BIM Execution Plan (BEP)

Digital Construction Competition

WorldSkills UK

Report reference – WSUK-BHK-ZZ-XX-SP-Z-2203-0001_BIM Execution Plan

April 2019

Project document control

Document details

Employer's Name	WorldSkills UK
Project Name	Digital Construction Competition
Employer's Project Code	WSUK19
Project Document Revision	P01
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Project document revisions

Rev	Amendments (Sections)	Issue Date	Author	Checked By	Approved By	Comment(s)
P01	First Issue	20/02/2019	Alisder Brown	Gary Hogg	Gary Hogg	Issued for comments
PO2	Contractual Issue	01/04/2019	Alisder Brown	Gary Hogg	Gary Hogg	

Project stakeholder agreement

This BEP has been agreed by the appointed stakeholder representatives listed below. Representatives named have been given the authority to accept this document for the specified project and are responsible for advising the Project Manager (therein after referred to as "Project Delivery Manager"), of any updates required.

Agreement to this BEP is assumed if not received within 10 working days.

Company Name	Stakeholder Representative	Orig. Code	Position	Date
BakerHicks	Alisder Brown	KPOINT	Comp. Judge	01/04/19
BakerHicks	Gary Hogg	KPOINT	Comp. Judge	01/04/19

Executive summary

To successfully implement BIM, a project team must perform detailed and comprehensive planning. This BIM Execution Plan (BEP) ensures that all parties are clearly aware of the opportunities, technicalities and responsibilities associated with the implementation of BIM on the project.

It is important the project team always work to the latest revision of the Project BEP, RESPONSIBILITY MATRIX and

AIDP available on the CDE.

Bim objectives

This BEP responds to the EIR noting the proposed strategic objectives of both the Employer and BakerHicks and the project activities to be undertaken. A summary of these objectives and opportunities are summarised below.

Item	Strategic Objective	Project Activity	Responsible Party
1	To supply appropriate information at handover to operate, maintain and assess the performance of the delivered asset.	Production of COBie information to an agreed scope within the models	Designer
2	To integrate the delivered asset and its information into C2C asset estate, creating content once and in the right format for multiple uses thereafter.	Test the COBie Schemas compatibility with clients selected CAFM system. Provide a fully federated model for the client to use for any ongoing maintenance or renovations	Designer
3	To use the federated model to develop high quality visual renders and animations.	Ensure coordinated models that have been Modelled to the agreed LOD	Designer

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SCOPE

This BEP is used to document the decisions made by the project team to capture information when working through the BIM execution plan process. It is associated with the Building Information Modelling standard ISO 19650-1 and PAS1192-2.

The BIM Execution Plan defines uses for BIM on every project (e.g. design authoring, cost estimating, and design coordination), along with a detailed design of the process for executing BIM throughout the project lifecycle. Additionally, this plan defines roles and responsibilities detailing scope of information to be shared, relevant business processes and supporting software.

At the outset of a project, the team needs to document the BIM strategy, which is managed and maintained by the BIM Coordinator/Manager. The project teams including consultants who are collaborating with the BIM are to familiarise themselves with these documents and apply the BIM standards to their work.

1.0 Project information

1.1 PROJECT DETAILS

Employer's Name	WorldSkills UK
Project Name	Digital Construction Competition
Employer's Project Code	WSUK19
Contact	Michael.mcguire@nclan.ac.uk
Project Address	WSUK Head Office
Project Value	£8 million
Contract Type & Delivery Method	NEC3 – Option A (Lump Sum)

1.2 PROJECT DESCRIPTION

New Build extension to an Existing Commercial Office Space comprising of three floors. Volume 1 is an existing, Volume 2 is a new build extension.

1.3 PROJECT SCHEDULE/PHASES/MILESTONES

The below tale outlines the deliverables for this project, they must be strictly adhered to.

Stage	Description	Information Exchange	Responsibility		Delivery Time
			Design Team	Contractor	
	Task A	1	✓		11:00
	Task B	2	✓		13:00
	BREAK				13:00 – 13:45
	Task C	3	✓		14:30
	Task D	4	✓		16:00

2.0 Project requirements

This section describes how the BIM Model and Facility Data are leveraged to maximize project value (e.g. design alternatives, life-cycle analysis, scheduling, estimating, material selection, pre-fabrication opportunities, site placement, etc).

2.1 BIM OBJECTIVES

This section lists the Client Objectives for the project and the format in which the information will be delivered.

Item	Strategic Objective	Project Activity	BIM use	Responsible Party
1	To supply appropriate information at handover to operate, maintain and assess the performance of the delivered asset.	Production of COBie information to an agreed scope within the models	COBie (Asset information)	All
2	To integrate the delivered asset and its information into WSUK asset estate, creating content once and in the right format for multiple uses thereafter.	Test the COBie Schemas compatibility with clients selected CAFM system. Provide a fully federated model for the client to use for any ongoing maintenance or renovations	Planned Maintenance and Facilities Maintenance	All
3	To use the federated model to develop high quality visual renders and animations.	Ensure coordinated models that have been Modelled to the agreed LOD	Visualisation and Communication	BPR

2.2 PROJECT DELIVERABLES

Project deliverables are noted in the Responsibility Matrix.

Deliverable	Responsibility
Structural project model	WSUK Competitor
Architectural project model	WSUK Competitor
Federated model NWD + IFC	WSUK Competitor
Elevations drawing A1	WSUK Competitor
Floor plans drawing A1	WSUK Competitor
Clash report html	WSUK Competitor
Soft clash issues assigned to BIM manager on the next gen 360 CDE	WSUK Competitor

2.3   INFORMATION EXCHANGE FORMATS

The dates for information exchange are referred to in **Section 1.3**. At each delivery date, each **Task Team** (Consultant and Contractor with Design Proportion) will be required to upload information in the following formats to the CDE.

Agreed formats for model and drawing file exchange are noted below.

Format(s)	IFC	Excel	PDF (V7.0 Onwards)	Native Format	Other (Add Format)
3D Model File(s)	✓			✓	
Federated Model File(s)					✓ (.NWF)
Drawing File(s)			✓	✓	
Clash Rendition					✓ (HTML Tabular)
COBie/Asset Data File(s)	✓	✓			
Reports/Specifications			✓		

3.0 Data requirements

3.1 EIR (EXCHANGE INFORMATION REQUIREMENTS)

Appendix A outlines all the assets that require data and specifically what data is required to be input and when.

COBie schemas shall be issued from each discipline at handover in line with the Appendix A.

3.2 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.

It is the responsibility of each **Task Team Manager** to ensure the integrity of COBie references (worksheet, column naming and positioning, cell and pick list referencing) prior to upload to the Shared area of the CDE.

3.3 COBIE PARAMETERS

It is the responsibility of each **Designer** to ensure the required COBie fields are populated before issue to the CDE. For information exchange dates please refer to **Section 1.3.**

COBie Parameter Name	Further Description
COBie.Contact.Email	Student email
COBie.Contact.Company	College/University of competitor
COBie.Facility.Name	Name of building
COBie.Facility.SiteName	Full site wide project name
COBie.Floor.Name	(Auto) Name of Level
COBie.Space.Name	Name of the space/room
COBie.Space.FloorName	(Auto) Level the space/room is on
COBie.Space.Category	(Auto – Classification) Classification information
COBie.Type.Name	(Auto) Type name of element
COBie.Type.Description	(Auto) Type description of element
COBie.Type.Category	(Auto - Classification) Classification information
COBie.Component.Name	(Auto) Name of element
COBie.Component.Space	(Auto) Location of the Element

4.0 Standard method & procedure

4.1 APPLICABLE STANDARDS

The use of a common language and standards are necessary to achieve a fully collaborative BIM process. To support consistency of graphical and non-graphical information, models shall be authored to an agreed industry standard. Where this document conflicts with the standards below the BEP will take precedence:

| M=Mandatory R=Recommended | Application | | | | | | | | | | | |
Standards	Guidance	Collaboration	File naming	Object naming	Drawing	Classification	LOD	LOI	CDE	Security	Asset Management	Contracts
ISO 19650-1			M		M	M			M			
ISO 19650-2	M	M					R	R	M			
BS1192-4	R										M	
Uniclass 2015						M						
BS8541-1				M								
The NBS BIM Toolkit	R				R	M	R		R			

4.2 FILE NAMING CONVENTION

Naming shall be based on ISO 19650-1 container naming. For full compliance, recommended character restrictions must be adopted.

1	2	3	4	5	6	7	8
Project	Originator	Volume	Level	Type	Role	Number	Description
WSUK19	XXX	XX	XX	XX	X	XXXX	XXX XXX

Field 1: Project Code	An abbreviated code or number identifying the project.
Field 2: Originator Code	A 3-6 character abbreviated code identifying the originator.
Field 3: Volume or System	Identifier of which building, area, phase, volume or zone of the project the model file relates to if the project is sub-divided by zones/volumes.
Field 4: Level	Identifier of which level, or group of levels, the model file relates to

	if the project is sub-divided by levels.
Field 5: Type	Document type. This will be M3 for 3D model files, as per ISO 19650-1
Field 6: Role	1 character discipline identifier code, as per ISO19650
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.
Field 8: Description (Optional for Models)	Descriptive field to define the type of data portrayed in the file. Avoid repeating information codified in other fields. Can be used to further clarify any other aspect of the contained data. It is preferred that this description does not change between issues.

4.3   VOLUME STRATEGY

Large projects may need to be split into several volumes or zones to facilitate efficient manipulation in the virtual environment. This helps reduce file sizes for; use, upload and download when working in a collaborative manner. This process must be managed by the Lead Designer. Volume plans and naming conventions to be shared via the CDE.

The volume strategy needs to be defined at project outset, as volume codes are included in the file naming protocol denoted in Section 4.2. The table below specifies the project volume strategy.

Volume Code	Description
Z1	Volume 1
Z2	Volume 2
ZZ	To be used if model has not been split or includes multiple zones/volumes

4.4   BIM OBJECT/ASSET NAMING

All elements must be named in accordance with BS8541-1 (latest version at time of BEP issue)

4.5   CLASSIFICATION

The Uniclass 2015 classification system must be used in conjunction with Appendix A to support COBie and Asset Management requirements.

Classification Table	En - entities	Ss - Systems	SL – Spaces/ Locations
Classification Revision	Uniclass 2015	Uniclass 2015	Uniclass 2015

4.6   PROJECT SPECIFIC NAMING CONVENTIONS

Project naming conventions must be agreed and observed by all suppliers in order to align with the CAFM system. The following naming conventions are required in this project. Refer to Appendix C for a detailed breakdown of project naming specifics.

Item	Project Requirement
Floor Numbers	
Basement	B1
Ground Floor	00
First Floor	01
Second Floor	02
Roof/Eaves	03
Space / Room Numbers	
Spaces/ Rooms to be numbered as follows:	LEVLCODE-RM-UNIQUEID Example 00-RM-001 Use the previously defined Floor numbers only for the Level Code

4.7   STATUS CODES & REVISIONS

Status codes are required for this project.

Status	Issue Purpose	Directory
S0	WIP	WIP
S1	Coordination	Shared
S2	Information	Shared

4.8   REVISION/VERSION EXPLAINED

P = Preliminary n = major revision number

Models saved to the CDE as Work In Progress shall have the Status code "S0" applied.

Discipline models shared internally shall use the "S1" status code for coordination purposes

Models, drawings and reports issued for review / checking shall use the S3 Status

4.9   SHARED DATUM AND COORDINATES

It is necessary to identify the relationship between the model origin and orientation of the Survey Grid. Origins must coordinate with any legacy data/ geometry or laser scans provided by the Employer. It is the Lead Designer's responsibility to issue the project coordinate grid file to all stakeholders via the CDE. For this project, a Geospatial Grids Revit model has been supplied

4.10   MODEL DIVISION

Worksets are to be named in accordance with the table below. Any changes to model subdivision or workset provision must be agreed by the <u>entire design team</u>. Any changes are to be recorded in the table below and the Project BEP updated on the CDE. Worksets should be created in such a manner to ease substitution of geometry with sub-Contractor's models e.g. curtain walling.

Discipline	Model	Worksets
Architecture	Architecture XXX = use the Element and Functions table on the NBS website or spreadsheets in Resources directory to find the classification codes and infill as appropriate.	A _External Walls
		A _Internal Walls
		A _Windows
		A _Doors
		A_Ceiling and Soffit System
		A _Floors
		A _Roofs
		A_CurtainWalls
	FFE	F_Furniture
Structure	Structural	S_Columns
		S_Frame
		S_Concrete Pile
		S_Walls

4.11 PROJECT INFORMATION MODEL (PIM) DELIVERY STRATEGY

Specific requirements of Stakeholders must be considered to enable effective coordination. To ensure that all information is accessible to all parties please follow the guidance detailed below. Any deviation from this table must be agreed with the Information Manager.

Item	Description
1	No more than one building shall be modelled in a single file and contain only data from one discipline.
2	Model files and information should not exceed 200MB. Should the file size be breached, the model shall be segregated following the Volume Strategy defined in Section 4.3.
3	Where multiple models make up a single project, a container model should be considered whose function it is to federate the models. Federated models should not exceed 500MB.
4	Placeholder volumes for key items such as ceilings, under floor voids and bespoke manufacture are to be defined at an early stage. Any changes to these placeholder volumes cannot be changed without agreement from all stakeholders. Placeholder volumes will be subdivided and ownership passed as the design is progressed.

5.0 Collaboration procedures

The process flow indicates the detailed information flow between disciplines and the method for approval and coordination via WIP and Shared process.

5.1   COLLABORATION STRATEGY

The Information Manager shall coordinate the file transfer process via a Common Data Environment at the earliest opportunity. All issued documents must comply with the document management protocols set out in the PEP.

CDE Platform	Autodesk BIM 360 Next Generation
CDE Website Address	https://bim360.autodesk.com/
Document Controller	Alisder Brown

6.0 Handover

All specifications and product data must be provided by the specifying supplier in digital format and named in accordance with **Section 4.2**. The following information will be provided on portable media at handover in accordance with ISO 19650-1

- Software Modelled Structural Project Information Model Volume 2
- Software Modelled Architectural Project Information Model Volume 2
- Federated model
- Assign Quality Assurance Issues
- Corrected Structural Project Information Model Volume 1
- Corrected Staircase Information Model
- Corrected Architectural Project Information Model Volume 1
- Single Coordinated COBie UK 2012 Schema
- 1 (one) x Elevation drawing on A1 sheet uploaded to CDE.
- 1 (one) x Floor Plan drawing on A1 sheet uploaded to CDE.
- 1 (one) x External Render (.PNG)
- 1 (one) x Internal Render (.PNG)
- 1 (one) x 360o Render

APPENDIX A.1 – COBie DATA REQUIREMENTS

windows
Ss_25_30_95_Window Systems

COBie Parameter Name	Information Exchange	Responsibility
COBie.Contact.Email	2	ARCHITECTURE
COBie.Contact.Company	2	ARCHITECTURE
COBie.Facility.Name	2	ARCHITECTURE
COBie.Facility.SiteName	2	ARCHITECTURE
COBie.Floor.Name	2	ARCHITECTURE
COBie.Space.Name	2	ARCHITECTURE
COBie.Space.FloorName	2	ARCHITECTURE
COBie.Space.Category	2	ARCHITECTURE
COBie.Type.Name	2	ARCHITECTURE
COBie.Type.Description	2	ARCHITECTURE
COBie.Type.Category	2	ARCHITECTURE
COBie.Component.Name	2	ARCHITECTURE
COBie.Component.Space	2	ARCHITECTURE

APPENDIX A.2 – COBie DATA REQUIREMENTS

Doors
Ss_25_30_20_Door, Shutter and Hatch Systems

COBie Parameter Name	Information Exchange	Responsibility
COBie.Contact.Email	2	ARCHITECTURE
COBie.Contact.Company	2	ARCHITECTURE
COBie.Facility.Name	2	ARCHITECTURE
COBie.Facility.SiteName	2	ARCHITECTURE
COBie.Floor.Name	2	ARCHITECTURE
COBie.Space.Name	2	ARCHITECTURE
COBie.Space.FloorName	2	ARCHITECTURE
COBie.Space.Category	2	ARCHITECTURE
COBie.Type.Name	2	ARCHITECTURE
COBie.Type.Description	2	ARCHITECTURE
COBie.Type.Category	2	ARCHITECTURE
COBie.Component.Name	2	ARCHITECTURE
COBie.Component.Space	2	ARCHITECTURE

APPENDIX B - FILE NAMING CODES

B.1   PROJECT CODE

The project code shall be: **WSUK19**

B.2   ORIGINATOR CODE

Organisation	Originator	Notes
BakerHicks	BHK	
Knowledgepoint	KPOINT	
WorldSkills	WSUK	
Autodesk	ADSK	
New College Lanarkshire	NCL	

B.3   DIVISIONS

B.3.1.   VOLUMES

Volumes shall be two or three characters where relevant. Where no volumes are assigned in models, ZZ is applicable where the model division is over multiple volumes. Model files names are not to change if issued prior to volumes being added. Refer to section 6.3 for Volume codes

B.4   TYPES CODES

Naming of each type of file needs to provide clarity using the two character codes below for drawings, models or documents.

B.4.1.   DRAWINGS & MODELS

AF	Animation Files	M2	2D Drawing – Taken from model file
CM	Combined Multi-Discipline Model	M3	3D Model File
CR	Clash Rendition Model	MR	Model rendition file for other renditions e.g. thermal analysis
M1	2D Drawing – NOT taken from model file	VS	Visualisation File

B.4.2   DOCUMENTS

BQ	Bill of Quantities		PP	Presentation
CA	Calculations		PR	Programme
CO	Correspondence		RD	Room Data Sheet
CP	Cost Plan		RI	Request for Information
DB	Database		RP	Report
FN	File Note		SA	Schedule of Accommodation
HS	Health & Safety		SH	Schedules
IE	Information Exchange File		SN	Snagging List
MI	Minutes/Action Notes		SP	Specification
MS	Method Statement		SU	Survey

B.5   ROLES

A	Architect		L	Landscape Architect
B	Building Surveyor		M	Mechanical Engineer
C	Civil Engineer		P	Public Health Engineer
D	Drainage, Highways Engineer		Q	Quantity Surveyor
E	Electrical Engineer		S	Structural Engineer
F	Facilities Manager		T	Town & Country Planner
G	Geographical & Land Surveyor		W	Contractor
H	Heating & Ventilation Designer		X	Subcontractor
I	Interior Designer		Y	Specialist Designer
K	Client		Z	General (non-disciplinary)

B.5.1.   PROJECT SPECIFIC CODES FOR ROLES

The codes J, N, R, U and V or longer codes are reserved for non-standard project specific roles.

APPENDIX C – CLASH DETECTION SETS AND TOLERANCES

Level 00 Search Set No 1	Search Set No 2	Stage 3 Tolerance (mm)
UC Columns - UC254x254x73	Stairs	50

Level 00 Search Set No 1	Search Set No 2	Stage 3 Tolerance (mm)
Doors - M_Single-Flush	UC Columns - UC254x254x73	500

Level Roof Search Set No 1	Search Set No 2	Stage 3 Tolerance (mm)
All Mechanical Equipment at Roof level	UB-Universal Beams at Roof Level	50