

Architectural Engineer

Portfolio

Shanikumar Anaghan



Post-graduation degree certificate (Fanshawe College, Canada)

BIM and Integrated Practices & Project Management

Bachelor of Engineering (B.E, GTU, India)

Civil Engineering

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1. Residential:

The project was to create a residential house with all the elements listed below.

- Developed a comprehensive residential house project encompassing all required elements, including exterior, interior, and curtain walls, meticulously detailed with hosted components such as windows, doors, furniture, and kitchen appliances.
- Produced detailed first-floor and second-floor plans, incorporating all architectural features such as rooms, room names, and numbers, along with a functional staircase connecting both levels seamlessly.
- Implemented accurate annotations throughout the plans, including wall tags, door tags, and window tags, ensuring clarity and ease of understanding for stakeholders.
- Generated precise dimensions for all components, ensuring adherence to design specifications and standards, and facilitating construction and implementation.
- Created a floor color fill legend plan to provide visual clarity and distinction between different areas within the house, enhancing readability and comprehension of the architectural layout.
- Compiled a comprehensive room schedule detailing the characteristics and specifications of each room, aiding in project management and coordination.
- Produced a rendered camera view of the front elevation using advanced modeling and rendering software, such as Revit and Enscape, to provide a realistic visual representation of the architectural design, enhancing presentation and visualization for clients and stakeholders.

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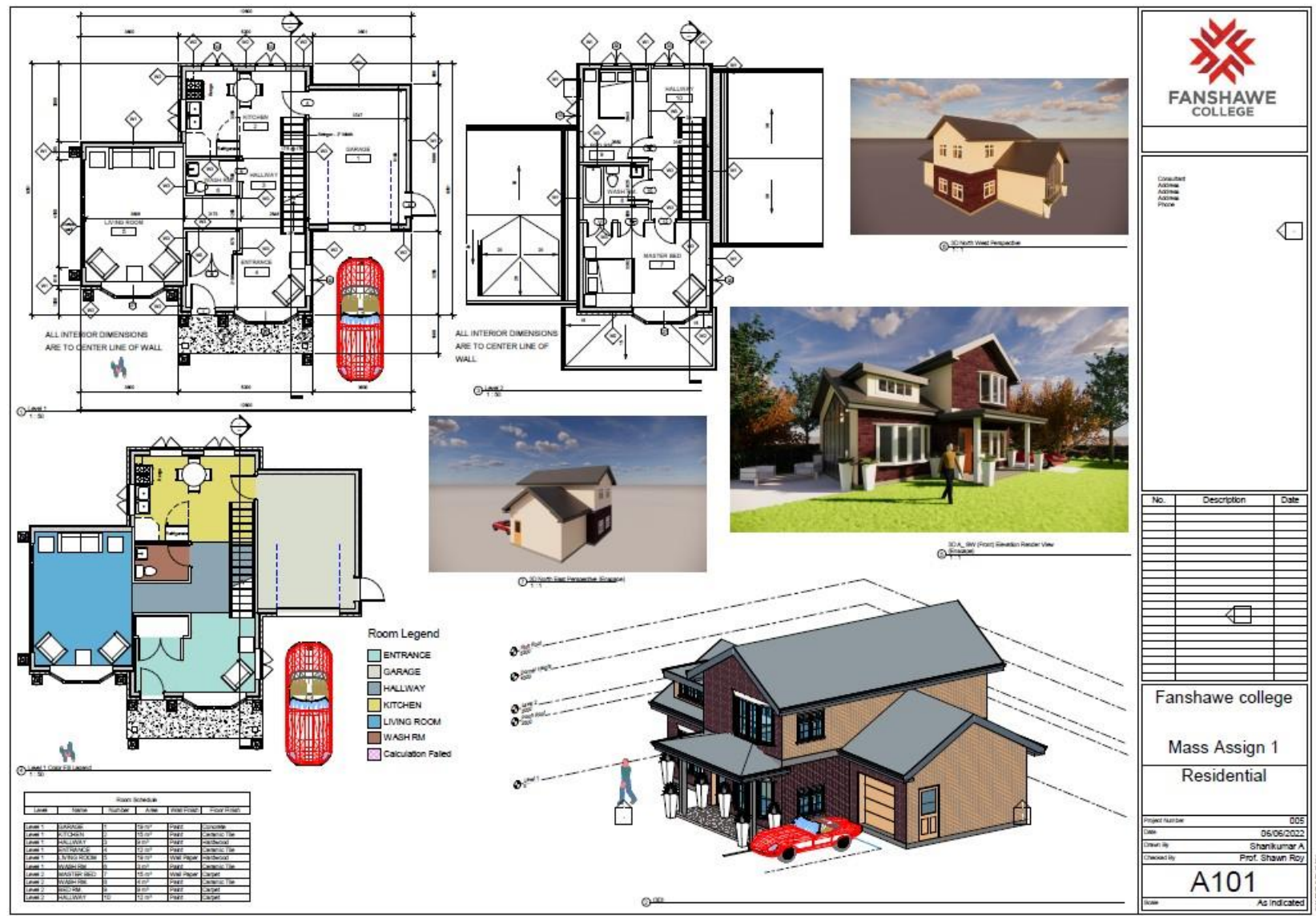


Figure 1 Residential house

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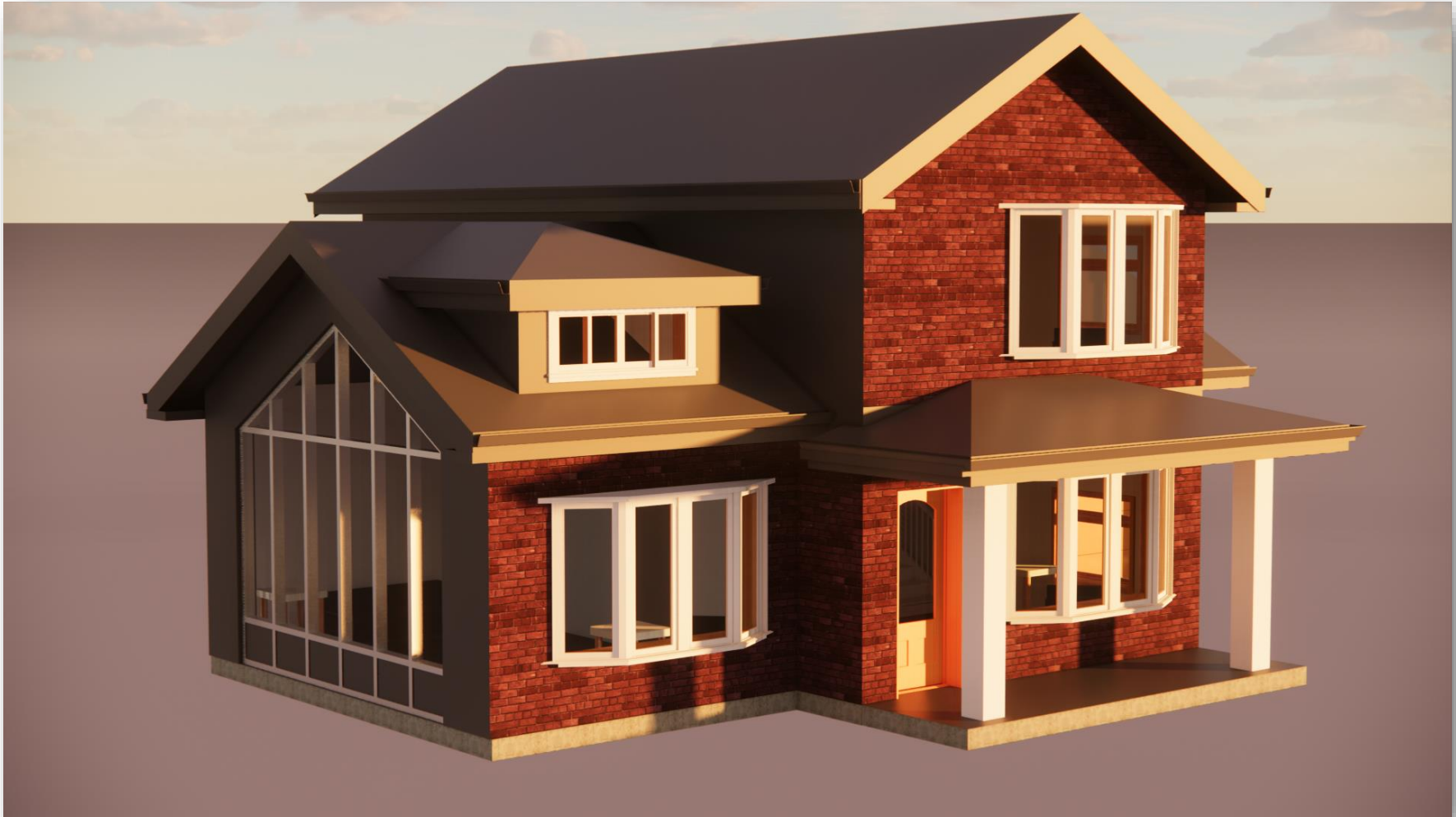


Figure 2 Residential house (Enscape Render)

2. Art Gallery:

Structure Information:

- Constructed the foundation wall with 250mm concrete at a depth of 1200mm, ensuring stability and durability.
- Installed footings using concrete measuring 500x200, providing a solid base for the structure.
- Erected column footings with 1500 x 1500 x 400 dimensions, ensuring sufficient support for structural columns.
- Utilized 450mm diameter round concrete columns to support the building's framework.
- Incorporated beams measuring 300 x 600, reinforcing structural integrity and load-bearing capacity.
- Laid a concrete floor with a thickness of 200mm, ensuring a sturdy and level surface.
- Installed precast hollow core slabs measuring 1200 x 200 for the roof structure, supplemented with EPDM insulation at Level 4 for thermal protection.

Architectural Information:

- Designed exterior and interior walls, curtain walls, exterior doors, and interior doors to delineate spaces and provide access.
- Installed ceilings at Level 2, enhancing aesthetics and providing insulation.
- Constructed parapets with a height of 450mm to provide safety and visual appeal.
- Implemented a cast-in-place monolithic stair, 1100mm wide, with glass guardrails for safety and aesthetics.
- Installed guard railing at Level 2 openings to prevent falls and ensure safety.
- Created a building section to illustrate the vertical structure and components of the building.

Schedule Information:

- Generated a material take-off schedule, detailing the quantity of concrete required for floors, walls, and structural components.
- Produced a room schedule indicating the level, room names, and room areas to facilitate project management and coordination.

First Floor HVAC RCP Information:

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- Developed a Ground Floor HVAC RCP Plan, including the layout of ducts and diffusers.
- Determined the height of ducts to optimize airflow and efficiency.
- Utilized 280mm diameter round ducts to distribute air throughout the building.
- Installed diffusers to regulate airflow and maintain indoor air quality.
- Implemented flex ducts, including round flex ducts with a diameter of 150mm, to accommodate HVAC system requirements.

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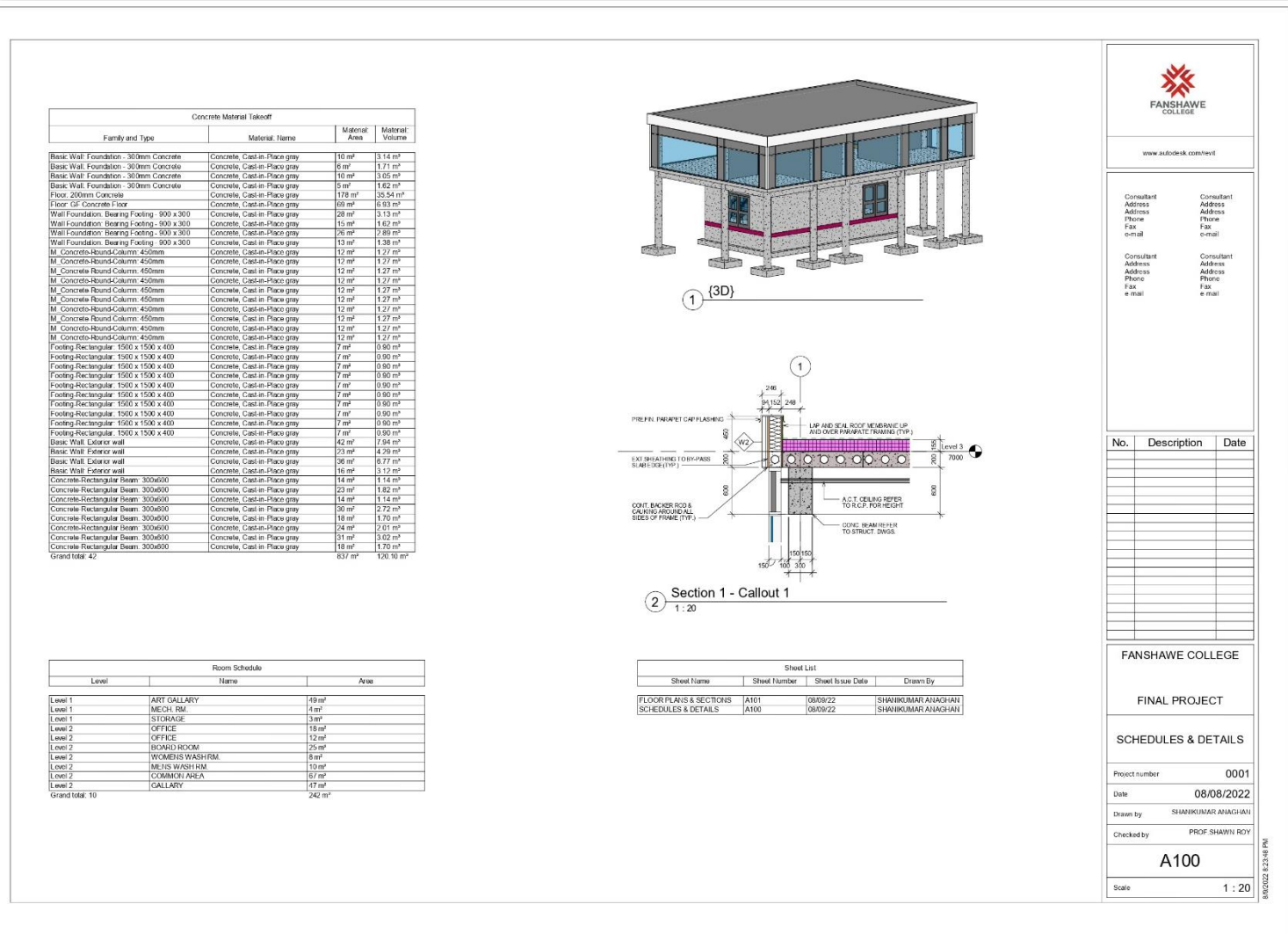


Figure 4 Schedules & Details

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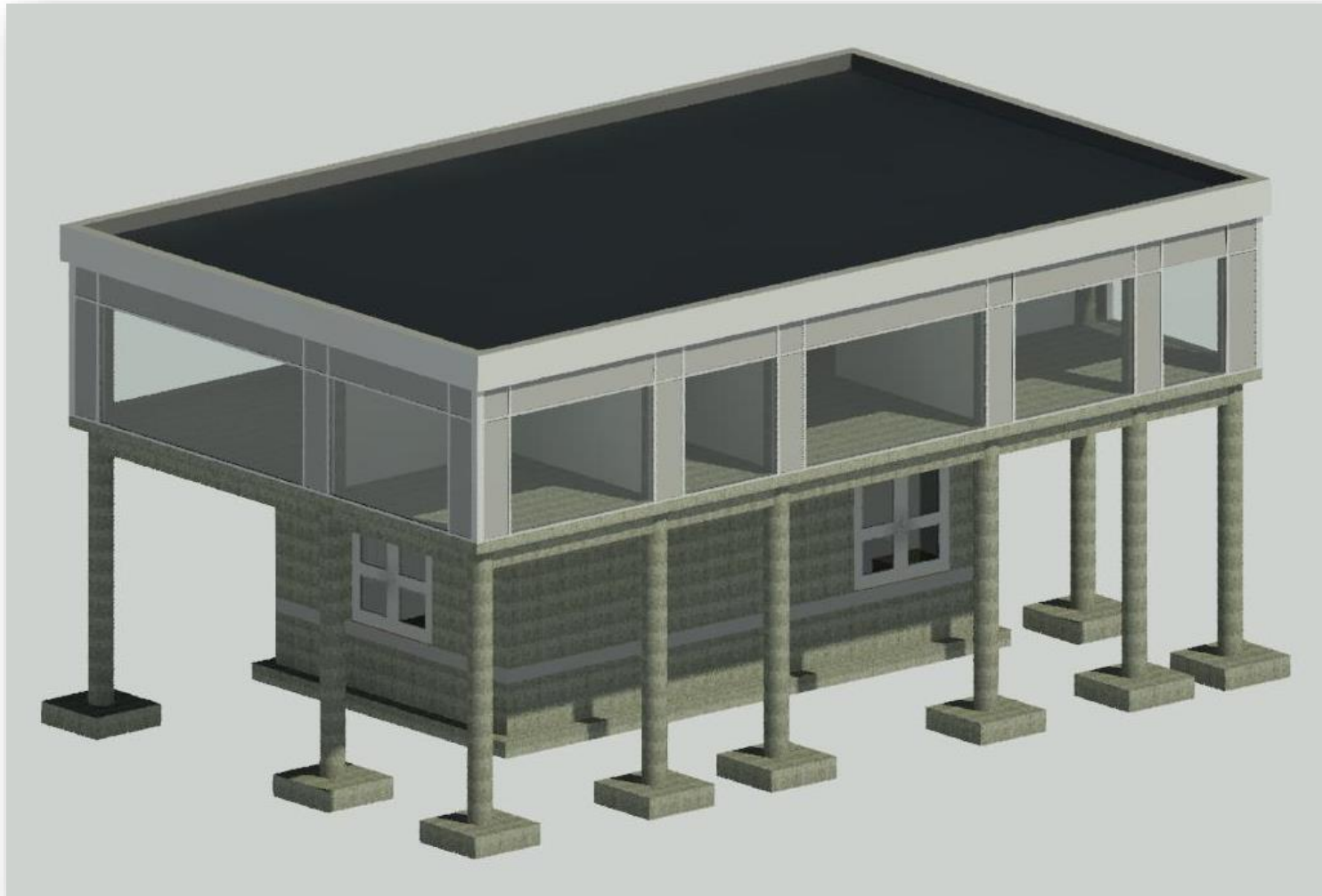


Figure 5 Art Gallery 3D

2.1. Parapet section details Modifications:

Exterior Wall Type and Roof Assembly Modification:

- a. Revised the exterior wall type to meet specified requirements, ensuring structural integrity and aesthetic appeal.
- b. Modified the roof assembly to enhance performance and durability, incorporating recommended materials and construction techniques.

Creation of Parapet Section Detail:

- a. Developed a detailed parapet section using a combination of detail components, filled and masking regions, detail lines, dimensions, and annotations (text).
- b. Integrated detail components to accurately represent the parapet structure and its components, ensuring clarity and precision.
- c. Utilized filled and masking regions to illustrate material layers and transitions within the parapet assembly, enhancing visual comprehension.
- d. Incorporated detail lines to delineate the parapet section's edges, joints, and other critical features, providing additional clarity and detail.
- e. Included dimensions to specify measurements and dimensions of key elements within the parapet section, ensuring accuracy and compliance with design standards.
- f. Added annotations (text) to provide supplementary information and clarify key details within the parapet section, enhancing understanding and communication.

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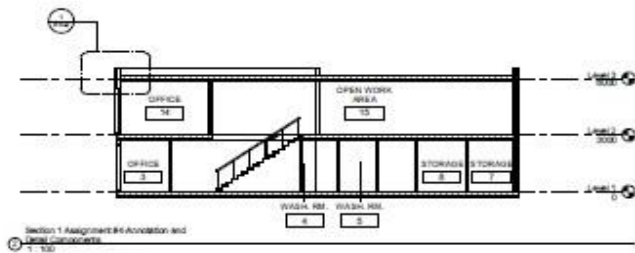
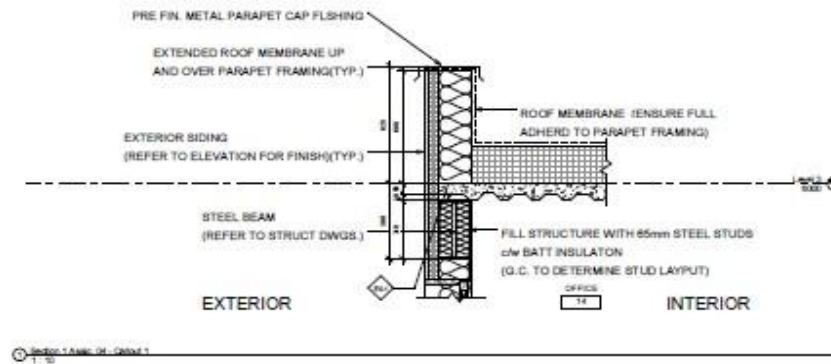


Figure 6 Parapet wall Section Detail

3. Structure and Topography:

Site Creation:

- a. Developed the site layout to accommodate the architectural structure, ensuring proper alignment and integration with the surrounding environment

Top surface Creation:

- a. Created a topo surface with earth material, utilizing elevation points to accurately represent the terrain and contours of the site.

Building Pad Creation:

- a. Constructed a building pad to match the provided specifications, including a depth of 1200mm from the lowest grade point, facilitating proper foundation support and construction.

Structure Information:

- a. Engineered the structure according to provided specifications, including foundation walls constructed with 250mm concrete at a depth of 1200mm, and footings made of concrete measuring 500x200, ensuring stability and load-bearing capacity.
- b. Implemented steel columns (HSS 203 x 203 x 4.8), beams (HSS 152.4 x 152.4 x 4.8), and braces (steel flat bar FL3.175x101.6) to support the building's framework, providing structural integrity and resistance to lateral forces.
- c. Utilized different types of joists/structure elements for each level, including C Channel C150 x 15.6 at 600mm centers for Level 2, K Series Bar Joist 10K1 at 600mm centers for Level 3, and 150mm hollow core precast slabs for Level 4, optimizing structural efficiency and load distribution.
- d. Incorporated concrete floors measuring 150mm with 50mm metal deck for Levels 2 and 3, providing a durable and stable flooring system.
- e. Installed EPDM insulation at Level 4 for the roof, enhancing thermal performance and weather resistance.

Levels Information:

- a. Established elevation differences between levels, ranging from 1200mm from the top of the footing to the top of the foundation wall to 2800mm between each subsequent level, ensuring proper spatial organization and functionality

Schedule Information:

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- a. Generated a material take-off schedule focusing on walls and foundations, detailing the quantity and specifications of materials required for construction, facilitating procurement, and project management

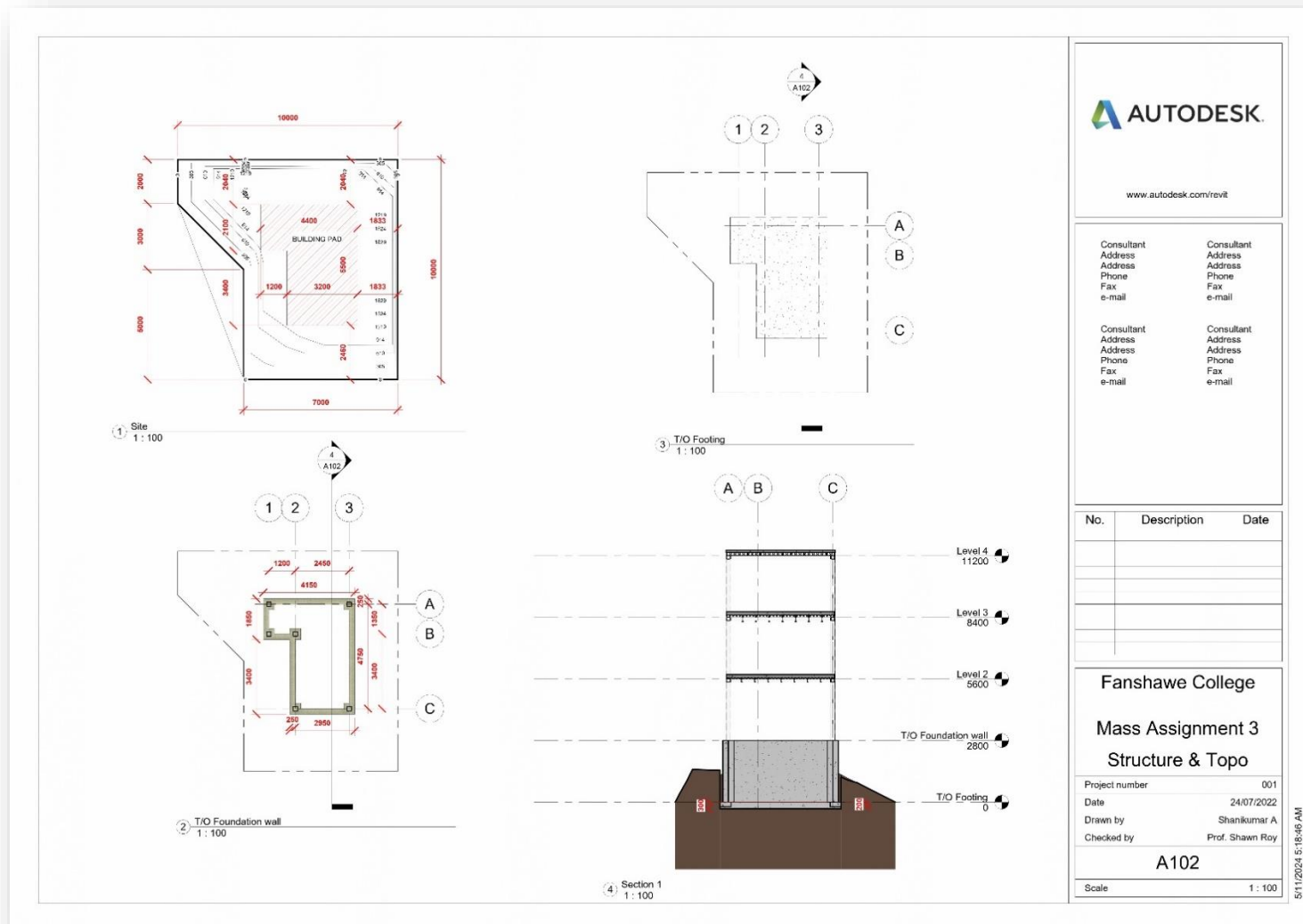
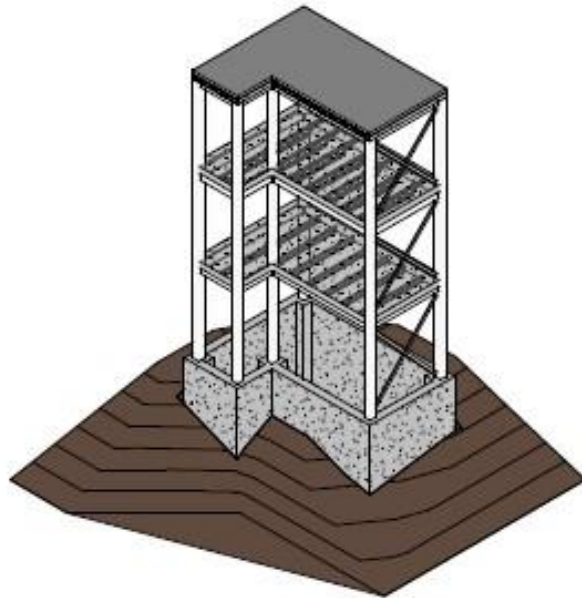


Figure 7 Structure and Topography

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Foundation Material Takeoff			
Family and Type	Material: Name	Material: Volume	Width
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	2.91 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	3.50 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	1.89 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	2.38 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.84 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.95 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.35 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.18 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.18 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.18 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.18 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.18 m³	250
Basic Wall: Foundation - 250mm Concrete	Concrete, Cast-In-Place gray	0.18 m³	250
Grand total: 13		13.86 m³	

Cut/Fill calculation		
Net out/fill	Fill	Cut
0.00 m³	0.00 m³	0.00 m³
0.00 m³	0.00 m³	0.00 m³

Figure 8 Structure and Topography (3D View) and Material Takeoff

4. Roof and Dormer:

Created a Roof and Dormer

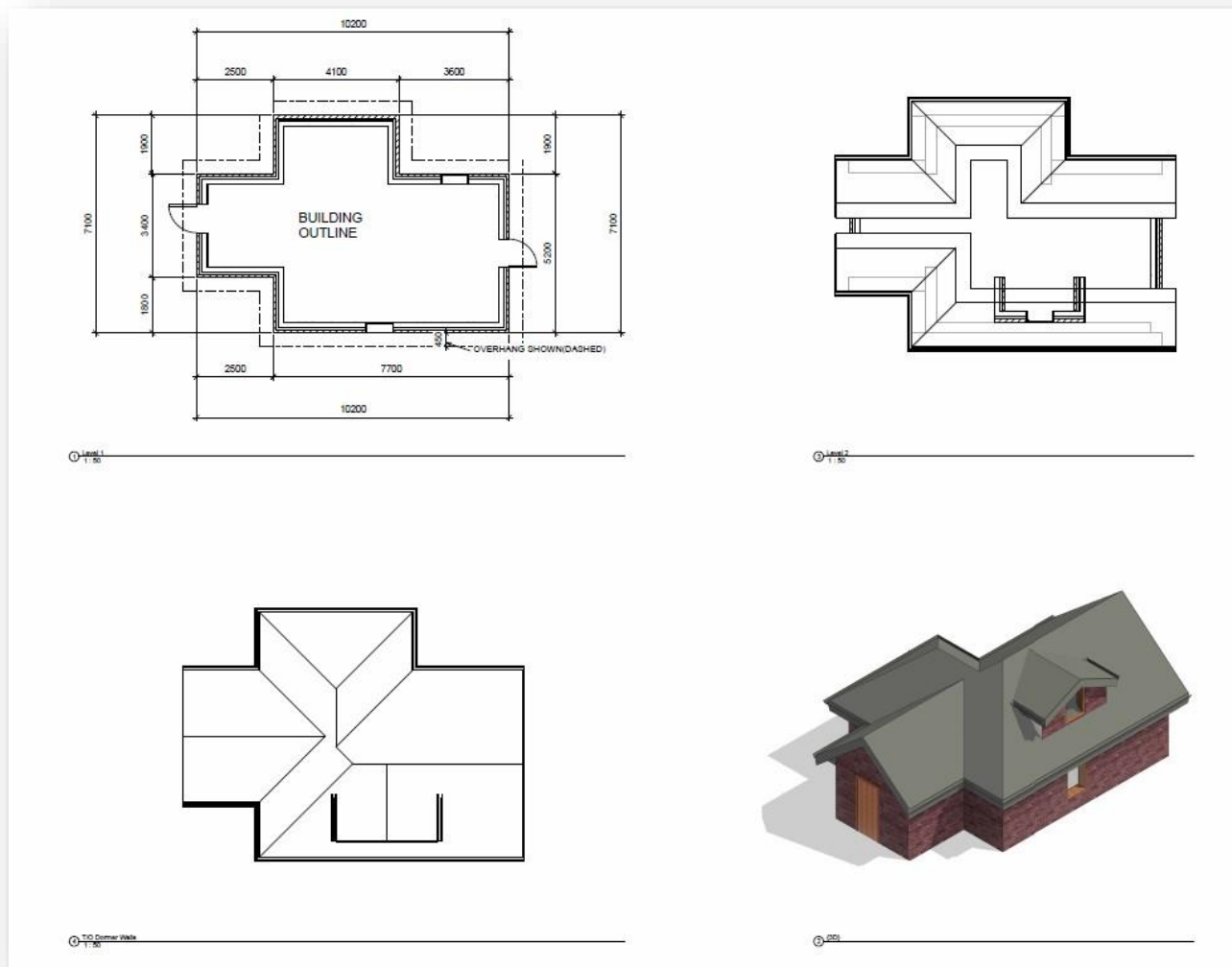


Figure 9 Roof and Dormer

5. Scheduling, Windows and Stairs:

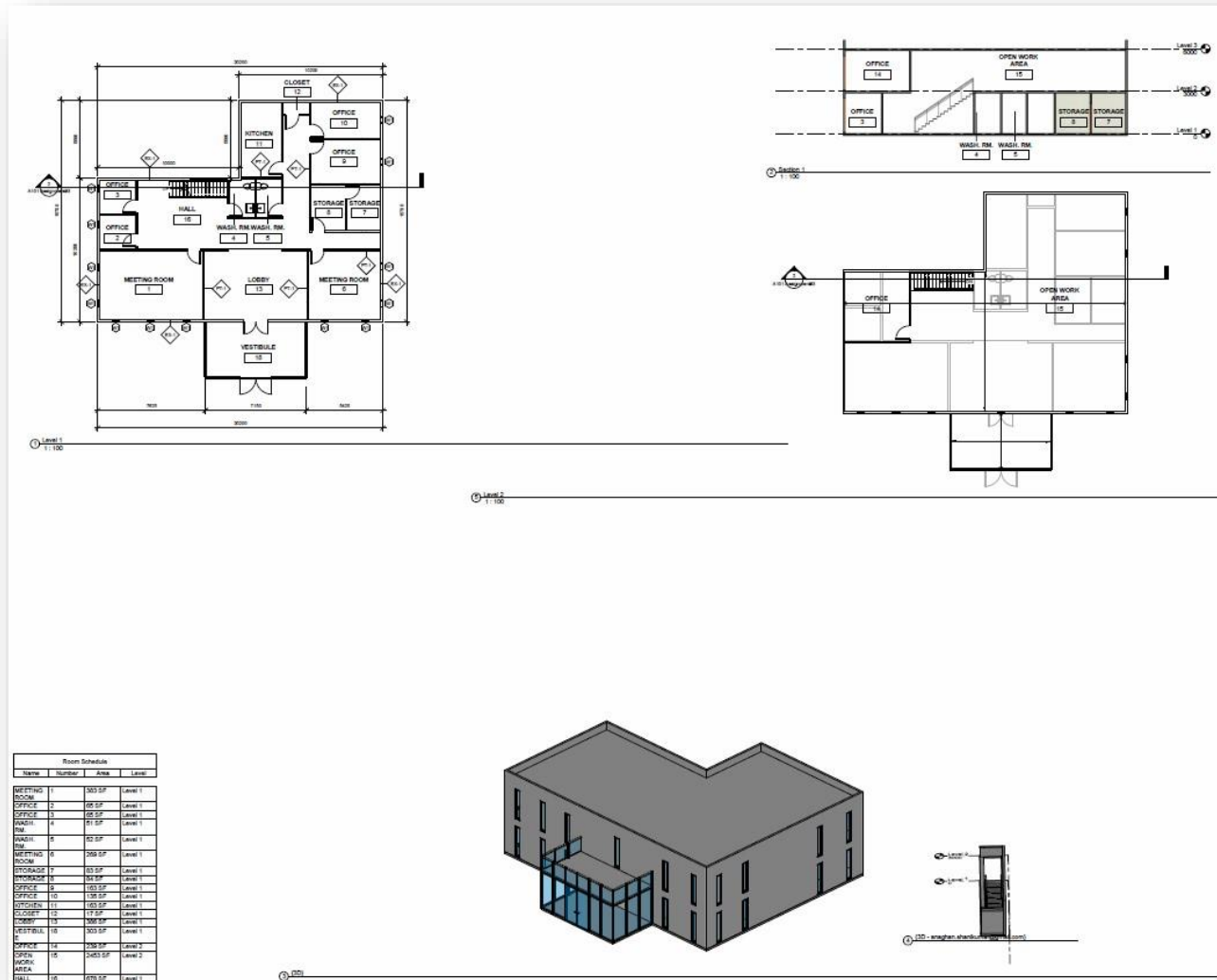


Figure 10 Scheduling, Windows, and Stairs

6. Families:

6.1. Fabric Chair with Stainless Steel Legs:

Designed a fabric chair with stainless steel legs, combining modern aesthetics with durability and functionality.

Chair Flexibility and Material:

- Engineered the chair to be flexible or adjustable, providing users with customizable comfort and support.
- Utilized green fabric as the primary material, offering a vibrant and inviting aesthetic while allowing for parameter customization.

Chair Dimensions:

- Established precise dimensions for the chair to ensure ergonomic comfort and proper functionality.
- Seat Height set to 420mm, facilitating comfortable seating posture for users.
- Seat Depth configured to 750mm, accommodating various body sizes and preferences.
- The Backrest Height was adjusted to 750mm, providing adequate support and comfort for the upper body.
- Chair Width was determined to be 850mm, offering spacious seating without compromising on room layout or functionality.
- Cushion Thickness is specified at 150mm, enhancing comfort and plushness for users.

Leg Configuration and Material Selection:

- Configured the chair to have two stainless steel legs, ensuring stability and support while maintaining a sleek and modern appearance.
- Selected stainless steel as the material for the chair legs, offering durability, corrosion resistance, and a contemporary aesthetic.

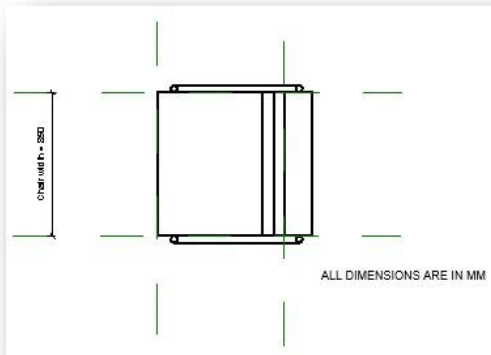


Figure 11 Ref. View

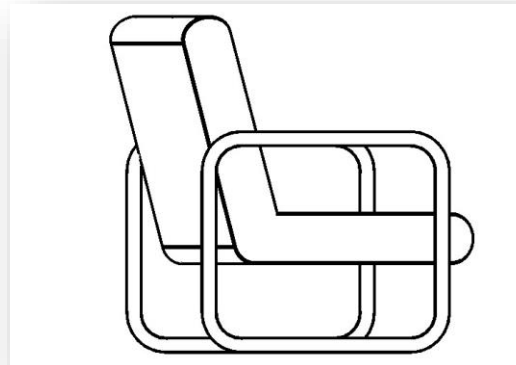


Figure 12 Chair front view



Figure 13 Chair 3D View

6.2. Coffee Table with Glass Top:

Designed a stylish coffee table featuring a glass top, blending elegance with functionality for modern living spaces.

Tabletop Design, Adjustable Table Height, Leg Configuration:

- Crafted the tabletop to measure 1525mm in diameter and 50mm thick, ensuring ample surface area for beverages and decor items. Utilized cherry wood as Material 1, with a 200mm perimeter, offering warmth and richness to the design. Clear glass, selected as Material 2, provides a sleek and contemporary contrast while allowing for customization through parameters.
- Engineered the coffee table with an adjustable height feature, allowing users to customize the table to their preferred seating arrangement and comfort level. Implemented a parameter that enables flexible adjustment of the table height, ensuring versatility and adaptability to various settings and needs.
- Constructed the coffee table with four sturdy legs, ensuring stability and balance for the glass top design. Each leg is meticulously crafted to complement the overall aesthetic while providing reliable support and durability for everyday use.

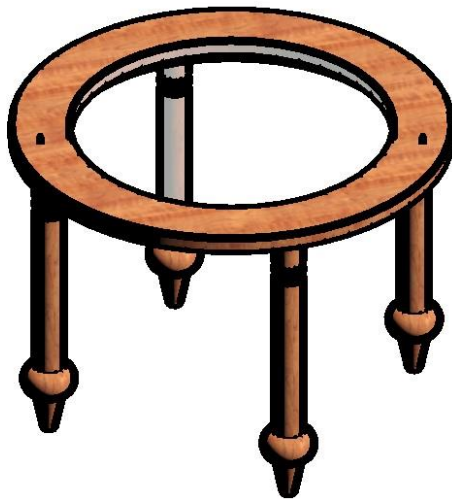


Figure 14 Coffee Table with Glass Top (3D)

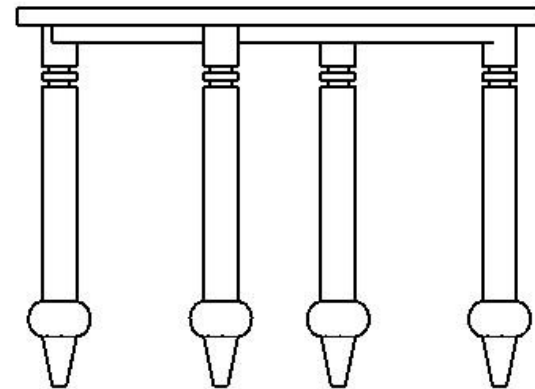


Figure 15 2D Plan of Coffee Table with Glass

6.3. Crown Molding Design:

Developed a unique crown molding profile, ensuring seamless integration with architectural elements and enhancing the aesthetic appeal of interior spaces. Utilized wood as Material 1, offering a classic and timeless look while providing flexibility for customization through parameters.

Generic Wall Creation:

Generated generic walls according to the layout provided, accurately replicating the specified design and dimensions. Positioned the crown molding at the top of the wall as illustrated, enhancing architectural detailing and adding visual interest to the space.

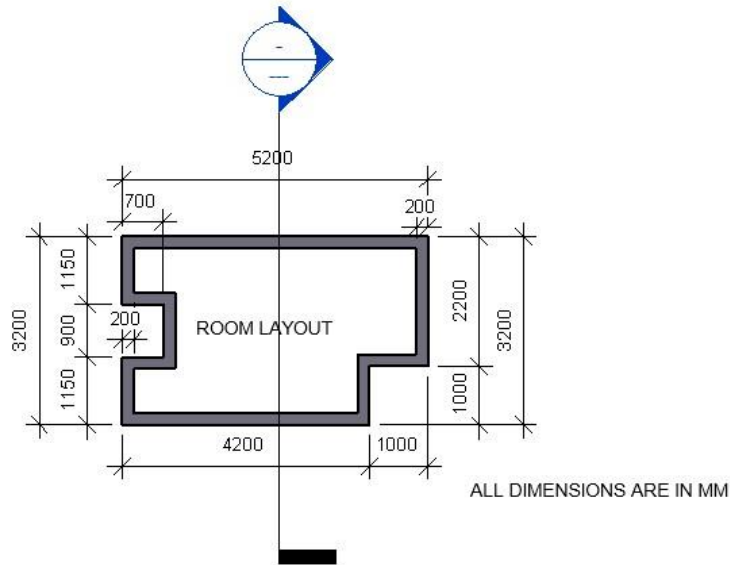


Figure 16 Crown Molding 2D plan

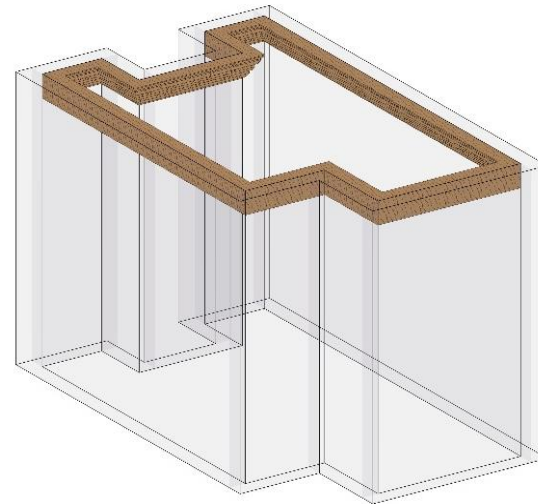


Figure 17 Crown Molding 3D view

7. Structure with Beam:

Structure Creation:

- a. Constructed the building structure according to the provided specifications, ensuring structural integrity and stability throughout.
- b. Erected a foundation wall using 250mm concrete at a depth of 1200mm, providing a robust base for the entire structure.
- c. Installed footings made of concrete measuring 1800x1800, offering sufficient support and load-bearing capacity.
- d. Utilized steel HSS (Hollow Structural Section) columns with dimensions of 203 x 203 x 4.8, providing vertical support for the building framework.
- e. Incorporated steel HSS beams measuring 152.4 x 152.4 x 4.8, reinforcing structural strength and distributing loads effectively.
- f. Implemented steel flat bar braces with dimensions of FL3.175x101.6, adding lateral support and stability to the structure.

Designed joists/structure elements for different levels:

- a. At Level 2, utilized C Channel C150 x 15.6 at 1000mm on center spacing, ensuring structural support and stability.
- b. At Level 3, employed K Series Bar Joist 10K1 at 1500mm on center spacing, providing efficient load distribution and support.

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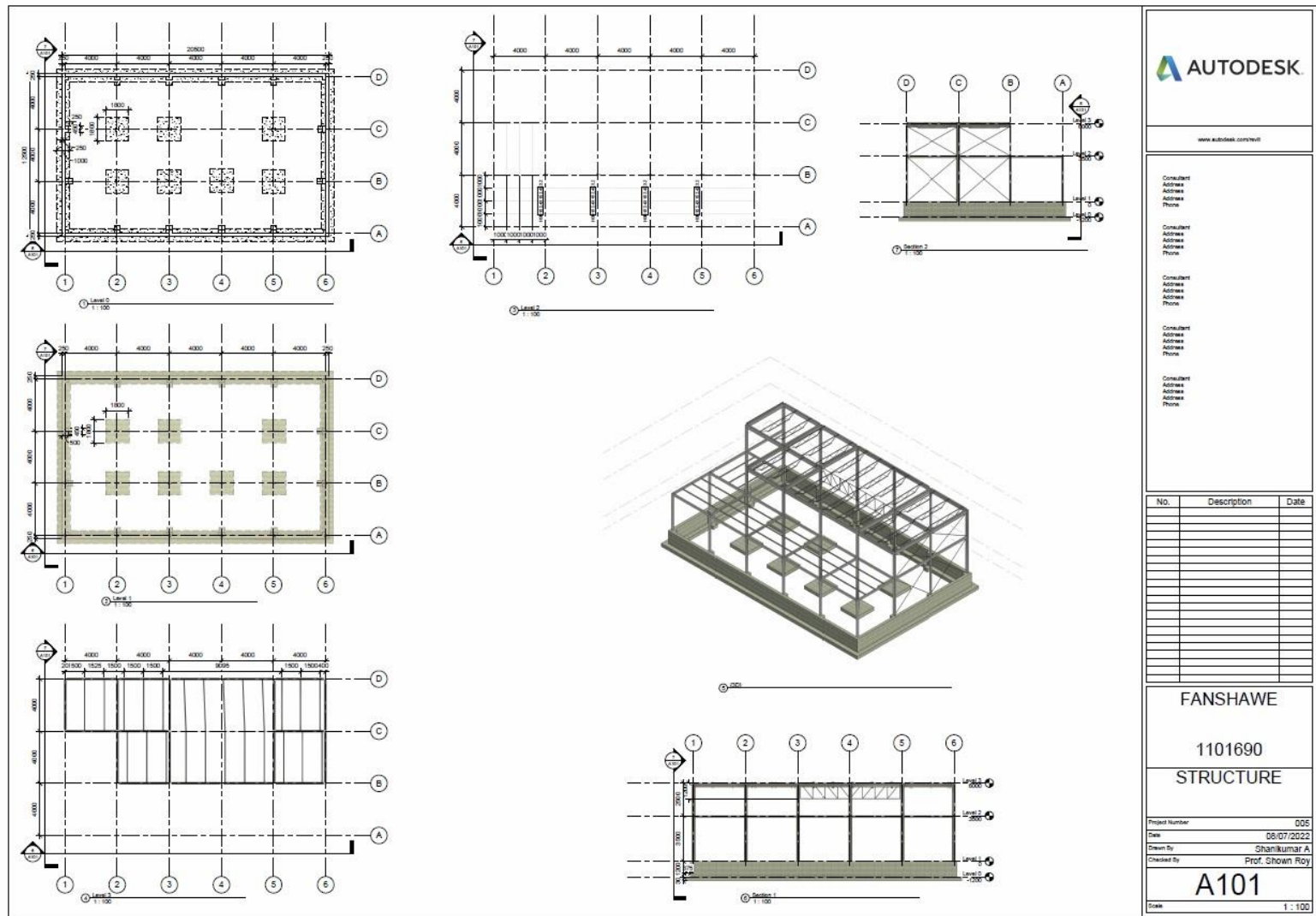


Figure 18 Steel Structural model

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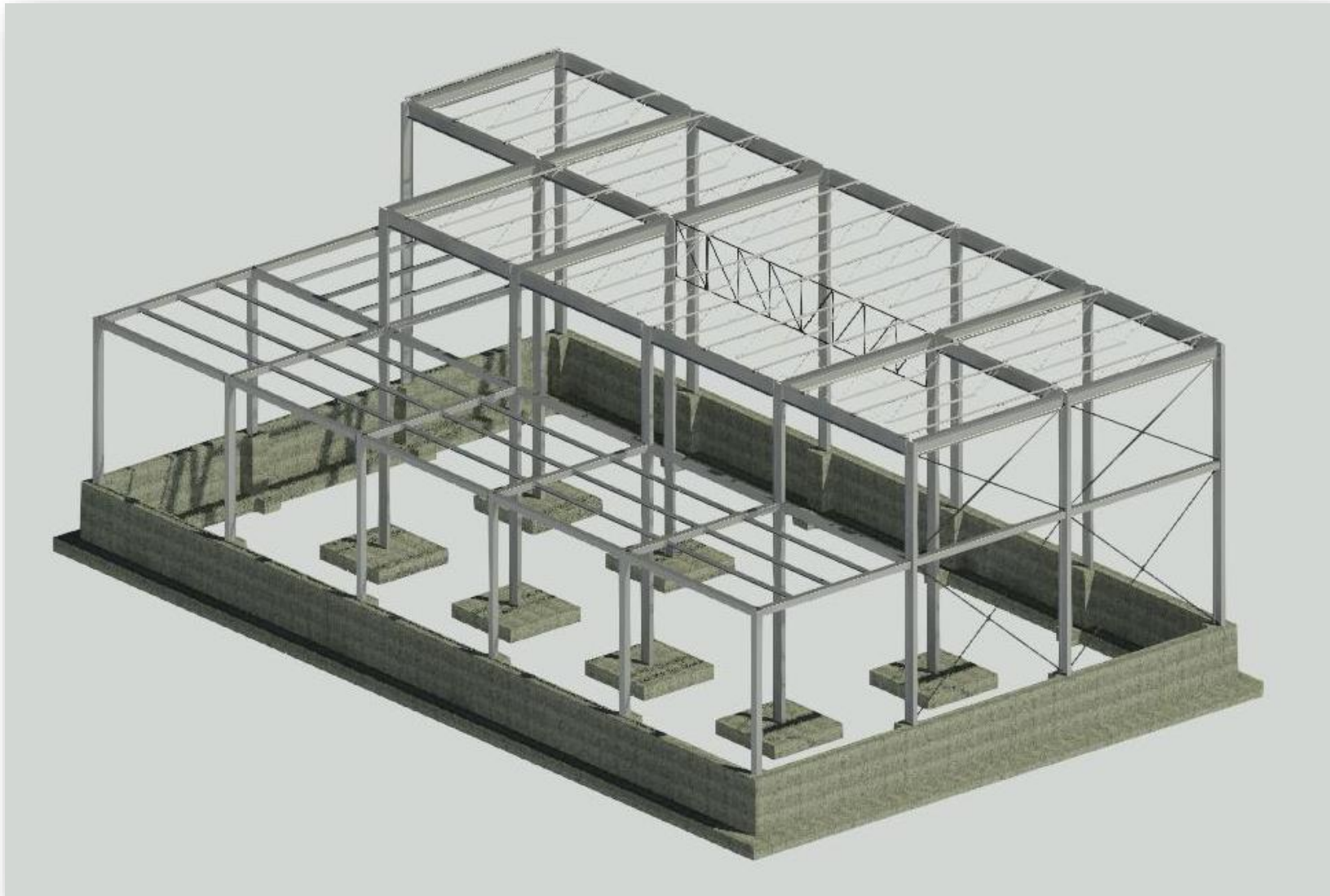


Figure 19 Steel Structural model (3D view)

BEACH RESORT – PROJECT (BIM)

The project was to build something unique on the existing site which is located in Kitchener (27 Sunbridge Crescent). The project is situated on the banks of the Grand River. The picturesque location with the tranquil flow of water inspired us to create something truly remarkable—a beach resort (Ground floor + Six Floors with a penthouse) that harmonized with its natural surroundings. BEACH RESORT is a design that will seek to accommodate its varied users by providing a well-articulated, sustainable concept in an eco-friendly environment; that will cater to various relaxation activities and enhance tourism.

As we delved into the project, the first step was a thorough site analysis. We studied the topography, vegetation, and the river's behavior to understand how we could best integrate the resort into the landscape while preserving its ecological balance.

Zoning regulations played a crucial role in shaping our design approach. We meticulously navigated through Ontario building code, zoning laws, and environmental regulations to ensure compliance while maximizing the potential of the site.



Figure 20 Existing site topography



Figure 21 Zoning

ONTARIO BUILDING CODE

- (1) Except as permitted in *Sentence (2)*, at least 10% of the *suites* of a *hotel* shall,
 - (a) have a *barrier-free* path of travel extending to,
 - (b) be distributed among *storeys* that are required by **Article 3.8.2.1.** to have a ***BARRIER-FREE PATH*** of travel, having regard to the height of the *suite* above *grade*.
 - **“3.8.2.1. Areas Requiring Barrier-Free Path of Travel**
- (2) Not more than 20 *suites* need comply with *Sentence (1)*.
- (3) A *suite* having a *barrier-free* path of travel required by *Sentence (1)* shall have a ***BATHROOM*** that,
 - **3.8.3.12. Universal Washrooms**
 - (1) A universal *washroom* shall,
 - (a) be served by a *barrier-free* path of travel,
 - (h) be *designed* to permit a wheelchair to turn in an open space not less than 1 700 mm in diameter,
 - (j) be provided with a mirror,
 - **3.8.3.13. Showers and Bathtubs**
 - (1) Except within a *suite* of *residential* occupancy, if *showers* are provided in a *building*, the number of *barrier-free showers* shall conform to Table 3.8.3.13.
 - Table 3.8.3.13.
Minimum Number of Barrier-Free *showers*
 - Forming Part of Sentence 3.8.3.13.(1)

(4) Except as required by Sentence 3.8.3.3. (17) for power door operator controls, controls for the operation of building services or safety devices, including electrical switches, thermostats, and intercom switches, intended to be operated by the occupant and located within a suite having a barrier-free path of travel required by Sentence (1) shall conform to Sentence 3.8.1.5. (1), 3.8.3.3. (17)

Except where a proximity scanning device is installed in conformance with Sentence (18), the control for a power door operator required by Sentence (4), (5), or (6) shall,

(18) A proximity scanning device that activates a power door shall be capable of detecting a person in a wheelchair.

(4) Except as permitted by Sentence (12), every door that provides a barrier-free path of travel through a barrier-free entrance required by Article 3.8.1.2. shall be equipped with a power door operator if the entrance serves a building containing a Group A, Group B, Division 2 or 3, Group C, Group D or Group E occupancy.

(5) Except as permitted by Sentence (12), where a barrier-free entrance required by Article 3.8.1.2. incorporates a vestibule, a door leading from the vestibule into the floor area shall be equipped with a power door operator in a building containing a Group A, Group B, Division 2 or 3, Group C, Group D or Group E occupancy.

(12) Only the active leaf in a multiple-leaf door in a barrier-free path of travel needs to conform to the requirements of this Article.

(6) A door shall be equipped with a power door operator where the door serves, (5) An entrance door to a suite having a barrier-free-path of travel required by Sentence (1) shall have,

(a) a power door operator conforming to Article 3.8.3.3., and

(b) a door viewer located at a height no higher than 1 100 mm above the finished floor.

(6) Where a door is provided between a suite having a barrier-free path of travel required by Sentence (1) and an adjoining suite, the door shall conform to Sentences 3.8.3.3. (1) and (3).

(7) Where an emergency power supply is supplied by a generator, it shall supply at least one emergency power receptacle in at least one of the suites having a barrier-free path of travel required by Sentence (1).

(8) The emergency power receptacle described in Sentence (7) shall be identified with a legible sign having the words EMERGENCY POWER outlet permanently mounted on the wall beside the receptacle.

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With a clear understanding of the site and its constraints, we set out to design the beach resort. The design featured walls that embraced the curves of the landscape, seamlessly blending with the natural contours of the site. We envisioned expansive curtain walls that would frame breathtaking views of the river and surrounding scenery, inviting the outdoors into the resort's interior spaces.

Glass became a predominant material in our design palette, allowing us to create light-filled spaces that showcased the beauty of the landscape. The use of glass not only maximized natural light but also blurred the boundaries between indoor and outdoor living, creating a sense of connection with nature.

A striking round staircase became the centerpiece of the resort, symbolizing the fluidity and movement of the nearby river. Its elegant design served as a focal point, guiding guests through the different levels of the resort while providing panoramic views of the surroundings.

The furniture layout was carefully considered to enhance the guest experience, with each piece thoughtfully placed to optimize comfort and functionality. Whether lounging by the riverside or enjoying a meal with a view, every space was designed with relaxation and enjoyment in mind.

As we progressed with the design, structural considerations became paramount. We strategically placed structural columns to support the resort's framework, ensuring stability and safety. Through meticulous structural analysis, we ensured that the building could withstand the elements while maintaining its architectural integrity.

In the end, our beach resort design seamlessly integrated with its natural setting, offering guests a tranquil retreat where they could immerse themselves in the beauty of nature while indulging in luxury and comfort. It stood as a testament to our dedication to creating architecture that not only enhances the built environment but also celebrates the harmony between human habitation and the natural world.

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Figure 21 Site layout

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Figure 22 Ground floor grid plan



Figure 23 First floor grid plan

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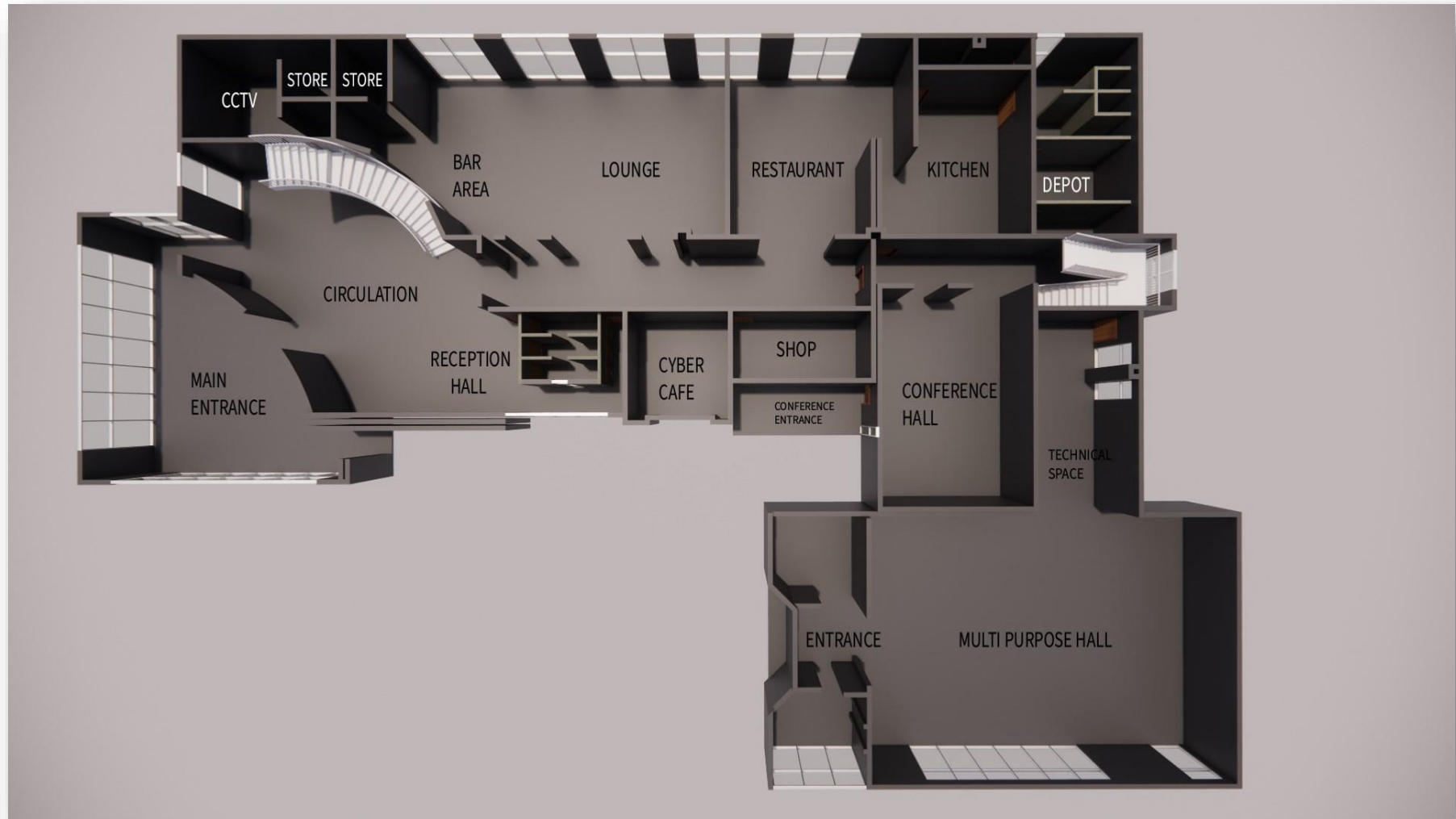


Figure 24 Ground floor plan functions

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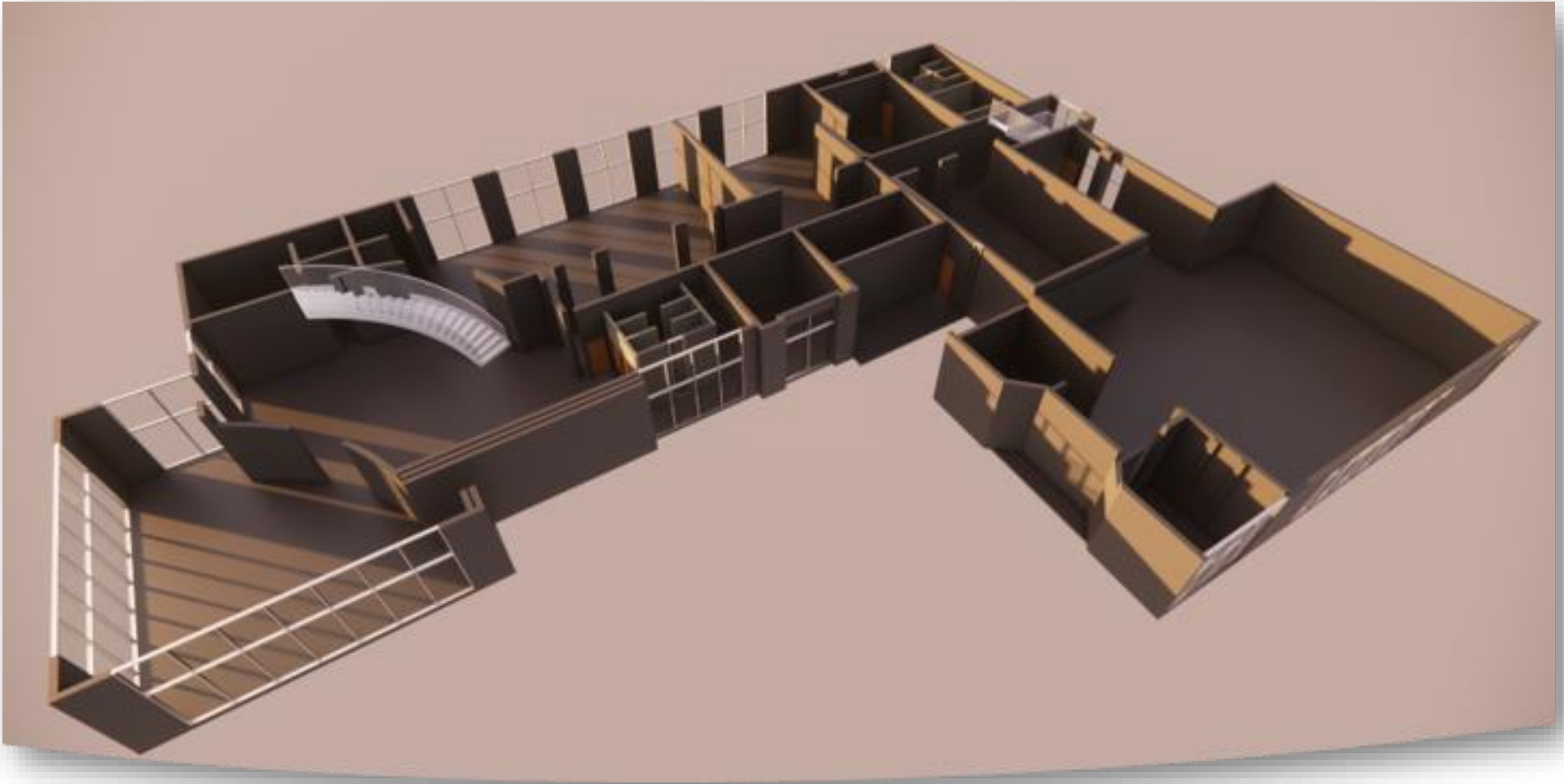


Figure 25 Ground floor plan

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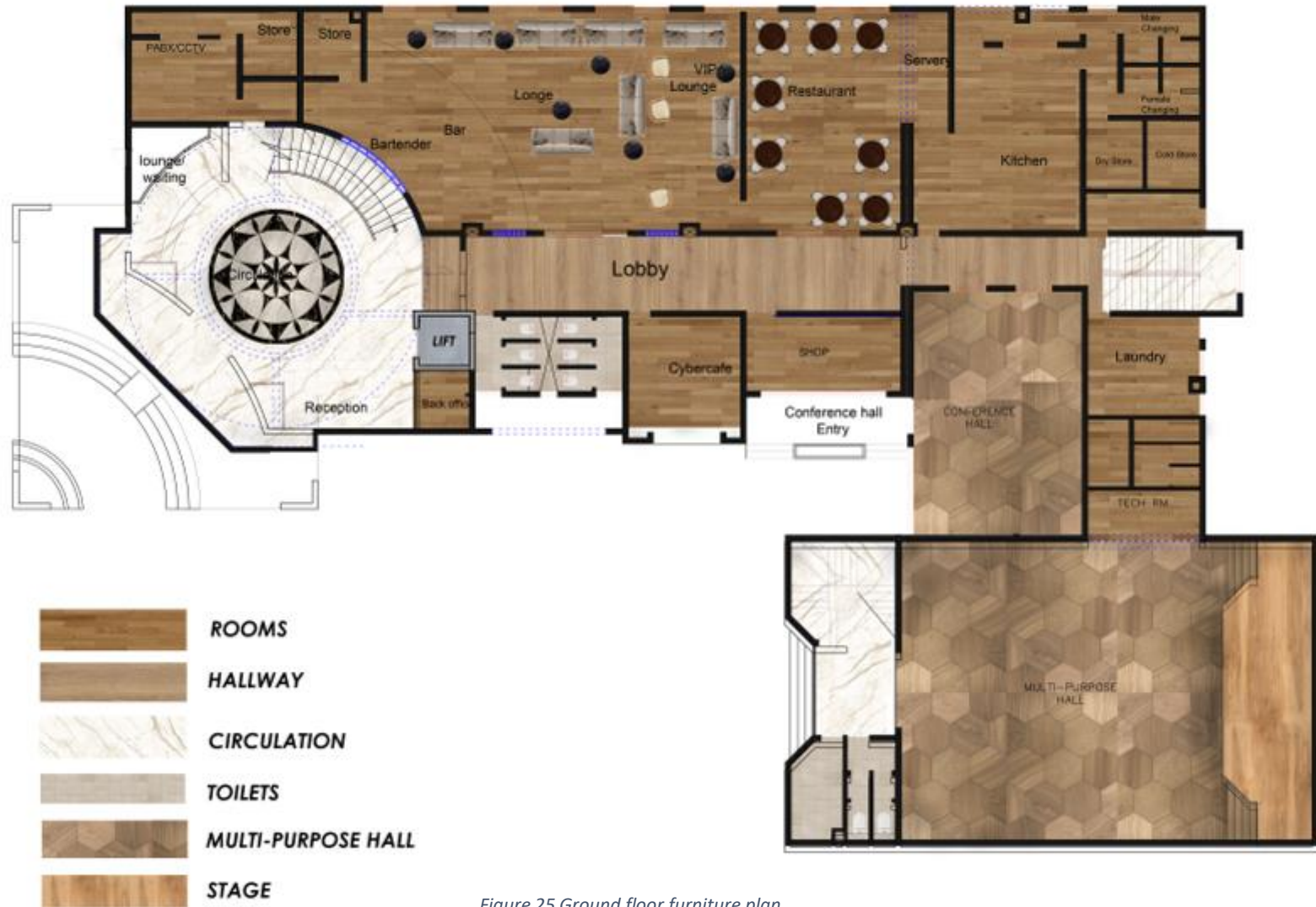


Figure 25 Ground floor furniture plan

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Figure 28 First floor furniture plan

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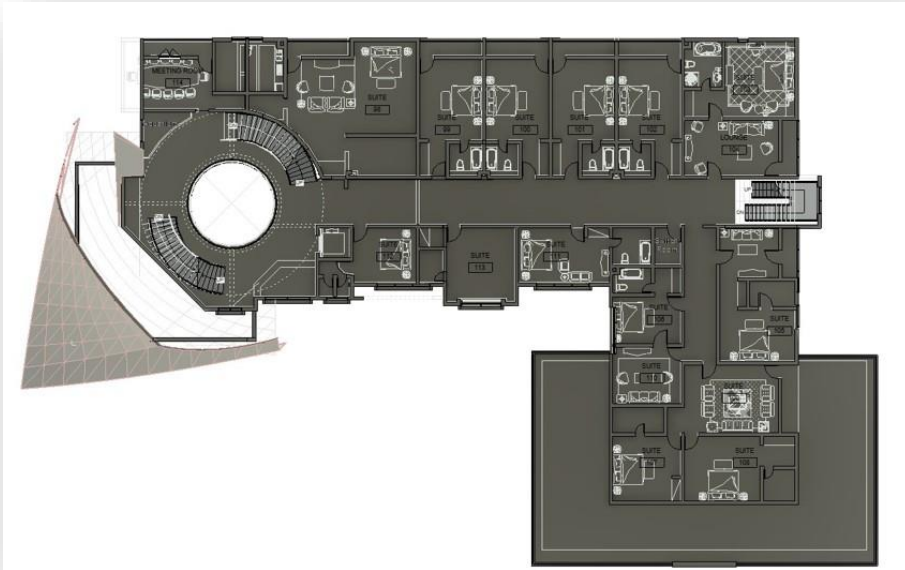


Figure 29 Second-floor plan



Figure 30 Second-floor furniture plan

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Figure 31 Third-floor furniture plan

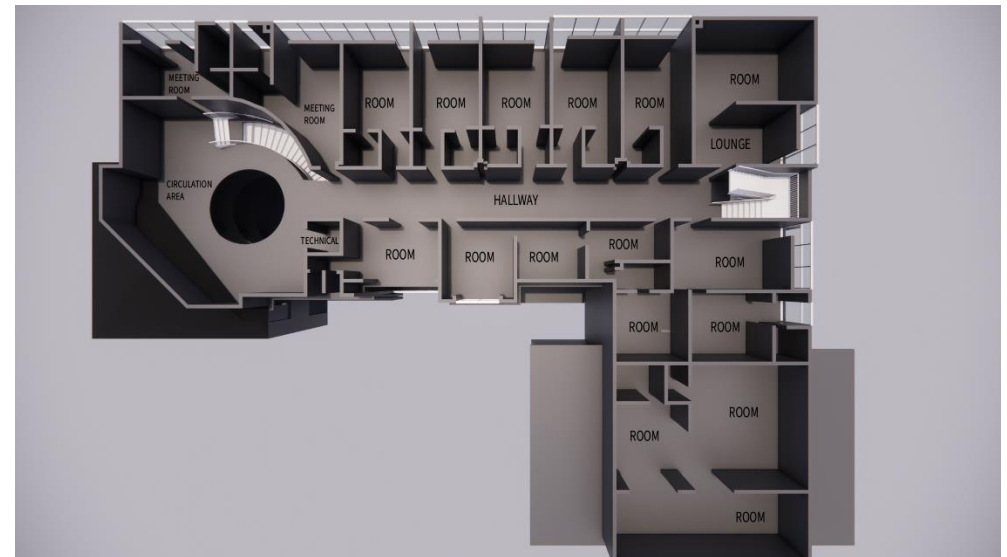


Figure 32 Third-floor plan

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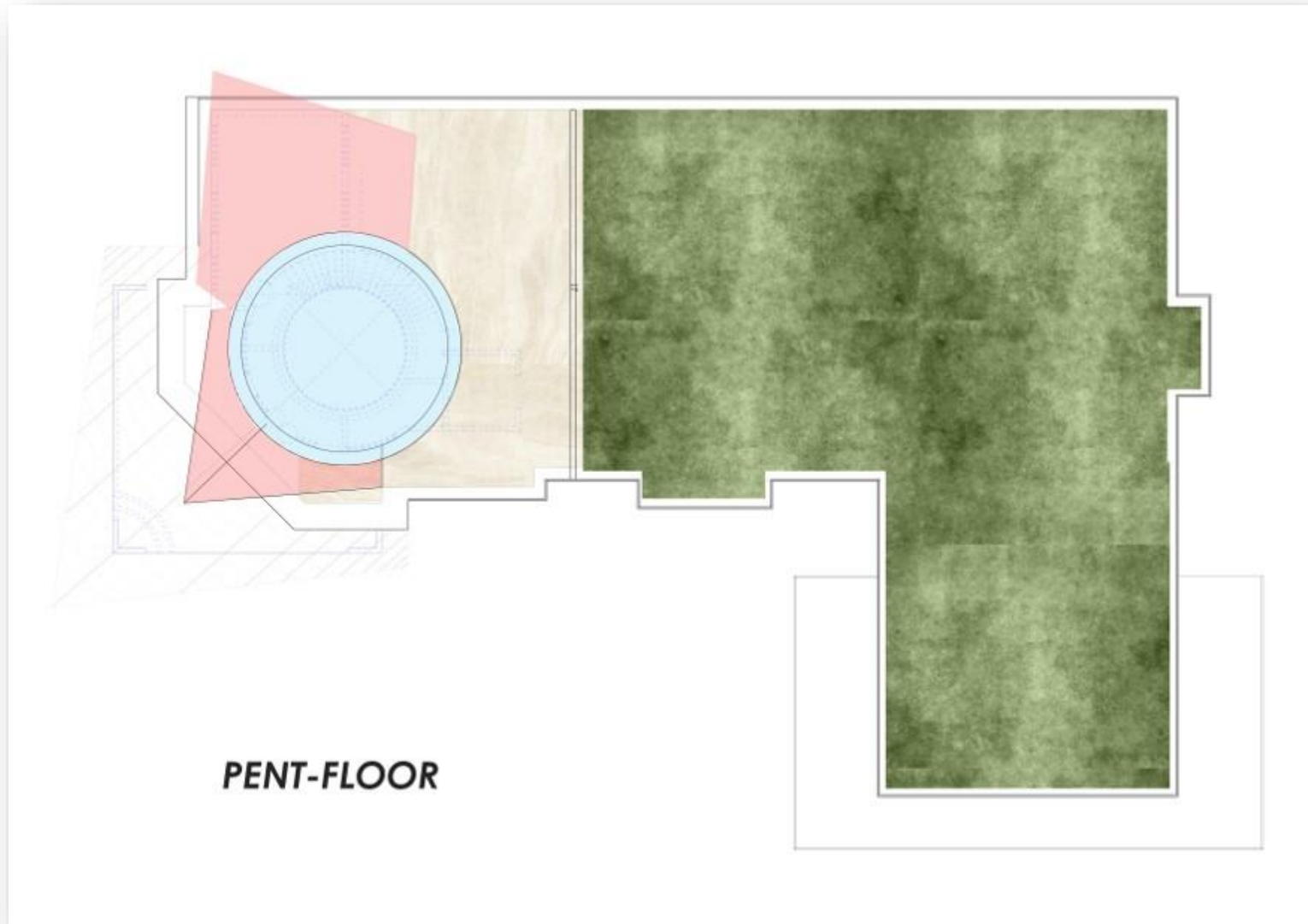


Figure 33 Penthouse plan

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Figure 34 Column plan

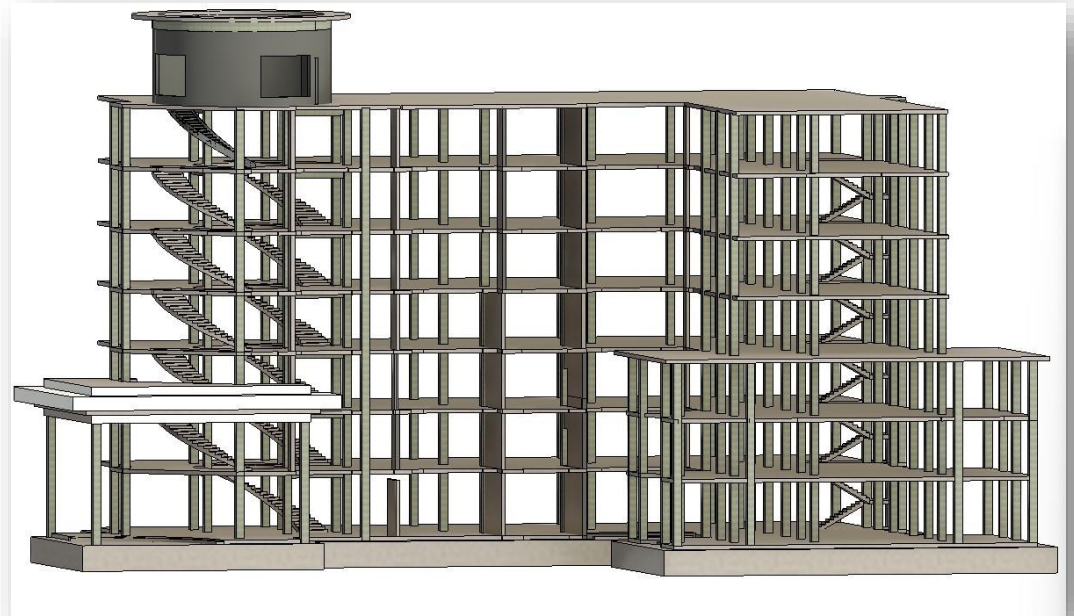


Figure 35 Structural plan

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BEACH RESORT



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BEACH RESORT