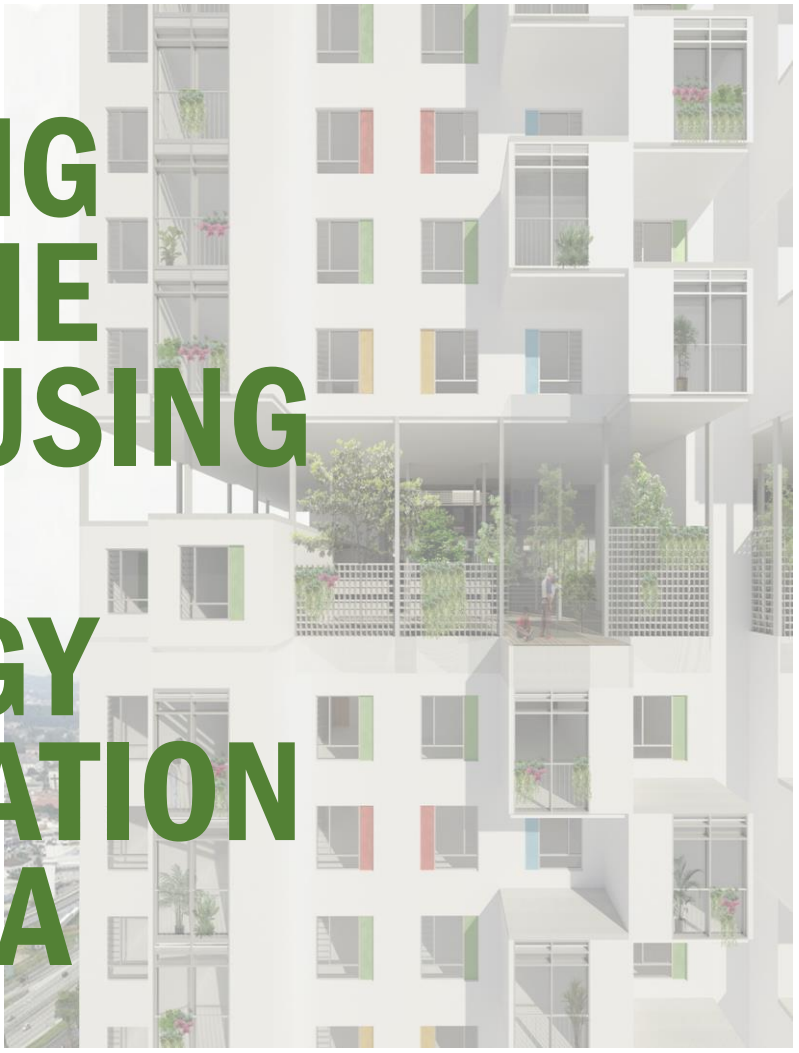
REPORT ON

HUMANISING LOW-INCOME GROUP HOUSING THROUGH TECHNOLOGY AND INNOVATION IN MALAYSIA



A TECHNICAL TEAM COORDINATION WORKSHOP

OCT 10TH, 2018

8:30am – 5:30pm
Cyberview Resort & Spa,
Cyberjaya

CIDB | CREAM | JPN | EJA | NS PREFAB CONSULTANCY | NUMAGINELAB | IPIM

INTRODUCTION

Construction Research Institute of Malaysia (CREAM) is collaborating with Jabatan Perumahan Negara (JPN) on a research entitled Humanising Low-Income Group Housing (HLIGH) Through Technology and Innovation in Malaysia to improve the quality of local affordable housing. This aim of this research is in tandem with Housing Minister YB Hjh Zuraida and her Ministry of Housing and Local Government (KPKT)'s aspiration which is to house Malaysian under a proper roof and a liveable home.

This research is being done by CREAM as the coordinator and its technical team which consists of the following:

- Project leader and Architect:
  Eleena Jamil Architect (EJA)
- Civil and Structure Engineer:
  NS Prefab Consultancy
- Mechanical, Electrical and Plumbing:
  NuMagineLab Sdn. Bhd.
- Quantity Surveyor:
  Integrated Project Information Management (IPIM)

To house Malaysian under a proper roof and in a liveable home

The output of this project is 10 typical designs of low-income group housing. These designs are categorised into high-rise, townhouse, terrace and rural bungalow. From the output achieved, a guidebook on how to humanise low-income group housing through technology and innovation will be developed at the end of this project.

EXECUTIVE SUMMARY

On 10th of October 2018, CREAM organised a coordination workshop at Cyberview Resort & Spa with the technical team. The objectives of the workshop are:

1. To introduce the technical team with each other's design requirements and proposal.
2. To introduce and elaborate the Client Brief or Requirements (CBOR) to the technical team.
3. To clarify the scope of work for each representative from the start until the end of design stage of the project.
4. To discuss on the deliverables that each representative needs to be carried out for the project.
5. To come out with a process flow of how the deliverables will be carried out.
6. To discuss on the issues that may arise during the project development and how to resolve the issues.

A systematic framework was constructed prior to the workshop to ensure the above objectives could be fulfilled.

WORKSHOP PROGRAMME

The workshop was held from 8:30 am until 5:30pm and was conducted in English and Malay. Table below was the tentative programme of the workshop.

TIME	TENTATIVE PROGRAM
8^{30} - 9^{00}	Registration and Welcome Coffee
9^{00} – 9^{30}	**Welcoming Remarks** Ir. Dr. Zuhairi Abd Hamid, FASc, CEO CREAM
9^{30} – 10^{00}	**Sharing Session with JPN on Client Brief of Requirements (CBOR)**
10^{00} – 10^{30}	Refreshment
PRESENTATIONS BY TECHNICAL HLIGH TEAM	
10^{30} – 11^{00}	**De-programming Low-Income Group Housing through Technology and Innovation (DeLIGHT): The Architectural Design** Eleena Jamil Architect (EJA)
11^{00} – 11^{30}	**Design on System and Components of IBS** NS Prefab Consultancy
11^{30} - 12^{00}	**MEP Design and Coordination using 3D Modelling** NuMagineLab Sdn. Bhd.
12^{00} - 12^{30}	**Cost Planning and Management: Extracting Bill of Quantities from BIM** Integrated Project Information Management (IPIM)
12^{30} – 14^{30}	Networking Lunch
14^{00} – 17^{00}	**Group Discussion**
17^{00} – 17^{30}	Refreshment / End of Workshop

WORKSHOP DISCUSSION

A systematic framework was constructed for the discussion was categorised into four main topic of discussions – Requirements, Deliverables, Process and Issues. The input of the discussion is tabulated below.

	PHASE	Strategic Definition	Preparation & Brief	Concept Design	Developed Design	Technical Design
Description of Key Tasks *(source from RIBA plan of Work)*		Identify: • Client's business case • Strategic brief • Project Requirement • BIM level to be identified (3D, 4D, 5D, 6D (Asset and Facilities Management))	Develop Project objectives including: • Quality Objective • Project Outcomes • Sustainability Aspirations • Project Budget • Parameters/ Constraints Develop Initial Project Brief, Undertake Feasibility Studies and review site information	Prepare concept design including: • Proposal for structural design • Proposal for building services system • Preliminary cost information and project strategies accordance with the design programme Agree alterations to brief and issue Final project brief	Prepare Developed design including: • Coordinated & updated proposal for structural design • Building services systems • Outline specifications • Cost information and project strategies accordance with the design programme	Prepare technical design in accordance with project strategies with design responsibility matrix (to include all architectural, structural and building services information, specialist subcontractor design and specifications, in accordance with design programme)
Information required *(source from https://www.designingbuildings.co.uk/wiki/Information_requirements_process_map)*		• Client's statement of need • Preliminary business case • Strategic brief • Initial responsibility matrix • Coordinated Strategic Brief to architect, civil and structure, mechanical and electrical and quantity surveyor by CREAM and Clients (JPN) • Coordination of BIM at MyBIM server cloud by CREAM	• Strategic Brief • Option review report • Initial cost appraisal • Business case • Project Management Plan • Project Brief • Employer's Information Requirement (EIR) • Elemental Cost Plan	• IFC BIM files • Drawings and reports • Updated EIR • Updated project management plan • Outline Specification • Elemental cost plan • Project Programme	- IFC BIM Files - Updated EIR - Specification - Elemental cost plan - Updated project management plan - Project Programme - Drawings and reports	- IFC BIM Files - Updated EIR - Updated project management plan - Specification - Approximate quantities cost plan - Project programme. - Drawings and reports.

Requirement	**Client's Brief of Requirements**
Requirements	Details
Number	500 units
IBS Score	Minimum 70 IBS Score
QLASSIC Score	80 points
Environmental rating tools	MyCREST – 4 Star rating (Design)
Construction cost	RM 195,000
Size of house unit	700 sqft
Image of PPR	Structured and organized housing that features modern and contemporary design and comply with the requirements of the Local Authorities
Size per room	According to Construction Industrial Standard (CIS)
Building materials and finishes	Use of green technology (paint use)
Colour scheme	Red, white and blue
House Layout Concept	Typical: 700 sqft, 3 bedroom, 2 toilets, living room, kitchen and yard and take into consideration of public spaces, semi-private spaces and privacy spaces

	OKU: 710 sqft, 3 bedroom, 2 toilets, living room, kitchen and yard, all space and entrance should follow MS1184: 2014 & MS1331:2002 except for second toilet, space design should be friendly user to OKU and and take into consideration of public spaces, semi-private spaces and privacy spaces
House Finishes	Floor: All spaces need to have tiles, bathrooms and kitchens tiled with waterproof coating and a yard with cement spade
	Wall: All rooms except kitchen and bathroom need to plaster & paint, tiles bathrooms with a waterproof layer with a height of 1.5m and tile kitchen with height of 1.5m
	Ceiling: Skim coat
	Roof: Metal deck
	Telephone and MATV Point: Should be put in living room
	Sanitary Wares: The main bathroom uses a toilet seat while squatting toilets is in the second bathroom. All bathrooms are provided with a wash hand basin. Laundry is provided in the kitchen
	Window: Casement windows is equipped with grilles used in all rooms except in the kitchen using lourves as well as a security bar. Fire and Rescue Department (BOMBA) requirements need to be fulfil
	Sanitary Fitting: Sanitary fittings in the bathrooms, kitchens and ledge are provided according to the needs and functions of the spaces
	Door: All room's door including the main door are using timber flush door. Only bathroom door use PVC doors. The ledge door is a flush door timber with a waterproof layer
	Electrical Appliances: Lights and fans are assembled according to the design and space provided
Prayer Room *(Surau)* Concept	Size: Capacity of 200 people for 500 house units
	Privacy: The design of the prayer room, ablution spot and corpse management room should take into account public spaces, semi-private spaces and privacy spaces
	Practicality: The concept of planning and designing ablution spot and corpse management room must be practical
	Disabled Friendly User (OKU): Parking design to Prayer Room should take into account the needs of the disabled and comply with MS1184: 2002 & MS1331: 2002 and two toilet (women and men) which is disabled friendly user
Prayer Room *(Surau)* Finishes	Floor: Mihrab hall, male and female prayer hall, Imam's room and the PA system room with carpet
	Wall: All rooms use plaster and paint finishes except toilet and ablution place which using tiles with 1.5 meters of waterproof coating
	Ceiling: All spaces using suspended ceilings except for concrete slabs which using skim coat
	Roof: Concrete roof tiles
	Corpse Management Room: Corpse bath place are easily mobilise and one table top cabinet is constructed at the room side with tile finishes
	Sanitary Wares: All the toilets are equipped with a toilet seat and equipped with a wash hand basin. Sinks are provided at the pantry and corpses management room
	Sanitary Fitting: Sanitary fittings in toilets, pantry, corpses management room and ablution rooms are provided according to the needs and functions of the spaces
	Electrical Appliances: Lamps, fans and PA system equipment are assembled according to the design and space provided
	Door: Provided according to the design and function of the space
	Window: Provided according to the design and function of the space
Taska and Kindergarten Concept	Size: Capacity of 25 pupil per class
	Design: One building includes classrooms, teacher rooms, bathrooms, pantry, dining room and hand-washing place. The concept of planning and design should give students the element of comfortable and convenience of learning, doing activities, interacting and socializing with each other.
	Practicality: The concept of planning and designing a bathroom should take into account the user's needs and suitability
Taska and Kindergarten Finishes	Floor: All spaces using vinyl sheets except for bathrooms that use tiles with waterproof coating. Tiles also are used for pantry, dining room and hand wash place
	Wall: All spaces using Plaster & Paints except for bathrooms that use tiles with waterproof coating. Tiles also are used for pantry, dining room and hand washing place. 1.5m height finishes are used at bathrooms, pantry, dining room and hand wash place
	Ceiling: All spaces using suspended ceilings except for concrete slabs which is using skim coat
	Roof: Metal deck
	Telephone Point: Place at teacher's room
	Sanitary Wares: All the bathrooms are equipped with a toilet seat and equipped with wash hand basin based on user needs. Sink is provided at the pantry
	Sanitary Fitting: Sanitary fittings in the bathroom and pantry according to the needs and function of the space
	Electrical Appliances: Lamps and fans are assembled according to the design and space provided
	Door: Provided according to the design and function of the space
	Window: Provided according to the design and function of the space
Community Hall Concept	Size: Capacity of 200 people

	Design: Space for community activities and equipped with 1 unit of management room, 2 disabled toilet unit, 1 unit of storage room, stage, 1 unit of dressing room and 1 unit of PA System room
	Practicality: Community Hall design should take into accounts a proper ventilation system. The amount of parking is dependent on the local authorities and disabled's need should follow MS1184: 2014 & MS1331:2002
Community Hall Finishes	Floor: All space use plaster except on stage which use vinyl sheets and toilet that use tiles with waterproof coating
	Wall: All wall space use Plaster & Paint except toilet which use tiles with 1.5meter waterproof coating
	Ceiling: All spaces using suspended ceilings except for concrete slabs which using skim coat
	Roof: Metal deck
	Telephone Point: Put in management office
	Sanitary Wares: All toilet must be equipped with toilet seat and wash hand basin
	Sanitary Fitting: Sanitary fittings on the toilet according to the needs and functions of the space
	Electrical Appliances: Lamps, Fans and PA System equipment are assembled according to the design and space provided
	Door: Provided according to the design and function of the space
	Window: Provided according to the design and function of the space
Shop and Stall Concept	Size: 134m^2
	Unit: 2 shops and 2 stalls
	Design: One building includes space for retail business, preparation and cooking space, disabled-friendly toilet, dining spaces and hand-washing basin
Landscape and Open Space Concept	Planning Concept: Take into accounts convenience, comfort and safety aspect of people
	Design: 2 set playgrounds, 2 set outdoor gym, 1 unit of *wakf* and 4 unit of garden chairs
Other Design Concept	*Ansilari* Building: The concept of planning and design of electrical substation, STP, pump house, water storage pond, waste house and water tank should take into account the needs of local authorities and utility suppliers.
	Car Park: The amount of parking will be determined by Local Authorities. The assumption is 1 Carpark: 1 House Unit with addition of 20% for visitor purposes. The arrangement of carpark should take into account the distance from the house.
Requirement	**Workshop Input**
Technical Brief	To architect, Civil & Structure (C&S), Mechanical and Electrical (M&E) and Quantity Surveyor by the client which is *Kementerian Perumahan dan Kerajaan Tempatan (KPKT)*
Finishes	The standard for finishes needs to be finalized
Refuse Chamber	Suitable refuse chamber to be propose
Size	The house unit size needs to be fixed in future whether smaller or bigger than current size
Disabled House Unit	To follow Malaysian Standard for Disabled
Public Amenities	The location needs to be finalised whether it can be above the ground level
House Type	Three type houses propose which is Transit House (Single and Married) – 600 sqft, Family House (5 members) – 900 sqft and Extended Generation (4th generation) – 1000 sqft. Universal design should be proposed for Disabled for 900 sqft and 1000 sqft.
Facilities and Amenities	1. Rainwater Harvesting System 2. Automated Waste Collection System 3. Lift Handling Capacity (waiting time interval) 4. Water Storage (enough for several days) 5. Dedicated BOMBA Lobby 6. Perimeter Security System with perimeter fencing 1.5m height 7. Community Hall instead of Hall 8. Carpark with ratio 1 Carpark: 1 Unit House + 20% for visitor purpose 9. Landscape and open space with 2 set playgrounds, 2 set outdoor gym, 1 set *wakf* and 4 garden chairs 10. The arrangement and location of facilities and amenities should be located in separate building (standalone) to ensure the house units can be repeatable until ground floor
Law	Compliance to UBBL 1984 (Amendment). Until now, only Selangor, Sabah and Penang have proclaimed the UBBL 2012 amendment

	PHASE	Strategic Definition	Preparation & Brief	Concept Design	Developed Design	Technical Design
Issues (Complications that need to be resolved to complete the project strategy)	**Client**		1. **CLIENT** needs to specify socket locations based on M&E Design Brief that will be delivered by **M&E ENGINEER** during Concept Design stage. 2. **ARCHITECT** proposes a site location from **CLIENT** in order to cater CBOR, MyCREST Scoring, GBI, authority requirements etc.	1. **CLIENT** has to appoint capable IBS manufacturer recommended by **C&S ENGINEER**	1. **CLIENT** has to coordinate with **C&S ENGINEER** on structure and **ARCHITECT** on aesthetic	1. **CLIENT** has to appoint capable and experienced IBS contractors
	Co-ordinator (CREAM)	1. **CO-ORDINATOR** must define BIM level clearly i.e. 3D, 4D, 5D, 6D, 7D etc. and its scope of limit/work	1. Make sure 4D duration resource level productivity rate is available	1. BIM Model should be co-ordinated between **ARCHITECTS**, **C&S ENGINEER** and **M&S ENGINEER** before passing to **QS** for take off to avoid double or triple reworks 2. Asset Management should be integrated with 4D and 5D		1. Asset Management to be linked to cost
	Architect		1. To prepare BIM Model Coordination - To produce guidelines for BIM Modelling - Naming convention format (standardisation)	1. To produce design that complies with guidelines from: a. Authority b. BOMBA's requirement c. CBOR d. Integration with other consultants' requirement 2. **C&S ENGINEER** requires **ARCHITECT** to produce design with standardised layout from ground floor to the top 3. Zoning of level before costing is needed by **CLIENT** and should be clear i.e. floor to floor 4. Clash detection should be done until it is free from clash		

	C&S Engineer		1. To prepare BIM Model Coordination - To produce guidelines for BIM Modelling - Naming convention format (standardisation)	1. To produce design that complies with CBOR 2. Joints should be using miter joints to avoid double or less counting 3. Clash detection should be done until it is free from clash 4. Facilities Management (FM) should be integrated with 4D and 5D	1. Provide installation method statement and sequence	1. Facilities Management (FM) to be linked to cost
	M&E Engineer		1. To prepare BIM Model Coordination - To produce guidelines for BIM Modelling - Naming convention format (standardisation)	1. To produce design that complies with CBOR 2. Clash detection should be done until it is free from clash		1. **C&S ENGINEER** requires **MEP ENGINEER** to specify opening for services
	Quantity Surveyor		1. To prepare need statement for modelling according to the requirement i.e. SMM2, SMM3 or NRMM standards for **ARCHITECTS, C&S ENGINEER** & **MEP ENGINEER**			1. Tenders should be done in e-tender work packages 2. Evaluation should be done in e-tender work 3. Monitoring of projects to use 4D BIM Model for interim payment, final account etc. 4. Variation to use the BIM Model and variation comparison for cost and quantity 5. Cost data to be reused

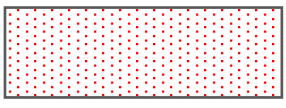
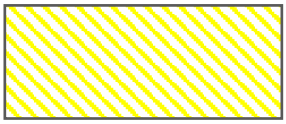
PLAN OF WORK

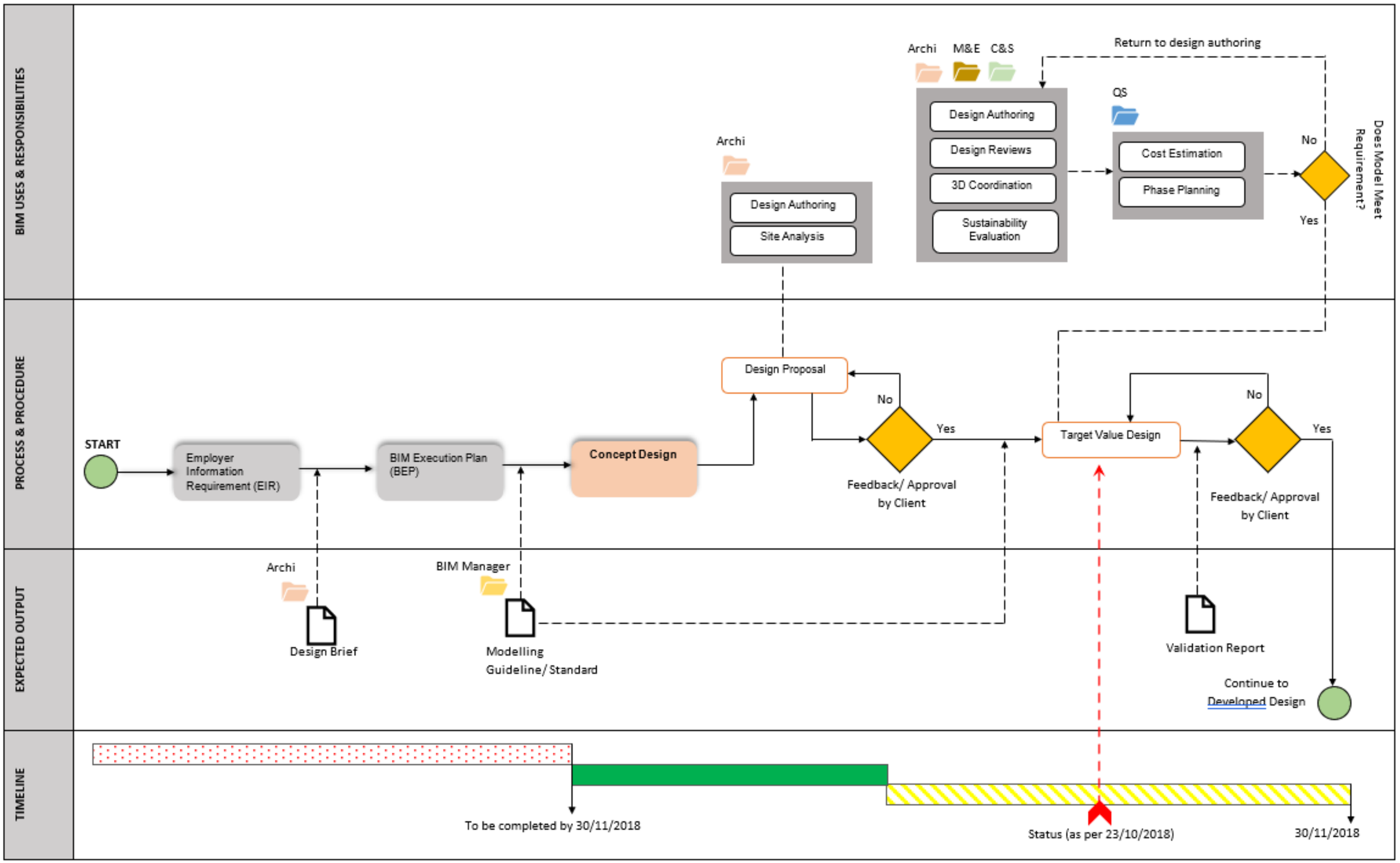
The Plan of Work outlines the process of planning, designing and managing projects into several important stages. The sequence or content of stages may vary or overlap to suit the project requirements. This Plan of Work was designed based on input captured during the technical team coordination workshop.

The Plan of Work sets out the various stages as follows:

Stage	Deliverable
Strategic definition	Employer Information Requirement (EIR), Design Brief, BIM Execution Plan (BEP), Modelling Standard/ Guidelines
Preparation and Brief	
Concept Design	Design Proposal, Target Value Design, Validation Report
Developed Design	Design Management, Validation report
Technical Design	Detailed Design, Project and Validation Report

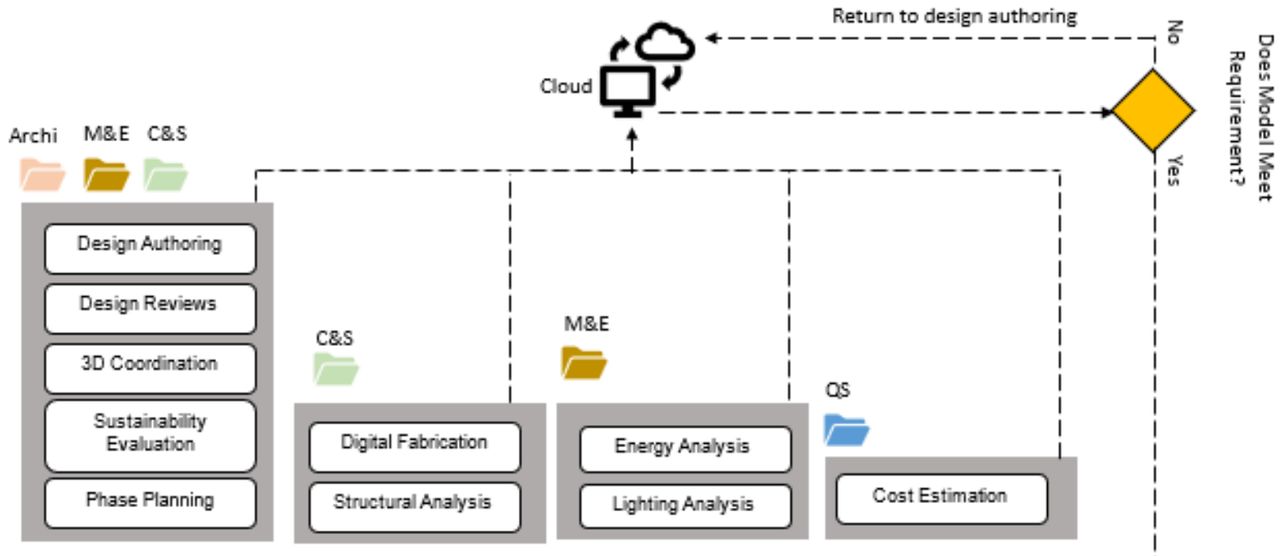
Legend

	No progress
	On-going
	Completed

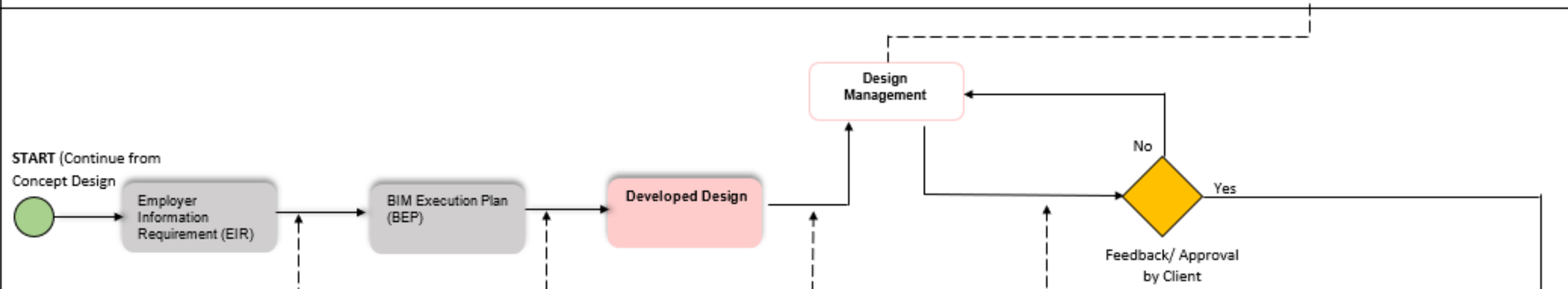

BIM USES & RESPONSIBILITIES
PROCESS & PROCEDURE
EXPECTED OUTPUT
TIMELINE
Archi
Design Authoring
Site Analysis
Archi
M&E
C&S
Design Authoring
Design Reviews
3D Coordination
Sustainability Evaluation
QS
Cost Estimation
Phase Planning
No
Yes
Does Model Meet Requirement?
Return to design authoring
START
Employer Information Requirement (EIR)
BIM Execution Plan (BEP)
Concept Design
Design Proposal
No
Yes
Feedback/ Approval by Client
Target Value Design
No
Yes
Feedback/ Approval by Client
Archi
Design Brief
BIM Manager
Modelling Guideline/ Standard
Validation Report
Continue to Developed Design
To be completed by 30/11/2018
Status (as per 23/10/2018)
30/11/2018

BIM USES & RESPONSIBILITIES

NOTE: BIM Uses will be determined based from EIR

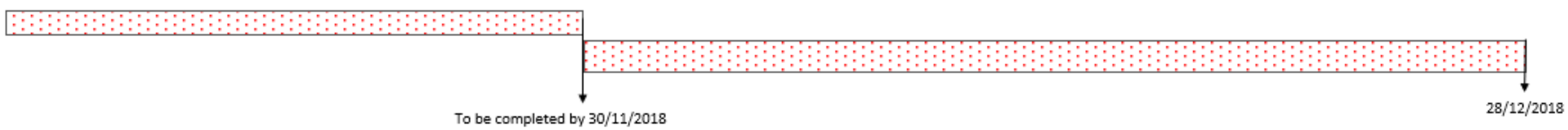


PROCESS & PROCEDURE

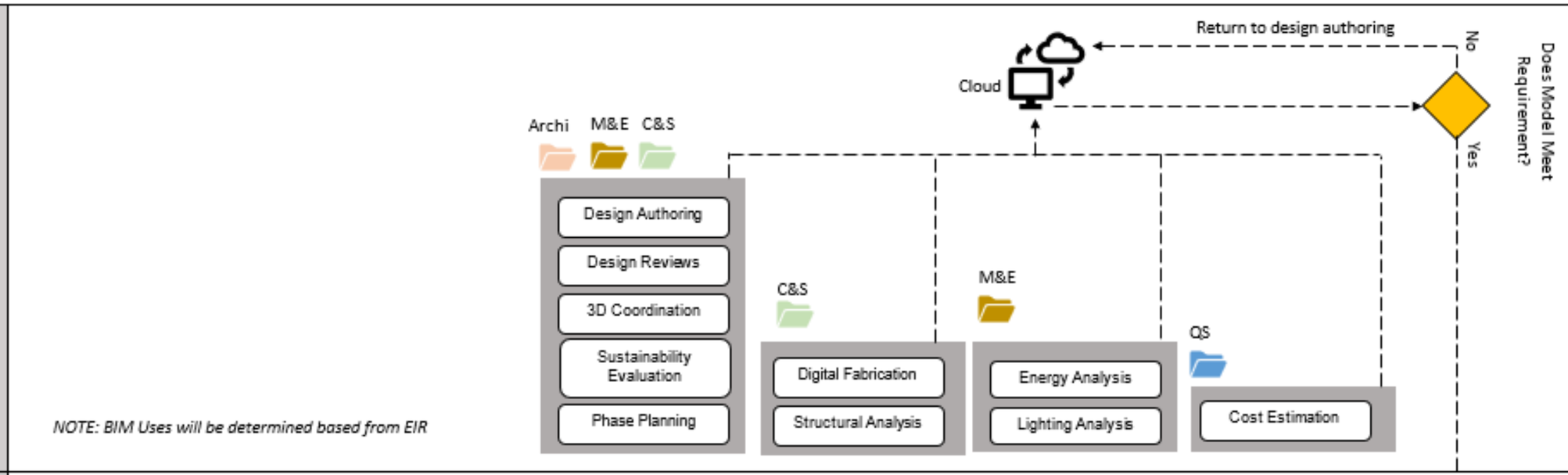


EXPECTED OUTPUT

TIMELINE

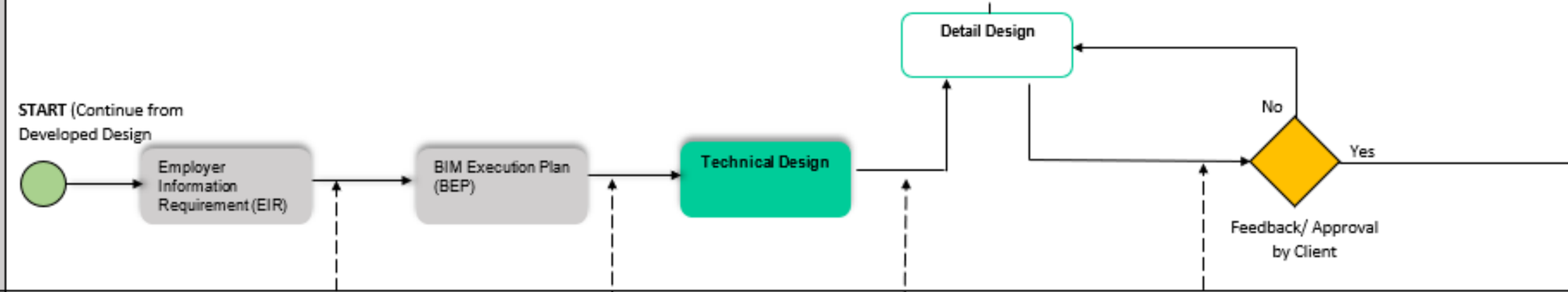


BIM USES & RESPONSIBILITIES

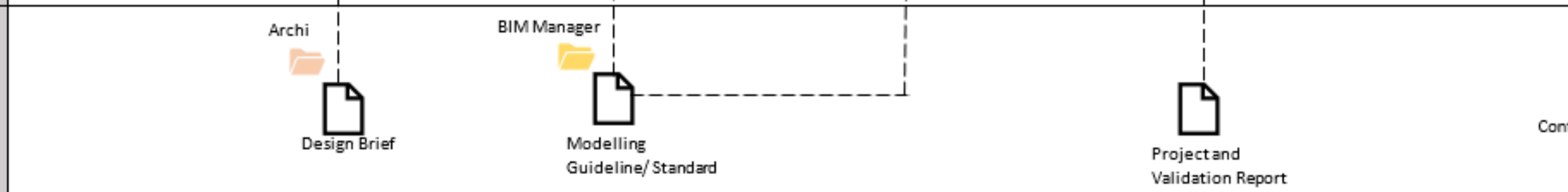


NOTE: BIM Uses will be determined based from EIR

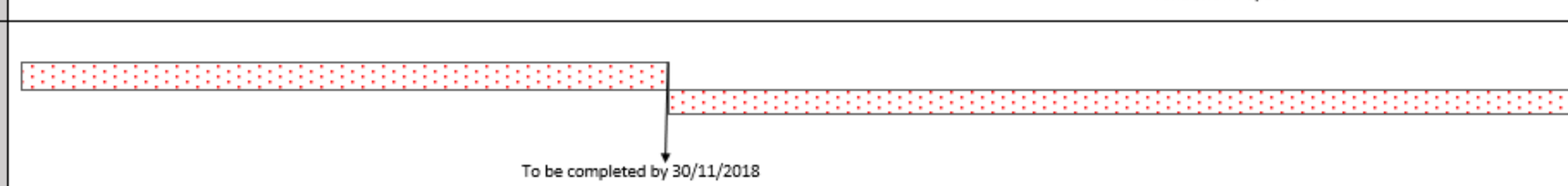
PROCESS & PROCEDURE



EXPECTED OUTPUT

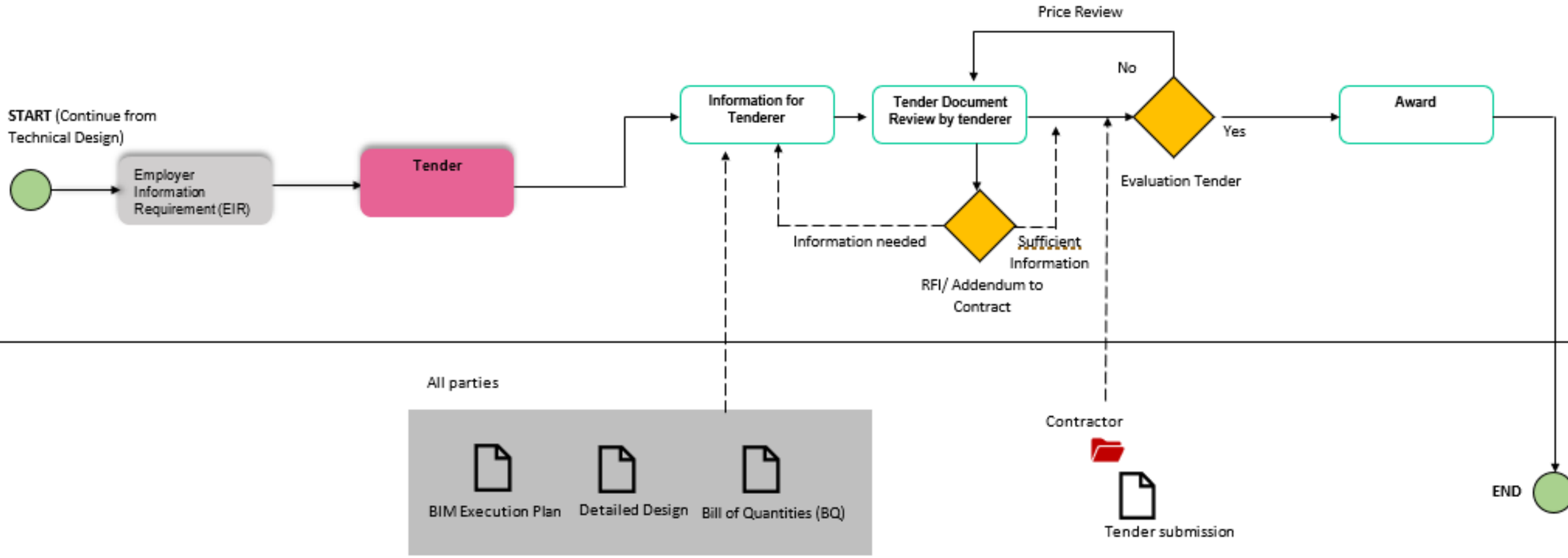


TIMELINE



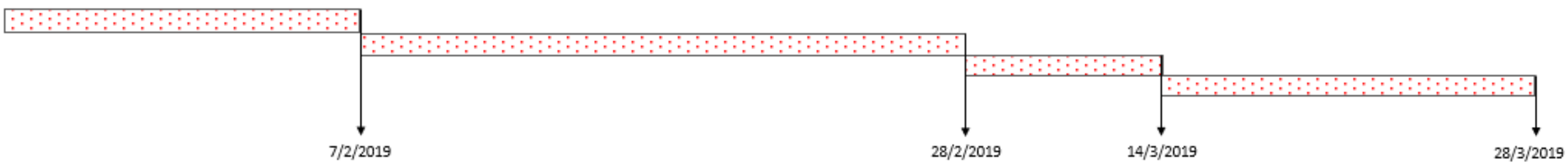
BIM USES & RESPONSIBILITIES

PROCESS & PROCEDURE



EXPECTED OUTPUT

TIMELINE



SUMMARY

The technical team coordination workshop was organised to discuss and establish effective delivery strategy based on the client requirements. As way forward, the technical team has highlighted few important items consists of the following:

a) To establish and include proper construction project management documentation system. This include Employer Information Requirement (EIR), Design Brief, BIM Execution Plan (BEP) and Modelling Standard/ Guidelines
b) Regular coordination workshop/ meeting between client, CREAM and project team
c) To assign BIM Manager/ Coordinator to manage and coordinate implementation of BIM and digital construction process based on project requirements

ACKNOWLEDGEMENT

1. Ir. Dr. Zuhairi Abd Hamid, FASc	-	Construction Research Institute of Malaysia (CREAM)
2. Mohd Rizal Norman	-	Construction Industry Development Board (CIDB)
3. Che Mohd Zahir Che Ahmad	-	MyIBS
4. Mohd Noor Nasriq Mohd Hudal	-	Jabatan Perumahan Negara (JPN)
5. Farah Sasha Rajahdin	-	Jabatan Perumahan Negara (JPN)
6. Muhammad Firdaus Ab Aziz	-	Jabatan Perumahan Negara (JPN)
7. Ar. Dr. Eleena Jamil	-	Eleena Jamil Architect (EJA)
8. Ar. Yusri Amri Yussoff	-	Eleena Jamil Architect (EJA)
9. Dalia Qistina Mohd. Nasaruddin	-	Eleena Jamil Architect (EJA)
10. Saiful Adli Abdul Karim	-	NS Prefab Consultancy
11. Zulkhairi Abd Hamid	-	NS Prefab Consultancy
12. Nurul Amanina Nor Azni Shah	-	NS Prefab Consultancy
13. Febriyanshah	-	NuMagineLab Sdn. Bhd.
14. Yap Yien Yee	-	NuMagineLab Sdn. Bhd.
15. Sr. Sharifah Noraini Noreen Syed Ibrahim Al-Jamalullail	-	Integrated Project Information Management (IPIM)

SECRETARIAT

1. Maria Zura Mohd Zain
2. Ahmad Farhan Roslan
3. Intan Diyana Musa
4. Nurulhuda Mat Kilau
5. Mohammad Faedzwan Abdul Rahman
6. Natasha Dzulkanine
7. Ihfasuziella Ibrahim
8. Mohd Syarizal Mohd Noor
9. Tengku Mohd Hafizi Raja Ahmad

Prepared by:

Centre for Advanced Construction Technology and Innovation (CACTI)
Construction Research Institute of Malaysia (CREAM)