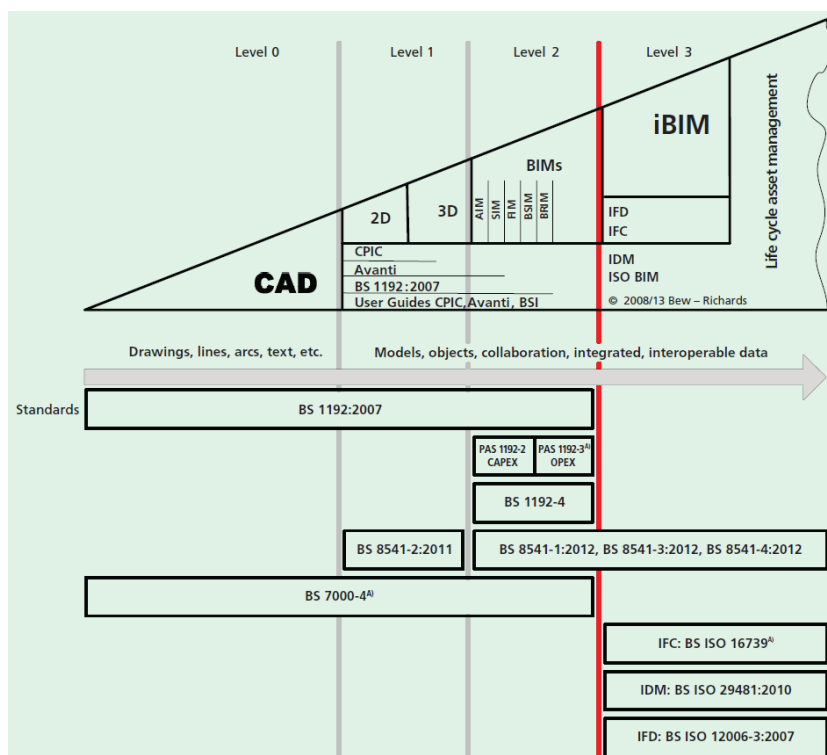




FPS Guidance Note 3: Definition of BIM compliance

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In order to be fully compliant with a particular level of BIM in accordance with the government definition, you need to comply with all the elements within the wedge shown above and all the supporting documents. You can be doing 3D CAD but not be compliant to BS-1192:2007 therefore you'll still be at level 0. In the following sections it will describe what the requirements are to be compliant at that level.

LEVEL 0

To be level 0 compliant you need to have the following:

- ❖ Be producing, managing and storing data as outlined in BS 1192:2007
- ❖ Be managing design activities in accordance with BS 7000-4:1996
- ❖ Producing basic 2D drawings and details

All points need to be satisfied to ensure level 0 compliance.

LEVEL 1

In *addition* to the requirements for level 0, to be level 1 compliant you need to have the following:

- ❖ Producing 2D models and objects
- ❖ Producing 3D models and objects
- ❖ Producing models and drawings in accordance with BS 8541-2:2011
- ❖ Be aware of the CPIC and Avanti documents and their influence

All level 0 & level 1 points need to be satisfied to ensure level 1 compliance.

LEVEL 2

In *addition* to the requirements for levels 0 & 1, to be level 2 compliant you need to be doing the following:

- ❖ Producing BIMs independently. (AIM = Architects Information Model. SIM = Structural Information Model etc)
- ❖ Producing, managing and storing data in accordance with PAS 1192-2:2013
- ❖ Working to a clear requirements given by the client (EIR) with clear decision points as defined by the CIC BIM protocol document
- ❖ Make themselves aware of the BIM Execution Plan and the deliverables, roles and responsibilities for their part of the works
- ❖ Information models produced using adequate enabling tools as defined in BS 1192-2:2013
- ❖ Producing models and drawings in accordance with BS 8541-1:2012, BS 8541-3:2012, BS8541-4:2012

All level 0, 1 & 2 points need to be satisfied to be level 2 complaint

WHERE TO START

The table below briefly describes the key areas from BS-1192:2007 which need addressing when stepping into a BIM environment. This is covered in more detail in the appendix.

Action	Reason
Having defined roles and responsibilities for communication and document flows	This is both internal and external. At tender stage you should request the main contractor's roles and responsibilities so you can adopt and define your own organisations responsibilities.
Finding the Common Data Environment (CDE) and ensuring people with responsibility for access know how to use it	This will commonly be driven by the main contractor; it can be systems such as BIW, Asite, Business Collaborator etc and will have a specific numbering and structure for each project. Finding this out and getting familiar with the process at the earliest possible stage
Have internal document / data management process in place	Ensure the way data is stored on local networks allows for an easy transition to a project CDE
Ensure everyone is working to the same common origin	This should be requested at tender stage so models can be created properly and there is no confusion when relaying co-ordinates
Adopt a standard document numbering system across all disciplines as set out in BS 1192:1	This system should cover all project documentation such as schedules, risk assessments, drawings, method statements etc.
Have document and drawing templates setup	This ensures consistency across all information that will be seen by another party.

All drawings and models contain standard layering	All drawing packages to have templates containing predefined layers that are produced from Uniclass tables
Agree on standard annotations and abbreviations	This avoids confusion internally and when displaying information externally.

Parts of the above still needs to be defined for the piling industry, for example a standard acronym for the independent BIM (e.g. PIM = Piling Information model or GEIM = Ground Engineering Information Model). There may be standard document codes we need adding to the new numbering system for example the site investigation or design software outputs. These will all be captured as the development the British Standards move on.

APPENDIX

BS 1192 STANDARDS

1. ROLES, RESPONSIBILITIES AND AUTHORITIES

At the start of a project it is important to identify the roles and responsibilities of the design team. Examples of the roles required within a large project are:

Design Manager

Lead Designer

Discipline Head / Task Team Manager

Interface Manager

Project Information Manager

BIM Coordinator

CAD Manager

AGREED ROLES, RESPONSIBILITIES AND AUTHORITY TABLE

Role	Authority	Name	Company	Contact Details
Design Manager				
Lead Designer				
Task Team Manager				
Interface Manager				
Project Information Manager				
BIM Coordinator				
CAD Manager				

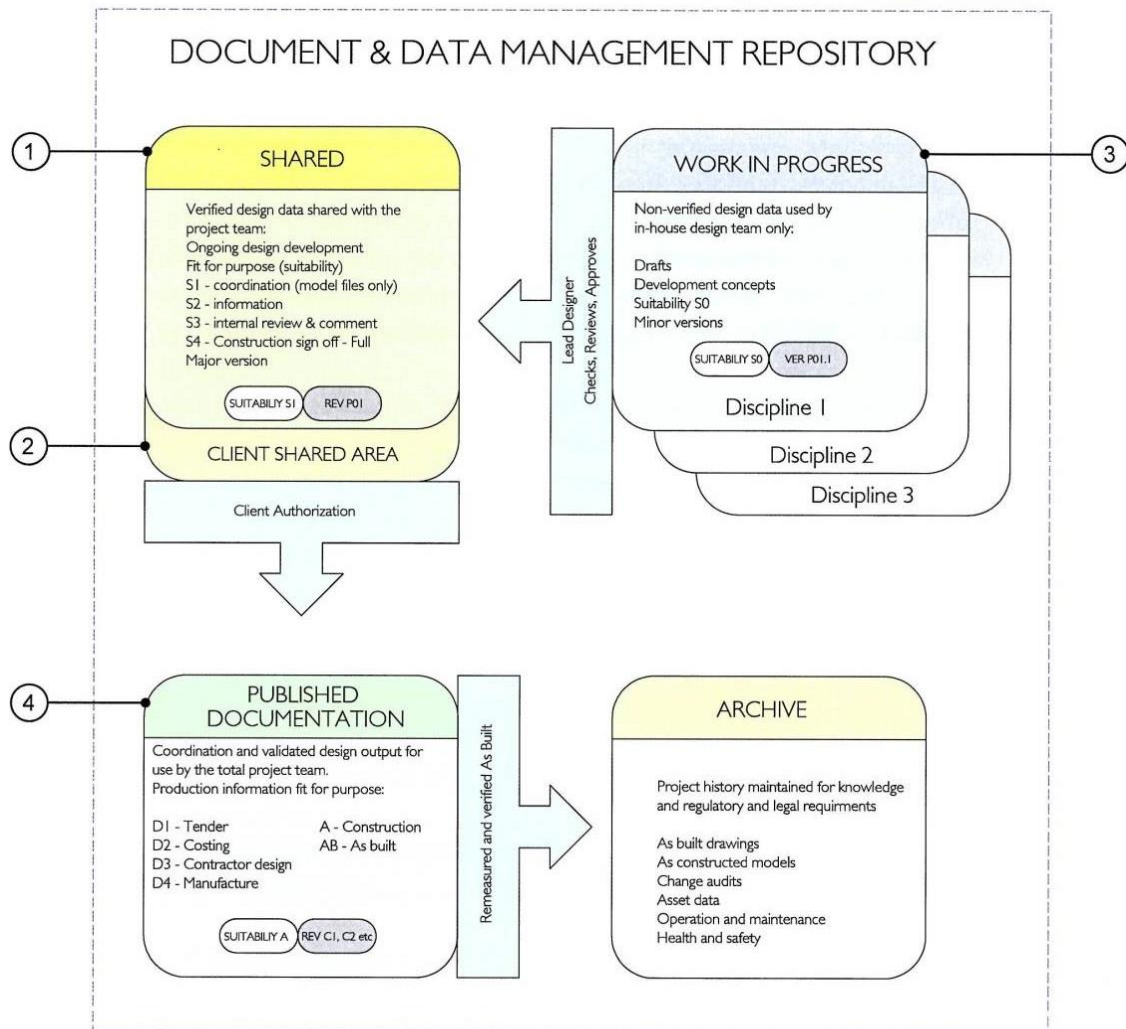
For role definitions please refer to BS1192

2. COMMON DATA ENVIRONMENT (CDE)

The fundamental requirement for producing information through a collaborative activity is to share information early, and to trust the information that is being shared as well as the originator of that information. What is needed is a disciplined auditable process that is transparent and controllable. The CDE is a means of allowing information to be shared efficiently and accurately between all members of the project team – whether that information is in 2D or 3D, or indeed textual or numeric.

The CDE enables multidisciplinary design teams to collaborate in a managed environment, where the build-up and development of information follows the design, manufacturing and construction sequence.

The Figure shown below shows how the CDE is divided into 4 phases, the lifecycle of the project information. Information is created in 'Work In Progress' the 'Private' area of a project team member it is then moved round the CDE in an anticlockwise direction.



For definitions of each area and how information is moved from stage to stage please refer to BS1192

3. ORIGIN AND ORIENTATION

In CAD systems the graphic information needed to generate production drawings is assembled in data files, which are based on Cartesian co-ordinates of all relevant points needed to define the project.

Spatial co-ordination is an essential requirement of good quality production information. To achieve a fully co-ordinated set of production drawings across all design disciplines a common building grid should be established by the lead designer and used by all members of the design team. This will

ensure that the different design discipline files achieve the same registration when co-ordinating, reviewing or plotting the drawings.

Site surveys are generally based on Northings and Eastings related to the OS grid. In some instances the survey origin may be based on an arbitrary grid chosen by the surveyor. Levels will be given in relation to a local OS bench mark or to a local temporary bench mark (TBM) established for the project.

To enable the building to be correctly located within the site it is necessary to relate the origin and orientation of the building grid to the origin and orientation of the survey grid. When the project grid is related to the site grid, final setting out information can be generated as coordinates from the underlying survey file.

AGREED ORIGIN AND ORIENTATION

Point	Grid Intersection Notation	Easting (m)	Northing (m)	Elevation or Site Datum (m)
Building grid definition / origin Bottom Left Intersection				
Site survey grid definition / origin Bottom Left Intersection				
Origin of Building relative to site survey grid Grid Intersection Bottom Left				
Orientation of Building relative to site survey grid Grid Intersection Bottom Right				

For full definitions on this please refer to BS1192

4. PROJECT FILE NAMING CONVENTION

A naming convention is required to deliver a rapid search capability for all relevant 'project' documents and data, including data files and CAD files, being managed through a repository such as an extranet, electronic document management system (EDMS). Since the search facility is in place to help all project participants, the naming convention should suit the needs of the project as a whole – not an individual, a designer, specialist or contractor. However, it does need to take into account the needs of the individual organisations in the wider team. It also takes into account the need to collect, manage and disseminate data/documents within a Common Data Environment (CDE).

Names for containers should be created by joining together codes in the specified fields, in the specified order, using only the “-” hyphen character, which is therefore not allowed in any code. The following naming convention will be used:

[Project]-[Originator]-[Zone]-[Level]-[File Type]-[Role]-[Number]

For example:

Example	Project		Originator		Zone		Level		File Type		Role		Number
<i>Drawing</i>	<i>BLO</i>	-	<i>CSL</i>	-	<i>A</i>	-	<i>F1</i>	-	<i>DR</i>	-	<i>X</i>	-	<i>001</i>
	Bloomberg		Cementation		Zone A		Found ation Level 1		Drawing		Sub Contractor		Number
<i>3D Model</i>	<i>BLO</i>	-	<i>CSL</i>	-	<i>00</i>	-	<i>F1</i>	-	<i>3DM</i>	-	<i>X</i>	-	<i>012</i>
	Bloomberg		Cementation		Multiple zones		Found ation Level 1		3D Model		Sub Contractor		Number
<i>Technical Query</i>	<i>BLO</i>	-	<i>CSL</i>	-	<i>A</i>	-	<i>F1</i>	-	<i>TQ</i>	-	<i>X</i>	-	<i>037</i>
	Bloomberg		Cementation		Zone A		Found ation Level 1		Tech Query		Sub Contractor		Number
<i>Survey</i>	<i>BLO</i>	-	<i>CSL</i>	-	<i>A</i>	-	<i>F1</i>	-	<i>SU</i>	-	<i>X</i>	-	<i>001</i>
	Bloomberg		Cementation		Zone A		Found ation Level 1		Survey		Sub Contractor		Number

The following sub sections record each of the agreed field contents.

PROJECT

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

Code	Project / Sub Project

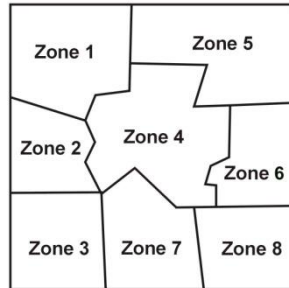
ORIGINATOR

The ‘originator’ is an alphabetic code that represents the company responsible for that aspect of the work. The codes must represent the company name, and not the discipline.

Code	Originator (Abbreviate to 2 or 3 alphanumeric characters)

ZONE

Each Individual team will provide a copy of their zoning strategy in the form of a drawing of each floor layout with Zones clearly marked and Inserted below.



Example Project Zones

Originator	Zones (Abbreviate to 2 No. alphanumeric characters)

LEVEL / LOCATION CODES

The ‘level’ code is a two- or three-character alphanumeric code that represents the level, storey.

Define this on a project-by-project basis.

Level / Location	Zones (Abbreviate to 2 No. alphanumeric characters)

FILE TYPE

The ‘file type’ is a two-character alphanumeric code that indicates the type of file. File types are used to identify the type of information in the file, for example, a CAD model file – not the format of the file content, e.g. .DWG, .DGN or .PDF.

Agree additional file types with the document controller to ensure consistency within the project team and in any document repository that manages the project information.

Code	Drawing / Models File Type
DWG	2D Drawing
2DM	2D Model File
3DM	3D Model File

Code	Document File Type
BQ	Bill of quantities
CM	Comments
CO	Correspondence
CP	Cost plan

Code	Document File Type
DB	Database
FN	File note
HS	Health and safety
MI	Minutes / action notes
MS	Method statement
PP	Presentation
PR	Programme
RD	Room data sheet
RI	Request for Information
RP	Report
SA	Schedule of accommodation
SC	Structural Calculations
SH	Schedule
SN	Snagging list
SP	Specification
SU	Survey
TQ	Technical query

ROLE CODES

The 'role' code is a single character indicating the discipline or tier contractor responsible for content, not the individual or sub-subcontractor. On larger projects, it may be useful to extend the role code to two or three characters as dictated by the 'project' need. Titles such as 'structural steelwork detailer' or 'reinforced concrete detailer' are not acceptable, because the purpose is to identify the responsible agent contractually, not the individual – in these examples, this is usually the chartered or qualified designer.

Selection of roles or titles should, however, be controlled, otherwise meaningless codes for sub- or sub-sub-contractors may proliferate.

Code	Role
A	Architect
B	Building Surveyor
C	Civil Engineer
D	Drainage, Highways Engineer
E	Electrical Engineer
F	Facilities Manager
G	Geographical and Land Surveyor
H	Heating and Ventilation Designer
I	Interior Designer
K	Client
L	Landscape Architect
M	Mechanical Engineer
P	Public Health Engineer

Code	Role
Q	Quantity Surveyor
S	Structural Engineer
T	Town and Country Planner
W	Contractor
X	Subcontractor
Y	Specialist Designer
Z	General (non-disciplinary)

NUMBER

The 'Number' may be a three, four-, five- or six-character code to suit project requirements. The number is viewed in a number of ways:

Each design discipline starts at 00001, and then allocates additional numbers to suit its own needs. This overcomes the problem of allocating numbers across the project team in an attempt to have consecutive and contiguous numbering. In this process, it is the concatenated naming convention that creates uniqueness, not the number.

FILE IDENTIFIER METADATA

Status defines the 'fitness' of information in a model, drawing or document. It allows each design discipline to control the use to which their information may be put. Unauthorised use of the data is not acceptable if control is to be maintained and errors or ambiguities avoided.

The 'status' is an attribute defined in the title block of the drawing sheet template, and will also be defined as metadata that is associated with the file-identifier when the file is uploaded into the document repository (Skandocs).

Status and revision should **not** be included as part of the file name as this will produce a new file each time those elements are updated, and an audit trail will not be maintained.

Status Code	Suitability	Models	Drawings / Documents
CDE – Work In Progress			
S0	Initial non-contractual code	Y	Y
CDE – Shared			
S1	Fit for co-ordination	Y	N
S2	Fit for information	N	Y
S3	Fit for internal review and comment	Y	Y
S4	Fit for construction approval	N	Y
CDE – Documentation, Non contractual (e.g. costing)			
D1	Fit for costing	Y	Y
D2	Fit for tender	N	Y
D3	Fit for contractor design	Y	Y

D4	Fit for manufacture/procurement	N	Y
CDE – Documentation, Contractual (e.g. construction)			
A	Fit for construction	N	Y
B	Fit for construction but with comments	N	Y
C	Comprehensive revisions needed	N	Y
CDE - Archive			
AB	As Built or Final Issue	Y	Y

For full definitions on this please refer to BS1192

5. DRAWING SHEET TEMPLATES

The drawing sheet templates must be used as the starting point for all drawings, with the necessary model files referenced into a view created in the drawing.

Drawing sheet templates in A0, A1, A2, A3 and A4 sizes will be issued to the project team members. Appropriate information that is specific to the project can be inserted into the title block of the drawing sheets, for example:

- Client name and logo
- Originator name and logo
- Project name
- Project number.

A project number required by each team office can be added to the drawing template as a company project number, but it is not part of the file name.

Attributes in the drawing title block contain metadata that is specific to each individual drawing. The metadata that relates to the 'file-identifier', 'revision' and 'status'.

The drawing number on a drawing sheet title block must contain the 'file identifier', with the other metadata information being presented in remaining sections of the title block as follows:

- Project name
- Drawing title
- Revision
- Status.
- Purpose of issue.
- Client authorisation information
- Revision description (including what has changed and why) with check and approval dates by the originator.

MODEL FILE TITLE BLOCK

By definition, a model file is either a '2dm' or '3dm' file type and may only contain actual modelled information; therefore it may not contain any drawings or views of the model.

It is important to identify such model files with respect to their 'revision' and 'status' when they are accessed or viewed in an environment, for example, a document repository that is not managing a model's metadata.

For full definitions on this please refer to BS1192

LAYER, 2D & 3D OBJECT NAMING

A naming standard will be applied to all 2D drawing layers, 2D blocks and 3D CAD objects that will be shared amongst the design teams.

The following convention based upon BS 1192:2007 will be adopted to define a layer, block and 3D object names. Note that there are hyphen '-' delimiters between the first three mandatory fields, and an underscore '_' delimiter is used between the mandatory and the alias.

The following naming convention will be used:

[Role]-[Element]-[Presentation]_[Alias]

Role is defined in Table 5.7 above

Element is the Uniclass code

Presentation is defined in Table 10.1 below

Alias is defined as follows:

Following an underscore delimiter character '_', the 'alias' directly correlates to the 'Uniclass classification'. The 'alias' should not be treated as a user-definable field, but must be agreed and used consistently by the project team – even though this is noted as 'optional' in BS 1192. For Uniclass, this will be controlled by the 'Uniclass Request Tool', and the aliases are consistent throughout with no ability to user-define. Inconsistent use of aliases creates problems of expanding the material schedule, because the naming of the alias has been user-defined.

Presentation Code	Description
D	Dimensioning
H	Hatching
M	Model related graphics (2D or 3D Blocks and / or Objects)
P	Page / Plot related graphics
T	Text

3D OBJECT PROPERTIES

As a minimum requirement the following attributes must be added to all objects to be used on a Skanska project:

Zone

Level

Role

Element

Alias or Description

APPROVAL OF INFORMATION

To ensure that model and drawing files are adequately checked, some form of 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. The design approval process should be specified, agreed and documented as early as possible in the project.

SOFTWARE VERSIONS

The cad / bim and other 'office' software and versions that will be used by the design teams must be agreed before starting the project

DATA EXCHANGE FORMATS

The agreed formats for model and drawing file exchange are to be listed.

ANNOTATION

The 'cad manager' should agree the text style and fonts to be used in drawing title blocks, and any other annotation that is added to a drawing.

DIMENSIONS

All dimensions should be generated as associative dimensions and never added as text.

Dimension text must not be modified and automatic or associative dimensions should never be broken into their constituent parts.

ABBREVIATIONS

Historically, abbreviations were used frequently in construction documents as part of standard practice. They were part of the drawing symbology, but led to errors of interpretation by contractors.

Abbreviations should therefore be controlled by an agreed ontology, since they are frequently part of the normal vocabulary used by different disciplines. For instance, 'LTHW' is used to refer to a low-temperature hot-water heating system.

Rules for use of abbreviations:

- Use uppercase lettering, without full stops



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- Do not use spaces within an abbreviation
- Use the same abbreviations for singular or plural.
- Abbreviations must be consistently applied by the design teams, and therefore a table of abbreviations should be maintained.

For full definitions on this please refer to BS1192