



SOBHA

CONSTRUCTIONS

**CATEGORY: OFF-SITE CONSTRUCTION
PROJECT OF THE YEAR**



PROJECT OF THE YEAR: OFFSITE CONSTRUCTION – NOMINEE



Name of Nominated
Project
The Crest



Project Location
**Sobha Hartland,
Nad Al Shiba**



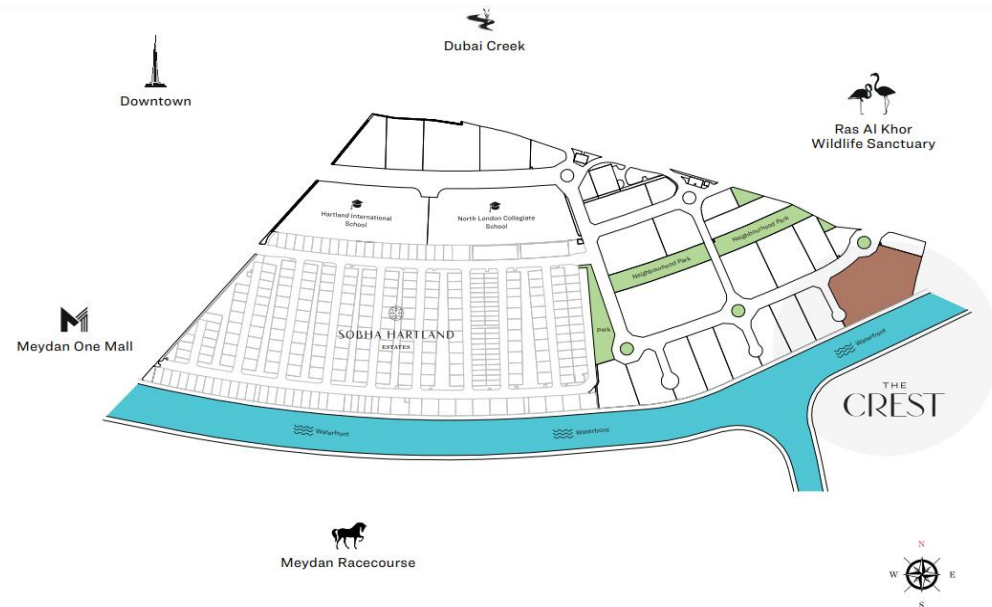
Name of the Company
Sobha Constructions L.L.C.



Project Commencement **Date 31
October 2021**



BCC Planned Date
June 2025



THE CREST

AN OVERVIEW

Plot Number: 347-0383

Location: AL MERKADH

Plot Area: 235,959.76 Sq.ft

Built Up Area: 2,399,986.67 Sq.ft

Configuration: B+G+5P+31+R

Building Height: 171.425 m

No. of Apartment: 1496 Nos

No. of Apartments in Typical Floor: 54 Nos.

No. of POD: 3250 Nos.

Unit Mix: 1 Bed-858 No; 2Bed-515 No; 3 Bed - 123

Retail Shop: 22 No @ Ground Floor

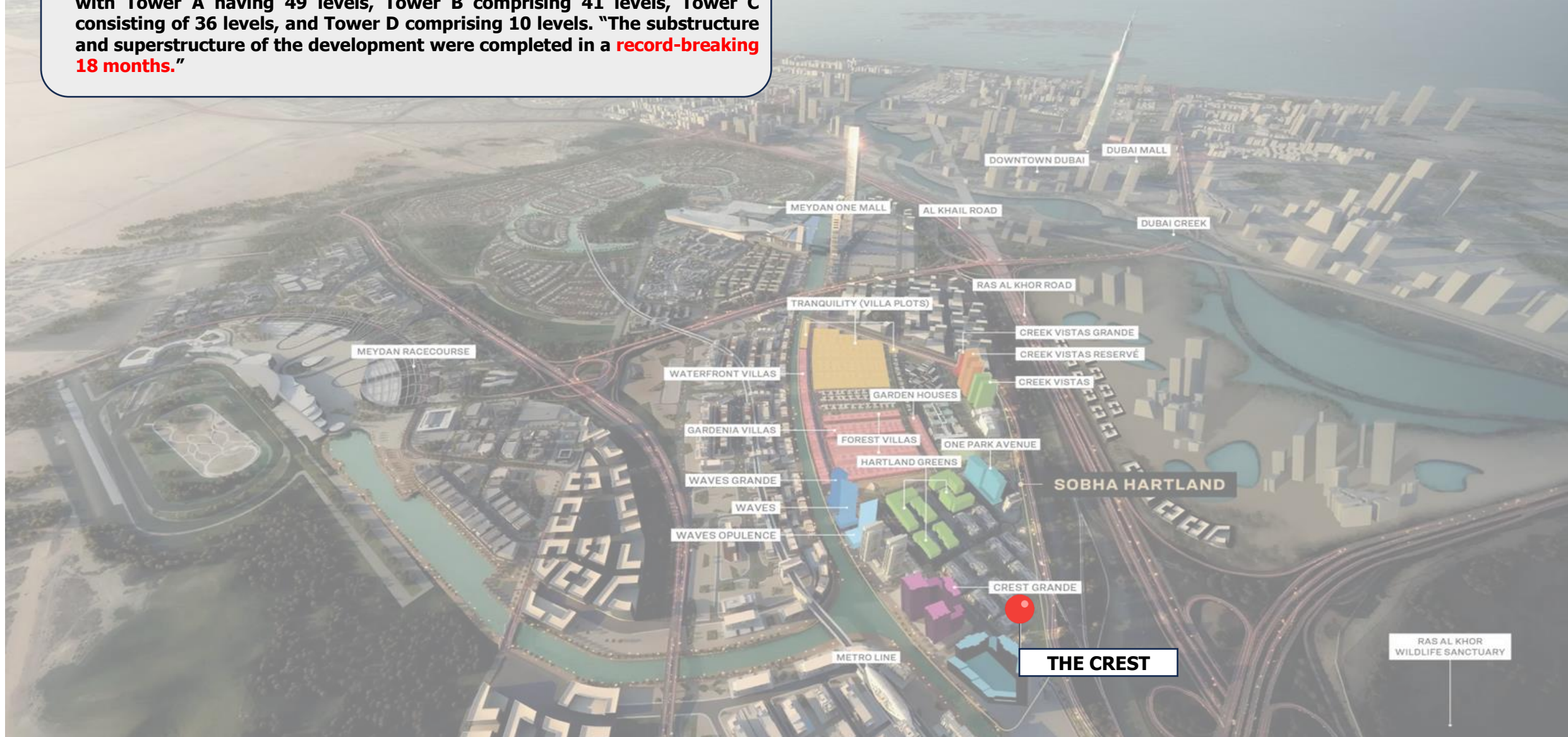
Podiums: 05 Nos **Parking:** 1592 Nos

No. of Lift: 27 Nos (24 passenger + 03 Fire)

No. of Fire Staircase: 12 (Tower + Podium)

Progress: 84.3%

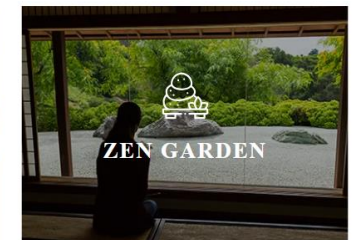
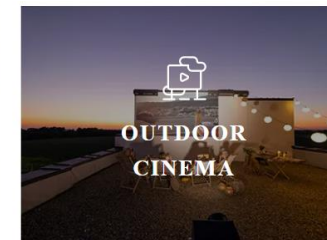
The scale of 'The CREST' is nothing short of monumental, with a total built-up area of 2.5 million sq. ft., housing four towers reaching for the sky, with Tower A having 49 levels, Tower B comprising 41 levels, Tower C consisting of 36 levels, and Tower D comprising 10 levels. "The substructure and superstructure of the development were completed in a **record-breaking 18 months.**"



AMENITIES & COMMUNITY MANAGEMENT

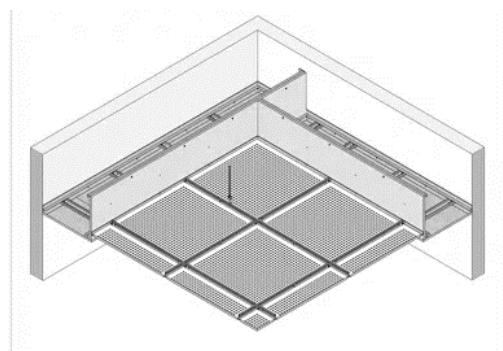


- 10-13 km accessibility to the heart of Dubai , Downtown, Burj Khalifa & Dubai Mall.
- The property is located very near to E44 (Ras Al Khor Road) and E66 (Al Ain-Dubai Road), providing good travel routes in all directions within Dubai and the UAE . Dubai International Airport is under 20 minutes away.
- Walkable distances to supermarkets, salons & cafes.
- 2 international schools nearby.
- Planted 8000 trees planted in this community so this region has its own microclimate which is a little cooler than the areas around.
- Located on the banks of a pristine CRYSTAL LAGOON
- 3 Inter-connected expansive towers
- The 3 towers have a series of stepped SKY GARDENS connecting them with each other.
- Inter-linked SKYWALK that brings all 3 towers of THE CREST together.
- Pet-Friendly Environment.



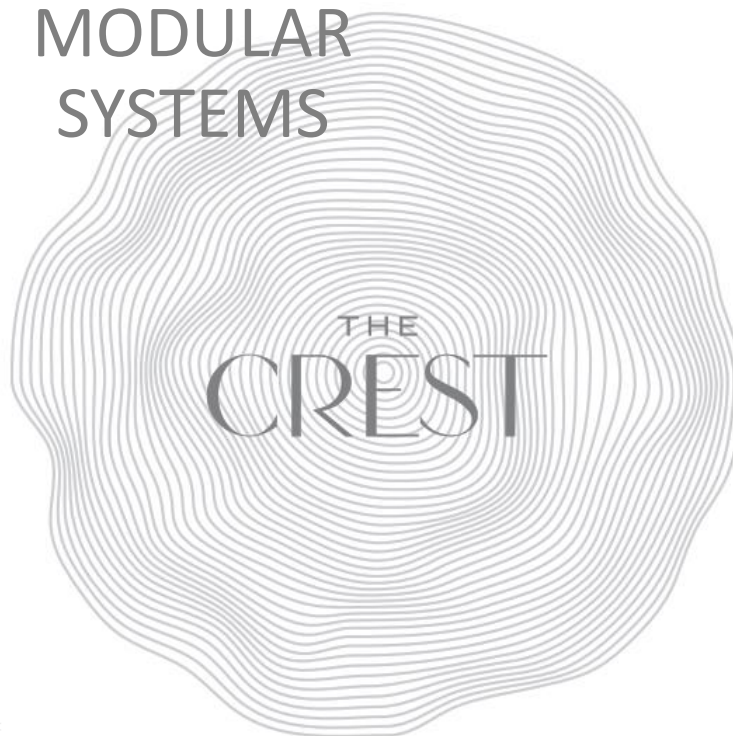


**POD :PRE-FABRICATED
BATHROOM UNIT**



**GYPSUM PRE-
FABRICATION UNIT**

MODULAR SYSTEMS



MEP MODULAR SYSTEM



TILE CRAFT CENTER

To reap the benefits of Off-site construction in terms of delivery, cost and quality, Sobha Constructions introduced the concept in the Crest Project using various initiatives such as implementation of pre-fabricated bathroom units – manufactured in Sobha’s POD Factory, MEP modular units, Gypsum pre-fabricated units and pre-packed cut tiles from Sobha’s Tile Craft Center.

After repeated trial and error during the R&D for identifying what suits best for the project, the four concepts were successfully implemented in collaboration with our Architects, Quality & Technology, Project Operations and Planning Team.

Why was modular concept adapted?

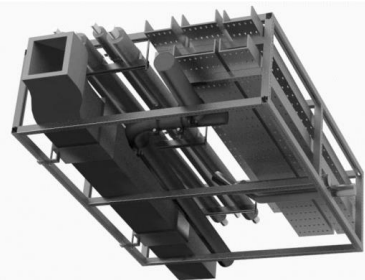
“Minimize on-site tasks to lessen reliance on skilled labor, and investigate alternatives such as a ready-to-install approach”

“Prefabrication reduces the need for highly skilled workers while boosting productivity and minimizing waste on-site. By assembling components off-site, it streamlines construction, requiring fewer adjustments and reducing material waste. Surplus materials can be repurposed, contributing to resource efficiency”



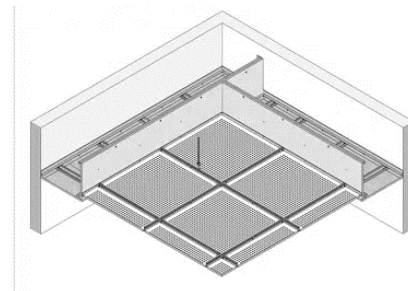
**POD :PRE-FABRICATED
BATHROOM UNIT**

3250 UNITS



MEP MODULAR SYSTEM

1053 UNITS



**GYPSUM PRE-
FABRICATION UNIT**

5314 UNITS



TILE CRAFT CENTER

184,800 sqm



Prefabricated Bathroom Unit (PBU) | Collaboration & Benefits

Prefabricated Bathroom Unit (PBU) is a preassembled unit completely manufactured, assembled & inspected inside the factory, with finishes, sanitary wares, concealed pipes, electricals, bathroom fixtures & cabinets before it is delivered and installed on-site.

Salient Features

- Sobha's very own POD factory is the largest factory in the region with single assembly line above 400m. Biggest in terms of volumes in the world.
- 0.8mm thick Light Gauge Steel Framing System with Precision Roll forming Technology
- High quality material like C60 concrete, fire rated gypsum boards & sanitary accessories.
- Horizontal connection in plumbing enabling zero leakage & letting technicians fix without entering POD.



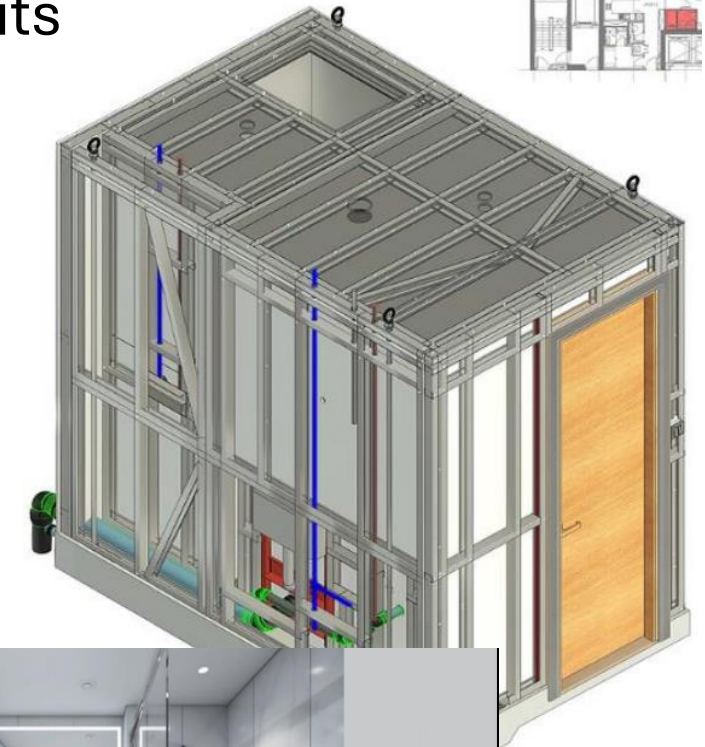
Benefits

- The number of utilities, fuel, and material consumption for manufacturing a pod is reduced by at least 20% due to standardization, centralized manufacturing at a fixed point, and lesser material waste & minimal movement of resources.
- Pods are estimated to take 30% less time than the traditional method upon optimizing the factory setup.
- Manufacturing bathrooms in a controlled environment with regular training for all the staff & in conditions that are much safer & better than the site, improves workforces' overall well-being.
- Fewer resources, overheads and manpower are used to make a Prefabricated Bathroom Unit compared to the legacy approach



Prefabricated Bathroom Unit (PBU) | Collaboration & Benefits

- **QUALITY CONTROL**
 - **Consistent quality:** Manufactured in a controlled factory environment, which helps ensure uniform quality and reduces the likelihood of defects or errors in the construction process.
 - **Fewer snagging issues:** Because bathroom pods are pre-fabricated, there are fewer opportunities for mistakes or variations that can lead to snagging issues.
- **DESIGN FLEXIBILITY**
 - **Customization:** Bathroom pods can be customized to meet specific design requirements, including fixtures, finishes, and layouts.
 - **Standardization:** Bathroom pods can maintain a consistent design standard across multiple units or projects.
- **HEALTH AND SAFETY:**
 - **Improved health and safety:** By minimizing on-site construction work, can reduce the risks associated with construction site accidents and hazards.
- **ENVIRONMENTAL BENEFITS:**
 - **Reduced carbon footprint:** By optimizing the construction process and reducing transportation of materials, bathroom pods can help lower the overall carbon footprint of a project.
 - **Longevity and Durability:** High-quality materials: Bathroom pods are often built using durable materials that can increase their longevity and reduce maintenance costs in the long run.



Prefabricated Bathroom Unit (PBU) | Collaboration & Benefits

- **SUSTAINABILITY**

- **Material efficiency:** Prefabrication can lead to less material waste, as it allows for more accurate planning and reduced over-ordering of materials.
- **Energy efficiency:** Some bathroom pod typologies are designed with energy-efficient fixtures and water-saving technologies, which can contribute to reduced resource consumption over time



Fig. Sobha Modular Factory

Prefabricated Bathroom Unit (PBU) | Collaboration & Benefits

The design for the prefabricated bathroom units crafted by the PNC Architects was crafted in close coordination with the Sobha Modular Team and Sobha Constructions team after several rounds of R&D to ensure manufacturability and constructability.

PODs get manufactured each day in the Sobha Modular Factory in Ras Al Khaimah after which it is transported in trailers to the Crest Project in Sobha Hartland. Each day **40** PODs are installed in close coordination with the project safety and quality team.

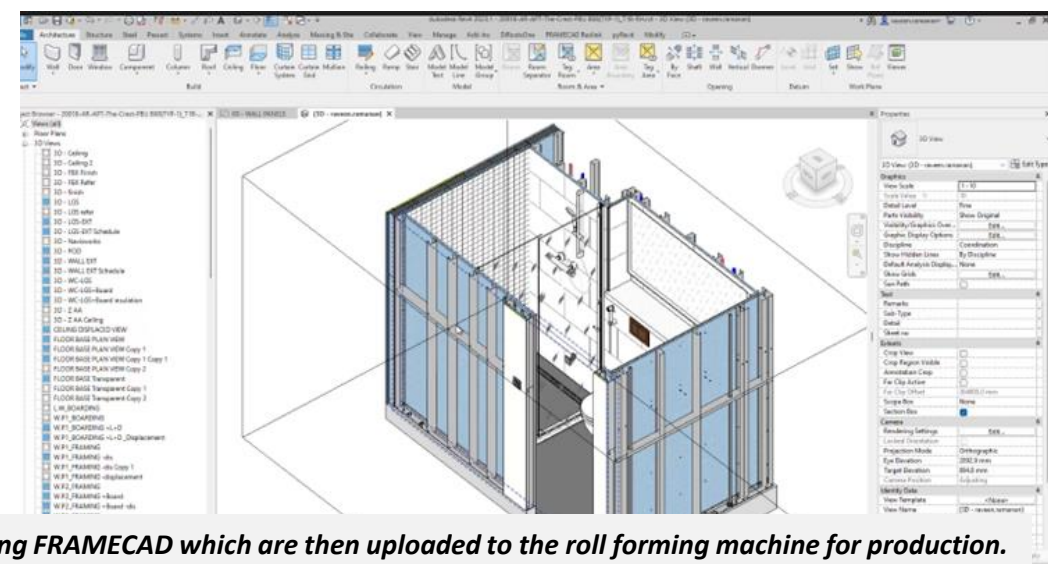
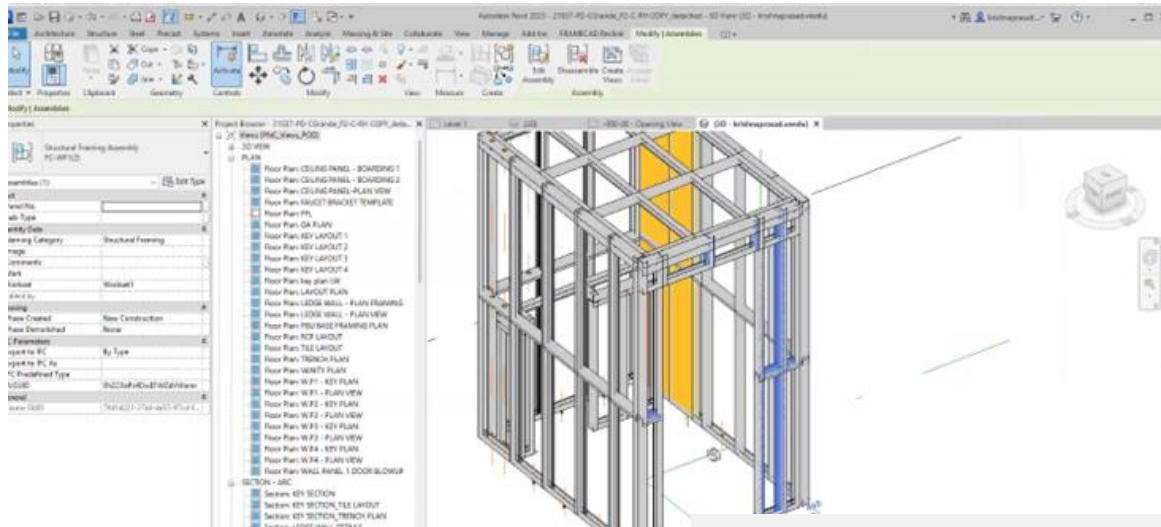
At Sobha, quality is our priority, and each activity from production to installation - can be commenced only once the previous activity is approved in PlanGrid, our collaborative construction software – by the Quality team.

Success of collaboration measured:

1. Increase in POD installation productivity by **9 times**.
2. Decrease bathroom unit activity completion duration by **70%** on moving the activity offsite.

Prefabricated Bathroom Unit (PBU) | Innovation & Creativity

Designed using specialist computer-aided CAD design and engineering software, the FRAMECAD system allows for cold formed steel to be implemented for the fabrication of our bathroom PODs. Our **Modular Factory** produces pre-engineered bathroom units and delivers them to site. They're then assembled as large elements of a building, forming complete rooms.



Framework structures are designed using FRAMECAD which are then uploaded to the roll forming machine for production.



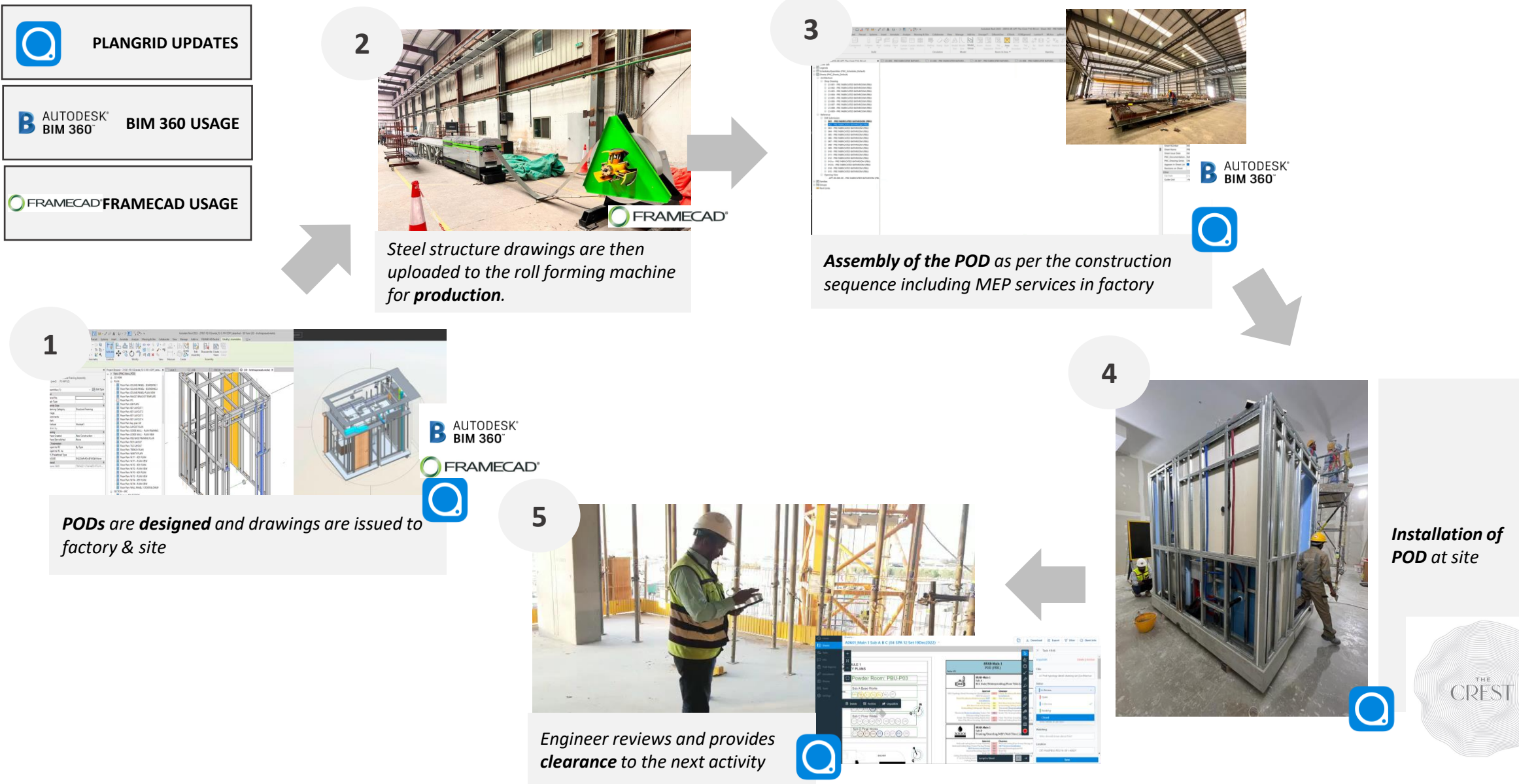
Framework production at our Modular Factory using roll forming machine

The FRAMECAD System unlocks the ability to design and construct web joists, trusses, structural framing and internal partitioning suitable for a diverse range of construction types.

FRAMECAD's roll forming machine integrates innovative engineering, design and production software to produce frames, trusses and joists that are ready to be assembled with ease.



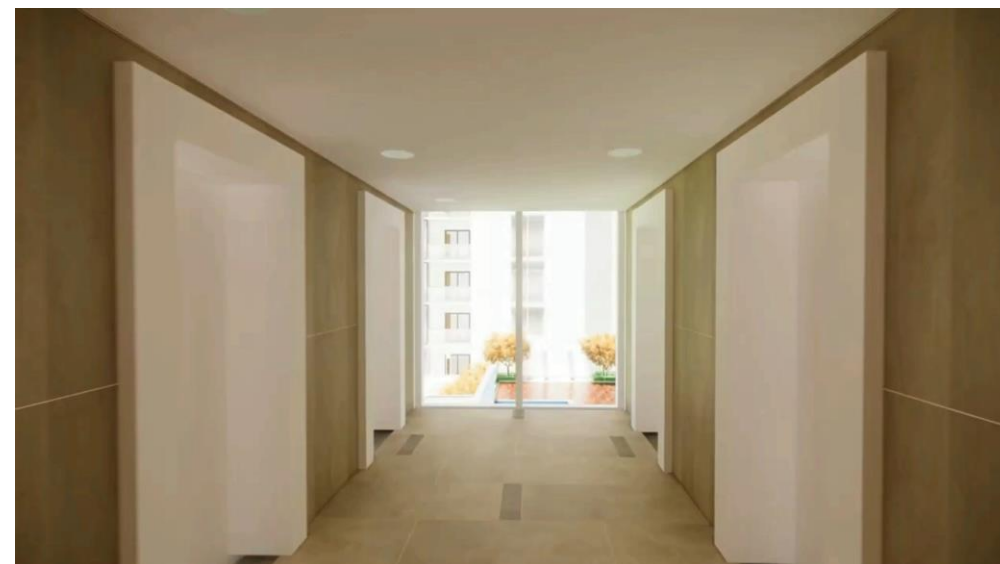
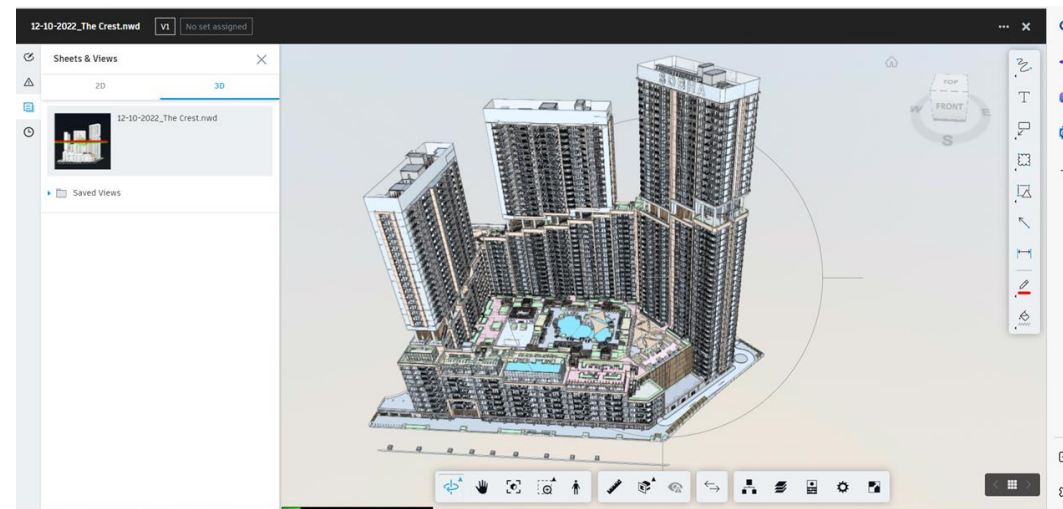
Prefabricated Bathroom Unit (PBU) | Design to Production to Installation



Prefabricated Bathroom Unit (PBU) | Design to Production to Installation



Enables us to see which are the modifications made in the building model



Prefabricated Bathroom Unit (PBU) | Design to Production to Installation



Fig. Stages of Pod Installation

Prefabricated Bathroom Unit (PBU) | Innovation & Creativity

POD Academy

As POD concept was relatively new in Sobha - Ground Floor of the Crest Project was used for setting up the POD Academy – a center created by the Quality & Technology team, dedicated to demonstrate the end-to-end POD production and installation for anyone to get an overview and learn on the same.



Prefabricated Bathroom Unit (PBU) | Innovation & Creativity

- Developed a horizontal drainage system with all pipes within concrete, this has higher sound insulation and is soundproof.
- High strength C60 concrete is used as POD base.
- Uses robots and machines such as welding robot, co-bot, pick & place robot ensuring products are delivered with high efficiency (5x improvement in cycle time)
- Full sized 120x60cm tiles rather than the conventional smaller tiles that indicate the luxury factor within Sobha projects.



Product Details

- Support up to 2.25 Tons of trailer tongue weight
- Designed to weld directly to the trailer frame
- Pull-pin keeps leg securely locked in place
- Made of high quality A3 steel, very durable and sturdy to use
- Side-wind handle easily raises or lowers trailer coupler



Handle Type: Fixed handle

Product Name Trailer Jack
Heavy Duty Trailer Jack
Side Frame Mount Jack
Cap : 2.25 Tons
Lift : 381mm
Weld-on
No Drop leg
With Foot
Side Wind Jack

Logistic system contains a high size threaded bars and bespoke **pod movement jack system** that ensures that product slides through the construction site with ease.

MEP Modular | Collaboration & Benefits

Factory-produced pre-engineered MEP modules that are delivered to a site and assembled are an intelligent and advanced form of construction methodology.

Building traditionally, we're waiting for the walls to be built but using the modular system we can produce corridors and risers, all before the structures are even built.

This parallel construction methodology allows the main building structure to be erected in tandem with the off-site fabrication of MEP services, reducing dependencies and potential delays.

These pre-fabricated modules consists of all the required mechanical-electrical and plumbing systems

Why was MEP Modular Corridor used?

- Provides clash free services
- Saves us 70% of MEP installation time.
- Saves space at site for storage and fabrication.
- Multiple drills were eliminated which improved the slab quality
- Better ergonomics which resulted in better quality of workmanship



MEP Modular | Collaboration & Benefits



Stage 1

- Structure Frame Assembly



Stage 2

- MEP Service Assembly



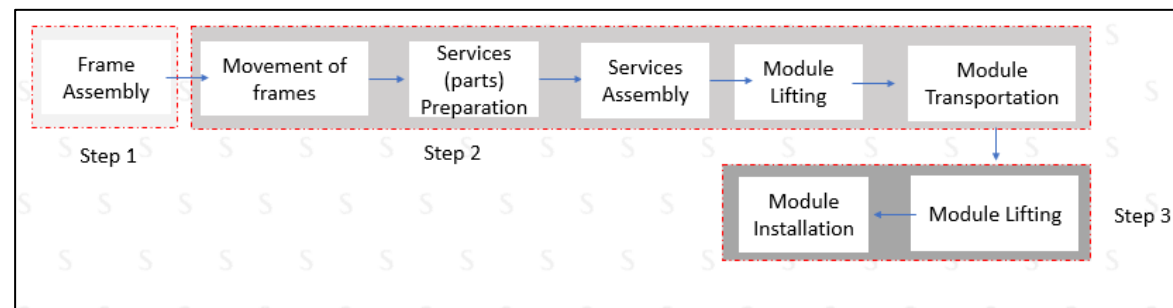
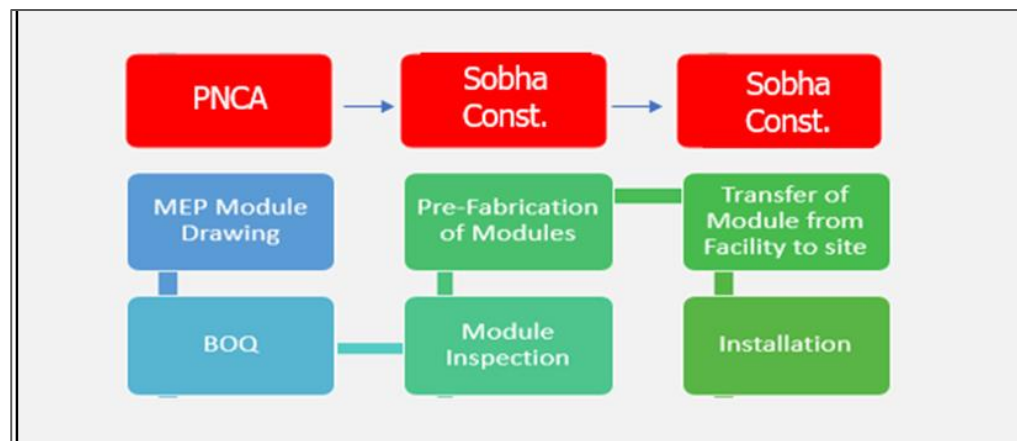
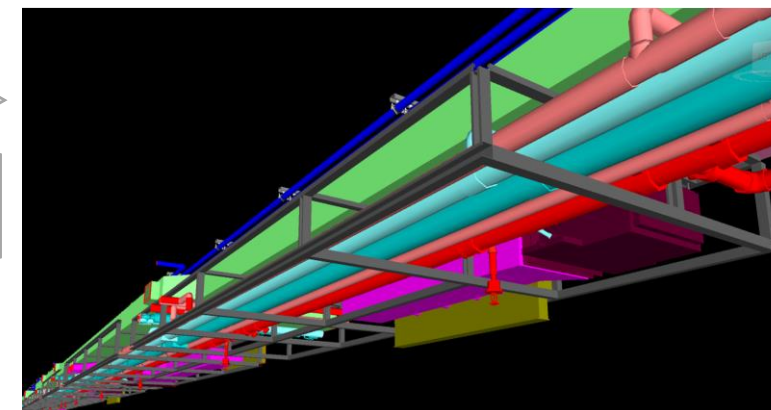
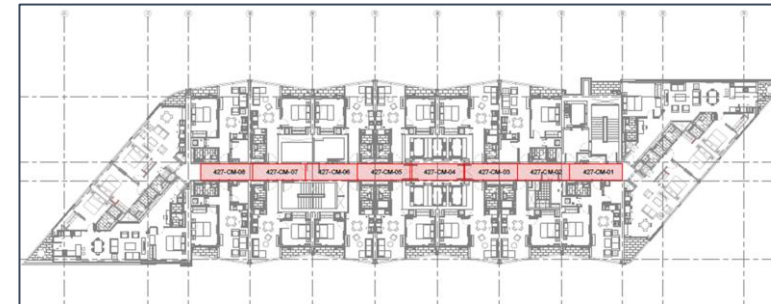
Stage 3

- Assembled Modular Lifting



Stage 4

- Modular onsite Installation

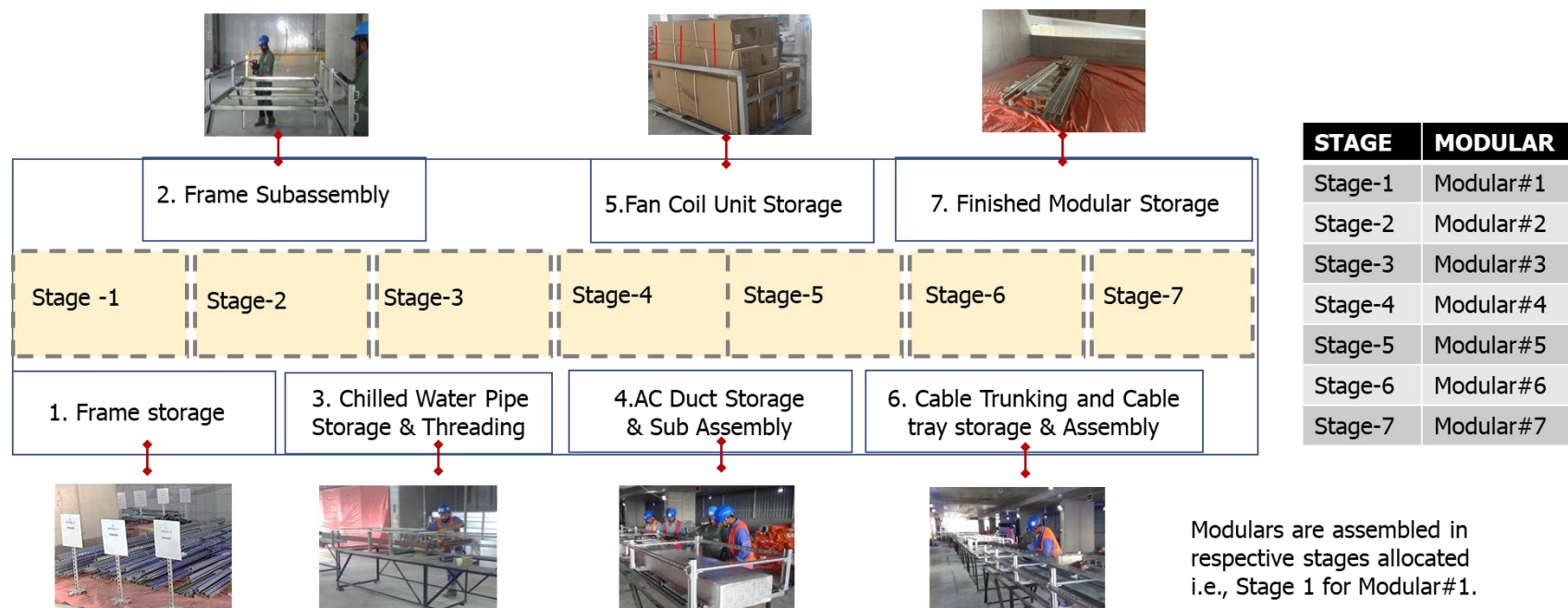


MEP Modular | Collaboration & Benefits

For this prefabrication knowledge acquisition, we established a collaboration with experts in the field. This partnership allowed us to tap into their expertise and incorporate it into the process effectively. Our technology partner – Wurth completed a technical feasibility study and developed a modular design and assembly plan with respect to which training was given to the engineers and foremen on installation.

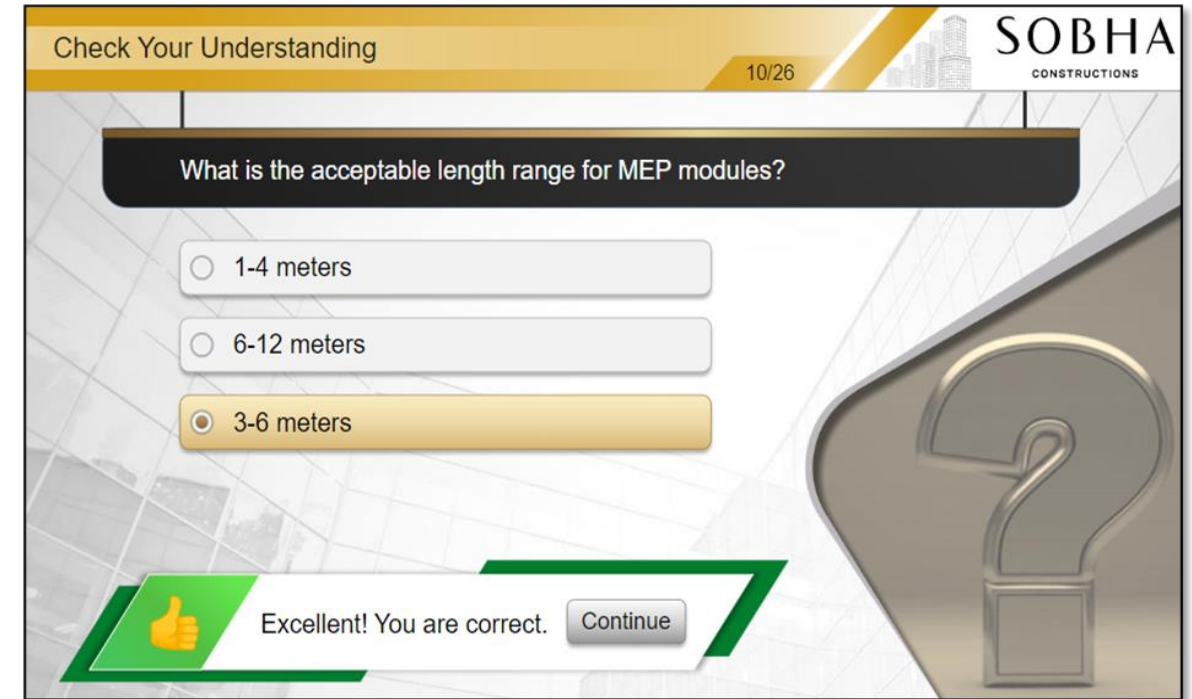
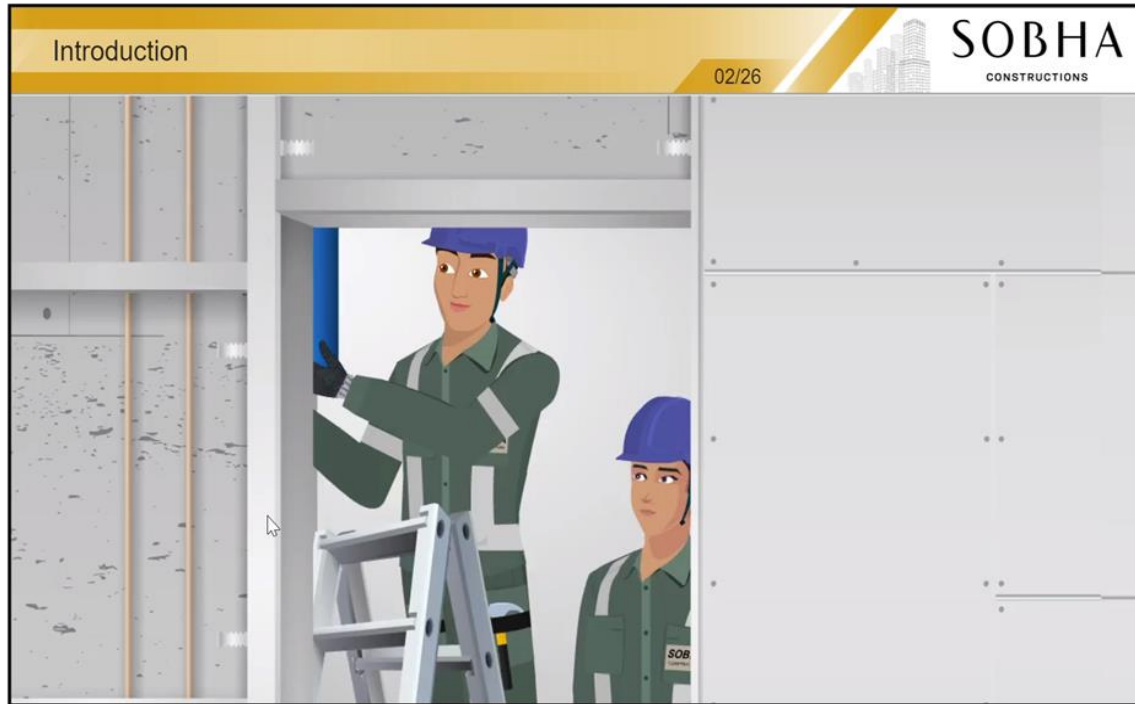
FMEA or Failure Mode Effective Analysis – typically used in manufacturing or industrial engineering was used by the operations team, quality team and planning team in collaboration with the consultants and subcontractor to determine the various risks involved such as design complexity, logistics & transportation risks, inaccuracy in manufacturing, structural instability, skilled labor shortage etc

To optimize the layout, a comprehensive analysis was done by the operations team – of the workflow to optimize the same.



MEP Modular | Collaboration & Benefits

To ensure skilled labor and utmost quality, video training material and SOPs were developed.



Success of collaboration:

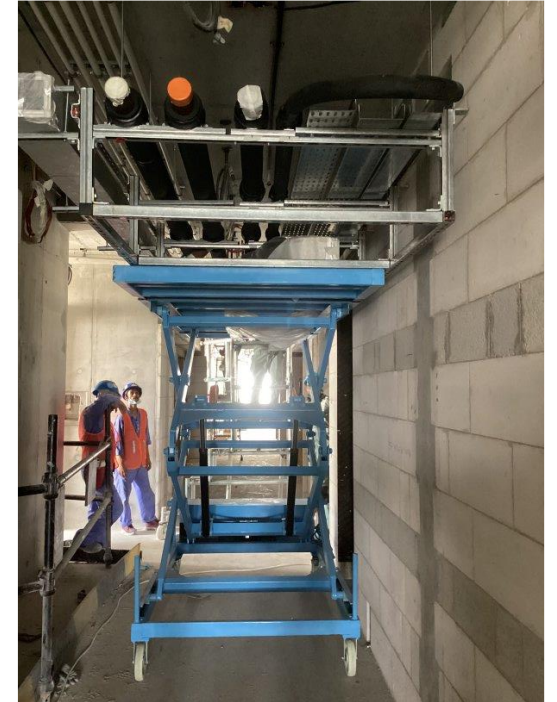
- 50% manhours were reduced
- 73% reduction in MEP service installation time



MEP Modular – Innovation/wow factor

Some notable factors:

1. Operating a duct lifter may require more manpower to synchronize the lifting and positioning of MEP modules, impacting efficiency, and labor allocation. – Hence, scissor lift was introduced. This provides benefits of easy operation, versatility, extended height reach, and reduced manpower. Manpower consumption reduced by 33% & Modular lifting cycle time reduced by 56% per floor.
2. Ergonomics of the technicians were our priority hence, worktable, drawing board next to the worktable, bolt pocket, marking reference created in advance etc were some initiatives that were taken.
3. To reduce nonvalue adding time - advanced tools such as cordless impact wrench were introduced to reduce the process time such as drilling time due to this initiative reduced from 27 seconds to 15 seconds.



Scissor Lift



Cordless Impact Wrench For Horizontal Modular

Gypsum Pre-fabrication Unit | Collaboration & Benefits

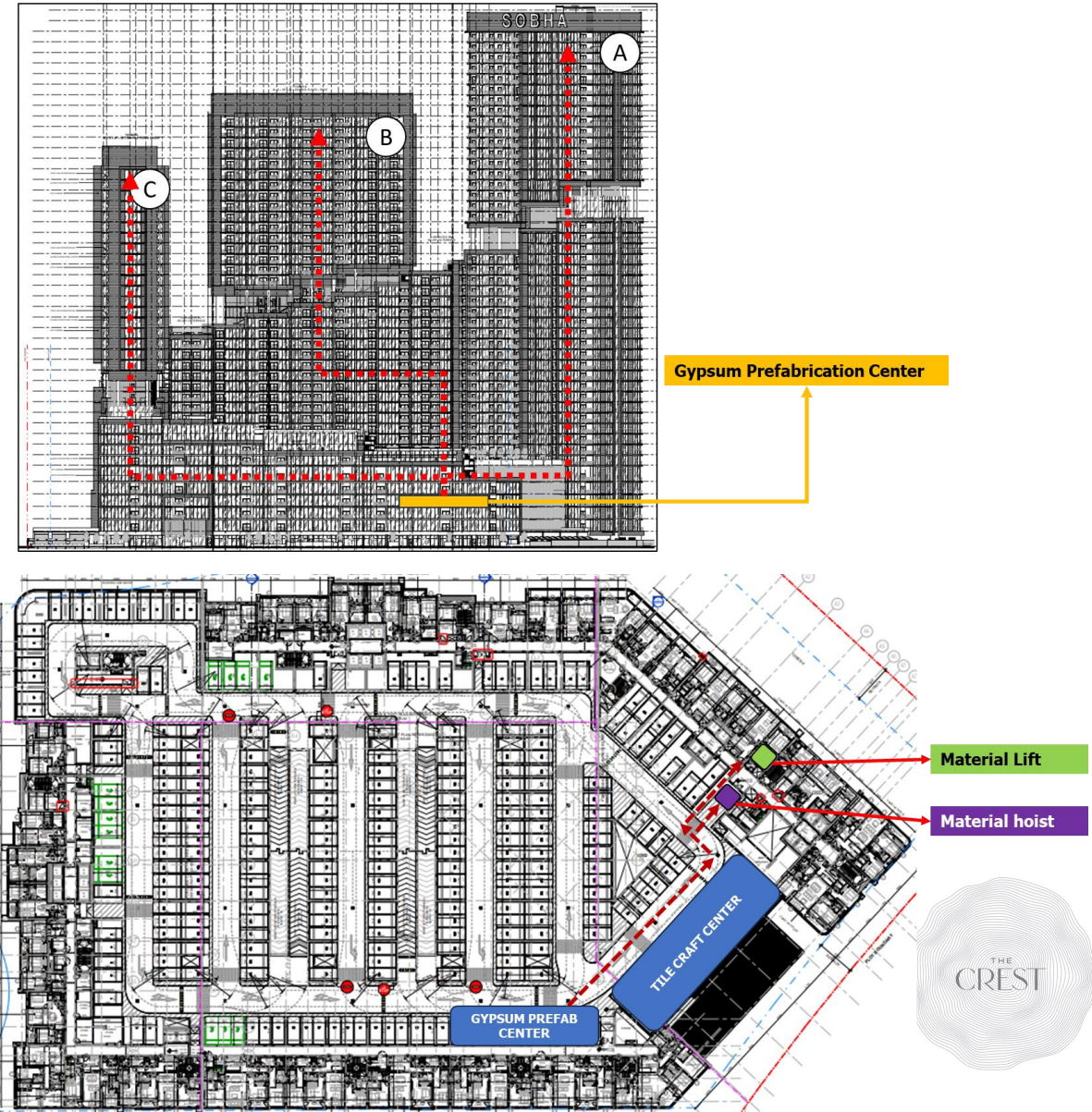
Gypsum Prefabrication Unit was introduced to ensure only marking and installation work is done at the construction site whereas the complete unit with framing, 1st layer, 2nd layer boarding was done at the prefabrication center.

The center is strategically planned in Podium area of Tower A for ease of material movement to other towers by the operations, logistics team

Gypsum Prefabrication Unit was setup in Sep 2023, Fully Operational from Oct 2023.

Success measures of collaboration

- 70% increase in productivity compared to conventional methods
- the time taken reduced by 42%
- No. of defects reduced by 70%
- Man cost per flat reduced by 43%



Gypsum Pre-fabrication Unit



Gypsum Pre-fabrication Unit | Innovation & Creativity

- 1. ECRS:** To further improve the productivity of the Gypsum Prefabrication unit ECRS method of Eliminate, Combine, Simplify – a concept & approach relatively new to construction industry was used for optimizing the process which doubled the panel production. Example of this include simplification in the process steps such as providing template for cutting, marking, cutting MEP hole etc.
- 2. Process and roles re-evaluation:** Increase in adherence to step-by step activity plan per day by 18% due to standardization in the process (including re-evaluation of pre-existing process steps) of Gypsum wall and role clarity between the team on who should do what.
- 3. Standard Operating Procedure:** Diagrammatic representation of the process flow along with the major tools/materials required, PPE required, pre-check, post-check etc were included in the training material of the technicians which increased productivity by 80%.
- 4. Flextos Grooving Machine** was used for simplified production process.

Wow factors:

Use of such tools enabled us to:

1. Reduce the time taken for overall activity by 23%
2. No. of quality defects have reduced by 59%
3. Manpower cost per flat has reduced by 36%

WORK INSTRUCTION - QUICK REFERENCE FIN WALL FRAMING	
MAJOR TOOLS & MATERIALS REQUIRED	PPE REQUIRED
PRE-CHECK	POST-CHECK
1. Get the dimensions of Fin Wall to be pre-fabricated from Foreman 2. Check whether all the required materials (GI Track, GI Stud, etc.) are available 3. Check whether all the required tools (measuring tape, marker, crimping tool, etc.) as listed above are available	1. Ensure the frames are at right angles 2. Ensure the joints of the two frames are at right angles and no gaps are left 3. Ensure centre to centre distance is maintained equally on both sides of the frame
PROCEDURE	
STEP 1 : Cut the GI Track & Stud as per the measurement 	STEP 2 : Mark & Cut the MEP square holes & supporting centre frame
STEP 3 : Assemble the frames on the assembly table 	STEP 4 : Fasten 3 screws on the edge joints of the frame
STEP 5 : Crimp & Twist at 4 joint locations on the frame 	STEP 6 : Flip the frame



Flextos Grooving Machine For Gypsum Activity

Tile Craft Center | Collaboration & Benefits

Tile Pre-fabrication and Kitting service was provided to enable pre-cut tile packages for the specific apartment unit as per design requirements prior to work start.

Why Tile Craft Center?

- Consistent tile cutting – Cut to size as per requirement at site therefore reduced wastage and rework
- Pre-cut tiles / Time-Saving – Cutting time on-site is reduced.
- Consistent Tile Shade – Prechecks in center help in reduced rework.
- Decreased Machinery at site– Angle grinders and cables



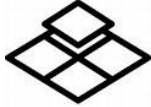
Tile Craft Center | Collaboration & Benefits



Kitting as per
project plan



10%
Tile laying Cost
Reduction



~7%
Reduction
Rejection Rate



5%
Tile Wastage
reduction rate



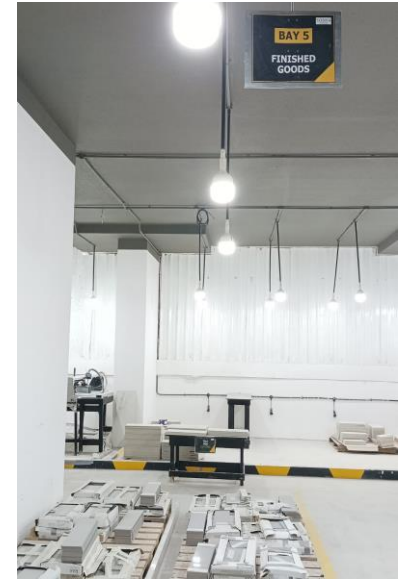
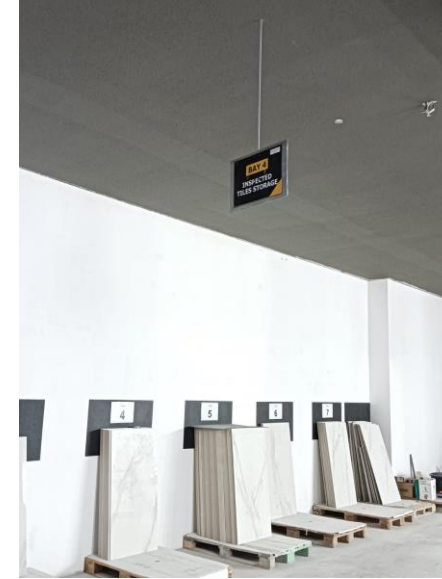
On-time
consistent
supply



20%
Decrease in
defect %



75%
Technician
productivity
rate



Team Collaboration | Innovation & Creativity

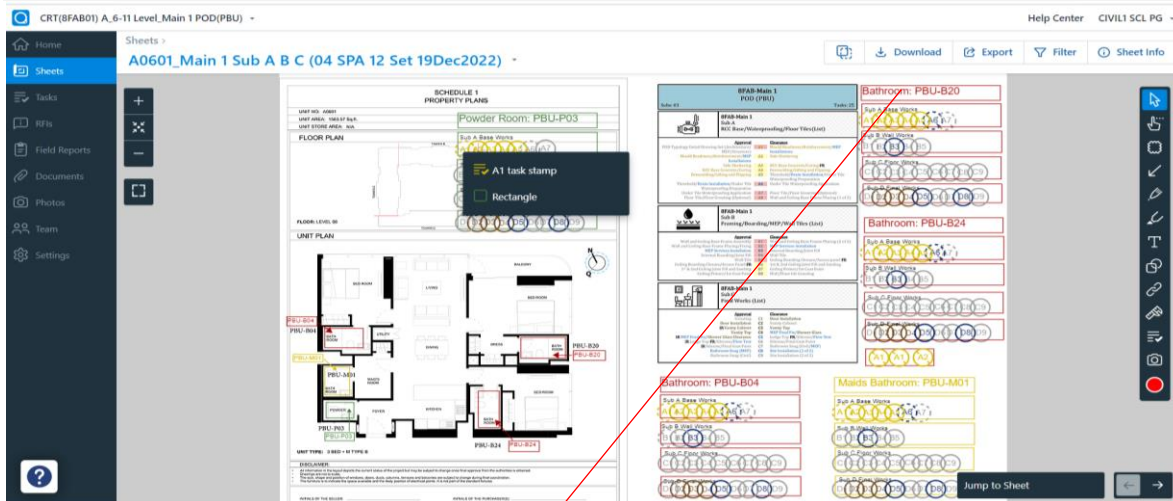
- Overall, these concepts posed many challenges such as clearance issues which were overcome by **micro-level monitoring** and **frequent reviews** by various stakeholders of different divisions of finishing, MEP, structures and business support functions – quality, planning, commercial to take collaborative decisions and corrective actions.
- **Heat Map Concept** introduced to keep a check on the availability of resources 3 days before the commencement of work – by the commercial and planning team.
- Use of **last planner system** by the operations team, including Foremen to plan activities, location wise.
- Collaborative Platforms used:
 1. PlanGrid
 2. BIM 360

(See next page for further details)

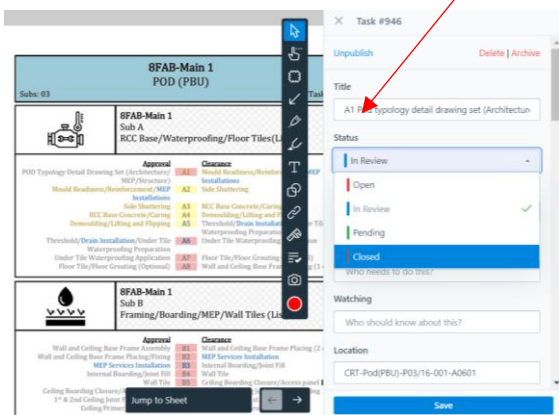
MAINTAINING PROGRESS THROUGH PLANGRID

Tasks stamps are maintained in PlanGrid across functions (consultants, contractors, audit) so that the progress is maintained and ensured at all stages from design to realization.

OVERVIEW OF A PLANGRID SHEET



The above rounded figures shows '**stamps**' that are to be updated at every stage.

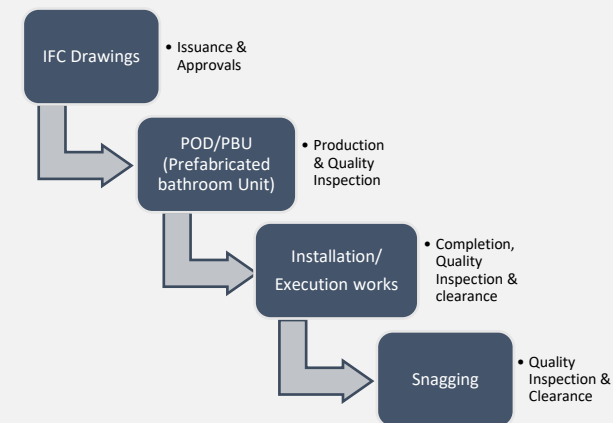


Clicking on each stage lets the user know the status of the particular stage.

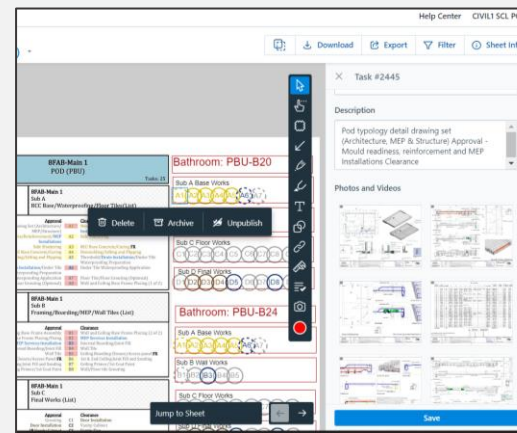
The respective person responsible for the activity updates the status at each stage.

Any stakeholder can see the status at any point of time reducing the need for follow-ups.

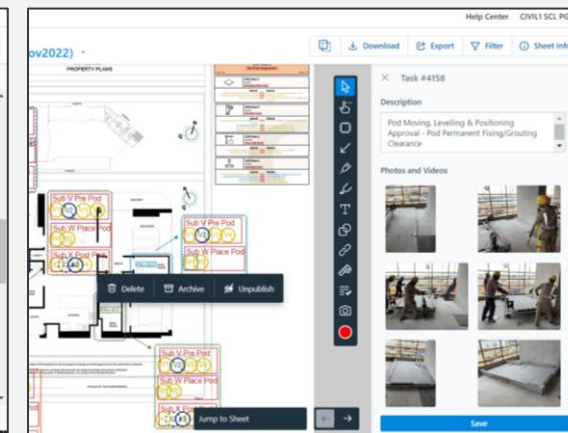
STAGES OF PLANGRID USAGE



SAMPLE PLANGRID UPDATES



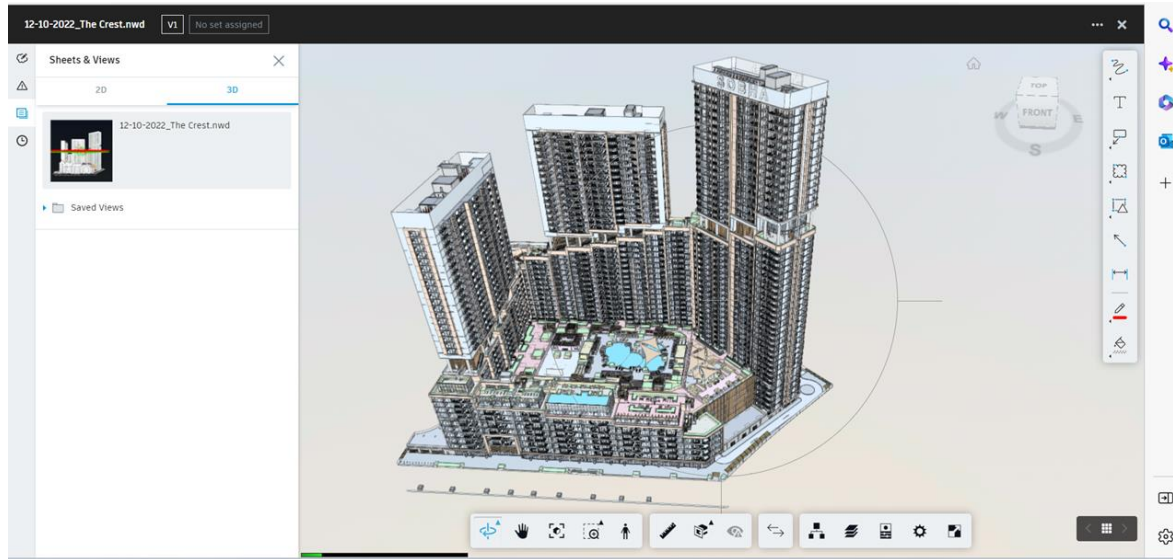
Sample stamps marking the detailed drawings issuance with pictures indicating the same.



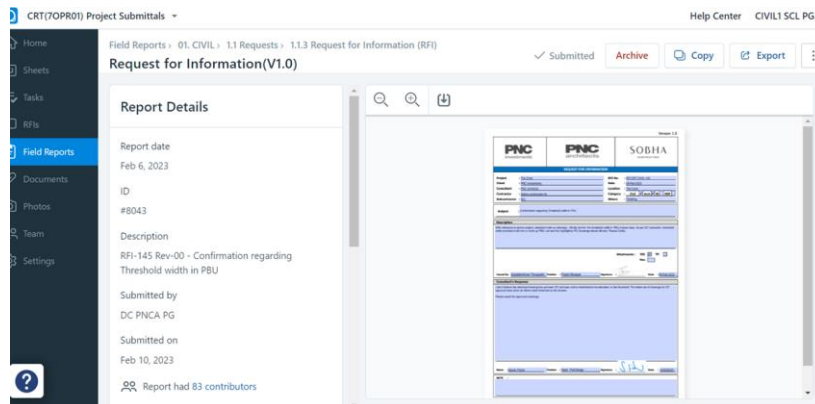
Sample stamps marking the progress of the execution with pictures indicating the same.

BIM 360

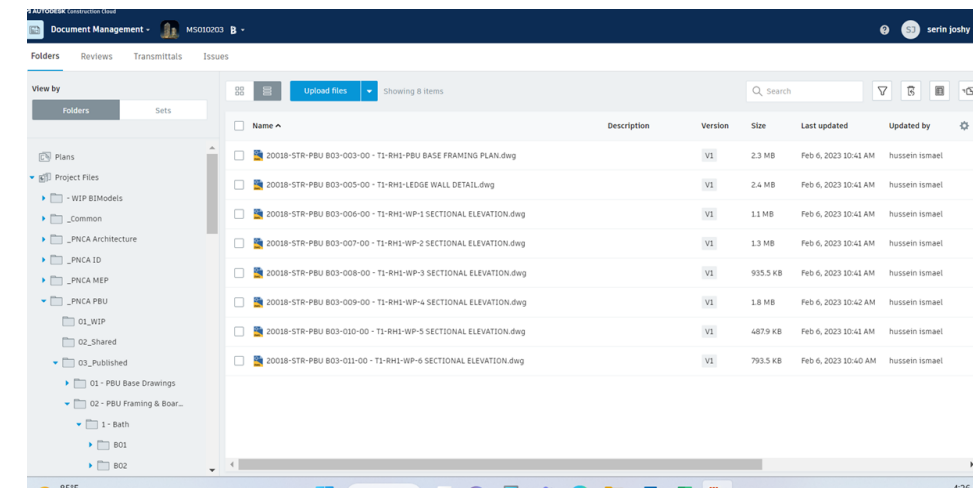
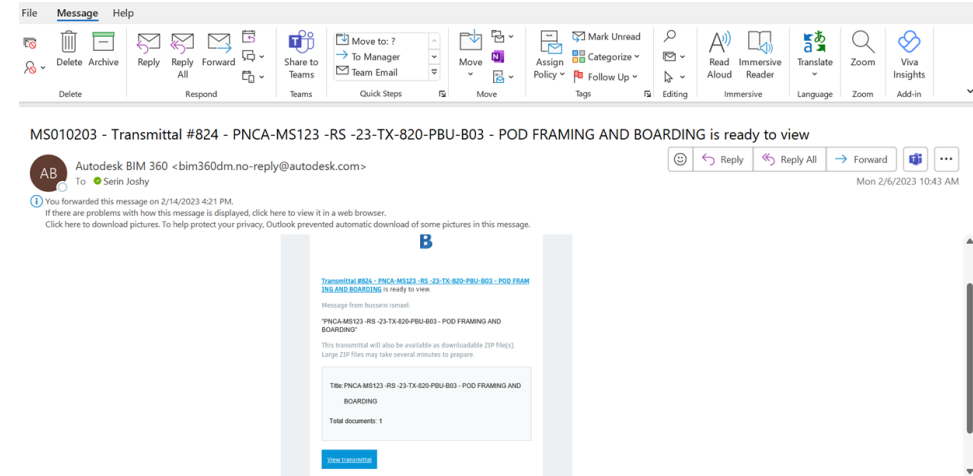
BIM 360 was used as a work-sharing platform enabling multidisciplinary teams to co-author shared Revit models, visualize every update, and manage design data throughout the project lifecycle.



3D Model built in Revit, visible to all stakeholders via **BIM 360**



RFIs/CVIs are then sent via PlanGrid



Transmittal notification and transfer via mail

Sustainable Modular Construction

Sobha Modular construction seeks to be the most innovative project embracing the principles of Environmental, Social and Governance in conceptualizing, designing, constructing and putting it to purpose in the assigned location. The transformative impacts of modular construction in general and sustainability in particular are outlined below. These are broadly revolving around Energy, water, waste, emissions, health & wellbeing, safety, time, quality, and process efficiency.

As modular construction focusses on mass production as opposed to in-situ, there is a big shift in the material composition resulting in lesser total material consumption as opposed to in-situ. As a group that has undertaken a pledge to the ministry of climate change and environment to support it in its net zero strategy, these form a large part of our net zero plan

POD:

There is a drastic reduction in the quantity of cement a main contributor of emissions. While the reduced quantities and usage of lower embodied carbon materials in the modular construction brings in an obvious reduction in energy and emissions, the automation and increased efficiency achieved in the modular further drives significant reductions in resources consumption and the waste generated out of the process

- The modular concept of POD enabled us to remove many components which are otherwise required in in-situ construction – this enabled us to eliminate approximately 24,765 Kg CO₂ for the Crest Project.
- The comprehensive analysis of the carbon emission reduction is in progress with the third-party consultant.

MEP Modular Concept:

One of the major contribution of the MEP modular concept is reduction of welding points. Studies on the carbon emission of electrical machines have not yet been well established and there are limited initiatives and calculation methods that provide only guidelines for assessing the carbon footprint.

Carbon monoxide (CO) and CO₂ may be generated in fluxed welding processes by the action of heat on flux materials such as carbonates and cellulose. A total of 2,142 welding points were eliminated enabling the reduction of the carbon emission

Sustainable Modular Construction

In addition to the environmental impacts, modular construction also contributes a lot in social spheres, and these are well governed as below.

- 1.Improved health conditions for our workers as the entire process is carried out in controlled conditions within the factory.
- 2.Additional well-being.
- 3.Improved efficiency.
- 4.Consistent high quality.
- 5.Higher productivity

We are currently in the process of assessing the overall sustainability and ESG impacts of this innovation beyond sustainability covering CO2e emissions reduction that is associated with decarbonization, percentage reduction in materials, approx. reduction in time frame, enhancement in health/ wellness and other factors.