Test Project

Digital Construction

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Introduction to Test Project

The Test Project (TP) simulates a real-world project but not all its actual processes. It contains multiple modules, which can be independently assessed. It is developed by sampling the skills defined in the WorldSkills Occupational Standards for digital construction professionals.

Competitor's work will be assessed against the instructions to evaluate the Competitor's competency in these skills. Point losses only occur when the Competitor fails to execute the instructions. A Marking Scheme was developed for this purpose. It is important that the Competitors read the instructions and all supporting materials carefully. Double punishment is avoided with the best of the Independent Test Project Designers (ITPDs).

1. Competitor instructions and supporting materials will be distributed module by module at the beginning of each module. They include pdf drawings, Revit template, BIM Execution Plan (BEP) document, and other supporting files.
2. The same version of BEP will be used throughout the four (4) days Competition.
3. You have been assigned to manage and develop a project that is pre-setup for this Competition. The project code is SILK followed by your two (2) digit Competitor number, such as SILK00 for an assigned number of "00."

Note: In this document and anywhere else in this TP dataset,

- **## stands for your assigned competition number, such as 01, 02, 03, etc.**
- **$ represents any character or number**
- **BEP** is short for BIM Execution Plan
- **CID** is short for Competitor Instruction Document (this document).
- **CDE** is short for Common Data Environment
- **TP** is short for Test Project

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Description of project and tasks

The Test Project is related to the delivery of a four-storey physical education teaching facility for an imaginary vocational university in Jiangsu province of China. It consists of nine (9) standalone modules, detailed below:

ITEM	MODULE	DURATION	DAY	ASSESSMENT SUMMARY
1	CDE setup	1	1	Project setup, take off, and site execution in Autodesk Forma.
2	Conceptual design modelling and rendering	2	1	Revit: massing and Twinmotion
3	Structural modelling	2	1	Revit: structure
4	Architectural modelling and collaboration	3.5	2	Revit: architecture and collaboration Forma- design collaboration
5	Model coordination	2	2	Forma coordination and Navisworks
6	Asset information modelling	1	3	Revit Interoperability tools and COBie
7	Data creation and management:	4	3	Revit (sheeting)
8	Modelling for sustainability and automation	2	4	Autodesk Forma and Revit: Carbon
9	Collaborative modelling	2	4	Architectural modelling in teams
	Total (hours)	19.5	-	-

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Module 1 – CDE setup

Reading time	5 minutes
Modelling time	55 minutes
Working folder	Forma: SILK##
Source folder	Forma: Resource for SILK 2026\Module 1
Provided files	WS2026-ITPD-TP-ID-M1.pdf WS2026-ITPD-TP-BEP-M1.pdf WS2026-ITPD-TP-SM-M1_SheetsTakeOff.pdf
Task brief	You work for the WSI to set up the project CDE and perform Takeoff of flooring, etc.

1.1 Project settings

1. In your Autodesk Forma account, complete the project setup by entering project details per BEP.
2. Add project members listed in BEP: Table 1 to the project with the proper roles and access levels. Pay attention to spellings.

1.2 Folder structure and attributes

1. Create the required folders given in Figure 1-1. Competitors need to pay attention to spellings and upper/lower cases.

Project Files

11 Architecture
12 Structure
13 MEP
20 Shared
30 Published
    Arch
    ST
    MEP
40 Archived
    Arch
    ST
    MEP

Figure 1-1: Folder structure

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2. Create a Naming Standard in accordance with BEP: Section 4.3 and apply it to the shared and all WIP folders and their subfolders.
3. Make sure all WIP folders and Shared folders have the following three attributes added with the corresponding types and values. Pay attention to spellings and upper/lower cases.

NAME	TYPE	VALUES
Status	Drop-down list	Refer to Appendix: Table A1
Classification	Text	-
Revision	Text	Refer to Appendix: Table A1

4. Assign the required folder permissions to each of the project members as shown below

COMPANY	EDIT PERMISSION	VIEW AND DOWNLOAD PERMISSION
SILK	-	20 Shared 30 Published 40 Archived
Arch Consulting	[11 Architecture] [20 Shared/Arch] [30 Published/Arch]	20 Shared 30 Published 40 Archived
Structure Consulting	[12 Structure] [20 Shared/ST] [30 Published/ST]	20 Shared 30 Published 40 Archived
MEP Consulting	[13 MEP] [20 Shared/MEP] [30 Published/MEP]	20 Shared 30 Published 40 Archived

1.3 Collaboration and coordination setups

1. In Forma Design Collaboration, create the following three teams and their corresponding coordination space using the team folder.

TEAM NAMES	TEAM'S FOLDER	TEAM'S SHARED FOLDER	COORDINATION SPACE ENABLED WITH AUTOMATIC CLASH?
Arch Consulting	11 Architecture	20 Shared/Arch	No
Structure Consulting	12 Structure	20 Shared/ST	No
MEP Consulting	13 MEP	20 Shared/MEP	Yes for RVT files only

2. Create a coordination space for the shared folder and enable automatic clash detection for IFC and Revit and NWC files only.
3. Create two approval workflows. The first one is a one-step approval process. The second one is a two-step approval process. Each step is a single-reviewer type.

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WORKFLOW NAME	INITIATOR	FIRST REVIEW	FINAL REVIEW	ACTION UPON APPROVAL
InternalReview process	Role=Architect ; Structural designer; and Engineer	-	BIM manager	(b)
ExternalReview process	Role=Architect; Structural designer; and Engineer	BIM Manager	Information manager	(a) and (b)

(a) Copy file to the "shared" folder but allow the Initiator to change the target folder.
(b) Enable attribute "status" to auto-increment for target folder (if any) and source folder but allow reviewers to choose if attributes are also updated for rejected files in the source folder.

1.4 Publish sheets for Takeoff

1. Publish the provided pdf sheet for Forma Preconstruction.

   (a) Version set name: First Version
   (b) Ensure correct issuance date, sheet number, and sheet title.

2. Create a Takeoff package named "Architecture."

   (a) Measurement system is Metric
   (b) Currency is CNY

1.5 Takeoff

1. Use the Takeoff tool in Autodesk Forma: Preconstruction to perform Takeoff for the flooring areas. The objective is to generate an Excel file (.xlsx) containing the Takeoff schedules of the flooring areas and estimated costs, like the sample shown in the table below. The schedule must contain all the columns listed in the table.

NAME	QUANTITY	UNIT	COST	TOTAL COST	DOCUMENT
Tennis Court	199.13	m^2	CN¥105/m2	CN¥1050.00	
Tennis Court – Installation: Laminate	10	m^2	CN¥5.00	CN¥50.00	A104
Tennis Court - Laminate	10	m^2	CN¥100.00	CN¥1000.00	A104
Office	10	m^2	CN¥155.00 /m2	CN¥1550.00	
Office – Ceramic	10	m^2	CN¥150.00	CN¥1500.00	A104
Office – Installation: Ceramic	10	m^2	CN¥5.00	CN¥50.00	A104
Takeoff package Total Cost				CN¥2600.00	

- Name column lists the floor types and cost items.
- Quantity lists the estimated area of three flooring materials, including the waste= actual area*(1+ waste ratio).
- Unit: area in m^2
- Cost: unit cost of the material or installation cost.
- Total cost: The total estimated cost for each item.
- Document: Source sheet for the Takeoff.

Only three (3) types of floor areas are needed: office, tennis court, and corridor. The finish flooring material and associated cost are listed in the table below.

ROOM TYPES	FLOORING MATERIAL	COST (CNY/M2)	INSTALLATION COST (CNY/M2)	MATERIAL WASTE RATIO
Office	Laminate	100	10	10%
Tennis court	Vinyl	50	0	2%
Corridor	Ceramic	150	50	5%

2. Upload the excel file to your shared folder on the CDE for information. Use "LDB" for Form code and "A" for Discipline code. (Choose any value for revision code and classification to proceed. These three attributes will not be marked).

1.6 Site execution

1. Create and enactive a root cause entitled "Wrong Unit" for the Design category.
2. Complete and submit a Daily Safety Inspection form within Autodesk Forma Build. The form is to report the results of onsite inspection conducted yesterday. All items on the form were inspected but only the two (2) issues were found:

   (a) Some construction trash was not removed and needs action ASAP.
   (b) Five (5) extinguishers were outdated and needs to be replaced ASAP.

3. For all daily safety inspection forms, the name should be "Daily Safety Inspection (C##)." "Project" field should be the complete project name. "Project #" field should be the Project Code. "Date" field should be the date when the inspection is performed.

Module 1 is finished.

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Module 2 – Conceptual design modelling and rendering

Reading time	10 minutes
Modelling time	110 minutes
Working folder	Forma: SILK-Module2\SILK##
Source folder	Forma: Resource for SILK 2026\Module 2
Provided files	WS2026-ITPD-TP-ID-M2.pdf WS2026-ITPD-TP-SM-M2_EntranceCanopyAdaptive.rfa WS2026-ITPD-TP-SM-M2_SiteRender.rvt
Task brief	You work for the Arch Consulting to develop a parametric architectural mass and produce high-quality visualized outputs integrated within the provided site model.

For Revit family files, there is no need to follow the naming standard specified in BEP.

2.1 Conceptual design modelling

Download the source files as you will need them later.

1. (**3-D cocoon massing**) Create a new conceptual mass family for a 3-D ellipsoid with its bottom cut off as illustrated in Figure 2-1. The following constraints apply.

- Name: ARCH-Cocoon-Metal-ParametricMass.rfa
- The long axis of the elliptic is 36 m
- The short axis of the elliptic is 20 m
- The actual height of the object is 30 m.

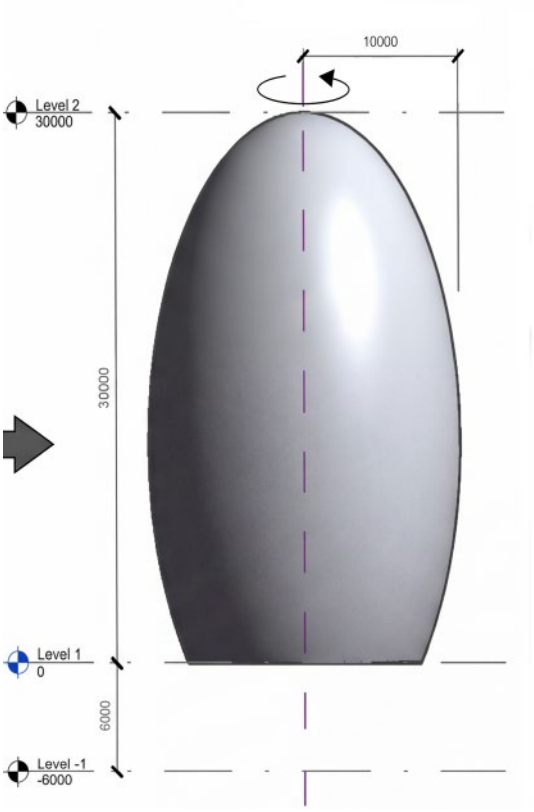


Figure 2-1: 3-D ellipsoid

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2. (**Surface Subdivision**) Apply a surface subdivision to the ellipsoid to generate a structured UV grid, as illustrated in Figure 2-2, with the following parameters:

- U grid number = 18
- V grid number = 12
- Surface pattern = "No Pattern"

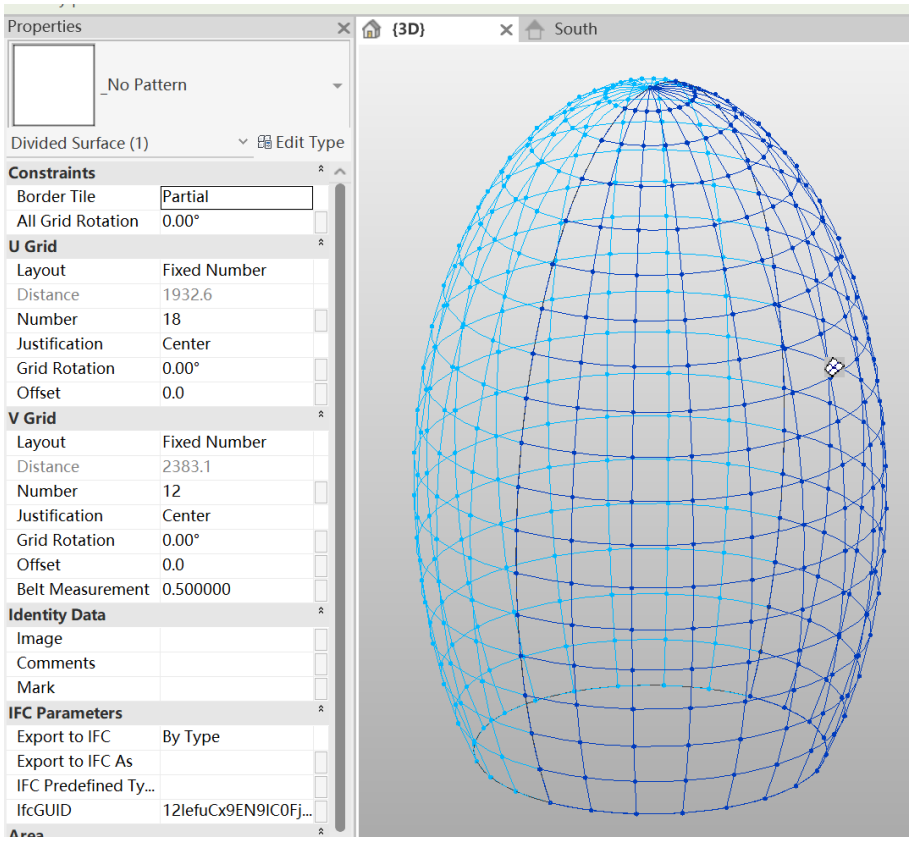


Figure 2-2: Surface Subdivision and Grid Configuration

3. (**Structural System Development**) Create an adaptive component using the template 'Metric Generic Model Adaptive.rft', for the rectangular frame as illustrated in Figure 2-3 such that:

- Name: ARCH-StructuralFrame-SteelAdaptive.rfa
- Frame size: 0.2 m x 0.4 m
- Material: Steel

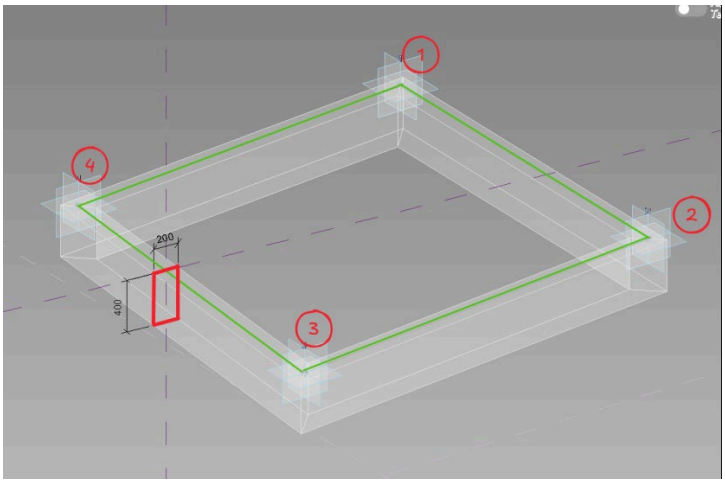


Figure 2-3: Adaptive Structural Component Definition

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4. Load the steel frame component into the cocoon mass family and place it onto the subdivided surface by snapping its four adaptive points to the cell nodes as shown in Figure 2-4 (left). Note that the frame's edges align with the cell diagonals. Use the Repeater function to propagate the component across all grid cells on the ellipsoid (see Figure 2-4, right).

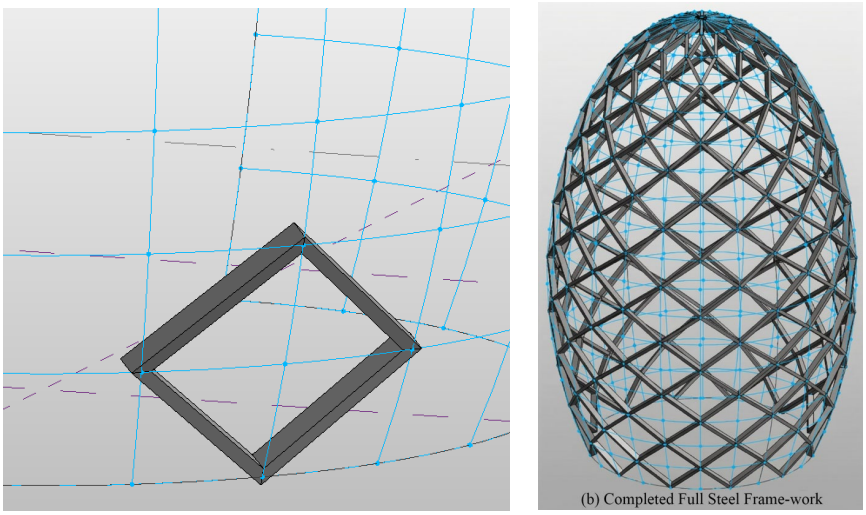


Figure 2-4: Adaptive Component Alignment on Surface Grid and the finished look

5. (**Aluminium panel modelling**) Create a family based adaptive component for panels as shown in Figure. 2-5 such that

- Name: ARCH-Panel-AdaptiveUnit.rfa
- Unit: Metric system
- Material: Aluminium
- The thickness of the panel is determined by the four heights

○,1 100 mm; ○,2 300 mm; ○,3 800 mm; ○,4 300 mm

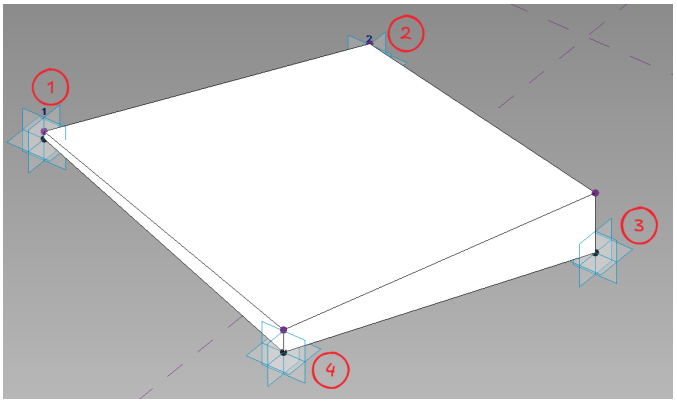


Figure 2-5: Adaptive Point Offset Configuration

6. (**Envelope Modelling**) Load the panel family into the framed ellipsoid mass and place it onto the divided surface grid to cover the **entire** ellipsoid, as illustrated in Figure. 2-6. Note that the panel is located on the outer face of the surface grid (not embedded in the frame as in the 'wrong' example), with the thinner corner at the top.

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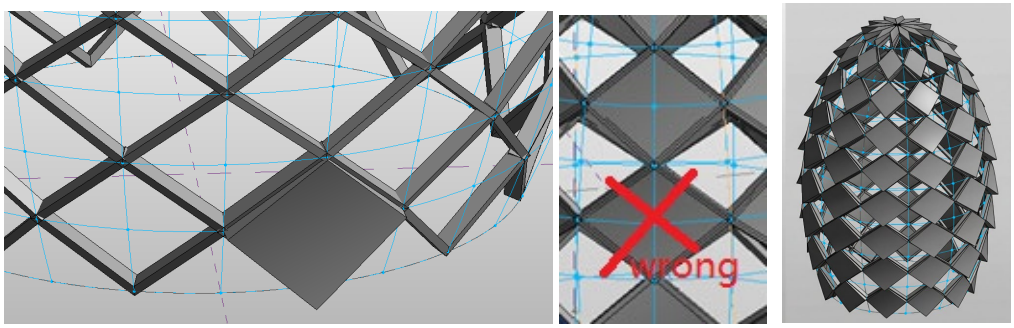


Figure 2-6: Envelope Component Placement on Grid

7. (**Entrance opening modelling**) In the south elevation, clear a region of 4 by 8 cells at the bottom of the ellipsoid by removing the structural frame for an entrance opening as illustrated in Figure 2-7(left). Load the provided adaptive component "WS2026-ITPD-TP-SM-M2_EntranceCanopyAdaptive.rfa" and place it by sequentially snapping its six (6) adaptive points to the corresponding grid nodes around the boundary of the opening, as illustrated in Figure 2-7(right).

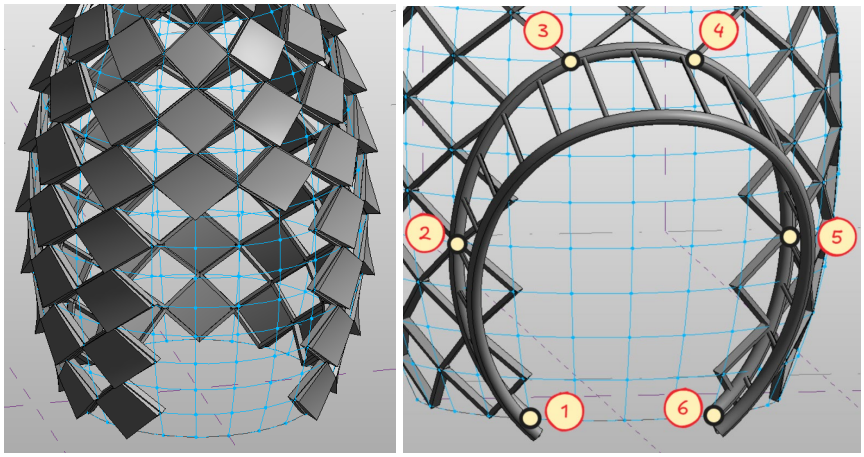


Figure 2-7: Entrance Opening Formation and Component Placement Using Adaptive Points

8. Upload the mass family to the CDE. No need to follow the file naming standards in BEP: section 4.3 for this file. The status, classification, and revision codes for this file will not be marked.

2.2 Visualization in Twin motion

1. Open the provided Revit file. If a warning message appears, choose either of the first two (2) options to continue. In sheet A100, the following two (2) pre-defined views are displayed for the site to be worked on:

- Daytime Aerial Perspective
- Main Entrance Perspective

Your task is to create two rendering images viewed from these two (2) perspectives and enhance the scenic environment in Twinmotion. Do not change any of the original architectural layout, building forms, plaza arrangement, water features, and main sculptural feature. Figures 2-8 and 2-9 provide a reference for the visual composition and atmosphere, but you do not have to do exactly the same.

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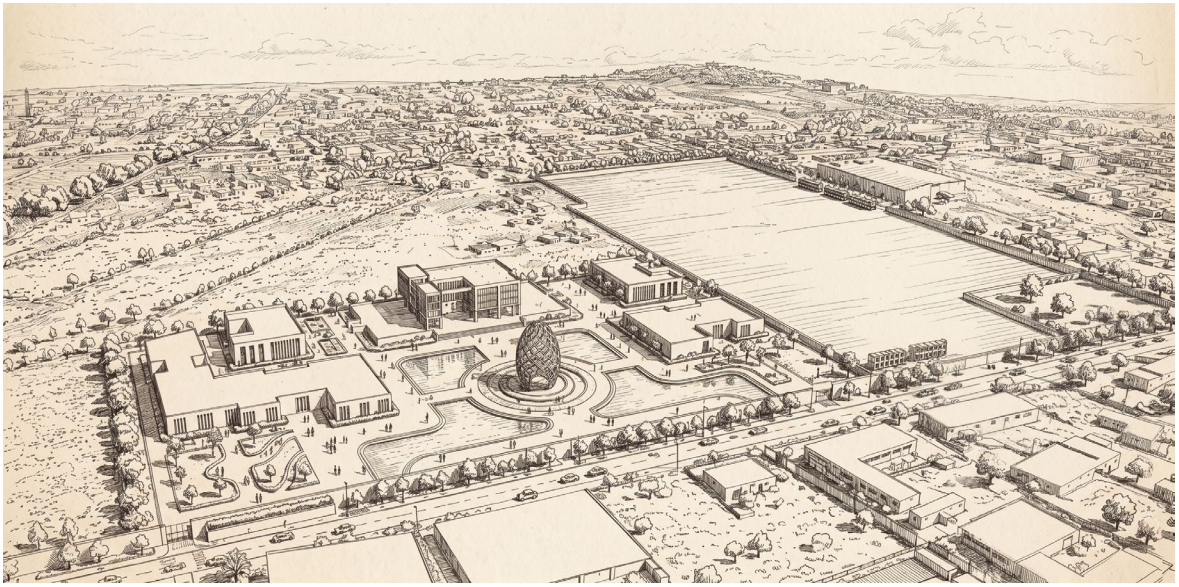


Figure 2-8: Reference Sketch for Daytime Aerial Perspective Enhancement

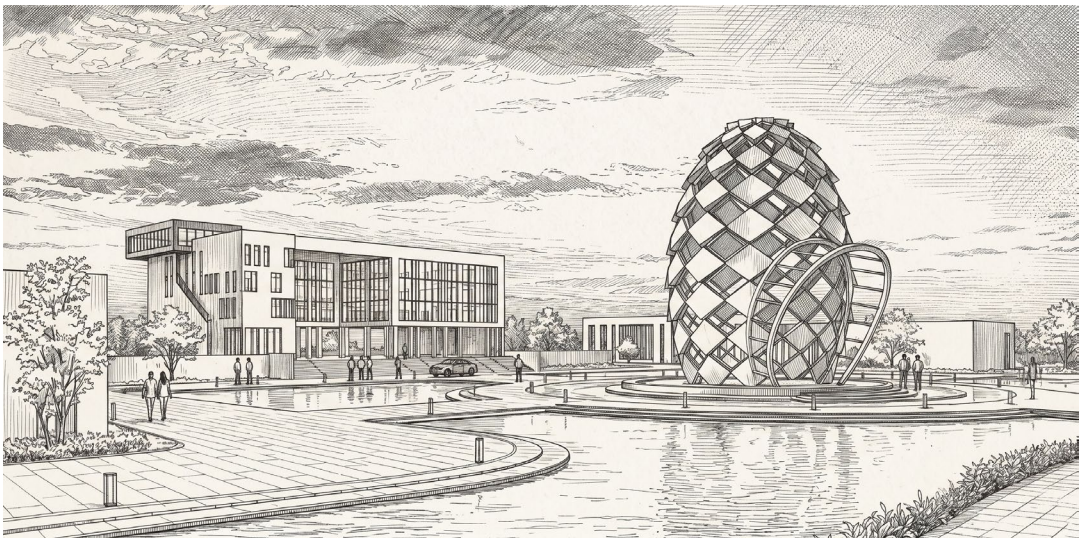


Figure 2-9: Reference Sketch for Main Entrance Perspective Enhancement

2. Daytime Aerial Perspective Image
   A daytime aerial rendering that emphasizes the overall site composition, architectural presentation, landscape integration, surrounding context, and environmental quality under natural daylight conditions. Competitors are to follow the following guidelines:

- Maintain the given camera position and viewing direction.
- Enhance the overall site atmosphere and environmental quality.
- Improve terrain, paving, water features, and surrounding context.
- Add appropriate landscape elements, such as trees, shrubs, grass, and site furniture.
- Add realistic entourage elements, such as people, vehicles, and street lighting.
- Refine architectural materials, reflections, shadows, and lighting conditions.
- Create a visually balanced and realistic daytime environment.

3. Dusk time Main Entrance Perspective Image
   A dusk (within one hour after sunset) rendering that emphasizes the spatial atmosphere of the entrance plaza and the visual experience around the main sculptural feature. Here are the guidelines:

- Maintain the given camera position and viewing direction.
- Emphasize spatial atmosphere and visual experience at the main entrance plaza.

- Apply warm dusk lighting conditions.
- Enhance the sculptural feature, water reflections, and especially façade lighting.
- Add environmental details, such as landscape lighting, trees and planting, pedestrians, vehicles, reflections, and surface textures.
- Create a cinematic and immersive architectural atmosphere.

4. Export the final renderings in JPG format:

- Aspect ratio: 2:1
- Recommended resolutions: 3840 × 1920, 4000 × 2000, or 6000 × 3000 pixels.

5. Save the completed twin motion project file in *.tm* format.
6. Submit the following 4 files to the CDE:

   (a) The daytime rendering image of the site
   (b) The dusk time rendering image of the entrance
   (c) The updated site Revit PIM
   (d) The Twin motion project file for the PIM

Note: No IFC files is needed for this module. Follow the naming standard in BEP section 4.3 with functional breakdown='ZZ' and spatial breakdown = 'ZZ.' The status, classification, and revision codes are not marked for these files.

Module 2 is completed.

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Module 3 – Structural modelling

Reading time	10 minutes
Modelling time	110 minutes
Working folders	Forma: SILK-Module3\SILK## Forma: SILK-Module3\Shared\SILK##
Source folders	Forma: Resource for SILK 2026\Module3
Provided files	WS2026-ITPD-TP-ID-M3.pdf WS2026-ITPD-TP-S-M3.rte WS2026-ITPD-TP-SM-M3_DrawingSheets.pdf WS2026-ITPD-TP-SD-PIMQAChecklist.docx
Task brief	You are employed by the Structure Consulting to deliver a structural model for the Momentum Hall in the SILK project.

3.1 Grids and levels file

1. With the provided template and drawing sheets, create a cloud work shared model that contains only work sets, grids, coordinates, and levels information. This will be the first revision of the structural PIM.
2. Conduct a quality assurance check on the PIM in accordance with BEP. Approve the check assuming the check is successful.
3. Submit the PIM to be shared for information or reference using a One-step Review (internal) workflow. Finish the review as if you are the team leader.
4. Copy the PIM to your team's shared folder.

3.2 Structural modelling

1. Continue to update the PIM as the second revision of the model. Complete the modelling in accordance with the provided drawing. Adhere to the requirements of the BEP.

3.3 Collaborative design and publish settings

1. Set the default 3-D view as the start view.
2. Save the work shared structural PIM to the CDE per the requirement of the BEP.

Module 3 is completed.

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Module 4 – Architectural modelling and collaboration

Reading time	10 minutes
Modelling time	200 minutes
Working folders	Forma: SILK-Module4\SILK## Forma: SILK-Module4\Shared\SILK##
Source folders	Forma: Resource for SILK 2026\Module4
Provided files	WS2026-ITPD-TP-ID-M4.pdf WS2026-ITPD-TP-AR-M4.rte WS2026-ITPD-TP-AR-M4_DrawingSheets.pdf WS2026-ITPD-TP-ST-M4_StructuralGridsLevels.rvt
Task brief	You work for the Arch Consulting to deliver an architectural model for the SILK project. It is the first revision of the PIM to be shared for review and comments

4.1 Architectural modelling

1. With the provided template and drawings, create a cloud work shared architectural PIM for the Momentum Hall. Please adhere to the requirements of the BEP. Elements to be modeled include but are not limited to the following:

- Work sets
- Coordinates
- File naming
- Walls, floors, roofs, ceilings
- Doors, windows, curtain walls
- Stairs and railing
- Start view = site plan view with PBP and Survey point visible
- Revision code
- Status code
- Classification

Hint:

(a) Use Core Centreline when positioning external and internal walls on grid lines where fit.
(b) There are repetitions in the project: The third and fourth floors share the same floor height and have some identical elements. You might take advantage of this in modelling by identifying them in the drawings.
(c) A structural PIM has been shared by a different task team. You can make use of this information container if you wish to.

2. Skip the quality assurance check on the PIM. Submit the PIM in the CDE for a one-step review for sharing with other teams using the process specified in BEP: section 3.4.2. This will be the first revision of the PIM.

- Review name: "Arch Model For Sharing"
- Upon success, the file will be copied to the team's shared folder.

3. Start the review as the team leader. Approve and submit the review all by yourself.

Module 4 is completed.

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Module 5 – Model coordination

Reading time	10 minutes
Modelling time	110 minutes
Working folders	Forma: SILK-Module5\SILK## Forma: SILK-Module5\Shared\SILK##
Source folders	Forma: Resource for SILK 2026\Module5
Provided files	WS2026-ITPD-TP-ID-M5.pdf WS2026-ITPD-TP-AR-M5.rvt WS2026-ITPD-TP-ST-M5.rvt WS2026-ITPD-TP-MEP-M5_P.rvt WS2026-ITPD-TP-MEP-M5_E.rvt WS2026-ITPD-TP-MEP-M5_M.rvt
Task brief	You work for the WSI to perform model coordination and corrective modelling.

5.1 Preparation

1. Locate the following PIMs in the Resources directory. Download and collaborate them to your working folder. Rename them properly per the requirements in the BEP. All these models are considered as the first version of the P01 revision of each model, i.e. P01.01.

- WS2026-ITPD-TP-MEP-M5_E.rvt
- WS2026-ITPD-TP-MEP-M5_P.rvt
- WS2026-ITPD-TP-MEP-M5_M.rvt

5.2 Perform Clash Detectives in Navisworks

1. Federate the three MEP models in Navisworks Manage.
2. Reset the display colours for duct and piping systems as shown in Table 5-1. Create one search set for each system type, or for system types that share the same display colour.

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Table 5-1

SEARCH SET NAME	SYSTEM TYPES/TYPES	COLOUR
Fresh Air	DS_Fresh Air	RGB:0,255,255
Exhaust Air	DS_Exhaust Air	RGB:128,128,255
HVAC	DS_Return Air	RGB:255,255,0
	DS_Fan Coil*	
	DS_Supply Air	
	PS_Chilled Water	
	PS_Condensate Drainage	
Sewage	PS_Sewage	RGB:128,255,255
Water Supply	PS_Water Supply	RGB:255,0,0
Waste Water	PS_Waste Water	RGB:255,255,128
Rainwater	PS_Rainwater	RGB:128,255,128
Fire Suppression	PS_Water Fire Suppression	RGB:0,0,255
Cable Trays high V	Cable Trays for high voltage	RGB:255,128,128
Cable Trays low V	Cable Trays for low voltage	RGB:128,0,255

** Note that the Fan coil is a generic family model in the provided Revit file.*

3. Perform hard and clearance clash detections per BEP among the three MEP models as shown in Table 5-2. Report the results in one pdf file.

Table 5-2 Clash detective tasks

MODEL 1	MODEL 2	TEST NAME
WS2026-ITPD-TP-MEP-M5_E.rvt	WS2026-ITPD-TP-MEP-M5_M.rvt	E vs Mechanic Hard E vs Mechanic Clearance
WS2026-ITPD-TP-MEP-M5_E.rvt	WS2026-ITPD-TP-MEP-M5_P.rvt	E vs Plumbing Hard E vs Plumbing Clearance
WS2026-ITPD-TP-MEP-M5_M.rvt	WS2026-ITPD-TP-MEP-M5_P.rvt	Mechanic vs Plumbing Hard Mechanic vs Plumbing Clearance

4. Save the federated model and submit it, along with the clash report, to the CDE **shared** folder as revision P01 and status code suitable for information per the BEP requirements.
5. Modify the MEP PIMs where appropriate to solve all the **hard** clashes by adjusting ducts and pipes. Do not modify cable trays. Do so until no hard clash is detected from the clash detection required in Table 5-2. All corrected PIMs should be updated to a higher revision code in the CDE.
6. A new version of the clash free federated MEP models shall be uploaded to the CDE **shared** folder. In the federated model, all tests of Table 5-2 shall be made available for the marking team to check. The new version shall be revision P02 with the meta-data attributions description = "clash free" and status code of S4.

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5.3 Perform Clash Detections in ACC

1. The task is to find hard clashes between the structural PIM and the Mechanical PIM in the Forma Model Coordination application. You should have access to a coordination space named after your Competitor number ##.
2. Create a private view:

- View named = "Structure vs Mechanical"
- The view is for the following two PIMs only:

  (a) WS2026-ITPD-TP-ST-M5.rvt
  (b) WS2026-ITPD-TP-MEP-M5_M.rvt
  (c) View shows clashes only between structural model and System Type = Ds_Exhaust Air.

3. Create issues for all clashes between the structure and the duct system: DS_Exhaust Air.

- For all issues, type = clash
- For all issues, the thumbnail snapshot should show the clashing components
- After all issues are created, save the clash check as a private type by name = "ST vs EA check"

Module 5 is completed.

Module 6 – Asset information modelling

Reading time	5 minutes
Modelling time	55 minutes
Working folders	Forma: SILK-Module6\SILK##
Source folders	Forma: Resource for SILK 2026\Module6
Provided files	WS2026-ITPD-TP-ID-M6.pdf WS2026-ITPD-TP-AR-M6.rvt WS2026-ITPD-TP-ST-M6.rvt
Task brief	You work for the WSI to deliver AIMs for the SILK project.

6.1 Setup documentation standards

1. From the source Published folder, download the two (2) Revit project models.
2. Setup the COBie extension in accordance with the BEP in the two PIMs.

- Use the UK locality during export and check the latest Uniclass 2015 schedules for import.
- Each COBie element uses Revit Element ID as its COBie External Identifier value.
- Units: linear in millimetre, area in m2, volume in m3, currency in CNY.
- COBie elements are located by Room except for parking, pipe accessories, pipe fittings, and pipes. Space name is built using the following rule
  - *Revit Category-Level-Number ("-" is the minus sign.)*
- When Type sheet is exported, the type name and description columns use the following rules:
  - *Revit Category+Family-Type*
- The category to be used has the following priority in order:

  (a) Uniclass Pr parameter value
  (b) Uniclass EF parameter value
  (c) Revit "Keynote" parameter value from the Type definition
  (d) N/A
- The Description column consists of Family and Type values as:
  - *Family : Type.*
- For the component sheet, the component name is built using the following rule:
  - *Revit Category-Family-Level-Element ID*

3. Add the following two COBie contacts.

- Contact 1:
  - Email: Your email address
  - Company: your county's skill competition team listed in BEP Section 7.4
  - Phone: Your phone number
  - Category: Ro_50_10_22 Design manager
  - CreatedBy: Your email address

  Note: When extracting information from the model, use the contact info of Contact 1 as created by.
- Contact 2:
  - Email: 58.digital.c@wss2026.com

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- Company: WSI
- Phone: +86-512-88206936
- Category: Use the Project Management table to find and select "Duty holder details."
- CreatedBy: Your email address

6.2 Classification information

1. Add classification information to all elements in the following table (**Table A2.** *AIR*)

ELEMENTS	EN/EN CODE	PR CODE	SS CODE
Facility	En_25_10_60		
Architectural PIM			
PANPAN_Door_Double_FireProof-Grade B: *FMB1523*	EF_25_30_25	Pr_30_59_24_85	
ADSK_Door_Internal_Single:*M0921*	EF_25_30_25	Pr_30_59_24_97	
ADSK_Door_External_Double:*M1521*	EF_25_30_25	Pr_30_59_24_86	
ZJU_Door_Internal_Double-glass:*MLC4649*	EF_25_30_25	Pr_30_59_24_80	
Curtain Wall:ZJU_CurtainWall_Embedding			Ss_25_10_20_85
Curtain Wall:ZJU_CurtainWall_Stud_MQST		Pr_30_59_48	
Curtain Wall:ADSK_CurtainWall	EF_25_30_97		Ss_25_10_20
ZJU_Window_Fixed_3Layer1Panel:*C0928L*		Pr_30_59_97_16	
Basic Wall:*WSI_Wall_EXT_Type-01*	EF_25_10_25		
Basic Wall:*WSI_Wall_EXT_Type-02*	EF_25_10_25		
Basic Wall:*WSI_Wall_EXT_Type-03*	EF_25_10_25		
Basic Wall:*WSI_Wall_INT_Type-01*	EF_25_10_40		
ZJU_Wall_Polygonal:*Walls 1*			Ss_25_20_35
Cast-In-Place Stair:*ADSK_Stair_Prefabricated_whole*	EF_35_10_40		
Railing:*WSI_Railing_Type-01*			Ss_25_60_05_35
Structural PIM			
ADSK_Slab_Floor_100m:		Pr_20_85_14_16	Ss_30_12_85
ADSK_Column_Square_ColdBent-Hollow:		Pr_20_85_16_11	
ADSK_Beam_IBeam_HotRolled:		Pr_20_85_08_11	Ss_20_20_75
WSI_Foundation_PileCap_4Pile:		Pr_20_85_62	Ss_20_30_75
WSI_Foundation_PileCap_6Pile:		Pr_20_85_62	Ss_20_30_75
WSI_Foundation_PileCap_9Pile:		Pr_20_85_62	Ss_20_30_75
ADSK_Beam_Rectangular_Concrete-C30:	EF_20_05		Ss_20_20_75

6.3 Update Asset information

1. For all the doors and windows, update information for windows and doors based on the table below. Then create a COBie sheet for windows and doors only with the relevant information appearing in the COBie sheet. Export the COBie sheet file to Autodesk Forma and name it per BEP requirements. The description attribute of the file must contain the words "window and door COBie sheet."

ELEMENTS	MANUFACTURER	COST (RMB)	REPLACEMENT COST (RMB)
ADSK_Door_External_Double:M1521	Panpan Wood Doors	4500	4500
ADSK_Door_Internal_Single:M0921	Panpan Wood Doors	2300	2300
PANPAN_Door_Double_FireProof-Grade B:FMB1523	Panpan Wood Doors	3800	3800
ZJU_Door_Internal_Double-glass:MLC4649	Lin's Automatic Doors	7600	7600
ZJU_Window_Casement_2Layer3Panel:C2725	Paiya Doors and Windows	5700	5700
ZJU_Window_Fixed_3Layer1Panel:C0928L	Paiya Doors and Windows	2300	2300
ZJU_Window_Sliding_2Layer6Panel:C4725	Paiya Doors and Windows	6700	6700

2. All door manufacturers agreed to provide a 90% discount (new price = original price *0.1) on the replacement of any products that break. Please update the COBie information in the model and export a new COBie spreadsheet. Don't replace the old one. Instead, increase the sequence number in the file name.
3. Upload the two COBie spreadsheets created from the last two (2) steps and the updated 3D PIMs to the CDE per the requirements in the BEP.

Module 6 is completed.

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Module 7 – Data creation and management

Reading time	10 minutes
Modelling time	230 minutes
Working folders	Forma: SILK-Module7\SILK##
Source folders	Forma: Resource for SILK 2026\Module7
Provided files	WS2026-ITPD-TP-ID-M7.pdf WS2026-ITPD-TP-SM-M7_ARForSheeting.rvt WS2026-ITPD-TP-SM-M7_SharedParameter.txt WS2026-ITPD-TP-SM-M7_StartView.rfa WS2026-ITPD-TP-SM-M7_FunctionalAreaMaxU.xlsx WS2026-ITPD-TP-SM-M7_ThermalEvaluator.dyn ThermalAudit.dyf
Task brief	You work for the WSI to create visual data of the PIM for the client.

7.1 Functional area plan colour scheme

1. Download the provided files and open the Revit project file.
2. Create two functional area plan views, each for 03FFL and 04FFL, following the example for 02FFL: 02FFL Functional Area Plan. Note that:

- Name the view in the same way.
- Areas and their rooms included are shown in the table below. Add area boundaries if needed.

FUNCTIONAL AREA NAME	ROOMS INCLUDED
Sports Activity Area	Badminton Courts; Basketball Courts; Performance Hall; Exhibition and Performance Hall; Student Activity Room; activity rooms; multi-purpose activity spaces
Public Circulation Area	Corridor; Atrium Hall; Student Lounge; lobbies; halls; public passages
Service Support Area	Sports Equipment Storage; Preparation Room; Activity Preparation Room; Staff Room; First Aid Room; Cleaning Storage; PE Teacher Office; Storage Room; Service Room; Management Office; Equipment Room; Actor Lounge
Sanitary Area	Changing Room; Male Washroom; Female Washroom; toilets; washrooms
Vertical Circulation Area	Stair 01; Stair 02
Outside Partitions	All other areas

- Refer to BEP 4.7.2 space numbers for numbering areas. **Note that areas can share the same boundaries but should not overlap each other.**

3. Create an area colour scheme based on functional area names (e.g. all sanitary areas are of the same colour) and apply it to all **three** area plan views. Do not forget to place a Colour Fill Legend.
4. Create three sheets for the three new area views using the provided "WS2026 A1 metric" title block. Use the following sheet numbers:

- M70001 for 02FFL area plan view
- M70002 for 03FFL area plan view
- M70003 for 04FFL area plan view

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7.2 Visual thermal performance

1. Load the provided shared parameter file into the project:
   The file contains three (3) groups of parameters as listed in the table below. Add them to the project by applying them to Walls, Curtain Walls, Doors, and Windows.

GROUP	PARAMETER NAME	DATA TYPE	TYPE/INSTANCE	DESCRIPTION
Thermal Base Data	U_Value	Number	Type	thermal transmittance
Functional Area Data	Functional Area	Text	Instance	Indicates the functional area(s) an element is bordering
	U_Value Requirement	Number	Instance	Is the maximum allowable U_Value
Thermal Analysis Result	Thermal Compliance Status	Text	Instance	Records whether the element satisfies the thermal requirement.
	HTR	Number	Instance	=U_Value × element area.

2. Assign the following values for the two parameters. For types not listed below, use the value of the type parameter "Heat Transfer Coefficient (U)":
   U_Value =Heat Transfer Coefficient (U).

CATEGORY	TYPE OR FAMILY:TYPE	U_VALUE	ENVELOPE TYPE
Wall	WSI_Wall_EXT_Type-01	0.4219	Exterior Wall
	WSI_Wall_EXT_Type-02	0.4219	Exterior Wall
	WSI_Wall_EXT_Type-03	0.2053	Exterior Wall
	WSI_Wall_INT_Type-01	0.9	Interior Wall
	WSI_Wall_INT_Type-02	0.55	Interior Wall
Window	ZJU_Window_Casement_2Layer3Panel: C2725	2	Window
	ZJU_Window_Fixed_3Layer1Panel: C0928	1.8	Window
	ZJU_Window_Sliding_2Layer6Panel: C4725	2	Window
Door	ADSK_Door_External_Double: M1521	1.8	External Door
	ADSK_Door_Internal_Single: M0921	1.9	Internal Door
	PANPAN_Door_Double_FireProof-Grade B: FMB1523	1.6	Fire-rated Door
	ZJU_Door_Internal_Double-glass: MLC4649	1.9	Internal Door
Curtain Wall	ZJU_CurtainWall_Linear_70x140	2.0	Curtain Wall
	ZJU_CurtainWall_Embedding	1.8	Curtain Wall
	ZJU_CurtainWall_Stud_MQST	2.0	Curtain Wall

3. Open Dynamo, add the "Custom_Nodes" folder to the Dynamo Package/Library Search Paths:

- Preferences > Package Settings > Package/Library Search Paths > Add Path
- Select the following folder: WS2026_M7_Dynamo_Scripts\Custom_Nodes
- Restart Dynamo if required.

4. Open the provided Dynamo script and continue.

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7.3 Thermal compliance visualization

1. Run the dynamo script to assign values to thermal performance related parameters for four (4) categories of building envelope: walls, curtain walls, doors, and windows on floors 02FFL, 03FFL, and 04FFL.

   (a) Use the level selector to select the target level
   (b) Set the Master Switch to True. This will assign proper values to the property parameter-- Functional Area for the applicable envelop elements.
   (c) Set the Master Switch to False to run the Thermal Audit. When pushed, select the provided requirement matrix file in the File Path node:
   WS2026-ITPD-TP-SM-M7_FunctionalAreaMaxU.xlsx

   This step will update the values for three parameters: U_Value Requirement, Thermal Compliance Status, and HTR based on the information in the excel file.

2. Create a 3D view for each floor that visualizes envelope thermal compliance status for all walls, curtain walls, doors, and Windows.

- Set the visual style of each 3D view to Hidden Line
- Use the 'WS2026 A1 metric' title blocks
- Create and use filters so elements are displayed in green if Thermal Compliance Status = 'Satisfied' and in red if Thermal Compliance Status is other than 'satisfied.'
- View scale is 1:250

3. Any red elements shown up in the 3D view must be corrected so that their colours turn to green. This is achieved by replacing the type with one that has a lower U_Value. Don't manually edit the values of parameters. To show that you have achieved this, you are to generate a sheet that displays and compares the compliance views before and after correction, as illustrated in Figure 7-1.

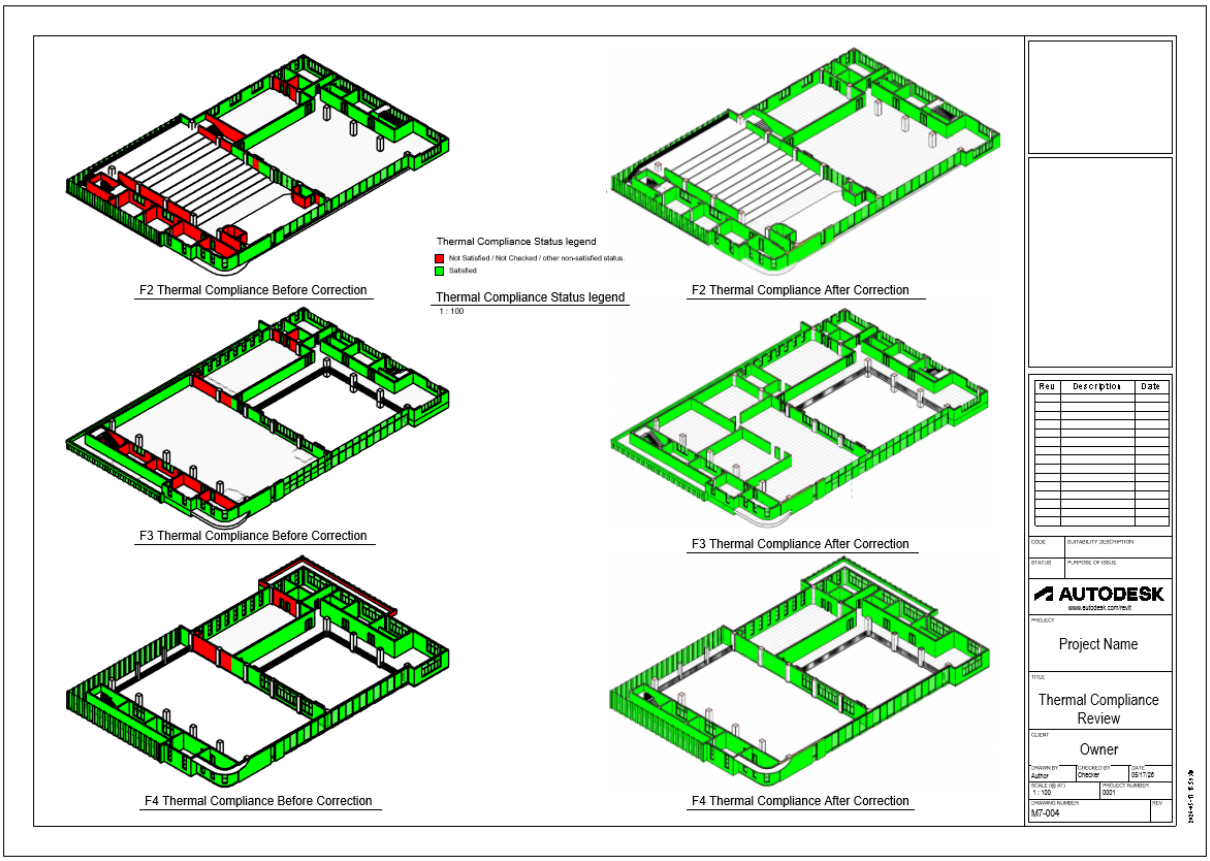


Figure 7-1: Illustration of the sheet comparing 3D views of (curtain) walls, doors, and windows.

Note this sheet does not necessarily represent the final result expected from Competitors. However, the same or similar 3D viewing angle shall be maintained for the before-correction image and after-correction views.

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- Sheet name: Thermal Compliance Review
- Sheet number: M70004
- Take screenshots for the before-correction views and place them properly in the sheet (Figure 7-1).
- Do the correction.
- Re-run the ThermalEvaluator script to make sure the colour changes to green.
- Take screenshots for the after-correction views and place them properly in the sheet (Figure 7-1).
- Place an image title for each view in the sheet using the title name in the table below.

LEVEL	BEFORE-CORRECTION IMAGE TITLE ON SHEET	AFTER-CORRECTION 3D REVIEW VIEW NAME
02	02FFL Thermal Compliance Before Correction	02 FFL Thermal Compliance After Correction
03	03FFL Thermal Compliance Before Correction	03 FFL Thermal Compliance After Correction
04	04FFL Thermal Compliance Before Correction	04 FFL Thermal Compliance After Correction

7.4 U Value Visualization

1. The task is to create U Value visualization views for levels 02–04. For each level, duplicate four (4) views named as follows:

VIEW NAME (USE LEVEL 02 AS AN EXAMPLE)	DESCRIPTION
02 U Value 3D Visualization	3D view for displaying all building envelopes
02 U Value Plan-Walls	2D view for colour-displaying walls and curtain walls
02 U Value Plan-Windows	2D view for colour-displaying windows
03 U Value Plan-Doors	2D view for colour-displaying doors

2. In each view, tag U values for the items to be displayed.

- Use any tag family available in the provided Revit model.
- In each view, tag only elements that need to be colour displayed: at least one tag for each type.
- Tags should not overlap model elements, dimensions, grid lines, room information, or other annotations.
- Set the visual style of the 3D visualization views to Hidden Line
- Use colour filters to colour display the elements according to the table below:

FILTER NAME	CRITERIA	DISPLAY COLOUR
U Excellent	External Walls: $U \leq 0.30$ Internal Walls: $U \leq 1.2$ External doors: $U \leq 0.5$ Internal doors: $U \leq 1.2$ Windows: $U \leq 1.1$	RGB 0,90,0
U Moderate	External Walls: $0.3 < U \leq 1.0$ Internal Walls: $1.2 < U \leq 1.5$ External doors: $0.5 < U \leq 0.8$ Internal doors: $1.2 < U \leq 1.5$ Windows: $1.1 < U \leq 2.8$	RGB 255,255,0
U Poor	External Walls: $U > 1.0$ Internal Walls: $U > 1.5$ External doors: $U > 0.8$ Internal doors: $U > 1.5$ Windows: $U > 2.8$	RGB 255,128,64

- Add a U_Value Legend to each 2D plan views

3. For each level, create a new sheet using the 'WS2026 A1 metric' title block to display the four views as illustrated in Figure 7-2.

- U Value 3D Visualization: 1:300
- U Value Plan-Walls: 1:250
- U Value Plan-Windows: 1:250
- U Value Plan-Doors: 1:250
- Sheet names are:

SHEET NUMBER	LEVEL CODE	SHEET NAME
M70005	02	02FFL U Value Visualization
M70006	03	03FFL U Value Visualization
M70007	04	04FFL U Value Visualization

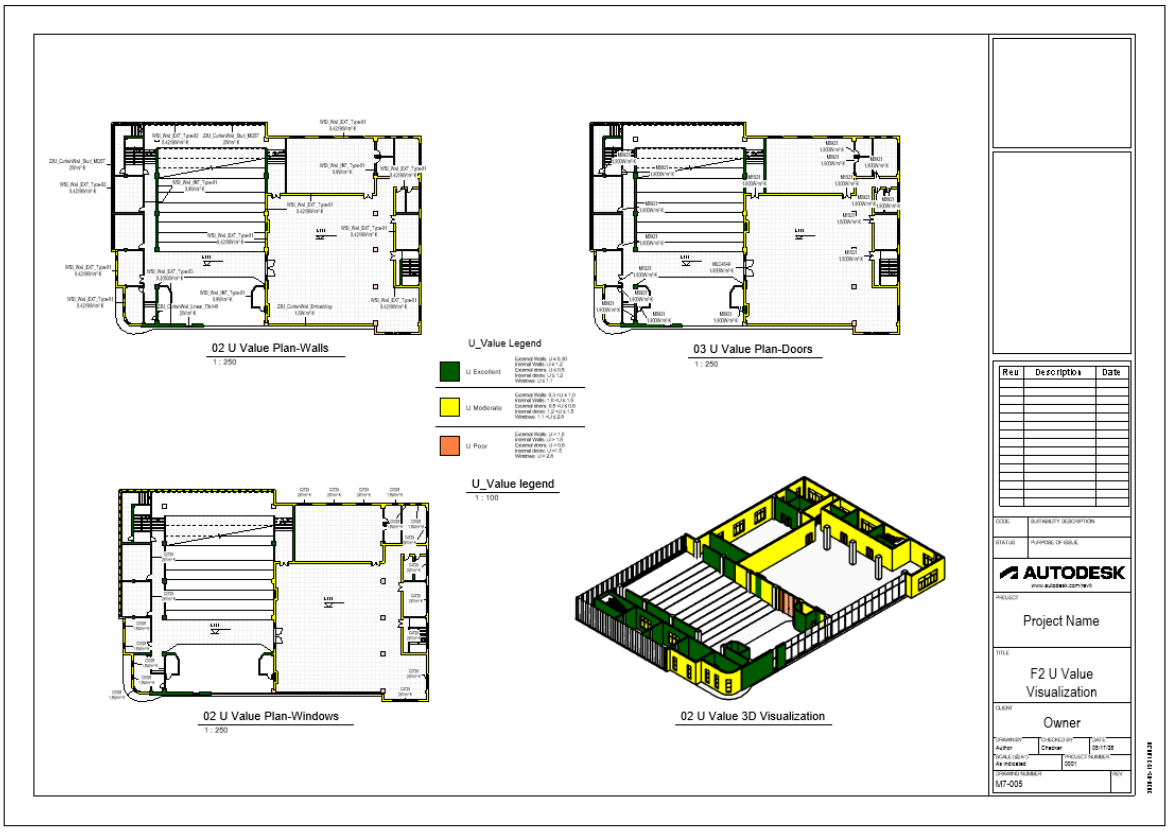


Figure 7-2: Illustration for Tasks 7.4.
Note this sheet does not necessarily represent the final results expected from Competitors.

7.5 Thermal Performance Scheduling

1. Create Multi-Category thermal performance schedules for the four (4) envelope categories: Walls, Curtain Walls, Doors, and Windows.

- Separate schedules must be created for each level
- Schedules are only needed for levels 02-04
- Only the following fields are to be included:

  Category, Family and Type, Functional Area,
  U_Value, U_Value Requirement, Thermal Compliance Status, HTR

- Sort the schedules by Category, Functional Area, and Thermal Compliance Status
- Itemize every instance to list all elements individually

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2. Place each of the schedules on the "WS2026 A0 metric" sheet with the number and name as follows:

SHEET NUMBER	SHEET NAME	SCHEDULES
M70008	02FFL Thermal Performance Schedule	All Schedules for level 02
M70009	03FFL Thermal Performance Schedule	All Schedules for level 03
M70010	04FFL Thermal Performance Schedule	All Schedules for level 04

7.6 Sheeting, Start View and Submission

1. Create an information sheet:

- Sheet number: M70011
- Sheet name: Module 07 Information and Sheet Index
- Template to be used: WS2026-ITPD-TP-SM-M7_StartView.rfa
- Fill out title block with project information and Competitor code.
- Add the Start View information parameters to Sheets. From the provided "WS2026-ITPD-TP-SM-M7_SharedParameter.txt," find the following parameters under the StartView group and add them to the project by applying them to Sheets.

GROUP	PARAMETER NAME	PARAMETER TYPE	TYPE / INSTANCE
StartView	Project Code	Text	Instance
	Competitor Code	Text	Instance
	Country/Region Code	Text	Instance

- Add a sheet index:

SHEET NUMBER	SHEET NAME
M70001	02 FFL Functional Zone
M70002	03 FFL Functional Zone
M70003	04 FFL Functional Zone
M70004	Thermal Compliance Review
M70005	02 FFL U Value Visualization
M70006	03 FFL U Value Visualization
M70007	04 FFL U Value Visualization
M70008	02 FFL Thermal Performance Schedule
M70009	03 FFL Thermal Performance Schedule
M70010	04 FFL Thermal Performance Schedule
M70011	Module 07 Information and Sheet Index

2. Set this information sheet as the project start view.
3. Export one PDF file containing all the Module 07 sheets.
4. Submit the pdf file along with the updated Revit file to the CDE per BEP requirements.

Module 7 is completed.

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Module 8 – Modelling for sustainability and AI

Reading time	15 minutes
Modelling time	105 minutes
Working folders	Forma: SILK-Module8\SILK## Forma Site Design: SILK-Module8:Site##
Source folders	Forma: Resource for SILK 2026\Module8
Provided files	WS2026-ITPD-TP-ID-M8.pdf WS2026-ITPD-TP-SM-M8_MassforFORMA.ifc WS2026-ITPD-TP-SM-M8_FunctionalAreaDiagram.png
Task brief	You work for the WorldSkills International. Through sustainability analysis, explore high-performance building solutions, while leveraging AI-generated layouts to inform early-stage site planning aligned with client requirements.

Note that file naming is not marked in this module.

8.1 Site Preparation

1. Download the two files from the source folders.
2. In Forma Site Design project "SILK-Module8," you should be invited to edit a site named "Site##," which shows two (2) proposals: Site Description and Original Proposal. The Site Description proposal is provided for your information; it shows the locations of two sites: Site A and Site B. Competitors are to work on the Original Proposal, which contains a copy of these two (2) sites and their limits. Remember that any subsequent revision of the proposal should not cause these limits to be exceeded or violated.
3. Import the provided mass model (.ifc) into the site with unit = meter.

8.2 Modelling of Site A

1. In the Original Proposal, place the mass model at site A with the orientation shown in Figure 8-1. Make sure the elevation (of the bottom) of the model is 5.0 m.
   Note: The limits or constraints are by default hidden in the base layer.

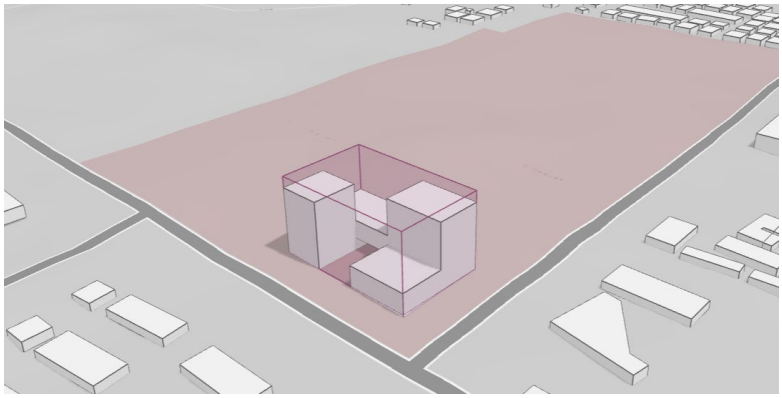


Figure 8-1: Illustration of the desired orientation of the model.

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2. Modify the model such that:

- Total floor number = 7
- First floor height = 6 m
- All other floor height = 4 m

3. Run daylight potential and solar energy analyses for site A.
4. Duplicate the "Original Proposal," rename it as "New Proposal Site A," and then modify only the first three (3) floors of the new proposal so that.

- the total proportion of facades with a Vertical Sky Component (VSC) score of ≥27 increases to no less than 97%
- the annual electrical output of the roof(s) is no less than 321,000 kWh at 70% surface coverage and 18% panel efficiency
- floor heights of floors 1 to 3 remain unchanged
- the total floor area remains unchanged (9180 m^2)

5. Re-run daylight potential and solar energy analyses for site A in the new proposal.
6. Using Forma Compare, compare the designs of the original and new proposals by displaying six (6) analysis results together as shown in Figure 8-2. Place the items for the new proposal on the top of those for the original proposal.

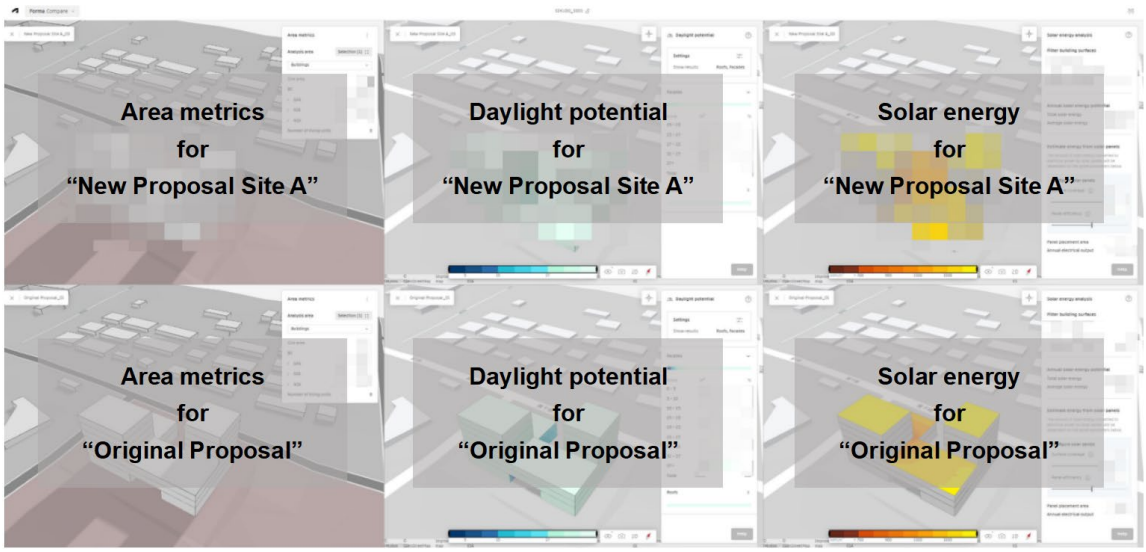


Figure 8-2: Display illustration of 6 analysis results in Forma Compare

7. Save a screenshot of the comparison and name it as "Module8-1-AnalyseCompare.pdf." Upload it to the CDE. Note that marking is based on results displayed in the screenshot. Table 8.1 lists the requirements for the results. Make sure these results are visible in your screenshot.

Table 8-1 *Requirements of analysis results*

ANALYSIS	VIEW TYPE	REQUIRED RESULTS
Area metrics	3D	South and east faces visible; Right side panel showing Analysis area for Buildings (Site area, BC, and GFA).
Daylight potential	3D	South and east faces visible; The colour bar filtered to show VSC ≥ 27; Right side panel showing itemized scores and their percentages for facades.
Solar energy	3D	South and east faces visible; Right side panel showing the total annual electrical output, Filter building surfaces, and the configuration of solar panels.

8.3 Modelling of Site B

1. Duplicate the proposal "New Proposal Site A" and rename it as "New Proposal Site B."
2. In Site B, using the site automation tool, generate a building layout according to the provided functional area diagram as shown in Figure 8-3 and the requirements specified in Table 8-2.

Note: You can import this image into the site as a reference to complete the building layout more accurately and quickly. Hide it after this step is completed.

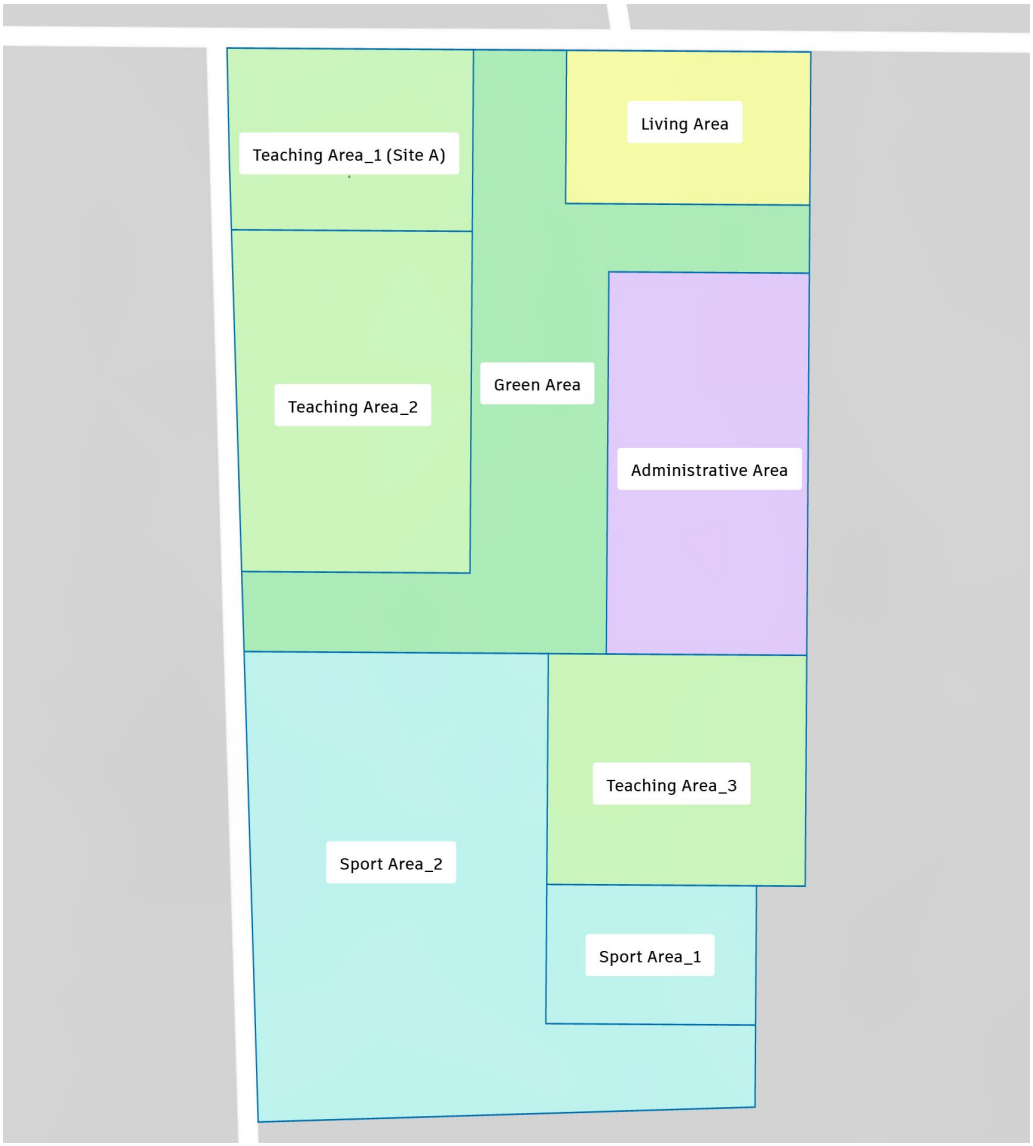


Figure 8-3: Functional Area Diagram

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Table 8-2 Requirements of building layout in Site B

FUNCTIONAL AREA	BUILDING TYPES	FLOORS	FLOOR HEIGHT	BUILDING WIDTH
Living Area	Linear buildings	6	3.5m	15m
Teaching Area_2 Teaching Area_3 Administrative Area	City blocks or Linear buildings	5 or 6	3.5m	15m
Sports Area_1	Linear building	2	6m	40m
Sports Area_2 Green Area	No Buildings	-	-	-

Note: When line buildings are arranged in parallel, their long axes must align the east-west direction with deviations less than 45 degrees.

3. Adjust the building layout to meet the requirements of Table 8-3.

Table 8-3 Requirements of Area metrics

Area metrics	Definition	Value
Site Area	Area of Site A and Site B	87676 m^2
BC	The area of the building footprint	20500 m^2 ≤BC ≤ 21000 m^2
GFA	Total area of the buildings, including walls	98000 m^2 ≤ GFA ≤ 100000 m^2

4. Release the site automation to zone. Set functions and colours for buildings according to Table 8-4.

Table 8-4 Building functions and colours for each area

FUNCTIONAL AREA	BUILDING FUNCTIONS	COLOUR VALUE (HEX)
Teaching Area_1 Teaching Area_2 Teaching Area_3	Educational	#CCF5BC
Administrative Area	Administrative	#E1CBFB
Living Area	Residential	#F5FBA7
Sports Area_1	Sports	#BFF3EE

5. Save a screenshot of the 3D aerial view from the southeast of site B displaying the area metrics of the buildings. Name it as "Module8-2-BuildingLayout.pdf." Upload it to the project CDE.

8.4 Wind and carbon analyses

1. Run total carbon analysis for sites B with the parameters given in Table 8-5. When the analysis is completed, display the total carbon analysis results for a building lifespan of 10 years. Save a screenshot of the result and name it as "Module-8-5-TotalCarbonAnalysis.PDF." Upload it to the CDE. Note that marking is based on results displayed in the screenshot.

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Table 8-5 Parameters for Total carbon analysis.

FUNCTIONAL AREA (FIG.8.3)	LIVING AREA	ADMINISTRATIVE AREA ;SPORTS AREA_1; ALL THE TEACHING AREAS
BUILDING TYPES	Multifamily	School or university
STRUCTURE	Brick - Brick, fiber insulation, light-weight concrete, dense plaster	Brick - Brick, fiber insulation, light-weight concrete, dense plaster
EXTERIOR WALLS	High - Low - E triple glazing	High - Low - E triple glazing
EXTERIOR OPENINGS	30%	50%
WINDOW-TO-WALL RATIO	Concrete Waterproof	Concrete Waterproof
ROOFS	Concrete high - Super-insulated	Concrete high - Super-insulated
SLABS ON GRADE	Brick - Light plaster, brick, light plaster	Brick - Light plaster, brick, light plaster
INTERIOR WALLS	Concrete 1 - Carpet, underlay, screed, concrete, insulation, building board	Concrete 1 - Carpet, underlay, screed, concrete, insulation, building board
INTERIOR FLOORS	Multifamily	School or university

Table 8-6 Requirements for results display

ANALYSIS	VIEW TYPE	REQUIRED RESULTS
Total carbon analysis	3D	South and east faces visible; legend; On the left side panel, analysis setup unfolded to show detail settings; On the right side panel, Total carbon is selected and Metrics unfolded to show details.
Pedestrian comfort analysis	2D	Oriented North; site boundary highlighted; legend displayed; Right side panel showing rapid comfort percentages.
Wind directional analysis	2D	Oriented North; site boundary highlighted; legend displayed; Right side panel showing rapid wind speed value and wind direction highlighted.

2. Run rapid wind analysis for sites A and B together to obtain a rough prediction for pedestrian wind comfort with the following settings:

- Comfort scale = Lawson LDDC
- Wind data: default weather data

Save a screenshot of the 2D view to the CDE as "Module-8-3-PedestrianComfortAnalysis.PDF."

3. Run rapid wind analysis for sites A and B together again to obtain a rough prediction for wind speed and direction with the following settings:

- Wind data: default weather data
- Wind direction = the dominant wind direction
- Wind speed = 4.5 m/s

Save a screenshot of the 2D view to the CDE as "Module-8-4-WindDirectionalAnalysis.PDF."

Module 8 is completed.

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Module 9 – Collaborative modelling

Reading time	2 minutes
Modelling time	118 minutes
Working folder	Forma: SILK-Module9\Team#
Source folders	Forma: Resource for SILK 2026\Module9
Provided files	WS2026-ITPD-TP-ID-M9.pdf WS2026-ITPD-TP-AR-M4.rte WS2026-ITPD-TP-SM-M4_DrawingSheets.pdf
Task brief	Competitors are grouped in several teams, each consisting of at least three (3) Competitors. Competitors in each team work together to deliver an architectural PIM within the time frame of the module. Communication within the team is allowed.

1. Grouping

- Team1: station No. 01-03; employed by Autodesk
- Team2: station No. 04-06; employed by WorldSkills International
- Team3: station No. 07-09; employed by Arch Consulting
- Team4: station No. 10-13; employed by Structure Consulting
- Team5: station No. 14-17; employed by MEP Consulting

2. With the provided template and drawing sheets, create a cloud workshared architectural PIM for the Momentum Hall. Please adhere to the requirements of the BEP and make sure that

- a 3D view of the progressing PIM is shown in the shared big screen.
  Hint:

  (a) Use Core Centreline when positioning external walls on grid lines where fit.
  (b) Use Wall Centreline when positioning internal walls on grid lines where fit.
  (c) Use Grey Stone Tile floor for all floors.

Module 9 is completed.

End of all modules.

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BIM execution plan

BIM objectives

The objective of using BIM on this project is to enhance design accuracy and efficiency, improve coordination among stakeholders, and streamline project delivery. By leveraging BIM, we aim to reduce errors and rework, ensure efficient information exchange, and facilitate real-time collaboration. BIM supports better decision-making through visualization and analysis, ultimately leading to a higher quality and more sustainability of construction that meets the project's goals and timelines.

Project stakeholder agreement

This BEP has been agreed by the appointed stakeholder representatives listed below.

Table 1 Stakeholders

NAME*	EMAIL ADDRESS	COMPANY NAME	ROLE	ACCESS LEVEL	PERMITTED PRODUCTS
Your login Name	Your Assigned Email address	WorldSkills International	Lead designer	Administrator	Enable all
Digital Construction	Scm.digital.construction @worldskills.org	WorldSkills International	BIM manager	Administrator	Enable all
Skilldc WM	Skill58DC@2925.com	WorldSkills International	Estimator	member	Data Management
Skilldc Client	Skill58DC.Client@2925.com	Silk Institute of Lake Kuncheng	Executive	Member	Data Management
Skilldc Arch	Skill58DC.Arch@2925.com	Arch Consulting	Architect	Member	Data Management
Skilldc Struc	Skill58DC.Struc@2925.com	Structure Consulting	Engineer	Member	Data Management
Skilldc System	Skill58DC.System@2925.com	MEP Consulting	Engineer	Member	Data Management
Ja DC	Skill58DC.JudgeA@2925.com	WorldSkills International	Judge	Administrator	Enable all
Jb DC	Skill58DC.JudgeB@2925.com	WorldSkills International	Judge	Administrator	Enable all
Jc DC	Skill58DC.JudgeC@2925.com	WorldSkills International	Judge	Administrator	Enable all
Jd DC	Skill58DC.JudgeD@2925.com	WorldSkills International	Judge	Administrator	Enable all
Je DC	Skill58DC.JudgeE@2925.com	WorldSkills International	Judge	Administrator	Enable all
Jf DC	Skill58DC.JudgeF@2925.com	WorldSkills International	Judge	Administrator	Enable all

* The name is in First name + Last name format.

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The Client is responsible for defining project requirements, approving designs, and ensuring that the project meets their expectations.

The Arch Consulting company develops the building design, ensuring that it meets functional and aesthetic requirements.

The Structure Consulting company designs and oversees the implementation of the building's structural elements, ensuring safety and stability.

The MEP Consulting company is responsible for the design and integration of mechanical, electrical, and plumbing systems, ensuring that they work seamlessly with the overall building design.

Each Competitor assumes the lead designer role with proper access levels in each module to perform tasks specified in the given instruction of the Test Project in accordance with this BEP. The Competitors must uphold the highest standards of integrity and fairness, ensuring all work is original and complies with WorldSkills International rules and ethics.

Note: In this document, the double hash symbol " ## " always refers to your assigned competition number, e.g. 01, 02, 03…).

Project information

Project description

The Silk Institute of Lake Kuncheng (SILK) is an imaginary vocational university proposed in Jiangsu province of China. This project concerns the delivery of several facilities in the east part of the campus. One of them is the Momentum Hall (MH), a building for physical education teaching. The broken-down strategy is shown in Table 2.

Table 2 Facility information

VOLUME	FACILITY NAME	FACILITY TYPE
Volume 1	Momentum Hall	Tiertiary education buildings
Volume 2	Other buildings	Tiertiary education buildings

Project details

Table 3 Project details

Appointing Party	The Silk Institute of Lake Kuncheng (SILK)
Project Name	SILK##-Momentum Hall
Project Code	SILK##
Project Address	58 Mogan Rd, Changshu, Jiangsu, 215500
Contact	WM Skill: client.skill58@worldskills2026.cn
Project Value	CNY 50,000,000.00
Latitude and longitude	31.592158 °N, 120.764229 °E
Project Period	September 22, 2026 –September 27, 2026

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Project milestones

The table below specifies the activity and submission window for each module. Any files uploaded outside these windows will not be marked.

Table 4 *Milestones*

DAY	MODULE	INFORMATION EXCHANGE	DELIVERY TIME
1	Module 1	1	09:00 – 10:00
	Module 2	2	10:10 – 13:40 (A Group) 10:10 – 12:10 (B Group)
	Lunch	**-**	**11:10 – 12:40 (A group)** **12:40 – 14:10 (B Group)**
	Module 3	3	13:45 – 16:15 (A Group) 12:15 – 16:15 (B Group)
2	Module 4	4	09:00 – 12:40 (A Group) 09:00 – 14:00 (B Group)
	Lunch	**-**	**11:10 – 12:40 (B group)** **12:40 – 14:10 (A Group)**
	Module 5	5	14:10-16:10
3	Module 6	6	09:00– 10:00
	Module 7	7	10:05 – 15:35
	Lunch	**-**	**11:15 – 12:45 (A Group)** **12:45 – 14:15 (B Group)**
4	Module 8	8	09:00 – 11:00
	Lunch time	**-**	**11:00 – 13:00**
	Module 9	9	13:00 – 15:00

Project requirements

This section describes how the BIM Model and Facility Data are leveraged to maximize project value.

Project deliverables

*Refer to Competition instructions document.

Information exchange formats

Competitors must upload information to the CDE at each delivery stage in the formats agreed for model and drawing file exchange, which are set out below.

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Table 5 Information exchange formats

INFORMATION CONTAINERS	IFC	EXCEL	PDF	NATIVE FORMAT	OTHER (ADD FORMAT)
3D Model Files	✓			✓	
Federated Models					✓ (.NWD)
Drawings			✓		
All reports (Clash, validation checklists, safety check etc.)			✓		
COBie/Asset Data File(s)	✓	✓		✓	
Specifications/shared parameters			✓		✓ (.txt)
Model Renditions					✓ (.jpg)

Data requirements

Exchange Information Requirements (EIR)

Refer to the Competition instruction document for the required data inputs and timing for all assets. Note that COBie schemas shall be issued by each discipline at handover in line with Table A2 in the Appendix.

Construction Operations Building Information Exchange (COBie)

This project will produce an output of COBie compliant information deliverables for facilities management use at the agreed Information Exchange stages throughout the life of the project.

Data drop review and delivery procedure

PIM Quality Assurance Check Process

Follow the following steps when conducting a quality assurance check on project information models (PIM).

1. Workshare the PIM in the CDE WIP folder;
2. Submit the PIM for a review using the approval workflow "QA Check Workflow."
3. During review, conduct a check on the PIM against the provided checklist document

   WS2026-ITPD-TP-SD-PIMQAChecklist.docx

4. If the check is successful, upload the filled checklist document to the CDE. In the "Description" attribute of the checked PIM file, enter the revision code and the word "checked", such as "P01.03 Checked." If the check fails, enter the revision code and the word "failed check," such as "P01.03 failed check."

Review for sharing process

Follow the following steps when conducting a review on PIMs for sharing:

1. Workshare the PIM in the CDE WIP folders;
2. Submit the PIM for a review using the approval workflow "Onestep Review (internal)."
3. Wait for the team leader to finish reviewing the PIM

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4. Upon approval, the file is copied to the shared folder with a proper status code, but the reviewer has the final say as what final status code is appropriate.
5. If the review is not successful, reject the PIM with a reason entered in the description.

Data and information issue process

Issue all data and information files in the format required to your team's shared folder.

Clash detection strategies and report

The following criteria must be followed when defining clashes between models:

MODELS	ALLOWANCE
Structure vs. Architecture	Hard 10 mm
Structure vs. MEP	Hard 20 mm Clearance 50 mm
MEP vs. Architecture	Hard 20 mm Clearance 50 mm
MEP vs. MEP	Hard 10 mm Clearance 100 mm

The following rules must be followed when reporting clashes.

1. Use HTML (tabular) format and all tests (combmined) type when writing out clashes reports from Navisworks Manage.
2. Final files submitted as per Table 2.2.

Standard method and procedure

Application standards

To support consistency of graphical and non-graphical information, models shall be authored to the following agreed industry standards. Where this document conflicts with the standards below, the BEP will take precedence:

Table 7 Standards (M=Mandatory, R=Recommended)

STANDARDS	APPLICATION						
	Guidance	Collaboration	File naming	Object naming	Drawing	Classification	CDE
ISO19650-1			M		M	M	M
ISO19650-2	M	M					M
Uniclass 2015						M	

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Common data environment

The project uses Autodesk Forma as the CDE. All project data, models, and documents will be stored and managed within this platform. No points will be awarded if the file to be marked cannot be found in the designated folder in the CDE.

The project adopts a folder strategy shown in Figure 1.

Team1
    Consumed
Team2
    Consumed
…
Shared
    Team1
    Team2
    …
Published
    Team1
    Team2
    …
Archived
    Team1
    Team2
    …

Figure 1: *Folder structure strategy (Note only generic folder names are illustrated)*

Any first level folders (e.g. Shared) other than the shared, published, and archived folders are working-in-progress folders for different teams.

Shared is the shared folder and the Coordination Space for the delivery team that includes all teams. Each consultant company should have a subfolder of its own with edit access.

Published is the published folder. Each team should have a subfolder of its own with edit access.

Archived is the archived folder. Each team should have a subfolder of its own with edit access.

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File naming convention

A hyphen is to be used between fields of the file names, which takes the following form.

SILK## – xxx – xx – xx – xxx – x – xxxx

Table 6 *Naming standard*

FIELD1	FIELD 2	FIELD 3	FIELD 4	FIELD 5	FIELD 6	FIELD 7
SILK##	xxx	xx	xx	xxx	x	0001
Project code	**Originator**	**Functional Breakdown**	**Spatial Breakdown**	**Form**	**Discipline**	**Number**
Field 1	Project Code	Alphanumeric text consists of six (6) characters.				
Field 2	Originator Code	An abbreviated code identifying the originator. **See Table A3.**				
Field 3	Functional Breakdown	Identifier of which building, area, phase, volume or work package of the project the model file relates to if the project is sub-divided by zones/volumes. **See Table A3.**				
Field 4	Spatial Breakdown	Identifiers of which spatial aspect of the project does the information container relate to, e.g. group of levels, region, location, floor etc. **See Table A3.**				
Field 5	Form	Nature of the information container, document type. This will be M3 for 3D model files, as per ISO 19650. **See Table A3.**				
Field 6	Discipline	1-character discipline identifier code, as per ISO19650. **See Table A3.**				
Field 7	Number	Sequential numbering should be used with a 4-digit numerical identifier. Leading zeros should be used. It should be noted that as the Name is made up by concatenating all fields, the Number part is only unique where other fields are the same.				

Document naming convention

When naming any documents such as a validation checklist, COBie Dataset etc., the model that is being validated or from which data are extracted, will be used to supply the functional breakdown and spatial breakdown fields as well as the discipline for the name of that document.

Example: Suppose you work for WorldSkills International and are producing a COBie dataset from a native model

12345-UAD-**02**-**ZZ**-M3-**A**-0001.rvt

The COBie spreadsheet extracted from this model is expected to be named as

12345-WSI-**02**-**ZZ**-LIE-**A**-0001.xlsx

Federation Strategy

This project is to be split into two volumes as shown in Table 2. Volume plans and naming conventions are to be shared via the CDE.

Classification

The Uniclass 2015 classification system must be used in conjunction with Table A2 to support COBie and Asset Management requirements. You are allowed to visit https://uniclass.thenbs.com/ to look up codes not listed in the following examples.

Metadata Classification for all files uploaded to the CDE should be in accordance with Uniclass 2015. A dedicated metadata attribute named 'Classification' shall have been created for this purpose. Use the PM table where possible.

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Examples

PM_40_40_27	Elevation drawings	PM_40_35_83	Structural engineering models
PM_10_20_27	Environmental reporting information	PM_60_10_60	Site grid reference
PM_40_60_39	Information validation	PM_40_60_31	Federated Coordination Models
PM_40_30_04	Architectural design	PM_40_35_10	Building services (all MEP) models

Project specific naming conventions

The following naming conventions are required in this project.

Level names

Levels to be named including the following discipline specific ID's:

Level Names: LevelCodeDisplicineID

Examples: 01TOS, 01SSL, 01FFL, etc.;

1) LevelCode: the defined Floor / roof numbers. **Refer to Table A3: Spatial breakdown codes**
2) DisciplineID:

Structural Discipline ID:	**Architectural Discipline ID:**
SSL: Structural Slab Level TOS: Top Of Steelwork TOF: Top of Foundation	FFL: Floor Finish Level

No ID is required for roof level naming

Figure 2: Level naming

Space/Room numbers

SPACE/ROOM NUMBERS

LevelCode-Space Identifier Code-UniqueID

Notes:

1. LevelCode: the defined Floor/roof numbers. **Refer to Table A3: Spatial breakdown codes**
2. Space Identifier Code: Use the initial capitals of the room name, e.g.

Space/Room	**Identifier codes:**
Sports Activity Area	SAA
Outside Partition	OP
Sanitary Area	SA

3. UniqueID: A number consisting of 3 characters.
   Examples:
   For two sports activity areas on the 1st floor: 01-SAA-001 and 01-SAA-002
   For three outside partition spaces on the 2nd floor: 02-OP-001, 02-OP-002, and 02-OP-003

Status code and revisions

Status codes and Revision numbers are required for all files uploaded to the CDE. Use Table A.1 in the Appendix.

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Shared datum and coordinates

Project coordinates must be utilized correctly at all stages of the project.

Table 8 Project coordinates and rotation

COORDINATE	GRID-GRID INTERSECTION	LOCAL COORDINATES (M)			ANGLE FROM PROJECT NORTH TO TRUE NORTH (DEGREE)
		Easting	Northing	Elevation	
Survey Point	F-9	1239990	4568880	15.0	5 East
Project Base Point	A-1	-	-	15.0	-

Model division

Workset names consist of a volume identifier and an element name, which are separated by underscore (_) as follows:

VolumeIdentifier_ElementName	**VolumeIdentifier:** 01 = Volume 1 02 = Volume 2
	ElementName: See Table 9

Table 9 Element Names: (Example: Work set for Volume 2 Beams: 02_StructuralFraming)

ARCHITECTURE		STRUCTURE
ExternalWalls	Floors	StructuralColumns
InternalWalls	Roofs	StructuralFraming
Windows	Stairs	StructuralFoundation
Doors	Ceilings	StructuralSlabs
CurtainWalling	Rooms	
Railings		

Project Information Model (PIM) delivery strategy

Follow the guidance detailed below for effective coordination.

Table 10 PIM Delivery strategy

ITEM	DESCRIPTION
1	Each PIM shall contain only one building and only data from one discipline.
2	Any PIM should not exceed a size of 200 MB. Should the file size be breached, the model shall be segregated following the Volume Strategy defined in Section 1.1.
3	Federated models should not exceed 500MB. When multiple models constitute a single project, a container model shall be considered for federating those models.

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Model units

Models shall use consistent units and will be drawn at 1:1 (actual size).

- For building projects: millimeters
- For infrastructure projects: meters with three decimal places
- Area: m^2
- Volume: m^3
- Weight: Kg
- Angle: Degrees

Collaboration strategy

Collaboration and coordination of the project are impletmented via the CDE shown below.

CDE Platform	Autodesk Forma
CDE Website Address	https://acc.autodesk.com/
Information Manager	SCM

Handover

As per Competition task instructions

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Appendix

Table A1 Status and Revision Codes

STATUS	DESCRIPTION	REVISION	GRAPHICAL	NON-GRAPHICAL	DOCUMENTS
WORK IN PROGRESS					
S0	Initial stage or WIP	P01.01 to Pnm.ij	✓	✓	✓
SHARED (NON-CONTRACTUAL)					
S1	For coordination	P01 to Pnm	✓	✓	✓
S2	For information or reference		✓	✓	✓
S3	For review and comment		As required	✓	✓
S4	For stage approval		✗	✗	✓
PUBLISHED DOCUMENTATION (CONTRACTUAL)					
A1	Approved and accepted as stage complete	C01 to Cnm			
B1	Partially signed off: With minor comments from the Appointing party	P01.01 to Pnm.ij			
PUBLISHED FOR AIM ACCEPTANCE					
CR	As Constructed Record documentation, PDF, Model etc.	C01 to Cnm			

Graphical: Data conveyed using shape and arrangement in space i.e. model information only.

Non-Graphical: Data conveyed using alphanumeric characters.

Documents: Including but not limited to correspondence, drawings, schedules, specifications, calculations, spreadsheets.

Table A2 AIR

This table lists asset information requirements (AIR) and has been moved to CID section 6.2.

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Table A3 Codes/Identifiers for File Naming

PROJECT CODE*	ORIGINATOR		FUNCTIONAL BREAKDOWN		SPATIAL BREAKDOWN		FORM		DISCIPLIINE		NUMBER
	CODE	COMPANY	CODE	VOLUME	CODE	LEVEL	CODE	DOCUMENT TYPE	CODE	DISCIPLINE	
SILK##	**ADSK**	Autodesk	**01**	Volume 1	**B1**	Basement level	**M3**	Native 3D model file	**A**	Architecture	**0001**
	WSI	WorldSkills International	**02**	Volume 2	**F1**	Foundations	**MCR**	Any federated models for any purposes	**S**	Structural Engineering	**0002**
	ARCH	Arch Consulting	**03**	Volume 3	**01**	1st floor (base) level	**TRP**	Text Report	**M**	Mechanical Engineering	**0003**
	STCS	Structure Consulting	**ZZ**	Multiple volumes	**02**	2nd floor level	**TSP**	Text Specification (validation checklist)	**E**	Electrical Engineering	**Etc.**
	MEPC	MEP Consulting	**XX**	Not applicable	**03**	3rd floor level etc.	**MR**	Model Rendition – Any export from native models (IFC, pictures, animations, etc.)	**P**	Plumbing Engineering	
	SILK	Silk Institute of Lake Kuncheng			**…**		**LRP**	List based Reports (including zipped clash reports)	**F**	Fire Protection Engineering	
					Rf	Roof level	**LIE**	List of Information Exchange (COBie data sheet)	**Z**	Multiple disciplines	
					RS	Roof of Stair	**LDB**	List: Database	**X**	Not applicable	
					ZZ	Multiple levels	**TPP**	Presentation	**K**	Client	
					XX	Not applicable	**BEP**	BIM Execution Plan	**L**	Landscape Architecture	
							HS	Health and Safety	**B**	Building Surveying	
							MI	Minutes/action notes	**C**	Civil Engineering	
							MS	Marking sheets	**G**	Ground Engineering	
							DG	Any 2D drawings (pdf, dwg)	**H**	Facility Management	
							PR	Program	**Q**	Quantity Surveying	
							RD	Room data sheet	**W**	Contractor	
							RI	Request for information			
							SA	Schedule of accommodation			

* ## is the Competitor's assigned number. For example, SILK00 for ITPV as the number for ITPV is 00.