



Built Environment Course | 2024

TIA1029 - 2324

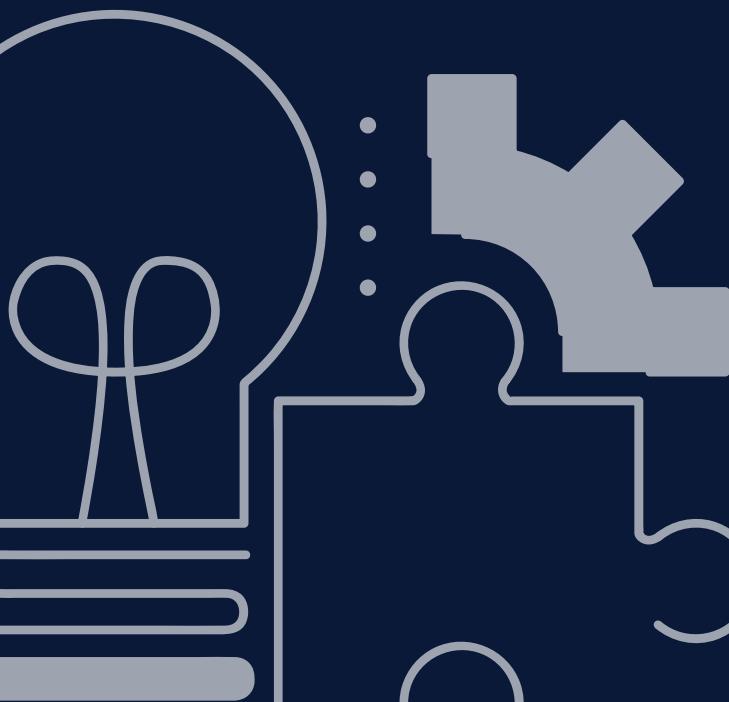
Collaborative Project

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GROUP TASK



1. Overall Project Strategy
2. Environment, Health & Safety Plan
3. Collaborative Planning Log
4. Collaboration Report



Overall Project Strategy

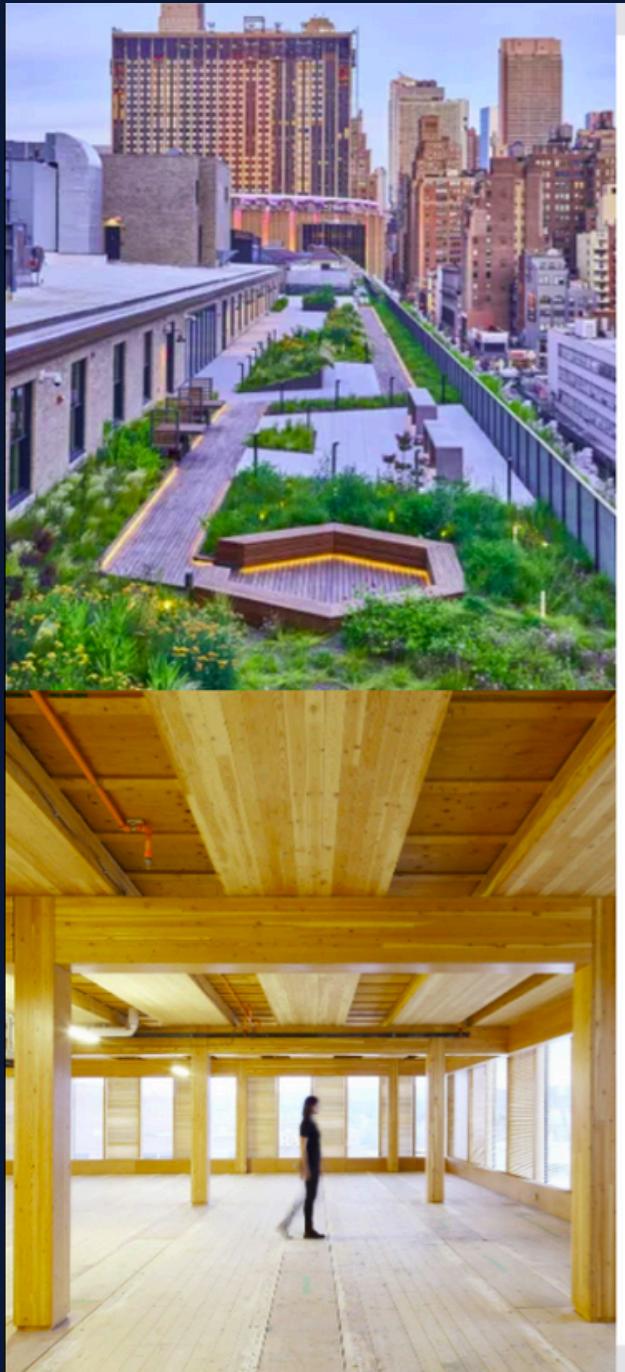


1. Interpretation and development of the Project Brief
2. Alternative design selection
3. Analysis and Feasibility Study
4. Project roles and task plan

Interpretation and development of the Project Brief

The Health Innovation Campus is a new building run by the University of Huddersfield. It is in Dalton Ward, Southgate/Leeds Road, Huddersfield, HD1 1TW. The building is a project made by partnerships of the University of Huddersfield, 3M Buckley Innovation Center (3M BIC) Kirklees Council's Business Kirklees, Mid Yorkshire Teaching NHS Trust, Calderdale and Huddersfield NHS Foundation Trust and other local and regional health and wellbeing partners. It is part of the ecosystem that aims to drive innovation in the health sector. Hence, the building is used for both education and treatment purposes. The project aims to raise awareness of health & wellbeing in general. The design team of the building is the same one as the Barbara Hepworth building, thus the two buildings would have a similar look. It is a seven-storey building with an area of approximately 2000 m² filled with a variety of modern facilities and support from residents doctors and industry experts. The main materials are concrete for the foundation; cross-laminated timber for the structure; york stone and corten metal panels for the facade green living wall for the roof finish, which are all sustainable. The building is WELL building standard - 'a performance-based system measuring the impact of the building on human well-being' approved.

Alternative design selection



Proposed Materials

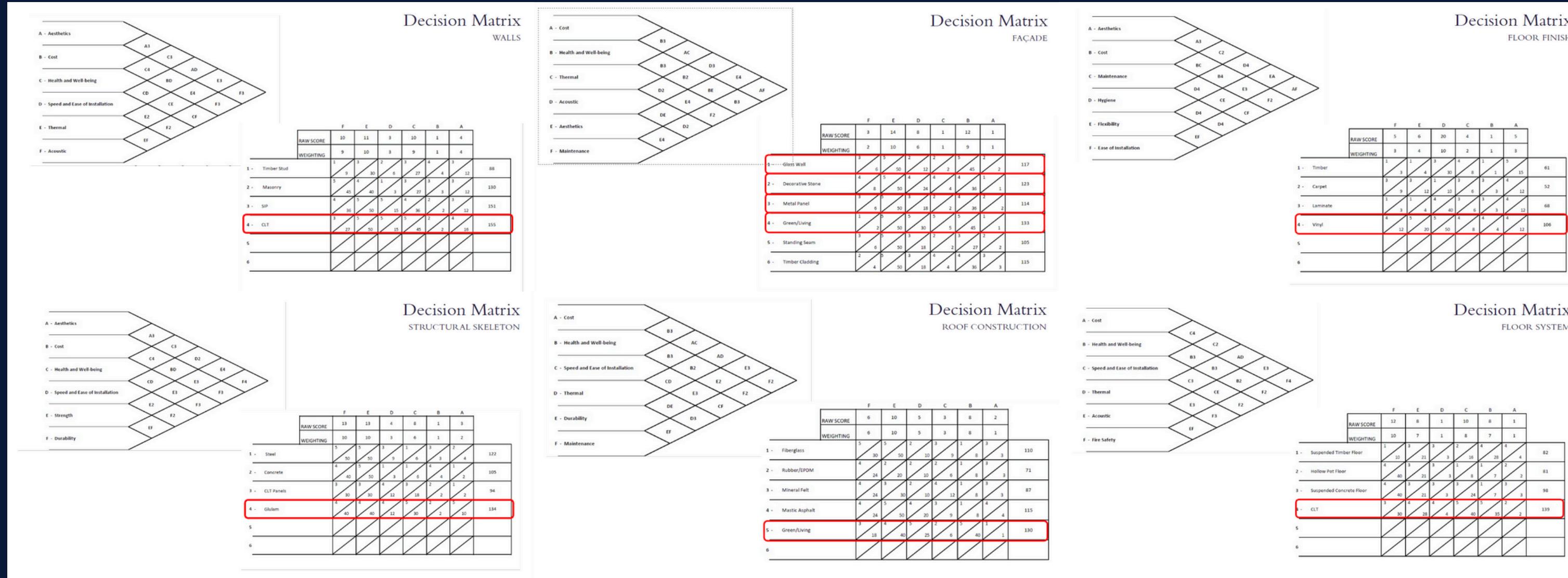
- *Foundation*
 - Concrete Pile
- *Structural Skeleton*
 - Glulam
- *Wall Structure*
 - Cross Laminated Timber
- *Floor Structure*
 - Cross Laminated Timber
- *Floor Finish*
 - Vinyl Sheet
- *Roof Structure*
 - Cross Laminated Timber
- *Roof Finish*
 - Green/Living & Terrace
- *Wall Façade*
 - Window Wall
 - Textured York Stone
 - Corten Metal Panels
 - Green/Living Wall



The materials were chosen by the ATs using the Matrix decisions



Alternative design selection



Courtesy of Claire Howarth

Project roles and task plan



Project Role	Responsibility	Task plan
Architectural Technologists	Clair + Gurinder	Architectural Design from 14/10/23 to 19/12/23
	Clair + Gurinder	Structural Scheme from 14/10/23 to 19/12/23
	Clair + Gurinder	Building Services Strategy from 18/01/23 to 25/04/24
	Clair + Gurinder	Technical Detailing from 18/01/23 to 25/04/24
Construction Project Managers	Estellia	Construction Method Statement & Constructability Analysis from 14/10/23 to 19/12/23
	Estellia	Project Scope Definition & Schedules from 14/10/23 to 19/12/23
	Estellia	Logistics & Site Layout plans from 18/01/23 to 25/04/24
	Estellia	Quality Control & IT plans from 18/01/23 to 25/04/24
Quantity Surveyors	Elicia + Christian	Design economy and value management from 14/10/23 to 19/12/23
	Elicia + Christian	Cost estimating and planning from 14/10/23 to 19/12/23
	Elicia + Christian	Procurement and tendering from 18/01/23 to 25/04/24



Environment, Health & Safety Plan

1. Understanding of environmental factors affecting the project
2. Development of the health and safety plan

HSG

SITE SAFETY

1. Falls

Falling is the most common accident on construction sites (33%). Workers are recommended to wear safety belts for easy sliding if an accident occurs. Furthermore, the hoists should be utilized as they are going to be rented throughout the process to remove the need to climb a ladder.

2. Trip

Tripping is the second most common accident on construction sites (30%).

Keep the walking path clean, and avoid any tripping hazards, including power cords and hose pipes. The process should follow guidelines on how to identify and eliminate or correct hazardous working conditions. workers should also use appropriate waterproof outwear to prevent slipping.

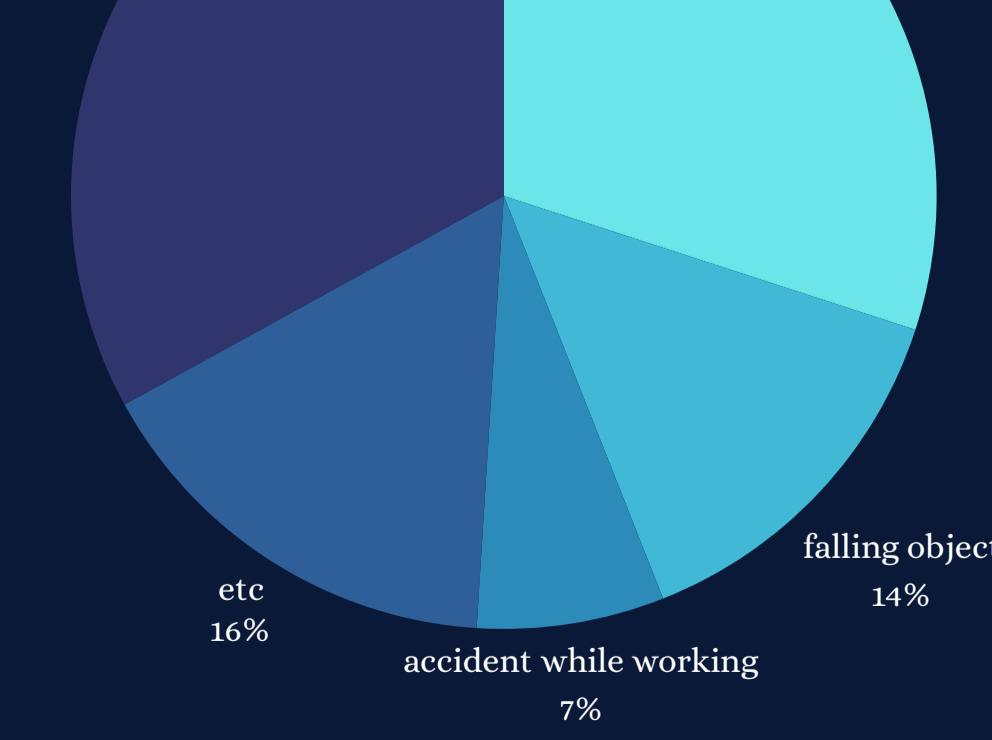
3. Falling material and collapses and mobile plant

Getting injured while handling on construction site comes third (14%). For falling materials and collapses, tether ropes and safety nets, which will be checked for the weight limit, are going to be used to hold the falling material. Moreover, devices will be properly set up for harmonizing work. Most importantly, workers will be trained before working together on the site, avoiding mistakes that could lead to injury.

For mobile plants, a unified schedule should be used as a way to communicate between the workers working on the task and the operators using the machines. Signs for pedestrians and vehicles should be put up and follow the standards set by the Health and Safety (Safety Signs and Signals) Regulations.

4. Electrical accident

Keep the walking path clean, avoid any tripping hazards, including power cords and hose pipes. The process should follow guidelines on how to identify and eliminate or correct hazardous working conditions. workers should also use appropriate waterproof outwear to prevent slipping.



HSG

ENVIRONMENT

1. Carbon released from the construction

Carbon released from the construction: As there are different recycling facilities, materials should be allocated before transporting out of the construction site to reduce emissions. Before starting the project, design an effective plan to place machines on the site that maximizes the functionality them. Use machines and plants that operate on carbon-neutral biofuels or renewable energy.

2. Noise

Install temporary noise barriers around the site as well as offer hearing protection for the workers. Organize staff's schedule for the minimum of staff on-site for the least expose to noise. Consider investing in quieter equipment.

3. Traffic

These are the guidelines on how to prevent the constraint:

- Establish a Traffic Management Plan
- Install correct traffic management signs
- Safety for pedestrians
- Regularly inspect traffic signs
- Ensure training and instruction

HEALTH

1. Asbestos

Means to prevent being overexposed to asbestos include using engineering controls, work practice controls, and personal protective equipment.

2. Manual handling

Prioritize lifting using machines and equipment; if not, try to decrease the weight being carried / using more stable boxes while arrange appropriate breaks and job rotation

3. Noise and vibration

For a softer sound, reduce the drop heights of the machine, and/or change the angle of impact to reduce the force of impact. Use resilient materials such as rubber-type to absorb the impact of falling objects and mats on the floor below work benches or guillotines

4. Chemicals

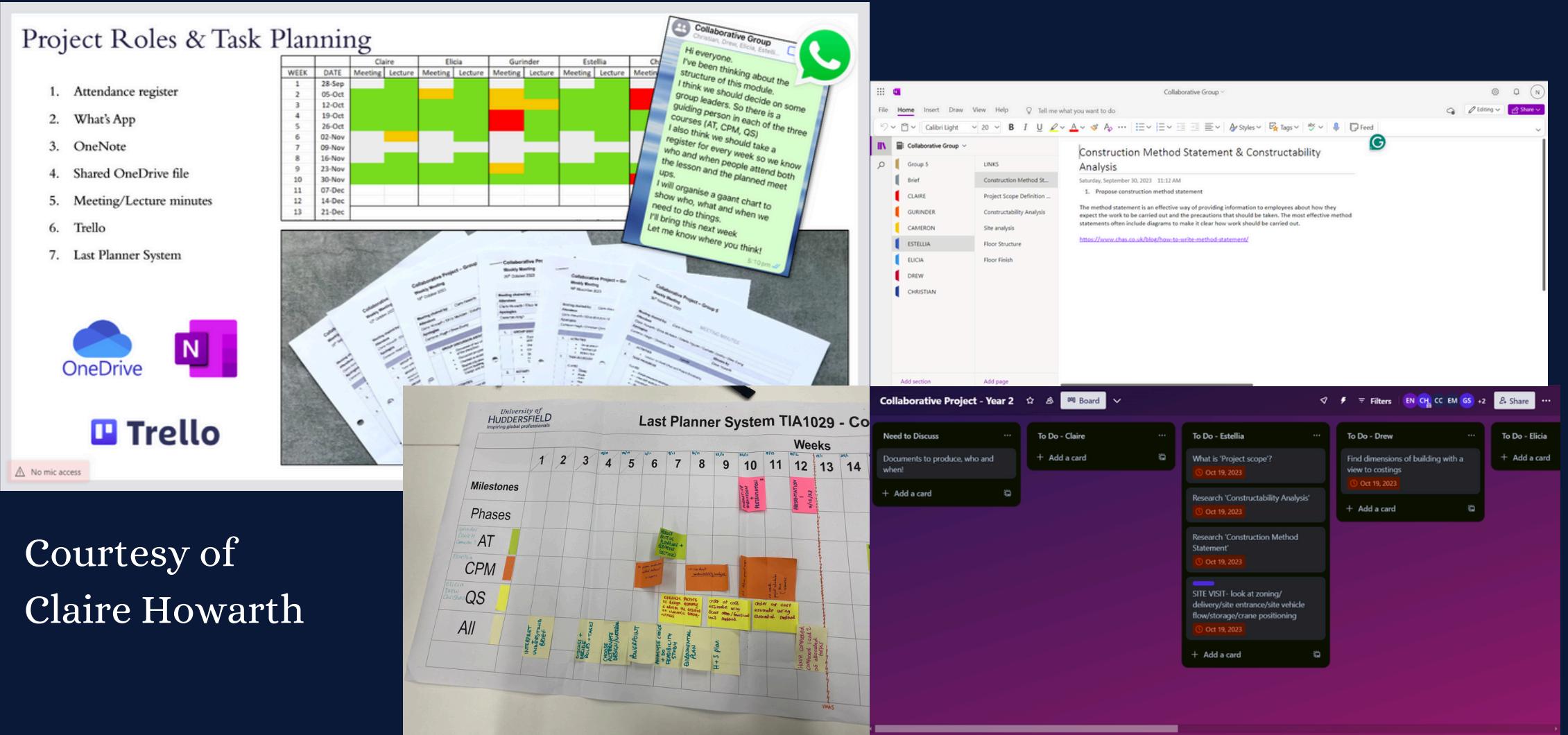
Make sure that employees understand chemical hazards and what to do when exposed according the the Health and Safety guide.

Collaborative Planning Log



1. Development of a collaborative planning log
2. Implementation and continuous use of the planning log during the collaborative project

Planning log



Courtesy of
Claire Howarth

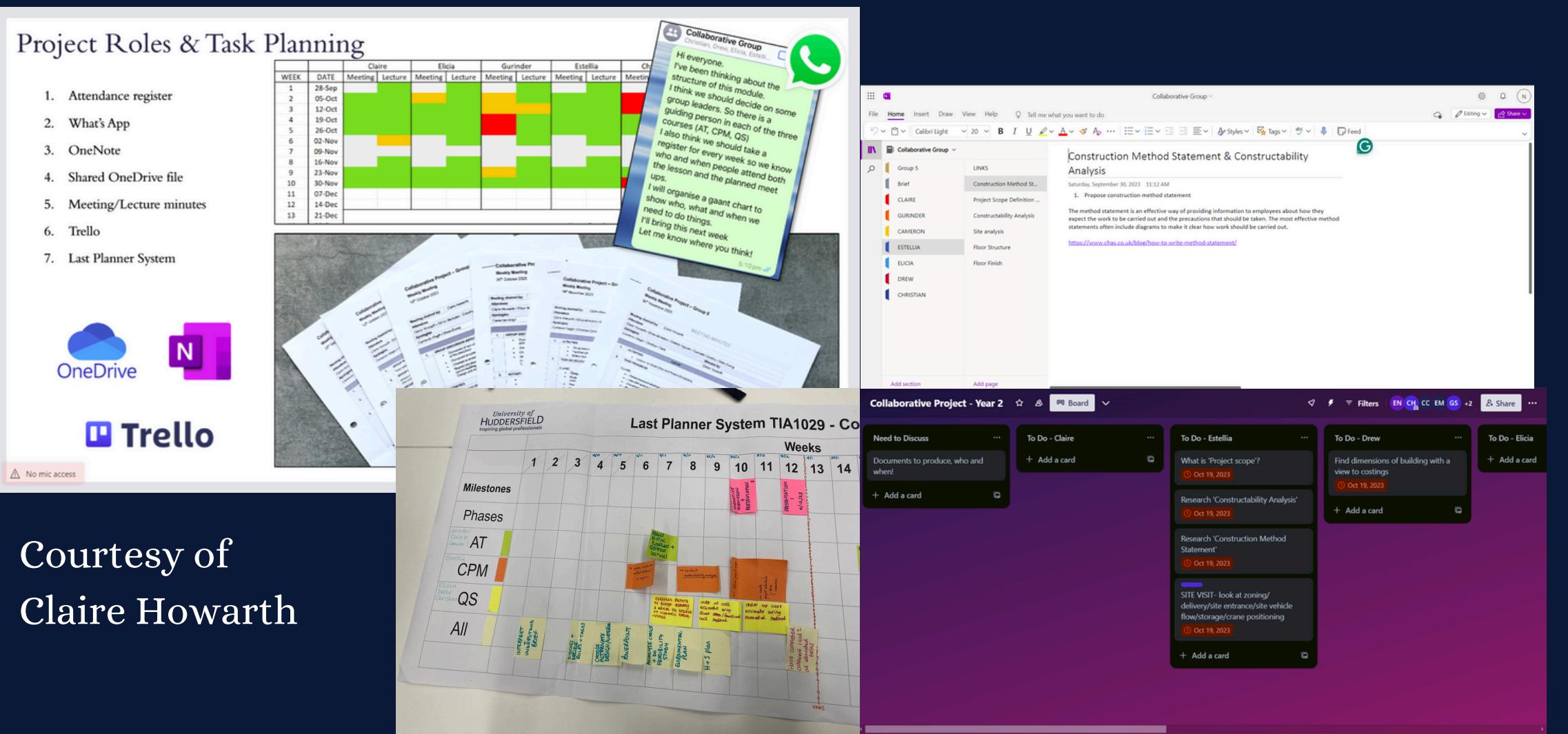
Also, in the second term, people are not as focused as they did in the first term, so we choose one method of communication.

We use various forms of communication, however, towards the end of the semester, we only use WhatsApp to contact about the work.

The main reason behind this is the approaching of other deadlines so we can not keep track with as much communication lines

Overall, the second term outcome was not as successful as the first term, however, we still achieve the requirements

Implementation and continuous use



Courtesy of
Claire Howarth

For the other forms of communication, even though we did not use them, they were still helpful as we stored our documents and researches there.

In the second term, we mostly used WhatsApp to discuss the work.

We still followed the Last System Planner to do the task, however, there were changes along the process as we did not complete the work in the amount of time that was assigned. Still, we completed the overall work on time.

Collaboration Report

1. Collective reflection on roles and responsibilities
2. Collective reflection on collaborative infrastructure and interactions

Collective reflection on roles and responsibilities

In this project, I was tasked to do the Construction Project Manager work, which includes producing the following:

- Construction Method Statement & Constructability Analysis
- Project Scope Definition & Schedules
- Logistics & Site Layout plans
- Quality Control & IT plans

When I was first approached with the project, I was overwhelmed overall with the amount of required outcomes. However, as I progressed to do the work, it became more manageable.

As I work alone with my tasks in the group, I do not need to communicate much with any of my teammates for details. However, it is necessary to discuss with them about the final work as there should be alignments among the project.

For the first half semester, I did not finish the work for the summative 1 presentation. Therefore, the results were not good. The submission for the formative 1 was better as I understood what needed to be done.

For the second semester, I already got used to the work, as well as coordinated with my teammates, so I was not as struggling as I was in the first semester

Collective reflection on collaborative infrastructure and interactions

Overall, the teammates in my group were responsible and coordinated well with each other.

In the first term, there was a member who never showed up and Drew, who did not complete the work that was allocated to him. However, after discussions and agreements among the teammates as well as the module leader, they were asked to leave the group. There were hardly any struggles for the team adjusting to that as the two mentioned members did not contribute. In the second term, everybody did the work and there were communications in the group.

The ATs and QSSs worked in groups of two and there were no conflicts between them. They worked well together and developed the tasks efficiently. The group atmosphere was comfortable as we all gave constructive comments as well as support each other.

In conclusion, the group's communication was good.

Construction Project Managers



1. Construction Method Statement & Constructability Analysis
2. Project Scope Definition & Schedules
3. Logistics & Site Layout plans
4. Quality Control & IT plans

1. Construction Method Statement & Constructability Analysis

1. Propose construction method statement
2. Conduct constructability analysis



Construction Method Statement



A construction method statement is a document that properly describes how the work is carried out securing the health and safety procedures and control measurements

A construction method statement is prepared before the work begins by a construction project manager

A construction method statement is generated with a guideline of how the job is done safely



CONSTRUCTION METHOD

STATEMENT

Project name: Health Innovation Campus

Date: 24/09/2023

Pre-construction activities

- Contractor will mobilise their:
 - Construction team
 - Specialist supply chain
- HSG is produced
- Develop construction programme
- Establish line of communication

Design, procurement and subcontract design

Detailed work & design is produced from this stage

- Specialist subcontractors are placed:
 - Bricklayers
 - Cladding installers
 - Concrete installers
 - Building services
- Obtain the design; materials and fabrication

Lead-in periods

- Begin the procurement of the initial main work packages
- Site establishment
 - Piling
 - Statutory services
- Groundworks
 - CLT frame
 - Scaffold
- The meetings are also held for the subcontractors to find common ground. Individual CMSs are produced.
- Surveys are carried out.
- Risk assessment & CMs will be issued
- A logistic site plan will be developed to a high level of detail

The project

It is a seven-stories building filled with modern facilities and support from both resident doctors and industry experts

Site location

Daphne Steele Building
Old Leeds Road
Huddersfield
HD1 1SG

Site establishment

- Site clearance
- Site marking
- Site access

Construction works

- Digging
- Piling
- Concrete pouring

Main building work

- Substructure: the foundation is built using piling method
- Superstructure:
 - Frame: are pre-assemble and take 21 days from order to deliver
 - Upper floors: are built simultaneously
- (Safety nets and edge protections are installed)
 - The roof and walls are progressed at the same time for scaffolding efficiency used
- Internal works: are done with the protection of the external parts
- Testing and commissioning the internal works
- External works: finish the outside area
 - Remove machines
 - Utilities & Drainage
 - Ground completion
- Quality control

Construction Method Statement



Site Analysis

- Accessible to West and South Yorkshire and Greater Manchester
- On the site of the former Huddersfield Sports Centre at Southgate
- Currently used as Kirklees Council staff car park
- Good public transport links
- Walking distance from
 - Huddersfield University Campus
 - Huddersfield Train Station
 - Huddersfield Bus Station
 - Sainsbury's Supermarket
 - Huddersfield Town Centre

this analysis was developed by my teammate



Constructability Analysis



A constructability analysis is a document that presents the risks that may occur and the solutions

A constructability analysis is prepared before the work begins by a construction project manager

A constructability analysis is generated by a risk assessment, with solutions to minimize those risks



CONSTRUCTABILITY ANALYSIS

GROUND CONDITION

The building is located at the Old Leeds Road in Huddersfield (HD1 1SG)

According to LandIS, the soil type is Soilscape 6: Freely draining slightly acid-loamy soils. Soilscape 6 type is often covered by arable and grassland, however, the fertility rate is relatively low, as well as the topsoil carbon. It is inhabited by neutral and acid pastures and deciduous woodlands, and the acid communities are in the upland. The drain mostly leads to local groundwater and rivers. The water suffers from soil erosion as it is contaminated with nitrate, siltation, and nutrient enrichment.

Risk assessment

1. Drainage

Firmly draining soil allows water to move around easily, which reduce the risk of waterlogging. However, if the drainage is not managed properly, **erosion** and **instability** could happen.

2. Soil texture

Loamy soils has a balanced mixture of sand, silt, and clay, which compromise between drainage and water retention. Eventhough the mixture should be depended on the engineering favour, the characteristic is suitable for construction in general.

3. Acidity (pH Level)

This is a **slightly acidic** soil with a pH level below 7, which is a risk to the **durability** of concrete and **corrosion**

Solution

1. Erosion risk

Implant erosion control measures such as vegetable cover and erosion cover blanket. This acts as a natural barrier as the blind spots are held by the roots of the vegetable, avoiding runoff.

2. Soil texture

Loamy soils have a balanced mixture of sand, silt, and clay, which compromise between drainage and water retention. Therefore the characteristic is suitable for construction.

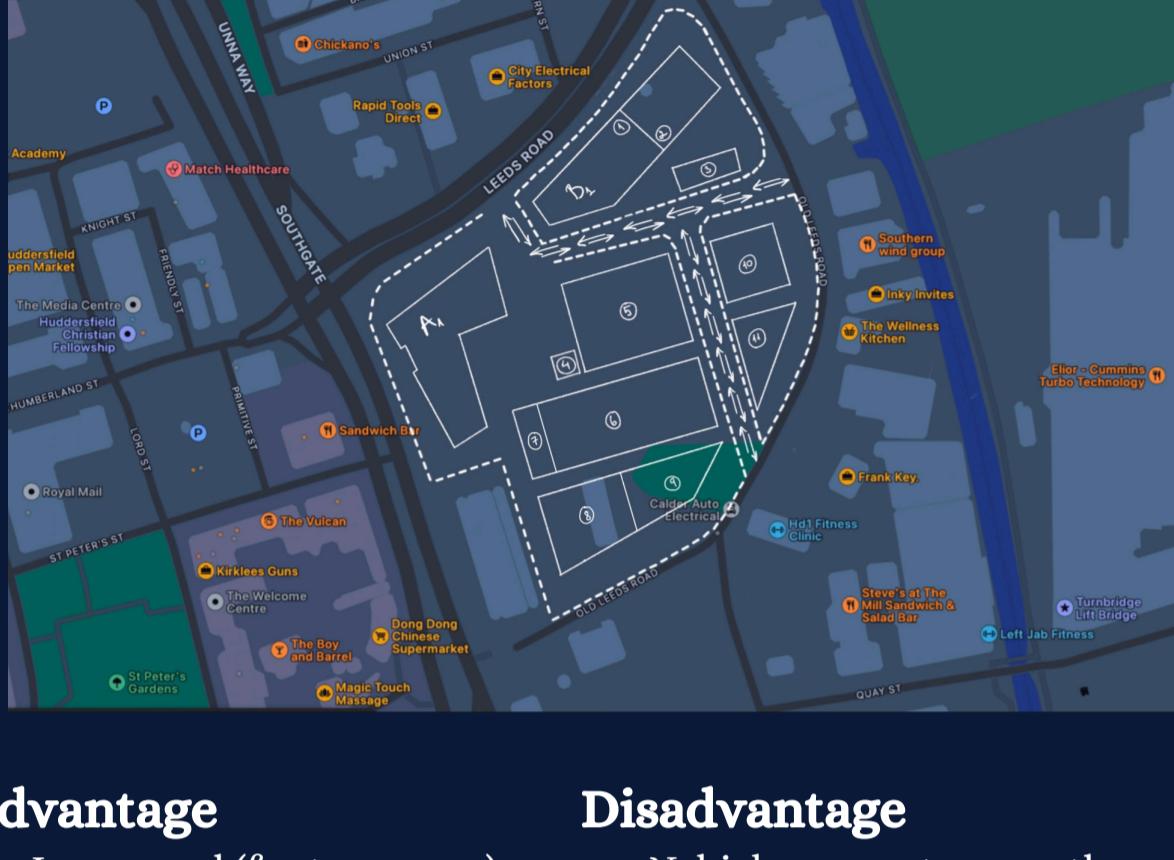
3. Acidity (pH Level)

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CONSTRUCTABILITY ANALYSIS

Logistic



Advantage

- Large road (for two-ways)
- Every buildings are accessible by machinery

Disadvantage

- Vehicles cannot access the construction zone
- Restrooms are far from the construction zone

Machines use Risk assessment

- Risks of accidents/injuries
- Damage to underground utilities/structure
- Materials/equipment falling out
- Instability/collapse
- Materials/equipments falling out of the forklift

Solutions

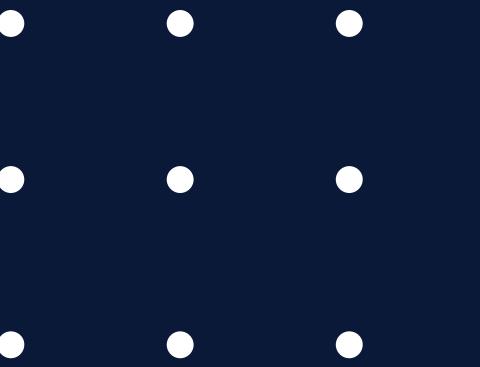
- Ensure proper installation, maintenance, and inspection of the equipment
- Regular inspections should be conducted to identify any signs of instability or potential collapse
- Adequate training and certification for operators are essential to ensure safe operation
- Implementing safety measures such as using safety harnesses, guardrails, and safety nets can help prevent materials and equipment from falling out

Environment damage

- Noise pollution: Sounds from the construction zone
- Air pollution: vehicles moving around causing CO₂
- Water pollution: chemicals spills and sediment runoff from construction site
- Energy and resource consumption: relate to the materials & the process of making them
- Waste producing: construction debris, packaging materials & hazard substances

Schedule delay

- Apply Network Construction Methods to monitor the progress of the project
- Reports every to response to any accidents might be as soon as possible



2. Project Scope Definition & Schedules

1. Define project scope
2. Create project schedules including time & resources



Project Scope



A project scope is a document that defines the features and functions of the project, as well as the deliverables

A project scope is prepared before the work begins by a construction project manager

A project is generated by informations of the project



PROJECT SCOPE

Project name: Health Innovation Campus

Project manager: Ngoc Uyen Chuong Nguyen

Duration: 275 days (including weekends)

Scope Description

- The Health Innovation Campus puts health and wellbeing at the heart of building design and construction
- It measures, certifies and monitors building features and their impact on the health and well-being of its users
- It will promote the effective use of the built environment to provide buildings for a healthy body, mind and spirit
- It is a seven-story building with an area of approximately 2000 m² filled with a variety of modern facilities and support from residents doctors and industry experts.

Stakeholders

- University of Huddersfield
- 3M Buckley Innovation centre
- Kirklees Council's Business Kirklees
- Mid Yorkshire Teaching NHS Trust
- Calderdale
- Huddersfield NHS Foundation Trust

Materials used

- Concrete for the foundation
- Cross-laminated timber for the structure
- York stone and corten metal panels for the facade
- Green living wall for the roof finish

Machines used

- Excavator: Crawler excavator with clamshell bucket
- Bored pile machine: Crawler-type bore piling machine
- Drilling machine: Rotary drilling rig
- Concrete truck: Standard transit concrete truck
- Crane: Tower crane
- Hoist: Platform hoist
- Lift: Forklifts
- Scaffolding: Double scaffolding

Acceptation criteria

WELL being building standard: a performance-based system measuring the impact of the building on human well-being

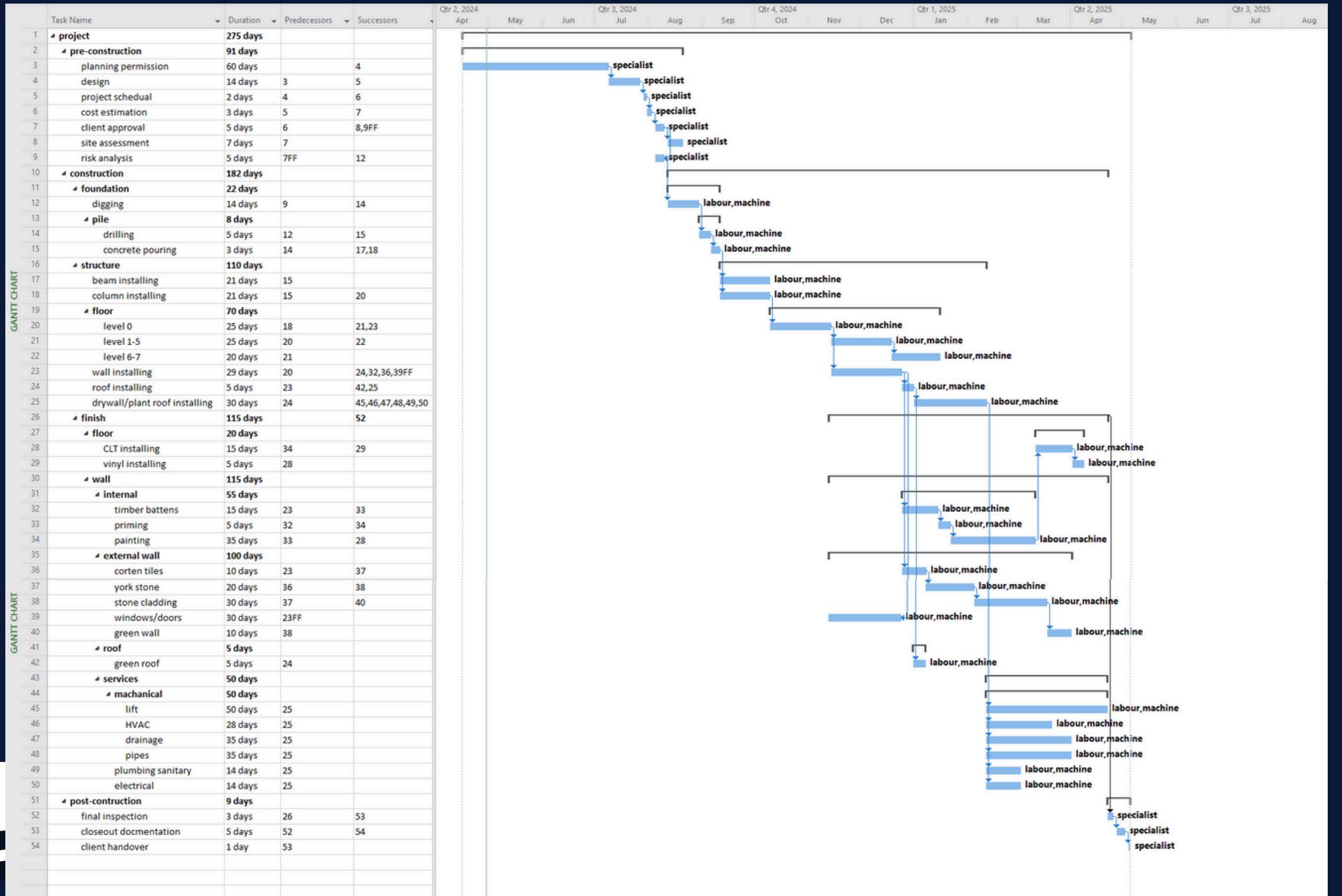
The criteria are:

- Air
- Water
- Nourishment
- Light
- Fitness
- Comfort
- Wind

Work Breakdown Structure



Project Schedules



There are 3 milestones of the project:

- Pre-construction
- Construction
- Post-construction

The project takes 275 days to finish, with the construction phase being the longest: 182 days containing foundation, structure, finish and service

PROJECT SCHEDULE

PROJECT RESOURCE

activities	resource	
	labor	machine
Construction phase		
foundation		
Digging	30	[1] excavator
Piling	30	[1] bored pile machine
Drilling	30	[1] drilling machine
Concrete Pouring	30	[1] concrete truck
Structure		
Beam installing	30	[4] crane; hoist; fastening tools; cutting tools
Column installing	30	[4] crane; hoist; fastening tools; cutting tools
Floor installing	36	[5] crane; hoist; lift; fastening tools; cutting tools
Wall installing	36	[4] crane; screw gun; panel manipulator; scaffolding
Drywall/plant roof installing	15	[3] crane; roofing nail gun; drill
Finishing phase		
floor		
CLT installing	20	[1] CNC machines
Vinyl installing	15	[6] utility knife; tapping block; rubber mallet; straightedge; heat gun; roller
Wall		
Internal		
Timber battens	20	[6] circular saw; drill; nail gun; measuring tape; level; hammer
Priming	15	[4] paint roller; paintbrush; paint sprayer; sanding machine
Painting	15	[7] paint roller; paintbrush; paint sprayer; sandpaper; putty knife; drop cloths; painter's tape
External wall		
Corten tiles	20	[4] tile cutter; tile removal tool; tiling machines; mixing paddle
York stone	20	[6] masonry saw; hammer and chisel; trowel; level; grout float; mortar mixer
Stone cladding	20	[6] masonry saw; hammer and chisel; trowel; level; grout float; mechanical fixing system
Windows/doors	16	[8] hammer; screwdriver; level; measuring tape; caulking gun; drill; putty knife; scaffolding
Green wall	20	[7] screwdriver; drill; level; cable ties; wire cutters; measuring tape; masonry anchors
Roof		
Green roof	15	[8] gas-powered concrete saw; screwdriver; drill; level; measuring tape; cable ties; putty knife; scaffolding
Services		
Mechanical		
Lift	10	[5] scissor lift; telescopic boom lift; cherry picker; forklift; bucket truck
HVAC	15	[10] refrigerant recovery machine; drill; screwdriver; level; measuring tape; flaring tool; pipe cutter; manifold gauge set; vacuum pump; brazing torch
Drainage	12	[6] drainage machines; trenchers; excavators; backhoes; pipe bursting equipment; high-pressure water jetters
Pipes	12	[5] trenching machines; pipe welding machines; pipe jacking machines; vibratory plows; pipe bevelers
Plumbing sanitary	12	[10] pipe cutter; pipe bending machine; pipe vice; threading dies; pipe wrench; chain-wrench; adjustable wrench; water pump pilers; ring spanners and common spanner; plumbers torch
Electrical	12	[10] wire strippers; cable pulling machines; cable cutters; crimping tools; conduct benders; multimeters; wire pulling grips; voltage testers; drilling machines; wire labeling machines

PROJECT SCOPE

MATERIALS SUSTAINABILITY

Timber

- Renewable Resource
- Carbon Sequestration
- Energy Efficiency in Production
- Biodegradability and Recyclability
- Low Embodied Energy
- Sustainable Forest Management
- Local Sourcing
- Natural Insulation Properties

York Stone

- Natural and Local Sourcing
- Durability and Longevity
- Recyclability and Reusability
- Low Maintenance
- Natural Aesthetics
- Permeability
- Local Economy Support

Concrete

- Long life.
- Low life-cycle cost
- Safety and reliability
- Resilience
- Recycling and Reuse

Corten tile

- Longevity and Durability
- Low Maintenance Requirements
- Recyclability
- Reduced Energy Consumption in Production
- Adaptability
- Local Sourcing
- Weathering Process as a Design Feature

FUNCTION

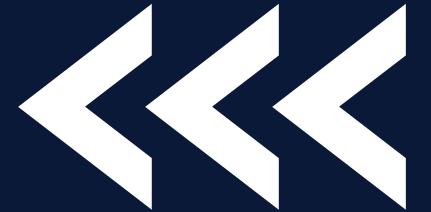
School

- Educational Services
- Administrative Services
- Student Support Services
- Extracurricular Activities
- Social and Emotional Learning
- Community Engagement
- Facilities Management
- Professional Development
- Leadership Development
- Technology Integration
- Curriculum Support
- Legal and Regulatory Compliance

Hospital

- Patient Care Services
- Clinical Services
- Nursing Services
- Support Services
- Administrative Services
- Facility Management
- Security
- Supportive Services
- Quality Assurance and Compliance
- Information Technology
- Education and Research
- Public Relations and Communication
- Patient and Public Communication
- Community Outreach

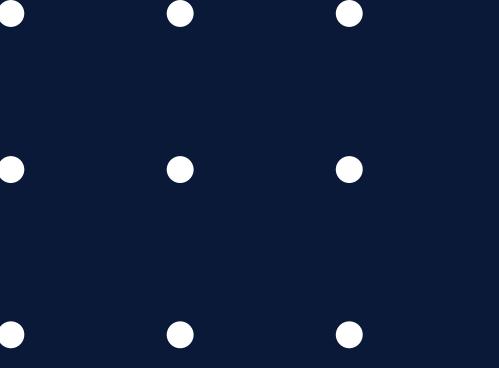
Project Scope



Lean Construction

- Transport: having specific & detailed logistic plan
- Overproduction: align the production with the goal
- Waiting: optimize the process flow, synchronize activities using technologies, implement preventive maintenance
- Overprocessing: simplify the process, eliminate redundancies, follow the goal
- Inventory: reduce the inventory levels
- Motion: improve workplace organization
- Defects: improve quality performance





3. Logistics & Site Layout plans

1. Create Outline and Detailed Logistics Plan
2. Propose Site Layout Plan



SITE LAYOUT PLAN

1. Car park

It is a secure location for parking vehicles safely and conveniently, reducing the risk of accidents or obstructions. Not only does it ensure functionality, efficiency, and cost minimization. It can manage traffic flow, prevent congestion, and ensure smooth movement. The place should be easy to access vehicles within the construction. This helps improve the overall accessibility and mobility of the construction site. The space is put there for easy access in both in and out of the site.

3. Entrance

The entrance is used to provide a stable pathway for vehicles going in and out. Also, it should be accessible for all users, as well as reachable from the site boundary and parking areas. For safety reasons, it may include measurements to protect pedestrians from potential hazards and prevent unauthorized access. The entrance is put in the entry way next to Old Leeds Road for easier control.

5. Storage

The storages provide shelter for materials and equipment. In detail, they ensure protection against damage from external elements such as unauthorized access or weather conditions.

6. Off – Loading site

The place improves safety and effective material handling. It also supports quality control, organization and inventory control, and optimizes traffic flow for the highest level of construction efficiency.

7. Checkpoint

The software is used to record crucial information, identify and address any possible concerns, as well as make sure quality standards and requirements are followed throughout the construction process. The checkpoint is close to the working area to provide simpler control and react better in the event of an accident.

8. Waste management

The goal of waste management on building sites is to minimize environmental damage and landfill disposal. It entails reusing, recycling, and repurposing things to divert trash away from landfills. Following the rules guarantees following the garbage disposal instructions. Effective waste management techniques minimize waste production and maximize resource use, which saves money. It also helps to keep a building site cleaner and safer by reducing dangers and promoting organization. In order to encourage environmental responsibility and create a more environmentally friendly sector, waste management is crucial for sustainable building.

11. Lab

By testing materials, construction testing labs ensure quality control and compliance. Innovation and sustainability in the building are propelled by research and development laboratories. Real-time analysis is provided by on-site labs, which speeds up construction. Safety labs guarantee adherence to regulations and a secure workplace.

SITE LAYOUT PLAN

9. Recycling facilities

Recycling facilities are essential to the management of garbage on building sites. By sorting and processing items on-site, they reduce the amount of waste that ends up in landfills and divert recyclable materials from disposal. This preserves natural resources and lessens the negative effects of development on the environment. Recycling facilities also help construction companies save money by lowering the cost of disposing of garbage and maybe making money from the sale of recycled materials. They also guarantee adherence to waste management laws and encourage a construction site that is safer and more managed. building businesses promote the idea of a circular economy by implementing recycling techniques, completing the loop and developing a more resource- and sustainability-efficient building sector.

10. Office/Restroom

Office spaces are used in construction projects to give employees a place to work, store paperwork, and communicate. They also provide a conducive setting for gatherings and teamwork.

Restrooms are used for workers to take their breaks between shifts, ensuring the working hours in labor law, as well as for them to stay overnight, shorten the traveling time, hence a more efficient time used. The place is situated back far from the construction site as it is stored with important paperwork.

The site layout was developed with the following ideas:

- The crane is put at the position where the boom can reach the farthest part of the building and the storage
- Almost every department has at least one facade exposed to the road for convenience
- The B1 building will be a car park until the building A1 is finished for maximum use of resources
- The checkpoint is attached to the storage and close to the construction zone for efficiency quality checkup purposes
- The entrance is placed at the side of the road and near the car parks for security reasons
- All of the departments are complied with the regulations



4. Quality Control & IT plans

1. Propose Quality Management Plan
2. Analyse IT requirements



Quality Management Plan



Total Quality Management

- Continuous improvement philosophy
- Long-term survival strategy in business, including construction
- Requires involvement and commitment from all; top to bottom



QUALITY CONTROL

Quality planning

Quality Requirements:

- Goal: It is a seven-storey building with an area of approximately 2000 m² filled with a variety of modern facilities and support from residents doctors and industry experts.
- Function: Used for both treating patient and teaching purposes
- Customer satisfaction measure method:
 - Monitor key performance indicators (KPIs) to reflect the objectives and deliverables that align with the goal and report regularly and transparently
 - Use customer relationship (CRM) software that can store and store and organize client information, such as contact details, preferences, feedback, and history; automate and streamline communication; generate and analyze reports and dashboards that can show the level and trends of client satisfaction
- Determine the success of the project: Achieve the goals of the project scope

Approaching and plans:

- Assessing the risks to success
 - Documenting everything
-
- Proposed plan for schedule check-up:
 - The design, scope and method are agreed upon among stakeholders
 - The schedule is carefully observed, hence a small change is noticed
 - There will be a report every day and stored in the office room on-site
 - There will be an annual meeting every 2 months (6 times) in the office room on-site
 - Materials check in the lab for the quality of the project
 - Proposed plan for better adaptation to changes:
 - Modular construction methods
 - Prefabrication and off-site construction
 - Produce flexible design & planning
 - Effective communication
 - Adopt advanced construction technology

Quality assurance and quality control:

Quality assurance relates to how a process is performed or how a product is made, quality control is more the inspection aspect of quality management.

	Quality Assurance	Quality Control
Foundation	<ul style="list-style-type: none">• Check for soil condition, machine used and material quality• Check for design quality and construction method	<ul style="list-style-type: none">• Inspect if it is safe, stable and durable• Check for any defects, cracks or damage that may affect the foundation integrity or functionality
Structure	<ul style="list-style-type: none">• Check for the foundation quality• Construct accordingly to the plan	<ul style="list-style-type: none">• Inspect if it is safe, stable and durable• Check for any defects, cracks or damage that may affect the structure integrity or functionality
Finish	<ul style="list-style-type: none">• Check for the quality of the services as well as the quality of the assembling process• Check if the machines are compatible	<ul style="list-style-type: none">• Inspect if the services function well, without any defects or potential risks• Ensure full knowledge, competence and proficiency in use

IT REQUIREMENT

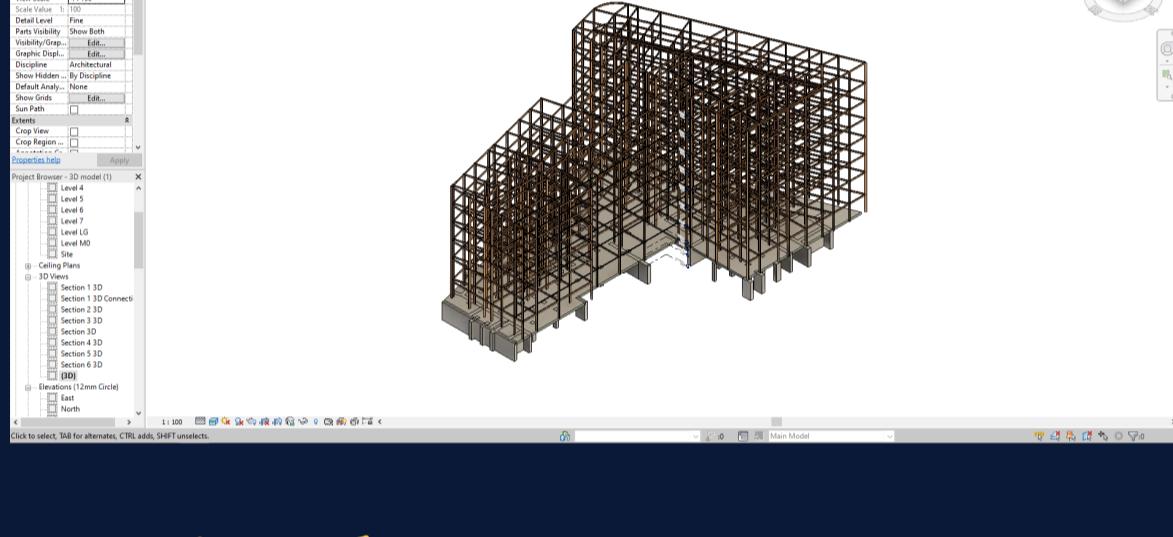
1. BIM

BIM is used for creating and managing data during the design, construction and operations process. BIM integrates multi-disciplinary data to create detailed digital representations that are managed in an open cloud platform for real-time collaboration

2. Revit

Revit is a database of information that lets you add to its powerful 3D architectural platform in multiple ways.

We use Revit to develop the model of the HIC building, including massing & level; structure; structure grid; sections; 3D model and technical detailing.

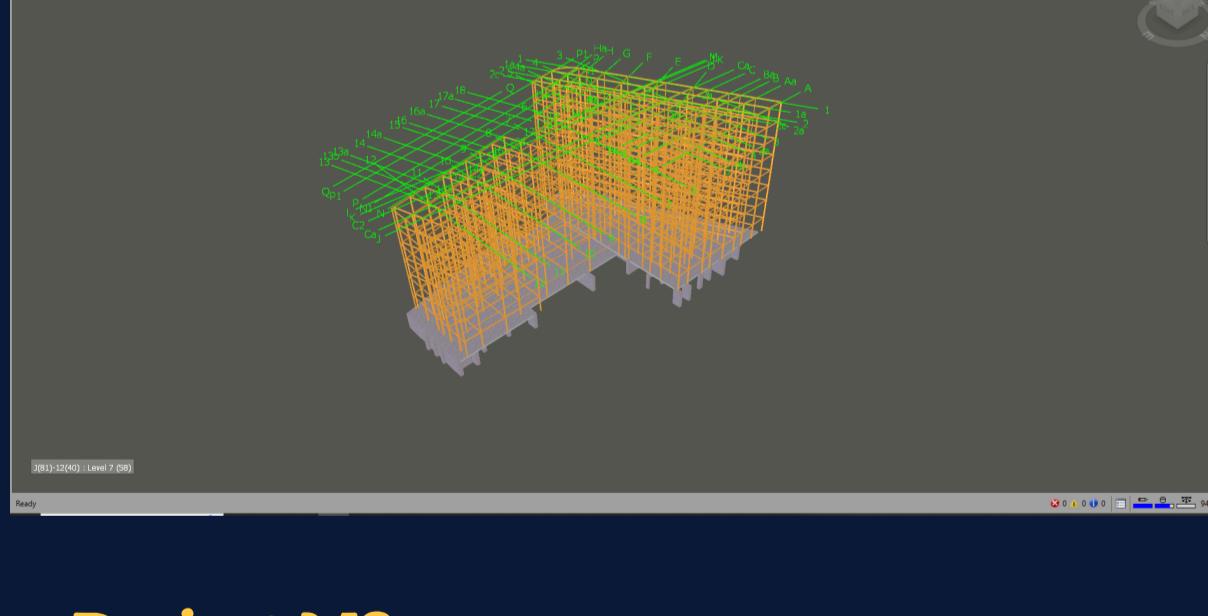


3. Naviswork

Allows users to open and combine 3D models, navigate around them in realtime and review the mode

This is a **review tool** where it can **detect clashes and co-ordinate model**

We use Naviswork to review our project as well as to the development of the building.



4. Project MS

Designed to assist a project manager in developing a schedule, assigning resources to tasks, tracking progress, managing the budget, and analyzing workloads.

We use project MS to produce the duration and the schedule for construction project

5. Checkpoint software

Software for security on construction site

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