



Copperstone Construction Ltd

BIM Execution Plan (BEP)

For

University of Wales Trinity St David
Leisure Centre

6003-CCL-XX-XX-SP-Z-004-BEP

Project Number: 6003



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Client: UWTSD

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1. Introduction

As the contractor team that has been appointed by the client to deliver the project, this BIM Execution Plan (BEP) has been developed in compliance with the requirements of BS EN ISO 19650-2:2018.

1.1. BIM Execution Plan (BEP) Overview

The purpose of this BEP is to set out the supply chains agreed approach to implementing BIM on this project, by acting as a digital method statement to form the framework for the management of the Project Information Model. If there are any disputes, conflicts, or lack of clarity over the life cycle of the project then the BEP provides a reference for the team members on clarity of resolution.

The Exchange Information Requirements (EIR) have been evaluated and allowed for an assessment of the BEP criteria, allowing for a revision of the first draft.

2. Project-Specific Information

This provides the general details of the project, its outcome aims, and the team responsible for it.

2.1. Project Description

Client	University of Wales Trinity St David
Project Name	Dockside Leisure Centre
Project Number	6003
Project Type	Olympic Swimming pool and Recreational facilities
Location	Roberts Rd, Port Tennant, Swansea, SA1 1LY

Table 1: project description



2.2. Project Scope

The aim of this project is to deliver a design and build project for a Leisure Centre that must include an Olympic sized swimming pool, five tennis courts and a rugby pitch, with all the required sanitary facilities to service the site. With consideration being given to the energy-efficient delivery for all services, including heating, lighting, drainage, and ventilation of the building. Parking is also to be supplied to service the site. This will be delivered using an NEC 4 form of contract.

2.3. Challenges Unique to the Project

Challenges that could possibly occur at the site consist of:

- Risk of discovering unexploded ordinances due to the historic activity of the site.
- Possibility for site contamination as the site was previously used for industrial activities.
- Tight access to the site location because of a single road in and out.
- Restricted working time because of residential properties surrounding the site.
- Site is exposed to coastal weather.
- Site may be susceptible to flooding in the lower levels due to proximity to active dock areas.



2.4. Companies and Disciplines involved

This is a reference of all stakeholders listed, showing roles and project discipline codes related to each stakeholder.

Project Disciplines	Role Code	Company	Originator Code
Client	K	ADJG Ltd	ADJG
Project Manager	J	Copperstone Construction Ltd	CCL
Asset Manager	F	ADJG Ltd	ADJG
Quantity Surveyor	Q	Copperstone Construction Ltd	CCL
Main Contractor	W	Copperstone Construction Ltd	CCL
Lead Designer	A	Copperstone Construction Ltd	CCL
Landscape Architect	L	Copperstone Construction Ltd	CCL
Structural Engineer	S	Copperstone Construction Ltd	CCL
BIM Manager	Z	Copperstone Construction Ltd	CCL
Mechanical Engineer	M	Atkins	AK
Electrical Engineer	E	Tawe Electrical	TE
Building and Land Surveyor	G	Davies Ken Surveyors Ltd	DKS
Heating & Ventilation Designer	H	Thermal Engineering (Wales) Ltd	TEW
Subcontractor 1	X1	Kershaw Connect	KC
Subcontractor 2	X2	Millisun Limited	ML

Table 2: project companies and disciplines



3. Management

3.1. Project BIM Objectives and Milestones

The Exchange Information Requirements (EIR) supplied by the client, to comply with protocols set out by ISO 19650-2, these documents will supply the information to specify the BIM objectives for the project and ensure that milestones are met during the project.

This document will be reviewed and updated as and when more information is supplied by the Client.

Start Date	Design Completion	Detail Design Completion, Fabrication	Construction	As constructed Models, Documents and Data	Handover

Table 3: milestones and objectives for project

3.2. PIM Delivery Strategy

The Project Information Model (PIM) will be developed throughout the design phase in response to the needs of the client that are recorded in the EIR, the level of detail will increase as progress is made from documentation and non-graphical data to a virtual construction model (McPartland, 2017). The BEP will be updated as these documents become available from the client.

ISO 19650 states that the PIM should consist of –

- Project Geometry



- Equipment locations
- Performance requirements of project design
- Method of construction
- Scheduling
- Details of installed systems
- Maintenance requirements

The PIM contributes to the end Asset Information Model (AIM) to support the management activities of the asset.

	Brief & Planning	Model Generation
Graphical Models		Native Discipline Models Federated IFC Model
Non-graphical Data		Federated COBie
Documentation	BIM Execution Plan	Site Plans, Floor Plans, Elevations, Sections, Door Schedule, Window Schedule, Maintenance Requirements

Table 4: Strategy for project information delivery

3.3. Survey Strategy

When surveys are conducted of the site they will be aligned with the origin and coordination convention as specified in section 5.2 and will be conducted to the standards set out by BS 5964-3:1996.

This information will be delivered, shared, and managed in accordance with BS EN ISO 19650-2:2018.



Survey Method	Delivery Format	Survey Origin	Notes
Standard DISTO (manual)			
LIDAR			
GNSS			
Laser Scanner			
'update when appropriate'			

Table 5: survey strategy

3.4. Existing Legacy Data

Following a review of existing documents as part of a feasibility study conducted at pre-contract phase in accordance to BS 5930:2015 Code of practice for ground investigations, any historical data asset should be included in the EIR.

This historical information will be extracted and formatted to suit the integration with the PIM, in this case it would be the historic OS topographical map.

3.5. Approval of Information

To ensure that documents submitted, amendments or additions to the model, and any schedules extracted are coherent and adequate there will be an approval process installed. This will allow the design team, main contractor, or the project manager to approve development changes to the design information to the project.

To ensure effective project design information management throughout the process, the responsible members are identified as the Architect, Client's Agent and Main Contractor. The process for identifying and approving PIM design input is described below.



1. Check delivered information for compliance
2. If applicable, check deliverable for dimensional accuracy
3. If applicable, check deliverable for spatial coordination
4. If applicable, check deliverable for sufficient attribute data
5. Sign-off
6. Check deliverable to satisfy purpose of issue
7. Update suitability code
8. Update Revision code
9. Sign Approved

If the information is identified as being non-cohesive during this process then the input will be rejected, this will be amended by the original author and then be resubmitted for approval.

3.6. PIM Authorisation Process

When agreed Objective Milestones have been completed (subject to EIR) published documents will be produced, at this point the project manager will authorise the information as 'A' suitable or 'B' suitable (approved stage complete or partially complete). If documents are 'B' suitable they will be returned to the appropriate member to address and resubmit for approval.

4. Planning & Documentation

This section is to confirm the capabilities of members of the supply chain and their ability to produce and share information in accordance with BS EN ISO 19650. The assessment of the supply chain should be carried out at the earliest time post-contract.



4.1. Project Implementation Plan (PIP)

The PIP consists of completed documents that show the capabilities and competence of the supply chain. These documents comprise of:

- Supplier building information management assessment form
- Supplier IT assessment form
- Supplier resource assessment form

And are then compiled in the Supply chain capability summary form.

Supplier	Discipline	Resource number	Levels of competence	Years' experience
Copperstone Construction Ltd	BIM Consultant		BIM, RIBA, CAD/Revit	
Copperstone Construction Ltd	Quantity Surveyor		FRICS, BIM	
Copperstone Construction Ltd	Main Contractor		RIBA, BIM, CAD/Revit, FCI0B	
Copperstone Construction Ltd	Architect		RIBA, CAD/Revit, BIM, Specification Author	
Copperstone Construction Ltd	Landscape Architect		RIBA, CAD/Revit, BIM	
Copperstone Construction Ltd	Structural Engineer		CAD/Revit, BIM, MStructE	
Atkins	Mechanical Engineer		BIM, IMechE, CAD	
Tawe Electrical	Electrical Engineer		BIM, CAD	
Davies Ken Surveyors Ltd	Building and Land Surveyor		FRICS, BIM, Revit	



Thermal Engineering (Wales) Ltd	Heating & Ventilation Designer		CIPHE, BIM, CAD	
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Table 6: supply chain competence and resource summary

4.2. Agreed Process for Collaboration and Information Modelling

This document is produced by responding to the EIR (once supplied), showing the Level of Definition Matrix (LoDM), this spells out the method agreed upon for the development and delivery of the information model.

This documentation defines ownership of the intellectual information and the requirements outlined by the EIR of the Level of Detail (LOD) and the Level of Information (LOI) at each designated project Milestone stage.

Models and Deliverables will be placed onto a designated drive folder to the viewing, access, and authorisation of information.

4.3. Task Information Delivery Plan (TIDP)

Each organisations team manager will be responsible for delivering their individual TIDP, identifying their information drops will coincide with the, yet to be agreed, milestone date required to match the programmes design and construction aims.

4.4. Master Information Delivery Plan (MIDP)

The MIDP contains the details of all information deliverables for the project that will eventually make up the PIM, it defines when certain information is to be delivered and by who aligning to the milestone dates.



This will be comprised when all team leaders and consultants have completed the TIDP, compiling all information into the MIDP and then shared in the Common Data Environment (CDE).

5. Standards, Methods & Procedure (SMP)

This section outlines the requirements needed to ensure the collaboration to successfully develop the PIM to satisfy BIM Level 2 procedure and provide an information model to the required standard. All team members must follow the SMP when contributing named and developed information to the PIM.

5.1. Volume and Level Strategy

Volumes are to be considered and assigned to the team responsible for delivery, these volumes may overlap but cannot in the 3-D space so clash avoidance will be achieved. Volume codes are to be shown in section 5.3.

As the project develops and a need arises for a redefined volume or level strategy then the design team will agree on requirements and publish them as a shared document.

5.2. PIM Origin and Orientation

The Sites origin is based on Ordnance Survey Grid Reference, with the orientation on the diagram being true north (see figure 1). The elevation for the site will be taken as a level with an elevation of 0.0. The blue dot shows the project base point to be used on the NW corner of the site.



Figure 1: project base point

Reference	Position
Project Base Point (OS Grid Ref)	SS 266933N 192804E
Ground Floor FFL	0.502m
Elevation Level	0.0
Building point 1	To be updated
Building point 2	To be updated

Table 7: project origin and orientation

5.3. File Naming Convention

The required protocol that should be observed by all stakeholders, is listed in table 2, this is the requirement for naming files when to be shared in the CDE as per ISO 19650-2:2018.



Field	Description
1	Project Identifier code (This must not be adapted for any other form once agreed upon).
2	Three letter code that identifies the Originator of the information, see section 2.4.
3	Two-digit code that identifies the volume or system, this is to identify a logical portion of work that is intended to be delivered.
4	Two-letter code identifying the level that the information relates to.
5	Two-digit code that identifies the type of information supplied whether a drawing, module or document.
6	Single-letter code that identifies what role or discipline the author conducts on the project. For roles and code see section 2.4
7	Three numeric digits are used to identify revised or updated documents that have identical previous fields.
E.g.	XXXX-ABC-ZZ-XX-M3-A-001

Table 8: information naming convention strategy

The project's unique code must stay the same throughout the project.

Project Name: **Dockside Leisure Centre**

Project code: **6003**



Volume designation codes

Code	Volume as described
ZZ	Multiple volumes depicted
XX	No volumes relevant or required
V1	Inside the proposed construction interior
V2	Depiction of any external finishes to the construction
V3	Surrounding site area of the construction

Table 9: code designation for volumes

Level designation code

Code	Level as described
ZZ	Multiple levels depicted
XX	No levels relevant or required
00	Base Level of Building or linear Asset
BS	Basement Level
GF	Ground Floor
1F	First Floor
2F	Second Floor
3F	Third Floor
4F	Fourth Floor
5F	Fifth Floor
6F	Sixth Floor
7F	Seventh Floor
GR	Glass Roof

Table 10: code designation for levels



File Type

CODES	DRAWINGS AND MODELS	CODES	DOCUMENTS
AF	Animation File	BQ	Bills of Quantities
CM	Combined Model	CA	Calculations
CR	Specific for the Clash Process	CO	Correspondence
DR	2D Drawing	ECP	Elemental Cost Plan
M2	2D Model File	DB	Database
M3	3D Model File	FN	File Note
MR	Model Rendition File	HS	Health and Safety
VS	Visualisation	IE	Information Exchange
		MI	Minutes/Action Notes
		MS	Method Statement
		PP	Presentation
		RD	Programme
		RI	Request for Information
		RP	Report
		SA	Schedule of Accommodation
		SH	Schedule
		SN	Snagging List
		SP	Specification
		SU	Survey
		MC	Material Cost Comparisons

Table 11: code designation for files

All program documents that are produced will follow the naming protocols; this is fundamental to meeting the requirements of BIM Level 2.



5.4. Object Naming

With the production of a relevant EIR from the client, any specific requirements for the structure of component names will be detailed here.

5.5. Layer Naming

Models will be complete with room layering information with logical numbering, this is in consultation with the client, and the conventions used will be based on the architectural model.

5.6. Agreed Construction Tolerances

In consultation with the client and design team agreements will be made on the agreed tolerances for construction elements according to project discipline. This will be updated in revision.

5.7. Drawing Sheet Template

Drawing sheets will be created in the modeling environment, these can remain in the model during any information exchange but should be removed from model files before Model Information Exchange.

Drawing Sheet Scales



All drawings and renders must be presented to the graded scale set out by the 'Design Manager'.

1:1000 Scale Detail shows shape and layout

1:100 Scale Detail shows shape, layout, and construction elements

1:50 Scale Detail shows how the construction elements meet at junctions

1:5 Scale detail show shape, dimensions, and assembly of the separate construction elements

1:1 All model files must be modelled at 1:1 Scale

5.8. Annotations, Dimensions, Abbreviations and Symbols

Each discipline task team leader needs to submit to the design manager and project manager the relevant annotations etc. relevant to the project. This will then be agreed upon and published to the Common Data Environment (CDE) to ensure continuity and consistency when designing and developing the model.

The project team should agree on common units of measurement. These should include distance (meter and millimetre) and angles (degrees/radians measured clockwise or counter-clockwise). This information will also be published to all members of the team, ensuring consistency in design.

5.9. Attribute Data

The attribute data requirements needed to be supplied in the PIM will be depicted by the EIR.



6. Project Resources & IT Requirements

This section details the various strands of information that constitute the PIM, also detailing the software used to author the 2D/3D models. Once the software requirements have been agreed there will be no software upgrades through the course of the project, unless agreed by the project manager, this would be documented with a BEP revision.

6.1. Software Versions

It is important that the stakeholder's software skills and experience match the needs of the project to successfully achieve BIM Level 2.

Only the software detailed in table 34 is to be used to generate the model of the projects.

Company	Purpose	Software	Version
Autodesk	2D Modelling	AutoCAD	2021
Autodesk	3D Modelling & Creating of Drawings	Revit	2021
Autodesk	Collaboration Software	Revizto	2017

Table 12: project software

6.2. Exchange Formats

The appropriate coordination software will be used by all stakeholders to access and deliver into the PIM. These documents will need to be produced to the Information Exchange Formats agreed on.

Table 13 details the agreed usage of authoring software to be used by each task team involved in the project and formatting of those files.



Discipline	2D/3D	Software	Version	Native File Type	Information Exchange Format
Main Contractor	3D	Autodesk Revit	2021	.rvt	.rvt and .ifc
Architect	3D	Autodesk Revit	2021	.rvt	.rvt and .ifc
Landscape Architect	3D	Autodesk Revit	2021	.rvt	.rvt and .ifc
Structural Engineer	3D	Autodesk Revit	2021	.rvt	.rvt and .ifc
Mechanical Engineer	3D	Autodesk Revit/AutoCAD	2021	.rvt/.dwg	.rvt, .dwg and .pdf
Electrical Engineer	3D	Autodesk Revit	2021	.rvt	.rvt and .ifc
Heating and Ventilation engineer	Tbc	Tbc	Tbc	Tbc	Tbc
Building and Land Surveyor	3D	Autodesk Revit	2021	.rvt	.rvt and .ifc

Table 13: authoring software and formatting



6.3. Process and Data Management Systems

The process and data management system are to be described under section 4.2.

Agreed project processes for collaboration and information modelling.

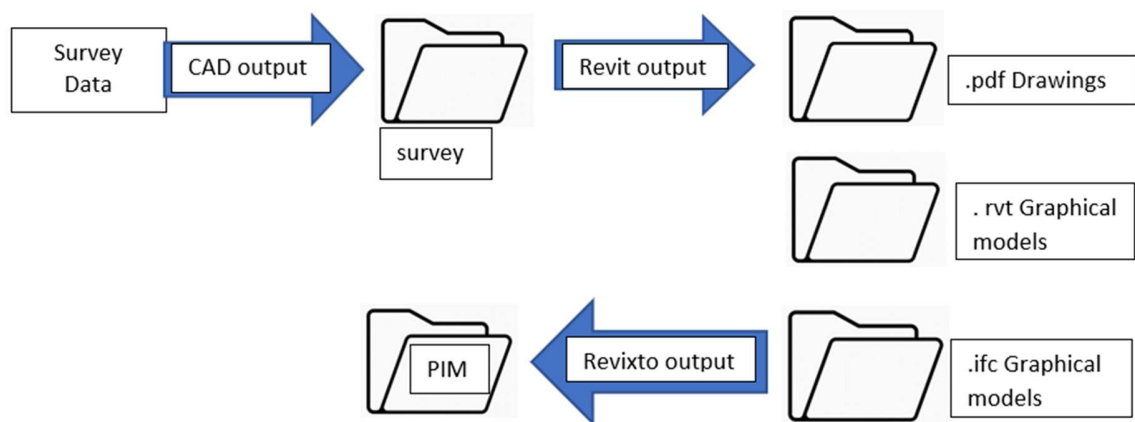


Figure 2: data management and transmittance