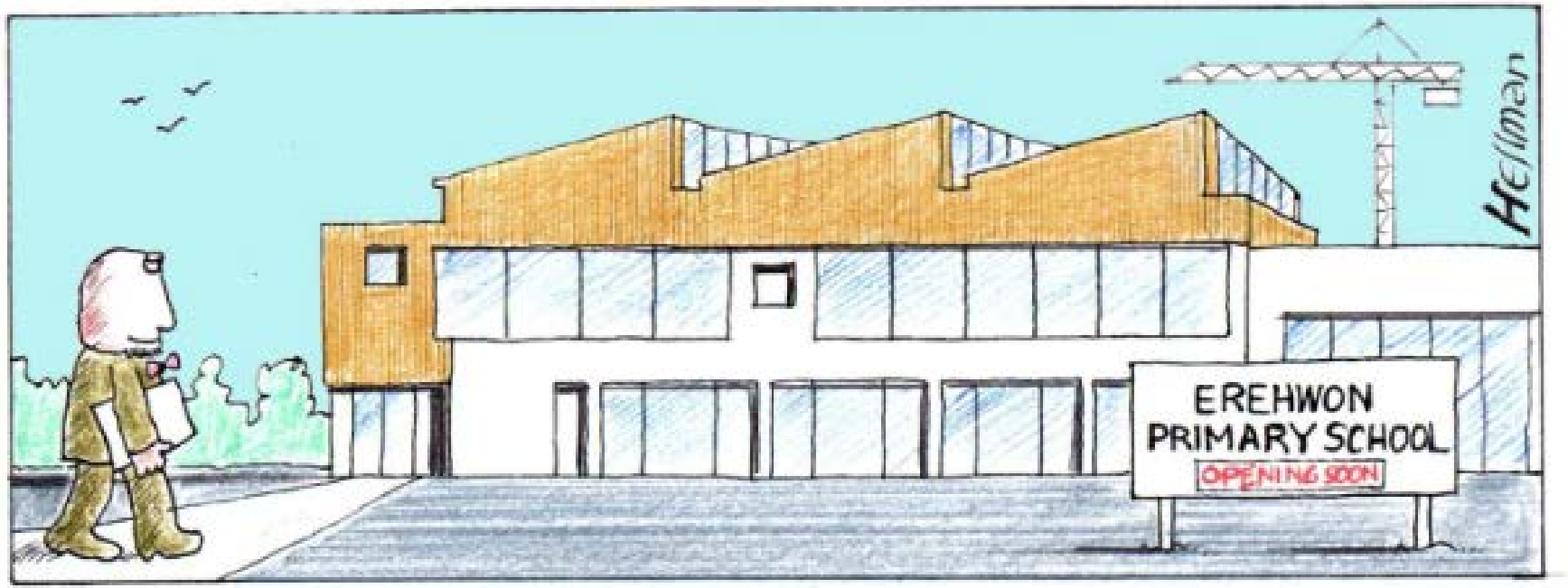

Derbynfa
Reception
Ysgol Treganna

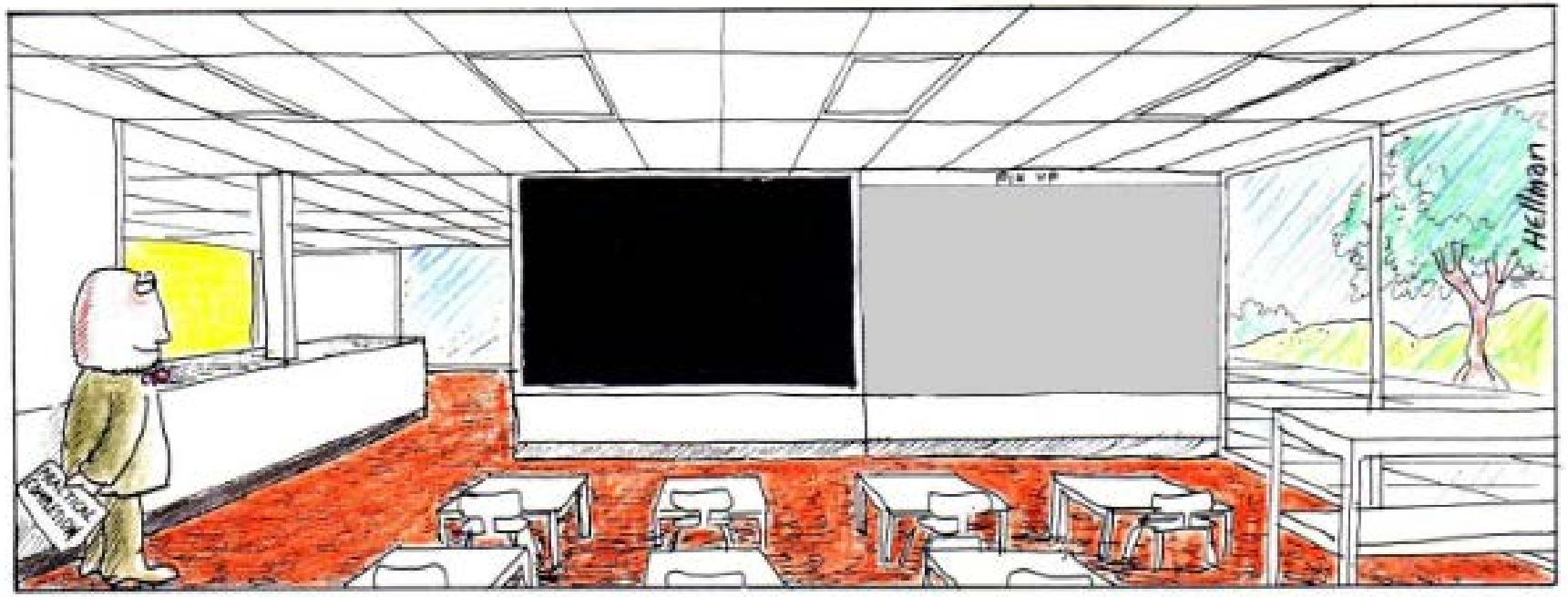



Ysgol
Treganna



https://www.google.co.uk/maps/@51.4818009,-3.2167394,346a,35y,180h,39.42t/data=!3m1!1e3





Louis Hellman in
Architect's Journal

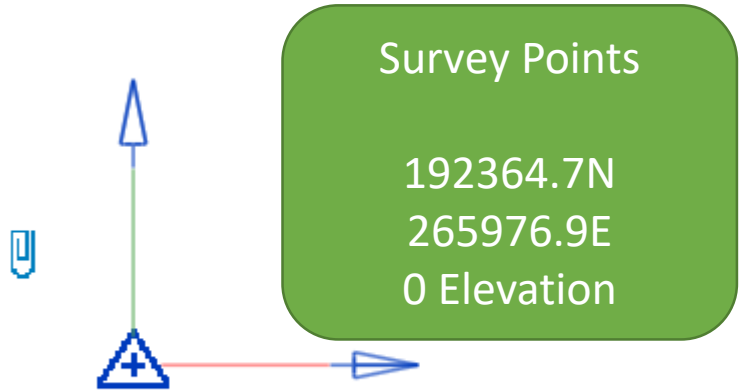
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https://www.bing.com/images/search?view=detailV2&ccid=56dh%2f9iM&id=0C604871884EAB9E5BFEEA21EE7FC3E1A58C4EB4&thid=OIP.56dh_9iMHNjvdIuRiEoP0wHaI1&mediaurl=https%3a%2f%2fi.pinimg.com%2foriginals%2f66%2f22%2f14%2f6622140862d27a95a2964ffe53773158.jpg&exph=1794&expw=1504&q=louis+helman+image+of+the+school&simid=608011277960348620&ck=9C70153377920998370 8B9DE16CE0400&selectedIndex=4&FORM=IRPRST&ajaxhist=0

AUTODESK® REVIT®

Assessment 2



Architectural Model

- Start a new project in REVIT – ‘architectural metric template’
- Set up levels
- Set up Project Base Point and Survey Point to the given coordinates
- Insert OSMAP in site view
- Unpin OSMAP and relocate to the Project Base Point and Survey Point
- Set up project north
- ***Set Up Phasing***
- Load Splash Page Titleblock
- Load UWTSD Titleblock

  SAVE file (with appropriate naming) and Close

Structural Model

- Start a new project in Revit – ‘structural metric template’
- Set up levels
- Insert Revit Link file (above), by ‘internal origin to internal origin’
- Relocate Project Base Point and Survey Point to the to match those of the Linked File
- Load Splash Page Titleblock
- Load UWTSD Titleblock

SAVE File (with appropriate naming) and Close

*Reopen the Architectural model and Insert Revit Link by ‘Project base point to Project base point’

NOW START DRAWING

Suggested Reading List

Francis Ching (2015) *Architectural Graphics*

BSi (2019) *The Little Book of BIM*

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

Eastman C, Teicholz P, Sacks R and Liston K (2011)
BIM Handbook: A Guide to BIM for Owners, Managers, Designers, Engineers & Contractors. Hoboken: John Wiley & Sons Inc.

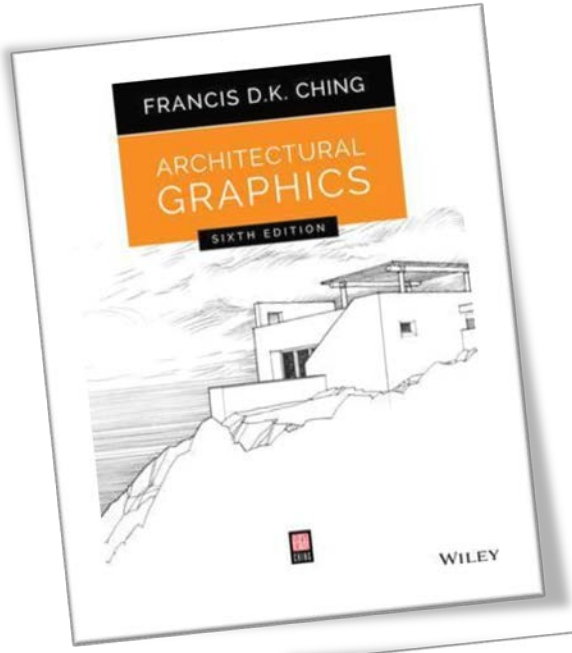
Mordue S Swaddle P and Philp D (2015). *Building Information Modelling for Dummies. Chichester:* John Wiley & Sons Ltd.

NBS National BIM Library

The BIM HUB: BIM Journal

https://academy.autodesk.com/
Revit Tutorials - Youtube.

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



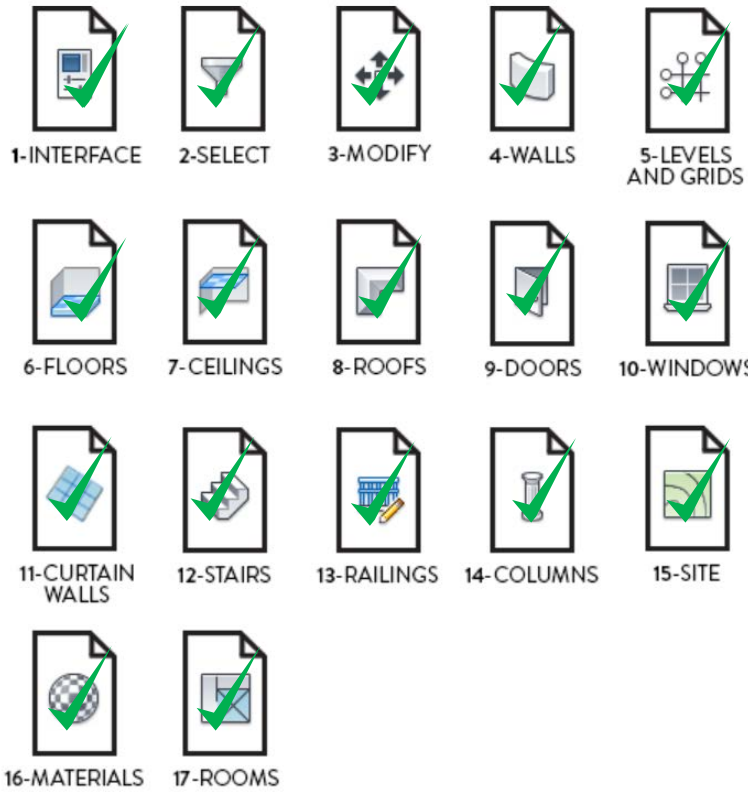


Key BIM Standards, ISO and PAS – refer to 'Little Book of BIM' guide

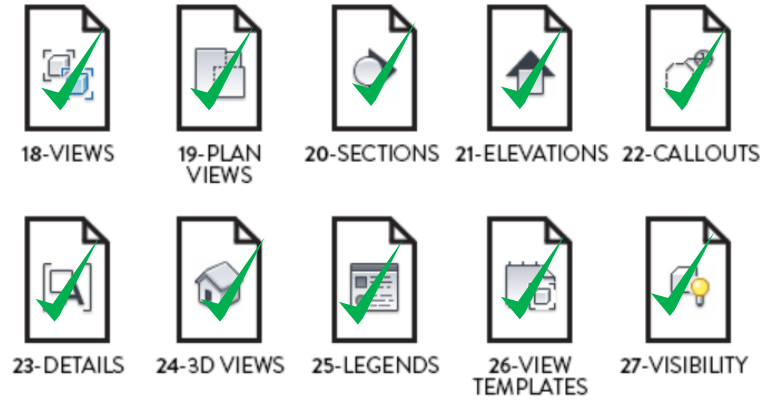


AUTODESK® REVIT® the basics

PART 1: MODEL



PART 2: VIEWS

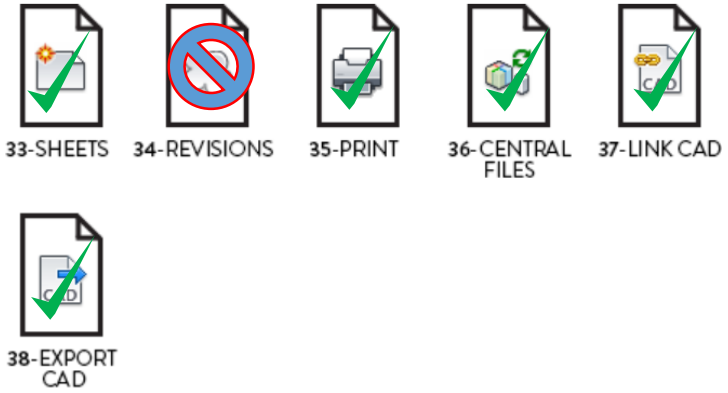


PART 3: ANNOTATE

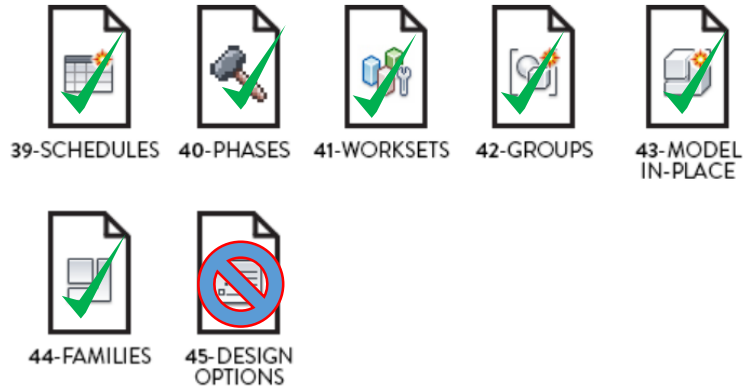


Covered in notes:

PART 4: PUBLISH AND COLLABORATE

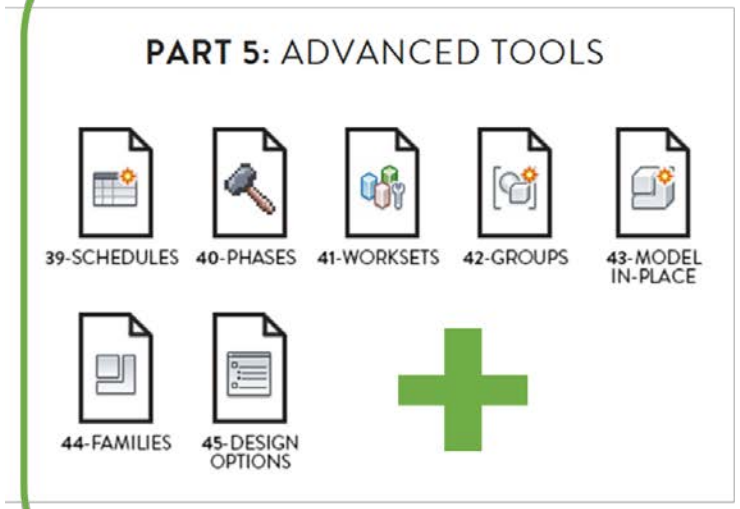


PART 5: ADVANCED TOOLS



https://revitpure.com/basics
https://academy.autodesk.com/

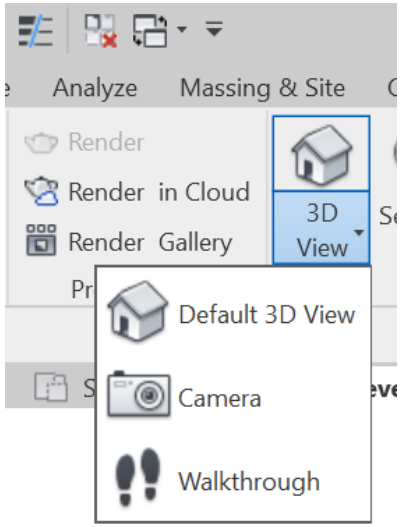
the basics: plus



- Creating Schedules for pricing
- Phased Works
- Central Models / Worksets / Federated Models
- Families
- Advanced Modelling: Sweeps Reveals and Model In Place
- *Collaboration and interoperability*
- *VR Visualisation*

Visualization

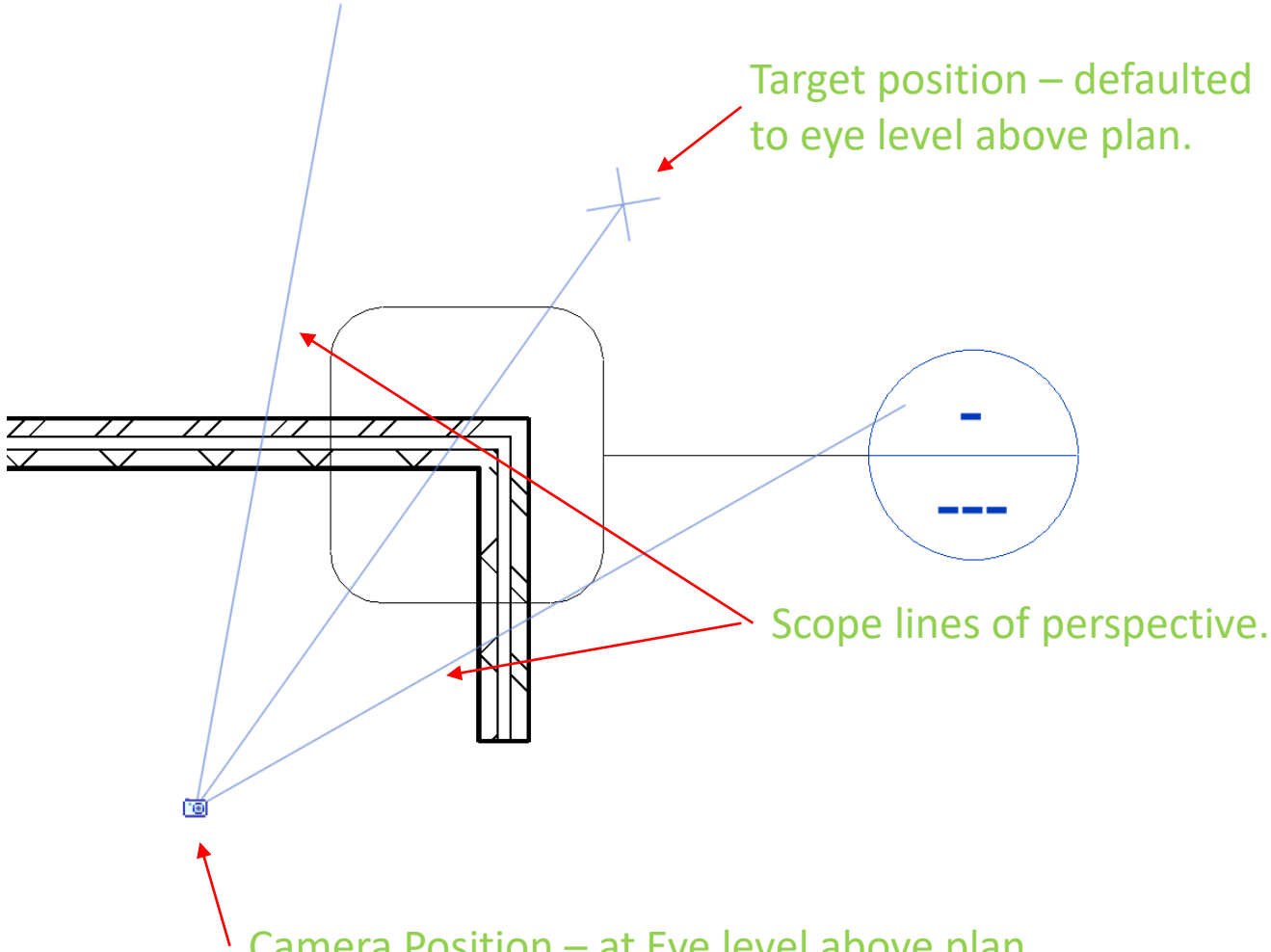




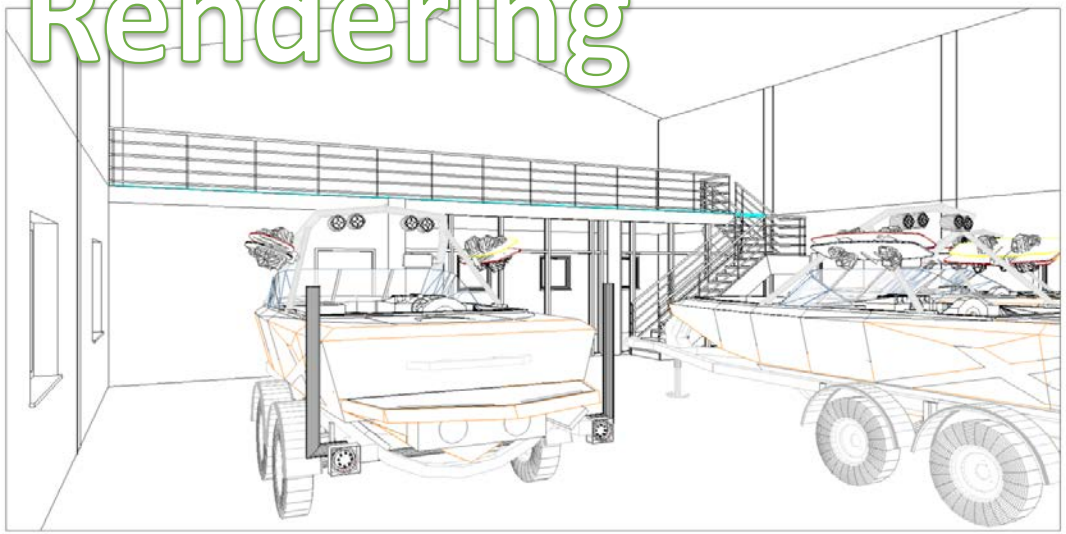
Place Camera Views in PLAN

Click to place camera and drag to show the scope of the perspective view.

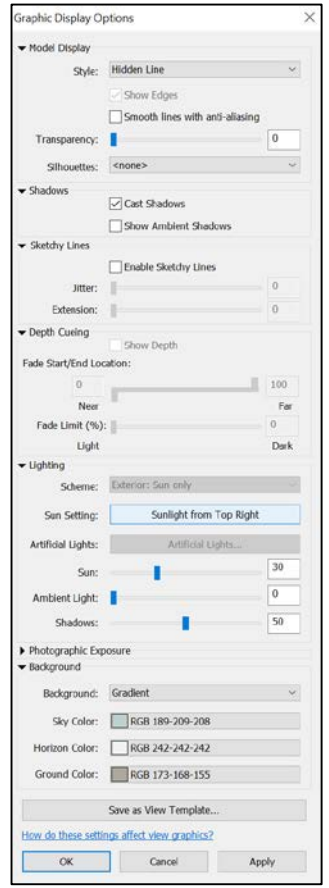
A new view will appear in the Project Browser Palette

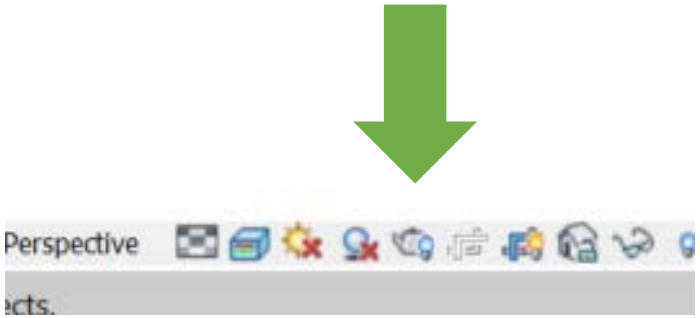


Rendering

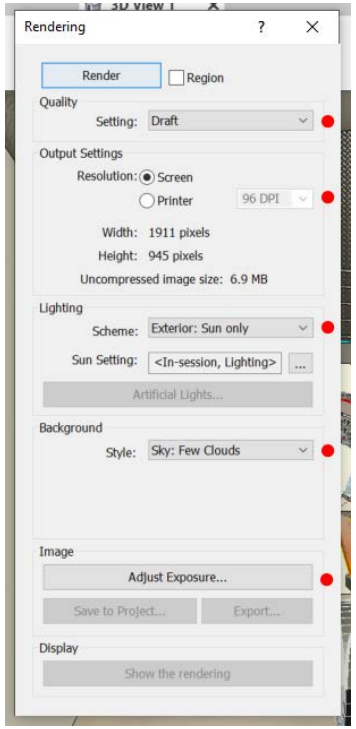




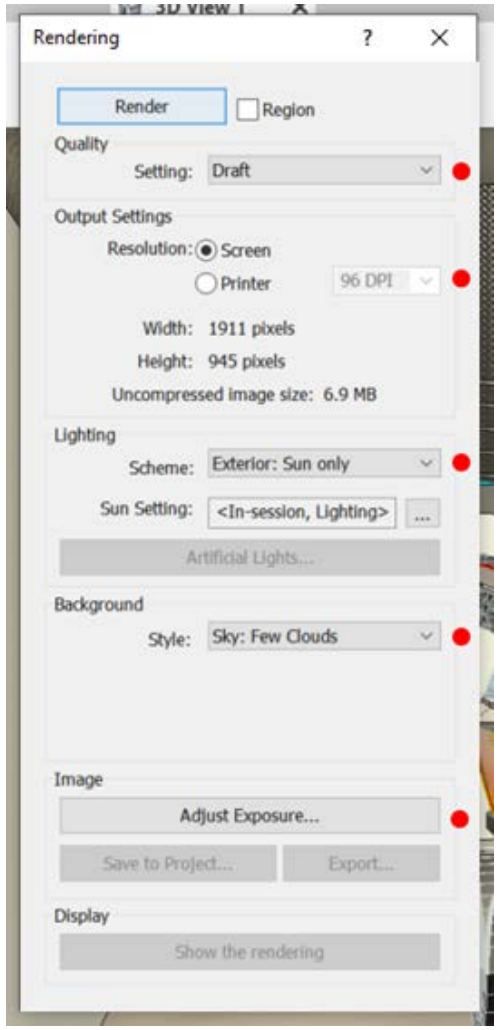








As well as adjusting the Graphical Display, Revit has a decent render engine to produce realistic views. The Render icon (teapot) allows you to set the graphical controls for the render.

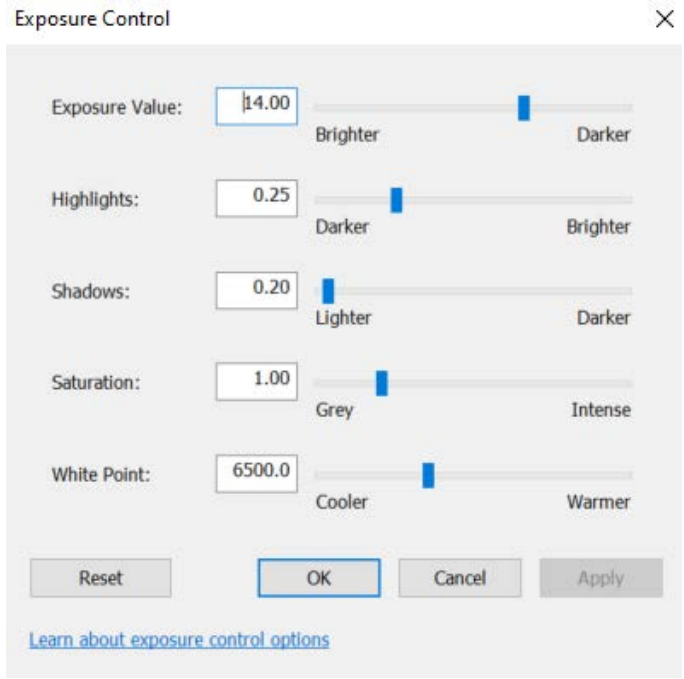


Speed / resolution

Resolution to Screen or DPI

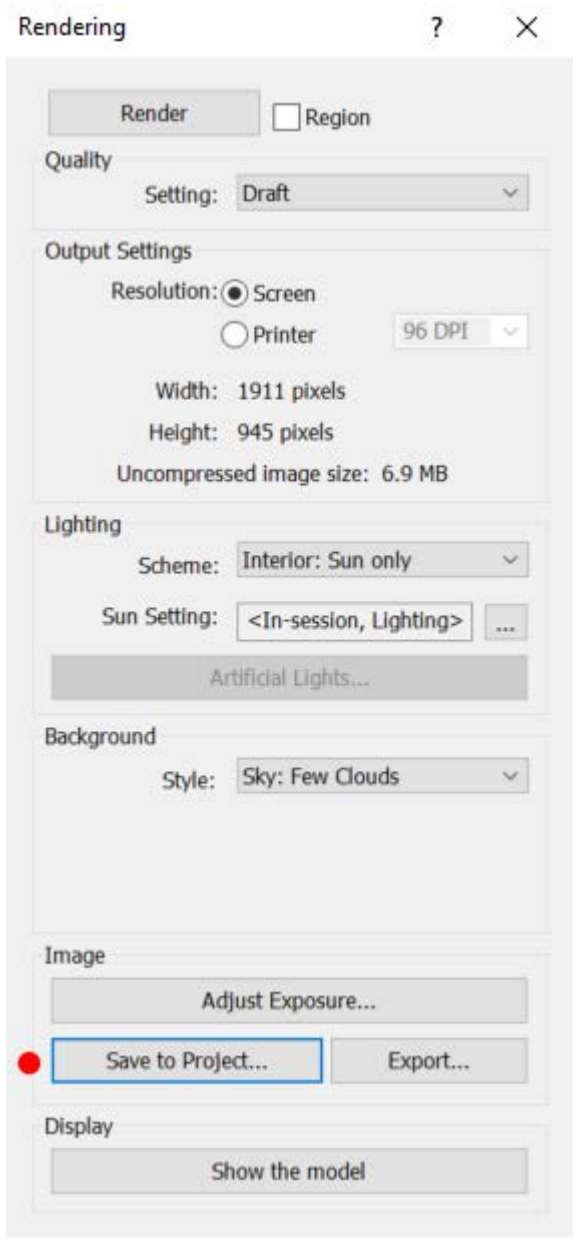
Lighting – Exterior or Internal views

Type of Sky



Exposure Values can be altered before or after a render whilst the dialogue box is open.

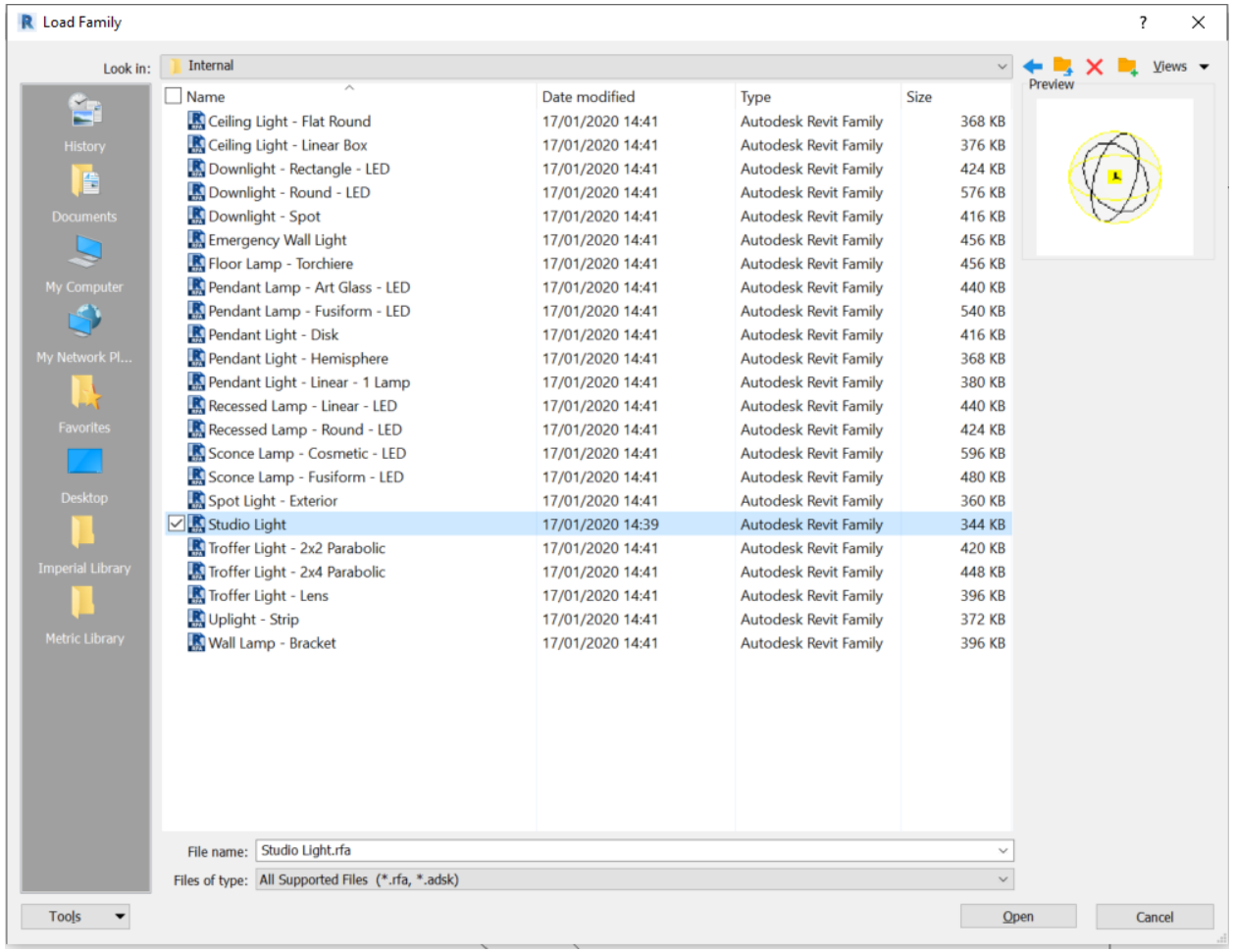
NB: Remember to Save your Rendered View to the Model

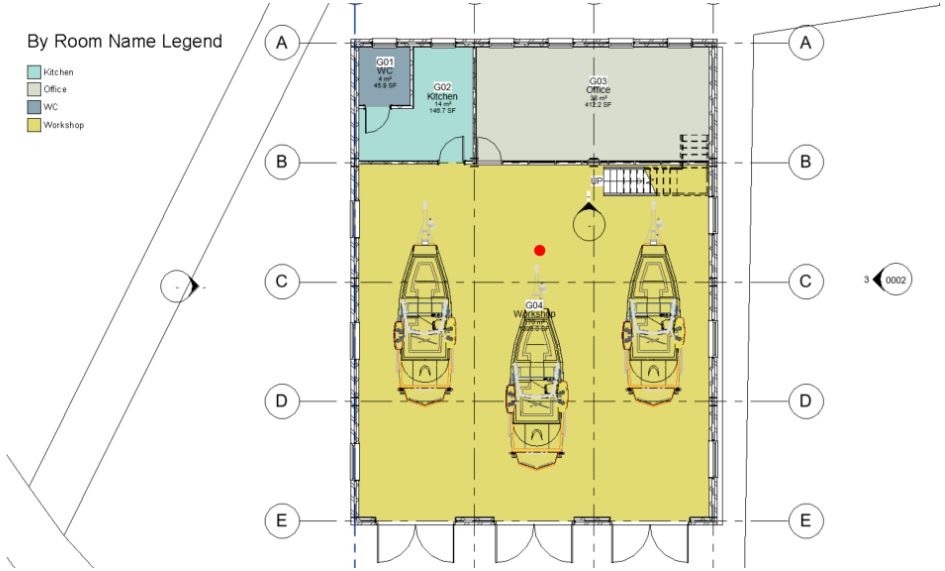


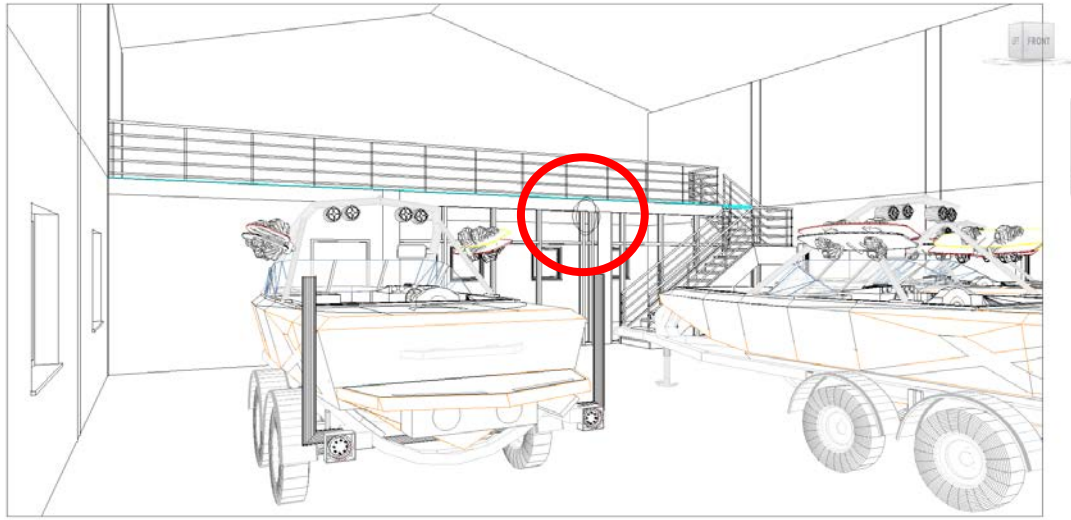


NB: Remember to Save your Rendered View to the Model

You can add Lighting families to your model such as a Studio Light

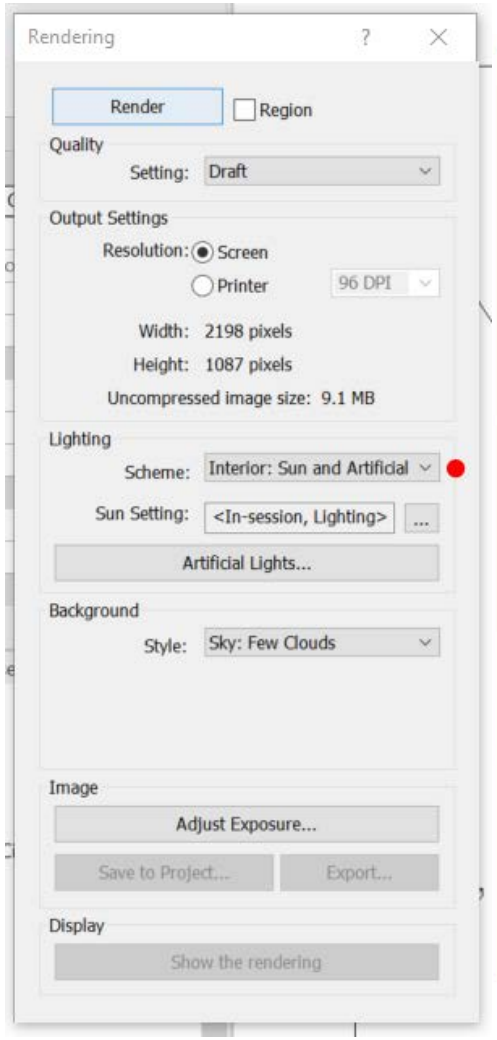






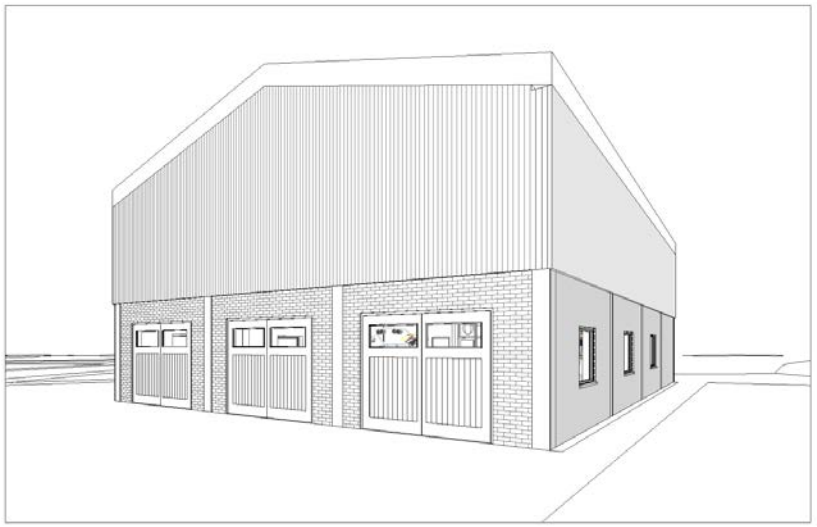
You can add then adjust your lighting settings to consider both the Sun and Artificial Lighting.
The more artificial lights you add the more time it takes to process the render.



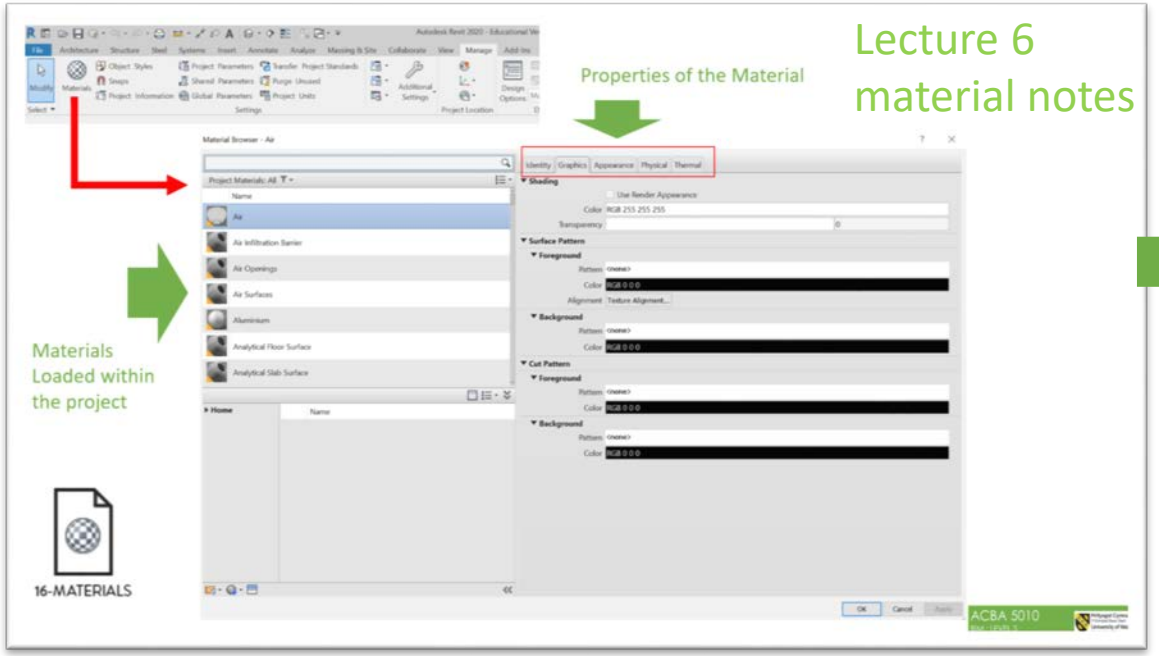




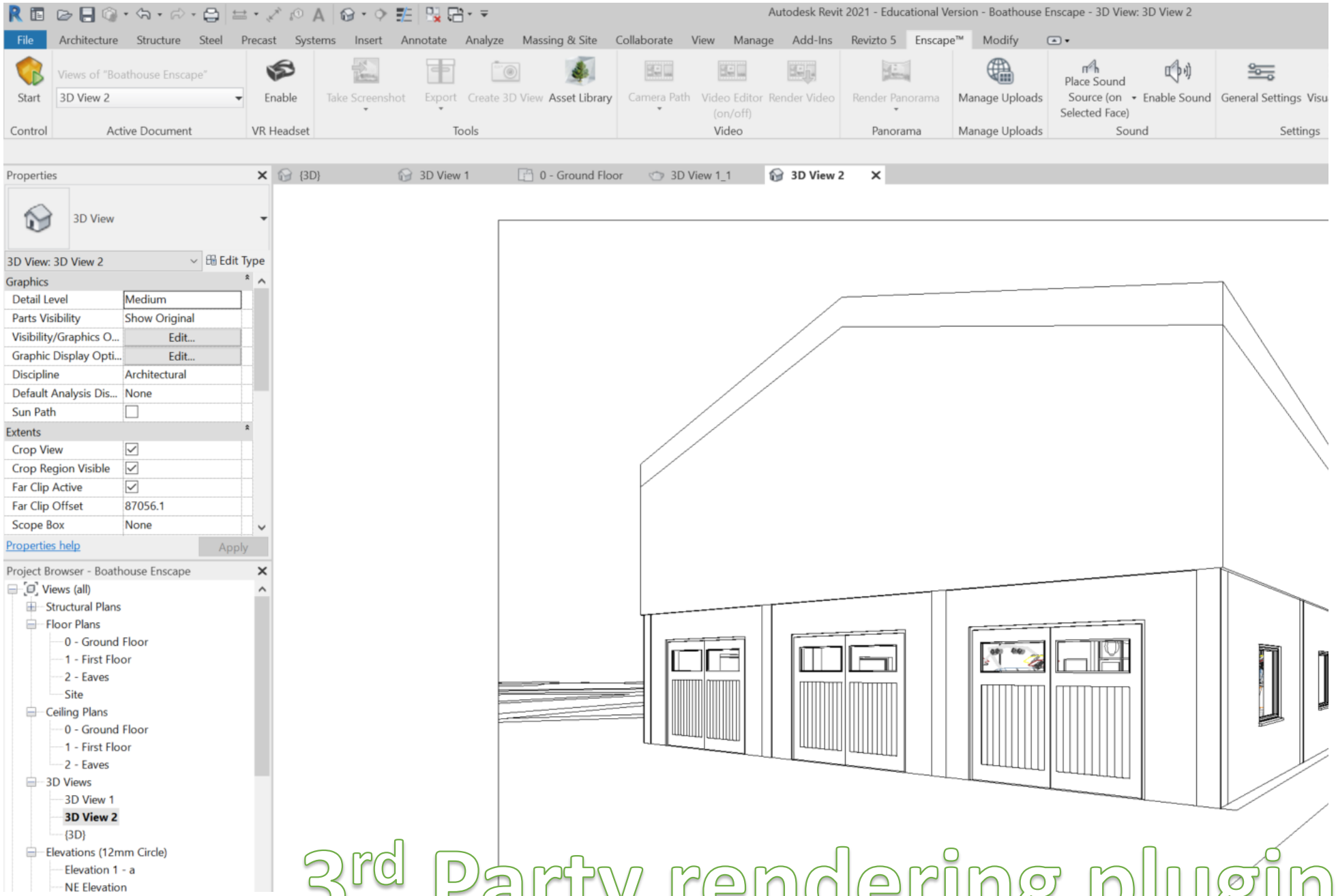
Material Choices











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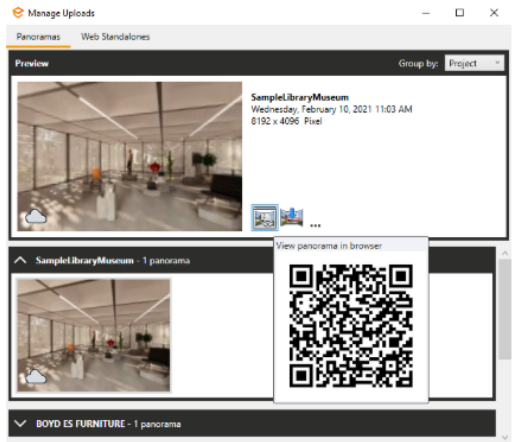
https://youtu.be/qo-HRFXIHZM

3rd Party rendering plugin





Once you have uploaded the panorama to the cloud, the **Upload panorama to cloud** button changes to the **View panorama in browser** button. Clicking on the button will directly open the panorama in your browser; hovering over this button will reveal a QR code that can be scanned with QR scanning software which will directly open the link to the panorama in the devices default browser.



Enscape's 'View panorama in browser' button showing the QR code when hovering over the button

Enscape can be linked to VR Technologies.
It can create Panoramic images for Google Cardboard
QR Codes can be generated to assist coordination and realisation of design drawings and ideas.

ENSCAPE™





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Whether you're a student preparing for an important exam, a teacher staying on the cutting edge, or a department head looking to expand your curriculum – Enscape will take you to the top of the class.

https://youtu.be/HZhw1ln2rNk

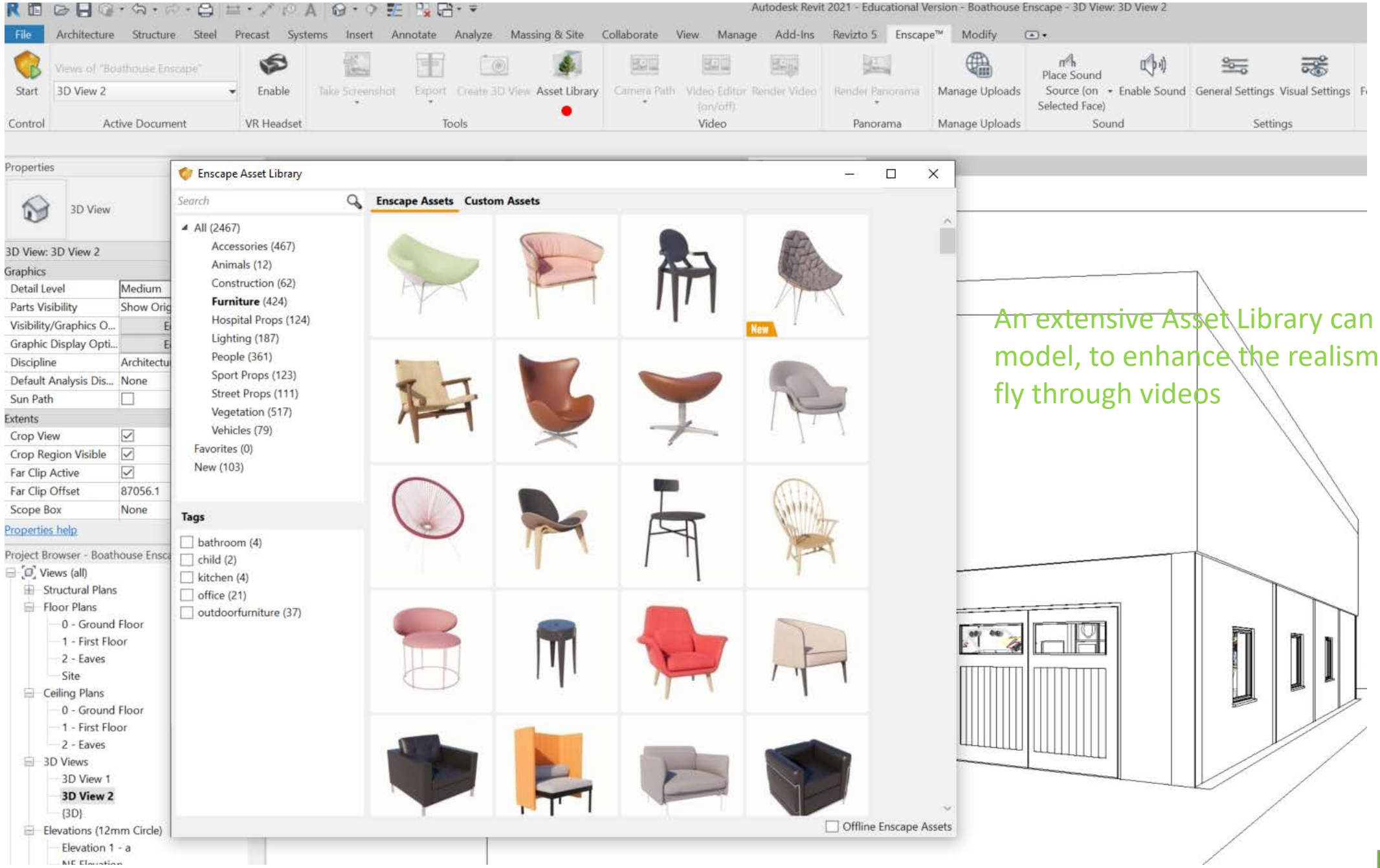
https://enscape3d.com/educational-license/

Realtime Rendering updated directly to the Revit Model



Interior views and materiality can be explored and updated within the Revit Model





An extensive Asset Library can be added to your model, to enhance the realism of you views and fly through videos

Week 8:

- Recap BIM for Lifecycle & Collaboration in Revizto.
- Assessments
- Visualisation in Revit
- Enscape



