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Ashghal Building Information Modelling Standards (ABIMS)

Level of Information Need Guide

Guide	Specification	Template

Code	D0401
Version	V2
Date	31 October 2023
Owner	Public Works Authority (Ashghal)
Author	Engineering Services Department

Document Properties

Document Title	**Level of Information Need Guide**
Document Owner	Public Works Authority – Ashghal (State of Qatar)
Document Author	Engineering Services Department (ESD)

Version Control

Version	Purpose / Modification	Author	Date
V1	Issued for Approval	ESD	31 March 2022
V2	Issued for Approval	ESD	31 October 2023

Release Authorization

The current version of the document is valid from the issue date to the revision date. The document has been authorized by the following:

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PURPOSE OF THE DOCUMENT

This document provides to both internal and external stakeholders an overview of the function of the Level of Information Need Specification and how it interacts with the Model Element Table Requirements. This document explains the process of creating a Level of Information Need Specification for a specific project, either by PWA to define the project requirements as part of the Exchange Information Requirements for the tender, or by the Contractor to develop their BIM Execution Plan for the project.

The Level of Information Need Specification identifies to stakeholders the amount of geometric complexity and associated information to be provided for each model element on a project, complementing the Model Element Table Requirements definition of which elements are expected to be modelled on a project.

1 LEVEL OF INFORMATION NEED

The Level of Information Need is PWA's method of providing a definition of the requirements for each model element on a project, in terms of its geographic complexity and information attributed to it, to allow PWA to carry out various functions, or BIM Uses, on a project (such as those defined within the Exchange Information Requirements). PWA defines the Level of Information Need as an aggregate to two sub definitions:

- **Level of Detail (LOD)**
  A scale to define the minimum amount of graphical representation of model elements
- **Level of Information (LOI)**
  A scale to define the minimum amount of information attached to model elements

This approach is aligned to ISO 19650 and the below principles are highlighted from the standard for reference:

- "The level of information need of each information deliverable should be determined according to its purpose. This should include the appropriate determination of quality, quantity, and granularity of information. This is referred to as its level of information need and this can vary from deliverable to deliverable." [1]
- "The levels of information need should be determined by the minimum amount of information needed to answer each relevant requirement, including information required by other contractors, and no more. Anything beyond this minimum is considered as waste." [1]
- "The relevance of an information deliverable is not always correlated to its granularity." [1]
- "The granularity of alphanumerical information should be considered to be at least as important as that of geometrical information."

The Level of Information Need definitions are approximately aligned to the PWA Project Stages based on the functions that PWA would expect to be carried out at the relevant stage, and therefore on the requirements of model elements to support these functions.

Project Stages	LOD	LOI
Project Initiation	n/a	n/a
Concept Design	100	n/a
Preliminary (Schematic) Design	200	100
Detailed Design	300	200
Tender & Construction Documents	350	300
Delivery (Construction)	400	400
Handover & Project Closure	500	500

Table 1: Mapping of Project Stages, LOD and LOI

It is not however a requirement that all elements on all projects are given the same Level of Information Need definitions related to the project stage, and specifically as PWA and the industry develops with the implementation of BIM, it is encouraged those deviations will develop, for example for specialist or complex elements to support earlier decision making, or to support more advanced BIM Uses.

[1] Extracts from Section 11.2 of ISO 19650-1:2018

1.1 PWA Level of Detail

The PWA Level of Detail is given by a three-digit number ranging from 100 – 500 and defined by a specification in the table below:

Level of Detail		
LOD	**Specification**	**Examples**
100	*Basic geometry with approximate shape, size, and orientation. In some cases, approved symbols can be used.*	*Concept model with the intention to study Basic areas, orientation, and cost for proper initial construction planning.* *Model Elements are presented as 2D, in plans, sections and elevations.*
200	*Model elements with approximate shape, size, and orientation.* *Visual distinctions, such as panelling, represented as line work on top of the model element.*	*Based on the Schematic Design & tentative placement of Model Elements with approximate quantities, size, shape, location, and orientation. The model is not final and is used as a reference for placement of large model objects.* *Generic Model Elements in 3D based on space reservation principles.*
300	*Model elements with design specific dimensions, orientation, and location.* *Space reservations and/or clearance required for installation, operation and maintenance identified.* *Visual distinctions are modelled as part of the element.*	*Pre-construction model representing Specific Design of services. Elements are modelled to their specific shape and coordinated with other services to avoid site level clashes.* *Space clearance requirements added to major equipment.* *Valves, fittings, control panels, pumps, etc., added to the model.*
350	*Detailed model elements with approved size, shape, location, and orientation.* *Space reservations and/or clearance required for installation, operation and maintenance identified.* *Basic details, such as fixtures, connections, placeholders or supports required for coordination.*	*Construction model representing Detailed Design of services. Elements are modelled to their accurate shape and coordinated with other services to avoid site level clashes. Model produced to this degree are utilized for generating Construction Drawings.* *Element supports and connection details are added to the model.*

Level of Detail		
LOD	**Specification**	**Examples**
400	*Model elements with actual size, shape, location, and orientation required for construction representation.* *Space reservations and/or clearance required for installation, operation and maintenance identified.* *Final details, such as fixtures, connections, placeholders or supports and temporary works required for site installation and fabrication are captured.* *Onsite assembly / construction for bespoke items captured.*	*An Accurate representation of the model elements wherein the model elements are segregated as per site deliverable requisites. The model elements shall then be utilized to fabricate Components for installation.* *Fabrication information captured in modelled elements. Installation fixings and temporary works are modelled.*
500	*Model elements that have been field verified for their final installed size, shape, location, and connections.*	*As Built model representing the services as it had been installed/Constructed. The model elements are enriched to incorporate the facility management requirement complete with asset data integrated onto the model elements. Asset Model is used for monitoring the elements for day-to-day operation and maintenance.* *Geometrically represented as LOD 300 at a minimum and verified.*

Table 2: PWA Level of Detail Specification

1.2 PWA Level of Information

The PWA Level of Information is given by a three-digit number ranging from 100 – 500 and defined by a specification in the table below:

Level of Information		
LOI	**Specification**	**Examples**
100	*The Model Element may contain information supporting the purposes of Preliminary (Schematic Design) such as approximate size, shape, area, or other dimensions.*	*Attribute information may be limited at this stage as Model Elements may be primarily placeholders, with information either not added or not accurate.*
200	*The Model Element includes attributes related to the detailed specification of the Elements, such as location, material, finishes and dimensions. Additionally, elements include attributes supporting Design Coordination. Attributes provided are approximate.*	*The information provided within elements can be used as an approximation of design intent, they may not be fully accurate but can be used for preliminary investigations and review. BIM Uses such as design coordination can start to be implemented based on the information provided.*
300	*The Model Element includes specific information identifying its intended specification. Information provided will be accurate. Attributes relevant to the tendering and the production of construction documents are provided. All elements will be fully categorised.*	*Attribute information will be accurate and complete enough to support design coordination checking, engineering analysis, the preliminary analysis of costs / quantity take-offs, and the development of a construction schedule.*
400	*The Model Element will include all information required to support the procurement, fabrication, and installation of the Element alongside coordination of other Elements. Information will be accurate of the current intent.*	*The information within the element will be suitable to support the construction process, and to allow detailed analysis to optimise the delivery of the project, including cost analysis, coordination analysis and resolution, along with logistics planning and construction scheduling. Information included should be regularly updated so that regular analysis can be undertaken to monitor the optimisation of the project.*
500	*The Model Element will be verified as an accurate representation of the completed project / final construction. Information required to support the handover to operation and maintenance, such as manufacturer, warranty, etc. is provided.*	*An LOI 500 Element will include all the information required for the Operation and Maintenance process to begin. This information will have been captured during prior stages or as part of other requirements. A verification process will have been undertaken to prove the accuracy of the information to PWA.*

Table 3: PWA Level of Information Specification

The PWA Level of Information requirement is a defined list of attributes based on:

- The PWA Feature Classes (used by the Asset Management Department),
- Parameters required to support the execution of PWA's BIM Uses,
- A number from industry best practices as required by the PWA departments.

These attributes are assigned based on Uniclass Classifications which will be applied as appropriate within the Project Information Models. Attributes are grouped into categories to easily identify their purpose, these categories are Geometric – which includes all attributes related to dimensions that may be used for a wide range of purposes including multiple BIM Uses, Design – which include attributes that have been specified to capture design specification information, and BIM Uses – which contains multiple subcategories related to the BIM Uses specified in the Exchange Information Requirements.

Attribute categories are only meant to be indicative; an attribute having been assigned to a specific category do not mean that it is only relevant to that category. *E.g., for Design Coordination, geometric parameters such as length, width, height are required alongside the specific Design Coordination attributes.*

The LOD and subsequent attribute categories, have a dependency on the projects objectives, and as a result some categories are prioritised at earlier stages and some later.

Category	Description
Geometry Parameters	Related to Dimensions
Design Parameters	Related to design such as Material, Finishes
Design Coordination	BIM Use
Construction Sequencing	BIM Use
Quantity Take Off	BIM Use
Asset Information	BIM Use
Costing	BIM Use
Engineering Analysis	BIM Use

Figure 1: Categories

1.3 Level of Information Need Specification

The Level of Information Need Specification may be amended by PWA to suit project specific needs or left as is. It provides a record of PWA's minimum requirements for the project. The tenderer is expected to then further detail the Level of Information Need Guide based on their intended requirements on the project, and to match the model elements being delivered on the project. It is expected that the Level of Information Need Guide will be updated within the BIM Execution Plan as any changes arise or as new information becomes available.

The Level of Information Need aims to capture the graphical and non-graphical information required of model elements but not define which model elements are needed or capture any definition of their production. Instead, the Level of Information Need Specification is inherently linked to the Model Element Table Requirements which fulfils this function. Therefore, it is required that the below steps to be followed for the use of the Level of Information Need Specification.

1. ***Definition of Level of Detail (LOD) and Level of Information (LOI):***
    - *To understand the concepts of Level of Detail (LOD) and Level of Information (LOI), please refer to Section 1.1 & Section 1.2.*
2. ***Project Stages Aligned with PWA's Gateways Requirements:***
    - *To identify the project stages that have been developed in accordance with PWA's Gateways requirements, please refer to Section 1.*
3. ***Mapping Project Stages with LOD and LOI Requirements:***
    - *For a detailed mapping of Project Stages with their corresponding LOD and LOI requirements, please consult Table 1.*
4. ***Minimum Model Element Table Requirement:***
    - *Ensure that all essential model elements required for PWA projects are included. This information can be found in PWA's Model Element Table Requirement.*
5. ***Compliance with Model Element Table Template:***
    - *Verify that all the model elements required for your projects are considered and accurately mapped in line with PWA's Model Element Table Template.*
6. ***Contractor Responsibilities:***
    - *Contractors are responsible for populating the necessary information, including Model Elements with Uniclass Codes, LOD, LOI, and MEA, for different project stages in the PWA's Model Element Table Template.*
7. ***Flexibility for Enhanced Solutions:***

Contractors shall have the opportunity to develop solutions that go beyond the minimum requirements specified in PWA's Model Element Table Requirement. However, any such enhancements must receive approval from PWA.

For Information about which major elements should be considered when developing a project model, the user shall first refer to the Model Element Table (MET) as explained in S*ection 2*.

2 MODEL ELEMENT TABLE REQUIREMENTS

The Model Element Table Requirements provides the ability to determine the LOD, LOI and responsibility for development of a Project Information Model by category of element, utilising the Uniclass 2015 classification system as shown in *Figure 2,* this allows a detailed specification to be developed for the project which clearly outlines expectations for the model development. As explained in the *section 1.3*, the Model Element Table Requirements should be reviewed and updated for the project.

The Model Element Table Requirements can be filtered for different project types, structures and project stages which will be explained in the following section.

The Model Element Table Requirements captures PWA's expected minimum requirements for a project subject to the elements being implemented on the project within the scope of works. When PWA receives responses from tenderers or the Contractor, PWA can use the provided MET to compare the proposed MET to PWA's minimum requirements.

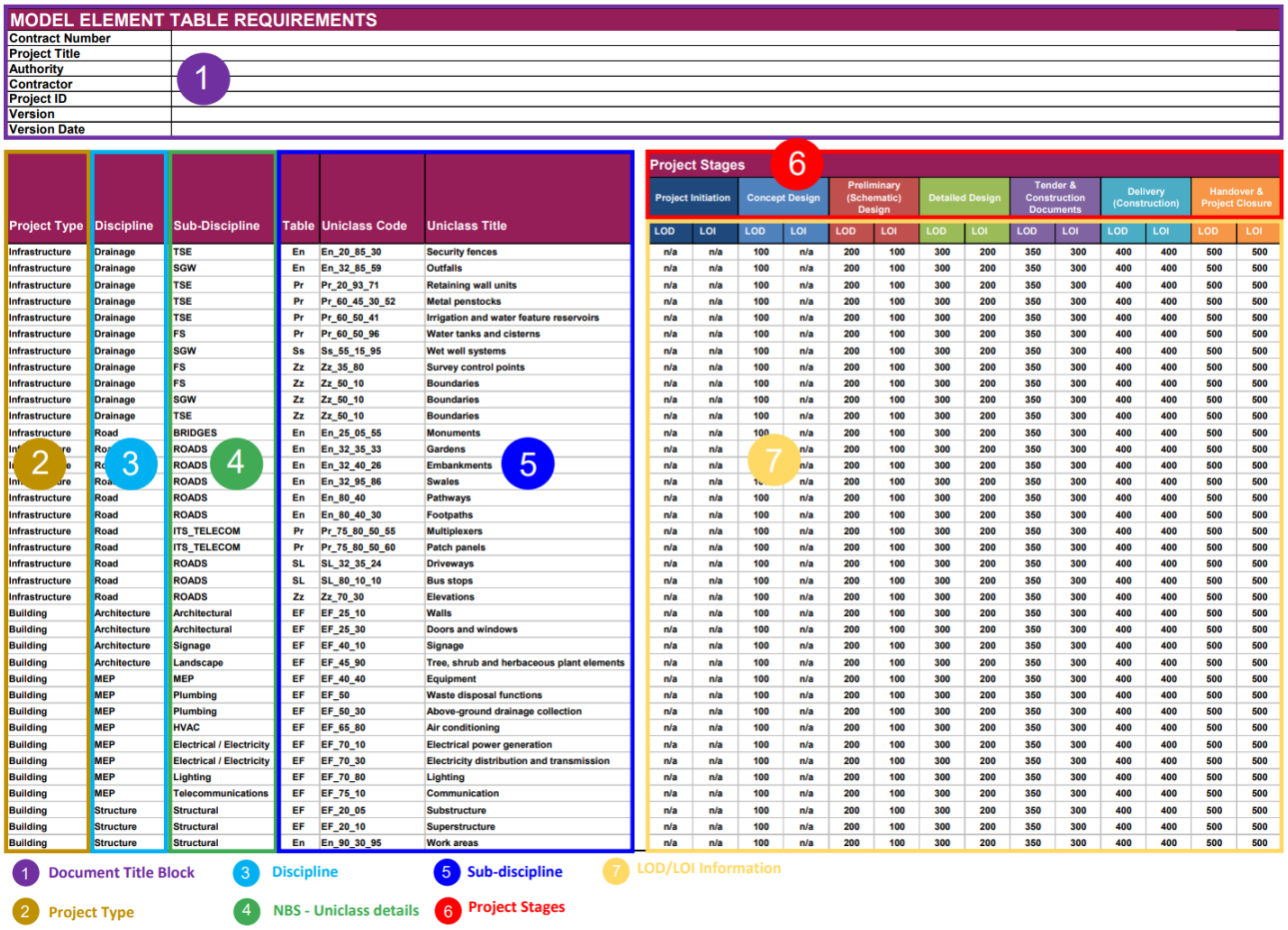


Figure 2: Model Element Table Requirements Overview

2.1 Document Title Block

The Project Team shall complete the document title block to clearly identify the project and to track updates to the file.

MODEL ELEMENT TABLE REQUIREMENTS	
Contract Number	
Project Title	
Authority	
Contractor	
Project ID	
Version	
Version Date	

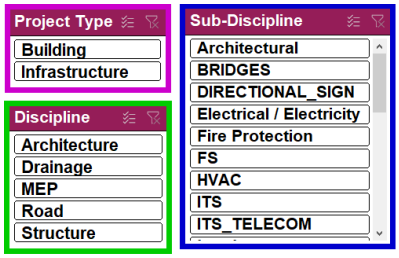
Figure 3: Document Title Block

Note: "Contract Number" is not required during Tender Stage.

Excel Slicer

Slicers are a built-in feature of Excel, that allow users to filter information within a table based on groupings or categories present in a table. Within the MET this feature is used to enable the user to filter the elements required for a project based on the Project Type Slicer, Discipline Slicer, and Sub-discipline Slicer placed in the top left corner.

Note: When items are added to the table, the slicer will be updated automatically.



MODEL ELEMENT TABLE REQUIREMENTS	
Contract Number	
Project Title	
Authority	
Contractor	
Project ID	
Version	
Version Date	

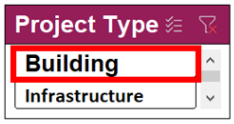
Project Type	Discipline	Sub-Discipline	Table	Uniclass Code	Uniclass Title
Infrastructure	Drainage	TSE	En	En_20_85_30	Security fences
Infrastructure	Drainage	SGW	En	En_32_85_59	Outfalls
Infrastructure	Drainage	TSE	Pr	Pr_20_93_71	Retaining wall units
Infrastructure	Drainage	TSE	Pr	Pr_40_10_77_86	Survey markers
Infrastructure	Drainage	FS	Pr	Pr_60_45_30_52	Metal penstocks
Infrastructure	Drainage	TSE	Pr	Pr_60_50_41	Irrigation and water feature reservoirs
Infrastructure	Drainage	FS	Pr	Pr_60_50_96	Water tanks and cisterns

Figure 4: Slicer for Model Element Table Requirements

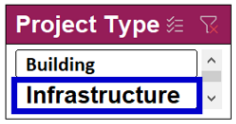
2.2 Select Project Type

Select the appropriate project type using Project Type slicer, the available options are 'Building' and 'Infrastructure'.

Note: For Infrastructure Projects, use both Building and Infrastructure slicer by holding CTRL button on Project Type slicer



Project Type	Discipline	Sub-Discipline	Table	Uniclass Code	Uniclass Title
Building	Architecture	Architectural	EF	EF_25_10	Walls
Building	Architecture	Architectural	EF	EF_25_30	Doors and windows
Building	Architecture	Architectural	EF	EF_25_55	Barriers
Building	Architecture	Architectural	EF	EF_30_10	Roofs
Building	Architecture	Architectural	EF	EF_30_20	Floors
Building	Architecture	Architectural	EF	EF_35_10	Stairs



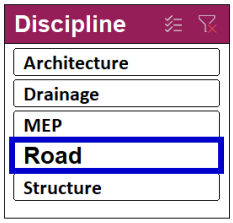
Project Type	Discipline	Sub-Discipline	Table	Uniclass Code	Uniclass Title
Infrastructure	Drainage	TSE	En	En_20_85_30	Security fences
Infrastructure	Drainage	SGW	En	En_32_85_59	Outfalls
Infrastructure	Drainage	TSE	Pr	Pr_20_93_71	Retaining wall units
Infrastructure	Drainage	TSE	Pr	Pr_40_10_77_86	Survey markers
Infrastructure	Drainage	FS	Pr	Pr_60_45_30_52	Metal penstocks
Infrastructure	Drainage	TSE	Pr	Pr_65_12	Chutes
Infrastructure	Drainage	FS	Pr	Pr_65_52_20	Culverts

Figure 5: Select Project Type

*Note: By holding down the **CTRL** button it is possible to select more than one project type*.

2.3 Select Project Discipline(s)

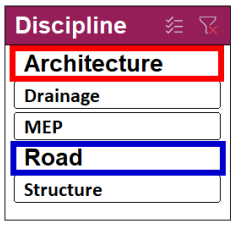
Use the **Discipline Slicer** to choose the discipline is applicable to the project. The Discipline names are approximately aligned to the PWA Departments. The Discipline were used across Design, Project, Operation and Maintenance. Select a slicer discipline to filter the table to include just the elements within that discipline, e.g., the selection of **Road** elements as shown in *Figure 6.*



Project Type	Discipline	Sub-Discipline	Table	Uniclass Code	Uniclass Title
Infrastructure	Road	BRIDGES	En	En_25_05_55	Monuments
Infrastructure	Road	ROADS	En	En_32_35_33	Gardens
Infrastructure	Road	ROADS	En	En_32_40_26	Embankments
Infrastructure	Road	ITS_TELECOM	Pr	Pr_65_70_11_30	Flexible conduit
Infrastructure	Road	BRIDGES	Pr	Pr_65_52_20	Culverts
Infrastructure	Road	ITS	Pr	Pr_65_65_25	Ductwork and fittings
Infrastructure	Road	TRAFFIC_SAFETY	Pr	Pr_20_85_07	Barrier rails

Figure 6: Discipline Filter - Single

By holding down the **CTRL** button it is possible to select more than one discipline as shown in *Figure 7.*

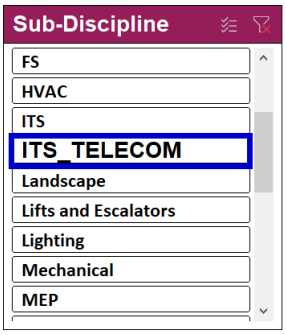


Project Type	Discipline	Sub-Discipline	Table	Uniclass Code	Uniclass Title
Infrastructure	Road	BRIDGES	En	En_25_05_55	Monuments
Infrastructure	Road	ROADS	En	En_32_35_33	Gardens
Infrastructure	Road	ITS_TELECOM	Pr	Pr_65_70_11_30	Flexible conduit
Infrastructure	Road	ITS	Pr	Pr_65_65_25	Ductwork and fittings
Infrastructure	Road	TRAFFIC_SAFETY	Pr	Pr_20_85_07	Barrier rails
Building	Architecture	Architectural	EF	EF_25_10	Walls
Building	Architecture	Architectural	EF	EF_25_30	Doors and windows
Building	Architecture	Architectural	EF	EF_30_20	Floors
Building	Architecture	Architectural	EF	EF_35_10	Stairs

Figure 7: Discipline Filter - Multiple Selections

2.4 Select Project Sub-discipline(s)

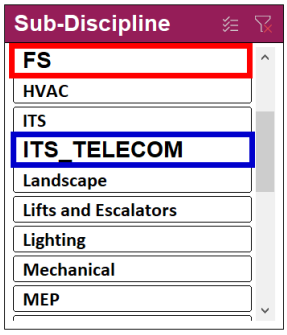
Use the **Sub-discipline Slicer** to choose the sub-discipline's applicable to the project. The Sub-discipline names are approximately aligned to the PWA Departments. The Sub-discipline were used across Design, Project, Operation and Maintenance. Select a slicer sub-discipline to filter the table to include just the elements within that sub-discipline, e.g., the selection of "**ITS_TELECOM"** elements as shown in *Figure 8.*



Project Type	Discipline	Sub-Discipline	Table	Uniclass Code	Uniclass Title
Infrastructure	Road	ITS_TELECOM	Pr	Pr_65_70_11_30	Flexible conduit
Infrastructure	Road	ITS_TELECOM	Pr	Pr_20_85_50_90	Traffic signal poles
Infrastructure	Road	ITS_TELECOM	Pr	Pr_65_70_15_58	Optical fibre cables
Infrastructure	Road	ITS_TELECOM	Pr	Pr_70_75_88	Telecoms equipment
Infrastructure	Road	ITS_TELECOM	Pr	Pr_75_80_50_55	Multiplexers
Infrastructure	Road	ITS_TELECOM	Pr	Pr_65_70_11_30	Flexible conduit
Infrastructure	Road	ITS_TELECOM	Pr	Pr_75_80_50_60	Patch panels

Figure 8: Sub-discipline Filter - Single

By holding down the **CTRL** button it is possible to select more than one sub-discipline as shown in *Figure 9*.



Project Type	Discipline	Sub-Discipline	Table	Uniclass Code	Uniclass Title
Infrastructure	Drainage	FS	Pr	Pr_60_45_30_52	Metal penstocks
Infrastructure	Drainage	FS	Pr	Pr_65_52_20	Culverts
Infrastructure	Drainage	FS	Pr	Pr_65_54_94_29	Flap valves
Infrastructure	Drainage	FS	Pr	Pr_65_54_95_08	Butterfly valves
Infrastructure	Road	ITS_TELECOM	Pr	Pr_65_70_15_58	Optical fibre cables
Infrastructure	Road	ITS_TELECOM	Pr	Pr_70_75_88	Telecoms equipment
Infrastructure	Road	ITS_TELECOM	Pr	Pr_75_80_50_55	Multiplexers
Infrastructure	Road	ITS_TELECOM	Pr	Pr_75_80_50_60	Patch panels

Figure 9: Sub-discipline Filter – Multiple Selections

2.5 Uniclass Codes

The headings of 'Table', 'Uniclass Codes' and 'Uniclass Title' refer to the Uniclass 2015 [2] classification system. Uniclass forms the basis for the MET, offering an exhaustive list of elements within the construction industry and its processes, that is maintained as an openly accessible resource by a third party, however the MET contains only a subset of this based on PWA's requirements. Some elements are applicable to multiple Disciplines. Based on the project requirements the user must complete the MET and issue to PWA for review.

*Example: The following steps shall be taken to find the Uniclass Code for an element which is not listed (e.g., **"Sand Trap"**).*

1. *Navigate to the NBS Uniclass 2015 website*
2. *Search for the "**Sand Trap**" using the Uniclass 2015 table on the website*
3. *Register the response from the NBS website **Pr_65_52_25***
4. *Find out which Project Type, Discipline and Sub-discipline the element belongs to*
5. *Find the element in the Level of Information Need Specification.*

Project Type	Discipline	Sub-Discipline	Table	Uniclass Code	Uniclass Title
Infrastructure	Drainage	SGW	Pr	Pr_60_50_96	Water tanks and cisterns
Infrastructure	Drainage	SGW	Pr	Pr_65_12	Chutes
Infrastructure	Drainage	FS	Pr	Pr_65_52_01_01	Access and inspection chambers
Infrastructure	Drainage	TSE	Pr	Pr_65_52_25	Drainage traps, separators and accessories
Infrastructure	Drainage	SGW	Pr	Ss_55_15_72	Water extraction and monitoring systems
Infrastructure	Drainage	SGW	Pr	Ss_55_15_95	Wet well systems
Infrastructure	Drainage	TSE	Pr	Ss_55_15_95	Wet well systems
Infrastructure	Drainage	FS	Pr	Zz_35_80	Survey control points

Figure 10: Uniclass Codes

[2] All Uniclass Codes are accessed from https://www.thenbs.com/our-tools/uniclass-2015

2.6 Project Stages

The PWA Project Stages are provided along the top of the table to provide a timeline to the delivery of the information. These stages should be aligned to the agreed project stages, if they differ, but should only been done so with the agreement of the BIM Office. In all but exceptional cases these should remain unaltered.

Table 1 outlines the general requirements for LOD and LOI by project stage. Deviations from this are allowed where information is required earlier, such as to accelerate decisions.

Project Stages						
Project Initiation	Concept Design	Preliminary (Schematic) Design	Detailed Design	Tender & Construction Documents	Delivery (Construction)	Handover & Project Closure

Figure 11: Project Stages

2.7 Select Project LOD and LOI for Project Stages

Based on the user selections on the Uniclass Codes, minimum LOD and LOI requirements are populated against each classification, these can be further modified based on project requirements per Project Stage.

Project Stages													
Project Initiation		Concept Design		Preliminary (Schematic) Design		Detailed Design		Tender & Construction Documents		Delivery (Construction)		Handover & Project Closure	
LOD	LOI	LOD	LOI	LOD	LOI	LOD	LOI	LOD	LOI	LOD	LOI	LOD	LOI
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500
n/a	n/a	100	n/a	200	100	300	200	350	300	400	400	500	500

Figure 12: Project Stages with LOD and LOI

3 LEVEL OF INFORMATION NEED SPECIFICATION

Once the required elements have been defined within the MET based on the specific project requirements, the Level of Information Need Specification can then be developed to detail the expected Graphical and Non-Graphical representation for each classification.

The Level of Information Need Specification has two main parts as specified below:

1. **Index Page** – The Index page in the Level of Information Need Specification is a master sheet, like the MET, which provides links to each of the Uniclass Code specific tabs for easier navigation, refer to *Section 3.1* for further details
2. **Element Pages** – The Element Pages contain the specific **LOD** and **LOI** information for each element, refer to *Section 3.2* for further details

Note: To maximise compatibility of the functions within the workbook, the Level of Information Need specification should be used in its original file format (XLSX).

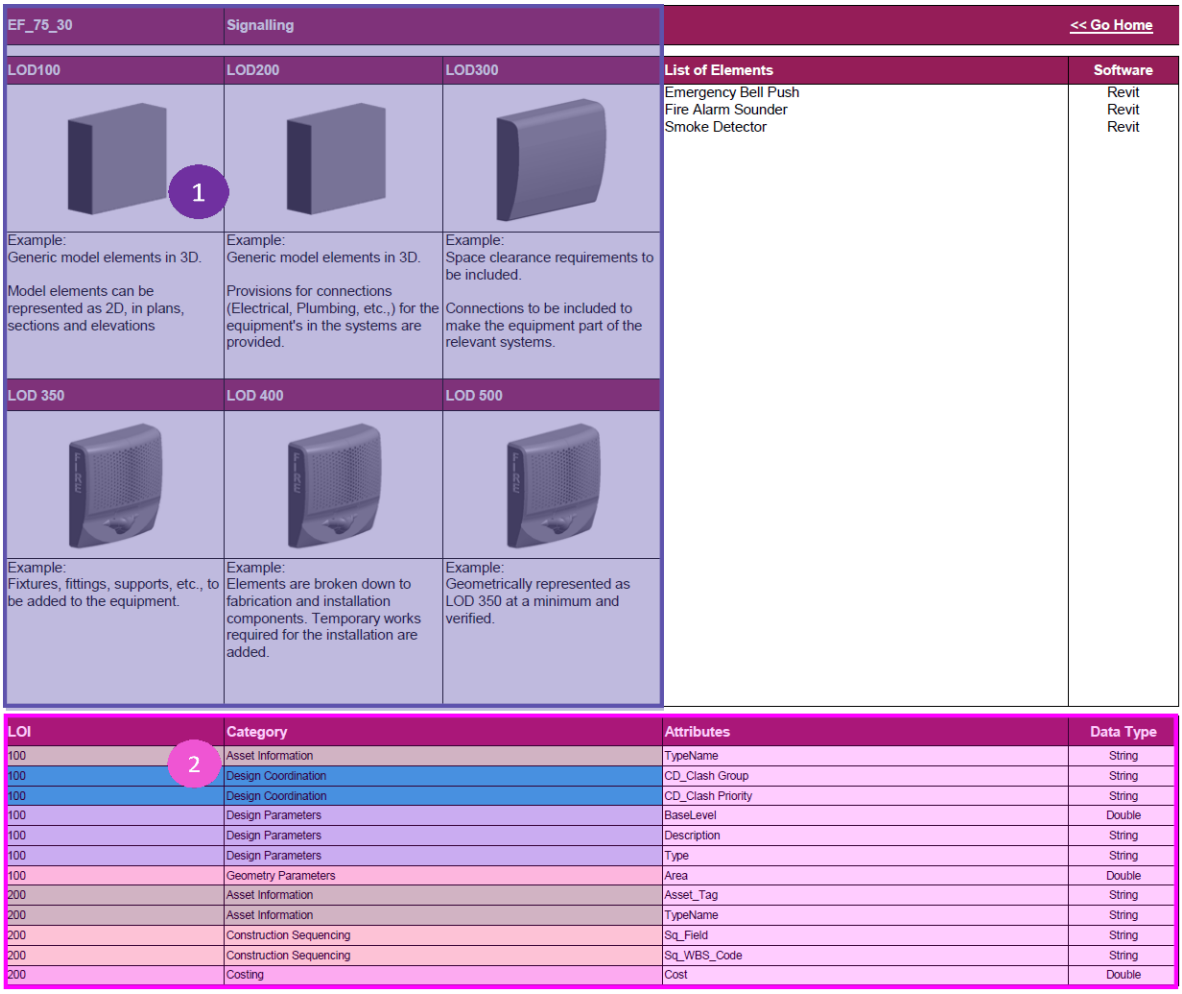
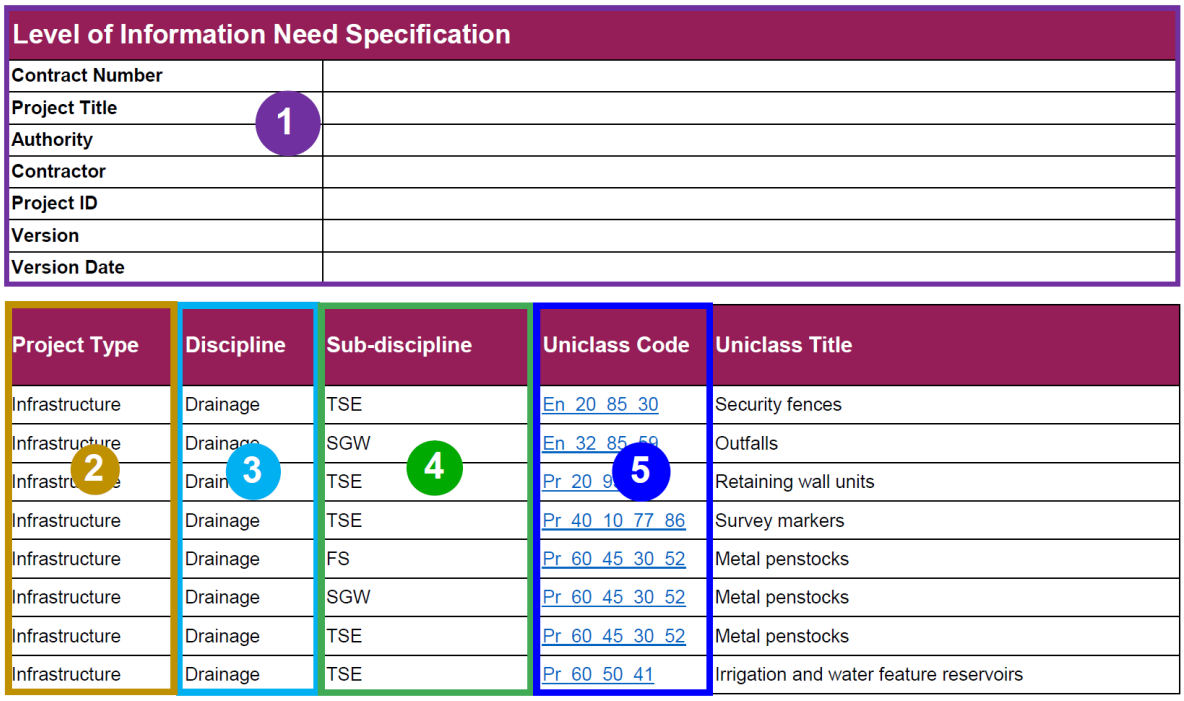


Figure 13: Element Page showing LOD and LOI for a Model Element.

3.1 Level of Information Need Specification – Index Page

This section explains how to use the Index Page.



Level of Information Need Specification	
Contract Number	
Project Title	
Authority	
Contractor	
Project ID	
Version	
Version Date	

Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Infrastructure	Drainage	TSE	En_20_85_30	Security fences
Infrastructure	Drainage	SGW	En_32_85_59	Outfalls
Infrastructure	Drainage	TSE	Pr_20_9	Retaining wall units
Infrastructure	Drainage	TSE	Pr_40_10_77_86	Survey markers
Infrastructure	Drainage	FS	Pr_60_45_30_52	Metal penstocks
Infrastructure	Drainage	SGW	Pr_60_45_30_52	Metal penstocks
Infrastructure	Drainage	TSE	Pr_60_45_30_52	Metal penstocks
Infrastructure	Drainage	TSE	Pr_60_50_41	Irrigation and water feature reservoirs

Figure 14: LOI - Index Page

1. **Document Title Block** – refer to *Section 0*
2. **Project Type** – refer to Section 3.1.2
3. **Project Discipline** – refer to Section 3.1.3
4. **Project Sub-discipline** – refer to Section 3.1.4
5. **Uniclass Code** – refer to Section 3.1.5

3.1.1 Document Title Block

The Project Team shall complete the document title block to identify the project and to track updates to the file.

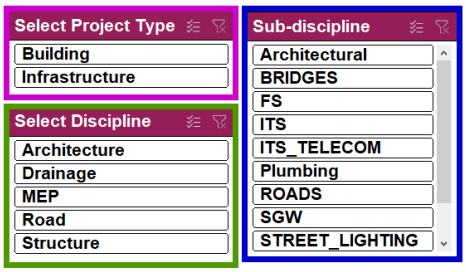
Level of Information Need Specification	
Contract Number	
Project Title	
Authority	
Contractor	
Project ID	
Version	
Version Date	

Figure 15: Document Title Block

Note: "Contract Number" is not required during Tender Stage.

Slicer

Within the Level of Information Need Specification – Index page this feature is used to enable the user to gradually filter the elements required for a project based on Project Type Slicer, Discipline Slicer, and Sub-discipline Slicer placed at the top left corner.



***For Infrastructure Projects use both slicer by holding CTRL button on Project Type slicer**

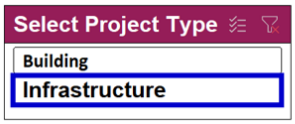
Level of Information Need Specification	
Contract Number	
Project Title	
Authority	
Contractor	
Project ID	
Version	
Version Date	

Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Infrastructure	Drainage	TSE	En_20_85_30	Security fences
Infrastructure	Drainage	SGW	En_32_85_59	Outfalls
Infrastructure	Drainage	FS	Pr_60_45_30_52	Metal penstocks
Infrastructure	Road	ROADS	En_32_35_33	Gardens
Infrastructure	Road	BRIDGES	En_80_94	Bridges
Infrastructure	Road	ITS_TELECOM	Pr_20_29_03	Anchors and components
Infrastructure	Road	ITS	Pr_20_85_50_90	Traffic signal poles
Infrastructure	Road	STREET_LIGHTING	Pr_20_85_50_90	Traffic signal poles
Building	Architecture	Architectural	EF_25_10	Walls
Building	MEP	Plumbing	EF_50	Waste disposal functions
Building	Structure	Structural	EF_20_05	Substructure

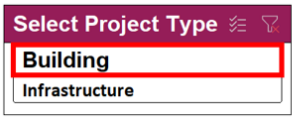
Figure 16: Slicer for Level of Information Need Specification – Index Page

3.1.2 Select Project Type

Select the appropriate project type using slicer, the available options are 'Building' and 'Infrastructure'.



Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Infrastructure	Drainage	TSE	En_20_85_30	Security fences
Infrastructure	Drainage	SGW	En_32_85_59	Outfalls
Infrastructure	Drainage	FS	Pr_60_45_30_52	Metal penstocks
Infrastructure	Road	ROADS	En_32_35_33	Gardens
Infrastructure	Road	BRIDGES	En_80_94	Bridges
Infrastructure	Road	ITS_TELECOM	Pr_20_29_03	Anchors and components
Infrastructure	Road	ITS	Pr_20_85_50_90	Traffic signal poles
Infrastructure	Road	STREET_LIGHTING	Pr_20_85_50_90	Traffic signal poles



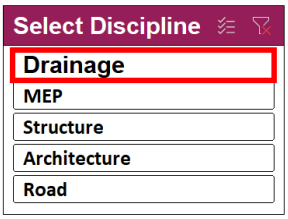
Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Building	Architecture	Architectural	EF_25_10	Walls
Building	Architecture	Architectural	EF_25_30	Doors and windows
Building	MEP	HVAC	EF_65_80	Air conditioning
Building	MEP	Plumbing	EF_50	Waste disposal functions
Building	MEP	Lighting	EF_70_80	Lighting
Building	MEP	Electrical / Electricity	EF_70_10	Electrical power generation
Building	Structure	Structural	EF_20_05	Substructure
Building	Structure	Structural	EF_35_20	Ramps

Figure 17: Select Project Type

*Note: By holding down the **CTRL** button it is possible to select more than one project type*.

3.1.3 Select Project Discipline(s)

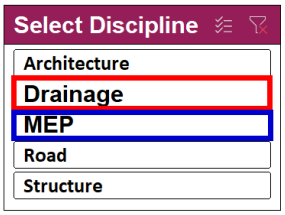
Use the **Discipline Slicer**, to choose the applicable discipline to review the requirements, e.g., the selection of **Drainage** elements as shown in *Figure 18.*



Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Infrastructure	Drainage	TSE	En_20_85_30	Security fences
Infrastructure	Drainage	SGW	En_32_85_59	Outfalls
Infrastructure	Drainage	TSE	Pr_20_93_71	Retaining wall units
Infrastructure	Drainage	TSE	Pr_40_10_77_86	Survey markers
Infrastructure	Drainage	FS	Pr_60_45_30_52	Metal penstocks

Figure 18: Discipline Filter - Single

By holding down the **CTRL** button it is possible to select more than one discipline as shown in *Figure 19.*

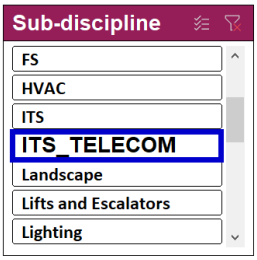


Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Infrastructure	Drainage	TSE	En_20_85_30	Security fences
Infrastructure	Drainage	SGW	En_32_85_59	Outfalls
Infrastructure	Drainage	TSE	Pr_20_93_71	Retaining wall units
Infrastructure	Drainage	TSE	Pr_40_10_77_86	Survey markers
Infrastructure	Drainage	FS	Pr_60_45_30_52	Metal penstocks
Building	MEP	HVAC	EF_60_60	Refrigeration
Building	MEP	Lighting	EF_70_80	Lighting
Building	MEP	Telecommunications	EF_75_10	Communication
Building	MEP	Security	EF_75_40	Security
Building	MEP	Fire Protection	Pr_40_50_28_96	Water fire extinguishers

Figure 19: Discipline Filter - Multiple Selection

3.1.4 Select Project Sub-discipline(s)

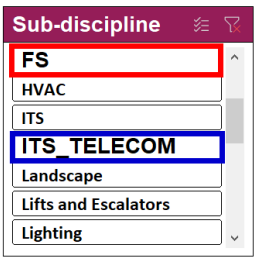
Use the **Sub-discipline Slicer**, to choose the applicable sub-discipline to review the requirements, e.g., the selection of **ITS_TELECOM** elements as shown in *Figure 18.*



Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Infrastructure	Road	ITS_TELECOM	Pr_60_75	Communications source products
Infrastructure	Road	ITS_TELECOM	Pr_65_70_11_30	Flexible conduit
Infrastructure	Road	ITS_TELECOM	Pr_70_75_88	Telecoms equipment
Infrastructure	Road	ITS_TELECOM	Pr_75_80_50_55	Multiplexers
Infrastructure	Road	ITS_TELECOM	Pr_75_80_50_60	Patch panels

Figure 20: Sub-discipline Filter - Single

By holding down the **CTRL** button it is possible to select more than one sub-discipline as shown in *Figure 19.*



Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Infrastructure	Drainage	FS	Pr_60_45_30_52	Metal penstocks
Infrastructure	Drainage	FS	Pr_65_52_01_01	Access and inspection chambers
Infrastructure	Drainage	FS	Pr_65_54_95_08	Butterfly valves
Infrastructure	Drainage	FS	Pr_65_54_95_66	Pressure-reducing valves
Infrastructure	Drainage	FS	Pr_80_51_46	Flowmeters
Infrastructure	Road	ITS_TELECOM	Pr_60_75	Communications source products
Infrastructure	Road	ITS_TELECOM	Pr_65_70_11_30	Flexible conduit
Infrastructure	Road	ITS_TELECOM	Pr_70_75_88	Telecoms equipment
Infrastructure	Road	ITS_TELECOM	Pr_75_80_50_55	Multiplexers
Infrastructure	Road	ITS_TELECOM	Pr_75_80_50_60	Patch panels

Figure 21: Sub-discipline Filter - Multiple Selection

3.1.5 Select Uniclass Codes

Click on the Uniclass Code hyperlink to navigate to the element specific tab where the Graphical and Non-Graphical requirements can be reviewed.

Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title
Infrastructure	Drainage	FS	Pr_60_45_30_52	Metal penstocks
Infrastructure	Drainage	FS	Pr_65_52_01_01	Access and inspection chambers
Infrastructure	Drainage	FS	Pr_65_54_95_08	Butterfly valves
Infrastructure	Drainage	FS	Pr_65_54_95_66	Pressure-reducing valves
Infrastructure	Drainage	FS	Pr_80_51_46	Flowmeters
Infrastructure	Road	ITS_TELECOM	Pr_60_75	Communications source products
Infrastructure	Road	ITS_TELECOM	Pr_65_70_11_30	Flexible conduit
Infrastructure	Road	ITS_TELECOM	Pr_70_75_88	Telecoms equipment
Infrastructure	Road	ITS_TELECOM	Pr_75_80_50_55	Multiplexers
Infrastructure	Road	ITS_TELECOM	Pr_75_80_50_60	Patch panels

Figure 22: LOI Uniclass Code

3.2 Level of Information Need Specification – Element Pages

Below is an overview of the Element Pages.

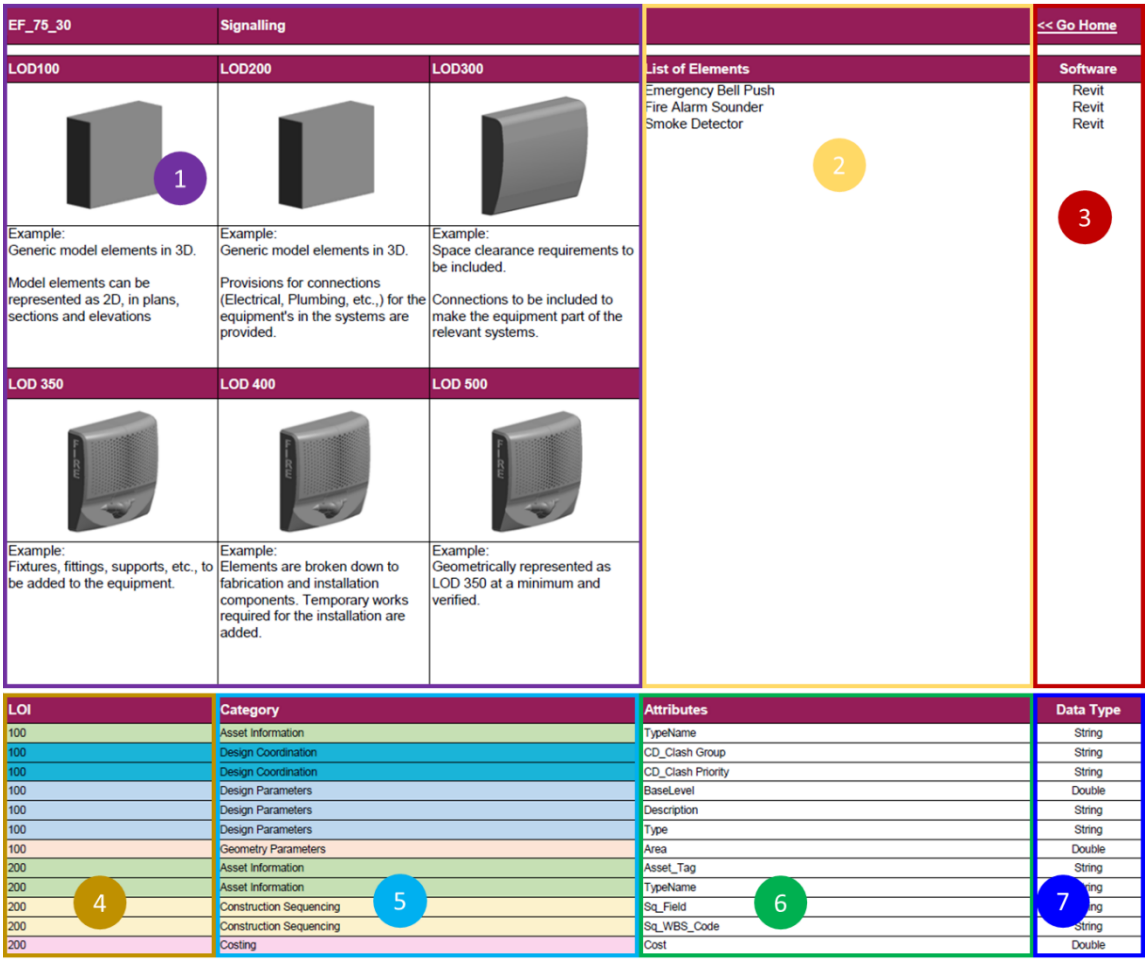


Figure 23: LOI - Element Pages

1. **Level of Detail Specification** – refer to *Section 3.2.1*
2. **List of Elements** – refer to *Section 3.2.2*
3. **Model authoring Software** – refer to *Section 3.2.3*
4. **Level of Information** – refer to *Section 3.2.4*
5. **Category** – refer to *Section 3.2.5*
6. **Attributes** – refer to *Section 3.2.6*
7. **Data Type** – *refer to Section 0*

3.2.1 Level of Detail Specification

Below is an overview of the top (LOD) portion of the element tabs, where the visual and textual definitions are provided for each model element against the LOD breakdown.

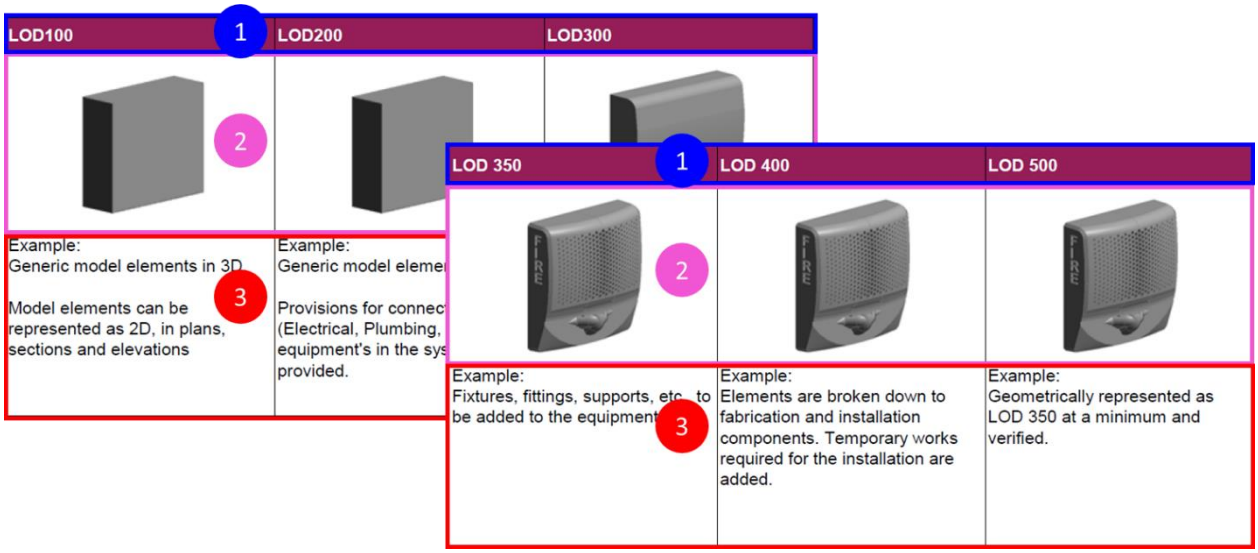


Figure 24: LOD Specification

1. The Level of Detail reference code.
2. An image providing a representation of the element in different LOD's. It is to provide a visual guide to help the Contractor in assigning a suitable LOD for each Project Stage.
3. An example of each element's LOD is provided below, identifying how it should look and what needs to be considered to develop the model element from Lower LOD to higher LOD's.

3.2.2 List of Elements

The Model Element Table Requirements and Level of Information Need Specification are defined by Uniclass classification based on the PWA Feature Class Elements, however, in some cases multiple feature class elements are contained under a single Uniclass classification. In such cases, all applicable elements are listed on the right hand “List of Elements” panel as shown below:

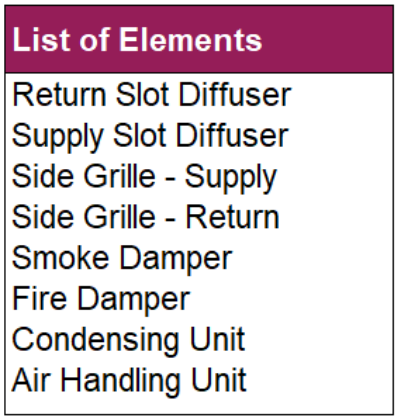


Figure 25: List of Elements

3.2.3 Model Authoring Software

Model Authoring Software is the software used to create models. Each trade may have different model authoring software. For all elements identified on a specific Level of Information Need Specification - Element Page, the potential software for their creation is specified as shown in *Figure 26*. During the tender response the actual software should be identified.

In cases where the model element can be used across trades, more than one software is identified.

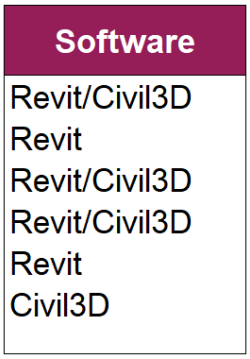


Figure 26: Software

Slicer

Within the Level of Information Need Specification – Element pages, this feature is used the enable the user to gradually filter the attributes required for an element based on LOI Slicer and Category Slicer placed at the top left corner.

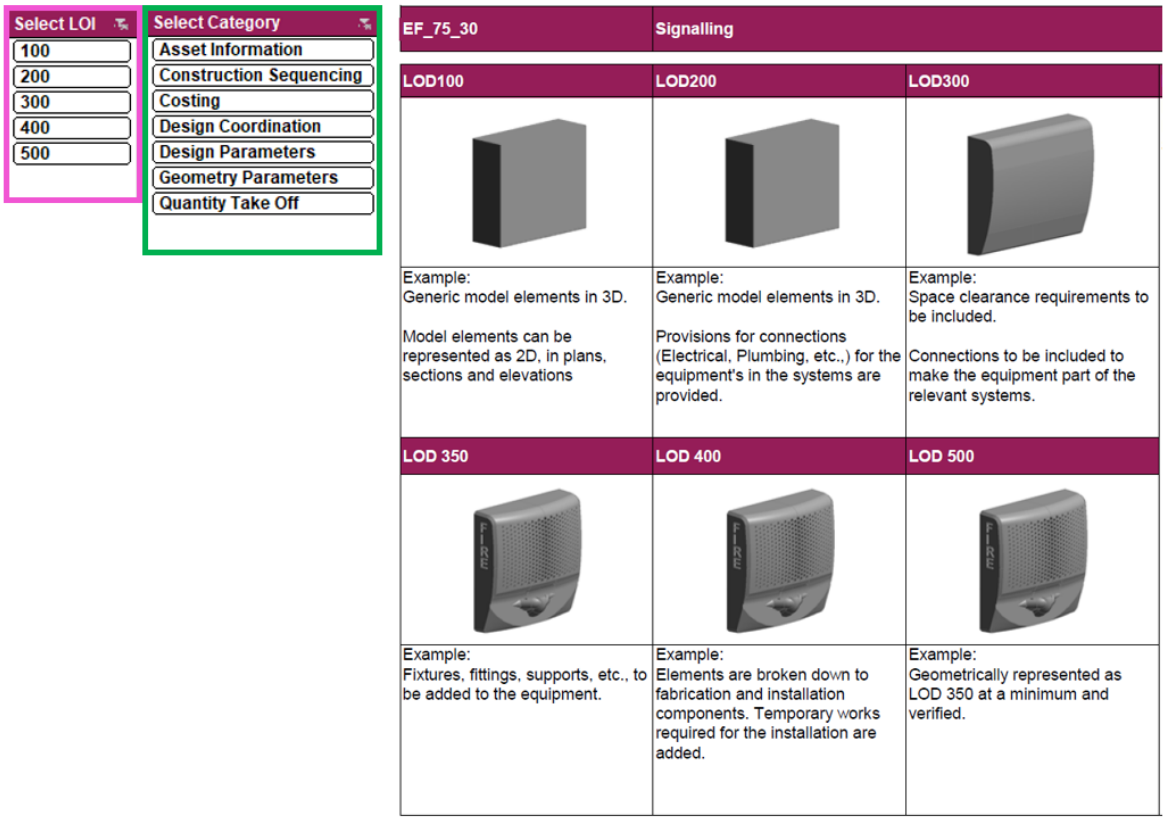


Figure 27: Slicer for Level of Information Need Specification – Element Pages

3.2.4 Select LOI

Use the LOI slicer to focus on the selected LOD and to filter the attributes required for that LOD.

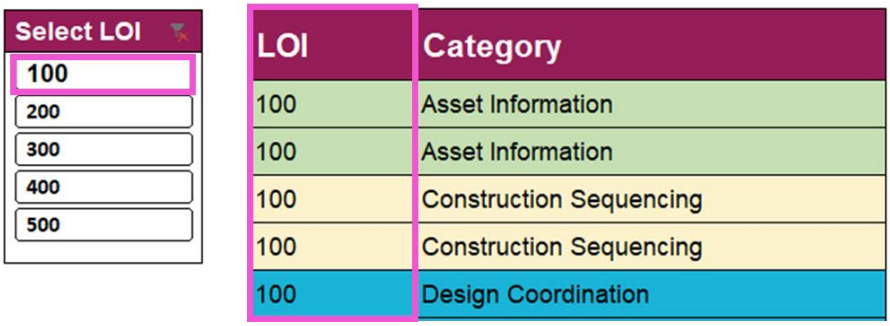
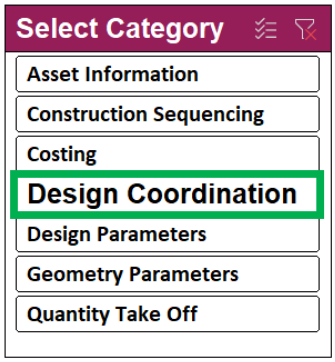


Figure 28: LOI Slicer

3.2.5 Select Category

Use the Category slicer to focus on those attributes related to the selected category.



LOI	Category	Attributes
100	Design Coordination	CD_ClashGroup
100	Design Coordination	CD_ClashPriority
200	Design Coordination	CD_ClashGroup
200	Design Coordination	CD_ClashPriority
300	Design Coordination	CD_ClashGroup
300	Design Coordination	CD_ClashPriority
400	Design Coordination	CD_ClashGroup
400	Design Coordination	CD_ClashPriority
500	Design Coordination	CD_ClashGroup
500	Design Coordination	CD_ClashPriority

Figure 29: Category Slicer

3.2.6 Attributes

Based on the user selections on the LOI and Category, a final list of attributes will be shown.

Attributes
Asset_Tag
CD_ClashGroup
CESMM
GFCODE
GlobalID
InstallationDate
Manufacturer
Maximo_ID
TypeName

Figure 30: Attributes List

Note:

- *Attributes are categorised but will only be identified once within the list to prevent duplication. E.g., length, width, and height are used across multiple BIM Uses but will only be listed once.*

Level of Information Need Specification includes some of the parameters required by PWA's COBie Template. To ensure that all the required information is captured refer to PWA's COBie Template Guide.

The Level of Information Need Specification mandates the inclusion of essential parameters, namely *SY_GIS, SY_EAMS_DRAINAGE, SY_EAMS_ROAD, and SY_BMS*. These parameters play a pivotal role in enabling PWA to accurately identify the infrastructure components being converted within the FME workbench, facilitating the extraction of data from BIM and its integration into GIS systems.

- *The elements associated with Bridges and its components, then SY_BMS to be filled with "Yes", while marking the other attributes, SY_EAMS_DRAINAGE, SY_EAMS_ROAD, and SY_GIS, as "No".*

- *For elements associated with the drainage network and their components that lack a GFCODE, assign "Yes" to SY_EAMS_DRAINAGE, while marking the other attributes, SY_BMS, SY_EAMS_ROAD, and SY_GIS, as "No".*

- *When dealing with elements related to roads and their components that lack a GFCODE, assign "Yes" to SY_EAMS_ROAD," while the other attributes, SY_BMS, SY_EAMS_DRAINAGE, and SY_GIS, should be marked as "No".*

- *For elements associated with roads and drainage network which has a GFCODE, assign "Yes" to SY_GIS, while marking the other attributes SY_BMS, SY_EAMS_DRAINAGE, and SY_EAMS_ROADS as "No".*

The inclusion of the "**CESMM**" (Civil Engineering Standard Methods of Measurement) attribute is a vital requirement that enables the Public Works Authority (PWA) to streamline the extraction of the Bill of Quantities (BOQ) and Bill of Materials (BOM) from the BIM Model.

Note:

To determine the field value for the attribute "GFCODE," please consult the "List of Elements" Tab within the Level of Information Need Specification. It's important to note that GFCODE pertains exclusively to Infrastructure elements.



Project Type	Discipline	Sub-discipline	Uniclass Code	Uniclass Title	List of Elements	GFCODE** (Applicable only to Infrastructure Projects)
Infrastructure	Drainage	FS	Pr_65_52_01_01	Access and inspection chambers	Air Chamber	SWARARCH
Infrastructure	Drainage	FS	Pr_65_52_25	Drainage traps, separators and accessories	Sand Trap	SWNDSDCH
Infrastructure	Drainage	TSE	Pr_65_52_63	Pipes and fittings	Foul Sewer Fittings	SWNDFITT
Infrastructure	Drainage	SGW	Pr_65_54_94	Water supply and wastewater valves	Air Release	SWNDARVA
Infrastructure	Road	ITS	Pr_60_75_86	Surveillance cameras, monitors and ancillaries	CCTV	RDNDCCTV
Infrastructure	Road	ITS_TELECOM	Pr_70_75_88	Telecoms equipment	LoadCoil	RDNDLOCO
Infrastructure	Road	ROADS	Pr_25_30_86_91	Traffic islands	Central / Roundabout Island	RDARRAIS
Infrastructure	Road	ROADS	Pr_25_93_45	Kerb units	Raised Kerb	RDLNRKRB
Infrastructure	Road	STREET_LIGHTING	Pr_65_65_25	Ductwork and fittings	StreetLightDuct	RDARSLDT
Infrastructure	Road	TRAFFIC_SAFETY	Pr_40_10_77_85	Street signs	Traffic_Sign	RDNDTSGN

Figure 31: Field value of GFCODE attribute

- *Description and Sample Field value for each attribute to be referred in the "Description_Sample Field Value" Tab in the Level of Information Need Specification.*



Level of Information Need - Attributes, Description & Sample Field Values					
Project Type	**Category**	**Attributes**	**Data Type**	**Description**	**Sample Field Value**
Infrastructure / Building	Asset Information	Asset_Tag	String	This field indicates the unique Asset Tag for the Asset's functional location only for applicable assets. (Refer to Above Ground Asset Referencing Standard (AA-AMPR-00X).	DA48-PSS-16N-NPM-TNK02
Infrastructure / Building	Asset Information	InstallationDate	Date	This field indicates the Date of Installation of an asset in [DD]-[MM]-[YYYY].	25-07-2021
Infrastructure / Building	Asset Information	Manufacturer	String	This field indicates the Name of Manufacturer of an asset.	Charlette
Infrastructure / Building	Asset Information	Model_No	String	This field is a unique number of an asset provided by the manufacturer itself.	GA15P
Infrastructure / Building	Asset Information	Serial_No	String	This field indicates the serial number provided by the manufacturer which is unique to the manufacturer and type of an item.	5937

Figure 32: Description and Sample Field value of attribute

As a part of our Quality Assurance/Quality Control (QA/QC) processes, we will employ validation tools such as Revit Model Checker, Solibri Office, Dynamo Studio, and others as necessary. The selection and detailed explanation of these tools for each project will be outlined in the BIM Execution Plan.

Please note that the attributes unique to ArcGIS are derived from the "PWA Roads & Drainage GIS Standards Manual version 4.1.1." To conform to ArcGIS naming conventions, field names must commence with a letter and should not include spaces; therefore, underscore characters were used as word separators.

Similarly, attribute names specific to COBie are sourced from PWA's COBie Template. In the case of the COBie Template, attribute names do not incorporate spaces between multiple words within the same attribute name.

3.2.7 Data Type

Data Type represent the format in which each field must be filled. Data Types used within the Level of Information Need Specification are:

- *String – Used to store alphanumerical values*
- *Boolean – Used to store true/false or yes/no values*
- *Integer – Used to store a numeric value without decimals*
- *Double – Used to store numeric values with decimals*
- *Date – Used to store dates (DD-MM-YYYY, as per COBie requirements)*

Data Type
String
Double
Integer
Double
String
Boolean

Figure 33: Data Type

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ENDNOTES

[1] Extracts from Section 11.2 of ISO 19650-1:2018

[2] All Uniclass Codes are accessed from https://www.thenbs.com/our-tools/uniclass-2015