



Shaw Auditorium at the Hong Kong University of Science and Technology

BIM Project Execution Plan Audit Report | January 2020

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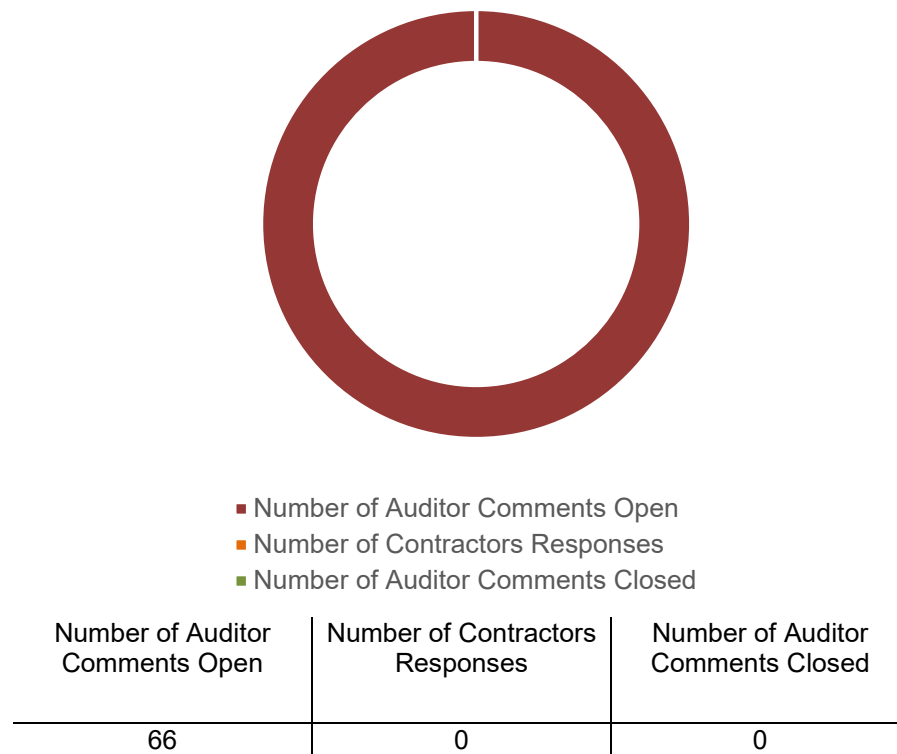
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1 st issue	13 Jan 2020	KST	KST

1.0

Introduction

The following report is an audit of the BIM Project Execution Plan (BIM PXP) for the Shaw Auditorium at the Hong Kong University of Science and Technology received under BIM-OT-001B on 22 October 2019 for compliance to industry best practice and the project BIM specification.

The audit status can be found below;



Refer to section 2.0 for the BIM PXP Audit Report.

2.0

BIM PXP Audit Report

Section Reference	Auditor Comment	Contractors Comment	Mutually Agreed Comment
III. BIM Uses	Is the Contractor responsible for Maintenance Scheduling? If not, this should not be included here.	Noted.	
III. BIM Uses	Use of BIM for Visualisation and Walkthrough is missing	Noted. Please refer to P.8 of updated PXP	
IV. Project Deliverables	There is no provision for the BIM Construction Model (LOD 350). This was meant to occur 1 month before commencement of super structure works. Please advise the intended approach for the delivery of this item?	The submission of 25% of BIM model on 6 th January 2020 was based on LOD 350. The superstructure to be commenced on 17 March 2020 (as per the master programme Rev. 0C)	
IV. Project Deliverables	There is no provision for the Complete As Built AIM Model. This should occur on or one month before practical completion. Please advise the intended approach for the delivery of this item?	7 th August 2021	
IV. Project Deliverables	Project deliverables list is not exhaustive. It is missing the BIM related drawings extracted from the models. Please provide a drawing submission schedule which contains all shop drawings, CSDs, CBWDs and any other information to be extracted from the models and their intended submission date, their linked construction activity.	Noted, please refer to P.10 of updated PXP.	
IV. Project Deliverables	Submission date for the models occur after the construction activities in the latest Main Works Programme. Please advise and associate the submission date of the deliverables with their respective construction activity task code?	Noted, please refer to P.10 of updated PXP.	
IV. Project Deliverables	The BIM Training to the employer's representatives is identified as TBC. Please provide the respective training plan for review, agenda, list of attendees for review and approval and submit records of attendance once completed.	Noted, please refer to P.11 of updated PXP.	
IV. Project Deliverables	The additional BIM training, identified in section 5.2 of the specification, is missing. Please provide the respective training plan, list of attendees and records of attendance once completed.	Noted, please refer to P.11 of updated PXP.	
IV. Project Deliverables	Submission of 4D digital construction sequence is identified as 'TBC Monthly'. Please advise when and how	4D simulation will submit for review monthly through Aconex in AVI format.	

	this will be delivered.		
IV. Project Deliverables	BIM model submissions should be supplemented with a submission checklist and a list of drawings used and correlate with the model.	Please refer to attached drawing list	
IV. Project Deliverables	The clash report submission should include the accompanying NWD and NWC files that the clash report produced from.	Noted.	
IV. Project Deliverables	With reference to section 2.6.(10)., there should be a regular reporting mechanism for clashes, progress and coordination. Please propose a reporting format to satisfy the requirements and define the interval in which you wish to report (ie monthly).	Noted, please refer to Annex 8 of updated PXP.	
V. Organization Roles	There is no organisation chart to depict all stakeholders. Organisation chart provided in BIM PXP is limited to the BIM team only. Please provide an organisation chart to show how the Contractor interfaces internally with their trade disciplines, and externally with the client, consultant etc.	Noted, please refer to P.12 of updated PXP	
V. Organization Roles	The subcontractors are missing from the organisation chart. Please identify the subcontractors within the project, their associated responsibility and how the Contractor interfaces with them within a BIM process.	Noted, please refer to P.14of updated PXP	
VI. Common Data Environment	BIM 360 Docs identified as the primary technological solution for the CDE. Please advise when this will be set up, how people access it, any access and security control measures.	Noted, please refer to P.20-21 of updated PXP.	
VI. Common Data Environment	The intent behind the CDE approach is to follow the principles behind ISO 19650-2 and clearly depict the flow of information throughout the construction period. This workflow has not been identified. Please provide a workflow to how information is managed from WIP, SHARED, CLIENT SHARED AREA, PUBLISHED and ARCHIVED.	Noted, please refer to P.20 of updated PXP.	
VI. Common Data Environment	Please identify how BIM 360 Docs works with the approval of information and use of Aconex.	Noted, please refer to P.19 of updated PXP.	
VI. Common Data Environment	Please identify how the CDE data is archived and transferred to HKUST FMO or the Architect.	Noted, please refer to P.19 of updated PXP.	

VI. Common Data Environment	Please identify how revisions are controlled and what is the standard approach to revisioning for the Works.	Noted, please refer to P. 20 section B of PXP.	
VI. Common Data Environment	With reference to section 2.12.(9).(a). please identify when and how frequent the Master BIM shall be shared.	Noted, please refer to P.19 of PXP.	
VI. Common Data Environment	Please advise how the Contractor will be tracking change during the process.	Noted, please refer to P. 20 section B and P.29 of PXP.	
VII. BIM Coordination Process & Collaboration Procedure, A. BIM Coordination Workflow	CAD drawings should not be used to build the model as there may be discrepancy between issued pdf's and CAD drawings. Pdf's should be used.	Noted.	
VII. BIM Coordination Process & Collaboration Procedure, A. BIM Coordination Workflow	Details of all model review workshops are missing. Please advise how the Contractor interfaces with the subcontractor in the BIM enabled process.	Please refer to P.24 of PXP.	
VII. BIM Coordination Process & Collaboration Procedure, A. BIM Coordination Workflow	This process implies that information is not derived from the model and merely the model is updated and coordinated. Please advise how the BIM is used to derive 2D deliverables out of the model and the steps taken to QA those deliverables.	Please refer to P.27 section E of updated PXP.	
VII. BIM Coordination Process & Collaboration Procedure, A. BIM Coordination Workflow	Shop drawings, CSDs and CBWDs have been identified as deliverables to be extracted from the BIM. Please advise of the intended workflow of the generation of these deliverables, interface of the subcontractors, whether there are interfaces where the consultant does a WIP review etc.	Please refer to P.27 section E of updated PXP.	
VII. BIM Coordination Process & Collaboration Procedure, A. BIM Coordination Workflow	Visual check & coordination is specified. Please advise how the Clash detection process fits into the workflow. This is not explicit in the graphical workflow.	Please refer to P.30-32 part IX of updated PXP.	
VII. BIM Coordination Process & Collaboration Procedure, A. BIM Coordination Workflow	The BIM PXP identifies the existence of the project coordination schedule. Please advise if you are able to provide and report against this.	Weekly BIM review meeting will be held with subcontractor and bi-weekly meeting will be held with design team for reporting and coordination.	

VII. BIM Coordination Process & Collaboration Procedure, A. BIM Coordination Workflow	The terminology, Major issues and Minor issues, are being used within this BIM PXP. At present, there is no definition of major and minor provided within the BIM PXP and can be incredibly subjective. Please advise what you are determining to be major and minor with examples and whether the terminology is congruent with section 2.6.(3). of the specification.	Noted, please refer to P.23 of PXP.	
VII. BIM Coordination Process & Collaboration Procedure, B. BIM Model and Submission Workflow	How does this workflow integrate with the workflow in the BIM Coordination Workflow highlighted previously?	Weekly BIM review meeting will be held with subcontractor and bi-weekly meeting will be held with design team for reporting and coordination.	
VII. BIM Coordination Process & Collaboration Procedure, B. BIM Model and Submission Workflow	Section 2.7.(1). identifies that all 2D drawings should be produced from the BIM. This submission workflow only identifies CSD and CBWD. Please provide a list of drawings to be extracted from the BIMs, their submission schedule, the linked construction activity and sample outputs for review and approval of the intended BIM standard.	Please refer to attached drawing list	
VII. BIM Coordination Process & Collaboration Procedure, B. BIM Model and Submission Workflow	The section identifies that 'all new information will be frozen on 14 days before submission and models will be frozen on 7 days before submission. BIM Manager carries out Clash Analysis to minimize and monitor the clashes before drawing production. Late information will be incorporated in next submission.' It is the responsibility of the Contractor to keep the preconstruction documentation and related BIM works in advance of construction and procurement. This statement should not be used as a way of circumventing their obligations nor releasing of RFIs at a late stage. In order to avoid this, please advise of the coordination and submission schedules, in addition to this, upon submission of deliverables, please advise what issues remain outstanding to allow the reviewer to understand the situation when reviewing the information for approval.	Noted.	

VII. BIM Coordination Process & Collaboration Procedure, C. As-Built Workflow	How does the CQMS integrate into this intended workflow? The CQMS is to aid in the identification of site activities where the BIM can be used onsite.		
VII. BIM Coordination Process & Collaboration Procedure, C. As-Built Workflow	With reference to 2.7.(1)., 'All 2D drawings produced by the Contractor shall be extracted from the BIM models'. This workflow suggests that the drawings will be provided by subcontractors and then models will be updated.	Noted. it will be followed.	
VII. BIM Coordination Process & Collaboration Procedure, C. As-Built Workflow	The BIM PXP identifies 'Main contractor is responsible to consolidate useful information for facility management and asset management provided by sub-contractors.' Please advise of what QA/QC procedures are in place to ensure this information is accurate upon receipt from the subcontractor.	Main contractor will issue the updated information (e.g. A.I drawing) to the contractor by site memo, and the weekly coordination meeting will be held with sub-contractor to pass the update information to construction team to ensure subcontractor receive information is accurate	
VII. BIM Coordination Process & Collaboration Procedure, C. As-Built Workflow	There is a quality checking process in the BIM PXP, but what checks are in place to fulfil the accuracy obligations of section 2.4.(3). of the specification.	Please refer to P.30-31 part IX of updated PXP.	
VII. BIM Coordination Process & Collaboration Procedure, D. Construction Quality Management System (CQMS) Workflow	The BIM PXP identifies that BIM 360 Built is to be used but does not specify a date for testing, training and implementation. Please provide a plan for BIM 360 Built testing, training and implementation	The BIM 360 built is processing the procurement now, the register account, testing, training and implementation will be provided to project team thereafter.	
VII. BIM Coordination Process & Collaboration Procedure, D. Construction Quality Management System (CQMS) Workflow	Software specification of BIM 360 Built suggests it is possible to achieve the obligations but performance audit to occur upon implementation.	Please refer to Annex 9 of updated PXP	
VII. BIM Coordination Process & Collaboration Procedure, D. Construction Quality Management System	Please advise when the mobile tablets and user accounts are provided in accordance with section 2.12.(7). of the specification.	Mobile tablet is processing the procurement now, it will be provided to project team thereafter.	

(CQMS) Workflow			
VII. BIM Coordination Process & Collaboration Procedure, D. Construction Quality Management System (CQMS) Workflow	Please advise when the training will be provided to the quality team as per section 2.12.(8). of the specification.	The BIM 360 built is processing the procurement now, the register account, testing, training and implementation will be provided to project team thereafter.	
VII. BIM Coordination Process & Collaboration Procedure, D. Construction Quality Management System (CQMS) Workflow	Please advise how the use of BIM 360 Built works within the context of the adopted CDE approach.	BIM 360 built and BIM 360 Docs can exchange information in the same source of data environment.	
VII. BIM Coordination Process & Collaboration Procedure, D. Construction Quality Management System (CQMS) Workflow	The section generally copies elements from the specification but please advise how you are going to work with this, who has access, how it interfaces with all stakeholders (inc consultants, subcontractors and clients.)	Noted, please refer to P. 28 section G of updated PXP.	
VIII. BIM and Facility Data Requirements	The BIM PXP omits the submission of; ironmongery schedules, window schedules, access panel schedules, shutter schedules, cate ladder schedules, sanitary fitment schedules, signage schedules, roofing system, material data sheets, O&M manuals and product catalogues as identified within section 2.10 of the specification. Please review the holistic requirements of the scope and include it in the BIM PXP. Where the BIM PXP deviates from scope, the Contractor should advise accordingly.	The ironmongery schedules, signage schedules, material schedules and O&M Manuals will be submitted in traditional format formally. However, Quantity of window, access panel, door, shutter, sanitary fitment, cat ladder roofing and it's ID will be aligned with BIM model.	
VIII. BIM and Facility Data Requirements	The BIM PXP refers to using EMSD BIM-AM standard but there is incongruence with their colour code, family naming and does not identify their intended data structure. Please review the colour code, naming requirements and propose their intended data structure to be used based on the EMSD	Noted. EMSD BIM-AM standard will be followed	

	shared parameters file.		
IX. Quality Checking Process	Please advise the frequency and responsible parties for all checking.	Please refer to P. 30-31 part IX of updated PXP.	
IX. Quality Checking Process	It suggests that these checks will be performed by the BIM team. How will the Contractor and Subcontractor validate these items in terms of technical and constructability?	Contractor and Subcontractor will validate these items during BIM coordination workshop weekly.	
IX. Quality Checking Process	Interference check is stated but the verification of design, installation and maintenance is missing. Please advise how you will check this within the BIM.	The verification of design, installation and maintenance will be carried out during BIM coordination workshop weekly..	
IX. Quality Checking Process	Clash detection requirements and process has not been provided within the BIM PXP. Please provide a clash detection workflow, list of clash detection measures to be used, with tolerances and frequency within the next iteration of the BIM PXP.	Please refer to P 32 of updated PXP.	
IX. Quality Checking Process	Please advise what QA/QC procedures you will incorporate for checking site activities and ensuring the model is up to date.	Please refer to P. 30-31 part IX of updated PXP.	
IX. Quality Checking Process	Please advise what QA/QC procedures you will incorporate for tracking change in the BIM process.	Please refer to P. 30-31 part IX of updated PXP.	
IX. Quality Checking Process	Please advise how and when you will report the results of the QA/QC measures.	Please refer to P. 30-31 part IX of updated PXP.	
X. Technological Infrastructure Needs	Please advise of the minimum hardware specification to satisfy the requirements within section 4.1 of the specification.	Please refer to P. 34-35 part X of updated PXP.	
X. Technological Infrastructure Needs	Please advise of the software used for Visualisation and Walkthrough.	Please refer to P. 33 part X of updated PXP.	
X. Technological Infrastructure Needs	Please advise of the software used for 4D.	Navisworks shall be used.	
XI. Model Structure, A. Model Structure and File Naming	No clear data segregation or processes and procedures have been provided. Please provide the data segregation strategy (ie model federation map)	Please refer to P.39 of updated PXP.	
XI. Model Structure, A. Model Structure and File Naming	The BIM PXP refers to using EMSD BIM-AM standard but there is incongruence with their colour code, family naming and does not identify their intended data structure. Please review the colour code, naming requirements and propose their intended data structure to be used based on the EMSD shared parameters file.	Noted. EMSD BIM-AM standard will be followed	

XI. Model Structure, C. Measurement and Coordinate System	Intent to use is specified but no specific grid reference provided for location to Hong Kong Metric Grid Coordinates or Datum outlined in BIM PXP. Please outline the specific Hong Kong Metric Grid Coordinates and Datum Elevation reference and included within the BIM PXP as the intended project basepoint.	Noted.	
XI. Model Structure, D. System Abbreviation	System abbreviation suggests using CIC BIM Standards (Phase One). It would be advisable to use EMSE BIM-AM standards for MEP routing.	Noted. EMSD BIM-AM standard will be followed	
XI. Model Structure, E. Colour Code	Use EMSD BIM-AM colour code.	Noted. EMSD BIM-AM standard will be followed	
XII. Level of Development, B. Level of Development Matrix	The LOD provided within the LOD Matrix of the BIM PXP has a geometric LOD of 350 for as-built. This implies it is not as-constructed and field verified information. Please advise of the reluctance of providing a LOD 500 model. If this is associated with geometric complexity, the Contractor should propose visually, what the level of geometric complexity they will provide and to what extent it is as-constructed and field verified.	According to ASD bim-guide-for-facilities-upkeep-ver1.1, it stated that the interpretation of LOD 500 is that the 3D geometry details of the element / object is not less than LOD400 and the shape should be modelled for easy identification. Therefore, Graphical of As-Built LOD will be updated to 400.	
XII. Level of Development, B. Level of Development Matrix	LOD Matrix provided does not capture the CAT code, Attributes of each elements such as type/grade of material, dimensions, performance criteria, Elements or groups of elements to be included in BIM models or the Responsible trade / parties. Please review the LOD Matrix and add the CAT code, Attributes of each elements such as type/grade of material, dimensions, performance criteria, Elements or groups of elements to be included in BIM models or the Responsible trade / parties for inclusion within the next iteration of the BIM PXP. Please integrate the colour code into this matrix.	Please refer to P. 41-42 of updated PXP.	
XII. Level of Development, B. Level of Development Matrix	LOD Matrix refers to graphics and information. Please advise what you believe to be LOD stages of graphics and information with samples.	Please refer to P.43-54 of updated PXP.	
Annex 1 CSD & CBWD Drawings Schedules	The schedules are outdated and non exhaustive. Please provide a list of drawings to be extracted from the BIMs, their submission schedule, the linked construction activity and the approach adopted for the	Please refer to attached drawing list	

	development of such shop drawings.		
Annex 2 Clash Report Template	Please identify the status of the issue (eg Outstanding, Resolved, Awaiting further information), Location of clash with respect to plan grid and level, Number of days that the clash/issue is outstanding, Parties involved in resolving the clash/issue, Dates of BIM workshops where the clash/issue was addressed with a link to the associated meeting minutes.	Please refer to P. 57 of PXP.	
Missing Information	Schedule for BIM presentation and walkthrough is missing	Please refer to P. 9 of PXP.	
Missing Information	Information exchange requirements have not been clearly detailed.	Weekly BIM review meeting will be held with subcontractor and bi-weekly meeting will be held with design team for reporting , coordination and information updated.	
Missing Information	The Contractor should provide a workflow, standard and timeline to how the 4D will be developed.	Please refer to P. 25 section D of updated PXP.	