



دائرة البلديات والنقل
DEPARTMENT OF MUNICIPALITIES
AND TRANSPORT

بلدية مدينة أبوظبي
ABU DHABI CITY MUNICIPALITY

Department of Municipalities and Transport
Municipality of Abu Dhabi City
Municipal Infrastructure and Assets Sector

BUILDING INFORMATION MODELLING (BIM) DOCUMENTATION

BIM QA/QC Checklist for Infrastructure

For internal use by ADM

Version 1.0

October 2020

Glossary

2D	Two-dimensional geometric representation (x, y)
3D	Three-dimensional geometric representation (x, y, z)
Appointing party	The provider of the information which will always be the Municipal Infrastructure and Asset Sector
Asset	Item, thing, or entity that has a potential or actual value of an organization. It always refers to a built asset.
BIM Execution Plan (BEP)	Defines the methodology to be adopted by the Project Team Member in respect of the production, sharing and publication of the BIM Material.
BIM Protocol	Stipulates the liabilities and obligations of the Project Team Member in the use and delivery of building information modelling under the Contract for its works and/or services.
Building Information Modeling (BIM)	An integrated collaboration process of designing, constructing, and/or operating a building or infrastructure asset using electronic object-oriented information throughout all project stages.
Clash Detection / Interference Check.	The process where software functionality allows for identification of spatial conflicts among BIM objects deriving from various interrelated building and infrastructure elements
Common Data Environment (CDE)	The single source of information used to collect, manage, and disseminate Project Information. It consists of the main 4 Model /Information states (Work-in-progress (WIP), Shared, Published, Archive) representing different stages of collaboration and three main gateways for approval and quality control QC.
Element Level of Detail (LOD)	The level of details of a model element.
Exchange Information Requirements (EIR)	A document that sets out the information to be delivered, the standards, and processes to be adopted by the Project Team Member as part of the project delivery process in relation to an appointment.
Family (Model Family)	A Family is a grouping of 2D and/or 3D information that serves to represent a discrete building or documentation element in the project. It defines parametric, graphical, and documentation requirements.
File Naming Conventions	A set of rules for constructing unique and descriptive names for digital files. The rules specify the order and the length of words, phrases, or abbreviations used in the name.
IFC Format	Industrial Foundation Classes by Building Smart International
Information Level of Detail (LOI)	The relevant level of information of a model element.
Life Cycle	Life of an asset from the day it is required and defined to the day it demolished or terminated, passing through all phases of conception, detailing, construction, operation, maintenance and demolish
Master Information Delivery Plan (MIDP)	The primary plan for when Project Information is to be prepared and by whom, as is produced by the Lead Consultant gathering all TIDP's

Municipal Infrastructure and Assets Sector LOD Matrix	The matrix identifying the applicable Levels of Detail to be used on the Project as is approved by or on behalf of the Employer.
Project Information Model (PIM)	This is the term for the information (structured and unstructured information) which is developed during the design/construction phase of the project and relating to the delivery phase.
Shared	The information which has been issued with a status code identifying the Permitted Purpose for sharing with other project team member's and uploaded or issued into the "shared" state of the Common Data Environment.
Status Code	The code allocated to BIM Material identifying the Permitted Purpose of the information therein and describing the suitability of its contents.
Structured Information	Referring to geometrical models, schedules, and database.
Task Teams	Individuals assembled to perform a specific task within a delivery team
Unstructured Information	Referring to documentation, video clips and sound recording
Worksets	A workset is a collection of elements in a work shared project. Or instance can be based on functional areas structure underground and structure overground

1. Introduction

Information to be produced and managed in the CDE throughout the project life cycle should be as it planned to be at the initiation and tender phases. In addition, all information (structured and unstructured) should be understandable by all parties, as well as being:

- Clear (produced with the recipient in mind)
- Complete (produced against the project's master information delivery plan)
- Consistent (produced in accordance with the project's information production methods and procedures)
- Coordinated (produced spatially coordinated and sourcing approved information by others)
- Correct (produced in compliance with the project's information standard)

In order to reach this target, the following should be agreed in the Project BEP

- Information formats.
- Delivery formats.
- Federation – break down the structure of the PIM Project Information Model.
- The predefined template and central library are delivered to task teams.
- Asset management.
- Classification of objects should be in accordance with the Employer's documentation and guidelines.
- Tolerances and clearances required for clash detection.

2. QA/QC Guideline / how to be used.

A BIM QA/QC to be carried out on all submissions prior to being shared by the task team managers and uploaded on the CDE shared folder. The Appointing party will certify each submission to be passed for technical review or to be returned to the task team for review along with the comments on the Employer's QA/QC checklist which agreed during the appointment phase.

The checklist will identify mandatory items (to have red colour checkboxes) for the submission to be passed. However, in case of the submission is approved to be passed with comments, the QA/QC comments will be sent back to the task team to avoid repeating the same comments in upcoming submissions.

The task team manager to carry out the initial check prior to share the submission and to use the YES/NO for confirmation of compliance, N/A if it is not applicable in respect to the status and the purpose of the submission. The task team manager to ensure the compliance of the submission with the approved MIDP and deliverables strategy, as the submission will be rejected if it did not meet the phase submission as agreed on the MIDP.

Comment area will be for the Appointing party BIM team to add their comments whether the submission to be passed or to be revised and resubmitted as illustrated in diagram 01

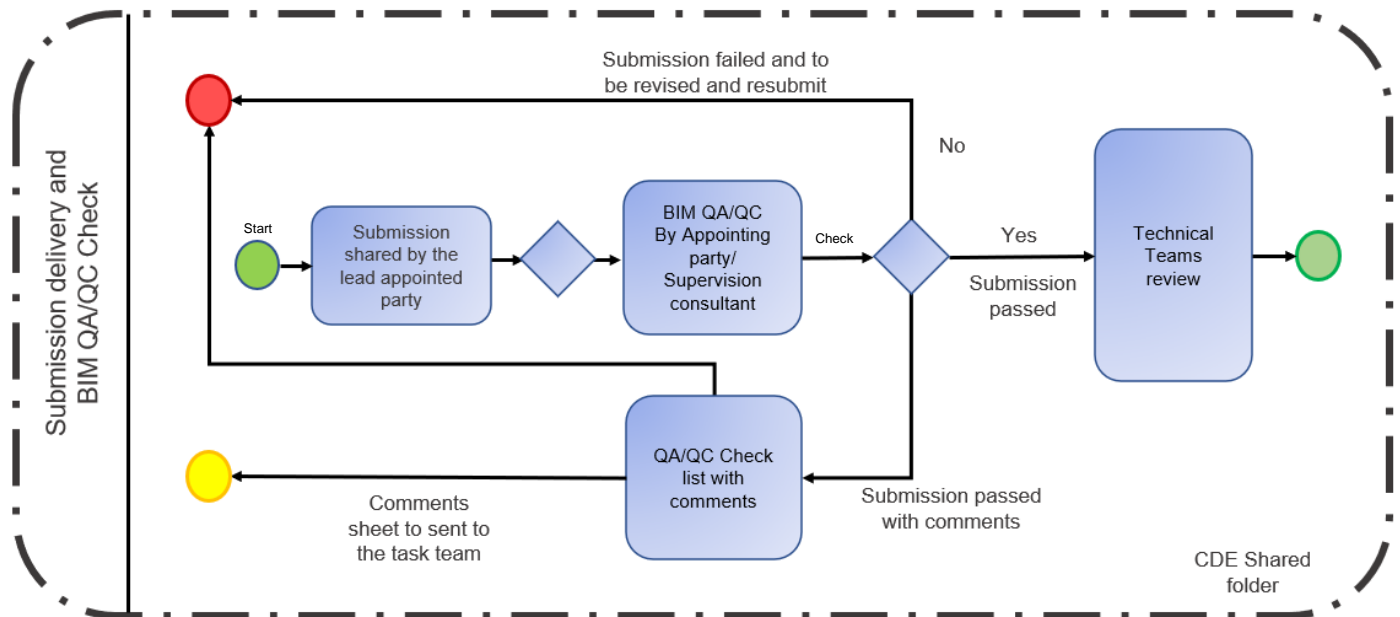


Diagram 01 – BIM QA/QC check workflow.

3. Standards

The QA/QC check will certify the submission against the following standards:

- The project EIR (Exchange Information Requirement)
- The project BEP (MIDP and approved standards methods and procedures)
- The Project LOD (Level Of Development) and matrices.
- The ADM documentation guidelines – standards of infrastructure which can be found [on the ADQCC website](#).
- ADM Consultant procedure manual for design consultancy services which can be found [on the ADQCC website](#).
- ADM QA QC Manual – 2011 Abu Dhabi, which can be found [on the ADQCC website](#).
- All relevant Abu Dhabi-QCC Manuals, including Standard Drawings and Standard Specifications which can be found [on the ADQCC website](#).

4. Quality measurement

The QA/QC measurement had been based on specific measures on the following factors:

- Submittals
- Model health and Set-up
- Modelling issues
- Coordination and constructability
- Documentation

Under each category, there are sub-categories and quality checkpoints, and some checkpoints are mandatory for the submission to be passed to the technical review team, while others should be checked for compliance.

The QA/QC checklist will be applicable for all submissions and all type of BIM files that are submitted in different phases of the collaborative production of information during the project life cycle.

This QA/QC check list can be shared with the Lead appointed party during the appointment phase as a guideline following the approved platforms and formats of files in the project BEP.

5. The checklists

General Information cover page

Project general information	
Project name:	
Project number:	

Personnel in charge of the submission contact details	
Project Role – Consultant	
Company:	
Contact:	
Name:	
Email:	
Tel No:	

Submission Information											
Status Code	S1	S2	S3	S4	S6	S7	D1	D2	D3	AB	other
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Revision Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	other
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Phase Code	CD	PD	DD	FT	PIM 1	PIM 2	PIM 3	PIM 4	AB	AIM	other
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If special submission	Status Code	<input type="checkbox"/>	Revision Code	<input type="checkbox"/>	Phase Code	<input type="checkbox"/>					
Comments											

Submission Discipline	Discipline code	
Road Geometry	RG	<input type="checkbox"/>
Signage and Marking	SM	<input type="checkbox"/>
Road Safety	RS	<input type="checkbox"/>
Road Pavement	RP	<input type="checkbox"/>
Lighting	L	<input type="checkbox"/>
Stormwater	SW	<input type="checkbox"/>
Geo-technical Study	GS	<input type="checkbox"/>
Structural	S	<input type="checkbox"/>
Landscape	LS	<input type="checkbox"/>
Irrigation	IR	<input type="checkbox"/>
Materials	MT	<input type="checkbox"/>
Electro mechanic	EM	<input type="checkbox"/>
Addressing	AD	<input type="checkbox"/>

All files submitted following the naming convention						<input type="checkbox"/>
Project Number	Originator	Federation/ Breakdown / Zones	Location or Part	Type	Discipline /Role	Number
S0244	XYZ	Z2	UG	3D	LS	0125

5.1. Submission file list

BIM Models

S.no	Discipline	File / Model name	LOD	LOI	Authoring tool	ADM Native format	Equivalent Exchange format
1	Roads	1284-8_PRS_Z1_P1_M3_RG_0001	200	200	C3D	DWG	IFC
2	Roads	1284-8_AJ_SZ1_P2_M3_SM_0002	300	300	RVT	RVT	IFC
3	Roads	1284-8_DL_Z2_P2_DR_RS_0021	300	300	CAD	DWG	IFC
4	Roads	1284-8_ABC_Z3_P1_M3_RP_0051	300	300	C3D	DWG	IFC
5	Roads	1284-8_ABC_Z3_P1_M3_RP_0051	400	400	Navisworks	NWD	Clash-free Report

The table information to be extracted from the MIDP, for coding samples refer to appendix A.

All Other Documents

S.no	Discipline	File / Model name	Authoring tool	Native format	Equivalent Exchange format
1	PRS	1284-8_PRS_Z1_P1_BQ_RG_0001	Excel	XLS	-
2	PRS	1284-8_AJ_Z2_P2_BQ_SM_0001	Excel	XLS	PDF
3	PRS	1284-8_DL_Z2_P2_CA_RS_0001	Word	DOC	PDF
4	PRS	1284-8_ABC_Z3_P1_CA_RP_0001			

The table information to be extracted from the MIDP, for coding samples refer to appendix A.

5.2. Checklist 1 - Submittals

Measuring that each submitted item had been submitted correctly and efficiently



: Mandatory items to be verified in order for the submission to be passed for technical review.

Submittals		Yes	No	N/A	Comments/ Equivalent Exchange format	Pass to Technical review
1.1	Submittal Files compliance					
1.1.1	All Files submitted through CDE are in the correct folder.					<input type="checkbox"/>
1.1.2	The submission has the correct Status/Suitability code.					<input type="checkbox"/>
1.1.3	The submission has the correct revision code.					<input type="checkbox"/>
1.1.4	Files naming is following the ADM Naming Standards.					<input type="checkbox"/>
1.1.5	All design proposals had been submitted in full submission.					<input type="checkbox"/>
1.2	List of Models and Drawings					
1.2.1	All submitted files/models list according to MIDP.					<input type="checkbox"/>
1.2.2	Native BIM model had been submitted.					<input type="checkbox"/>
1.2.3	NWD federated model had been submitted.					<input type="checkbox"/>
1.2.4	NWC files had been submitted for each volume.					<input type="checkbox"/>
1.2.5	IFC files format had been submitted.					<input type="checkbox"/>
1.3	File Format/Software Version					
1.3.1	All submitted files are in correct format.					<input type="checkbox"/>
1.3.2	All submitted file in the correct version.					<input type="checkbox"/>
1.4	Documentation					
1.4.1	All submitted models following the predefined LOD submission phase.					<input type="checkbox"/>
1.4.2	Clash report had been submitted in the correct format.					<input type="checkbox"/>
1.4.3	Clash proposed resolutions had been submitted.					<input type="checkbox"/>
1.4.4	Compare model versions (BIM 360 feature) report had been submitted.					<input type="checkbox"/>
1.5	Replies to Previous Comments					
1.5.1	All submitted drawing sheets/ models responding to previous submission comments.					<input type="checkbox"/>
1.5.2	All submitted drawing sheets responding to previous RFIs.					<input type="checkbox"/>
1.5.3	All submitted drawing has revision clouds (in case of resubmission).					<input type="checkbox"/>
Comments:						
1.1	Add comment here if any					

5.3. Model health and Set-up

Measuring the compliance of the submitted models with standards and project requirement

Model Health & Set-Up		Yes	No	N/A	Comments	Pass to Technical review
2.1	Submittal Health & QA/QC					
2.1.1	Submitted models size as per agreed in the BEP.					<input type="checkbox"/>
2.1.2	Submitted models files open correctly.					<input type="checkbox"/>
2.2	Templates and Central Library					
2.2.1	Employer's predefined template had been used in creating the model.					<input type="checkbox"/>
2.2.2	Employer's central library had been used.					<input type="checkbox"/>
2.2.3	Newly introduced objects are following the Employer's library standards.					<input type="checkbox"/>
2.3	Naming Convention					
	Civil 3D models					
2.3.1	Object naming is following the Employer's standards.					<input type="checkbox"/>
2.3.2	Layer naming is following the Employer's standards.					<input type="checkbox"/>
2.3.3	Material naming is following the ADM standards					<input type="checkbox"/>
	Revit Models					
2.3.4	Model's sheets naming is following the Employer's standards.					<input type="checkbox"/>
2.4	Project Set-Up					
	Civil 3D models					
2.4.1	Model units following the BEP.					<input type="checkbox"/>
2.4.2	Model coordinates and origin point following the Employer's GIS system.					<input type="checkbox"/>
2.4.3	All models have the same insertion/origin point.					<input type="checkbox"/>
2.4.4	Model levels and grids have any changes from the approved submission.					<input type="checkbox"/>
2.4.5	All drawing sheets submitted are included in the BIM model.					<input type="checkbox"/>
2.4.6	All drawing sheets have the same internal revision number as per the file attribute.					<input type="checkbox"/>
	Revit Models					
2.4.7	The model has correct worksets as approved in the BEP.					<input type="checkbox"/>
2.4.8	The model is in Share Coordinates and the origin point following the Employer's GIS system					<input type="checkbox"/>

2.5	Model Subdivision Strategy					
2.5.1	Model federation strategy as per agreed on the BEP and has no update.					<input type="checkbox"/>
2.6	Clean Up Model					
2.6.1	The model is clean and has no warnings, unreferenced links, DWG imports.					<input type="checkbox"/>
2.6.2	The model is clean from unused/ unnecessary information, sheets, lines or views.					<input type="checkbox"/>
2.6.3	The model has all corridor files with no profile views.					<input type="checkbox"/>
2.6.4	The Model is free of unnecessary surface snapshots.					<input type="checkbox"/>
Comments:						
2.1	Add comment here if Any					

5.4. Modelling issues

Measuring the modelling and drafting quality of the submitted models and sheets

	Modelling Issues	Yes	No	N/A	Comments	Pass to Technical review
3.1	Elements Geometry					
3.1.1	Model is visually accepted and has no floating or misplaced elements.					<input type="checkbox"/>
3.1.2	Model objects are geometrically accurate and correctly located.					<input type="checkbox"/>
3.1.3	All model surfaces had been created from XML links or other input dates in Civil3D.					<input type="checkbox"/>
3.1.4	Model corridors had been created with respect to the road alignment.					<input type="checkbox"/>
3.2	LOD Compliance					
3.2.1	Model objects are following the LOD matrix as per Employer's standards					<input type="checkbox"/>
3.2.2	Model objects are geometrically following the Employer's LOD standards.					<input type="checkbox"/>
3.2.3	Model families are following the Employer's LOD standards.					<input type="checkbox"/>
3.3	LOI Compliance					
3.3.1	Model objects are following the LOI matrix as per Employer's standards					<input type="checkbox"/>
3.3.2	Model families are in the correct category.					<input type="checkbox"/>

3.3.3	Model objects attributes are following the Employer's LOI Standards.					<input type="checkbox"/>
3.3.4	Model families are following the Employer's LOI standards.					<input type="checkbox"/>
3.3.5	Model objects attributes are following the Asset Management standards.					<input type="checkbox"/>
3.4	Modelling Method Inconsistency					
3.4.1	Model objects are not overlapping/ duplicated on the same place.					<input type="checkbox"/>
3.4.2	Model objects are referenced to the correct level and correctly located.					<input type="checkbox"/>
3.4.3	Model objects had been modelled with defined materials.					<input type="checkbox"/>
3.4.4	Model object's assembly code is following the Employer's LOI matrix.					<input type="checkbox"/>
Comments:						
3.1	Add comment here if Any					

5.5. Coordination and constructability

Measuring the quality of coordination between appointed task teams and the project federation.

Coordination & Constructability		Yes	No	N/A	Comments	Pass to Technical review
4.1	Discrepancies between 2D Drawings and BIM Model					
4.1.1	The submitted models and sheets have no discrepancies between 2D drawings (Plans, Sections, Elevations) and BIM model.					<input type="checkbox"/>
4.2	Phasing Types					
4.2.1	All Phasing types (i.e. new, existing, interface, demolition, etc.) are following the submission phase.					<input type="checkbox"/>
4.3	Clashes and Coordination Issues					
4.3.1	The submitted model has no significant clashes between objects.					<input type="checkbox"/>
4.3.2	The submitted models of different interface areas (different volumes/disciplines) are free of clashes with respect to the submission phase.					<input type="checkbox"/>
4.3.3	Resolution of clashes had been submitted along with the clash report.					<input type="checkbox"/>
4.4	Discrepancies between Native and Navisworks files					

4.4.1	The submitted native (Civil3D/Revit) model and Navisworks files are consistent with no discrepancy (i.e. hidden elements, deleted elements etc.)					<input type="checkbox"/>
4.5	Utilities Routing and Location Issues					
4.5.1	All modeled pipelines are properly connected to manholes.					<input type="checkbox"/>
4.5.2	All modelled drainage pipes are modelled with a slope to allow for more appropriate Spatial coordination					<input type="checkbox"/>
4.5.3	All modeled pipes/ manholes/ duct banks are modeled at the appropriate elevation.					<input type="checkbox"/>
4.5.4	All modelled lighting / electrical equipment placed at the correct elevation					<input type="checkbox"/>
4.6	Non-Standard Elements					
4.6.1	All Modeled objects (Pipes/ manholes/ Duct banks) have standards size and fittings					<input type="checkbox"/>
Comments:						
4.1	Add comment here if Any					

5.6. Documentation

Measuring overall submitted documents quality and consistency.

Documentation Quality		Yes	No	N/A	Comments	Pass to Technical review
5.1	Sheets organization					
5.1.1	All 2D drawings are extracted from relevant BIM Models					<input type="checkbox"/>
5.1.2	Total number of sheets existing in the model are matching with total number of 2D drawings submitted.					<input type="checkbox"/>
5.1.3	All sections, plans, elevations views are extracted from relevant BIM Models					<input type="checkbox"/>
5.1.4	All sheets scale are correct and as per the MIDP					<input type="checkbox"/>
5.1.5	All sheets naming and sequence of numbers as per the MIDP.					<input type="checkbox"/>
5.1.6	All section symbols/callouts and section views existing on the sheets are matching					<input type="checkbox"/>
5.2	Annotations and Tagging					
	Civil 3D models					
5.2.1	The sheets annotation and tags are included in the sheets.					<input type="checkbox"/>

5.2.2	All dimensions are dimensions families.					<input type="checkbox"/>
	Revit Models					
5.2.3	All tags are tags families and the information existing in the tags are extracted from relevant BIM objects					<input type="checkbox"/>
5.3	Scheduling & Quantification					
5.3.1	All schedules are extracted from relevant BIM Models					<input type="checkbox"/>
5.4	Drafting Issue					
5.4.1	All spelling for sheet information is correct.					<input type="checkbox"/>
5.4.2	All Construction terminology is up to standards					<input type="checkbox"/>
Comments:						
5.1	Add comment here if Any					

Appendix A

Coding samples for files naming convention fields and file attributes can be found in this appendix.

Folder	Description	Status Code	Revision Code	Notes
WIP	Initial Model	S0	P1	initial
	Task Team Internal development	S0	P1.01	Internal
	Returned /Rejected	S0	Pn	New revision
	Task Team Internal development	S0	Pn.0n	Internal
	Task Team Internal development	S0	Pn.0n	Internal
	Task Team Internal development	S0	Pn.0n	Internal
Shared	For coordination only	S1	Pn	shared
	For Information	S2	Pn	shared
	For Internal review & comments	S3	Pn	shared
	For Stage approval	S4	Pn	Submission
	For PIM authorization	S6	Pn	Submission
	For AIM authorization	S7	Pn	Submission
	Costing	D1	Pn	Deliverable
	Tender	D2	Pn	Submission
	Obtain Utilities approval	D3	Pn	Deliverable
Published	Approved	A1	Cn	Commercial Doc
	Proceed with comments	B	Cn	Commercial Doc
	Costing	D1	Cn	Commercial Doc
	Tender	D2	Cn	Commercial Doc
	Obtain Utilities approval	D3	Cn	Commercial Doc
	Revision required	C	Cn	Commercial Doc
	As-Built	AB	Cn	Commercial Doc

Table 01 - Submission status and revision codes in relation to the CDE state where the submission exists. (n is integer serial number counting versions of the file)

All WIP state work will take S0 as a status code, Revisions will start by P1, and to remain P1 until it approved to be shared by the task team manager. Internally it will take P1.01, P1.02, P1.03 as much it needed to reach the targeted level. The returned submissions to start the serial of P2 or P3 onward and consequently P2.01, P2.02 or P3.01, P3.02 onward.

BIM submission	Submission Code
Concept Design	CD
Preliminary Design	PD
Detailed Design	DD
For Tender	FT
Construction (Regular submissions of the PIM can be scheduled as per the project Milestones)	PIM
As-Built	AB
Asset –Handing over	AIM

Table 02 - BIM Submissions phases codes.

Discipline Code		
1	RG	Road Geometry
2	SM	Signage and Marking
3	RS	Road Safety
4	RP	Road Pavement
5	L	Lighting
6	SW	Stormwater
7	GS	Geo-technical Study
8	ST	Structural
9	LS	Landscape
10	IR	Irrigation
11	MT	Materials
12	EM	Electro mechanic
13	AD	Addressing

Table 03 –Infrastructure disciplines codes.

Role/ Discipline Code		
1	A	Architect
2	B	Building Surveyor

3	C	Civil Engineer
4	D	Drainage, Highways Engineer
5	E	Electrical Engineer
6	F	Facilities Manager
7	G	Geographical and Land Surveyor
8	H	Heating and Ventilation Designer
9	I	Interior Designer
10	IR	Irrigation Engineer
11	K	Client
12	L	Landscape Architect
13	M	Mechanical Engineer
14	O	Public Health Engineer
15	P	Quantity Surveyor
16	Q	Structural Engineer
17	S	Town and Country Planner
18	TW	Contractor
19	U	Utility Engineer
20	X	Subcontractor
21	Y	Specialist Designer
22	Z	General (non-disciplinary)

Table 04 – Roles/ Disciplines codes.

Drawing information Code		
1	AF	Animation file (of a model)
2	CM	Combined model (Combined multidiscipline model)
3	CR	Specific for the clash process
4	DR	2D Drawing
5	M2	2D Model file
6	M3	3D Model file
7	MR	Model rendition file for the other renditions, e.g. thermal analysis
8	VS	Visualization

Table 05 – Drawings of information codes.

Document Code		
1	BQ	Bill of Quantity
2	CA	Calculations
3	CO	Correspondence
4	CP	Cost plan
5	DB	Database
6	FN	File note
7	HS	Health and safety
8	IE	Information Exchange file
9	MI	Minutes / action notes
10	MS	Method statement
11	PP	Presentation
12	PR	Programme
13	RI	Request for Information
14	RP	Report
15	SC	Structural Calculation
16	SH	Schedule or table
17	SN	Snagging list
18	SP	Specification
19	SU	Survey

Table 06 – Documents codes.