

Building Information Management

A Standard Framework and Guide to BS 1192

Mervyn Richards



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Contents

Preface	xv
1 Introduction	1
2 Production information for the construction industry	3
2.1 Roles and responsibilities	4
2.2 Common Data Environment (CDE)	4
2.3 Standard Method and Procedure (SMP)	5
3 Definitions	7
4 Roles and responsibilities	13
4.1 Design Coordination Manager (also known as the Design Manager on some contracts)	13
4.2 Lead Designer	13
4.3 Task Team Manager	14
4.4 Interface Manager	14
4.5 Project Information Manager	14
4.6 CAD Coordinator	14
4.7 CAD Manager	15
4.8 Software versions	16
4.9 CAD checking tools	16
5 The Common Data Environment (CDE)	17
5.1 Functional sections of the CDE	20
5.1.1 Work-in-progress	20
5.1.2 Shared	24
5.1.3 Published documentation	28
5.1.4 The purpose of the 'D' code	29

5.1.5	Archive	36
5.1.6	The distributed CDE for project and programme	40
5.2	BIM and the Common Data Environment	40
6	Standard Method and Procedure	47
6.1	File naming	47
6.1.1	File identifiers	47
6.1.1.1	Document/drawing descriptor	48
6.1.1.2	Graphic/model file descriptor	48
6.1.1.3	All other documents	49
6.1.2	Field name definitions	50
6.1.2.1	Project	50
6.1.2.2	Originator	51
6.1.2.3	Zone	52
6.1.2.4	Level/location	59
6.1.2.5	File type	60
6.1.2.6	Role codes	60
6.1.2.7	Number	63
6.1.2.8	File-identifier examples	64
6.1.3	File-identifier metadata	65
6.1.3.1	Status	67
6.1.3.2	Revision	67
6.1.3.3	Version	68
6.2	Origin and orientation	68
6.2.1	Coordinates	68
6.2.2	Spatial coordination	69
6.2.3	Building grids	69
6.2.4	Site surveys	70
6.2.5	Alignment of the building to real-world coordinates	70
6.2.6	Example of building alignment	72
6.2.7	Dimensional consistency	72
6.3	Drawing sheet templates	73

6.3.1	Drawing title block attributes/tags	73
6.3.2	Model title block	74
6.3.3	Drawing sheet sizes	77
6.3.4	Drawing sheet scales	77
6.4	Layer standards	78
6.4.1	Role	78
6.4.2	Element/classification	79
6.4.3	Presentation	79
6.4.4	Description/alias	80
6.4.5	Extract from BS 1192	80
6.5	Annotation	81
6.5.1	Dimensions	82
6.5.2	Abbreviations	82
6.5.3	Symbols	82
7	Specification	85
7.1	Master specification systems	86
7.2	System software	87
8	Implications of design management	89
8.1	Time and resource programming	90
8.2	Approval of information	92
	Appendix A Master document index template	95
	Appendix B Process maps	97
B.1	Creating a model file	98
B.2	Sharing a model file	99
B.3	Coordinating model files	100
B.4	Transfer of ownership	101
B.5	Creating a drawing rendition	102
B.6	Design team sign-off process	103
B.7	Approval route – stage 2	104
B.8	Approval route – stage 3	105

Appendix C Consultant’s technical systems questionnaire	107
Appendix D Project team member questionnaire	109
Appendix E Drawing sheet template	111
Appendix F Measurements and benefits	115
F.1 Project results – overview report	115
F.1.1 Introduction	115
F.2 Key measured impacts	116
F.2.1 Investment required	116
F.2.2 Return on investment	116
F.3 Commentary	117
F.3.1 Investment required	117
F.3.2 Return on investment	118
F.3.3 Request for information (RFI) analysis on a single core project	119
F.4 Emerging themes	120
F.4.1 Belief	120
F.4.2 Achieving payback on a single project	120
F.4.3 Fixed, single industry-wide Avanti CDE/SMP or a flexible approach?	121
F.4.4 Model files and their impacts	121
F.4.5 Level of challenge	122
F.4.6 Increase in quality of information	123
F.4.7 Consequential benefits	123
F.4.8 Which projects are most likely to benefit from Avanti?	124
F.4.9 Benefits and risks of a <100 per cent Avanti implementation	124
F.4.10 Need for active, independent support and coaching	125

Appendix G Abbreviations	127
Appendix H References and further reading	133
Standards publications	133
Other publications	134
Appendix I Contact details	135

Figures

1: High-level Common Data Environment	18
2: CDE expanded description	22
3: Example work-in-progress architects' models	24
4: Architects' models uploaded for sharing	26
5: Sharing model files	27
6: Coordinating model files	27
7: Uploading structural models	30
8: Architect's removal of duplicate layers	31
9: Concurrent and iterative uploads and downloads	32
10: Creating drawings from shared models	34
11: Status D	37
12: Archive section of the CDE	38
13: CDE in team environment	41
14: CDE in programme environment	42
15: The BIM development process	45
16: Development of iBIM content	46

17: Examples of zones	52
18: 3D models that relate to a zone relating to a core	54
19: Ground floor slabs, columns, stairs – walls	55
20: Second floor as first – and third floor – as separate reference files	55
21: Completed architectural staircase core	56
22: Structural – foundations and floor lift as defined by structural frame assembly	56
23: Completed structural staircase core	56
24: Ground floor ductwork and ground floor risers + architectural fabric	57
25: Ductwork + architectural + structural for two floor lifts	57
26: Complete core all disciplines	58
27: Examples of zones in a building	58
28: Cartesian coordinate system	69
29: Building grid definition	71
30: Site grid definition	71
31: Alignment of the building to the real-world coordinates	71

32: Building grid and setting out points	72
33: Drawing sheet title block	75
34: Model file	76
35: Model file title block	76
36: Some standard symbols	83
37: Simplified time and resource programme	91
38: Creating a model file	98
39: Sharing a model file	99
40: Coordinating model files	100
41: Transfer of layer ownership	101
42: Creating a drawing rendition	102
43: Design team approval stage 1	103
44: Approval route: stage 2	104
45: Approval route: stage 3	105

Tables

1: Definition of terms	7
2: Assigned roles	15
3: Project codes	51
4: Example of originator codes	51
5: Level codes	60
6: File types – for drawings and models	61
7: File types – for documents	61
8: Role codes (from BS 1192)	62
9: Status codes	66
10: Examples for purpose of issue	67
11: Setting out a building grid	72
12: Drawing sheet sizes	77
13: Drawing sheet scales	77
14: Example of layer name codes	78
15: Presentation codes from BS 1192	79
16: Approvals stages for a model file	92

17: MDI template	96
18: Example list of abbreviations	127

Preface

British Standard BS 1192:2007, *Collaborative production of architectural, engineering and construction information — Code of Practice* was published to provide a standard and ‘best-practice’ method for the development, organization and management of production information for the construction industry.

A ‘standard’ is required, so that all offices, teams or team members can produce information to the same form and quality – enabling it to be used and reused without change or interpretation. If an individual, office or team changes the standard without agreement, it will hinder collaboration and document sharing. ‘My standard’ is not acceptable in a team working environment.

Construction Project Information Committee (CPIC) defines production information as ‘the information prepared by designers that is passed to a construction team to enable a project to be constructed’. It is independent of who employs the designers and which procurement route or form of contract is used. Production information is the output of the design team and specialist contractors, and is conveyed by drawings, specifications and bills of quantity or schedules of work. In a Building Information Modelling (BIM) working environment the delivery may take the form of three-dimensional models with associated information attached by direct attribution or population from a database.

Unless this information is complete, accurate, well structured and coordinated, it will not be effective and – no matter how good the design – it will not be satisfactorily realized on site.

Poor production information causes delays, extra costs and poor quality, which in turn give rise to disputes over who is responsible for the problems.

Good production information is therefore vitally important to the success of the practice, project and delivery of the major contracts handover document required for the successful management and maintenance of the asset throughout its life.

BS 1192 is not only a means of delivering the two-dimensional drawing information that is required for a project, but it is also the basis on which information management and

the delivery of the three-dimensional Integrated Building Information Model (iBIM) and its associated data should be delivered.

We have compiled this guide to give more detailed information on the specific elements of the process supported by the standard.

1 Introduction

This guidance document has been produced using background information on procedures that have been taken from successful application in the construction industry, and has been developed in conjunction with the management processes required to manage information through the project lifecycle. The adoption of such procedures will allow the move from a document-centric environment to an information-centric environment – unlocking the power of information technology.

The toolkit has been developed from the computer-aided design (CAD) standards, methods and procedures of over 70 different companies in the construction industry who work in collaborative framework environments, Construction Project Information Committee (CPIC), its consultants and steering groups, Construction Industry Research and Information Association (CIRIA) research documents (funded by the DTI), and many other individual practitioners.

It also takes account of BS 1192, ISO 13567, CPIC's *Production Information: A code of procedure for the construction industry*, Uniclass classifications and the PIX Protocol Toolkit, developed by the Building Centre Trust. All of these documents are now available on the CPIC website.

This procedure relies heavily on industry documentation, research and practical application within live projects. The projects range from simple housing developments to the value of a few hundred thousand pounds to the most prestigious multi-billion-pound projects.

The knowledge and experiences of those practices have been measured and published over the past 15 years, showing both benefits and blockers to the application of collaborative working. For the most part, such innovative applications have been successful, with the benefits far outweighing the effort employed.

Recommendation: these procedures apply to all organizations, from small consultancies and small projects to major contractors and large-scale projects.

2 Production information for the construction industry

Research has shown that inaccurate, incomplete and ambiguous production information causes many problems on site. The impacts on the project are late delivery and increased cost – estimated to amount to approximately 25–30 per cent of the construction cost, and affecting each member of the supply chain. Effective communication of high-quality production information between designers, manufacturers/fabricators and constructors is therefore essential for the satisfactory realization of construction projects.

The evidence shows that improving the quality of production information reduces the cost of developing that information, as well as the incidence of site-quality problems, leading to significant savings in the cost of construction work. The 2003 CPIC publication *Production Information: a code of procedure for the construction industry* quotes an 18 per cent reduction in drawing costs and an overall cost–benefit of at least 10 per cent of the contract sum.

Further testing on live projects has demonstrated that, when applied properly, standard methods and procedures provide savings and improved profit for each office and all members of the supply chain. To change or ‘simplify’ any element of the procedure – without an understanding of the impact of that change – puts the improvements at risk, and at best will only maintain the ‘status quo’.

In addition, the processes and procedures offer the potential for greater saving in the delivery of the lifecycle information and the asset management data to be used and updated throughout the life of the facility or utility.

There are three specific areas that must be addressed to enhance the production information process. These are:

- roles and responsibilities;
- Common Data Environment (CDE); and
- Standard Method and Procedure (SMP).

2.1 Roles and responsibilities

Ownership of data along with the clear definition of responsibility is a crucial part of any design delivery. This document defines specific roles together with associated responsibilities to aid the process.

2.2 Common Data Environment (CDE)

The CDE is a procedure for managing the iterative development of the design documentation to achieve full integration and spatial coordination of the data/information from all participants and offices, and from all originators within project supply chains.

These procedures are not restricted to the development of the design team information. The procedure must be used throughout the process of delivery and into the management of the asset itself. The subcontractor and fabrication design teams must deliver the final 'virtual construction' model representing the actual construction elements. In turn the contractor, commissioning agents and suppliers must also use the CDE to complete the database of information required for asset management.

The procedure also ensures that data/information is checked and issued fit for a specific purpose at a number of defined 'gates' such that it may be used for the stated purpose. Finally, the procedure allows for the dissemination of the signed-off information 'fit for detail design development' or 'fit for construction', and the collection of all relevant data/information needed to deliver the project handover document for the administration, maintenance and deconstruction of the final product.

These processes were well defined and managed in a paper-based filing system, but with the adoption of new electronic technologies, the need for good management has been overlooked and the systems have not been replaced.

The procedures outlined in this document apply to all approaches to project modelling, including:

- coordination of the project model files in 2D as they develop;
- coordination of the project model files in 3D as they develop;
- production of 2D drawings from 3D models;

- production of 2D drawings using 2D CAD drafting software;
- the collection, management and dissemination of all relevant construction documentation;
- the management of all spreadsheets, text files, etc. as extracts from the model;
- application of the process and procedures for the delivery of the 'integrated Building Information Model' (iBIM) and all relevant handover documentation; and
- application and coordination of the specifications and costing requirements.

2.3 Standard Method and Procedure (SMP)

This document also defines a Standard Method and Procedure (SMP) that should be used for developing and presenting the design information and documentation for construction projects. Organizations should define standards consistent with BS 1192.

When commencing a project that will involve the production of CAD/BIM information, it is critical for each office to adopt the approaches outlined in this document, when using any software solution for producing 3D or 2D models and 2D drawings.

To implement this SMP, the following eight principles should be followed:

- Roles, responsibilities and authorities: agree roles, responsibilities and authorities – in particular, the responsibility for design coordination of the various design disciplines.
- Common Data Environment (CDE): adopt a CDE approach and allow information to be shared between all members of the office team. Some form of document repository – for example, a project extranet or electronic document management system – will need to be used when collaborating on a project.
- Document management/electronic data management (DM/EDM): agree a suitable information hierarchy that will support the concepts of the CDE and the document repository.
- File-naming convention: adopt file-/document-naming conventions, so that relevant information can be identified using file names. Agree the reference codes for 'status' and 'revision' of files and documents, but these are not part of the file name.
- Origin and setting out: agree the origin of the coordinate system and method for spatial coordination.
- Drawing sheet templates: agree the title block, attributes, paper sizes and production scales. Make model file and drawing templates available including: title blocks, layer names, text styles, line types, etc. for consistent delivery of the final construction information.

- Layer standard: agree a 'layer-naming standard' based on BS 1192 that includes a classification system. BS 1192 recommends the use of the Uniclass classification system.
- Annotation: agree a standard for abbreviations, text dimensions and symbols and ensure all models are drawn to scale and dimensioned as such.

Each organization involved must adopt the project SMP, and all relevant parties (client, design consultants, supply chain partners, etc.) must agree and commit to it. Each organization should produce the project SMP at the pre-contract stage and include it in the procurement documents and contracts.