Building Information Management

A Standard Framework and Guide to BS 1192

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Publishing and liability

This guide includes relevant sections from the acknowledged groups, but also includes new information from current learning by the Construction Project Information Committee (CPIC) and the British Standards Institute (BSI) on a number of recent projects.

This information is published as guidance of a general nature, and the author accepts no liability for any use to which it may be put.
Acknowledgements

*Production Information: A code of procedure for the construction industry*, published by CPIC (www.CPIC.org.uk).


Many of the images in this guide are based on those first published in CPIC’s *Production Information: A code of procedure for the construction industry* (2003) and BS 1192:2007 documentation or by MR1 Consulting Ltd.
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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.