BIM4Design comparative analysis and usage of drawing naming order in accordance with BS EN ISO 19650-2:2018

1. PPP
2. OOO
3. ZZ
4. ZZ
5. DR
6. A
7. XXXXXX

Document prepared by Ronald Lammerts van Bueren on behalf of the BIM4Design forum.
Introduction

BIM4Design

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In 2016, under the UK BIM Alliance, the ABDforum became known as the BIM4 group and was later renamed BIM4Design.

The forum includes representation from a range of sectors directly related to interoperable design processes: architects, landscape architects, BIM consultancies and design software developers.

Our mission statement

“BIM4DESIGN is an impartial discussion forum which exchanges and shares Building Information Modelling (BIM) solutions, ideas and best practice relating to building design.

The forum currently shares experiences of all types of design software, BIM workflows, technical issues and related technology, providing impartial feedback and guidance on BIM design procedures.

The group is driven by the combined and shared experience individuals bring to the forum. All members currently implement, lead and support BIM and digital design tools within their practices and represent small, medium and large national and international firms.

Building design teams are frequently the initiators of BIM. For any BIM procedure to excel and be a major asset throughout all the design phases of a building project, it is crucial to set BIM parameters early. It is also essential that future development of BIM is focused on enabling better design as well as facilitating a more effective delivery.

As BIM has become more ingrained in our design practices, the technology has evolved, our knowledge has expanded and the forum has been able to widen its focus. The members now also include BIM professionals representing a range of sectors directly related to the interoperable design processes: architects, landscape architects, and design software developers.”
BIM4Design members and contributors to this project are:

Johannes Renner
Bevan Badenhorst
Dario Stiore
Marc Thomas
Ronald Lammerts van Bueren
Stephen Holmes
Mike Turpin
Gareth Lapworth
Gavin Bailey-Hague
Rupert Cook
Tomas Slovik
Stefano Esposito
Susanne Chan
Martyn Horne
Carlotta Mirri

Bentley
Rogers Stirk Harbour + Partners
David Chipperfield Architects
Bentley Technical
Astudio
Cadventure
Innovating Futures
Fira Landscape
Sheppard Robson
Architecture PLB
Hawkins\Brown
Weston Williamson + Partners
Vectorworks UK
Max Fordham
Project objective
As a group we have analysed the BS EN ISO 19650-2:2018 information container identification nomenclature that we apply to our design drawing documentation.

We have compared how members from our forum apply the naming conventions to accommodate their requirements, such as drawing order. On comparison we found that we all applied a similar method.

The objective of this document and its content is to make the wider BIM community aware of the practical use of the drawing naming conventions and how it impacts on us on a daily basis. We do recognise that these solutions are biased towards architecture and we welcome feedback from other groups.

1. Project
A single common project identifier should be defined at the initiation of the project. It should be independent and recognizably distinct from any individual organization’s internal job number and be fixed within the project information standard. It is recommended that the code for the project field be between two and six characters in length.

NOTE 1 There are no standard codes for the project field.
NOTE 2 A project can be divided into sub-projects.
NOTE 3 Where a project involves several elements or one element with several phases, each element or phase can be assigned an identifier.

Members found that subdivision of the larger projects using the same project Identifier, into zones or phases needs to be clarified, Note 2/3, can this be added as a separate string?

2. Originator
A unique identifier should be defined for each organization on joining the project, to identify the organization responsible for producing the information within the container, and fixed within the project information standard. It is recommended that the code for the originator field be between three and six characters in length.

NOTE Where a project involves several elements or one element with several phases, each element or phase can be assigned an identifier.

3. Volume/System
A unique identifier should be defined for each volume/system and fixed within the project information standard. It is recommended that the code for the volume/system field be two characters in length. The following standard codes should apply.

ZZ all volumes/systems
XX no volume/system applicable

NOTE This list can be expanded with project-specific codes.

Instead of using a sub-project code, this field often gets populated for the Zoning/Phasing
4. Level/Location
A unique identifier should be defined for each level/location and fixed within the project information standard. It is recommended that the code for level/location field be two characters in length. The following standard codes should apply.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZ</td>
<td>multiple levels/locations</td>
</tr>
<tr>
<td>XX</td>
<td>no level/location applicable</td>
</tr>
<tr>
<td>00</td>
<td>base level</td>
</tr>
<tr>
<td>01</td>
<td>level 01</td>
</tr>
<tr>
<td>02</td>
<td>level 02, etc.</td>
</tr>
<tr>
<td>M1</td>
<td>mezzanine above level 01</td>
</tr>
<tr>
<td>M2</td>
<td>mezzanine above level 02, etc.</td>
</tr>
<tr>
<td>B1</td>
<td>Basement Level 1</td>
</tr>
<tr>
<td>B2</td>
<td>Basement Level 2</td>
</tr>
</tbody>
</table>

NOTE 1 This list can be expanded with project-specific codes.
NOTE 2 The location codes for assets other than buildings are likely to require project-specific codes.

This does not allow for buildings over 99 levels or 9 basements. Also Mezzanine floors are not ordered with their associated floor levels.

5. Type
A unique identifier should be defined for each type of information, to identify the type of information held within the information container, and fixed within the project information standard. It is recommended that the code for the type field be two characters in length. The following standard codes should apply.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>animation file (of a model)</td>
</tr>
<tr>
<td>BQ</td>
<td>bill of quantities</td>
</tr>
<tr>
<td>CA</td>
<td>calculations</td>
</tr>
<tr>
<td>CM</td>
<td>combined model (combined multidiscipline model)</td>
</tr>
<tr>
<td>CO</td>
<td>correspondence</td>
</tr>
<tr>
<td>CP</td>
<td>cost plan</td>
</tr>
<tr>
<td>CR</td>
<td>clash rendition</td>
</tr>
<tr>
<td>DB</td>
<td>database</td>
</tr>
<tr>
<td>DR</td>
<td>drawing rendition</td>
</tr>
<tr>
<td>FN</td>
<td>file note</td>
</tr>
<tr>
<td>HS</td>
<td>health and safety</td>
</tr>
<tr>
<td>IE</td>
<td>information exchange file</td>
</tr>
<tr>
<td>M2</td>
<td>2D model</td>
</tr>
<tr>
<td>M3</td>
<td>3D model</td>
</tr>
<tr>
<td>MI</td>
<td>minutes / action notes</td>
</tr>
<tr>
<td>MR</td>
<td>model rendition for other renditions, e.g. thermal analysis, etc.</td>
</tr>
<tr>
<td>MS</td>
<td>method statement</td>
</tr>
<tr>
<td>PP</td>
<td>presentation</td>
</tr>
<tr>
<td>PR</td>
<td>programme</td>
</tr>
<tr>
<td>RD</td>
<td>room data sheet</td>
</tr>
<tr>
<td>RI</td>
<td>request for information</td>
</tr>
<tr>
<td>RP</td>
<td>report</td>
</tr>
<tr>
<td>SA</td>
<td>schedule of accommodation</td>
</tr>
<tr>
<td>SN</td>
<td>snagging list</td>
</tr>
<tr>
<td>SP</td>
<td>specification</td>
</tr>
<tr>
<td>SU</td>
<td>survey</td>
</tr>
</tbody>
</table>

BIM 4 DESIGN
6. Role
A unique identifier should be defined for each role on the project that an organization is assigned and fixed within the project information standard. It is recommended that the code for the role field be one or two characters in length. The following standard codes should apply.

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 (deprecated)
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  subcontractor
Y  specialist designer
Z  general (non-disciplinary)

NOTE This list can be expanded with two character project-specific codes.

7. Number
A sequential number should be assigned to each information container when it is one of a series, not distinguished by any other of the fields. The numbering for standard coding should be fixed within the project information standard and it is recommended that it be between four and six integer numeric digits in length.

NOTE Leading zeros should be used and care should be taken not to embody information that is present in other fields.

This tends to order the drawings in a drawing set. A more detailed explanation and reason is provided in this document.
How does the current nomenclature affect the drawing order?

When using the "ISO" nomenclature, the drawings are grouped firstly by project, originator, volume/system then by floor level etc.

In a digital world this may be sufficient as meta data can be used to filter particular categories.

However, in practical terms, hard copy format documentation and digital document format such as pdf still rely on the file naming for ordering these documents.

An example of the order the documents appear in the explorer view. It shows drawings ordered by zone then floor categories. We do not have control over the order of the drawings.

Why is drawing order so important to us?

A set of design drawings needs to be read in a particular order. It can be compared to reading a story. Our story describes how a building could be put together.

Our drawings are normally broken down into categories: cover legends, drawing lists, location, site, general arrangement drawings, detail drawings and schedules.

They all interact with each other through call outs.
The drawing order is normally defined by the drawing number. These drawing numbers should be unique, and we do not want to repeat a sequence number in the set. We use this order to be able to communicate easily between teams and to select groups of drawings for various tender packages for example. By having a unique drawing number it mitigates the risk of parties looking at different information, without relying on the whole drawing naming string.

To navigate between these drawings, we use callouts. These callouts only display the drawings’ sequence numbers, as the use of the whole string would confuse, clutter and take up too much space on our drawings.

![Callouts Example](image)

An example of callouts.

In practice, when communicating on site only the sequence code is used. The use of the whole documentation string can cause confusion, i.e. instead of using: “PPP-OOO-ZZ-ZZ-DR-A-12345” often only the sequence number is used i.e. “12345”.

Imagine being on the phone to a contractor discussing 10 different drawings, reading out 10 documentation strings, then finding these drawings in a hard copy drawing set.
How could we create drawing order to the drawing documentation using ISO 19650-2 nomenclature?

If we focus on the 7th field and look at the definition provided by ISO 19650-2. This can be a four to six digit number.

For clarity, we have used a six digit number. This could be between four to six.

ISO 19560-2 Definition

The 7th field can be used to create order within a set of drawings. This code can then be broken up into 2 parts. A category code and a sequence.

By keeping categories 3 to 6 with the same for each drawing, the order will follow using string 7. This will require agreement and buy in of all the relevant parties.

If agreement can not be reached, then by separating the sequence code from the rest of the string, a similar result may be achieved through the use of 3rd party software solutions. These could be collaboration software such as 4P, Asite, Newforma or others which can break down the string into groups.
Putting intelligence into the sequence code

The study group examined how forum team members use the sequence code. Some examples follow:

5 number sequence code: 12345

6 number sequence code: 123456

Architectural Examples

The different approaches shown here are based on defining a category number against a package/series codes. These can be defined in-house, based on a typical drawing storyboard.
The approaches shown here are based on defining a category number which uses a known standard numbering system, such as CI/SFB, Uniclass, Uniclass 2015, or other similar systems.

The drawback to this is that because the number of digits is restricted to a maximum of six, the numbering can only use the main categories headings.

Due to there not being a general and general arrangements category, which is crucial in a set of design drawings, those categories need to be created.
<table>
<thead>
<tr>
<th>Role</th>
<th>Number (VW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>5 number sequence code.</td>
</tr>
<tr>
<td>02</td>
<td>MEP Building Services Examples</td>
</tr>
</tbody>
</table>

### MEP Building Services Examples

#### Role
- **System Type**
  - 10: Pressure Systems
  - 11: Distribution
  - 12: Pumping
  - 13: Valves
  - 14: Control
- **Material Handling**
  - 50: Lifts
  - 51: Sliding Doors
- **Fire Protection**
  - 52: Sprinkler
  - 53: Fire Alarm
  - 54: Smoke Control
- **Hvac Systems**
  - 55: Air Handling Units
  - 56: Ductwork
  - 57: Fans
  - 58: HVAC Controls
  - 59: Chillers
- **Boiler Room & Plant**
  - 60: Boilers
  - 61: Water Heaters
  - 62: Steam Generators
  - 63: Condensers
- **Generators & Inverters**
  - 64: Generators
  - 65: Inverters
  - 66: Battery Systems
  - 67: UPS Systems
- **Electrical Systems**
  - 68: Lighting
  - 69: Overhead Tramway Systems
  - 70: Surge Protection
  - 71: Lightning Protection
  - 72: Fire Alarm Systems
  - 73: Smoke Detection
  - 74: Alarm Systems
- **Water & Wastewater**
  - 75: Sewage Treatment
  - 76: Wastewater Treatment
  - 77: Stormwater Management
  - 78: Underground Utilities
  - 79: Water Distribution
  - 80: Water Supply
  - 81: Sewer System
- **Piping Systems**
  - 82: Water Supply pipelines
  - 83: Drainage Systems
  - 84: Fire Protection Piping
  - 85: Steam Piping
  - 86: Condensate Piping
  - 87: Refrigeration Piping
- **Structural Engineering**
  - 88: Structural Steel
  - 89: Concrete
  - 90: Masonry
  - 91: Wood Framing
  - 92: Metal Framing
  - 93: Insulation Systems
  - 94: Pressure Vessels
  - 95: Pumps & Motors
  - 96: Motor Control Centers
  - 97: Variable Frequency Drives
  - 98: Power Transformers
  - 99: Switchgear

#### Number (XYZ)
- **X**: Drawing Type
  - 01: Sheet 1
  - 02: Title Block
  - 03: Title 2
- **Y**: Title
  - 04: 01
  - 05: 02
  - 06: 03
  - 07: 04
  - 08: 05
  - 09: 06
- **Z**: Sequential Numbering
  - 01: 001
  - 02: 002
  - 03: 003
  - 04: 004
  - 05: 005
  - 06: 006

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BIM 4 DESIGN
Conclusion

As long as there is a requirement to provide a set of design drawings, using the BIM model as a base, then the ISO 19650-2 nomenclature drawing order will remain a problem outside of the CDE.

Unless software providers, such as Microsoft and Apple can provide and allow us to break up the file naming string and individually order each group of the string, this problem will persist.

For the future, if the BIM model becomes a deliverable rather than a design/contract drawing set, then these issues will be resolved. This is what the BIM models’ intention is. However, until this happens we will continue to have to accommodate to this hybrid approach.

BIM4Design has created a proposal that by making minimal changes to the current nomenclature we may be able to address this document order. This proposal has been described in:

“BIM4Design Proposal for making changes to BS EN ISO 19650-2:2018 National Annex drawing nomenclature”
BIM4Design Proposal for making changes to BS EN ISO 19650-2:2018 National Annex drawing nomenclature

EXISTING

1. 2. 3. 4. 5. 6. 7.
PPP-OOO-ZZ-LL-TT-R-XXXXXXXX

PROPOSED

1. 2. 3. 4. 5. 6. 7. 8.
PPP-SPp-OOO-VSs-LLI-TT-R-NNNNnn

Document prepared by Stephen Holmes/Ronald Lammerts van Bueren
Introduction

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Project objective

As a group we have analysed the BS EN ISO 19650-2:2018 information container identification nomenclature that we apply to our design drawing documentation.

The document “BIM4Design comparative analysis of drawing naming order in accordance with BS EN ISO 19650-2:2018” describes how BIM4Design members have applied and implemented a way of working using the nomenclature code.

The objective of this following document is to see how we could provide feedback and provide a workable solution and approach to the nomenclature code.

Contributors

Desired outcomes

The desire is to be able to apply the nomenclature code across all design documents/files in a consistent format that makes it human readable inside and outside of a CDE.

To be able to keep drawings and models in a hierarchical structure when outside of a CDE.

To be able to sequence information in a hierarchical structure from large to small = Project > Building > System > Level/Location.

To be able to put System before Level/Location (currently practices are utilising the Number Sequence first 2 digital for “systems” to group drawing packages together sequentially and XX for Level/Location to create a order within the set.)
Proposed Change

Our proposed change below would extend the naming standard without causing alteration to existing implementations.

Separate the reference to a building on a project (2) with multiple buildings to facilitate using Volume/System as a System code consistently whether a single building project or multi-building project so it is applicable for small and large companies.

This would then allow us to sequence information in a hierarchical structure from large to small = Project(1) > Building(2) > Originator(3) > System(4) > Location(6)

This also allows us to put System (4) before Level/Location (5) and would allow the use of Level without compromising sequencing of drawing sets for packages.

We considered just putting Sub-Project concatenated with the project number (AC123B1 in this example) but felt we would get kick back from clients over having multiple project numbers on a multi-building site as in this example.

The Sub-Project could go either side of the Originator field and still work in sequencing, but was generally felt it sits better between Project Number and Originator code, this would then allow sub projects to be split off to other companies more easily through tender allocation and contract award if required.

We would also like to extend the number of characters available for Volume/System and Level/Location to accommodate larger more complex projects.
Therefore we would like to propose these extension/amendments:

**Changes Requested**

1. **Introduction of an Optional field Sub Project** between Project Number and Originator 2-3 digits.

2. **Change the Volume/System to 2-3 digits** for allow for complex projects with more than 99 system types and to allow industry sectors to standardise on coding for systems within their sector

3. **Change the Level/Location to 2-3 digits** to accommodate tall buildings and linear projects e.g. 12th floor mezzanine (12M) – possibly this needs to expand further for infrastructure projects (2-6 digits)

   Change for mezzanine to a suffix (01M or 1M) to keep levels sequential in file naming order.

**Example Name:**

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Sub Project</th>
<th>Originator</th>
<th>Volume/System</th>
<th>Level/Location</th>
<th>Type</th>
<th>Role</th>
<th>Number Sequence</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC123</td>
<td>B1</td>
<td>C0V</td>
<td>24</td>
<td>XX</td>
<td>DR</td>
<td>A</td>
<td>0001</td>
<td>.pdf</td>
</tr>
</tbody>
</table>

*Project ID AC123*  
Optional (In this example B1 for building 1 or a multi building project site)  
Cadventure Ltd  
Used as System Walls/Partitions (24)  
XX for typical details or floor locations e.g. 01 for rest.  
Always This for title block Drawing Sheets  
Architect  
the sheet sequence in the series