



CPIx on Line

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The Post Contract-Award Building Information Modelling Execution Plan (BEP)

Preface

The BEP shall list the agreed targets for responsibility, timely delivery, exchange, reuse and final handover to the clients. It will also list all of agreed elements as outlined in the Employers Information Requirements, the Brief, the BS1192:2007, PAS1192-2:2013, the CPlx Protocol and the contract documents.

This BEP is structured in accordance with PAS1192-2:2013.

Project Delivery Manager

This document is owned and maintained by the current Project Delivery Manager listed below.

Project Delivery Manager - Name	Company Responsible

Project Team Representatives and Role

Company Name	Representative and Authorised Responsible Agent	Role

Document Authority

This project plan has been agreed by the representatives of the project team as listed above with the authority of their parent companies to accept this document as the **Agreed BIM Execution Plan**.

Contents

1	PROJECT INFORMATION	7
2	INFORMATION REQUIRED BY THE EIR	8
2.1	PLANNING OF WORK AND DATA SEGREGATION	8
2.2	CO-ORDINATION AND CLASH DETECTION	8
2.3	COLLABORATION PROCESS	8
2.4	HEALTH AND SAFETY/CDM MANAGEMENT	8
2.5	COMPLIANCE PLAN	8
3	MANAGEMENT	9
3.1	ROLES, RESPONSIBILITIES AND AUTHORITIES	9
3.2	MAJOR PROJECT MILESTONES	10
3.3	PROJECT INFORMATION MODEL DELIVERY STRATEGY	10
3.4	SURVEY STRATEGY	11
3.5	EXISTING LEGACY DATA USE	11
3.6	APPROVAL OF INFORMATION	11
3.7	PIM AUTHORIZATION PROCESS	11
4	PLANNING AND DOCUMENTATION	12
4.1	REVISED PROJECT IMPLEMENTATION PLAN	12
4.2	AGREED PROJECT PROCESSES FOR COLLABORATION AND INFORMATION MODELLING	12
4.3	AGREED MATRIX OF RESPONSIBILITIES ACROSS THE SUPPLY CHAIN	14
4.4	TASK INFORMATION DELIVERY PLAN (TIDP)	17
4.5	MASTER INFORMATION DELIVERY PLAN (MIDP)	17
5	STANDARD METHOD AND PROCEDURE	18
5.1	VOLUME STRATEGY	18
5.2	PIM ORIGIN AND ORIENTATION	18
5.3	FILE NAMING CONVENTION	18
5.4	LAYER NAMING CONVENTION	23
5.5	AGREED CONSTRUCTION TOLERANCES FOR ALL DISCIPLINES	23
5.6	DRAWING SHEET TEMPLATES	23
5.7	ANNOTATIONS, DIMENSIONS, ABBREVIATIONS AND SYMBOLS	24
5.8	ATTRIBUTE DATA	24
6	IT SOLUTIONS	25
6.1	SOFTWARE VERSIONS	25
6.2	EXCHANGE FORMATS	25
6.3	PROCESS AND DATA MANAGEMENT SYSTEMS	25

List of Tables

TABLE 1 – PROJECT INFORMATION	7
TABLE 2 – ROLES AND RESPONSIBILITIES	9
TABLE 3 – ROLE AUTHORITIES	9
TABLE 4 – MAJOR PROJECT MILESTONES	10
TABLE 5 – STRATEGY FOR INFORMATION DELIVERY	10
TABLE 6 – SURVEY STRATEGY	11
TABLE 7 – SCHEDULE OF INFORMATION APPROVAL RESPONSIBILITIES	11
TABLE 8 – SUPPLIER RESOURCE SUMMARY	12
TABLE 9 – PROCESSES FOR COLLABORATION AND INFORMATION MODELLING	12
TABLE 10 – CLASH RENDITION VIEWER	13
TABLE 11 – AUTHORISATIONS FOR SECURITY, EXTRANET AND DOCUMENT DISTRIBUTION	13
TABLE 12 – RESPONSIBILITY MATRIX FOR INFORMATION PRODUCTION	14
TABLE 13 – TEMPLATE FOR TASK INFORMATION DELIVERY PLANS	17
TABLE 14 – RECORD OF INFORMATION MODEL ORIGIN AND ORIENTATION	18
TABLE 15 – TEMPLATE FOR FILE NAMING	18
TABLE 16 – PROJECT CODE(S)	18
TABLE 17 – ORIGINATOR CODES	19

TABLE 18 – TEMPLATE FOR DEFINING PROJECT VOLUMES	19
TABLE 19 – LEVEL OR LOCATION CODES.....	20
TABLE 20 – AGREED FILE TYPES FOR DRAWINGS AND MODELS (SEE BS1192:2007, PAS1192-2).....	20
TABLE 21 – AGREED FILE TYPES FOR DOCUMENTS (SEE BS1192:2007, PAS1192-2)	20
TABLE 22 – DISCIPLINE CODES (SEE BS1192-5)	21
TABLE 23 – EXTENDED DISCIPLINE CODES FOR THIS PROJECT	21
TABLE 24 – METADATA STATUS CODES FROM PAS1192-2	22
TABLE 25 – LAYER NAMING CONVENTION.....	23
TABLE 26 – AGREED TOLERANCES FOR CONSTRUCTION ELEMENTS ACCORDING TO PROJECT DISCIPLINE.....	23
TABLE 27 – LIST OF DRAWING SHEET TEMPLATES.....	23
TABLE 28 – DRAWING SHEET SCALES	24
TABLE 29 – AGREED UNITS OF MEASUREMENT	24
TABLE 30 – AGREED SOFTWARE VERSIONS	25
TABLE 31 – AGREED EXCHANGE FORMATS FOR MODELS AND DRAWINGS	25

1 Project Information

Table 1 – Project information

Project Name	
Project Address	
Project Number (Clients Project Number or reference)	
Contract Form	
Project Design Start Date	
Project Construction Start Date	
Project Completion and Handover Date	
Project Description (EIR)	May be an additional document, please reference.
Project Brief and CDM requirements	
Project Deliverable as defined in the EIR and COBie project templates (see also the CPIx Protocol)	May be an additional document, please reference.

2 Information required by the EIR

PAS1192-2:2013 Clause 5.3 defines the minimum contents of the Employers Information Requirements. The following subsections of the BEP respond to the parts of the EIR specifically requesting bidders' proposals.

2.1 *Planning of work and data segregation*

Required in response to the EIR by PAS1192-2 Clause 5.3 a) 3).

The planning of work and data segregation aspects of the project are described in later parts of the BEP, in particular Section 3 Management, Section 4 Planning and documentation and Section 5 Standard method and procedure.

2.2 *Co-ordination and clash detection*

Required in response to the EIR by PAS1192-2 Clause 5.3 a) 4).

This section of the BEP contains the bidders' proposals for managing the co-ordination process. The requirements for co-ordination are stated in PAS1192-2 Clause 9.4.

2.3 *Collaboration process*

Required in response to the EIR by PAS1192-2 Clause 5.3 a) 5).

This is described in Section 4.2.

2.4 *Health and safety/CDM management*

Required in response to the EIR by PAS1192-2 Clause 5.3 a) 6).

This section of the BEP contains the bidders' proposals for using BIM and the Common Data Environment to support the management of health and safety and CDM requirements.

2.5 *Compliance plan*

Required in response to the EIR by PAS1192-2 Clause 5.3 a) 10).

This section of the BEP contains the bidders' proposals for managing the co-ordination process. See Section 2.2, above.

3 Management

This section of the BEP covers the requirements of PAS1192-2 Clause 7.2.1 a).

3.1 Roles, responsibilities and authorities

At the start of a project it is important to identify the roles and responsibilities of the design teams. Table 2 is used to record the names and contact details of the individuals fulfilling the necessary project roles

Table 2 – Roles and responsibilities

Role Company	Name	Email and Telephone number
Lead Designer Company.....		
Project Delivery Manager Company		
Construction Manager Company.....		
Project Information Manager Company..... Company.....		
Task Team Manager * Company..... Company.....		
Task Team Information Manager * Company..... Company.....		
Task Team Interface Manager * Company..... Company.....		
Task Team BIM Authors * Company..... Company..... Company.....		

* Note – specify these roles for each task team involved in the project

The standard authorities of the different roles related to production and management of information are given in Table 3.

Table 3 – Role authorities

Role	Authority
Project Information Manager	Enforce the Project BIM Standard and ensure delivery of the Information requirement in the EIR.
Lead Designer	Enforce spatial coordination
Task Team Manager	Enforce documentation standards
Interface Manager	Negotiate space allocation
Task Team Information Manager	Reject non compliant models, drawings & documents
CAD Coordinator	Enforce CAD related Project BIM Standards

3.2 Major project milestones

Table 4 – Major project milestones

Start Date	Design Completion	Detail Design Completion + Fabrication	Construction	As Constructed Models, Documents and Data	Handover.

Only the Major milestones are listed. A more detail and co-ordinated MIDP and Project Plan must be developed and agreed with the stakeholders.

3.3 Project information model delivery strategy

The major goals and objectives for the BIM implementation must be considered and stated as a project strategy document, append to this document, under the headings listed in Table 5.

Table 5 – Strategy for information delivery

Brief	Concept	Definition	Design	Build & Commission	Handover & Closeout	In use

3.4 Survey strategy

Table 6 – Survey strategy

Survey Method	Delivery Format	Survey Origin	Details, notes
Point cloud			
Light detecting and ranging (LIDAR)			
Global navigation satellite systems (GNSS)			
<<others as appropriate>>			

3.5 Existing legacy data use

As provided and defined by the EIR.

3.6 Approval of information

To ensure that model, drawing files and spreadsheet extraction are adequately checked, some form of agreed approvals process needs to be in place to enable the design teams and the contractor (or client) to approve and sign-off the development of the design information for a project and to assign responsible team members.

Table 7 – Schedule of information approval responsibilities

Name	Role or Title	Models	Drawings	Peer Review	Lead Designer/Lead Contractor	Client Review Team

3.7 PIM authorization process

The design and construction approval process should be specified, agreed and documented as early as possible in the project. This includes the sign off of specialist design completion information.

Sign off and authorisation process to be agreed and published in coordination with the abilities of the collaboration or EDMS solution and inserted here.

4 Planning and documentation

This section of the BEP covers the requirements of PAS1192-2 Clause 7.2.1 b).

4.1 Revised Project Implementation Plan

The revised PIP confirms the capability of the supply chain.

The PIP consists of the following completed CPIx documentation:

- Supply chain capability summary form, which summarises the contents of ...
- Supplier building information management assessment form(s)
- Supplier IT assessment form(s)
- Supplier resource assessment form(s)

These are available as separate templates on the CPIx website.

The supplier resource for the project can also be summarised as per the example in Table 8.

Table 8 – Supplier resource summary

Supplier	Discipline	Resource numbers	Levels of competence	Years of Experience	Names of individuals
<<name 1>>	Qualified Architect	2	RIBA, CAD/BIM, Specification Author		
	Architectural Technologist (CIAT)	3	CIAT, CAD/BIM Trained		
	Architectural Technician	5	Certificate of CAD or Model Competence		
<<name 2>>	Qualified Structural Engineer	3	MIStructE,		
Etc					

4.2 Agreed project processes for collaboration and information modelling

Table 9 – Processes for collaboration and information modelling

Company	Solution	Network	Database	File based	Comments

The clash rendition viewer to be used across the whole project.

Table 10 – Clash rendition viewer

Agreed clash rendition viewer	Version

This section of the BEP also covers the agreed authorisations for security and extranet access and authority to distribute documents.

Table 11 – Authorisations for security, extranet and document distribution

Company	Authorised Manager	Authority (Upload, download, change Access/Distribution)

4.3 Agreed matrix of responsibilities across the supply chain

It is important to define who models what (the BIM Author) and to what Level of Detail (LOD).

There are 7 levels of detail defined in the PAS1192-2 which do not reflect specific modelling guidelines for any particular software, rather a generic definition of model detail (graphical), how individual objects display themselves and the level of information as a minimum to answer the English question stated in the EIR.

Table 12 – Responsibility matrix for information production

	Example Software	Native Format	Exchange Format(s)	Plan of Work						
				1 Brief	2 Concept	3 Definition	4 Design	5 Build & Commission	6 Handover & Closeout	7 Operation
Model Authoring										
Space Planning										
Site, Urban Design Context										
Site and Existing Buildings										
Architectural Model										
Structural Design Model										
HVAC Design Model										
Building Services MEP Design Models										
Lighting Design Model										
Electrical Design Model										
Hydraulics Design Model										
Interior Layouts and Design Model										
HVAC Fabrication Model										
Structural Steel Fabrication Model										

Curtain Wall Fabrication Model										
Road and Civil Design										
Landscaping and External Works Options										
Renovation and Refurbishment										
Facility Management Model										
Construction Model										
Model Analysis										
Brief Development										
Alternative Design Options Analysis										
Design Performance Analysis										
Sun and Shadow Studies										
Structural Analysis										
Thermal Simulation										
Sustainability Analysis										
LCA Analysis										
Model Clash Detection Rendition										
Cost Planning and Control										
Construction Scheduling / 4D Animation										
Security Analysis										
Code Checking and Regulatory Compliance										
Acoustic Analysis and Design										

Disabled Access and Egress										
Fire Protection										
FM, Operation and Maintenance										
Automated/Linked Specifications										
Heritage Documentation and Assessment										
Solar Envelopes										
Overshading										
Daylight Analysis										
Solar Analysis										
Photovoltaic Collectors										

4.4 Task information delivery plan (TIDP)

A task information delivery plan (TIDP) for each task within the project shall be prepared using the template below so that the format is consistent with the format required for the master information delivery plan. When completed by all team members the TIDPs should be published in this document appendix and on the project extranet.

Table 13 – Template for task information delivery plans

File identifier							Model / drawing title	Delivery dates				
Project	Originator	Volume	Level	File type	Discipline	Number		Milestone 1	Milestone 2	Milestone 3	Milestone 4	Etc.

4.5 Master information delivery plan (MIDP)

The master information delivery plan (MIDP) shall be developed from the separate TIDPs produced for each task within the project. This more detailed, co-ordinated MIDP must be developed and agreed with the stakeholders. When completed the MIDP should be published in this document appendix and on the project extranet as a project plan.

5 Standard method and procedure

This section of the BEP covers the requirements of PAS1192-2 Clause 7.2.1 c).

5.1 Volume strategy

See Section 5.3 (file naming convention), sub-section Volume for the definitions and abbreviations of volumes to be used on the project.

5.2 PIM origin and orientation

The origin and orientation of the project are based on the project location and its reference to other global or local grids, for example Ordnance Survey. Some projects have their own grid system: Crossrail, for instance, uses the London Grid specified for that project, as did the Olympics programme.

See the CPlc Production Information 2003 publication for specific requirements.

Table 14 – Record of information model origin and orientation

Point	Grid intersection notation	Easting (m)	Northing (m)	Elevation or site Datum
Site local grid origin				
Grid origin Bottom Left Intersection				
Grid Intersection Bottom Right				
Grid Intersection Top Left				

5.3 File naming convention

Table 15 – Template for file naming

Project	Originator	Volume	Level or Location	File Type	Discipline	Number

See the 'Guide to BS1192:2007' for additional explanation.

Project

The 'project' is an alphanumeric code that is used by the project team to identify the project.

It should not be confused with the Project Contract number which may be different for each company working on the project.

Table 16 – Project code(s)

Code	Project

Where an organisation needs to use their own internal project numbers, then they can be indicated in the drawing title block using a separate 'project number' box.

Originator

Table 17 – Originator codes

Code (Abbreviate to either 2 or three digits)	Originator Company name

Volume

Each individual team will provide a copy of their volume strategy in the form of a drawing of each floor layout, section or site with volumes clearly marked named and inserted below. For volumes relating to infrastructure refer to PAS1192-2:2013.

Example:

When planning complex projects and determining the number of model files required, it is commonplace and good practice for the project to be divided into volumes defined by coordinates within an overall project model that will be held as separate model files. This enables multiple users to work on the project efficiently. Volumes should be allocated using cut lines to indicate their limits. Volume boundaries could be structural joints or grid lines; for road projects they could be chainage distances; or they could be defined by use e.g. a vertical distribution shaft.

Each team will provide a copy of their volume strategy in the form of a drawing of each floor layout with volumes clearly marked and inserted below.

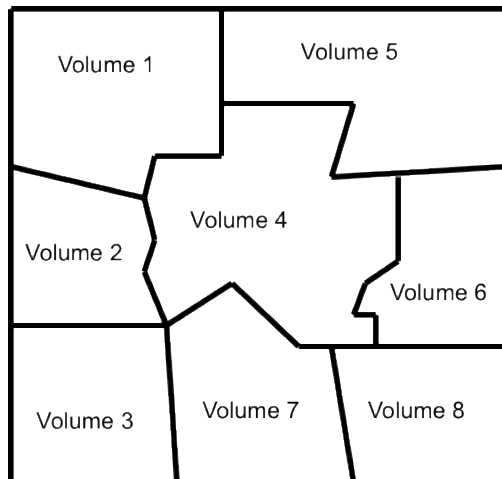


Table 18 – Template for defining project volumes

Discipline/Originator:	
Code	Volume (Abbreviate to 2 No. alphanumeric characters)

Level or Location

The 'level' code is a 2 or 3 character alphanumeric code that represents the level or storey of the building. For infrastructure (linear) the level is replaced by **location** defined as a chainage and offset.

Table 19 – Level or location codes

Code	Level	Code	Location

File type

Table 20 – Agreed file types for drawings and models (see BS1192:2007, PAS1192-2)

Code	File Type

Table 11 – Agreed file types for documents (see BS1192:2007, PAS1192-2)

Code	File Type

Discipline

A list of discipline or role codes as recommended in BS1192 Part 5 are shown in the Table below.

Table 22 – Discipline codes (see BS1192-5)

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

The 'discipline' code is a single character indicating the discipline. On larger projects it may be useful to extend the discipline code to 2 characters and listed here.

Table 23 – Extended discipline codes for this project

Code	Discipline

Number

The 'number' is a 5-character code. The number may be viewed in a number of ways:

1. Each design disciplines starts at 00001 and then allocates additional numbers to suit their own needs.
2. The first two or three characters of the number could be used to signify an 'element code' that further classifies the file. One classification code system should be chosen and consistently used by all project teams.

Metadata

Extend the standard Metadata status codes as required for the project, add to but do not change the codes in the PAS1192-2.

Table 24 – Metadata status codes from PAS1192-2

Status	Description
Work in Progress	
S0	Initial status or WIP Master document index of file identifiers uploaded into the extranet.
Shared (Non-Contractual)	
S1	Suitable for Co-ordination The file is available to be 'shared' and used by other disciplines as a background for their information.
S2	Suitable for Information
S3	Suitable for Internal Review & Comment
S4	Suitable for Construction Approval
S5	Suitable for Manufacture
S6	Suitable for PIM Authorization (Information Exchanges 1-3)
S7	Suitable for AIM Authorization (Information Exchange 6)
D1	Suitable for Costing
D2	Suitable for Tender
D3	Suitable for Contractor Design
D4	Suitable for Manufacture/Procurement
AM	As Maintained
Published Documentation (Contractual)	
A	Suitable for Construction
B	Partially signed-off: For Construction with minor comments from the Client. All minor comments should be indicated by the insertion of a cloud and a statement of "in abeyance" until the comment is resolved, then resubmitted for full authorization.
AB	As-Built Handover documentation, PDF, native models, COBie etc.

5.4 Layer naming convention

Each discipline should provide the Design Manager and the CAD manager with a full list of all layer names to be used on the project. This list should be published to all members of the project team for information.

Table 25 – Layer naming convention

Field	Discipline	Classification	Presentation	Description
Name	A	- G23	- M2	Stairs
Example	Architect	Stairs (Uniclass)	Model graphics (2D)	

Some software solutions suggest that layer names are not necessary but it has been found that the convention shall be used when sharing or exchanging information.

5.5 Agreed construction tolerances for all disciplines

Table 26 – Agreed tolerances for construction elements according to project discipline

Discipline	Element	Tolerance

5.6 Drawing sheet templates

Table 27 – List of drawing sheet templates

Sheet Size	Sheet File name
A0	
A1	

All drawing template must be rendered and presented at one of a number of approved scales, which are typically defined by the 'CAD Manager'. Scales other than those approved should not be used. The templates shall also be in the standard format for sharing and interoperability.

Table 28 – Drawing sheet scales

Drawing Sheet Scales	
All drawings must be rendered and presented at one of a number of approved scales, which are typically defined by the 'CAD Manager'. Scales other than those approved should not be used.	
Scale	Description of detail
1:1000	1:1000 Scale Detail shows shape and layout
1:500	
1:200	
1:100	1:100 Scale Detail shows shape, layout and construction elements
1:50	1:50 Scale Detail shows how the construction elements meet at junctions
1:20	
1:10	
1:5	1:5 Scale detail show shape, dimensions and assembly of the separate construction elements
1:2	1:2 Scale detail show shape, dimensions and assembly of the separate construction elements
1:1	All model files must be modelled at 1:1 Scale

5.7 Annotations, dimensions, abbreviations and symbols

Each discipline should provide the Design Manager and the CAD manager with a full list to be used on the project. This list should be published to all members of the project team to ensure consistency of the document graphical presentation and shall be consistent throughout the project. Also see BS8541 Parts 1, 2, 3 and 4.

Dimensions should be derived automatically from the underlying CAD coordinates by using the 'associative dimensioning' function of CAD systems. Dimensions should not be entered as 'text' as they are purely graphic characters having no relationship with the underlying CAD coordinates and will cause the relative positions of elements in a drawing to be compromised.

The project team should agree common units of measurement. These should include distance (e.g. metre and millimetre) and angles (e.g. degrees/radians measured clockwise or counter clockwise).

Table 29 – Agreed units of measurement

Type of information	Millimetres	Metres	Degrees	Radians	Clockwise	Counter
Survey						
Roads						
Models						
Drawings						

5.8 Attribute data

Attribute data for the project as defined in the EIR and appropriate COBie templates.

6 IT solutions

This section of the BEP covers the requirements of PAS1192-2 Clause 7.2.1 d).

6.1 Software versions

The CAD software and versions that will be used by the design teams shall be agreed before starting the project.

Table 30 – Agreed software versions

Company	Database	CAD software	Version	Format	Comments

6.2 Exchange formats

The agreed formats for model and drawing file exchange are

Table 31 – Agreed exchange formats for models and drawings

	DWG	DGN	DWF	PDF	IFC	Other
<i>Models</i>						
Drawings						
Final drawing format						
Schedules or spreadsheets						

6.3 Process and data management systems

The process and data management systems shall be described under section 4.2 Agreed project processes for collaboration and information modelling.