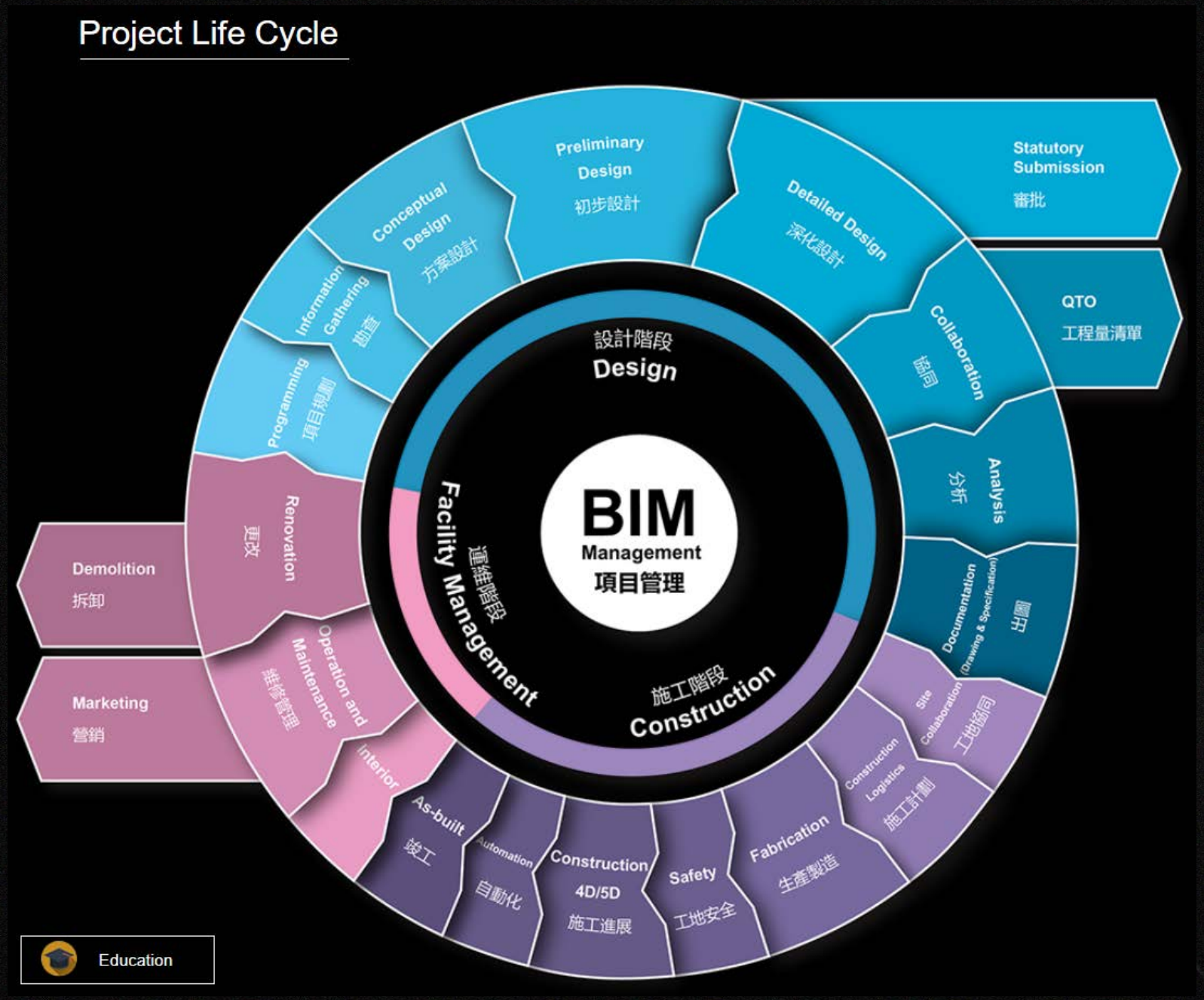
Advanced
Construction
Information
Development Ltd.

BIM - Contractual & Legal Aspects

David Fung

Registered Architect, HKIA
Managing Director, A.C.I.D.
Immediate past Chairman, HKIBIM
Assistant Professor, Department of Architecture, Chuhai College

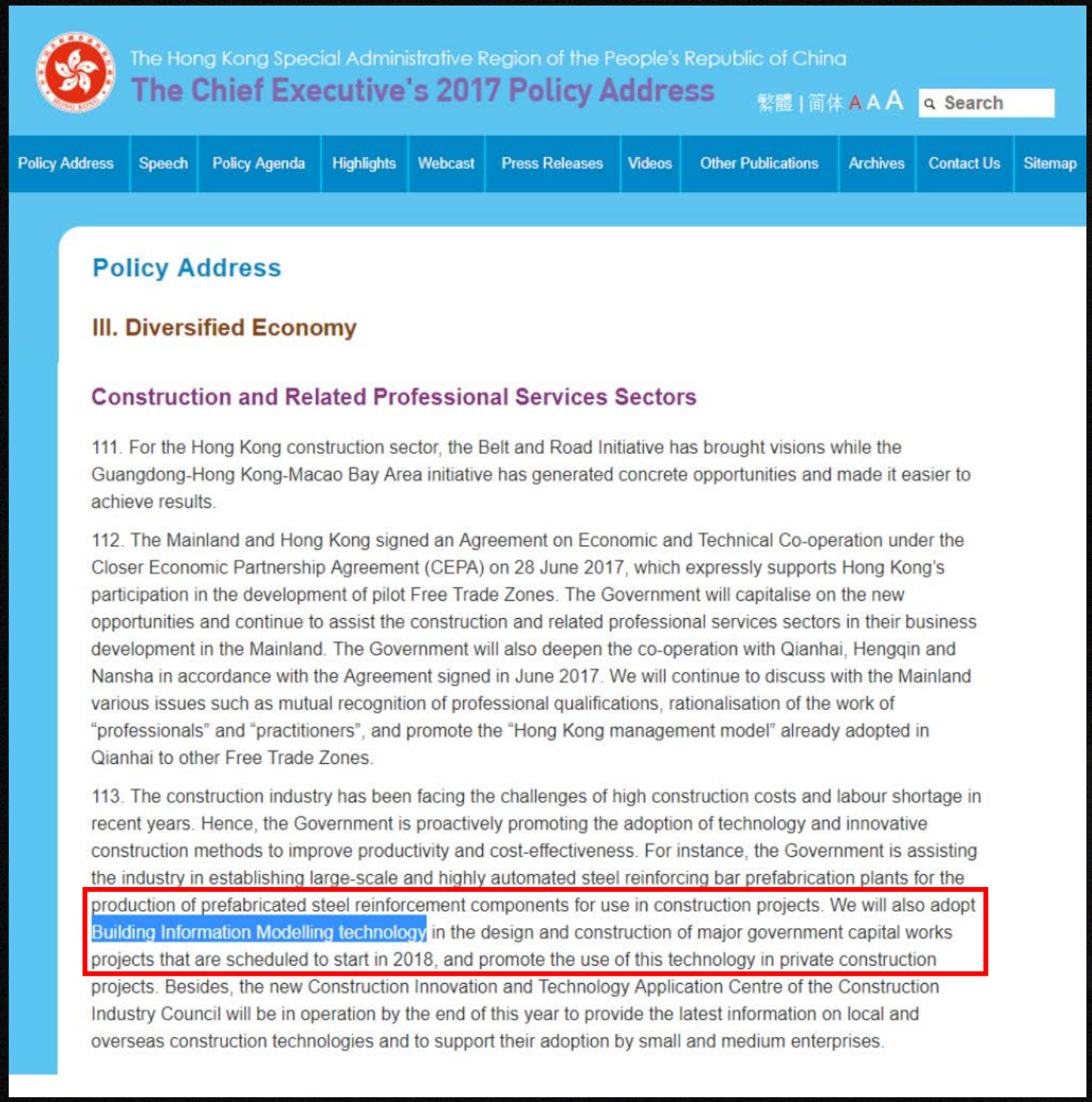
What is BIM?


Project Life Cycle
BIM
Management
項目管理
設計階段
Design
施工階段
Construction
運維階段
Facility Management
Information Gathering
勘查
Programming
項目規劃
Conceptual Design
方案設計
Preliminary Design
初步設計
Detailed Design
深化設計
Statutory Submission
審批
QTO
工程量清單
Collaboration
協同
Analysis
分析
Documentation
(Drawing & Specification)
圖冊
Site Collaboration
工地協同
Construction Logistics
施工計劃
Fabrication
生產製造
Safety
工地安全
Construction 4D/5D
施工進展
Automation
自動化
As-built
竣工
Interior
Operation and Maintenance
維修管理
Renovation
更改
Demolition
拆卸
Marketing
營銷
Education

What is BIM?

BIM is a rehearsal ……..

Government Policy



The Hong Kong Special Administrative Region of the People's Republic of China

The Chief Executive's 2017 Policy Address

繁體 | 简体 A A A Search

Policy Address | Speech | Policy Agenda | Highlights | Webcast | Press Releases | Videos | Other Publications | Archives | Contact Us | Sitemap

Policy Address

III. Diversified Economy

Construction and Related Professional Services Sectors

111. For the Hong Kong construction sector, the Belt and Road Initiative has brought visions while the Guangdong-Hong Kong-Macao Bay Area initiative has generated concrete opportunities and made it easier to achieve results.

112. The Mainland and Hong Kong signed an Agreement on Economic and Technical Co-operation under the Closer Economic Partnership Agreement (CEPA) on 28 June 2017, which expressly supports Hong Kong's participation in the development of pilot Free Trade Zones. The Government will capitalise on the new opportunities and continue to assist the construction and related professional services sectors in their business development in the Mainland. The Government will also deepen the co-operation with Qianhai, Hengqin and Nansha in accordance with the Agreement signed in June 2017. We will continue to discuss with the Mainland various issues such as mutual recognition of professional qualifications, rationalisation of the work of "professionals" and "practitioners", and promote the "Hong Kong management model" already adopted in Qianhai to other Free Trade Zones.

113. The construction industry has been facing the challenges of high construction costs and labour shortage in recent years. Hence, the Government is proactively promoting the adoption of technology and innovative construction methods to improve productivity and cost-effectiveness. For instance, the Government is assisting the industry in establishing large-scale and highly automated steel reinforcing bar prefabrication plants for the production of prefabricated steel reinforcement components for use in construction projects. We will also adopt Building Information Modelling technology in the design and construction of major government capital works projects that are scheduled to start in 2018, and promote the use of this technology in private construction projects. Besides, the new Construction Innovation and Technology Application Centre of the Construction Industry Council will be in operation by the end of this year to provide the latest information on local and overseas construction technologies and to support their adoption by small and medium enterprises.

Development Bureau (DevB) Technical Circular – BIM Adoption

香 港 特 別 行 政 區 政 府
The Government of the Hong Kong Special Administrative Region

政府總部
發展局
工務科
香港添馬添美道 2 號
政府總部西翼 18 樓

Works Branch
Development Bureau
Government Secretariat
18/F, West Wing,
Central Government Offices,
2 Tim Mei Avenue, Tamar,
Hong Kong

Ref : DEVB(W) 430/80/01
Group : 2, 5, 6

1 December 2017

Development Bureau
Technical Circular (Works) No. 7/2017

Adoption of Building Information Modelling
for Capital Works Projects in Hong Kong

Scope

This Circular sets out the policy and requirements on the adoption of Building Information Modelling (BIM) technology.

2. This Circular applies to works either by in-house government staff, consultants or contractors.

Effective Date

3. This Circular takes effect on **1 January 2018**.

Effect on Existing Circulars and Circular Memoranda

4. This Circular has no effect on existing circulars.

9. Capital works projects with project estimates more than **$30 Million**[1] shall use BIM technology. The policy is applicable for projects in the investigation, feasibility, planning, design or construction stages in the Capital Works Programme irrespective of the modes of delivery as detailed in the ensuing paragraphs. For entrustment works, subvented capital works projects and works that are undertaken by private parties but will be handed back to the Government for maintenance, the BIM adoption policy is covered in paragraph 16.

Government Policy

Buildings Department	Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers	ADV-34

Building Information Modelling

The use of Building Information Modelling (BIM) is a relatively new and innovative approach to building design and construction. The Buildings Department (BD) encourages authorized persons (AP), registered structural engineers (RSE) and registered geotechnical engineers (RGE) to consider adopting BIM in their building projects under the Buildings Ordinance. This practice note provides general guidelines on BIM submissions for building proposals as supplementary information to facilitate plan processing by the BD.

BIM Submissions

2. There is a wide range of applications of BIM on new building development and alteration and addition works which are considered useful to facilitate the BD in processing plan submissions. Some examples of BIM applications are given in **Appendix A** and the project AP/RSE/RGE are encouraged to provide the BD with a soft copy of the computer modelling information under the specified format for consideration.

Format and Software Version

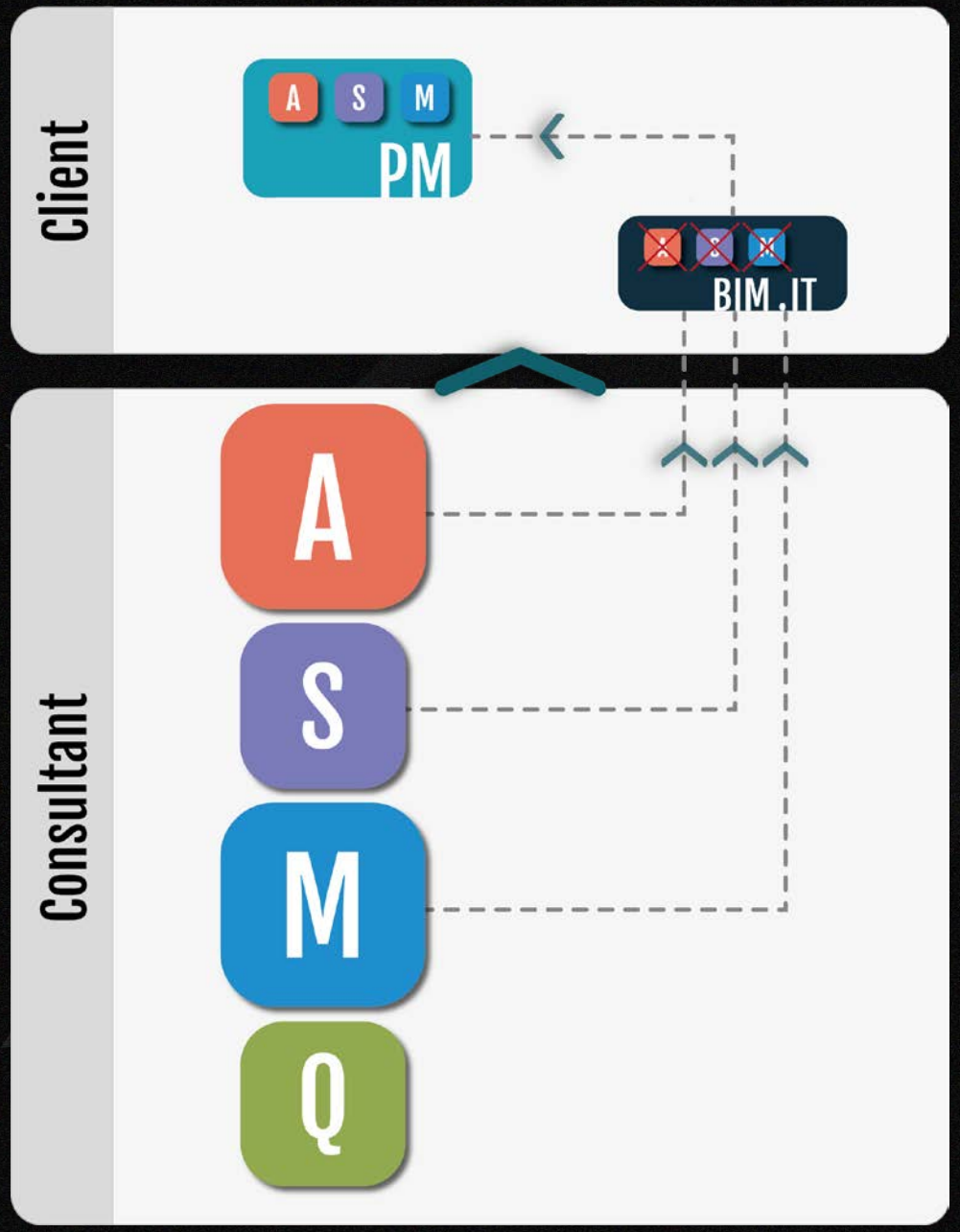
3. In addition to the statutory requirement of plan submission in paper format, AP/RSE/RGE are encouraged to present their building and/or building works proposals by the computer aid of BIM information in digital format compatible with BIM viewing software or real-time simulation to enhance illustration of the proposals and/or the construction sequence of the proposed works in the following manner and format:-

Government Policy

Construction Innovation and Technology Fund

115. I propose to set up a $1 billion Construction Innovation and Technology Fund to boost the capacities of enterprises and practitioners in the construction industry to adopt new technology, and support the industry to harness innovative technology. Eligible contractors, registered sub-contractors and consultants can apply for financial support from the Fund to acquire the software and hardware as well as to nurture the expertise required for using local and overseas innovative construction technologies, such as BIM, steel reinforcing bar products produced in local prefabrication yards and MiC when carrying out construction projects. The Fund will also support students and practitioners of the construction industry to receive training on innovative construction technologies.

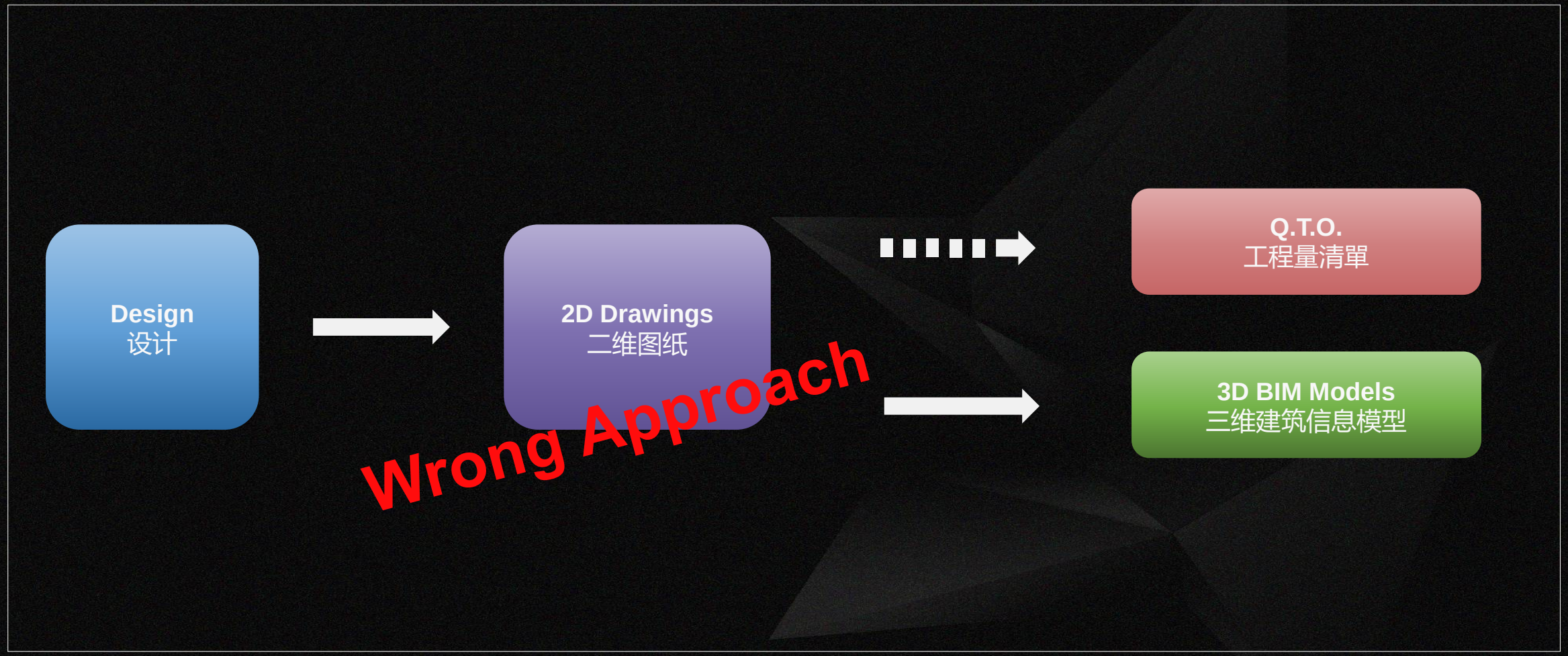
Historical BIM Procurement



Low Level BIM

Super BIM !

Perceived BIM Workflow



Wrong Approach to BIM Consultancy

2. BIM Modeling services

2.1 Architecture and Structure Modeling Package

- To develop Architecture and Structure BIM models based on CAD drawings provided by Client according to BIM Requirement Specification for clash analysis and constructability review.
- Modeling duration: 2 weeks
- Deliverable: Architecture and Structure model for the basement carparks (including B1/F and B2/F) and podium for clubhouse and residential entrance lobbies (including G/F and 1/F) in Autodesk Revit Format

2.2 Detail M&E Modeling Package

- To develop detail M&E BIM models for all areas based on CAD drawings provided by Client according to BIM Requirement Specification for clash analysis and constructability review
- Modeling duration: 2 weeks
- Deliverable: Detail M&E model for the basement carparks (including B1/F and B2/F) and podium for clubhouse and residential entrance lobbies (including G/F and 1/F) in Autodesk Revit Format

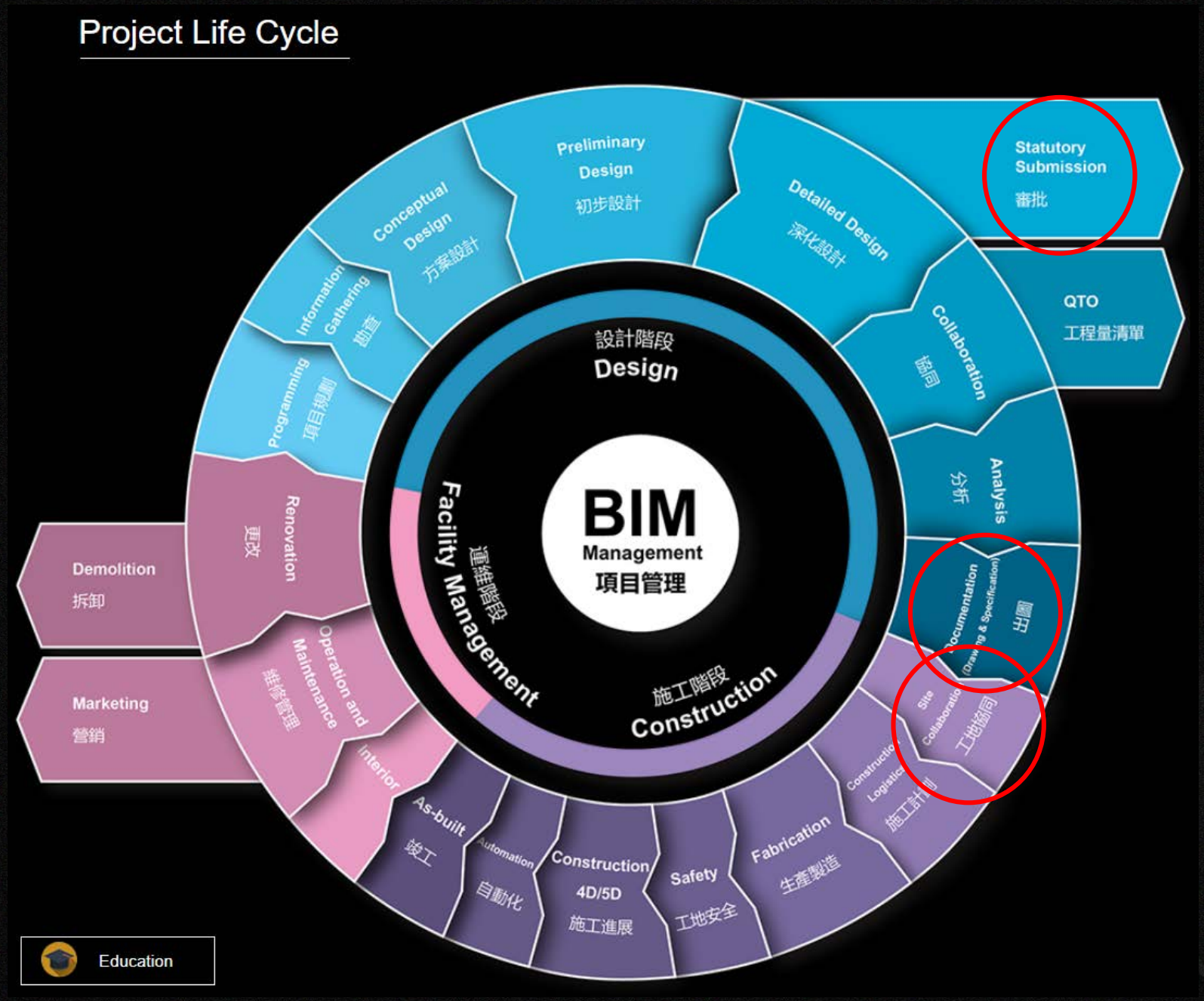
2.3 Update Architecture and Structure Modeling Package (Maximum 5 times)

- To update Architecture and Structure BIM models based on updated CAD drawings provided by Client according to BIM Requirement Specification for clash analysis and constructability review
- Modeling duration: 1 week
- Deliverable: Updated Architecture and Structure model for the basement carparks (including B1/F and B2/F) and podium for clubhouse and residential entrance lobbies (including G/F and 1/F) in Autodesk Revit Format

Wrong Approach to BIM Consultancy

3. Project Management Services
   - To manage BIM documentation systematically to ensure quality of data
   - To provide BIM/ CAD manager off-site with the following scope of works
     - To develop BIM project execution plan
     - To develop clash analysis and constructability review matrix
     - To develop systematic procedures for quality assurance, BIM model review and inspect information flow, BIM modeling process, clash analysis process and technical query reporting process.
     - To perform clash analysis based on clash analysis and constructability review matrix
     - To prepare 2D views for example 2D section(s), 3D section(s) from integrated BIM model as requested by Client
     - To prepare technical query of clashes detected and report to the Project team
     - To coordinate with Project team to resolve the clashes detected
     - To attend meetings when request by client and coordinate with Project team in the meetings
     - To assess, control and assure the quality of BIM deliverables
     - To report on project progress and issues
     - To deliver BIM deliverables such as BIM models, Technical Query, Model Progress Report, CSD, CBWD in Autodesk Revit Format and other relevant documents to the main contractor for smooth transition of the information and models.

What is BIM


Project Life Cycle
BIM
Management
項目管理
設計階段
Design
施工階段
Construction
運維階段
Facility Management
Information Gathering
勘查
Conceptual Design
方案設計
Preliminary Design
初步設計
Detailed Design
深化設計
Statutory Submission
審批
QTO
工程量清單
Collaboration
協同
Analysis
分析
Documentation
圖出
Site Collaboration
工地協同
Construction Logistic
施工計劃
Fabrication
生產製造
Safety
工地安全
Construction 4D/5D
施工進展
Automation
自動化
As-built
竣工
Interior
Operation and Maintenance
維修管理
Renovation
更改
Programming
項目規劃
Demolition
拆卸
Marketing
營銷
Education

Development Bureau Technical Circular Requirements and Deliverables

Process

Deliverable

	BIM Use	Investigation, Feasibility and Planning	Design	Construction
1	Design Authoring	O	M	M
2	Design Reviews	O	M	M
3	Existing Conditions Modelling	O	O	M
4	Site Analysis	O	M	
5	3D Coordination		M	M
6	Cost Estimation	O	O	O
7	Engineering Analysis		O	O
8	Facility Energy Analysis		O	O
9	Sustainability Evaluation	O	O	O
10	Space Programming	O	O	
11	Phase Planning (4D Modelling)		O	M
12	Digital Fabrication		O	O
13	Site Utilization Planning			O
14	3D Control and Planning			O
15	As-Built Modelling			M
16	Project Systems Analysis			O
17	Maintenance Scheduling			O
18	Space Management and Tracking			O
19	Asset Management			O
20	Drawing Generation (Drawing Production)		M	M

Legend:

M – Mandatory BIM Use for the mentioned stage, including that carried forward from previous stage.

O – Optional BIM Use

Design Presentation

Architectural Design
Structural Design
MEP Design
Landscape Design
Civil Design ……..

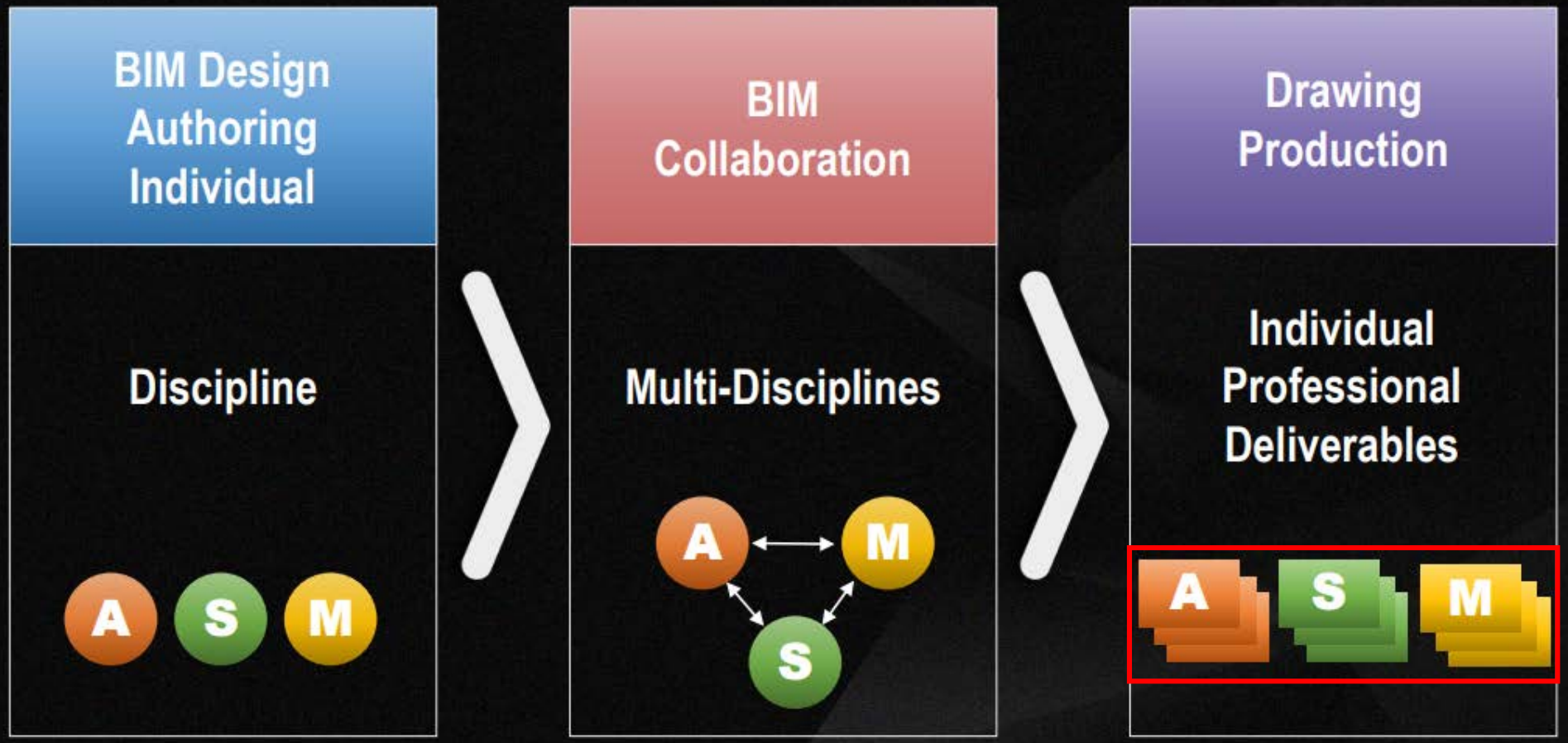
Statutory Submission - Legal

General Building Plan,
Curtain Wall submission,
Demolition Plan, Site Formation Plan, Structural Submission,
Drainage Submission, Utility Submission, ……..

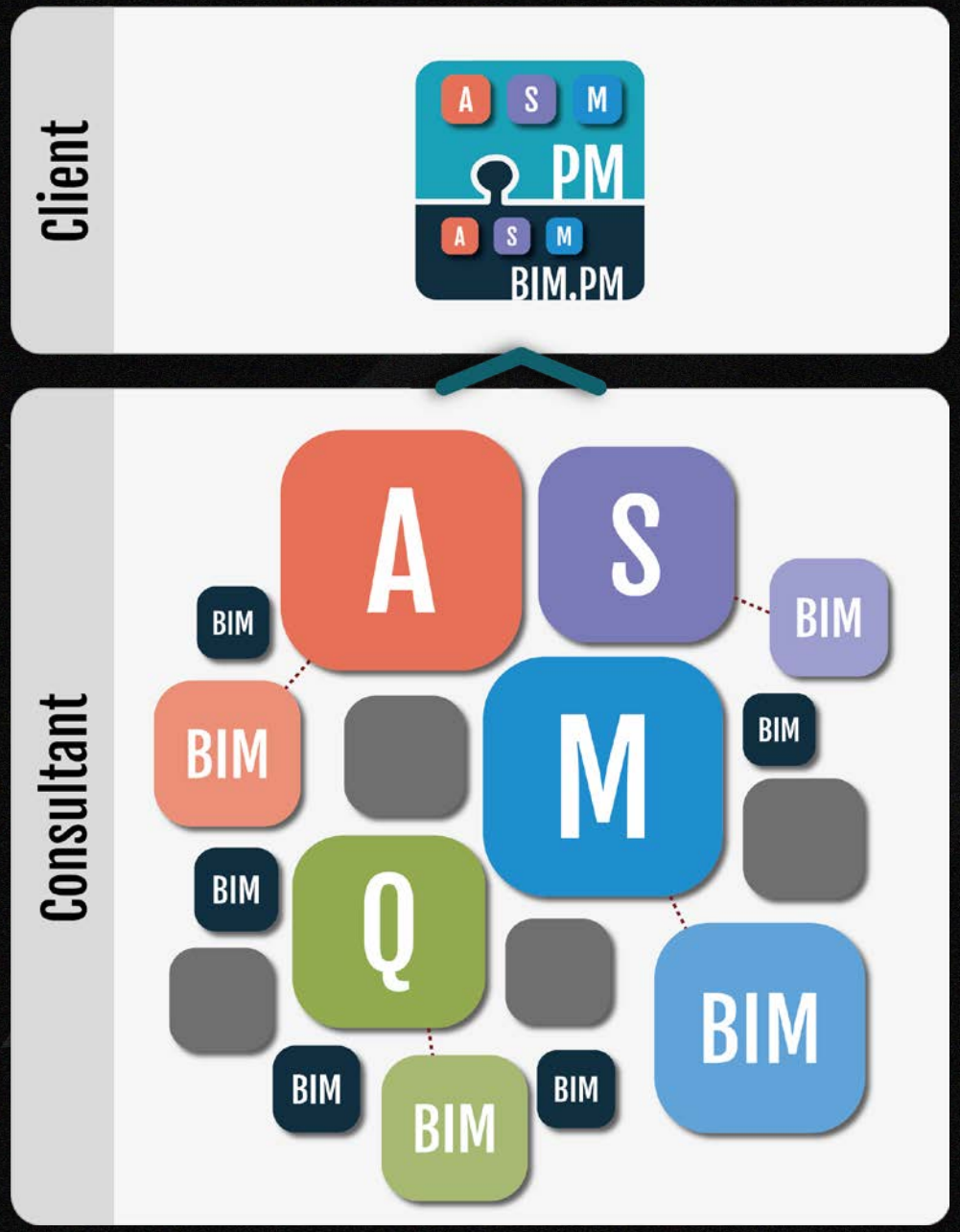
Construction - Contractual

Tender Drawing, Construction Drawing,
Shop Drawings,
Combined Services Drawings,
Combined Builder's Work Drawings,
As – built drawings…….

Design Authoring, Collaboration, Drawing Production



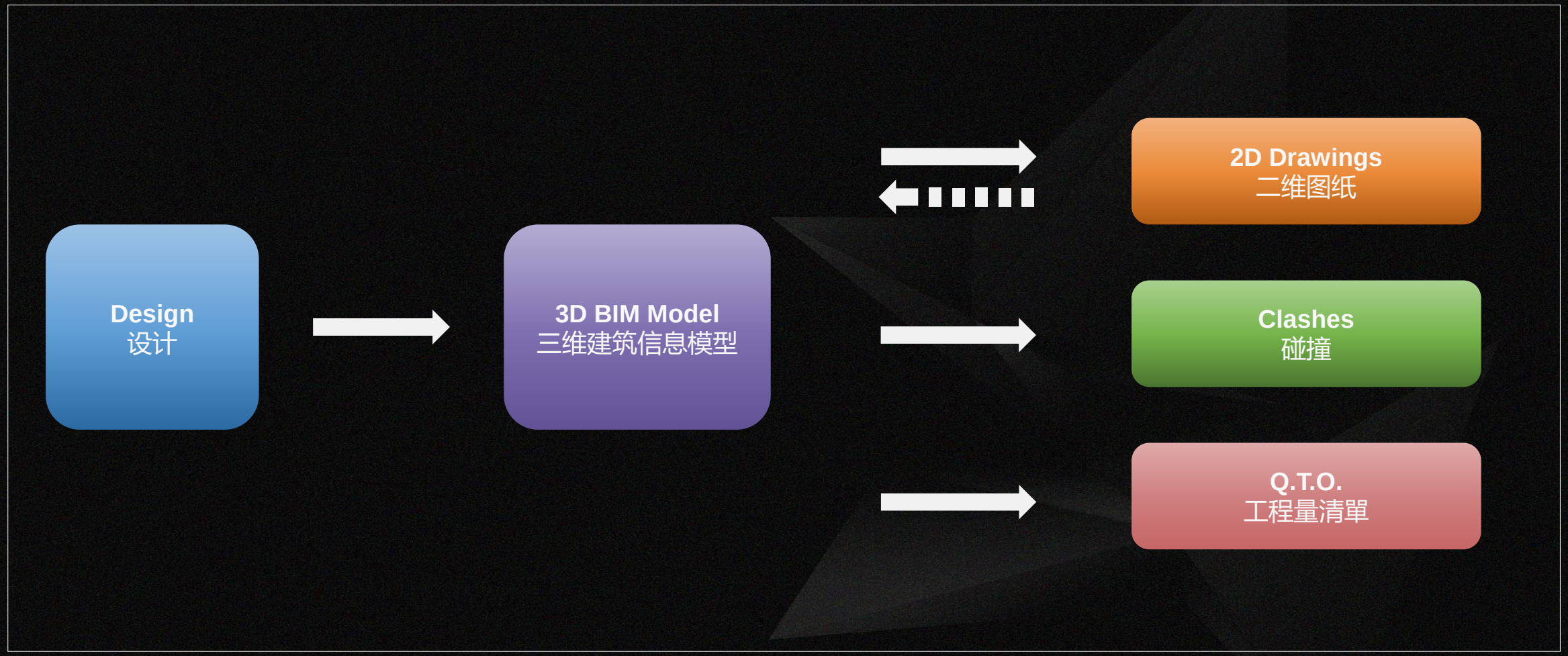
BIM Procurement



Specialized BIM

High Demand

True BIM Workflow :



BIM Enabled Consultancy

Building Information Modelling

(xv) The Consultant shall deliver the Project with collaborative Building Information Modelling (BIM) technologies and management processes. The Consultant shall deliver continuously and progressively through the design from the outset, and shall work in close coordination with other Project Consultants, including the BIM Auditor of the Project Management Consultant (PMC), in all Work stages. The Consultant shall extend the use of BIM in supervision and coordination with the Contractor in Work Stages 5 and 6.

Building Information Modelling (BIM)

The goal of the application of BIM is to create a digital 3D building information model of the facility, comprising models from each design discipline in a coordinated and federated format. The creation and management of the BIM are to be delivered by the Consultant continuously and progressively throughout the entire Project duration from the design at the outset to the post-construction stage. The Consultant shall work closely with consultants of other disciplines in achieving the objectives of the BIM. The BIM is for the following beneficial purposes:-

(a) To minimize design discrepancies, improve design coordination and deliver a clash-free design through the use of the 3D digital BIMs and clash analysis tools;
(b) To improve speed and accuracy on quantity take off (QTO) and cost estimating through use of the digital 3D BIMs;
(c) To enhance visual communication between the Design Team and stakeholders and improve mutual understanding of the design intent through the digital modelling process, to achieve a more

BIM Enabled Consultancy

Building Information Modelling (BIM)

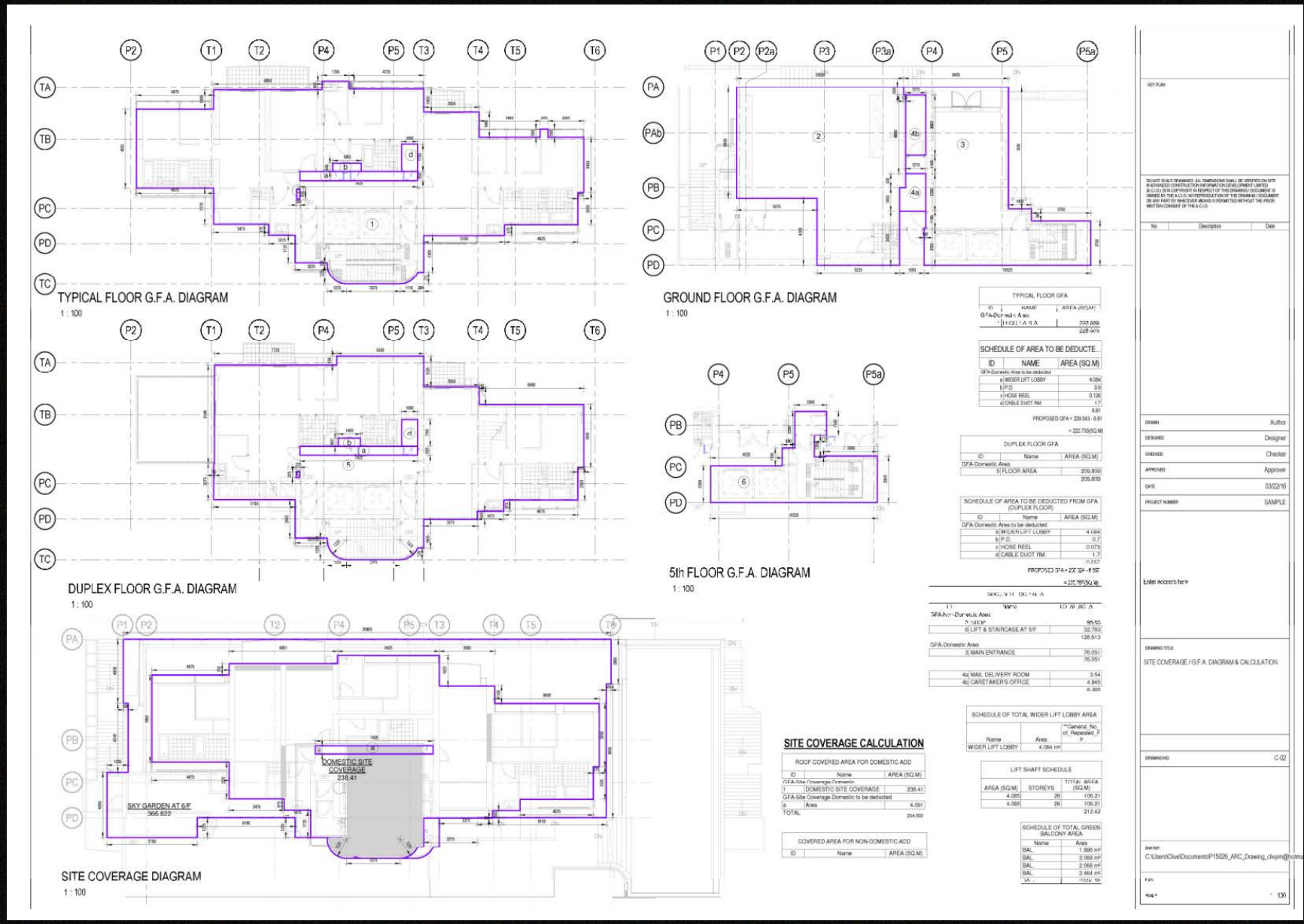
The goal of the application of BIM is to create a digital 3D building information model of the facility, comprising models from each design discipline in a coordinated and federated format. The creation and management of the BIM are to be delivered by the Consultant continuously and progressively throughout the entire Project duration from the design at the outset to the post-construction stage. The Consultant shall work closely with consultants of other disciplines in achieving the objectives of the BIM. The BIM is for the following beneficial purposes:-

(a) To minimize design discrepancies, improve design coordination and deliver a clash-free design through the use of the 3D digital BIMs and clash analysis tools;
(b) To improve speed and accuracy on quantity take off (QTO) and cost estimating through use of the digital 3D BIMs;
(c) To enhance visual communication between the Design Team and stakeholders and improve mutual understanding of the design intent through the digital modelling process, to achieve a more effective design approval process with reduced timescales;
(d) To support the statutory and non-statutory approvals submission process (for example to the Independent Checker in accordance with Buildings Department's PNAP ADV-34 and compliance with BIM recommendations under ArchSD Design Guide AR03);
(e) To support the efficient delivery of 2D drawings, including Combined Services Drawings (CSDs) and Combined Builder's work Drawings (CBWDs) and 3D room loaded drawings directly derived from the coordinated BIMs;
(f) During the construction stage, (i) to support the Contractor in developing 4D digital construction sequence models to enhance communication, predict and manage construction progress and logistics, and (ii) to support the Contractor in developing an 'as-built' Asset Information Model (AIM) at handover to provide more effective operation of the facility.

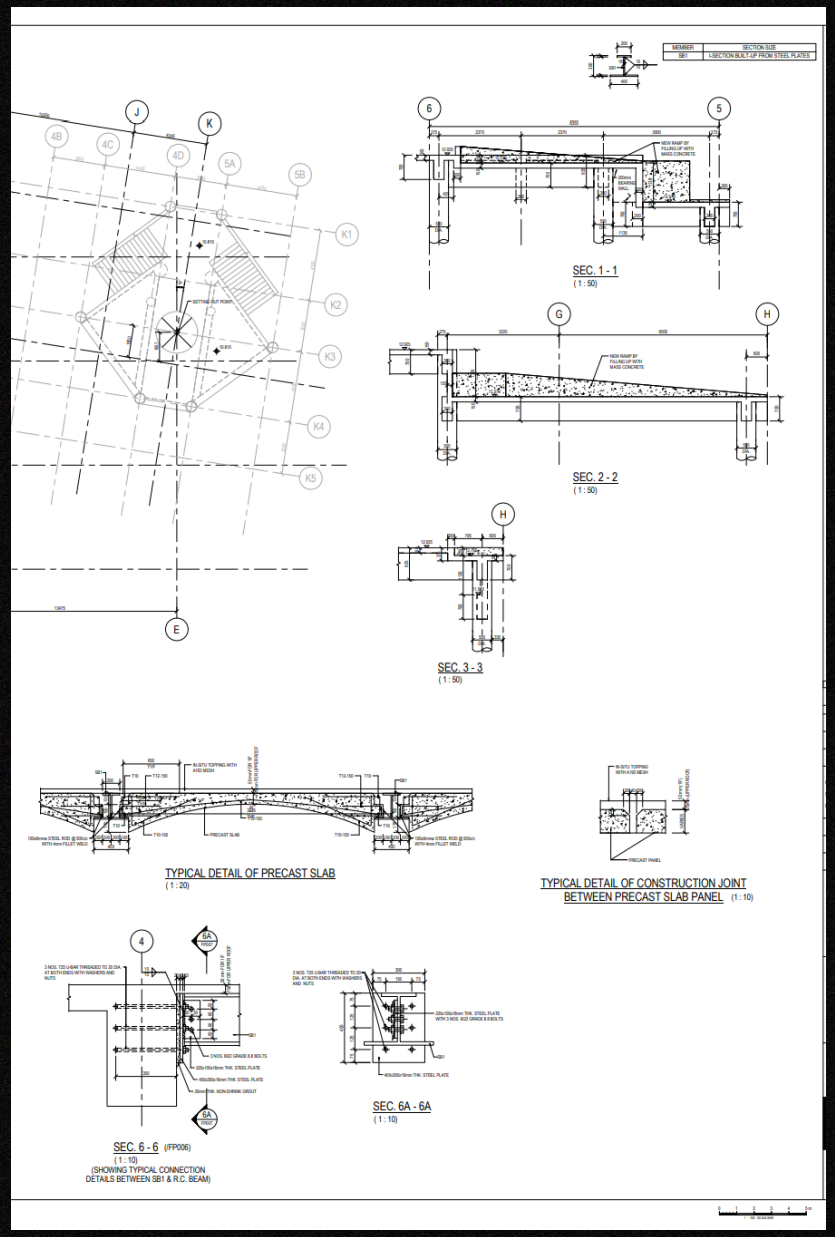
The Consultant shall develop a BIM for its scope of works under this Brief and cooperate with consultants of the other disciplines and the PMC in the development and revision of the BIM Project Execution Plan (BIM PXP).

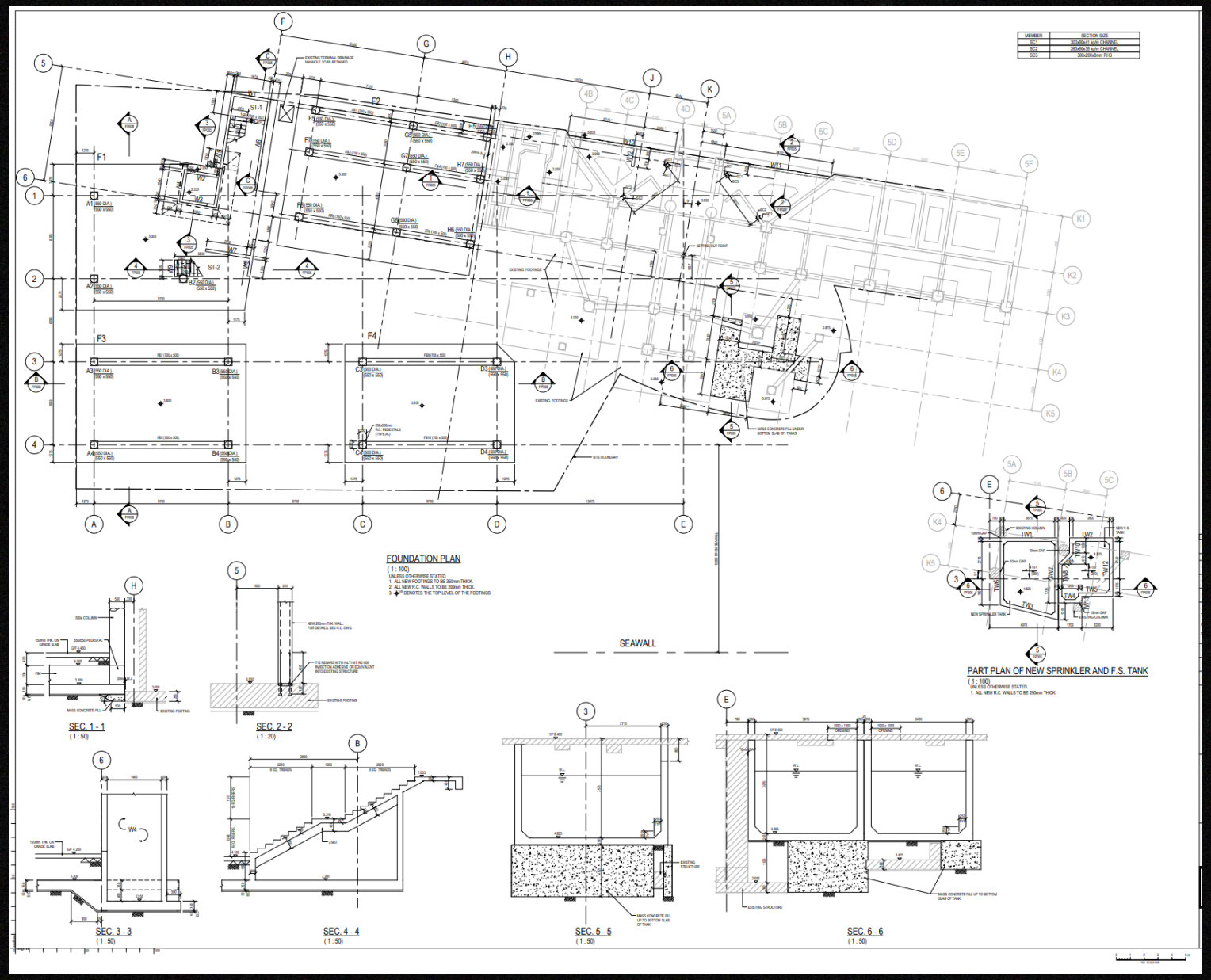
Professional Deliverables – Architectural General Building Plan (GBP)

Professional Deliverables - Architectural General Building Plan (GBP Calculations)

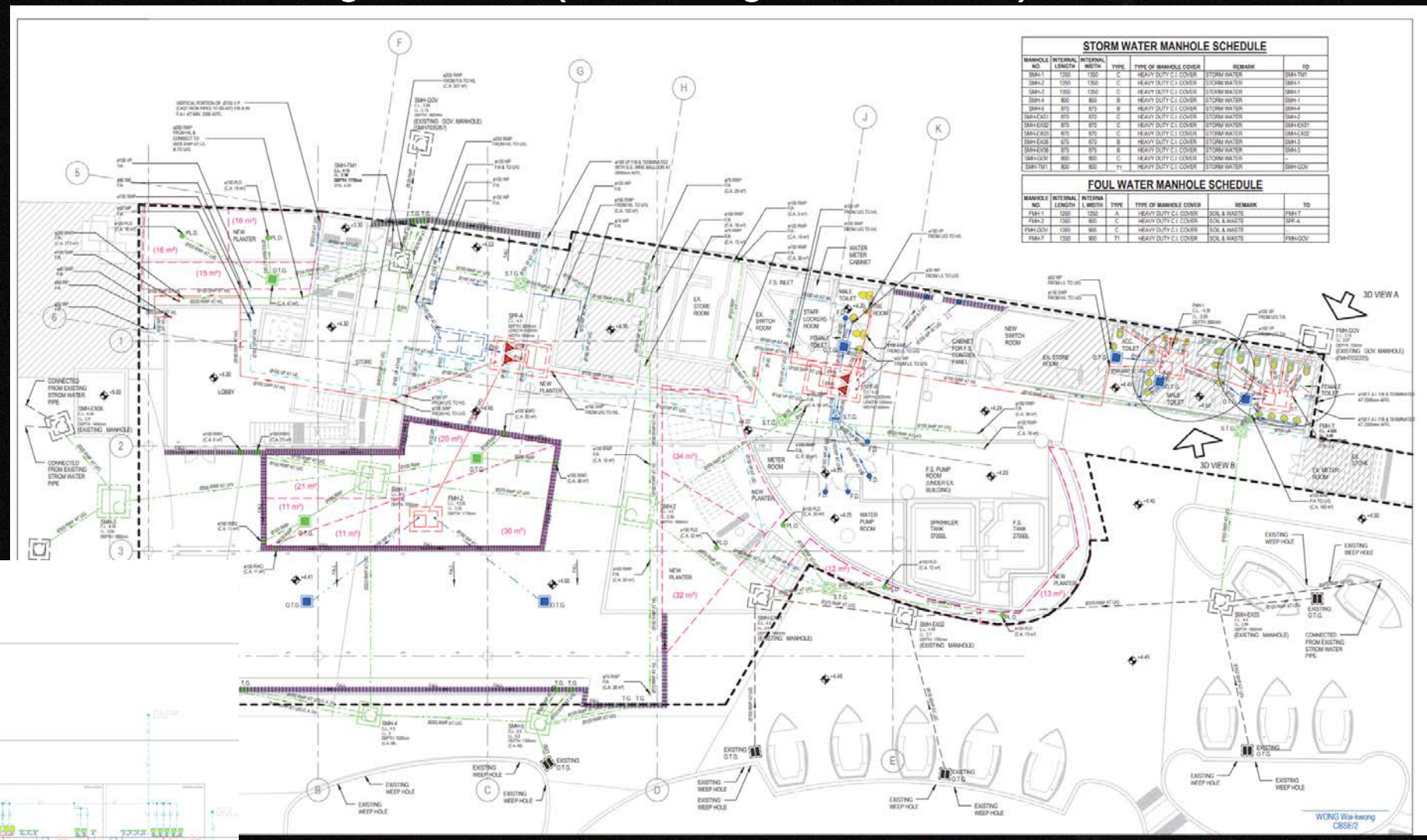


Professional Deliverables – Structural Submission





Professional Deliverables – Building Services (Drainaing Submission)



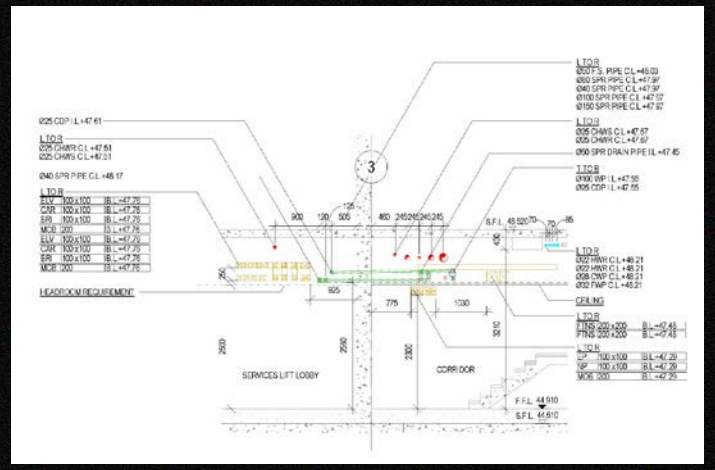
STORM WATER MANHOLE SCHEDULE

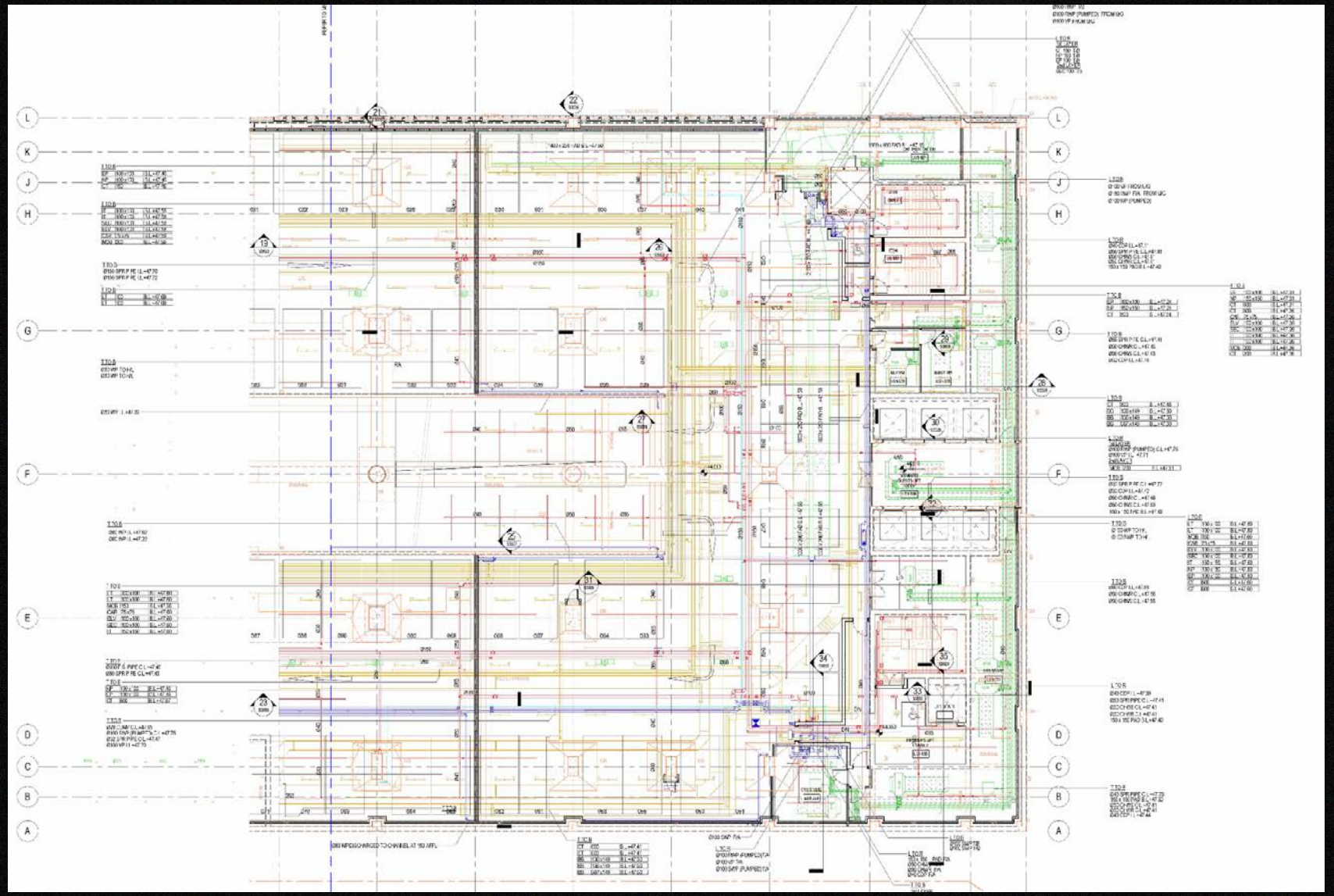
MANHOLE NO.	INTERNAL LENGTH	INTERNAL WIDTH	TYPE	TYPE OF MANHOLE COVER	REMARK	TO
SMH-1	1350	1350	C	HEAVY DUTY C.I. COVER	STORM WATER	SMH-TM1
SMH-2	1350	1350	C	HEAVY DUTY C.I. COVER	STORM WATER	SMH-1
SMH-3	1350	1350	C	HEAVY DUTY C.I. COVER	STORM WATER	SMH-1
SMH-4	800	800	B	HEAVY DUTY C.I. COVER	STORM WATER	SMH-1
SMH-5	875	875	B	HEAVY DUTY C.I. COVER	STORM WATER	SMH-4
SMH-EX01	870	870	C	HEAVY DUTY C.I. COVER	STORM WATER	SMH-2
SMH-EX02	870	870	C	HEAVY DUTY C.I. COVER	STORM WATER	SMH-EX01
SMH-EX03	670	670	C	HEAVY DUTY C.I. COVER	STORM WATER	SMH-EX02
SMH-EX05	670	670	B	HEAVY DUTY C.I. COVER	STORM WATER	SMH-3
SMH-EX06	875	875	B	HEAVY DUTY C.I. COVER	STORM WATER	SMH-3
SMH-GOV	800	800	C	HEAVY DUTY C.I. COVER	STORM WATER	-
SMH-TM1	800	800	T1	HEAVY DUTY C.I. COVER	STORM WATER	SMH-GOV

FOUL WATER MANHOLE SCHEDULE

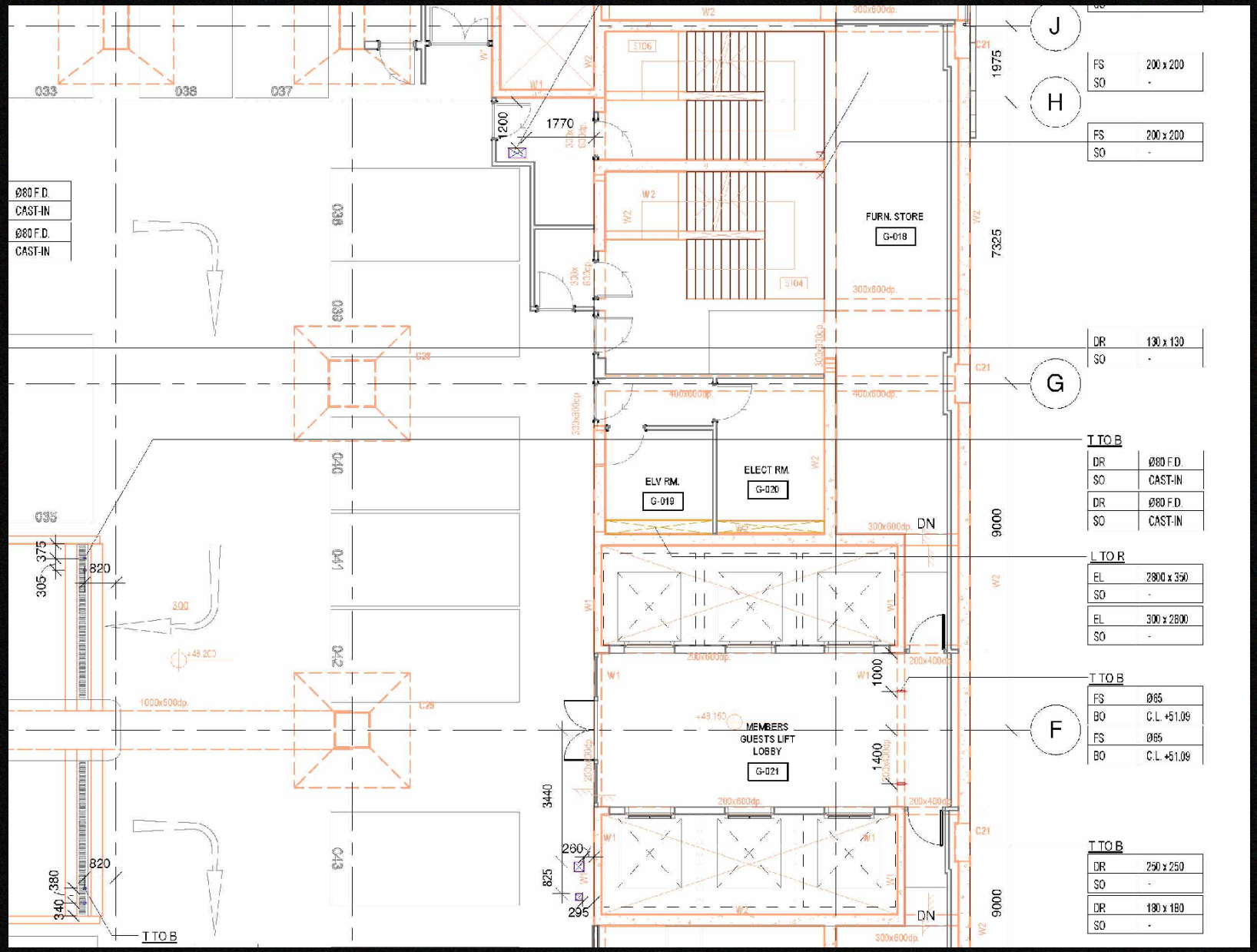
MANHOLE NO.	INTERNAL LENGTH	INTERNAL WIDTH	TYPE	TYPE OF MANHOLE COVER	REMARK	TO
FMH-1	1200	1200	A	HEAVY DUTY C.I. COVER	SOIL & WASTE	FMH-T
FMH-2	1350	900	C	HEAVY DUTY C.I. COVER	SOIL & WASTE	SPF-A
FMH-GOV	1360	900	C	HEAVY DUTY C.I. COVER	SOIL & WASTE	-
FMH-T	1350	900	T1	HEAVY DUTY C.I. COVER	SOIL & WASTE	FMH-GOV

Professional Deliverables – Construction Combined Services Drawings (CSD)

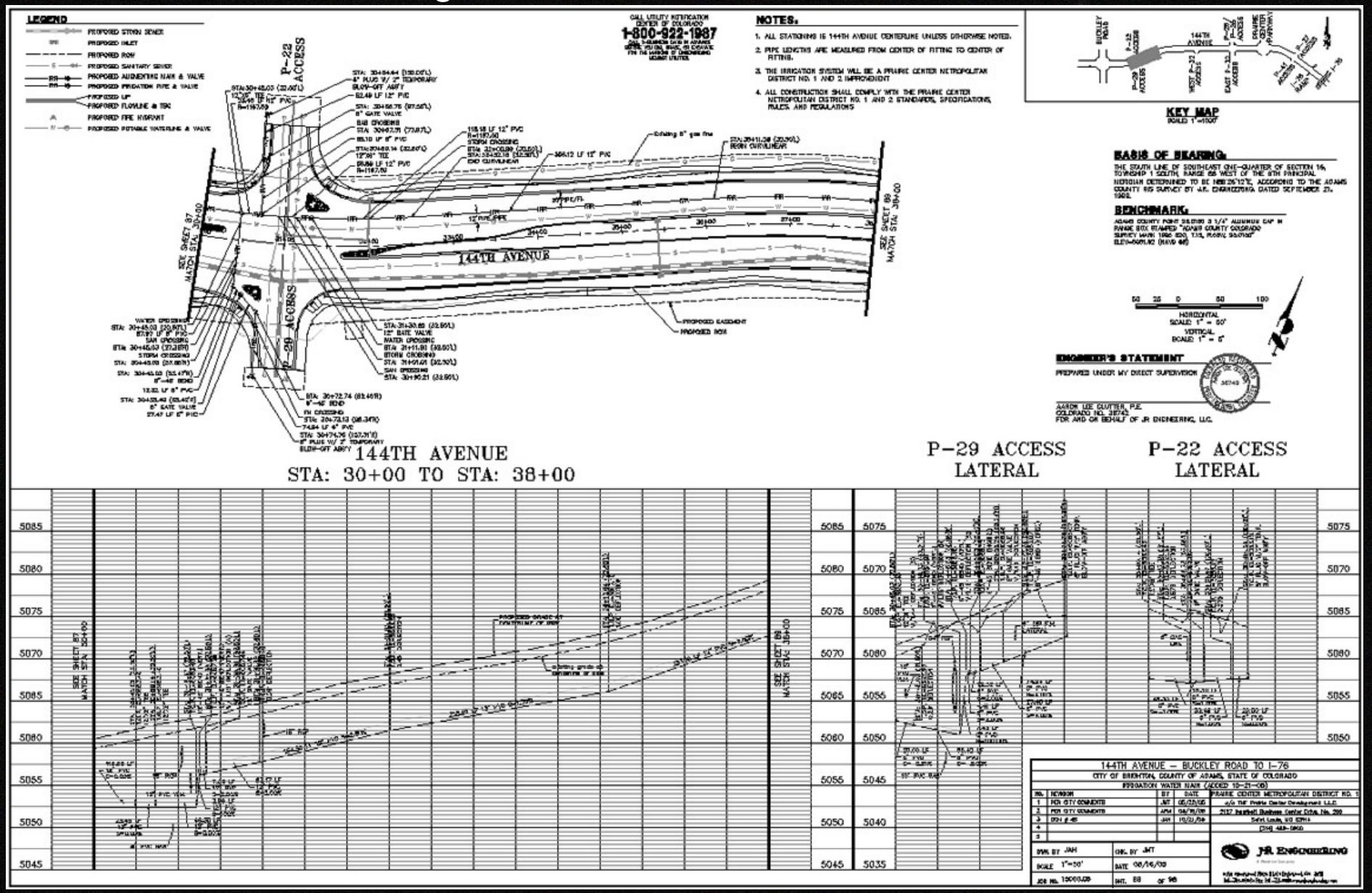




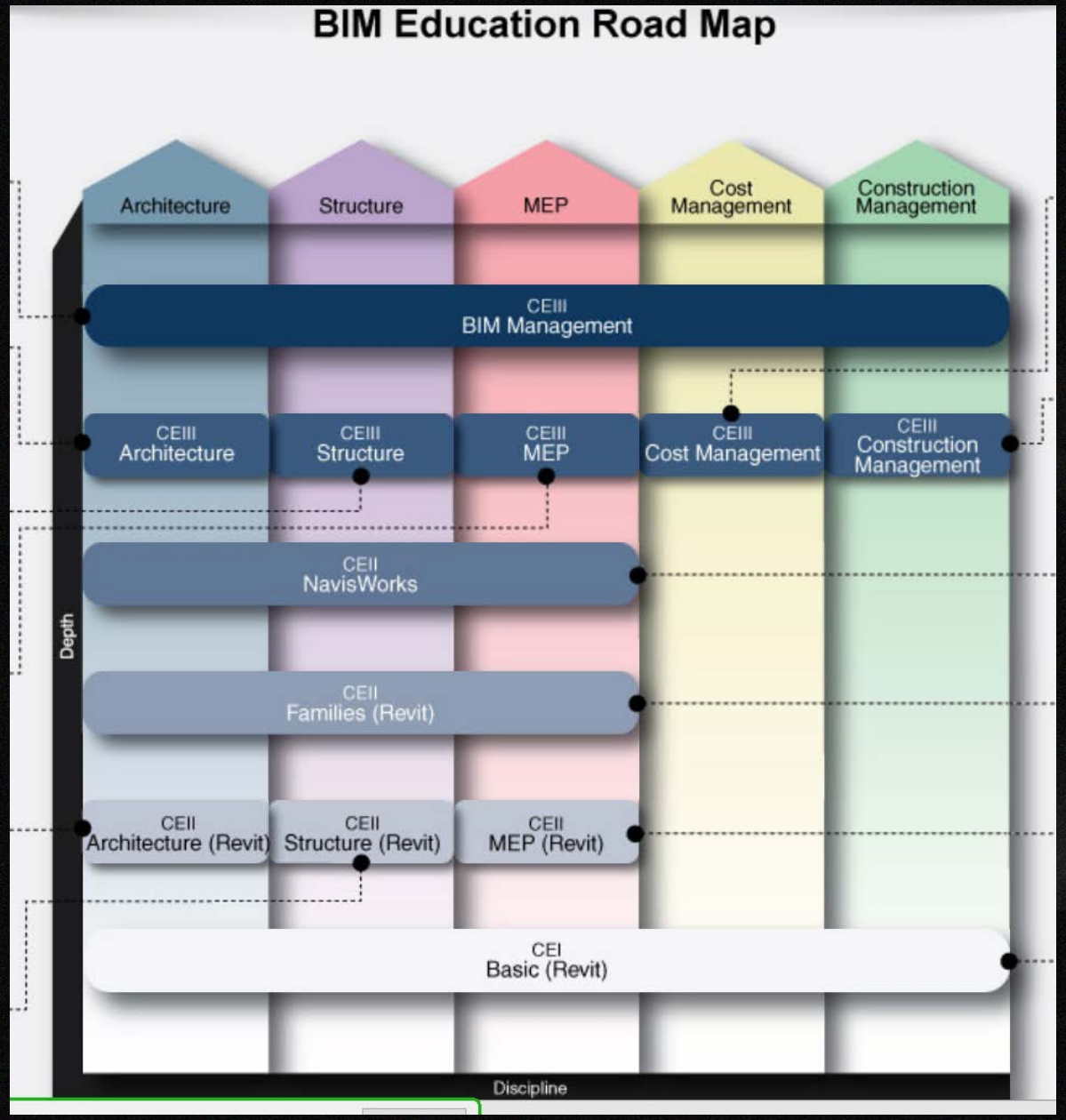
Professional Deliverables – Construction Combined Builder's Work Drawings (CBWD)



Professional Deliverables – Civil Drawings



BIM Consultancy Qualification and Liability



Professional

Multidisciplinary

Across Disciplines

Consolidate Disciplines

Technical

Multi - Platforms

Different Level of Advancement

Information Integrity Mindset

I.T. Infrastructure

DevB Technical Circular - BIM Consultancy Qualification and Liability

Organization, Training and Sub-contracting Requirements

BIM Team Structure

The Consultant/Contractor* shall propose and establish a BIM team that are appropriate for the scale and complexity of the Assignment/Contract*, highlighting key roles and responsibilities of each position, within [14] calendar days after commencement of Assignment/Contract*. The team shall be led by a BIM team leader who holds a key position in the Consultant/Contractor's* project team structure. The BIM team shall include sufficient and technically competent resources in order to complete all BIM tasks and deliverables specified in the Assignment/Contract*. Notwithstanding, the BIM team shall at least comprise [3] staff well trained in relevant disciplines. The BIM team leader shall either have corporate membership of an appropriate professional institution or shall have [5] years relevant post-qualification experience plus university degree or equivalent in an appropriate engineering discipline. The BIM team leader shall have a minimum of [3] years of practical experience in management of BIM projects or a professional member of the Hong Kong Institute of Building Information Modelling (HKIBIM) or equivalent. The disciplinary BIM coordinators shall have [3] years related construction project experience. The coordinators shall have a minimum of [1] year practical experience in BIM projects or an associate member of the HKIBIM or equivalent.

The BIM team leader shall be responsible for the overall BIM managements and process controls. The BIM team leader shall delegate BIM coordinator(s) for handling BIM tasks such as BIM modelling, collaborate information exchange amongst related stakeholders and maintain a drawing/information register to record the information to be incorporated in the model(s).

For any proposed staff movement or change in the BIM team, the Consultant/Contractor* shall provide a CV of the replacement personnel together with evidence of equivalent BIM competency to the Director/Engineer* within [7] calendar days for approval.

Professional Institutes

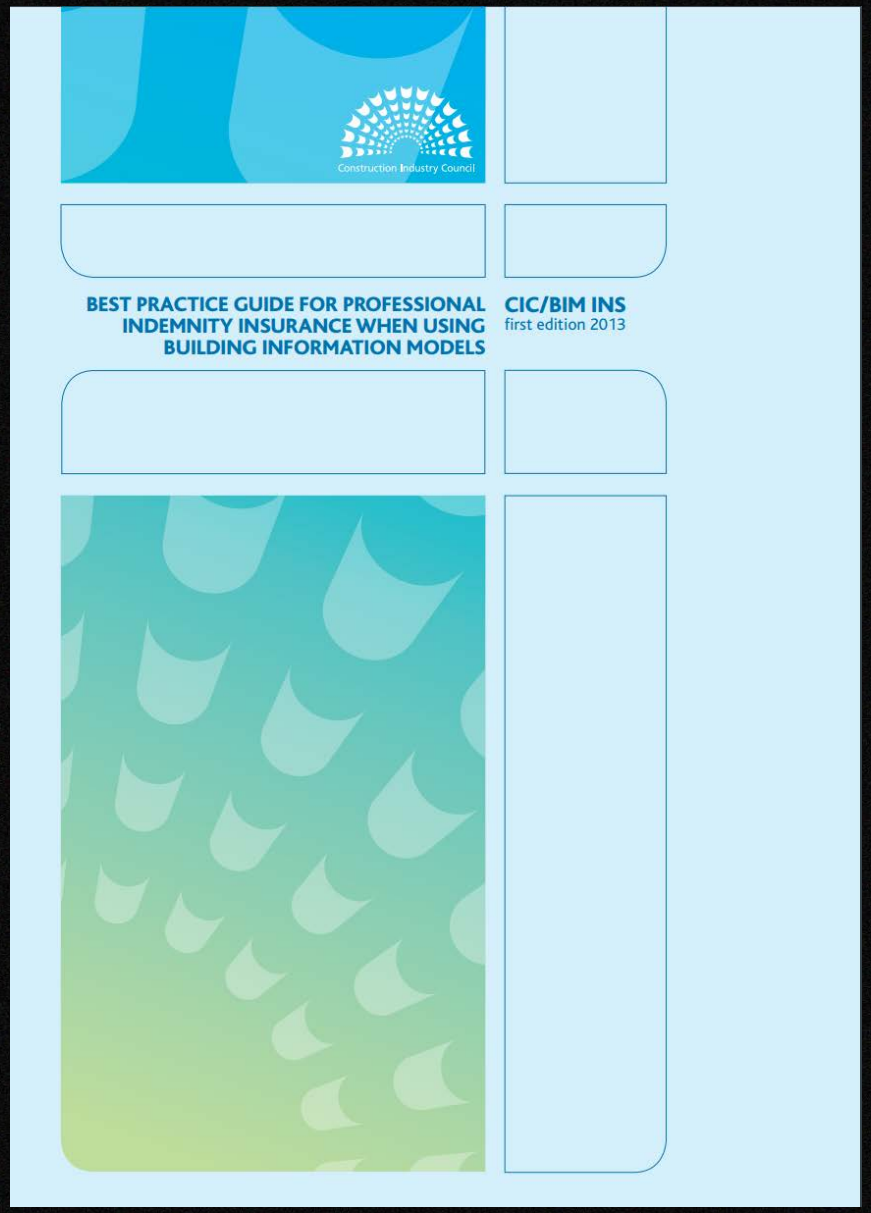
HKIA, HKIE, HKIS .....

+

BIM Institutes / BIM experinece

HKIBIM

BIM Professional Indemnity



1. Executive Summary

This Best Practice Guide has been produced by Griffiths & Armour on behalf of CIC in support of the work of the BIM Task Group. The guide is directly addressed to the needs of insured parties – particularly consultants engaged in the production of definition information using Building Information Models.

The aim of this best practice guide is to support the construction industry's take up of Level 2 Building Information Modelling, by summarising the key areas of risk which Professional Indemnity ('PI') insurers associate with level 2 BIM and what you can do about those risks as a prudent insured.

We are therefore looking to inform you, the insured, of what you might be required to do in order to ensure that your PI insurance arrangements are in order.

The foundation of this document is a series of consultations held by Griffiths & Armour with the majority of the PI insurance market, including several Lloyd's syndicates and the main insurers in the company market. A major and necessary part of the consultation process was the education of insurers as to what the introduction of level 2 BIM involves, what technology is required to support it and what the "outputs" of such a design process might involve.

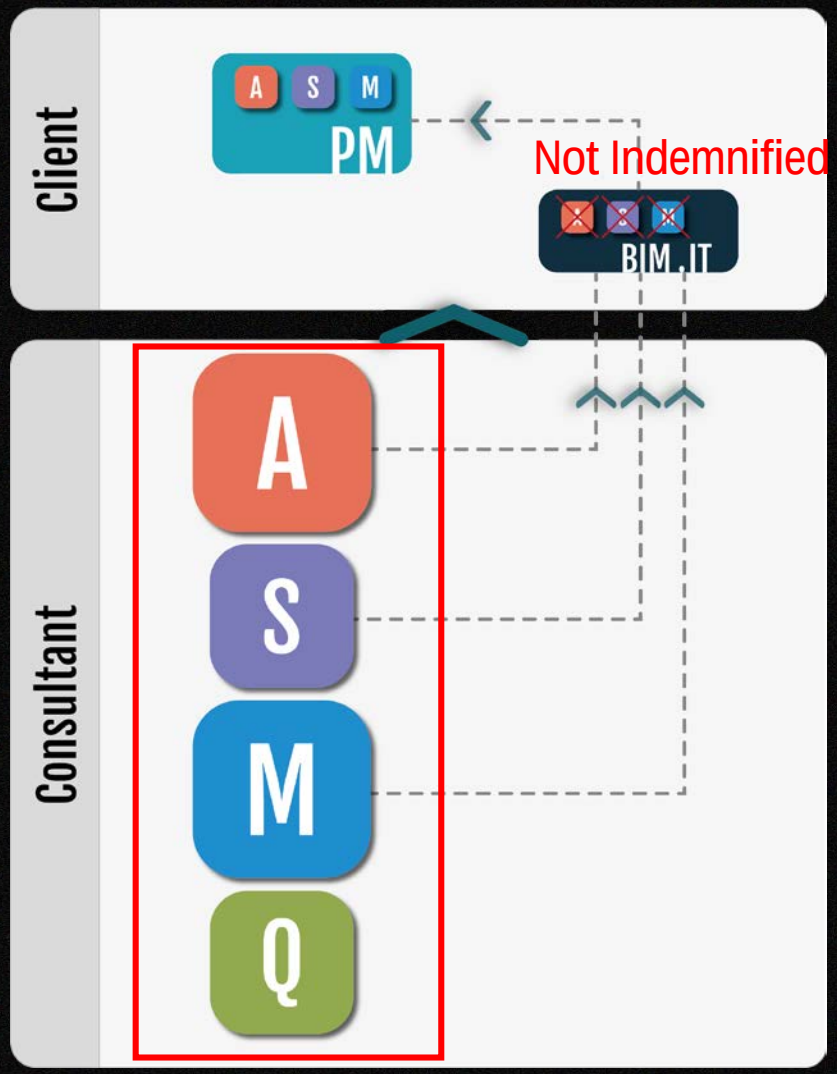
The overarching response to the consultation from insurers has been that there are no issues with level 2 BIM which are sufficiently serious as to require coverage restrictions for consultants which use it, nor will its use, all things being equal, materially alter the risk profile presented by a consultant, and therefore the premium implications will be minimal.

You should, therefore, have little difficulty in obtaining assurance from your broker that this activity will fall within the range of activities contemplated by our PI insurers.

It should also be stressed that this report **does not consider the Level 3 BIM environment**, which raises very different liability issues which will need further consideration. By way of explanation, by level 2 BIM we broadly mean that a "federated model" is being used, albeit in a managed 3D environment and perhaps with 4D construction sequencing and /or 5D cost information. Level 2 BIM requires each participant to develop their own model(s), which are then shared with the project model, with appropriate audit trails in place. It is the robustness of these audit trails and change control systems that gives insurers comfort.

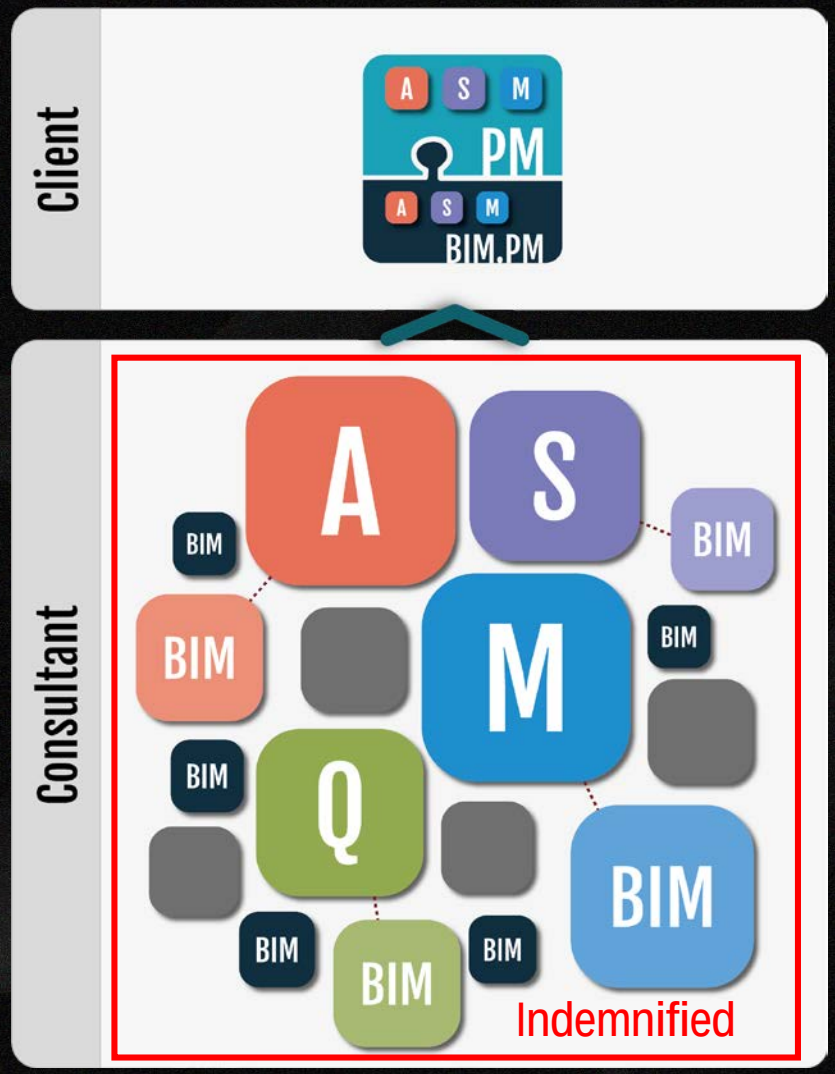
It should be noted that simply because two or more parties are working together, this does not mean that this extends into Level 3 BIM territory, provided that the resultant models are still "federated".

Liability



Historic BIM Procurement

Vs



New BIM Procurement

Points to take away

- BIM is no longer a trend, it is Mandatory (Government Capital Projects).
- Professional Drawing Productions Deliverables are Mandatory from BIM.
- BIM drawing triggers Statutory and Contractual liability issues.
- BIM involves Professional Indemnity (PI).
- BIM Implementation shall not rely on external consultancy but will become inherent professional skillset due to liability.

Advanced
Construction
Information
Development Ltd.

David Fung
davidfung@a-c-i-d.com
www. hkacid.com

THANK YOU !