BROOKLANDS

Name: Sai Rishyanth Visinigiri
Year: 11
School: St Josephs College, Upper Norwood
Subject: Design & Technology

Unit - 1

1. The candidate will understand a client's needs.	2. The candidate will be able to formulate a project brief.	3. The candidate can understand the constraints on the project.	4. The candidate will be able to draft a plan.
1.1 identify the contextual needs of a client	2.1 outline the functional requirements of the project	3.1 identify constraints associated with the site location and present solutions	4.1 create a draft project plan
1.2 record project requirements and client expectations	2.2 establish quality objectives for the project	3.2 test initial ideas against planning protocol	4.2 match project planning to the human resources of the team
1.3 understand the requirement to establish a budget in relation to the agreed client's needs	2.3 set the sustainability aspirations of the project	3.3 explain the principles of legislation relevant to the project	4.3 create an Organogram for the project
		3.4 I can carry out a feasibility study and present the results	4.4 forecast the lifespan of the completed project
		3.5 make a judgement on project viability based on evidence	4.5 forecast facilities management costs
		3.6 I can explain how the building design helps minimise energy use	4.6 take account of environmental considerations in planning

1.1

Local Area- Brooklands Museum, Weybridge, England

- Brooklands Museum is located south of Weybridge, Surrey and was first opened regularly in 1991 on 30 acres of the original 1907 motor-racing circuit. Brooklands was the birthplace of British motorsport and aviation and the site of many engineering and technological achievement throughout eight decades of the 20th century. The racing circuit was constructed by local landowner Hugh F. Locke King in 1907 and was the first purpose-built racing circuit in the world.
- The site is conveniently located close to Weybridge town center and the amenities of Brooklands Retail Park, which is home to Marks & Spencer and Tesco. Neighboring towns include Chertsey, Woking, Guildford and Stains plus the St George's Hill Golf Club are just a stone's throw from the site.
- Weybridge is home to some of the world's biggest businesses including LG Electronics, Experian Samsung, Cargill, ISS World, Alliance Boots, JTI Cheep, Daikin, P&G and Mercedes Benz. The local vicinity offers a wide range of leisure facilities enjoyed by workers and residents alike including several golf courses, open countryside, health clubs and spas, horse racing at Kempton and Sandown.
- 10 minutes to the M25, A318 and A245 and 21 miles to Central London from the site. 1 mile from Weybridge station. A dedicated bus service runs from Weybridge Station every 8 minutes. The London Waterloo can reached in 35 minutes, with four to five trains per hour. The site is 12 miles away from London Heathrow, the world's third largest airport and 25 miles from Gatwick Airport

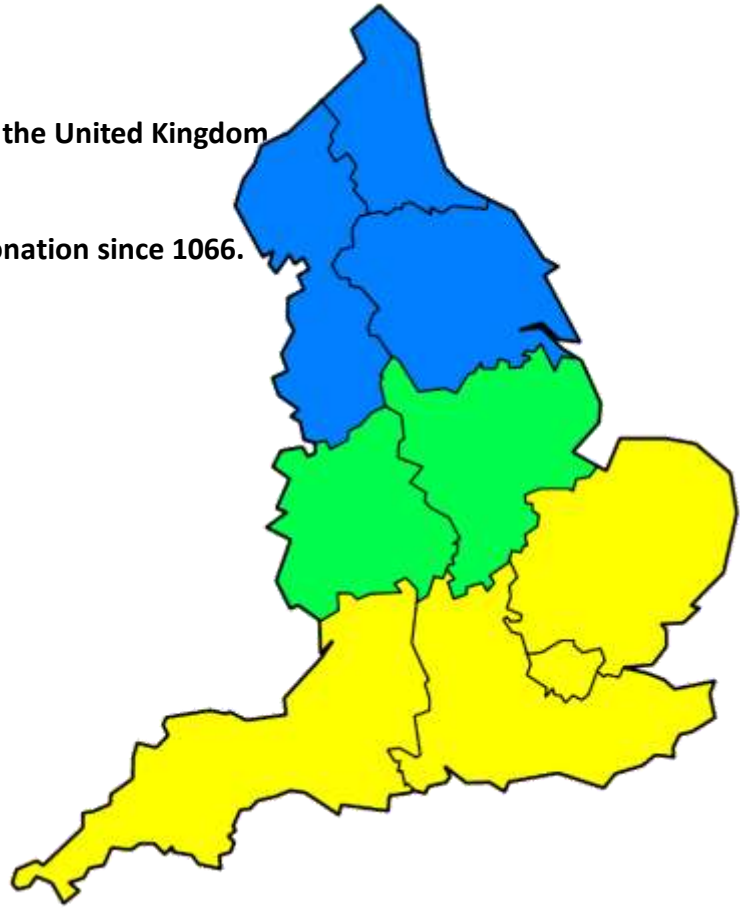
1.1

Regional Location- South East England

The M25 or London Orbital Motorway is a 117-mile (188 km) motorway that encircles almost all of Greater England, England in the United Kingdom.
The Brooklands Museum is accessible through the M25.The majority of new homes in England are built using traditional masonry construction according o self build guide. A national survey by MORI found that 61% of respondents would prefer to buy a newly built property of traditional block construction. Timber frame covers a number of build systems and in essence it is a traditional method of construction, however manufacturing developments have moved many of these methods into the classification of modern methods of construction discussed below. It is the second most popular technique for new home construction in the UK according to self-build guide.

Iconic buildings and Landmarks in South-East England

Stonehenge – A prehistoric monument built in the ancient Neolithic and Bronze age
Palace of Westminster - The meeting place of the House of Commons and the House of Lords, the two houses of the Parliament of the United Kingdom
Windsor Castle - A royal residence at Windsor in the English county of Berkshire.
Tower of London - A historic castle located on the north bank of the River Thames in central London
Westminster Abbey- Gothic church & site for coronations. Protestant abbey hosting daily services and every English and British coronation since 1066.
Roman Baths - a site of historical interest in the English city of Bath. The house is a well-preserved Roman site for public bathing.



The south of England varies from e southern quarter (below the M4/Northern M25), via one-third of the country (excluding central England), to the southern half, bordering Northern England .. Southern England is divided into four regions: South West England, South East England , London and the East of England. hey have a total area of 62,042 square kilometers, and a population of 28 million.Southern England generally has higher maximum & minimum temperatures than the other areas of the UK. It is also sunnier throughout the year, but unlike Wales, Northern Ireland & Scotland, the sunniest month is July. It rains on fewer days in every month throughout the year than the rest of the UK, and rainfall totals are less in every month, with the driest month, May, averaging 58.4 mm according to met office.

1.1

International Location- The United Kingdom

The United Kingdom is located in the northern hemisphere. The changes in these regions between summer and winter are generally mild, rather than extreme hot or cold. However, a temperate climate can have very unpredictable weather Thus, clockwise air circulation is characteristic of high pressure weather cells in the Northern Hemisphere.

In the Northern Hemisphere, the four astronomical seasons are:

- Spring - March Equinox to June Solstice.
- Summer - June Solstice to September Equinox.
- Autumn - September Equinox to December Solstice.
- Winter - December Solstice to March Equinox

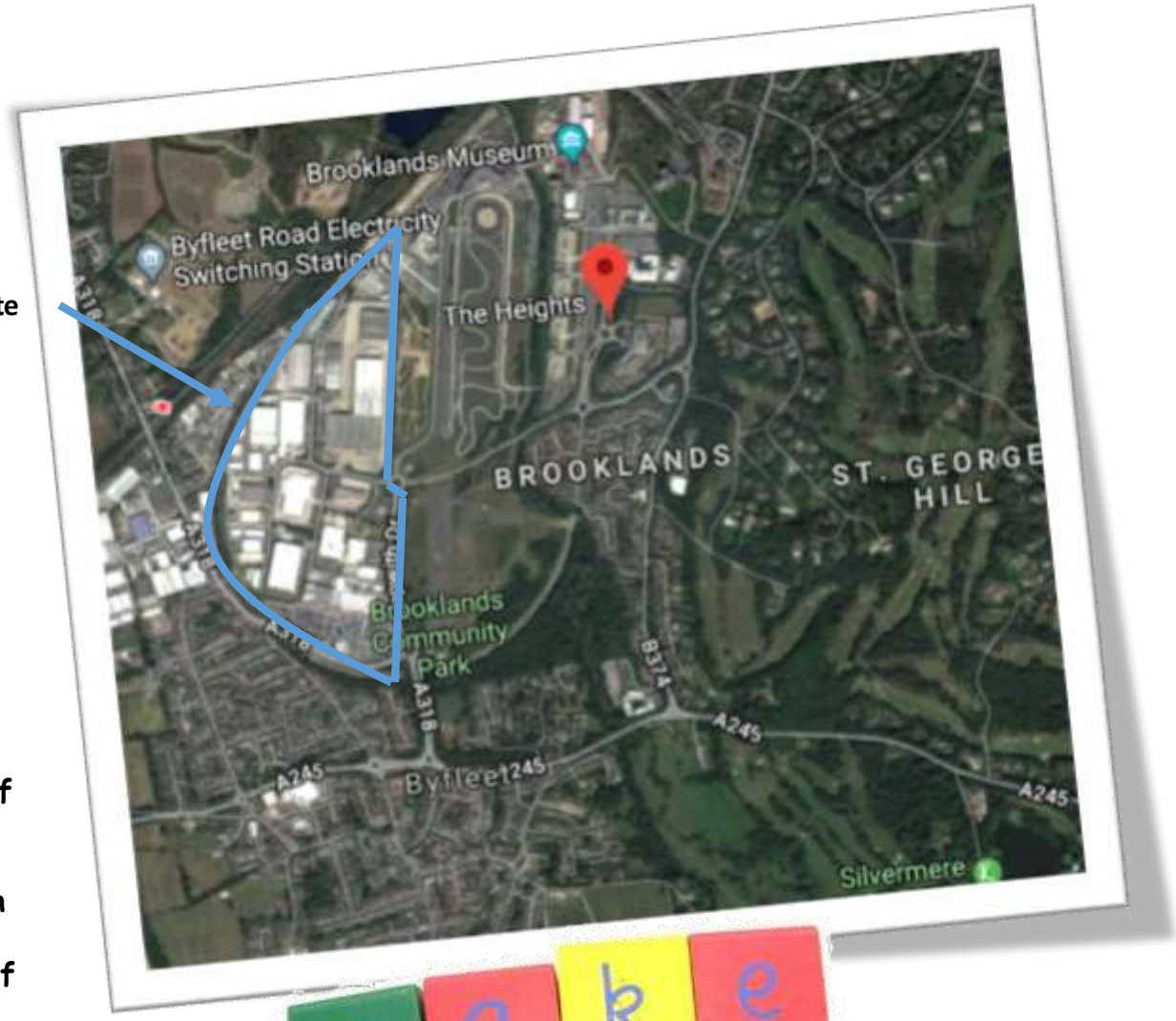
The two most popular methods of construction in the UK are Traditional (brick and block) Construction and Timber Frame. These, together with some internal partitions which are also built of blockwork, will support the structure of the building. In timber frame construction the internal structure is a wooden frame which has been designed to support the structure of the building. This frame is then clad by a facing material such as brick or stone, to provide an attractive finish.

In 2014, road delivered products travelled an average of 30 miles; the average distance and load size is partly a reflection of the scale and breadth of projects in the UK construction market according to assets publishing service UK.

Sustainable transport methods are vital to taking vehicles off the road and reducing carbon and Aggregate Industries has extensive rail and water transport capability. But rail and water links are not available everywhere. We need to work with key stakeholders, internally and externally, to ensure that we are well positioned to manage the environmental impact of our transportation activity. Materials would be procured from locally sourced companies o reduce carbon footprint.

3.1 Stakeholder

Stakeholders- Commercial area near the site



The stakeholders of the project are the client, government , community and the end users because they are indirectly affected by the outcome. The end users and the client have a major interest in the success of our project because they get influenced by the organization's work. . The company has a secondary responsibility towards them.

The residents living near the site and people visiting the Brookland's Museum are the stakeholders who are affected negatively during the development stages of the construction project. This is due to the loud noises of drilling , machinery or of other construction activities. During the development stages of a project, a stake holder management strategy should be developed. This process will allow the projects stakeholders to be effectively mapped out. The next step is to assess their key characteristics and present this information in a way that helps the project team implement effective stake holder management initiatives . Our external stakeholders have high enough levels of legitimacy and power to effect project success and as such, they should be treated as partners to increase their engagement and commitment. This can be achieved by revising and tailoring project strategies, objectives, and outcomes if necessary to support their win. The internal stakeholders of our building ideas are the entities within our business such as the employees and managers. They are directly affected by the by the outcome. They serve the organization. The company has a primary responsibility towards them. A stakeholder management should setup because it is a critical component to the success of the project. The commercial

1.2 Priorities

Priorities

Environment

- The indoor environmental quality (IEQ) of a building has a significant impact on occupant health, comfort, and productivity. Among other attributes, a sustainable building maximizes daylighting, has appropriate ventilation and moisture control, optimizes acoustic performance, and avoids the use of materials with high-VOC emissions. Principles of IEQ also emphasize occupant control over systems such as lighting and temperature.
- Energy resources: Renewable energy resources would be used in my building. The solar panels would be used to generate electricity in the building which would be very cost-effective and efficient . Solar power is locally generated and so avoids transmission losses of up to 12%, whilst delivering a healthy return on investment of around 15%. The energy is also predominantly consumed in the building so there will be further relief of pressure on the grid.
- Sustainable development is a development that meets the need of the present without compromising to the ability of future generation to meet their own needs.
- The sustainable features included in my building would be using natural light .The controlled admission of natural light, direct sunlight and diffused-skylight will reduce electric lighting and save energy. This could be done by placing openings and reflective surfaces
- The environmental issues associated with my building idea would be CO2 emissions due to the cement productions, methane emissions, odour problems, damage to roads caused by heavy vehicles, noise pollution from vehicles and machinery, local air pollution particularly in the form of dust, nuisance and disease

Users

- The building would be used by tourists and the local community living in Weybridge.
- The building would be operated by the Brooklands Museum

Aesthetics

- A set of principles concerned with nature or appreciation of beauty
- The building would be egg-shaped
- The building would have a transparent colour
- The building would have a contemporary architectural style.
- The building would have a structural glass facade with glazed aluminium structure

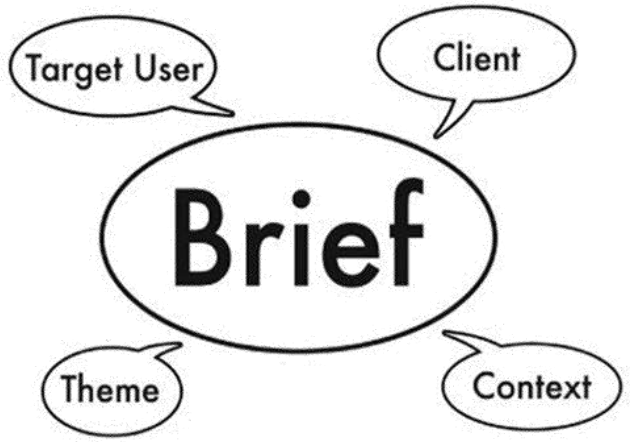
Functions

- The building will have a ice rink in the ground floor, restaurant, roof garden and swimming pool. The building would help people visiting the building to be socialized

Technical

- The ice rink would need Insulated walls and ceiling, Efficient refrigeration plant, Mechanical ventilation, Efficient heating system, Air dehumidification
- The restaurant would need insulated walls and celliengs, Mechanical ventilation , Refrigeration , Washer, Air conditioners and Radiators

Project Brief 1.2, 2.1, 2.2, 2.3



Title: Redevelopment of the Stratosphere Chamber, Brooklands

Project Location: Brooklands Rd, Weybridge KT13 0QN

Client: Brooklands Museum

Architect: Rishyanth Visinigiri

Service: Commercial Redevelopment

Brief Description:

Our project involves the redevelopment of the Stratosphere chamber into a community centre. The Stratosphere chamber currently has collection of aero engines ranging from the simplest early piston engines up to advanced turbofan jet engines and, in the chamber itself, the forward section of Vickers Vanguard airliner just as it could have been seen on test in the test in 1950s. The Stratosphere chamber is currently visited by tourists and visitors. The proposal plan is to build a ice rink at ground level for ice skating and a state of the art restaurant at the first level with a glass floor and a state of the art swimming pool at the top level with a roof garden on the old stratosphere chamber building in Brooklands, Weybridge.

According to the IIHF the minimum requirements of an ice rink are stated below that would be included in the Brooklands building.

Ice rink facilities share all the same concerns: energy usage, operating costs and indoor climate. Ice rink design and operation are totally unique and differ in many ways from standard buildings. The basic technical elements of a well-working facility are:

Thermal conditions vary from -5 ºC on the ice surface to +10 ºC in the stand and +20 ºC in the public areas like dressing rooms and offices. High humidity of indoor air will bring on corroding problems with steel structures, decay in wooden structures and indoor air quality problems like fungi and mold growth etc.

- **Mechanical ventilation: Mechanical ventilation is necessary to be able to control the indoor air quality and thermal as well as humidity conditions inside the ice rink.**
- **Efficient heating system: Remarkable energy-savings can be achieved when using waste heat of the refrigeration process to warm up the air. Ventilation offers also a means to heat the ice rink. Heating the ice rink with air necessitates the use of re-circulated air and that the ventilation unit is equipped with heating coil(s).**
- **Insulated walls and ceiling: Insulated walls and ceiling makes it possible to control the indoor climate regardless of the outdoor climate.**
- **Efficient refrigeration plant : The refrigeration plant is needed to make and maintain ice on the rink.**
- **Air dehumidification: The dehumidification plant is needed in well working facility to dry the rink air. Excess moisture in indoor air will cause corrosion of metal structures, rotting of wooden structures, fungi and mould growth, increased energy consumption and ice quality problems.**

Spatial requirements: In the small ice rink there is a minimum space needed for following use: one standard IIHF ice pad, size of 30 m x 60 m surrounded by a dasher board and glass protection with 1,5 m minimum space outside of the dasher board, dressing rooms incl. toilets, showers and lockers for personal items, referees and linesmen dressing room including toilet and shower, two drying rooms, entrance hall, ticketing, medical room, equipment service room (skate sharpening, stick storage etc.), storage space, technical room for mechanical and electrical system, tribune for 200 spectators and public toilets.

The end user requirements of the state of the art ice rink is a ice pad with dash board and glass protection, tribune for the spectators, Dressing room, medical room, technical room and entrance hall with ticketing.

Project Brief 1.2, 2.1, 2.2, 2.3

The ethnic restaurant in the first level of the building would be an ethnic restaurant with multicultural cuisine such as Chinese, Indian, Italian, Mexican ,etc. The restaurant would have state of the art kitchen and dining hall. The interior design of the building would be an industrial style followed by a glass floor which allows to have a spectacular look at the ice rink at birds eye view. The restaurant would be train themed restaurant that would be waiter independent as the food is delivered to the table trough toy trains. The interactive dining table would allow customers to order food from their table.

The technical requirements of the restaurant are as follows according t the food safety guidelines :

Washing Equipment: Dish- and hand-washing stations are integral to restaurant operations; both are typically required by local health departments.
Ice Machines and Refrigerators: Many food items must be kept at a minimum temperature, as required by food safety codes. drawers. Automatic ice machines are necessary, particularly for restaurants with full bars and cocktail offerings.
Freezers and Grills: Freezers are essential for food storage, as food cannot always be used immediately
Safety Equipment: Safety equipment is required by state and federal law. The Occupational Safety and Health Administration requires first-aid kits in the workplace.
Fire extinguishers are also required. Local fire marshals inspect new restaurants to ensure compliance with fire codes; this includes making sure the restaurant.
Thermal Comfort and Indoor Air Quality
The internal heat gains are very high in all restaurants (especially in kitchens) due to cooking, lighting, electrical equipment and the number of clients. HVAC (heating ventilation and air conditioning) forms an important feature and consideration for achieving a functional restaurant design.
Lighting: Using as much as natural light as possible to save energy. It provides for our visual needs, and also safety and security. People intuitively know that light affects their mood.

Spatial requirements:

Acoustic: People talking, background noise or sound and architectural design of the restaurant itself impacts the overall acoustical quality of space. The quality of ambient sound in a restaurant straightaway regulates the user experience and ultimately the feedback. A modern look which generally includes high ceilings and hard surfaces and an open plan. hey are known to produce excessive room echo. As these venues are usually fast-paced and crowded, this makes for an uncomfortably loud environment. A balance needs to be created in terms of aesthetics and desired acoustical levels for ultimate human comfort.
Optimum Utilization of Seating and Smooth Circulation.
The plan should be made in such a way that allows the servers to move easily with food and beverages in the restaurant and also allows the guests to move in and out of the restaurant freely.
The end user requirements is human comfort. Human comfort in an indoor space primarily relies on thermal comfort and indoor air quality (achieved by temperature, humidity control good and ventilation), lighting and acoustic comfort.

1.2 Formal Letter to the Client

St Joseph's College

Beulah Hill

London

SE19 3HL

Architect Agreement Brookland Ice rink, restaurant and roof garden

Dear client,

This letter is to clarify the proposal for an ice rink, ethnic restaurant and roof garden to be built on the old stratosphere chamber in Brooklands Museum, Weybridge, Surrey. The consultation with the stake holder has led to a decision that the ice rink would provide a lot of different functions such as ice skating, ice hockey and curling, etc. including toilets, showers and lockers for mechanical and electrical system, tribune for 200 spectators. The following spatial requirements would be required to provide these facilities. Furthermore, the first floor of the building would have a state of the art ethnic restaurant with multicultural cuisine including parties, clubs, etc. The following rooms needed to provide these facilities is a state of the heart kitchen and public toilets. The restaurant would have an industrial style and have a glass floor to have a bird's eye view of the ice rink.

The top floor of the building would have a roof garden to provide recreational time for the visitors and tourists visiting Brooklands Museum for a healthy life. The roof would give a spectacular view of the Brooklands Museum. The roof garden would have variety of trees, flowers, an open space and a swimming pool. The total area will be 1000 m^2. The main room will have a size of 30m x 60m which would be the ice rink and other rooms that will take rest of the space. The building should be modern but still fit in with the area around and have eco and sustainable materials. The budget for the project is £4 million and the average per square metre is £2000. The project should begin as soon as possible and be completed about a year later in 2019. The building should use solar panels, green roof and rain water harvesting which helps decrease the amount of impact on the surrounding environment. If you have any additional features or wish to make any changes to any of the criteria then please respond by letter.

Yours Sincerely

Rishyanth Visinigiri

Architect

Job Roles – Salary and No. of Days Involved

		Salary	Day Rate	Number of days on site	Number of people	Total
Design And Planning	Quantity Surveyor	£30,000	£82	60	1	£4,920
	Facilities Manager	£26,000	£71	60	1	£4,260
	CAD Operatives	£40,000	£117	5	1	£585
	Project Manager	£50,000	£147	60	1	£8,820
	Architect	£50,000	£147	20	1	£2,940
	Structural Engineer	£40,000	£117	40	1	£4,680
	Building Control Surveyor	£40,000	£118	60	1	£7,080
	Estimator	£34,000	£100	10	1	£1,000
	Planner	£30,000	£88	3	1	£264
Demolition & Deconstruction	Diamond Drilling Operative	£25,000	£74	3	2	£444
	Demolition Operaritive	£25,000	£74	2	4	£592
	Site Manger	£35,000	£102	60	1	£6,120
	Plant Operator	£25,000	£74	4	50	£14,800
	Site Engineer/ Technican	£21,000	£62	60	6	£22,320
	Civil Engineer - Senior	£60,000	£176	50	1	£8,800
	Civil Engineer - Experienced	£40,000	£117	50	2	£11,700
Foundations	Building Technician	£30,000	£82	20	1	£1,640
	Construction Manager	£48,000	£147	50	1	£7,350
	Buyer	£33,000	£97	20	1	£1,940
	Joiner - Senior	£30,000	£82	7	1	£574
	Joiner -Experienced	£20,000	£59	7	1	£413
	Joiner - Newly Trained	£14,000	£41	7	2	£574
	Brick Layer - Senior	£30,000	£82	7	1	£574
	Brick Layer - Experienced	£17,000	£50	7	2	£7,000
	Brick Layer - Newly Trained	£15,000	£44	7	4	£1,232
	Piling Operator	£25,000	£74	2	1	£148
	Ground Worker - Newly Trained	£10,000	£29	40	40	£46,400
	Ground Worker - Experienced	£15,000	£44	40	10	£17,600
Super Structure	Scaffolder	£30,000	£82	3	5	£1,230
	Roofing Operative - Senior	£25,000	£74	5	2	£750
	Roofing Operative - Experienced	£15,000	£44	5	4	£880
	Roofing Operative - Newly Trained	£12,000	£35	5	4	£700
	Plant Manager	£35,000	£103	5	1	£515
	Glazier	£16,000	£47	3	20	£2,820
	Carpenters	£17,000	£50	10	10	£5,000
	Steel Erectors	£24,000	£70	5	5	£1,750
1st and 2nd Fixing	Team Leader	£30,000	£82	60	1	£4,920
	Dryliner	£20,000	£59	10	10	£5,900
	Clerks of Works	£40,000	£118	60	1	£7,080
	Plumber	£16,000	£47	4	2	£376
	Contract Manager	£46,000	£135	60	1	£8,100
	Lightning Conductor Engineer	£28,000	£82	2	1	£164
	Ceiling Fixer	£20,000	£59	5	5	£1,475
	Electrician	£30,000	£82	4	5	£1,640
3rd Fixing	Plasterer	£28,000	£82	5	10	£4,100
	Partitioning System Operatives	£26,000	£76	20	1	£1,520
	Wall And Floor Tiler	£28,000	£82	5	10	£4,100
Total						£237,790

The table in the left shows the types of job roles needed for different phases of construction. In addition, it gives us an idea of no. of days each person is involved in the project and the amount of salary to give each of them based on their annual salary and no of days involved in the site. This helps us determine an estimate of the total labour cost of the project and know when each type of job role is needed.
The building would require a general manger, caretaker, decorator as part of the facilities management team and other maintenance team to provide management facilities to the building on a daily basis. He building facilities management cost is estimated to be £22,000 annually.

The Materials table gives us an idea of the different materials needed in the construction of the building. Furthermore, gives us an idea of the quantity/ amount needed for each material and its cost. This gives an estimate of the material cost in the project which has a major contribution in the budget. This makes it easier when buying the materials and also helps us compare the total cost of the materials if there is any inflation.

Materials needed and their cost

Materials	Unit	QTY	Cost of Each	No. of Needed	Unit QTY	Total
Foundation Concrete	Kg	12 ,032 ,651	£10	606,000	20	£6,060,000
Concrete Lintels (215mm x 100mmx 2400mm)	No.	50	£300	50	1	£15,000
Sand	Kg	8,000,000	£43	8889	900	£328,227
Cement	Kg	2,370,000	£20	74600	50	£1,492,000
Mortar Plasticiser	L	596	£15	596	1	£8,940
Engineering Blocks	No.	2470	£496	6	400	£2,976
Oversite Concrete	m3	6,000,000	£8	5000	1200	£40,000
Loft Insulation	m2	1,000	£10	240	4.9	£2,040
Cavity Wall Insulation 1200mm x 450mm x 100mm	m3	5,000	£20	5400	1	£108,000
Pipe Insualtion (Rolls)	ft	2,000	£4	80	1	£320
Floor Insulation	m2	1,000	£15	2352	1	£34,875
Wall Ties	No.	200	£9	200	1	£1,800
Cavity Closers	No.	2,084	£7	2084	1	£14,588
Cavity Weep Vents	No.	2,000	£4	2000	1	£8,000
Fixings, Screws And Nailings	No.	10,000	£60	6	2100	£360
Roof Timbers (25mm x 50mm)	No.	100	£3	100	1	£300
Metal Strapping	m	200	£8	21	1	£168
Tiles And Fittings	No.	21,641	£27	21641	1	£584,307
Fasica / Barge Boards	m2	500	£11	667	1	£7,333
Reinforced Concrete	m3	6,000,000	£13	5000	1200	£15,000
Steel Beams (8m)	No.	30	£50	30	1	£1,500
Thermal Insulated Plasterboard	m2	500	£53	179	2.88	£9,487
Total						£8,735,221

This table which involves the job roles gives us an idea of which day each job roles is needed and determines of different job roles are linked together in the project

Job Roles involved in different days

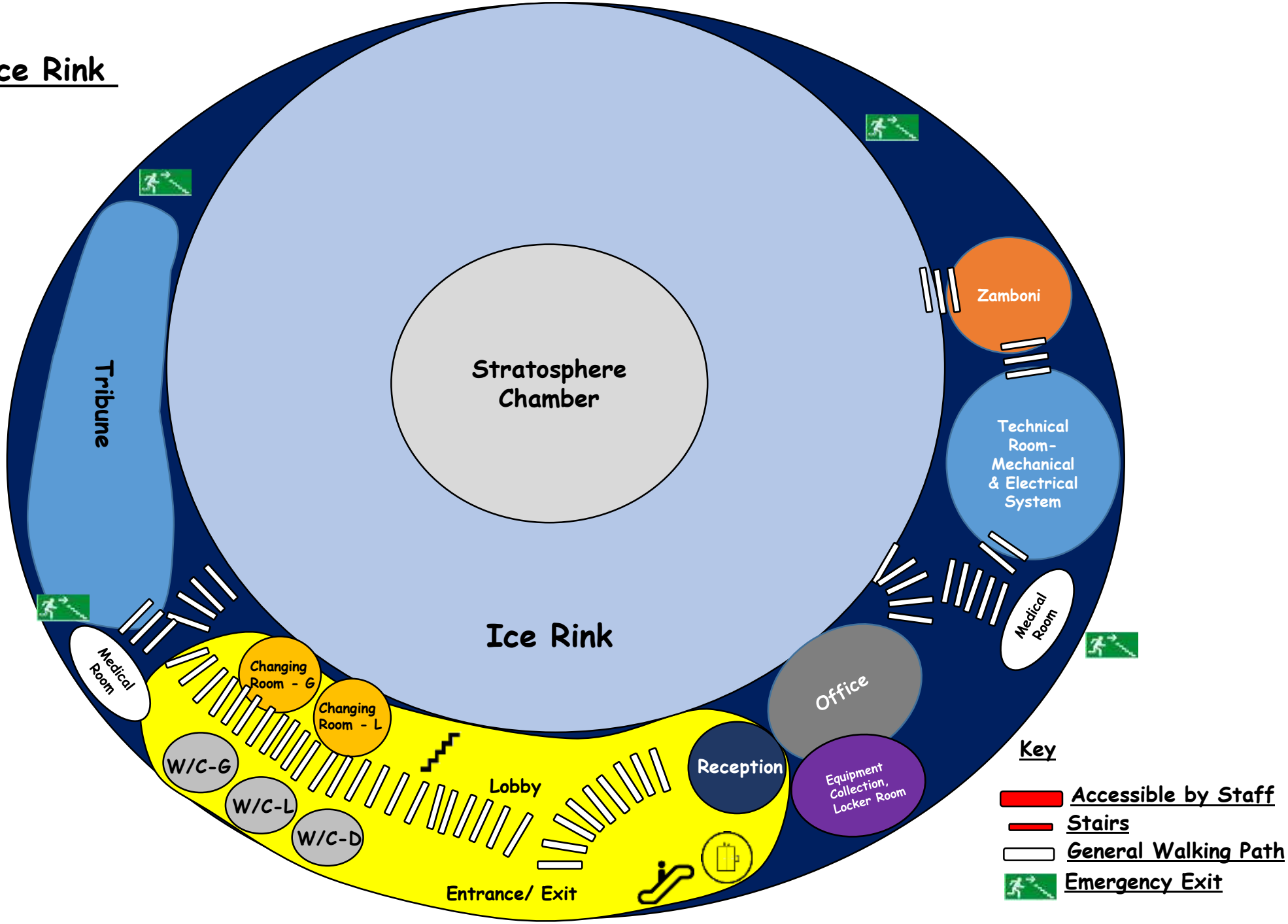
Job Roles	Days of Work																																																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Quantity Surveyor																																																												
Facilities Manager																																																												
CAD Operatives																																																												
Project Manager																																																												
Architect																																																												
Structural Engineer																																																												
Building Control Surveyor																																																												
Estimator																																																												
Planner																																																												
Diamond Drilling Operative																																																												
Demolition Operaritive																																																												
Site Manger																																																												
Plant Operator																																																												
Site Engineer/ Technican																																																												
Civil Engineer - Senior																																																												
Civil Engineer - Experienced																																																												
Building Technician																																																												
Construction Manager																																																												
Buyer																																																												
Joiner - Senior																																																												
Joiner -Experienced																																																												
Joiner - Newly Trained																																																												
Brick Layer - Senior																																																												
Brick Layer - Experienced																																																												
Brick Layer - Newly Trained																																																												
Piling Operator																																																												
Ground Worker - Newly Trained																																																												
Ground Worker - Experienced																																																												
Scaffolder																																																												
Roofing Operative - Senior																																																												
Roofing Operative - Experiened																																																												
Roofing Operative - Newly Trained																																																												
Plant Manager																																																												
Glazier																																																												
Carpenters																																																												
Steel Erectors																																																												
Team Leader																																																												
Dryliner																																																												
Clerks of Works																																																												
Plumber																																																												
Contract Manager																																																												
Lightning Conductor Engineer																																																												
Ceiling Fixer																																																												
Electrician																																																												
Plasterer																																																												
Partitioning System Operatives																																																												
Wall And Floor Tiler																																																												

Bubble Diagram – Ice Rink

Option 1

Ground Floor

This bubble diagram shows the layout of an ice rink planned to be build in the ground floor of the building. The centre of the ice rink would have the iconic stratosphere chamber. The ice rink has a capacity of 50 people with a 150 seating capacity in the tribune. The lobby at the entrance would have the reception for booking, elevator for upstairs, restrooms, changing room, lockers and equipment service room. The technical room, locker, equipment service room are connected to the office and are away from the public spaces. There are four emergency exit apart from the main entrance. Two emergency exits on the either side of the tribune. The third emergency exit is at the office and the last emergency exit at the right hand corner.

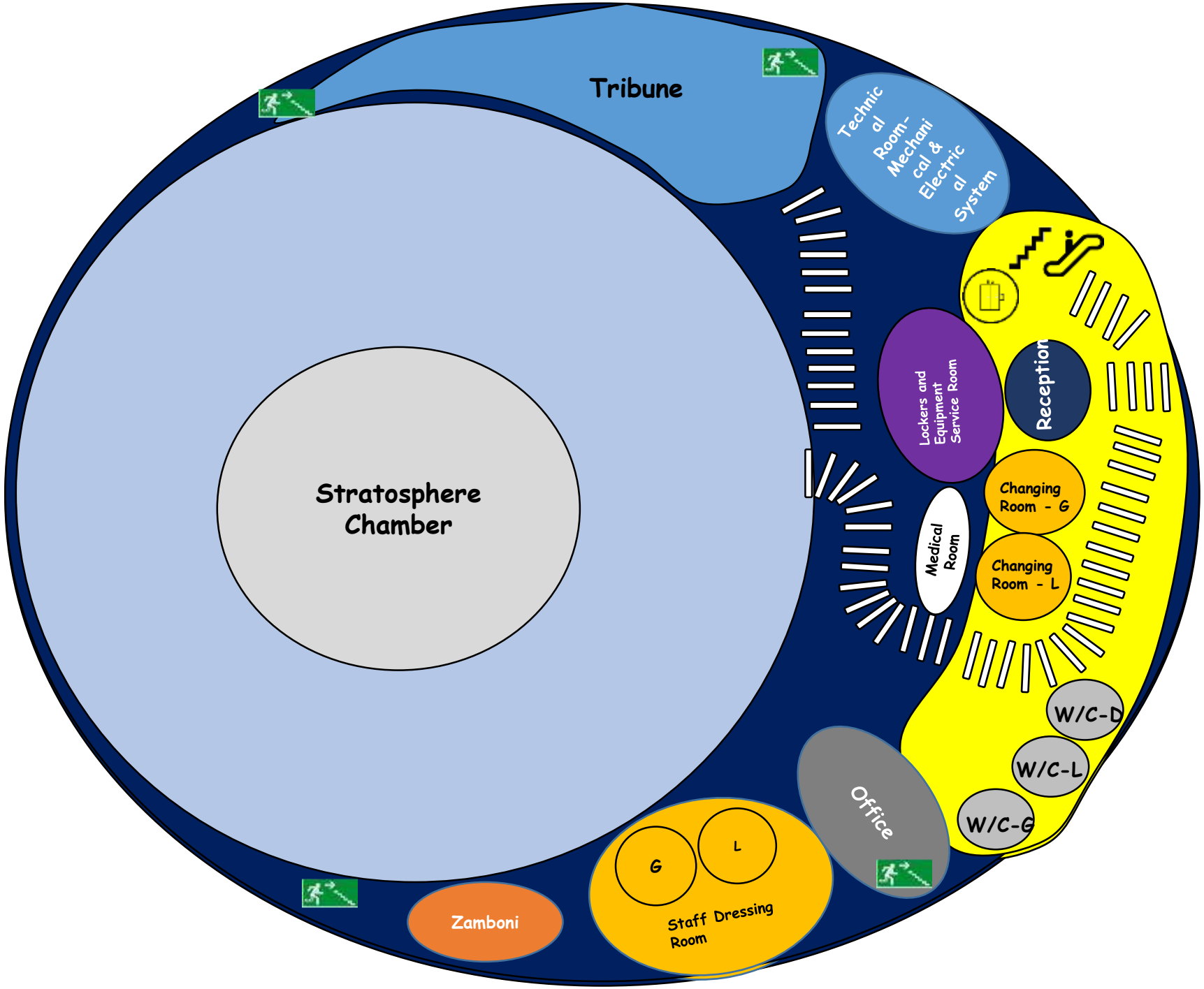


Bubble Diagram – Ice Rink

Option 2

Ground Floor

This bubble diagram shows the layout of an ice rink planned to be build in the ground floor of the building. The left hand side of the building is planned to have the ice rink. The ice rink has a capacity of 60 people with a 100 seating capacity in the tribune. The lobby at the entrance would have the reception for booking, elevator for upstairs, restrooms, changing room, lockers and equipment service room. The technical room is located near the tribune. There are four emergency exit apart from the main entrance. Two emergency exits on the either side of the tribune. The third emergency exit is at the office and another emergency exit at near the Zamboni.

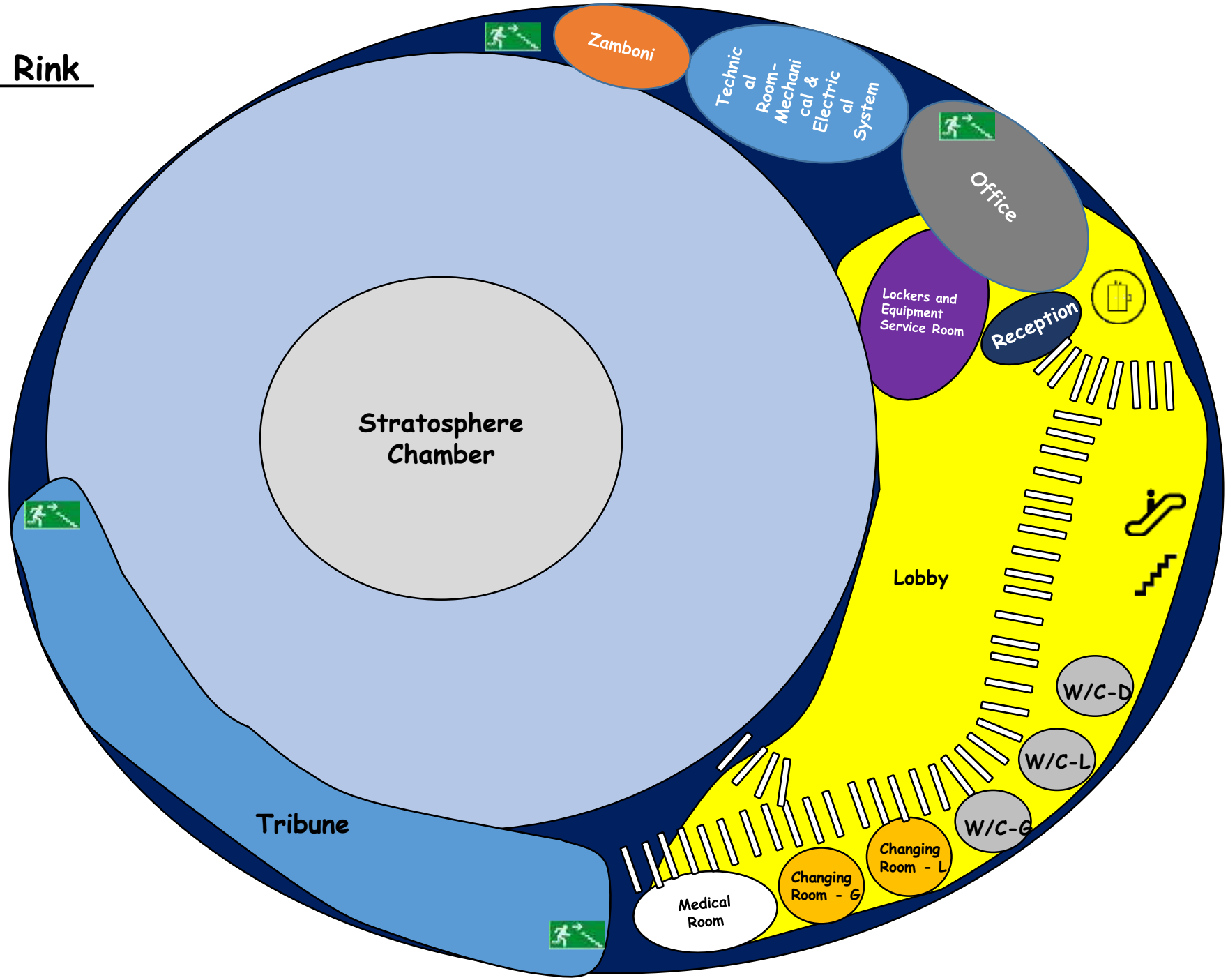


Bubble Diagram – Ice Rink

Option 3

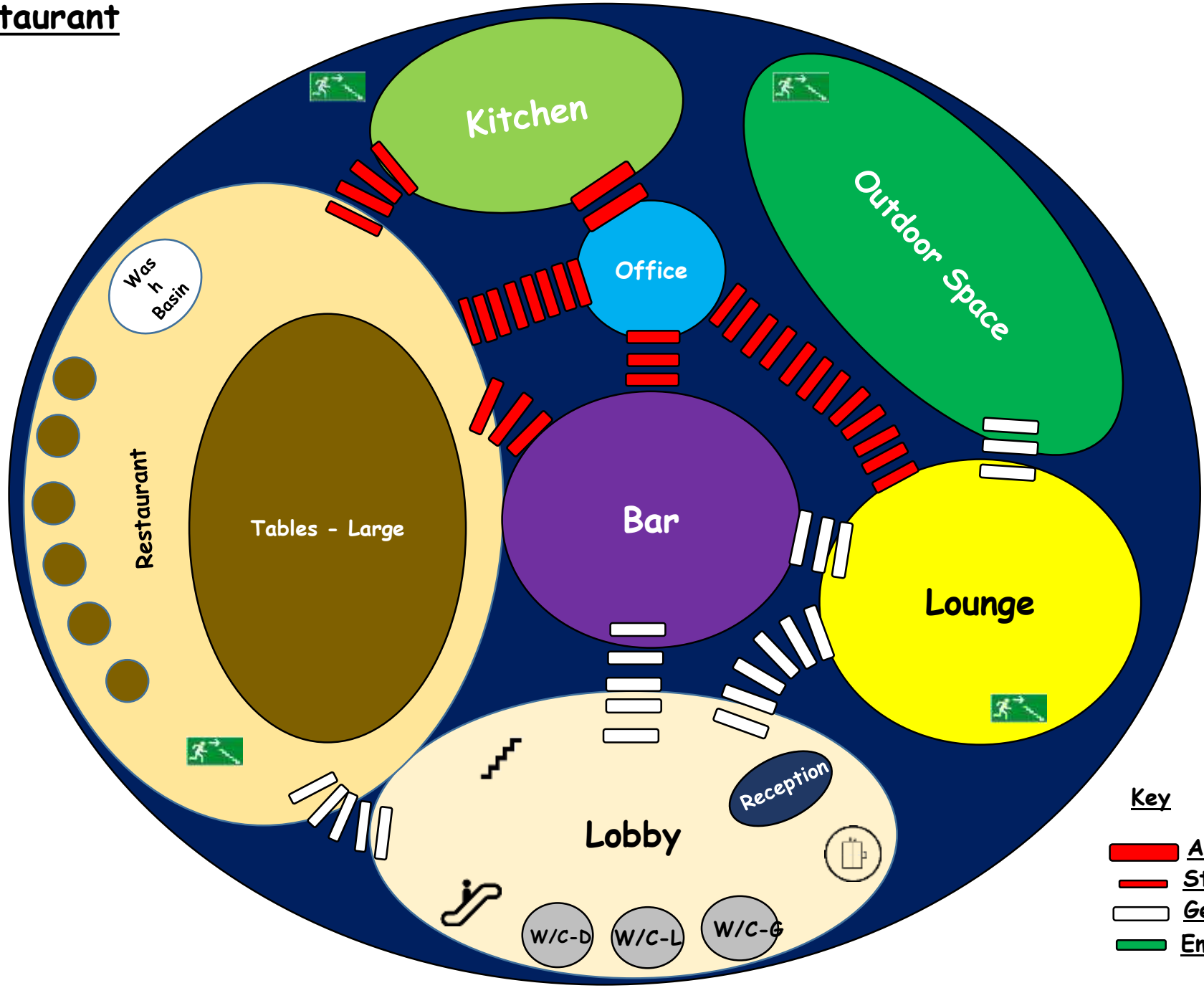
Ground Floor

This bubble diagram shows the layout of an ice rink planned to be build in the ground floor of the building. The left hand side of the building is planned to have the ice rink. The ice rink has a capacity of 50 people with a 200 seating capacity in the tribune. The lobby at the entrance would have the reception for booking, elevator for upstairs, restrooms, changing room, lockers and equipment service room. The technical room is located near the tribune. There are four emergency exit apart from the main entrance. Two emergency exits on the either side of the tribune. The third emergency exit is at the office and another emergency exit at near the Zamboni. The lobby is bigger in this design compared to the other to designs.



Bubble Diagram – Restaurant
Option 1
1st Floor

This bubble diagram shows the layout of a restaurant which is planned to be built at the first floor. The first floor has a lobby which connects to the restaurant, bar and the lounge. The restaurant is planned to be on the left hand side which would ¼ of the floor. It has a capacity of 250 people. The kitchen would be fitted with state of the art equipment and can only be accessed by the staff. The Bar will be in the centre of the floor which is connected to the lounge and lobby for people to access and also to the restaurant and office for the staff to access. There is an open outdoor space that can be accessed from the lounge. This outdoor space could be used for recreational activities and for parties. The office is connected directly to the restaurant, lounge and kitchen. There are four emergency exits. One in the restaurant, one in the Lounge, one in the kitchen and another is the outdoor space.

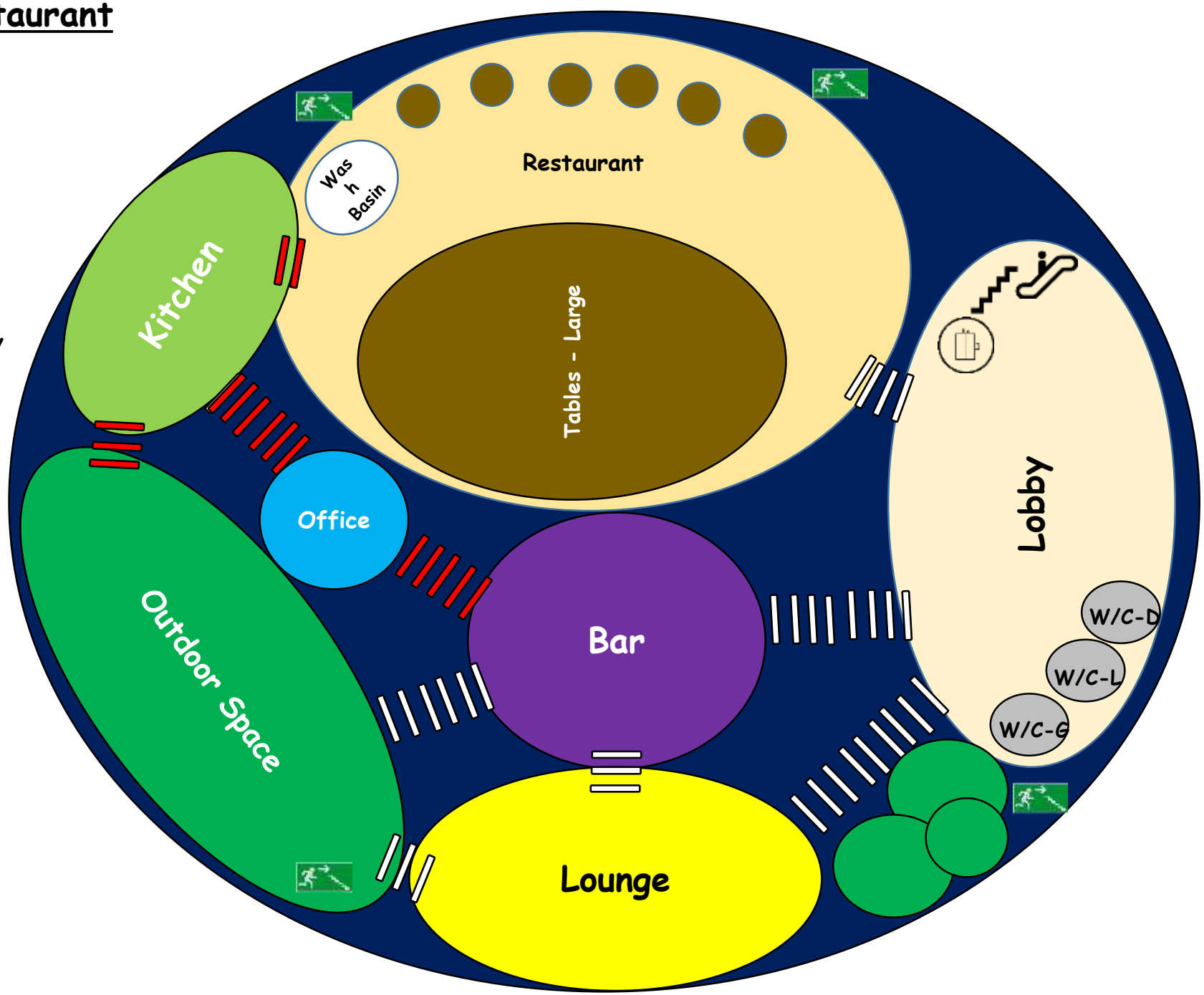


Bubble Diagram – Restaurant

Option 2

1st Floor

This bubble diagram shows the layout of a restaurant which is planned to be built at the first floor. The first floor has a lobby which is designed to connect the restaurant, bar and the lounge. The restaurant is designed to be at the east side from the lobby. It has a capacity of 200 people. The kitchen is next to the restaurant .The Bar will be in the centre of the floor which is connected to the lounge and lobby for people to access and also to the restaurant and office for the staff to access.
There is an open outdoor space that can be accessed from the lounge. This outdoor space could be used for recreational activities and for parties. The office is connected directly to the kitchen, restaurant and the bar. There are four emergency exits. One in the outdoor space, lobby and either side of the restaurant

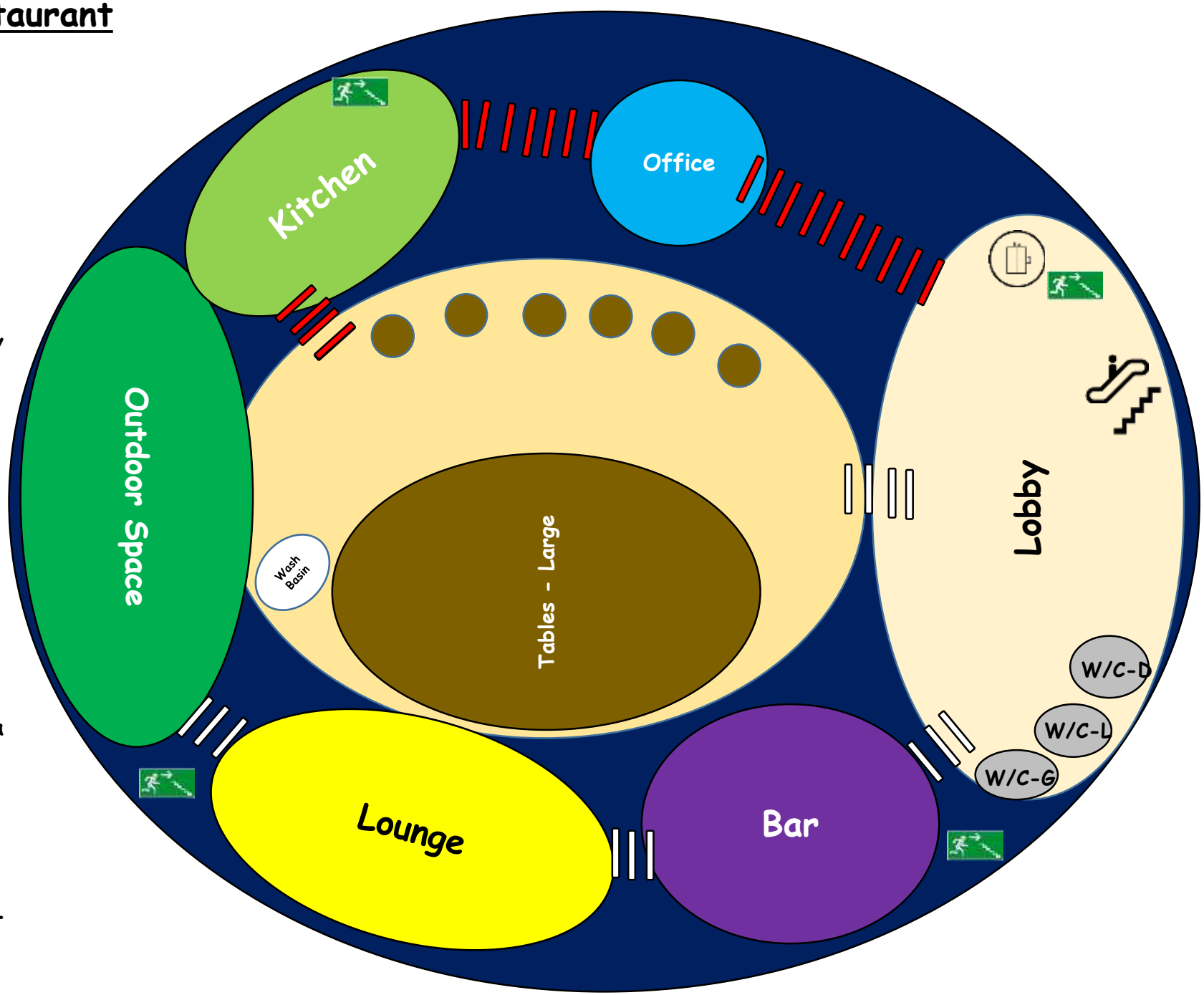


Bubble Diagram – Restaurant

Option 3

1st Floor

This bubble diagram shows the layout of a restaurant which is planned to be built at the first floor. The first floor has a lobby which is designed to connect the restaurant, bar and the office. The restaurant is planned to situated at the centre. It has a capacity of 200 people. The kitchen is next to the restaurant .The Bar can be access directly from the lobby or from the lounge.
There is an open outdoor space that can be accessed from the lounge and the restaurant. This outdoor space could be used for recreational activities and gives a spectacular view of the planes in brooklands. The office is connected directly to the kitchen, restaurant and the bar. There are four emergency exits. One in the outdoor space, lobby and either side of the restaurant



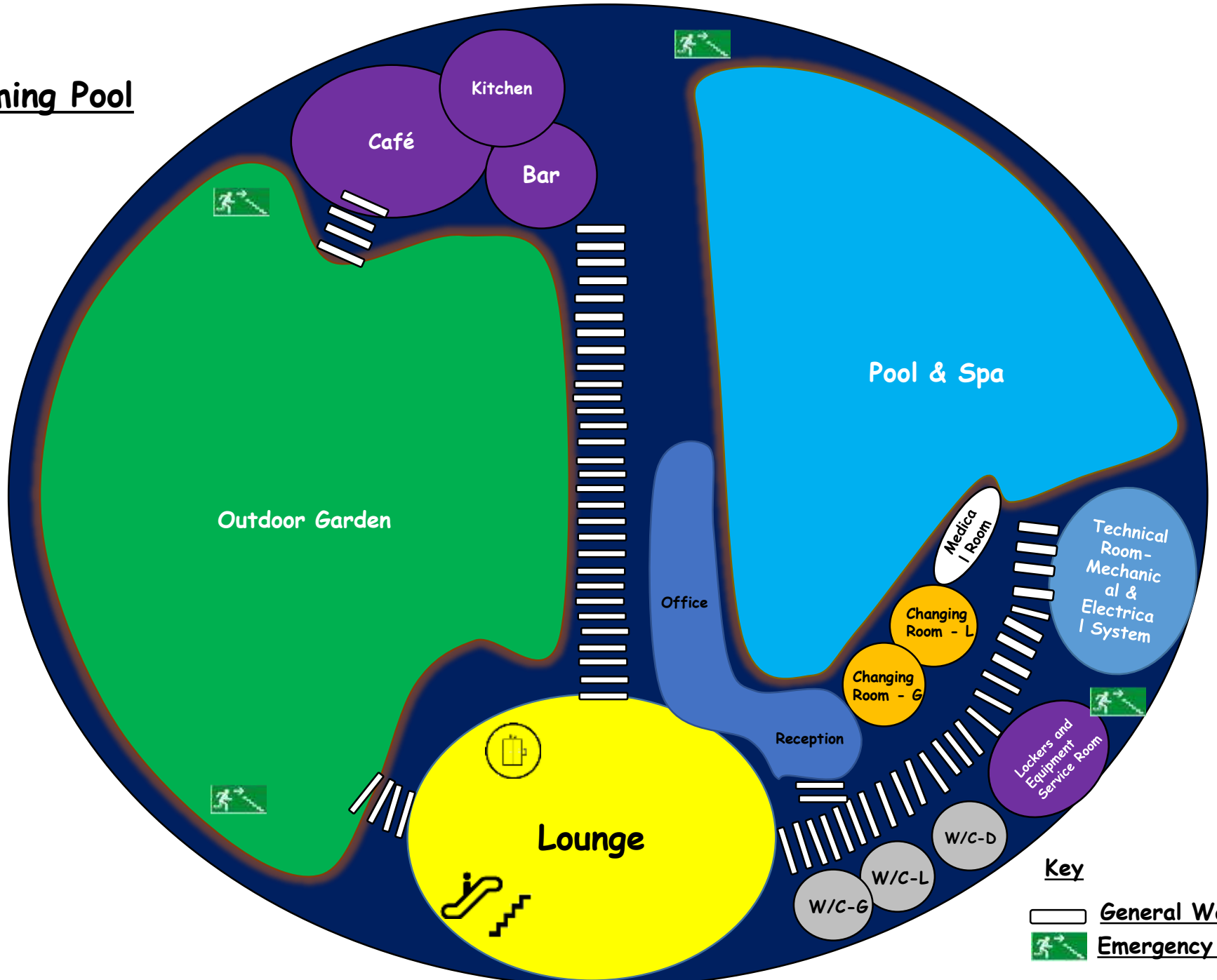
Bubble Diagram –

Roof Top Garden & Swimming Pool

2nd Floor

Option 1

This bubble diagram shows the layout of a roof top garden, swimming pool, bar and café in the top floor. The Lounge at the entrance of the top floor connects to the roof top garden, the pool and the bar and café directly. The roof-top garden and the swimming pool covers approximately 75% of the area. The café and bar can either be accessed from the garden or the pool. People visiting the pool also have access to the spa. There are changing rooms, restrooms, lockers for the people to use. There are four emergency exits. Two in the either end of the garden. Another two in the either end of the pool.



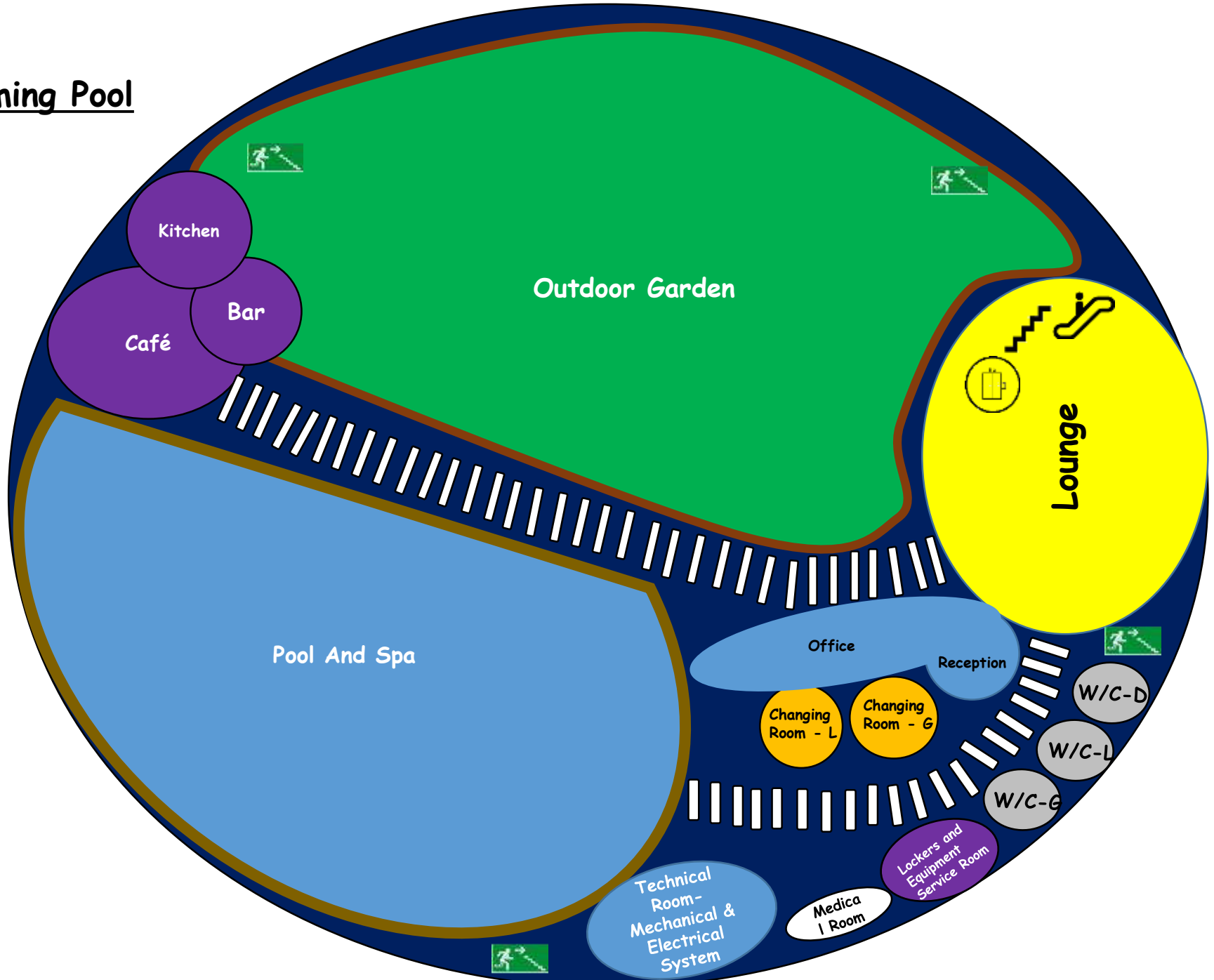
Bubble Diagram –

Roof Top Garden & Swimming Pool

2nd Floor

Option 2

This bubble diagram shows the layout of a roof top garden, swimming pool, bar and café in the top floor. The Lounge at the entrance of the top floor connects to the roof top garden, the pool and the bar and café directly. The roof-top garden and the swimming pool covers approximately 50% of the area. The café and bar can either be accessed from the garden or form the lounge. People visiting the pool also have access to the spa. There are changing rooms, restrooms, lockers for the people to use. There are four emergency exits. Two in the either end of the garden. One in the either end of the pool. Another in the lounge.



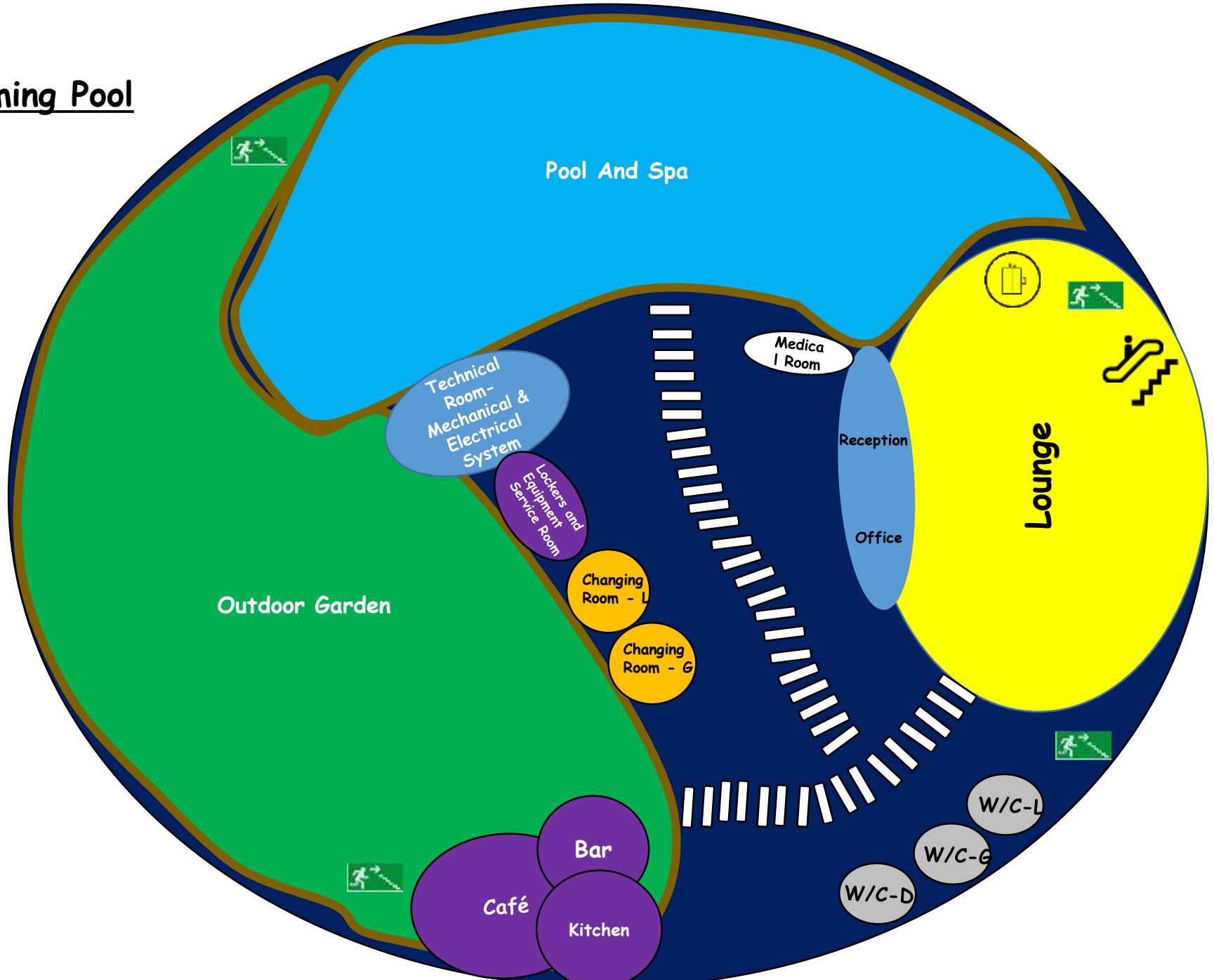
Bubble Diagram –

Roof Top Garden & Swimming Pool

2nd Floor

Option 3

This bubble diagram shows the layout of a roof top garden, swimming pool, bar and café in the top floor. The Lounge at the entrance of the top floor connects to the roof top garden, the pool and the bar and café directly. The roof-top garden and the swimming pool covers approximately 60% of the area. The garden has the café and bar. There are changing rooms, restrooms, lockers for the people who would be using the pool and the spa. There are four emergency exits. Two in the either end of the garden. Another two in the either end of the lounge. There is much more open space between the lounge and the garden than the other 2 options' design. This opens space would be decorated with fountains and the old flight engines.



Schedule of Accommodation

	Accommadation Schedule	Brooklands Leisure Centre					
	Room Type	Number of Rooms	Width (m)	Length (m)	Area of Room (m2)	Total Area (m2)	Commentary
Ground Floor	Stratosphere Chamber	1	10	11	110	110	Plannned to fit in the middle of the ice rink
	Ice Rink	1	30	33	880	880	Middle of the building
	Changing Room	2	5.5	6.2	34	58	
	Restrooms	3	4	8	32	94	
	Medical Room	1	4	7	28	28	
	Reception	1	5.1	5.5	36	36	
	Locker & Equipment Service Room	2	20	20	40	68	
	Lobby	1	6.5	10	65	60	All these rooms are planned to be in the lobby or can directly be accessed from the lobby
	Office Room	1	5.5	9.5	52	52	
	Tribune	1	15	17	255	200	
	Staff Dressing Room	2	7	11	77	128	Next to the ice rink. Seating capacity of 150 people.
	Refrigeration Plant	1	6	6	36	36	Included in the technical room
	Technical Room - Mechanical & Electrical System	1	5	10	50	50	
	Zamboni (x2) - Parking Space	1	4	8	32	35	Separate room for parking two zambonis
Total						1835	
1st Floor	Lounge	1	10	15	150	150	Next to the Outdoor garden. Can also be used for board meetings, parties ,etc.
	Lobby	1	10	22	220	220	Entrance for the 1st floor. Allows to acess the restaurant, bar and lounge directly.
	Bar	1	8	13	104	104	Next to the restaurant. Not included with restaurant
	Restaurant	1	24	35.4	849	852	
	Kitchen	1	8	15	120	120	
	Office Room	1	5	11	55	55	The office room has access to all the rooms in the building directly.
	Restrooms	3	4	8	32	96	
	Outdoor Garden	1	15	15.9	238	238	Can be accessed from the Lounge. Can be used for small recreational activities
Total						1835	
Top Floor	Lounge	1	10	220	220	220	Entrance to the second floor. Has the elevator, escalator and lift for going downstairs.
	Reception	1	5.1	5.5	36	36	Reception for accessing the pool and spa
	Office	1	5.2	12..5	65	65	
	Restrooms	3	4	8	32	96	
	Changing Rooms	2	5.5	6.2	34	58	
	Lockers & Equipment Service Room	1	20	20	40	40	Only for the people using the pool
	Café	1	10	11	110	110	Small Café and bar next to the roof top garden
	Kitchen	1	7.5	7.8	58	58	
	Bar	1	20	30	60	60	Kitchen and Bar included in the café
	Medical Room	1	4	7	28	28	
	Technical Room	1	5	10	50	50	
	Pool & Spa	1	20	21.4	428	431	Can only be accessed from the reception
	Roof- Top Garden	1	11	53	583	583	
Total						1835	

The planned Brooklands Leisure Centre would be a curved building, with a total surface area of 1835 square meters. The roof of the building would be wing shaped representing the aeronautical history of Brooklands that would house the restaurant and the roof-top garden and the swimming pool in the top floor. The curved building in the bottom would have the ice rink. The titanium shell is in shape of a super ellipsoid. It is divided in two by a curved glass. During the day, light flows through the glass roof into the building. At night, the movements within can be seen from outside due to fixtures f large glass and open lan f the building,. The building houses an ice rink , restaurant in different floors and a swimming pool and a roof top garden in the top floor. The areas that are open to the general public take the form of an urban distinct with its succession of different spaces: waiting lounges, lobbies restaurants, café and restful spaces. The public area is highly developed in order to endow the building with its open, popular character. The stratosphere chamber is a the center of the building in the bottom floor over which the restaurant and the roof-top garden with a swimming poo would be in different floors. The stratosphere chamber is the single most important element in the project which cannot be ignored. Due to the size of the stratosphere chamber it is planned to placed in the center of the ice rink. The public areas are built on a base that houses all operating support facilities in a complex designed to be as efficiently and economically organized as an industrial production area. At the same time, the technical utility area never mars the harmony of the public areas and the pleasure of visitors, ice rink would be covered with glass walls and the roof would made of thousands of small crystals that reflect light. The glass walls are partially transparent when there is light in such as way that it reveals what is there while creating a distance. Furthermore, the glass walls will be fitted with mood lights. Every floor has a lounge which affords the general public and the ice skaters and swimmers with a view of the Brooklands especially the lounge on the highest level under the roof. The building would allow the residents in Weybridge to spend some recreational time and socialize with other visitors. There is no ice skating in Weybridge. Therefore, the ice rink would be profitable for the Brooklands Museum and would be in demand throughout the year. The building would have sustainable features and would be built with sustainable materials that would make the building durable from different weather conditions. The building would be designed to be elegant and world class that would make the building more attractive and bring glory to the building. The building would mainly be built by glass that would give it an elegant look. The building would completely be solar powered and would use rain water harvesting system that would store a lot of water in monsoons. The building is suitable for all age groups that also has facilities for disabled people. The design would fulfill all the rules in the disability discrimination act.

Project Vision

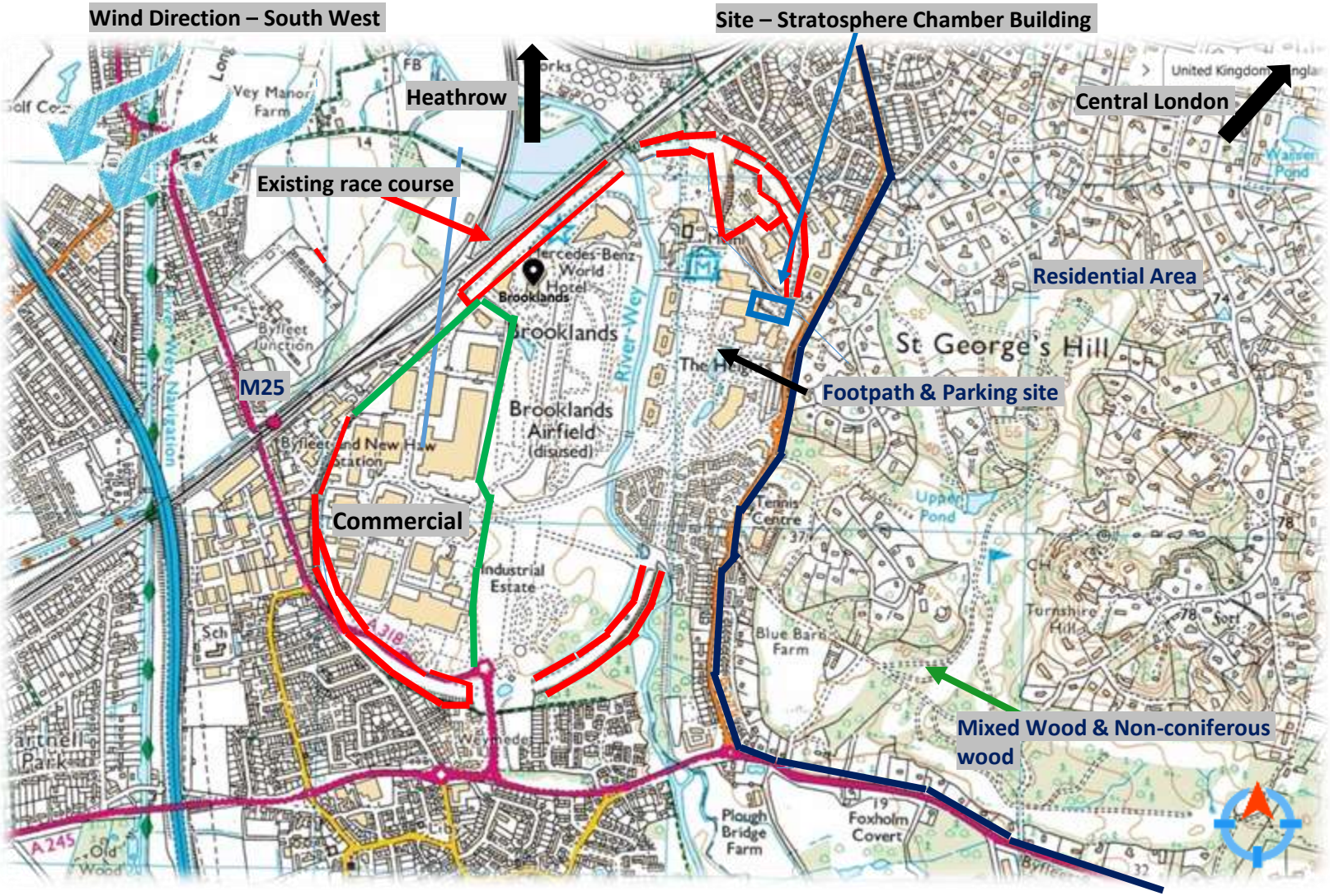
Objective :1.4

Sustainable features

The construction debris is planned to be recycled. 95% of the demolition waste will be reused from landfill. Over 25% of the total value of material in the project will be recycled content. Over 45% of the value of material used will be extracted, processed and manufactured regionally to reduce carbon footprint. The buildings would be wheelchair accessible and there would be power wheelchair charging stations located in every floor; they would be powered by solar panels. The water usage would be reduced by over 90% trough water efficient strategies such as rain water harvesting system. Reclaimed water and dual flush fixtures for toilets, infrared sensor control faucets and low flow heads, and highly efficient irrigation would reduce the wastage of water. Daylighting and connection between interior spaces and interior to exterior spaces is a design priority trough light shelves and open plan. The building in all the sides would be fitted with large windows. This optimizes the heating/cooling systems by not having to turn on the air conditioning in the afternoons. The ice rink will also be equipped with a remote control that enables us to dim for even less energy use, set a timer to auto turn on/off, enables motion control to auto turn on/off when not in use and allow for auto dimming when more sunlight is coming in through windows. The occupancy sensors throughout the facility turns off the light when there is no activity in those areas to reduce the electricity used.
Highly efficient mechanical and electrical equipment, effective daylighting, high performance exterior envelop with exterior sun screens, insulated dual pane glazing and highly insulated wall; flexible ventilation system, all incorporated to reduce energy consumption by 50%.

According to the Portland State Enrollment Management the infinity pool would be installed with the following technical requirements to increase energy efficiency.
A rooftop solar array would be installed, which is intended to create energy all the floors. The pool and spa are connected to a UV filtration system; this is an alternate chemical procedure that cleans the water. When someone brings debris into the pool or spa, such as sweat or shampoo, the chlorine combines with the debris . The UV light kills off the debris, thus the chlorine is useable again and gets recycled back into the pool.

3.1 Site Analysis



The site in the Brooklands Race Course can be accessed by footpath. The carpark and driveway is near the existing building. There are few parts of the historic race course that still exist near the site which can be accessed through the footpath. The residential buildings and public areas are to the east of the building site. The contour lines are far apart from each other which shows that the gradient of the land is narrow. The vegetation near the site consist of non-coniferous and mixed wood. Brooklands just 1 hour from London, easy access from the M25 and A3. The main visitor entrance of the Museum is reached via Brooklands Drive - follow the road around the back of the Mercedes-Benz World building until you reach the Museum car park through which you could access the building site. The Brooklands by the river Wey. It is bounded to the north by the River Thames at the mouth of the Wey, from which it gets its name. A tributary of river Wey flows through Brooklands. It is an outlying suburban town within the Greater London Urban Area, situated 7 miles (11 km) northeast of Woking and 16 miles (25 km) southwest of central London. The climate is warm and temperate in Weybridge. The rainfall in Weybridge is significant, with precipitation even during the driest month. The temperature here averages 10.3 °C. In a year, the average rainfall is 642 mm.

	Projects	Ablution
01	Preliminary & General	48,700.00
02	Excavations	3,000.00
03	Concrete/Formwork	16,200.00
04	Reinforcing Steel	7,200.00
05	Structural Steel	
06	Brickwork	
07	Block work	26,900.00
08	Metalwork	
09	Carpentry	67,000.00
10	Joinery	10,100.00
11	Aluminium Joinery	5,800.00
12	Suspended Ceilings	
13	Roof Coverings	7,800.00
14	Plumbing	28,500.00
15	Drainage	24,300.00
16	Mechanical Services	
17	Fire Protection	5,000.00
18	Electrical	4,200.00
19	Tiling	
20	Resilient Flooring	6,700.00
21	Painting	22,100.00
22	Paver	
23	Demolition	
24	Contingency	20,000.00
25	Increased Cost	5,700.00
		309,200.00

3.4 Feasibility Study

The site in the Brooklands Race Course can be accessed by footpath. The carpark and driveway is near the existing building. There are few parts of the historic race course that still exist near the site which can be accessed through the footpath. The residential buildings and public areas are to the east of the building site. The contour lines are far apart from each other which shows that the gradient of the land is narrow. The vegetation near the site consist of non-coniferous and mixed wood. Brooklands just 1 hour from London, easy access from the M25 and A3.

The spaces in the building fit the proposed area of the building. The budget of the building project is likely to meet the proposed budget estimate. The building is planned to completed within 3 months that includes construction and demolition. The job roles and building materials are chosen that are included in the building budget. The supply chain and job roles included makes sure that the building is deliverable within the time proposed. A RIBA plan of work would be carried out to illustrate the construction process in stages and involvement of job roles in each that ensures that the building is feasible to build.

Planning Statement

3.2, 4.1

The site forms part of the Brooklands Museum within the boundary of Brooklands. The Museum is between Weybridge and Byfleet in Surrey. Just a few minutes from Junction 10 of the M25 and the A3 London-Portsmouth trunk road. To the west of the site is the test hill where drive test of the vintage racing cars used to take place to drive on the world's first purpose built racing circuit. To the East and North East of the site is Balloon hanger and the iconic Concorde and other collection of planes.

The site is within the Brooklands Boundary in Weybridge which current houses the stratosphere chamber. The adjoining Clubhouse is pursuant to planning permission.

Pre application advice on the scope and content of the transport statement was discussed with Surrey county council.
In summary the development comprises an ice rink, a multicuisine restaurant and a roof-top garden with a swimming pool and spa with associated surface parking provision, areas for vehicle and pedestrian circulation, access and egress road and servicing area.
The development is for Brooklands and is to be a recreational building. It will be the only building in Brooklands with a green roof and it also incorporates a number of other eco-design features.
The ice rink in the ground floor of the building that would house the stratosphere chamber and the roof-top garden with a swimming pool and spa on the top floor will offer the visitors with recreational activity. The multicuisine restaurant in the second floor will offer the customers the choice of eating within the restaurant or 'take away' from the counter.
The development has been carefully designed having regard to the need to protect the most important stratosphere chamber on the site, to avoid the encroachment of development into the designated structural landscape. Provision is also made for replacement tree planting as part of a structural and comprehensive landscaping scheme for the site. The proposed landscaping and public realm will define the site frontage and provide attractive setting for the building. A key feature of the building is its pen top roof which houses the roof top garden, which offers a number of eco-friendly benefits. But other measures include solar power, ground source heat pump and rain water harvesting system are also proposed.
The building is a fully accessible facility. The cycle and disabled parking and other measures allows the building to be utilised by all and to be accessed by non car modes of transport.
The building has an integrated directional and information signage palate comprising hierarchy of signs which meets the operational needs of the site. During constructing phases
The lighting strategy is based upon requirements for luminance level which maintains security, and which is to an acceptable standard for the visually impaired.
The development of the stratosphere chamber will also contribute to economic growth through the employment opportunities generated.
The construction of the development will need to be undertaken with care to protect the stratosphere chamber and the clubhouse adjoining the building and in regard to the seasonal ecological constraints, but the development will not give rise to an acceptable impacts on biodiversity interests.

Planning Legislation 3.2

Planning Legislation

- HASWWA
  - The primary piece of legislation covering occupational health and safety in Great Britain.
- Building Regulation
  - Minimum standards for design, construction and alteration to virtually every building
- Construction Design Managment
  - The main set of regulations for managing the health, safety and welfare of construction projects.
- Disability Discrimination Act (DDA)
  - The Disability Discrimination Act (DDA) works to protect people with disabilities including blind and partially sighted people from discrimination.
- BREEAM
  - Method of assessing, rating, and certifying the sustainability of buildings.
- Equality Act
  - It gives legal protection from discrimination in the workplace and in wider society, consolidating three previous duties covering race, disability and gender.

Planning Legislation 3.5

Building Legislation: All the requirements to meet the planning legislations are take from HSE.gov.co.UK

- **Structural Safety**: The alteration, demolition and dismantling work should be carefully planned and carried out by competent people to avoid unplanned structural collapse. The commercial clients would provide contractors with relevant information about a building's structure, including stability and structural form and any significant design assumptions, suggested work methods and sequences. The contractor must then use that information to plan and carry out the work safely.
- Workers and passers-by can be injured by premature and uncontrolled collapse of structures, and by flying debris. A competent person would do a through structural survey and assessment before any potentially load – bearing parts of a structure are altered.
- The structural survey would consider:
  - The age of the structure
  - Previous use
  - Type of construction
  - Nearby buildings or structures.
- The temporary support would be designed, installed and maintained to withstand foreseeable loads and structures would never be overloaded.
- The demolition or dismantling arrangements would be written down before the work begins. This safe system of work may be in the form of safety method statements identifying the sequence required to prevent accidental collapse of the structure.
- In addition to the design and method of temporary supports a safe system of work may include:
  - Establishing exclusion zones and hard-hat areas, clearly marked and with barriers or hoardings;
  - covered walkways;
  - using high-reach machines;
  - reinforcing machine cabs so that drivers are not injured; and
  - training and supervising site workers.
  - tent to cover the aspecto.

The building control department of the local authority would be consulted in the area where the building is located before any structural alteration are made to the building. The Council's Building Control Surveyor will need to inspect the work on the site regularly to ensure that all the buildings standards are met. It is important that the builder or owner notifies the Building at certain stages of the building work.

- **Fire Safety**: Fire safety measures are key aspects which provide safe means of escape on construction site and in the building,
- The risk assessment would determine the escape route which would be kept available and unobstructed. Well-separated alternative ways to ground level would be provided where possible. The escape routes would be protected by installing permanent fire separation and fire doors. The escape routes give access to a safe place where people can assemble and be accounted for. Signs would be provided if people are not familiar with the escape routes. Emergency lighting would be provided for enclosed escape routes.
- A permanent and a temporary mains operated fire alarm would be fitted to alert people on site. The warning would be distinctive, audible above other noise and recognizable by everyone.
- Fire extinguishers would be located at identified fire points around the site. The extinguishers would be appropriate to the nature of the potential fire:
- wood, paper and cloth – water extinguisher;
- flammable liquids – dry powder or foam extinguisher;
- electrical – carbon dioxide (C02) extinguisher.

Disability Discrimination Act 3.5

The below facilities are the minimum requirements according to the National Disability Authority tat would be meet by the building

The parking spaces for people with disabilities are accessible. The surface and lighting around the building and on the paths that customers use to get to the building. The main entrance door is correctly designed and is easily accessible by the wheelchaired. The public service areas in the building have slopes that are less steeper and are replaced by stairs. All in the building would be accessible through lifts that are wheel chaired and disabled accessible.. All the doors accessible by the customers are automatic and slide. He doors would be designed to be wider and the lobby to spacious with varying seat sizes.

- Read visual information
- Hear audio information or intercoms
- Reach tickets or intercoms by people of different heights
- Understand complicated language.
- All the spaces in the building would include bailey language to assist specially challenged users.

Toilets that customers with disabilities can use would be provided. An alarm system would be fitted in the accessible toilets with a flashing light (so that the deaf would be aware) and would be tested regularly to make sure that a member of staff will help somebody in an emergency. A wired switch would be installed to ensure that that anyone who trips or slips in the toilet and cannot communicate with others can pull the switch that would trigger the alarm
Sanitary bins would be provided inaccessible toilets, and put them where they will not obstruct wheelchair users.
The light the building would be distributed evenly. There would be no large variation in lighting levels and the light would not be too bright or too dark.

-That will help customers with vision impairments to:
-Distinguish between walls and floors
-Distinguish between door backgrounds and fittings
-Avoid hazards
-Find their way around the building.

Construction and Design Management 3.5

•Slips, trips and falls - Assess, eliminate and control the risks of slips, trips and falls on construction sites.
•Work at height - The hierarchy of controls for working at height, from working at ground level, using towers, scaffolds, platforms and ladders and, as a last resort, fall restraints and safety netting.
•Structural stability - Assess the risks and prevent unintentional structural collapse during alterations, demolition and dismantling; and the measures you need to take to prevent accidents in excavations.
•Cranes - All lifting operations involving lifting equipment must be properly planned by a competent person; appropriately supervised; and carried out in a safe manner.
•Electricity - Work safely with power supplies and electrical equipment; map overhead power lines and underground cables to prevent accidental contact with machinery.
•Fire - Identify the risks of fire; control combustible materials and ignition sources; and make it clear exactly what to do if fire does break out.
•Mobile plant and vehicles - Assess the risks, establish competence to operate and control access to telehandlers, excavators, mobile work platforms, dumpers and road vehicles.
•Demolition - All demolition, dismantling and structural alteration should be carefully planned and carried out by competent practitioners.

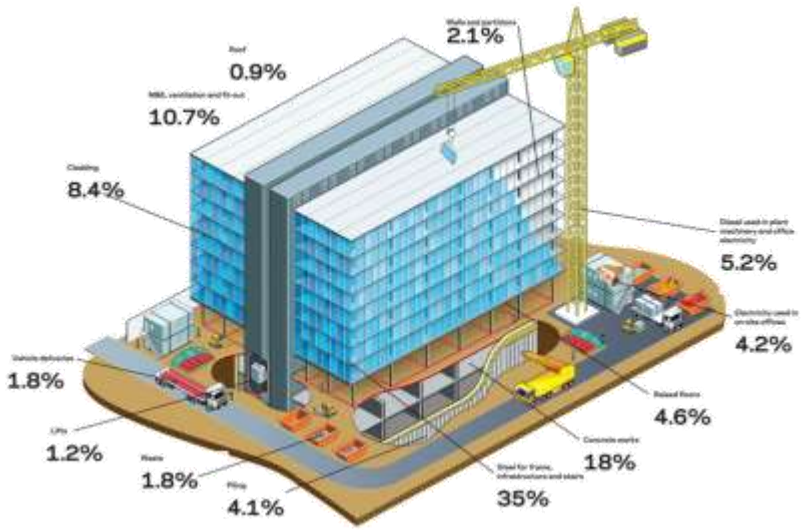
BREEAM

Highly efficient mechanical and electrical equipment, effective daylighting, high performance exterior envelop with exterior sun screens, insulated dual pane glazing and highly insulated wall; flexible ventilation system, all incorporated to reduce energy consumption by 29%.
Eco-roof planters on the second level terrace would retain and treat storm water to reduce overflow from the fire water-tank during winter months and preloading the fire suppression system/ A rooftop solar array would be installed, which is intended to create energy for the power wheelchair charging station on all the floors. The natatorium (simply means a building that contains a swimming pool) is unique because the pool and spa are connected to a UV filtration system; this is an alternate chemical procedure that cleans the water. When someone brings debris into the pool or spa, such as sweat or shampoo, the chlorine combines with the debris and the result is called "combined chlorine". The UV process begins to work when the water is filtered through a machine where the UV light kills off the debris, thus the chlorine is useable again and gets recycled back into the pool. In traditional pools, the combined chlorine never leaves the pool and more chlorine has to be added continuously so that there is enough chlorine available to attach to the debris. Ultimately, the UV process used in the natatorium keeps the odor down and the pool cleaner.

Embodied Energy 4.6

Some of the building materials used in our development with its embodied energy.

Materials	Energy MJ Per Kg
Concrete	1.11
Bricks	3
Concrete Block	0.67
Cement Mortar	1.33
Aluminium	170
Copper	100.0
Plasterboard	4.4
Plywood	10.4
Acrylic Paint	61.5
Glass	12.7
Steel	38.0



The building would have a steel framing which uses less embodied energy than aluminium framing. Light weight building materials are used which are appropriate for the climate of Weybridge. Passive energy is used to reduce the need to use energy sources. The passive energy includes windows that allow winter sun in but block the summer sun. plants to block walls where the sun strikes. Good ventilation and The building be constructed with highly durable products that will reduce the amount of embodied energy used over the lifetime of the product. Recycled materials would be used from the waste of demolition and construction to reduce embodied energy. Furthermore, locally sourced materials would used to reduce carbon footprint and reduce the energy required to process , manufacture and transport the materials.

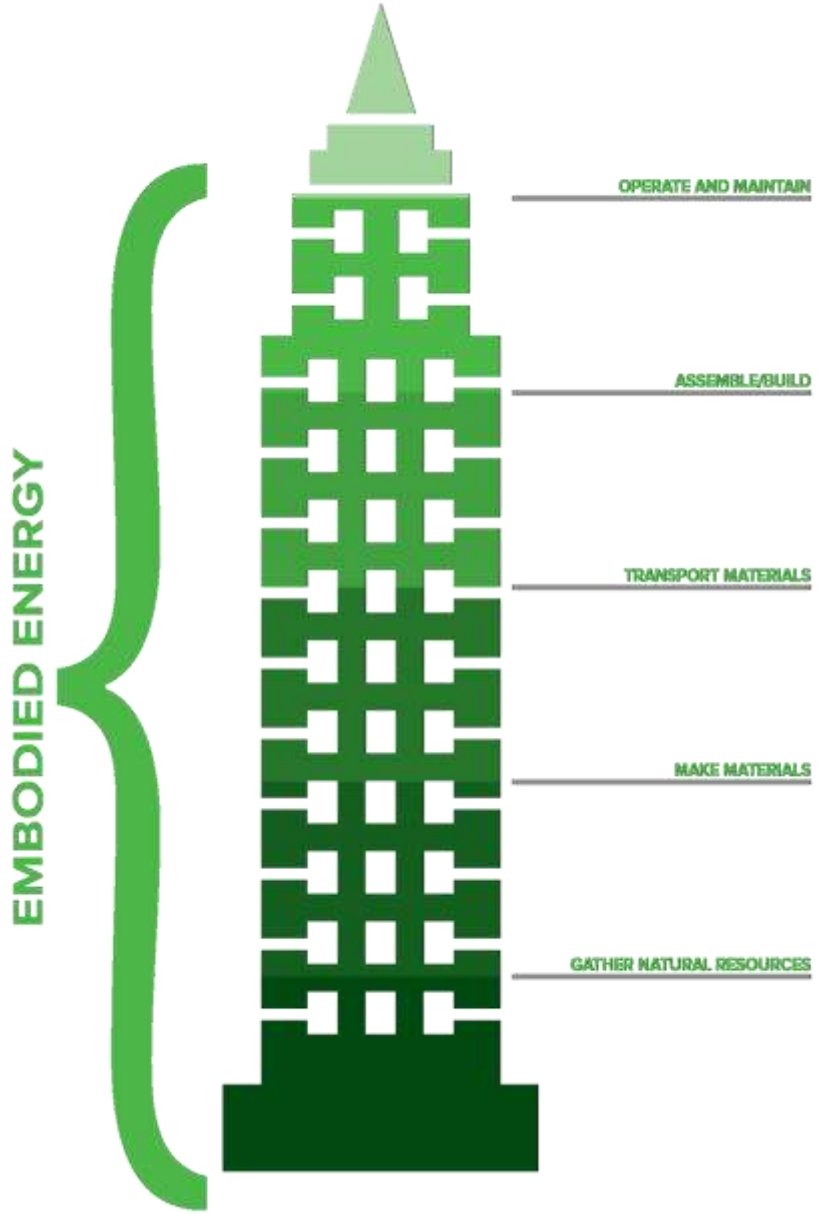
Impact of Embodied Energy on Our Development 4.6

Embodied energy has a large impact the manufacture, supply and delivery of construction materials to the building site. Acquiring materials that have less embodied energy would make the building efficient for end-users and increase the life cycle of the building as the materials that have low embodied energy has increased life cycle. Low embodied energy materials reduces the monthly cost of living of the building and improves its reliability . Low cost of ownership due to improved energy efficiency and reduces the requirements for additional sustainable features.

Locally sourced materials have a low embodied energy that benefits our development as the materials would be cheaper to acquire. The transport materials from international and regional scale have higher carbon footprint and require high energy to process, manufacture and transport the materials to the site. Assembling the sustainable materials would be easier as they require less energy. Building made of sustainable building materials emit less wasted energy and eventually have a lower embodied energy that increases the life cycle of a building higher tan estimated benefiting the cost of ownership of the client.
Demand-side management programs can benefit customers – both those who participate in the programs and those who do not. Participating customers benefit by spending less money on electricity bills. Non-participating customers can save money, too, because the programs shift electricity usage away from times where demand is highest to times when energy is cheapest Finally, demand-side management can benefit the environment by increasing the use of renewable energy when it is available and reduce fossil fuel usage.

- Engaging with occupants and operators to encourage energy-saving behaviour
- Enabling energy-procurement competition through data collection, analysis and aggregation

ENERGY TODAY



Energy On-demand systems 4.6

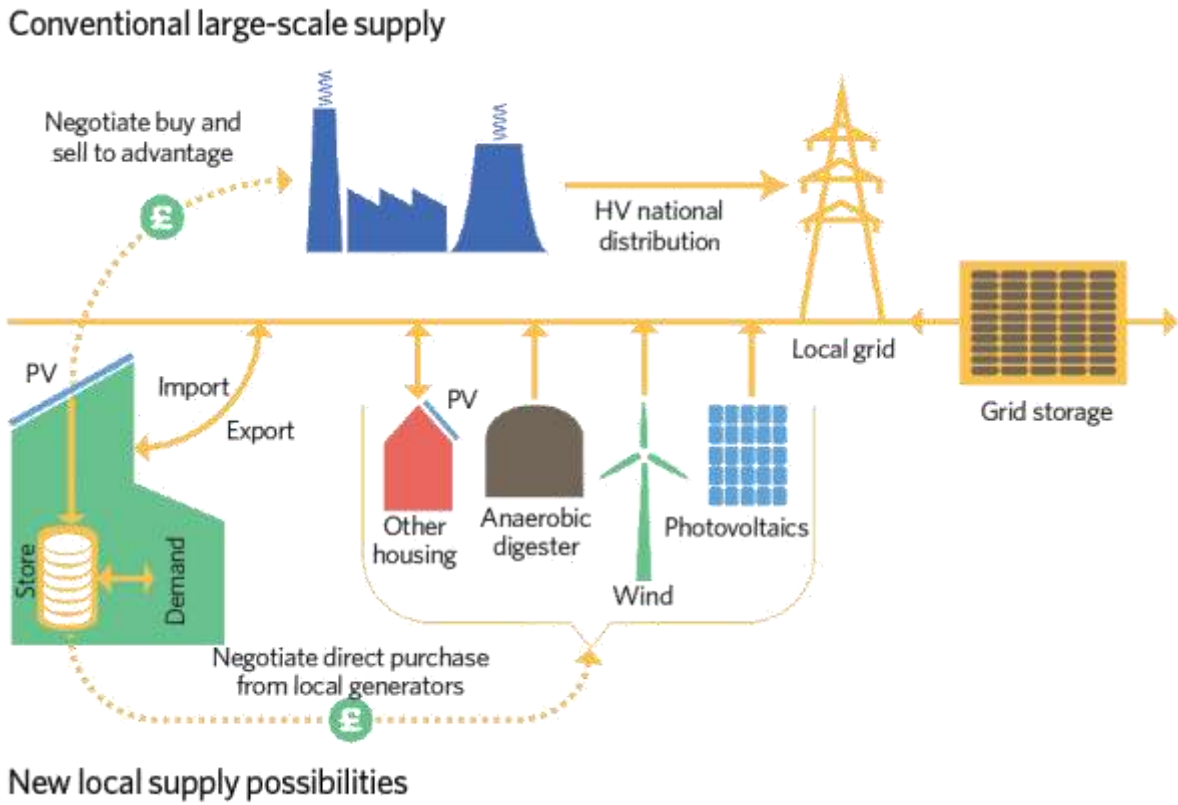
•Ensuring vehicle charging at buildings is controlled as part of the building-energy control strategy.

The building has to become part of the electricity network, allowing its energy demand to fluctuate in response to the needs of the grid..

The use and procurement of energy becomes a complex interconnected process, with the ultimate aim of reducing consumer bills and enabling low carbon energy production.

According to the revolutionary redox system a Chemical Looping Energy-on-Demand System (CLES) would eliminates the need for a battery to store energy, instead generating and storing power in just one device. The CLES could totally change how we power the building. The device can either generate electricity with natural gas, or store electricity from the grid or renewables to be utilized later. It centres around a reduction-oxidation (redox) reaction in which particles oxidize and create steam that powers an electricity-generating turbine. When the particles reduce they release oxygen. The system can also produce oxygen or hydrogen, which could be used or sold. Under different conditions it will absorb oxygen (oxidise) transitioning to a higher state of oxidation and releasing energy in the form of heat. The CLES uses a turbine to generate electricity from this heat energy, or it can be used directly for heating.

The CLES has dual chambers containing the oxide so it can simultaneously consume and produce energy depending on availability and demand
This system would highly benefit the building's efficiency in terms of energy as it makes the environmentally sustainable.



Impact of Embodied Energy on Our Development 4.6

Businesses invest in the most energy-efficient equipment to reduce their operating costs. They often participate in demand response programs, too, cutting usage when they get the signal from their utility in exchange for reduced electric rates. Electric power supply/demand data is valuable not just for manufacturers, but potentially in just about any business. To achieve these goals, it will be necessary to leverage not only the energy assets of each company, but also all of the various energy management systems, as well as to integrate the backbone systems of providers and customers. Energy Supply & Demand Management System evolved as an energy management platform that links with these systems to make it possible to achieve advanced energy management.

Advantage of using Energy On-demand systems

- Facilitates effective utilization of renewable sources
- Can be combined into smart integrated energy system
- Reduces need for increased peak generation capacity
- Enhances grid reliability
- Performance and cost are continually improving
- Allows renewable and fossil source to integrate

Disadvantage of using Energy On-demand systems

- Energy lost in "round trip" inefficiencies
- Additional cost and complexity
- Additional infrastructure and space requirements

Design Team 4.2

Interior Designer – Enhance the interior of the building to achieve pleasant environment for end-users.

Quantity Surveyor - Quantity surveyors accurately determine the amount of materials needed to build the project. They prepare a bill of quantities establishing a record of all the materials needed and identify all the information necessary to draft out a specification of the works. The quantity surveyor can then advise and guide the architect or the client on the cost of the job, check tenders and evaluate any costs as work proceeds.

Landscape Architect - The landscape architect is sometimes contracted to design the external environment of the project. As with interior design, the landscape can be enhanced by a specialist to improve the completed project.

Resident Engineer - Resident Engineers are based close to the construction works, on the construction site itself. They report back to the structural engineer and the architect on the matters relating to the structure and the load-bearing components that have been designed by the structural engineer.

Structural Engineer - Structural Engineers determine the design of loadbearing elements of the building and ensure that each component is designed to safely withstand the loads that are imposed on the building. Structural engineers typically work for the client but are frequently engaged by the architect to inform and supervise the design and installation of structural elements as work proceeds. They work very closely with the architectural technologist and the principal contractor.

Building Services Engineer - Building services engineers design and implement a range of items into the project that don't improve the resources and the quality of the building. Building services and the effective use of heat, light, acoustics and other electrical appliances have seen significant improvements in recent years and many of these items, such as lifts, escalators, air conditioning and heating and ventilation systems, need to be integrated into the contract drawings at an early stage to avoid conflicts of space or to ensure that the design can accommodate machinery, plant and equipment.

Clerk of Works - The clerk of works is employed directly by the client, who will want assurance that a contractor is producing a building that meets specification in terms of both materials and workmanship. The clerk of works also reports to the architect on progress of the construction works. Clerks of works do not issue instructions and do not have authority to impose variations or changes to the design but will need to inspect the works as it proceeds and hence need to visit the site frequently. On some larger sites, a clerk of works will have a resident office and spend their entire working time there.

Contractor - Contractors perform many duties on site and thus they are in the best position to ensure that site activities are carried out safely. Contractors must ensure that subcontractors have information about risks on the site and that all workers and operatives working on the project have adequate training and a suitable induction to site procedures.

RIBA
Royal Institute of British Architects

4.3 Organogram

RIBA
Royal Institute of British Architects

- Board of Directors
  - General Manager
    - Project Manager
      - Contractor
      - Resident Engineer
      - Site Engineer
      - Surveyor
      - Safety
      - Architect
    - Design Team
      - Clerks of Work
      - Interior Designer
      - Landscape Architect
      - Architect

Plan of Work 4.4, 4.5

RIBA
Royal Institute of British Architects

	0 Strategic Definition	1 Preparation and Brief	2 Concept Design	3 Developed Design	4 Technical Design	5 Construction	6 Handover and Close Out	7 In Use
What each stage involves ?	Strategic Definition is a new stage in which a project is strategically appraised and defined before a detailed brief is created. This is particularly relevant in the context of sustainability.	Developing an initial project brief. This may include; considering feedback from previous projects, defining overall spatial requirements, carrying out surveys and quantifying the budget. Carrying out feasibility studies..	The concept design represents the design team's initial response to the project brief. Concept design is followed by 'detailed design' or 'developed design' during which all the main components of the building and how they fit together are described	Coordinated and updated proposals for structural design, building services systems, outline specifications, cost inform ation and project strategies in accordance with the design programme.'	Project activities that take place after the detailed design (or 'developed design' or 'definition') has been completed, but before the construction contract is tendered or co nstruction begins.	The carrying out of any building, civil engineering or engineering construction work. Construction may also be considered to include: • Demolition. • Rebuilding. • Alterations of or additions to buildings.	They describe the activities carried out during the stage as, 'handover of building and conclusion of building contract' including updating 'as constructed' information, commissioning , training and perhaps post-occupancy evaluation following the 'soft landings' process.	Post-occupancy evaluation and post-project review as well as new duties that can be undertaken during the In Use period of a building
What job roles are needed in each stage involves ?	Project Manager, Building Control Surveyor& Site Manager, Facilities Manager, Site Manager, Team Leader, Contract Manager and Clerk of Works.	Project Manager, Building Control Surveyor, Estimator, Quantity Surveyor. Facilities Manager, Site Manager, Team Leader, Contract Manager and Clerk of Works.	Project Manager, Architect, Planner, Site Manager, Contract Manager, Team Leader and Clerk of Works, Landscape Architect, CAD Operative	Project Manager, Architect, Estimator, Planner, Site Manager, Contract Manager, Team Leader and Clerk of Works, Landscape Architect, Interior Designer, CAD Operative	Project Manager, Architect,, Planner, Site Manager, Contract Manager, Team Leader and Clerk of Works, Building Technician, CAD Operative.	Project Manager, Architect, Structural Engineers, Civil Engineer, Quantity Surveyor, Site Supervisor, Laborers, Brick Layers, Estimator, Clerk of Works , Team Leader and Demolition Operative.	Project Manager, Architect, Structural Engineers, Civil Engineer, Quantity Surveyor, Site Supervisor, Estimator, Clerk of Works, Electrician, Plasterer, Plumber, Carpenter, Buyer, Partitioning System Operative	Clerk of Works, Maintenance Operative. Project Manger, Building Services Engineer, Fire Protection Installer, Decorator Painter, Qualified Painter and Structural Engineer
How long each stage stage takes ?	2 Days	2 Days	5 Days	6 Days	5 Days	35 Days	5 Days	**73000** Days

Unit - 2

1. The candidate will be able to develop feasible proposals from needs analysis.	2. The candidate will produce technical support collateral for a project.	3. The candidate will support development of a project concept.
1.1 prepare concept diagrams to describe and communicate ideas	2.1 prepare 3D representations of outline information	3.1 explain the importance of compatibility between existing infrastructure and the project proposals
1.2 Present the quality of the proposal to a client	2.2 utilise the 3D environment to test the design in virtual locations	3.2 explain the environmental and climate change reduction strategies
1.3 communicate the concept design to the project team	2.3 use quantitative methods to establish the energy requirements, and a lighting strategy	3.3 monitor the execution of the plan to ensure compliance with client requirements taking appropriate action where necessary
1.4 identify procurement options related to key elements of the project	2.4 prepare detailed, scaled drawings that can form the basis of a planning application	3.4 establish strategies for the proposed construction that support health and safety, occupancy, management and operation
	2.5 describe the project in writing to form the basis of a planning application	3.5 relate building design specification to energy efficiency
	2.6 produce a financial model of the budget that aggregates the elemental costs of the project	3.6 inform planning through collaborative working groups

Procurements 1.4

The demolition and removals of existing would be done through selective demolition that allows us to recycle the building materials. Selective interior and exterior demolition of metals, and concrete would be used in future new structure. Firstly, scaffolding of the existing building would provide temporary support to the work crew and materials to aid in the construction process. Heavy machinery such as cranes, bulldozers and elevated work platforms would be required such as the cherry pickers for the demolition process. The elevated work platforms prevent collisions with pedestrians and people who work at the Brooklands Museum. Heavy machines such as hammer drills, angle, grinders, saws and hydraulic jacks, etc. are required for manual demolition work. Covered walkways would be in place to protect any pedestrians who walk past the building from collapse of structures, falling debris and other safety measures. Designated exclusion zones and would be marked with barriers. Effective traffic management system are put forward for the safety of the workers. All the debris would be removed and transported to a safe place to be disposed safely to keep the space tidy to prevent any trips, slips or falls.

Th foundation of the building would be simple known as strip foundation. The materials used in the foundation of the building include concrete that would be placed into trenches . This would be built up from blockwork to ground level, where the walls switch to the chosen cladding. Metal reinforcements are added to the concrete to provide extra strength and rigidity. . The first fix of the building would generally include the construction of the structure, flooring, cladding, stairs, etc. and installing cables for electrical and ICT distribution. Furthermore, the installations of pipes for water and gas distribution and heating ventilating and air-conditioning.

After the first fix installations second fix takes place. These fittings are visible and are held back to avoid damage. These include fitting internal doors, windows, architraves, handrails and other fixtures and fittings including outlets.

When asbestos-containing materials are disturbed during the removal process, deadly fibers can be released into the surrounding air. Using thick, plastic sheets and negative HEPA filtration, it will be completely sealed off and block the area where the asbestos will be removed.

1.4 Procurements

Component	Materials	Supplier	Origin	Sustainability
Interior Walls	SIPs, Plasterboard	Sustain build	Surrey	Can be built quickly and acts as insulation for the building.
Exterior Walls	Timber Cladding Curtain Wall	Woodtrend LTD Kalwall	London	Use local and renewable resources
Roof	Green Roof. Solar Panels	Travis Perkins	Elmbrodge	Provides insulation and takes in Carbon Dioxide so good for the environment.
Windows	Triple Glazing Glass	JCM Glazing LTD	Darlington	Increase insulation and decrease noise pollution
Door	Eco Door	Health House Mill	London	Long Lasting and Insulate Well
Foundations and floor		HOPE Eco	Sheffield	Uses recycled concrete

1.4

Sustainable Procurements

The building materials would processed and manufactured regionally to reduce carbon footprint. The sustainable building materials would ensure low carbon emissions. The construction phase of the building would be carbon neutral. The equipment and the machinery would be powered by renewable energy such as solar arrays rather than electricity from fossil fuels. Renewable energy resources could be used instantaneously and the excess energy could be stored in a closed system and can be used in times where renewable generations cannot be used. This is more sustainable rather than using more carbon-intensive fuels and technologies. Reducing carbon emissions reduces enhancement of greenhouse effect that leads to climate change. 85% of the building materials would be acquired through the recycled content rather than manufacturing new that leads to the depletion f natural resources .

Sustainable building materials such as timber and cellulose have the lowest environmental impact on its production and life cycle. The sustainable materials are highly durable and can incorporate different technologies, such as capturing energy and carbon dioxide reducing pollution. Rather than using power derived from non-renewable resources such as fossil fuels the machinery and the equipment involved in the demolition and construction process can be powered by solar energy. The building would develop a sustainable community as it is environmentally sensitive, well designed and built that would minimise the depletion of natural resources for e.g. through effective daylight and ventilation system. The existing building is well connected with the M25 therefore, is better accessed. The building would be disabled access allowing it be me fairer. The proposal of the building is suitable for all ae groups and all genders. The building would be well served by public and private services that are appropriate for people's needs.

Lighting Strategy 2.3

The restaurant would have Low lighting that can be relaxed and encourages customers to stay longer. These settings typically have overhead fixtures with dimmers and lots of accent lighting. The low lighting creates more intimacy, as sections of brighter light, like those over dining tables or the bar area, allow customers to feel like they are more isolated from the other guests in the room. Overhead fixtures of white lighting would be used after the closure of the restaurant to allow the workers to clean the restaurant.

The ice arena in the ground level would be illuminated through natural lighting. Large triple glazes windows on the south of the building would reflect daylight deep into the building through light shelves made of diffusive materials however prevent the heat from entering the building. The sunlight is reflected from the upper surface of the light shelves into the ceilings which additional provides diffuse light that provides uniform illumination across the ice rink. The ceiling of the ground level would be higher than normal to effectively make use of the daylight under conditions of overcast sky. The ice arena would have overhead fixtures of LED lighting that are more energy efficient than florescent lighting. These LED lights would serve as the task lighting for the ice arena that increase light levels and reduce temperature. The creative lighting of the arena include illumination of the ice rink with different colours based on the mood and accent lighting on the sides of building. The roof top garden and the terrace swimming pool would have natural lighting over the day and ambient lighting on the wall surfaces and the plants and trees.

All the floors in the building would be fitted with emergency lighting that operate automatically and give illumination sufficient of high level to enable all occupants to evacuate from the building safely. Restaurant would have floor lighting in the form of arrows as the restaurant lighting is dim. The emergency lighting would still be operational even if there are any normal illumination fails.

Day light controlled electric light fixtures turn off when daylight conditions are sufficient for the tasks or space use, provides better lighting and reduces the electricity demand and the building cooling load. LED lights would be installed high above the ice rink and the restaurant. LEDs are the smart choice because they use only 25% of the energy of our original CFL florescent lamps. LED also offer higher light quality and distribution than the CFL florescent lamps and there's virtually no maintenance or bulb replacement.

Photometers would be used to measure building brightness. The lighting of the building would automatically change depending on the availability of natural light. Different space in the building require different hours of natural lighting. The ice rink depends on natural lighting throughput the day and would be illuminated by ambient lighting at dusk. The roof top garden and terrace swimming pool completely depends on natural lighting and through illumination by dimers alongside the tress and plants. The restaurant requires low hours of natural lighting as the theme of the restaurant demands accent lighting. The choice of the building benefits the aesthetics of the building not only the interior but also attract customers by its exterior illumination. The most efficient LED lights would be installed to reduce dissipation of wasted energy. The potential cost of installing would be high however would be illuminated renewably through solar energy.

Planning Application 2.6

Application for Planning Permission.
Elmbridge Borough Council

1. Applicant Name and Address

Title:	Mr.
First name:	Rishyanth
Last name:	Visinigiri
Company (optional):	SustainaBuild
Unit:	12
House number:	4352
House suffix:	
House name:	Marion
Address 1:	Spring Street
Address 2:	Foosland
Address 3:	
Town:	London
County:	Greater London
Country:	United Kingdom
Postcode:	NW15 7JG

2. Agent Name and Address

Title:	Mr.
First name:	Michael
Last name:	T. Reilly
Company (optional):	Brooklands Museum
Unit:	
House number:	
House suffix:	
House name:	Brooklands
Address 1:	Brooklands RD, Weybridge
Address 2:	
Address 3:	
Town:	Weybridge
County:	Elmbridge
Country:	United Kingdom
Postcode:	KT13 0SL

Planning Application 2.6

3. Description of the Proposal

Please describe the proposed development, including any change of use:

The proposed development of the Brooklands Museum Stratosphere Chamber is to demolish the existing building however protecting the stratosphere chamber as per the client requirements. The building that is currently not in operation is used as a tourist attraction in Weybridge. The building is planned to be a two-storey building with an open roof. The ground level would house an ice arena that would have a capacity of 50 people. The second floor would be restaurant and the terrace would have a glass roof that houses an indoor roof top garden. The open roof would be built as an infinity pool. Each floor is self-contained and isn't interdependent on each other. All the floors consist of 3 fire exits on different sides of the building. The building would be built with stare of the art technology and would be independent in generating the power through solar and wind energy. The rain water harvesting system would save large volumes of water every year. It is built from locally sourced sustainable building materials to reduce carbon footprint and locally sourced labour to maintain social sustainability.

Has the building, work or change of use already started? ☐ Yes ● No

If Yes, please state the date when building, work or use were started (DD/MM/YYYY): _____ (date must be pre-application submission)

Has the building, work or change of use been completed? ☐ Yes ● No

If Yes, please state the date when the building, work or change of use was completed: (DD/MM/YYYY): _____ (date must be pre-application submission)

Reference no. of permission in principle being relied on (technical details consent applications only): 2019/2265

Estimated Budget

The estimated budget defined through the building materials is £8,735,7221.

Materials	Unit	QTY	Cost of Each	No. of Needed	Unit QTY	Total
Foundation Concrete	Kg	12 ,032 ,651	£10	606,000	20	£6,060,000
Concrete Lintels (215mm x 100mmx 2400mm)	No.	50	£300	50	1	£15,000
Sand	Kg	8,000,000	£43	8889	900	£328,227
Cement	Kg	2,370,000	£20	74600	50	£1,492,000
Mortar Plasticiser	L	596	£15	596	1	£8,940
Engineering Blocks	No.	2470	£496	6	400	£2,976
Oversite Concrete	m3	6,000,000	£8	5000	1200	£40,000
Loft Insulation	m2	1,000	£10	240	4.9	£2,040
Cavity Wall Insulation 1200mm x 450mm x 100mm	m3	5,000	£20	5400	1	£108,000
Pipe Insualtion (Rolls)	ft	2,000	£4	80	1	£320
Floor Insulation	m2	1,000	£15	2352	1	£34,875
Wall Ties	No.	200	£9	200	1	£1,800
Cavity Closers	No.	2,084	£7	2084	1	£14,588
Cavity Weep Vents	No.	2,000	£4	2000	1	£8,000
Fixings, Screws And Nailings	No.	10,000	£60	6	2100	£360
Roof Timbers (25mm x 50mm)	No.	100	£3	100	1	£300
Metal Strapping	m	200	£8	21	1	£168
Tiles And Fittings	No.	21,641	£27	21641	1	£584,307
Fasica / Barge Boards	m2	500	£11	667	1	£7,333
Reinforced Concrete	m3	6,000,000	£13	5000	1200	£15,000
Steel Beams (8m)	No.	30	£50	30	1	£1,500
Thermal Insulated Plasterboard	m2	500	£53	179	2.88	£9,487
Total						£8,735,221

Sustainable Infrastructure. 3.1

The area near the site have limited existing sustainable infrastructure that meets the modern standards. The Brooklands Redevelopment would be precedent for sustainable infrastructure in Weybridge. The building can be accessed through the M25 and A3 that makes it easily accessible from London and other major locations in southern England. The Museum is between Weybridge and Byfleet in Surrey. Just a few minutes from Junction 10 of the M25 and the A3 London-Portsmouth trunk road.

The building would be powered from renewable energy sources. Solar panels and wind turbines would installed. The building generated power independently through renewable sources. Each floor of the building would be powered independently to easily identify any technical issues and reduce interdependence. As it might impact the business. The existing water supply system would eb used within the building. However, rain water harvesting system would be installed on the roof to store rain water and treat the rain water to make it able to be drinking water. The water will be brought into the through existing pipelines however the capacity would be increased due to the increase in usage of the building.

Communication, sewage, water and electric system of the existing building would also be included to make sure the new building doesn't have a negative impact on the existing system. The existing electric system would also be used as an alternative if the renewable energy sources are not available or not reliable due to weather changes. The additional sustainable infrastructure would only be affective on the planned building and wouldn't affect the rest of the Brooklands Museum. The Brooklands Museum currently is powered by the National Grid and doesn't power any of its buildings through renewable energy sources therefore, would be installed.

Solar arrays and wind turbines require high-cost investment to install. Powering the whole building through renewable energy would have a negative impact on the budget as they are relatively expensive to buy and install. However, they would have positive impact on the environment as they do not cause pollution and contribute to climate change. Furthermore, they are viable as they benefit the client as the operation cost is free. Fitting of high capacity pipelines would be expensive as they include removing the existing the pipelines and are energy-intensive too.

Local Action

The Brooklands stratosphere chamber is an historic building that is losing its prominence. The client requirement included the redevelopment of the Stratosphere chamber building to make it a social space for the local community however the building should be sustainable in all aspects. The building is planned to be developed into a multi-purpose space for leisure activities. The ground floor of the building houses the ice rink and the terrace locates a roof-top garden and a infinity pool that set precedent not only in Weybridge but also in Elmbridge. This maintains economic sustainability as the precedence of the building would result in more users and more revenues generated as a result for the client bringing more prominence to the Brookland Museum. In Addition, other unique selling point of the building is the train themed restaurant that attracts more customers. The leisure activities encourages more people in the society to visit the building increasing social sustainability as the building is suitable for all age groups as well as disabled people. The location of the Building within the Brooklands Museum makes it more easier to access and being identified.

The building is powered by solar and wind energy to maintain environmental sustainability as the building doesn't contribute to climate change and aims to have 0% carbon footprint. 95% of the building debris is recycled and the waste is managed efficiently. The supply chain would be form a local and regional scale. The building materials would be procured from local scale to reduce carbon footprint. Furthermore, locally sourced labours would be employed as a result would maintain social and environmental sustainability leading to a bearable project.

Reclaimed water and dual flush fixtures for toilets, infrared sensor control faucets and low flow heads, and highly efficient irrigation would reduce the wastage of water.
Daylighting and connection between interior spaces and interior to exterior spaces is a design priority trough light shelves and open plan. The building in all the sides would be fitted with large windows. This optimizes the heating/cooling systems by not having to turn on the air conditioning in the afternoons. The ice rink will also be equipped with a remote control that enables us to dim for even less energy use, set a timer to auto turn on/off, enables motion control to auto turn on/off when not in use and allow for auto dimming when more sunlight is coming in through windows. The occupancy sensors throughout the facility turns off the light when there is no activity in those areas to reduce the electricity used.
Highly efficient mechanical and electrical equipment, effective daylighting, high performance exterior envelop with ex

3.3 Compliance with client requirements

Criteria	Check List	How the criteria was met?	Action Required
Location: Existing Stratosphere Chamber Building, Brooklands Museum, Weybridge.		**Slide 3 Local Location states the precise location of the site. The site can be accessed through the M25 and A3.**	**None**
Facilities (Ice Arena): Changing rooms, Storage room, Lobby, Toilets.		**Schedule of Accommodation**	**None**
Facilities (Restaurant): Café, Bar, Lobby, Toilets.		**Schedule of Accommodation**	**None**
Facilities (Roof-top): Garden, Café, Swimming Pool/Spa.		**Schedule of Accommodation**	**None**
Area : 1835 m2		**Schedule of Accommodation and Site analysis. The existing building's size is smaller. However the building would be demolished.**	**None**
Budget :£ 12,150,000		**Construction budget defined by the labour cost and building materials in slide 11.**	**None**
Technology: Solar Panels, Mini Wind Turbines, Rain Water Harvesting System.		**The sustainable technologies stated aren't included in the design of the building.**	**Solar panels and wind turbines should be added to he roof.**
Sustainability: Green roof, Rain water harvesting system, Solar Panels		**The green roof isn't placed on the terrace of the design.**	**Green roof top could be used.**
Style : The building is designed to be a modern building that as state of the art equipment.		**The building has a modern look evident from the 3D models**	**None**

3.4

Health and Safety Considerations

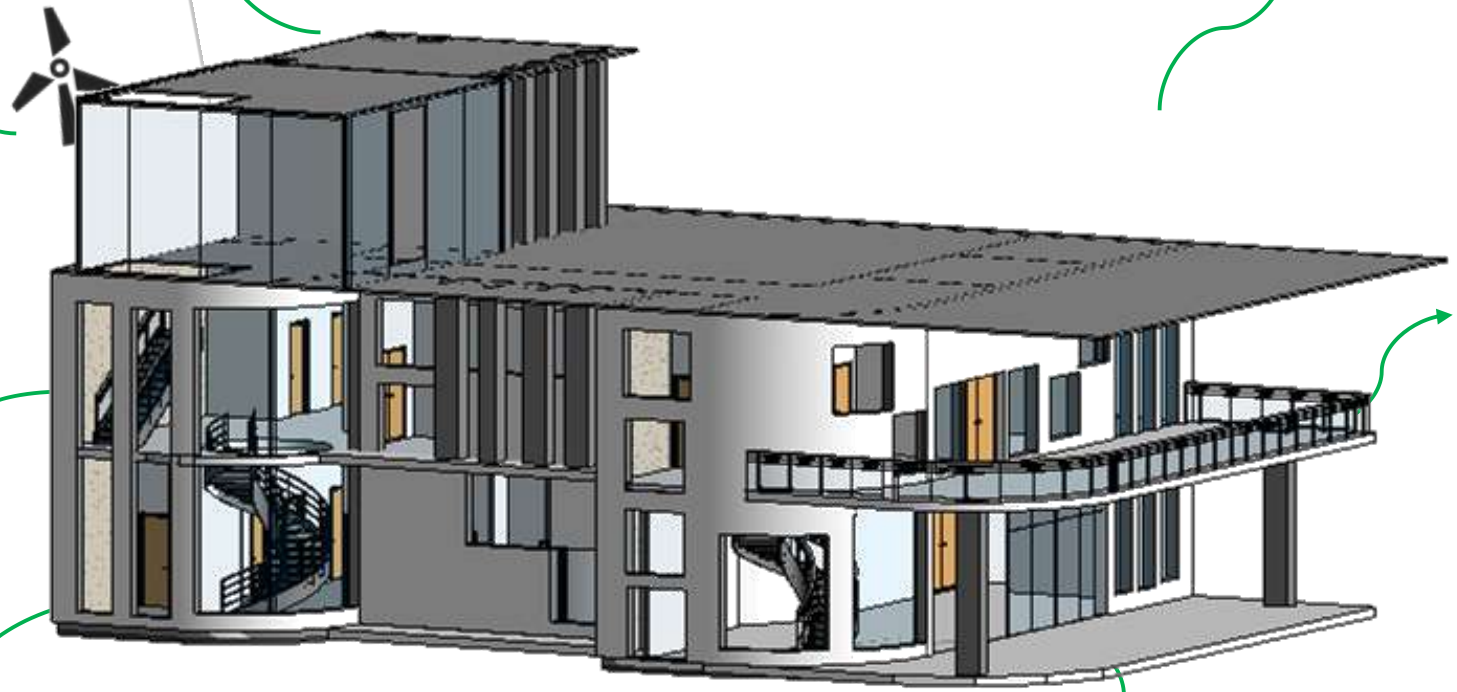
Health and Safety Consideration	Construction	Occupancy
	The site would be covered by fences to discourage people wandering on site. Signs would be included to alert people of the construction.	Maintenance would be done at set time and date and the customers would be noticed to makes sure least amount of people visit during the maintenance
	Flow of people in and out of the construction site would be controlled as the would sign in and out everyday. Job type that is required on each day would be noticed so that only the people required for a particular function that day would be included.	Spillage of liquids would be alerted through signs on the floor to prevent slipping and falling.
	Risk of falling from the scaffolding would be reduced by ensuring people wear harnesses when they work at high altitudes.	Eliminate the risk of falling from the open roof through raised railings .
	Ensure that every person wears a helmet while working on the site to prevent any harm from falling objects.	Stairs and ramps would have railings to ensure support for elderly people or support in case of falling.
	Having signs and lighting at construction site at night to prevent risk of people falling in trenches.	Reduce the risk of people accessing restricted rooms such as the elevator room or equipment and machine room that are harmful for the people by setting up user access levels allowing authorised entry through biometrics to restricted and harmful places.

Energy Efficiency 3.2, 3.5

Solar Panels generate renewable energy for the building

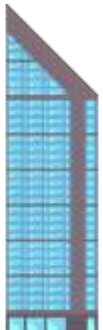
Green Roof reduces the amount of carbon dioxide.

Wind turbines generate energy through wind. Alternate energy source for solar



Energy efficient lighting

Rain-water harvesting system



Large windows to allow greater amount of natural light into the building.

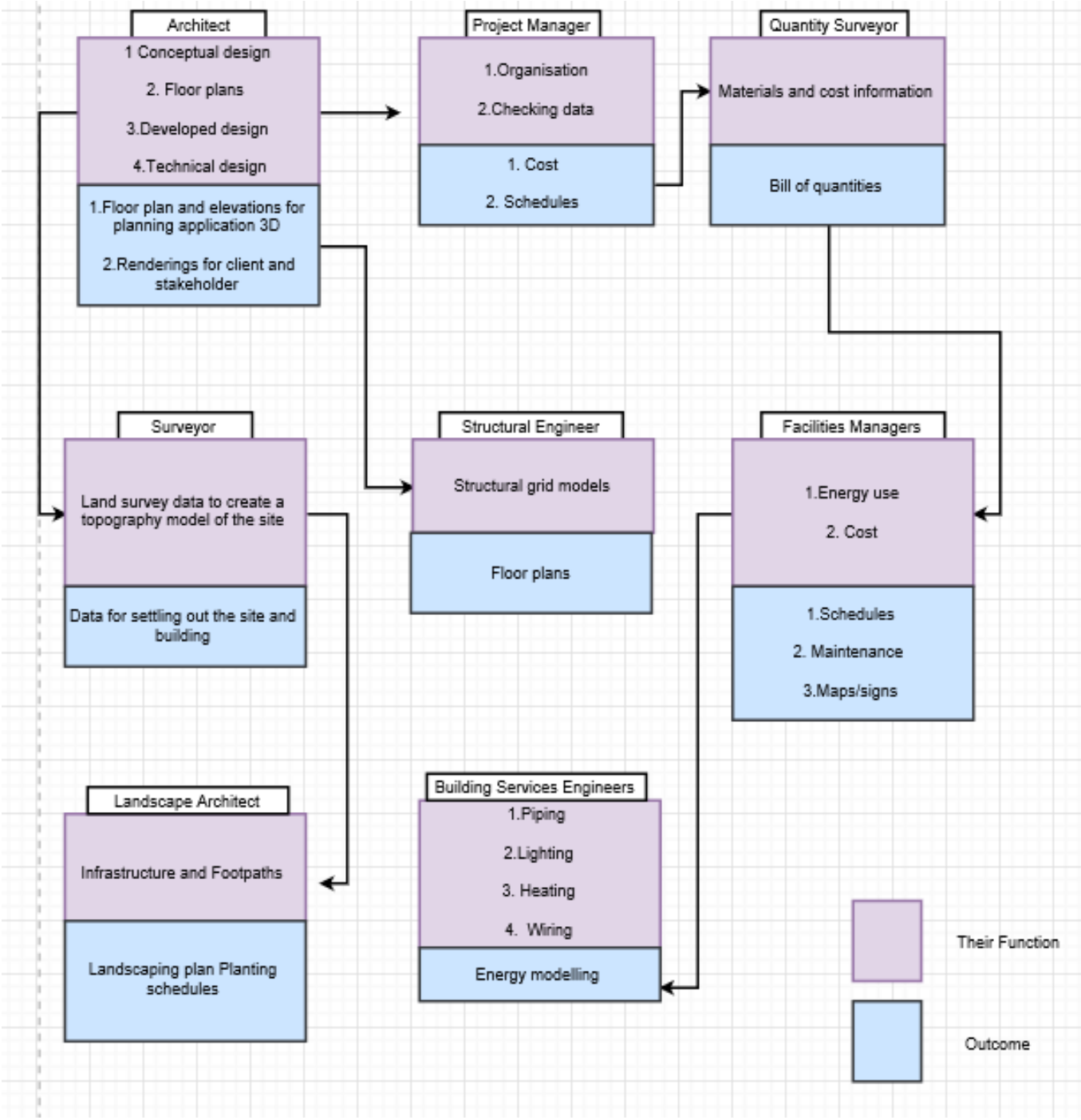
Sensor-controlled taps to save the loss of water

Energy Efficiency

3.2

Energy Efficiency Strategy	Reducing C02	Impact	Further Improvements.
Renewable building materials - Environmental friendly and non-toxic	Sustainable materials like Air Crete blocks greatly reduce the amount of Co2 produced into the atmosphere. The building materials will be able to be reused.	The sustainable building materials will have less long term impact on the environment as they don't contribute to Co2 emissions. It is beneficial because the materials don't have to be manufactured.	Makes sure the building materials are not manufactured especially for the building.
Technologies: - Solar Panels - Wind Turbines - Led Lights	Solar panels and wind turbines are renewable energy source and do not cause any pollution. It creates its own electricity therefore no green house emissions. Led lights also reduce the C02 produced by the building.	Solar Panels and Wind turbines are renewable energy source and do not require any burning of fossil fuels. Therefore, no Co2 is produced.	Incorporate as many as sustainable technologies as possible into the design.
Systems: -PIR System: lights only will only be used when someone is in he room. -Rain Water harvesting system -Locally sourced materials	PIR system reduces the amount of energy used because the lights would only in operation in presence of any users in the building. It makes sure that the energy isn't over used.	The building would be more sustainable and more money an be saved on the cost of electricity.	Make sure they are the best type to ensure that no or as little energy is wasted.
End-user behaviour - Encourage people to make travel sustainably to the building. - Encourage people to travel by walk or through bike	Encourage people to travel by bike or walking reduces C02 emissions.	Recycling materials means waste produced by the building wont be affecting the environment as much because its disposed of in abetter way as well as being made into a new products. Encourage people to walk also decreases the amount of road pollution that is produced.	Make sure the users have access to accessible cycle routs and walking path. Bins, that have options for recycling, glass and plastic as well as general rubbish bins are placed to ensure efficient management of waste.

Communication Action Plan 3.6

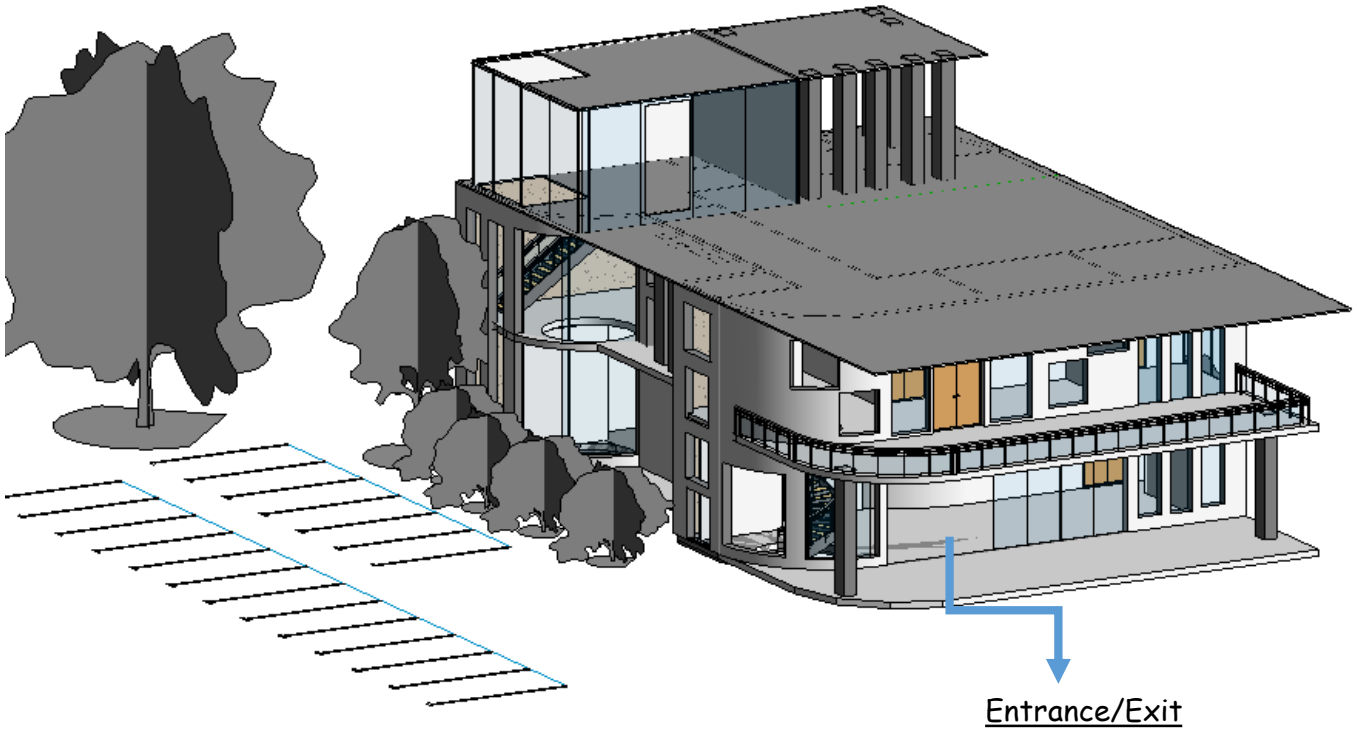


2.1, 2.2

Redesigned Stratosphere Chamber Building

The building would be used as a leisure centre and a private restaurant for the local residents of Weybridge. It is a 2 storey building with an open terrace. The building is in a shape of rectangle with internal curves for its elegance. Most of the buildings are installed with glass walls to let in natural light. The building is sustainable as it is made of sustainable materials

3D Model

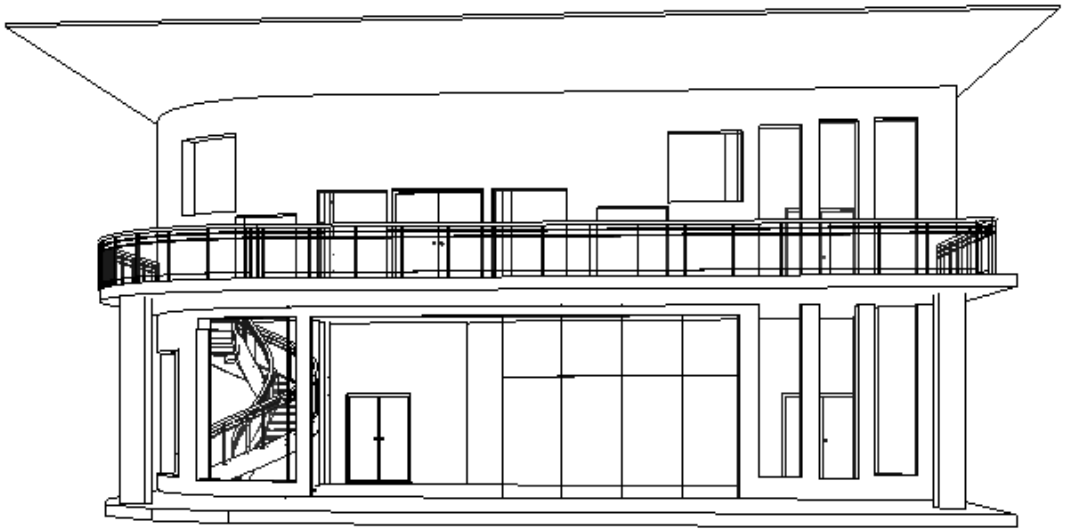


3D Sketch

Side View

Render Model

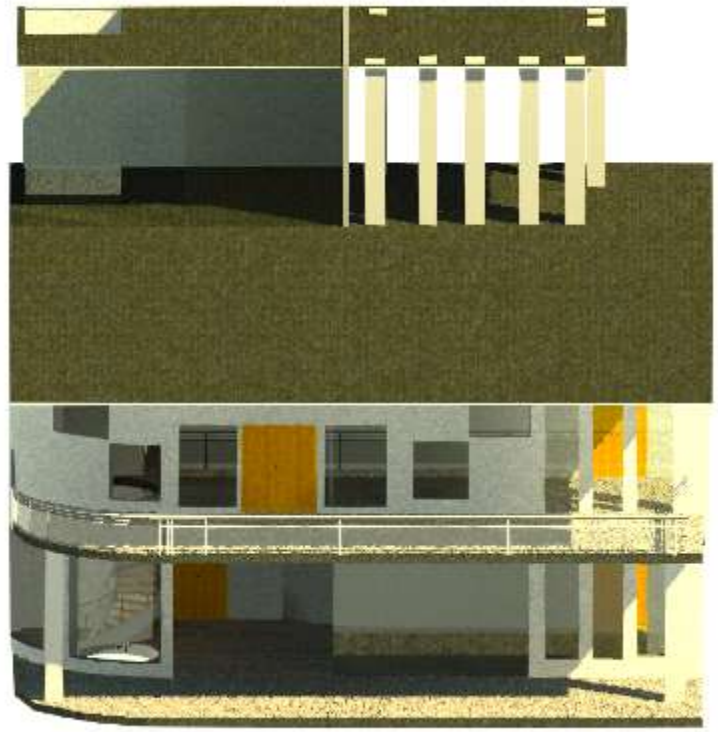
3D Sketch 2.1



Front 3D Model

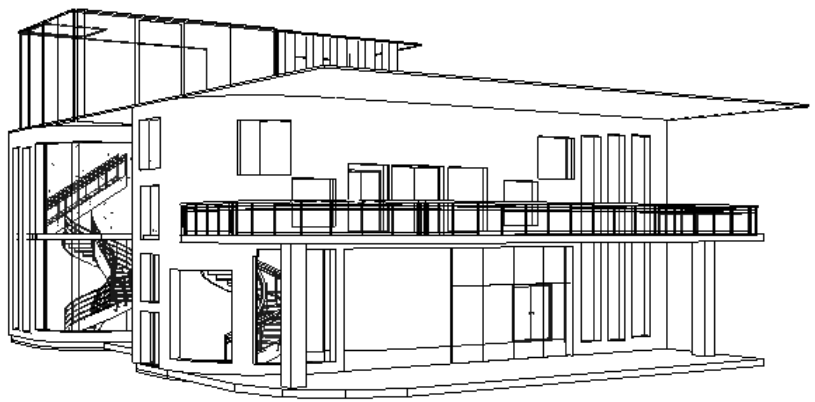
Front View of the building

Render Model



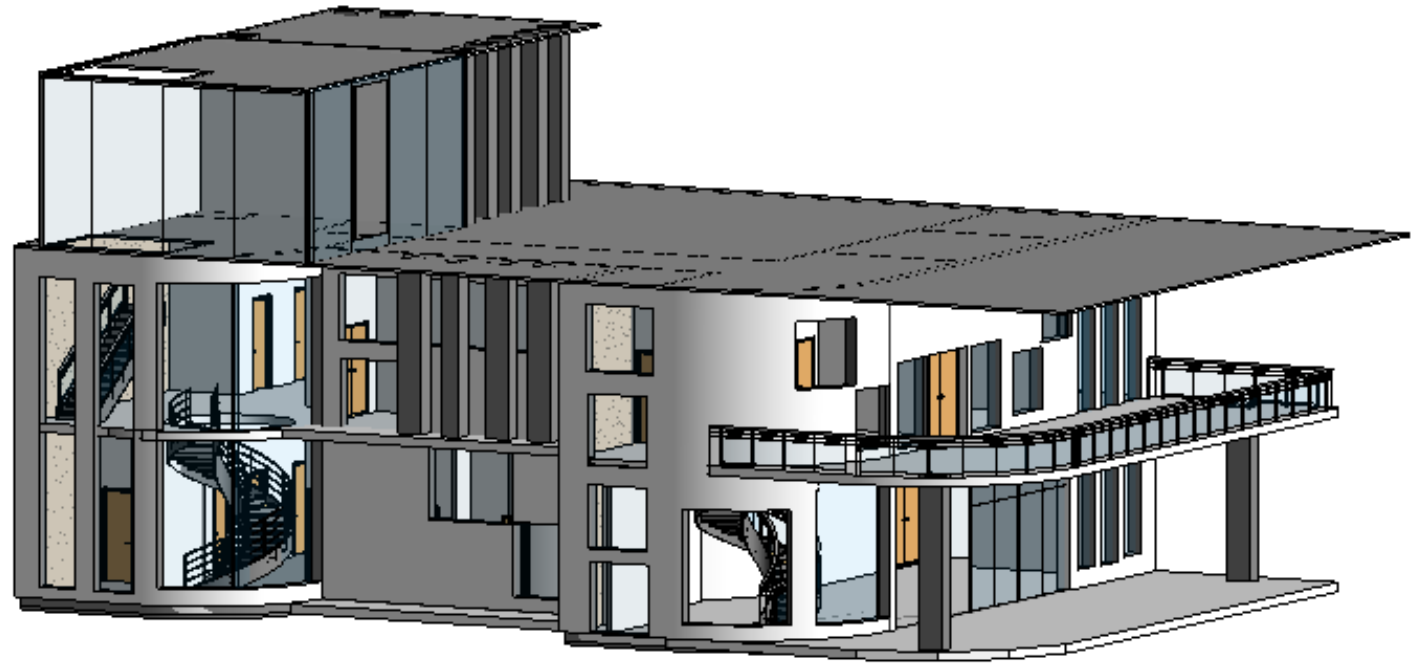
Render Model 2.1

Side 3D Model

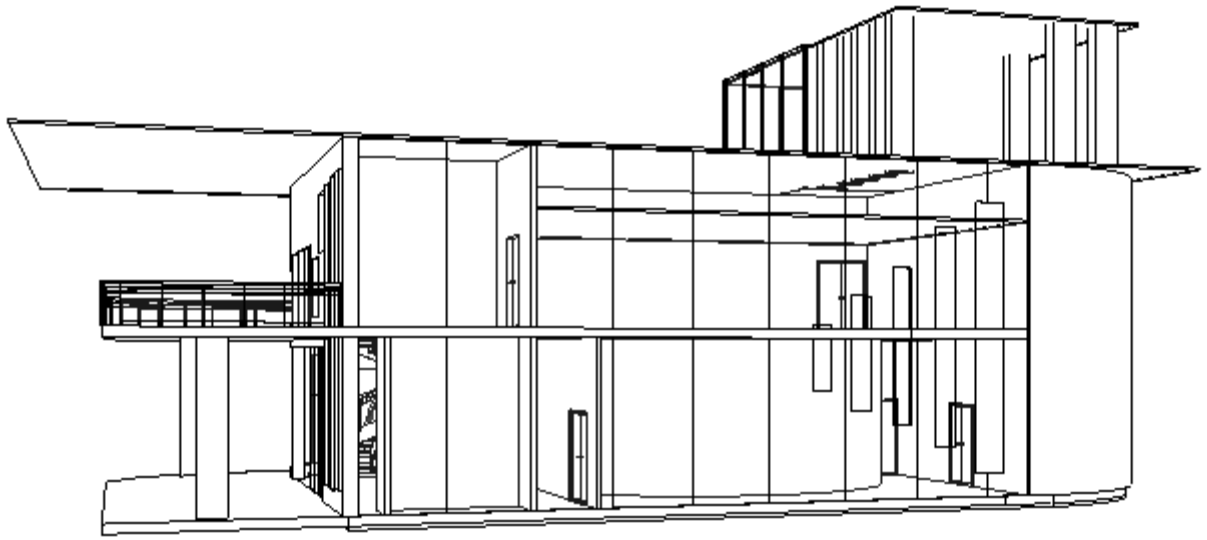


Side View of the building

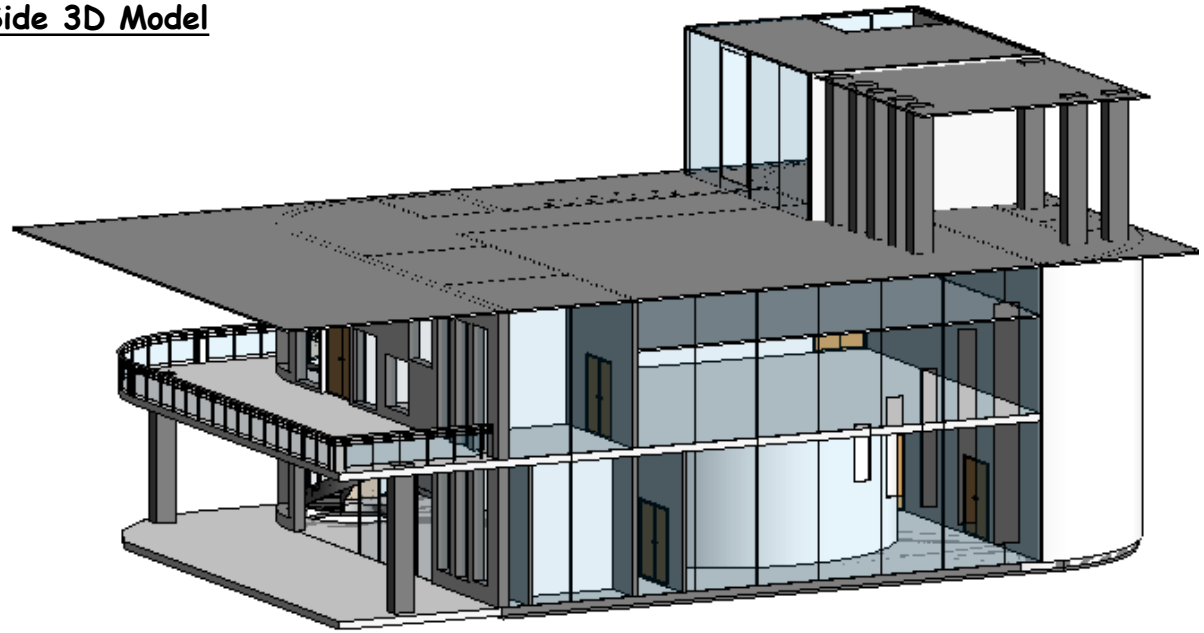
3D Sketch



3D Sketch **2.1**



Side 3D Model



Second Side View of the building

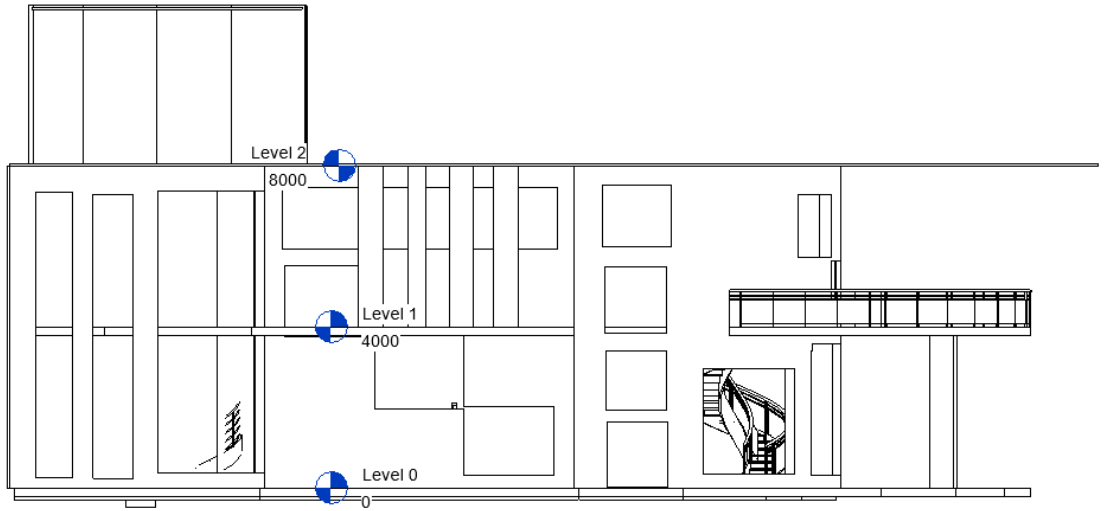
Render Model

2.1

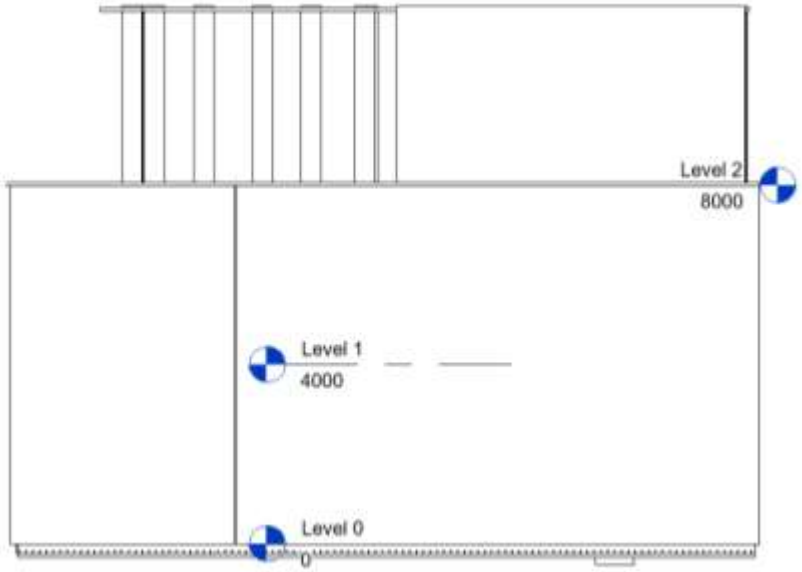
Elevations

North Elevation (Front)

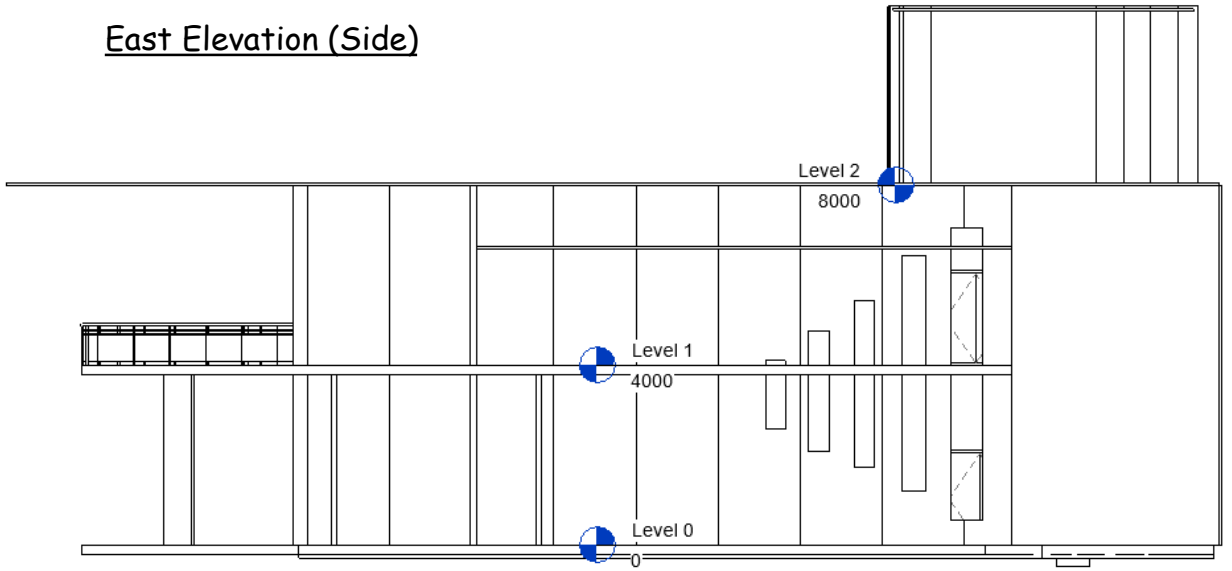
West Elevation (Side)



South Elevation (Back)



East Elevation (Side)

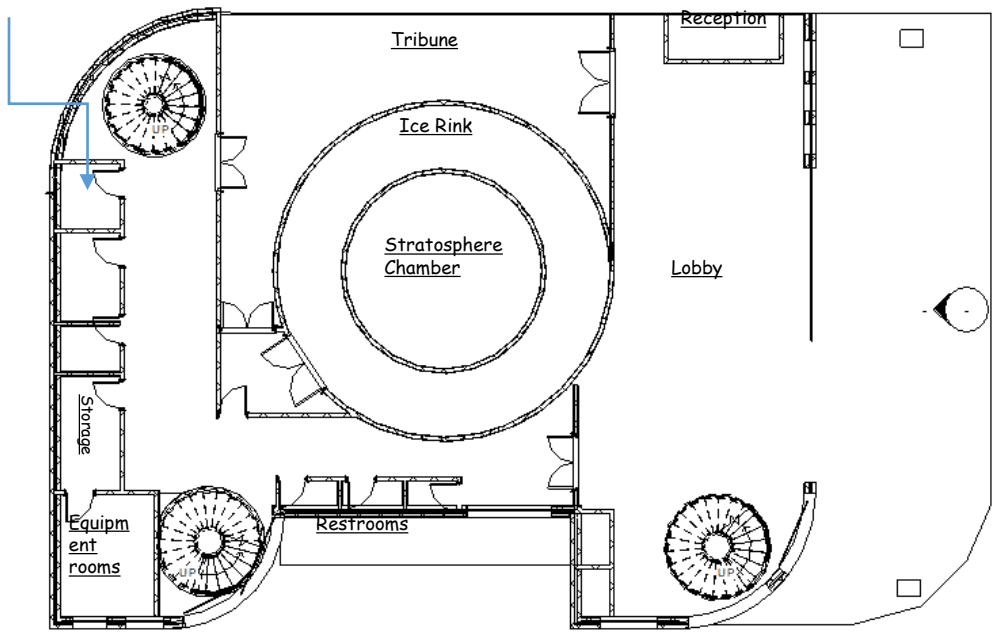


Floor Plans 2.1,2.4

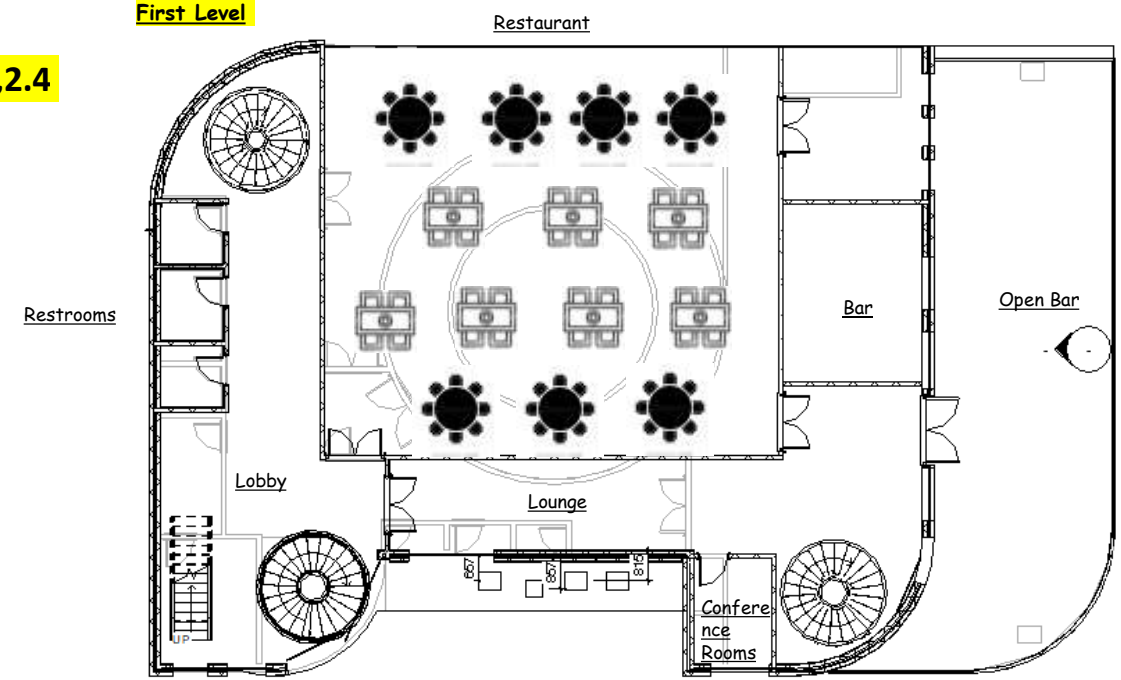
The structural plans shows the floor plans of each floor of the building. The spaces in each floor is labelled. The spaces gives an overview of the area of different spaces in the building. The floor plan shows the relationship between the spaces and how they are connected together.

Ground Floor	Stratosphere Chamber	110
	Ice Rink	880
	Changing Room	58
	Restrooms	94
	Medical Room	28
	Reception	36
	Locker & Equipment Service Room	68
	Lobby	60
	Office Room	52
	Tribune	200
	Staff Dressing Room	128
	Refrigeration Plant	36
	Technical Room - Mechanical & Electrical System	50
	Zamboni (x2) - Parking Space	35
Total		1835

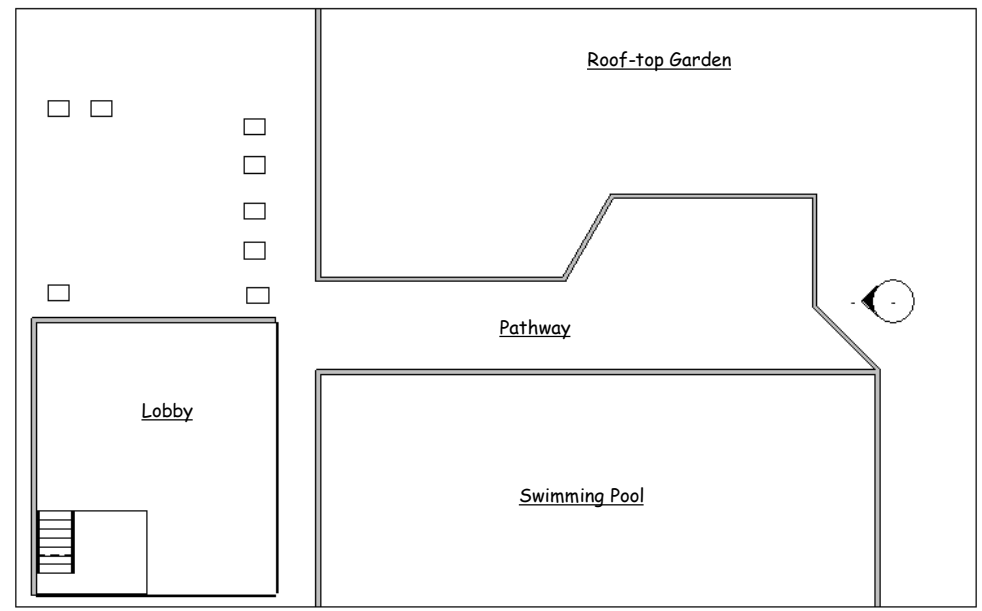
Ground Level



First Level



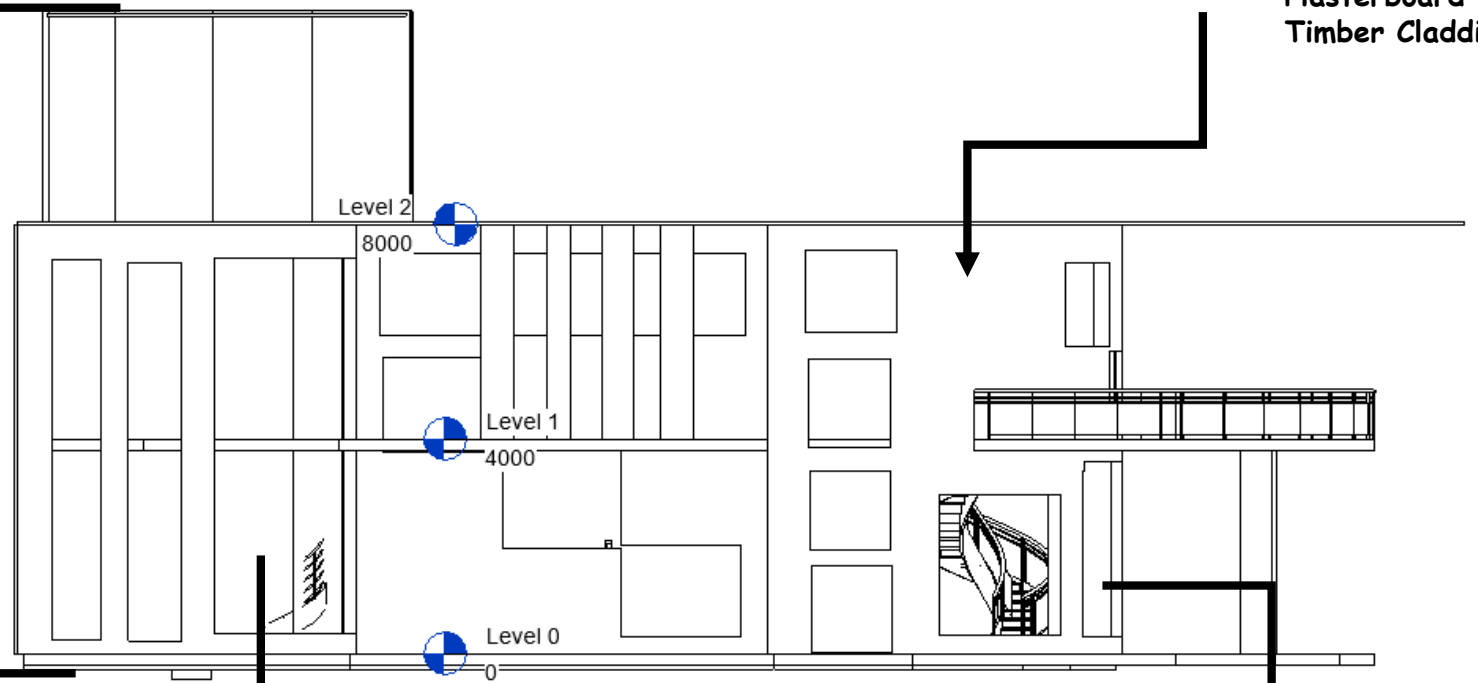
Second Level / Terrace



Choosing Materials 2.5

Solar Panels/ Green roof

Walls: Curtain Walls (Glass)
Plasterboard
Timber Cladding



Steel Floor

Concrete Foundations

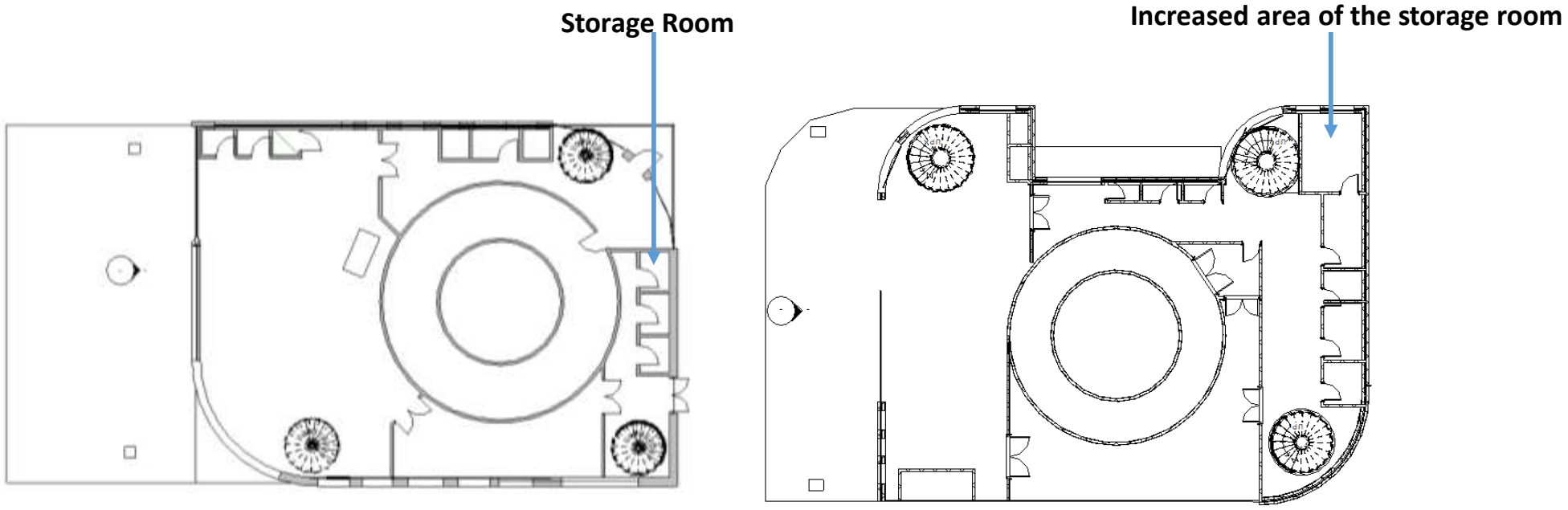
Eco Door

Triple-Glazed Windows

Unit 3

UNIT 3: Delivering a Sustainable Construction Project. 4 credits (30 GLH) – M/615/8833											
1. The candidate will be able to carry out a project.					2. The candidate will respond to technical issues.						
1.1 coordinate a design proposal to ensure mistakes are avoided	1.2 identify potential problems at an early stage and take appropriate action	1.3 identify needs that require specialists from outside the team	1.4 monitor progress in consultation with peers	1.5 ensure the project is developed on time and to budget	2.1 use a 3D model to test my design	2.2 validate the design against the brief using a technical investigation	2.3 ensure that the project complies with building regulations as it progresses	2.4 explain how the building works in practice using quantitative monitoring.	2.5 review progress and reflect on decisions	2.6 consult and respond appropriately to peer review

1.1 Building Tweaks



Technical Issue	Outcome	Accept changes
The area of the storage room is less. Therefore, there would be less space for storing Zambonis.	This can be solved extending the area of the storage room	Yes
The kitchen on the second level blocks the entry to the balcony on the second level	This issue is solved by connecting the lobby directly to the balcony at the second level. The restaurant is directly connected to the balcony. The location of the kitchen is replaced with the bar so that the balcony is connected towards the bar.	Yes
The main entrance has no door. It opens and closes through the shutter and allows into the building.	The main entrance is door less due to its high celling and to increase the flow of customers.	No

1.2 Existing Building Analysis.

Problems		Suggestions for the Improvement	Cost
The stratosphere chamber building's floor that is made of cement is breaking down. This creates hazards like tripping.		The flooring would be re-done with better materials that would last longer.	
The existing building doesn't has less ventilation due to fewer windows.		The existing building would be demolished therefore the new building would be installed with more and larger windows with opening for ventilation and to reflect more natural light in to the building.	
The walls of the building isn't well insulated and there isn't any loft insulation.		The walls would be re-build with cavity-wall insulation using better insulating materials. The loft of the building would also be insulated to prevent heat loss through the roof.	
The existing lighting in the building isn't adequate for the function of the building and should be replaced as they are dull and less attractive.		The lighting of the building would be replaced by Led lights for more lighting and to save energy. Ambient lighting would be added to improve the elegance of the building to attract customers into the building.	

2.3, 2.4 Building Regulations - Actions taken

Document	Title	Consideration 1	Consideration 2	Consideration 3	Actions
Part B	Fire safety	The building includes 3 emergency fire exits in each level. It enables the evacuation the users easy and rapid as the building can be evacuated from 3 different directions.	All the fire exits in the building have a width of 30 inches and height of 9 inches for easier evacuation of large amount of people. The emergency lighting includes self-contained emergency lighting luminaire providing the directions for the emergency exits.	The building is easily accessible through e m25. The fire fighters can easily access the building from the Brooklands Museum main entrance. The parking site can be used to place the equipment.	• The building is fitted with self-contained luminaire lighting in all he floors that illuminate in the dark • Fire alarms are fitted in all spaces of the building. • Building floors are illuminated with arrows that indicate the directions of the emergency exits.
Part L	Conservation of fuel and power	The building is full-powered by solar energy that doesn't burn any fossil fuels Solar power is renewable source and educes demand on power	The materials are procured locally to reduce carbon footprint. The green roof over the building absorbs C02 in the surroundings of the building and releases O2	Triple-glazed windows are fitted to reduce thermal conductivity from windows. Cavity wall insulation and loft insulation by wool greatly reduces eat loss.	• Green roof absorbs the C02 released from the building. • Sustainable materials are used that have less embodied energy are used to reduce C2 emissions. • Insulating materials that have low thermal conductivity are chosen to fit in the building.

2.3, 2.4

Building Regulations - Actions taken

Regulations	Checklist	Action Requires
Part A. Structure		Safety checks of the building has been performed through the structural engineers to ensure the building's structure is safe.
Part B. Fire Safety		The building is designed to inform the users of emergency situations through emergency lightings and alarms and adequate escape routes. Fire extinguishers available in all the floors to reduce the spread of fire.
Part F. Ventilation		The building's main entrance is a high celling opening with no door for more ventilation . Furthermore, windows would be opened to increase ventilation
Part G. Sanitation and Hygiene and Water Efficiency		Adequate sanitary would be provided at toilets for improved sanitation. Kitchen would be kept cleaner for food preparation with good hygiene.
Part H. Drainage and water disposal		Water is disposed through adequate drainage for sewage. Rain water is make sure that it reaches from the roof to the floor.
Part L. Conservation of fuel an power		Green roof reduce heat loss. Solar panels and wind turbines produce energy on their own therefore don't require fuel consumption.
Part M. Access to and use of Building.		The building would be accessible easily and by all including the disabled through ramps and lifts.
Regulation 7		The building materials are appropriate for the building. And are adequate enough for building function

1.4, 1.5

Attributes of the building.

Suitable for intended use.	**The building is suitable for intended use as each floor is dedicated to its particular purpose. Each floor of the building as its own lobby and are independent and self- contained. The functionality of each floor doesn't affect the other spaces. The building was intended to be used as a commercial space for leisure.**
Built to last	**The buildings is planned to be built by sustainable building materials that has higher life-cycle that increases the operation life of the building. The embodied energy of the building materials are lower. The building is planned to built to last for over 50 years. Sustainable building techniques are used during the construction unlike traditional techniques such as waste management prefabricating materials in controlled environment.**
Adaptable and easy to occupy	**The building is easy to occupy and as the capacity of over 250 people. The lobbies on each floor are designed to be spacious. The high ceilings and the elegance design of the building makes it attractive for end-users to occupy. The building is adaptable for all age groups and for disabled users. Each floor has ramps and wheel-chaired charging on each floor as well as meets all the criteria of the disability discrimination act.**
Sustainable to construct and use	**The building is suitable to construct because it is built over an existing building. The building is sustainable to use as it doesn't have impact on the society and the environment due to sustainable measures taken. The building would be powered by solar and wind energy to make sure it doesn't cause pollution.**
Contributes to its context	**The building was historically a stratosphere camber and present status is a tourist spot. It contributes to its context as the stratosphere chamber remains unmoved from is initial position as it is one of the user requirements.**
Looks good	**The building is designed to have an elegance look meeting all the criteria of a modern building. Glass is used to observe internal movement in the building. The glass roof and infinity pool are the attractive factors for the building and sets a precedent in Weybridge.**

Unit-4

UNIT 4: Evaluating a Sustainable Construction Project. 3 credits (20 GLH) – T/615/8834									
1. The candidate will be able to compare intentions with outcomes.					2. The candidate will transfer project evaluation to other contexts.				
1.1 explain how the building works and what users need to do to optimise performance	1.2 explain how well final outcomes meet original intentions	1.3 evaluate feedback and use it as a basis for improvements in future projects	1.4 analyse data and use it as evidence to inform evaluation	1.5 use data to forecast long term performance of the building	2.1 identify issues in existing familiar buildings	2.2 make recommendations to improve existing buildings	2.3 carry out a qualitative audit reporting on aesthetics and sensory experiences of users	2.4 present the building project to a professional audience	

1.1 Compliance with client requirements

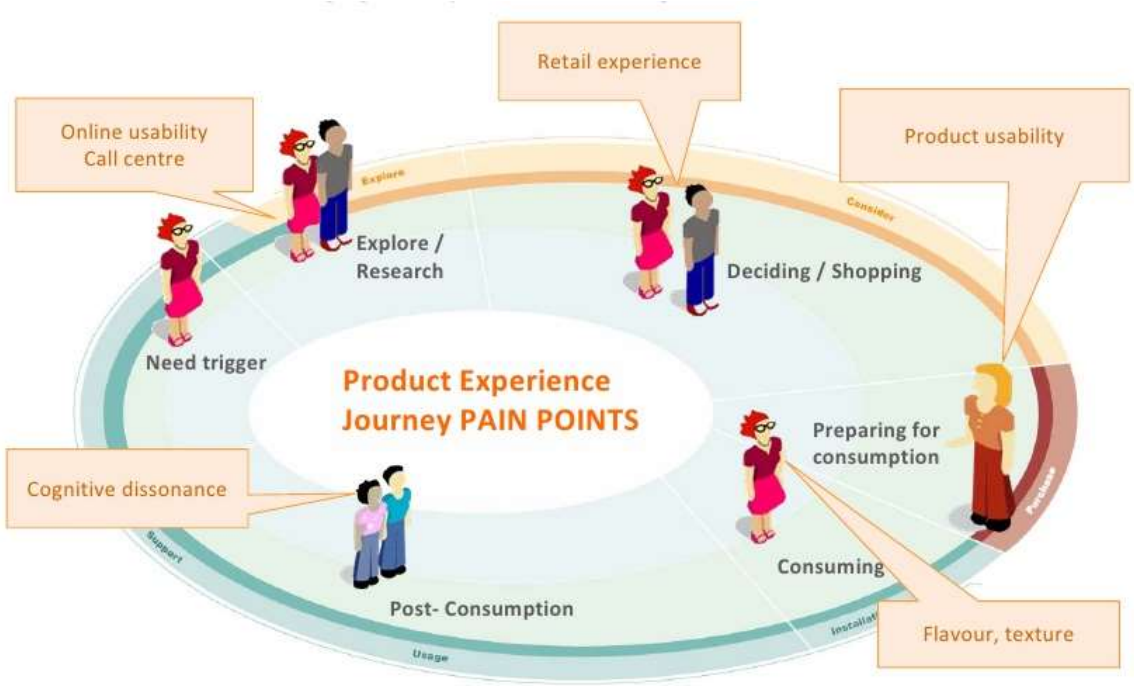
Criteria	Check List	How the criteria was met?	Action Required
Location: Existing Stratosphere Chamber Building, Brooklands Museum, Weybridge.		**Slide 3 Local Location states the precise location of the site. The site can be accessed through the M25 and A3.**	**None**
Facilities (Ice Arena): Changing rooms, Storage room, Lobby, Toilets.		**Schedule of Accommodation**	**None**
Facilities (Restaurant): Café, Bar, Lobby, Toilets.		**Schedule of Accommodation**	**None**
Facilities (Roof-top): Garden, Café, Swimming Pool/Spa.		**Schedule of Accommodation**	**None**
Area : 1835 m2		**Schedule of Accommodation and Site analysis. The existing building's size is smaller. However the building would be demolished.**	**None**
Budget :£ 12,150,000		**Construction budget defined by the labour cost and building materials in slide 11.**	**None**
Technology: Solar Panels, Mini Wind Turbines, Rain Water Harvesting System.		**The sustainable technologies stated aren't included in the design of the building.**	**Solar panels and wind turbines should be added to he roof.**
Sustainability: Green roof, Rain water harvesting system, Solar Panels		**The green roof isn't placed on the terrace of the design.**	**Green roof top could be used.**
Style : The building is designed to be a modern building that as state of the art equipment.		**The building has a modern look evident from the 3D models**	**None**

1.2

Existing Building Analysis.

Problems		Suggestions for the Improvement	Cost
The stratosphere chamber building's floor that is made of cement is breaking down. This creates hazards like tripping.		The flooring would be re-done with better materials that would last longer.	
The existing building doesn't has less ventilation due to fewer windows.		The existing building would be demolished therefore the new building would be installed with more and larger windows with opening for ventilation and to reflect more natural light in to the building.	
The walls of the building isn't well insulated and there isn't any loft insulation.		The walls would be re-build with cavity-wall insulation using better insulating materials. The loft of the building would also be insulated to prevent heat loss through the roof.	
The existing lighting in the building isn't adequate for the function of the building and should be replaced as they are dull and less attractive.		The lighting of the building would be replaced by Led lights for more lighting and to save energy. Ambient lighting would be added to improve the elegance of the building to attract customers into the building.	

2.3 Sensory and Aesthetics Audit

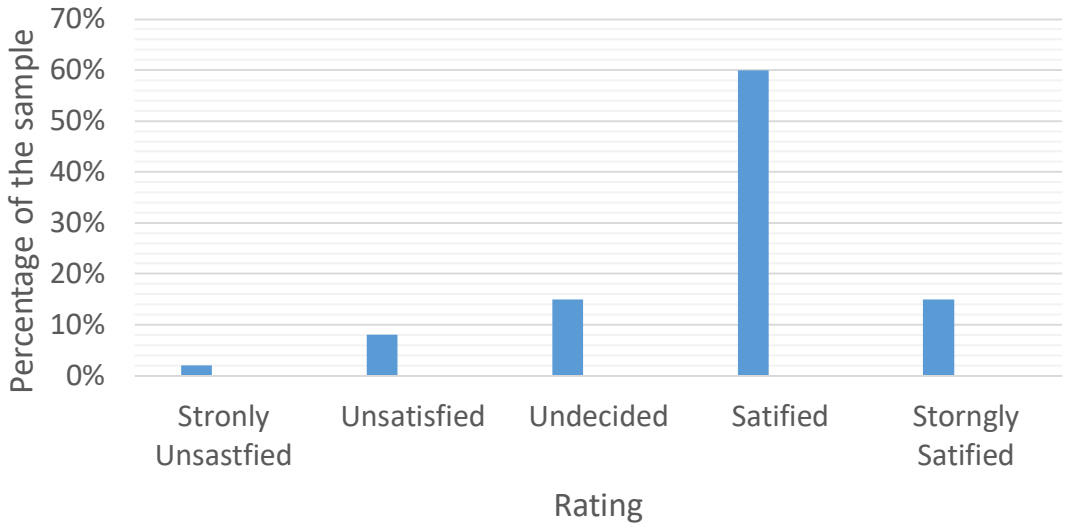


5 Strongly Unsatisfied	4 Unsatisfied	3 Undecided	2 Satisfied	1 Strongly Satisfied
Q1 How do you rate the building from the outside?				
Q2 How do you rate the building from the inside?				
Q3 Are the rooms in the building spacious and comfortable?				
Q4 Level of natural light in the building?				
Q5 Temperature levels in the building?				
Q6 The circulation spaces in the building?				
Q7 The noise levels in the circulation spaces?				
Q8 Sound echo in the building?				
Q9 How does the building make you feel?				
Q10 Overall how would you describe the building?				

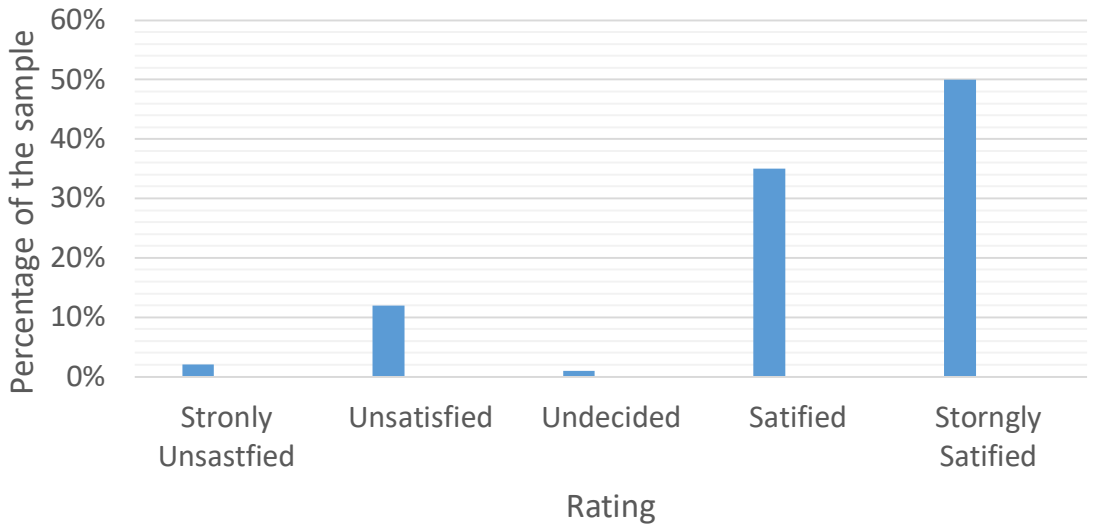
2.3 Feedback on the sensory and aesthetic experience

Sample Size: 59 People

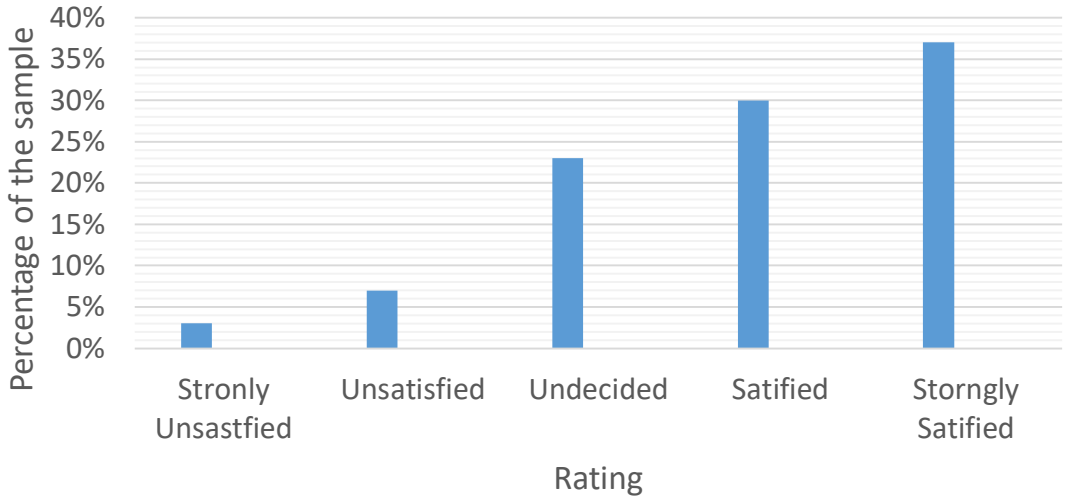
Q.1. How do you rate the building from the outside?



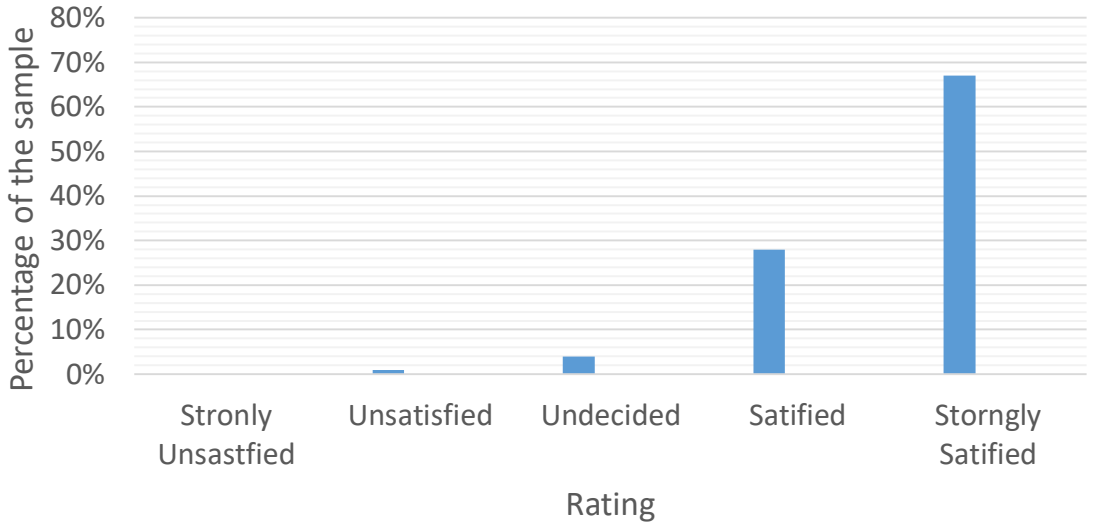
Q.2. How do you rate the building from the inside?



Q.3. Are the rooms in the building spacious and comfortable?



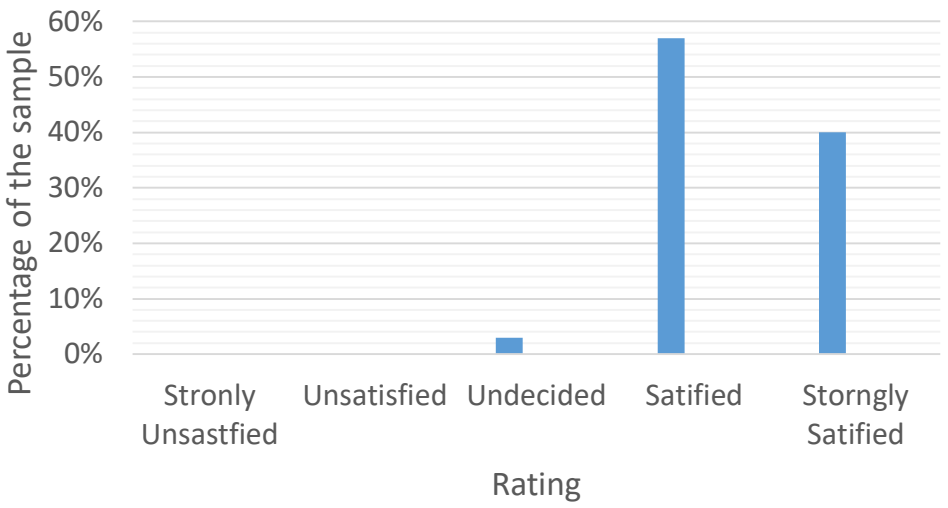
Q.4. Level of natural light in the building?



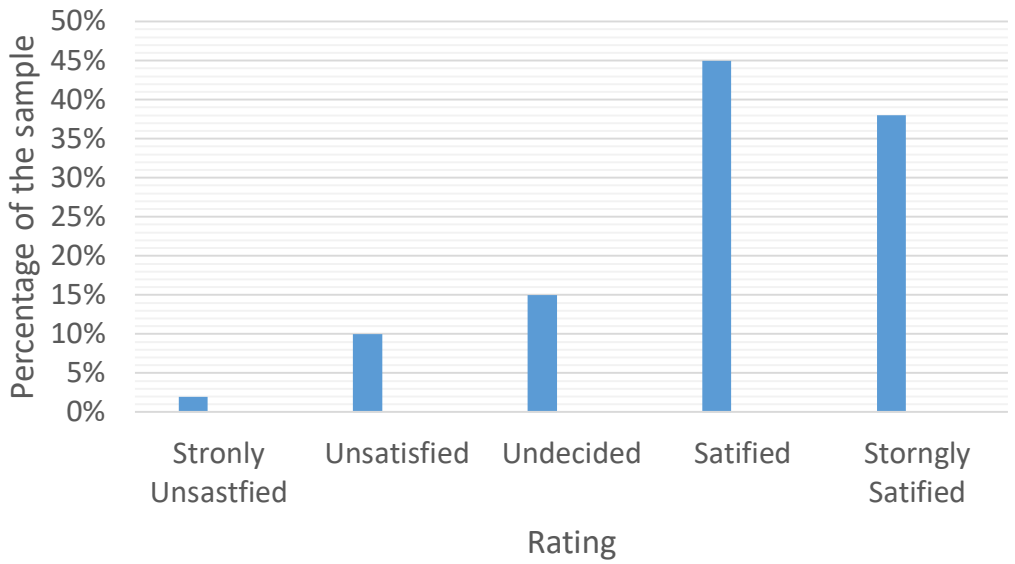
2.3 Feedback on the sensory and aesthetic experience

Sample Size: 59 People

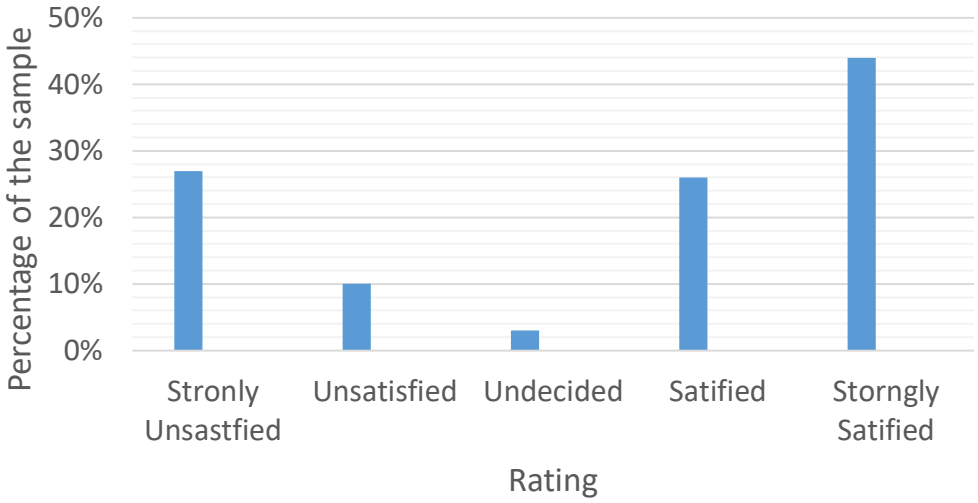
Q.5. Temperature levels in the building?



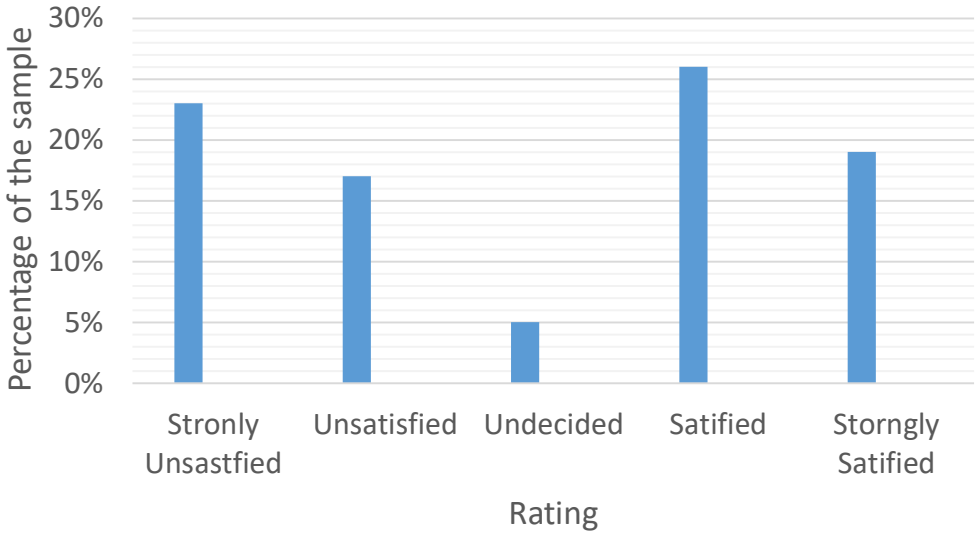
Q.6. The circulation spaces in the building?



Q.7. The noise levels in the circulation spaces?

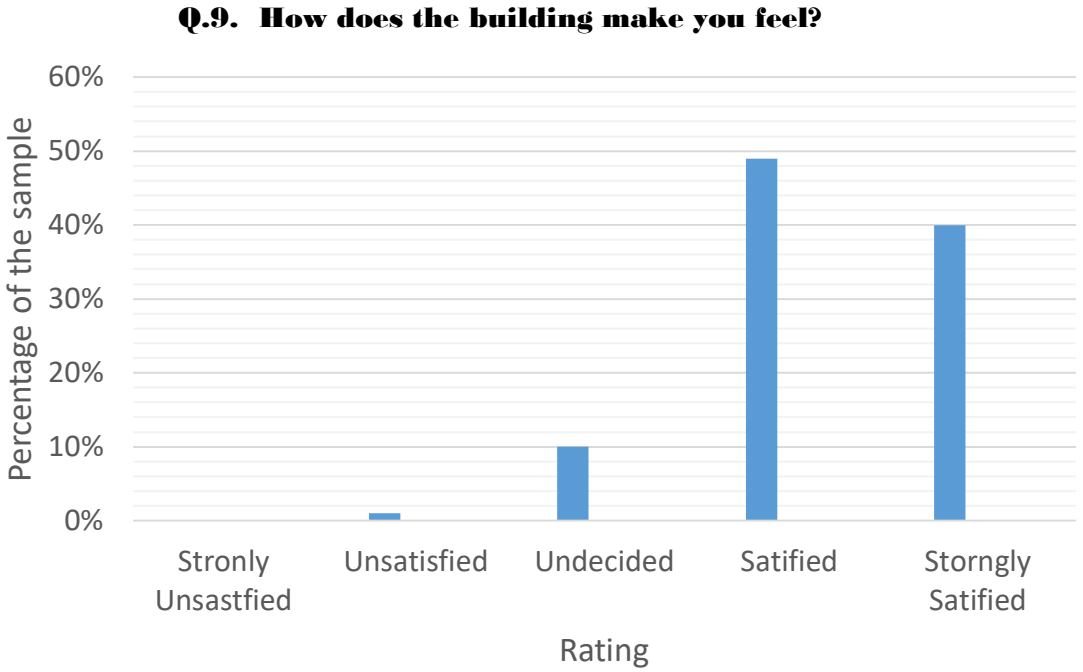


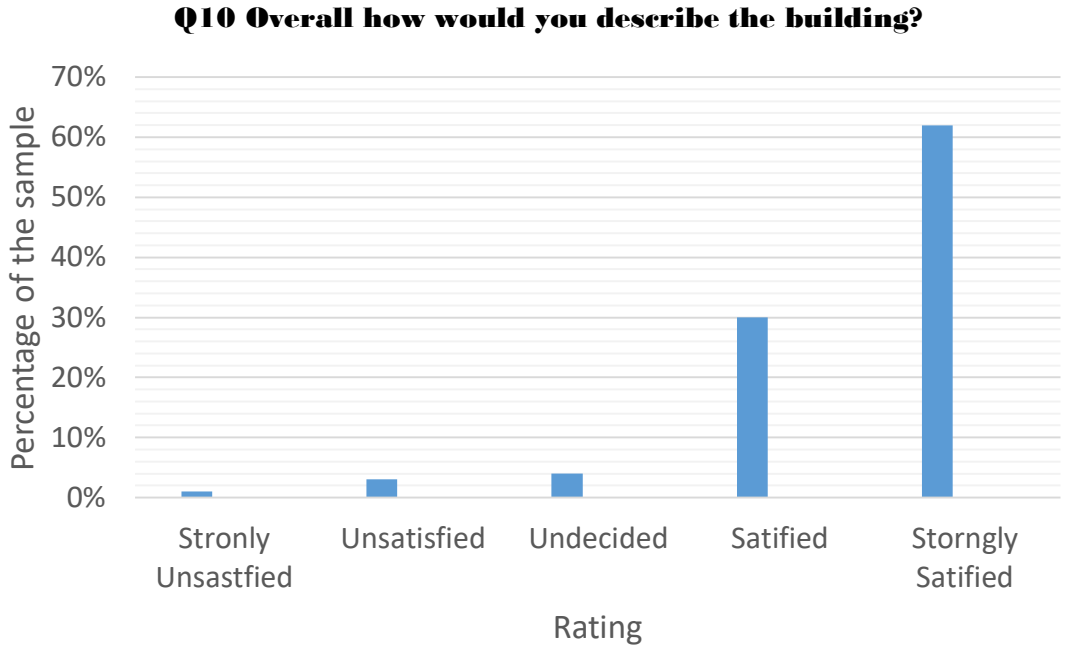
Q.8. Sound echo in the building?



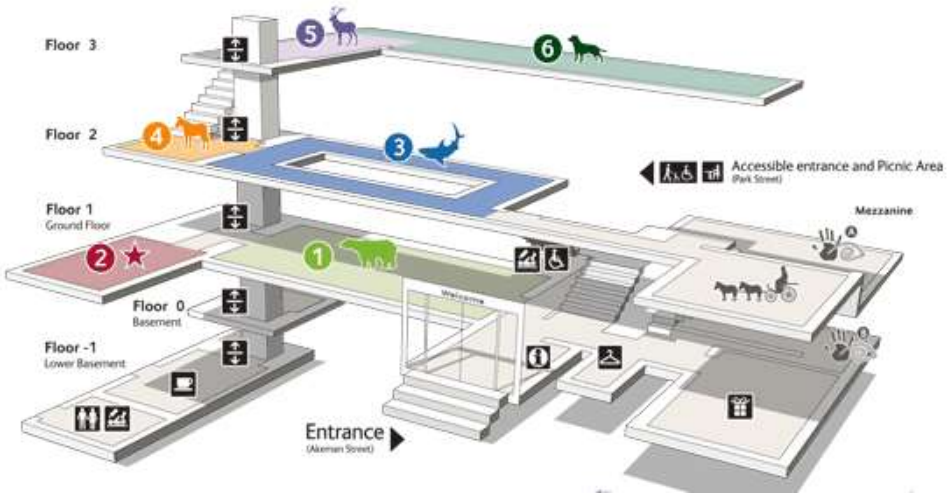
2.3 Feedback on the sensory and aesthetic experience

Sample Size: 59 People





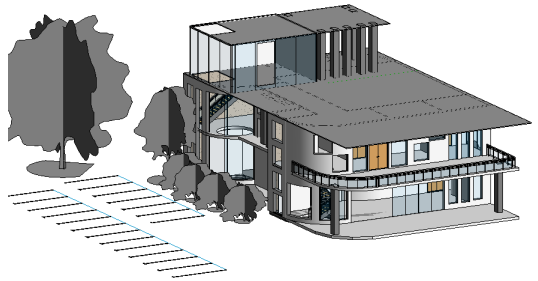
2.1, 2.2 Case Study: Minimising Energy Usage- Museum of London



Location	**Museum of London, London**
Function	Museum
Materials	Glazed glass doors and windows, Timber, stone and copper plating.
Facilities	Toilets, Baby changing, Restaurants and cafés, Child-friendly eating and cloakrooms.
Embodied Energy	Timber frame external walls, green roof, wood reclaimed from national trust to reduce costs down.
Energy in use	• Photo voltaic cells • Lighting • Solar water heating • Insulation
Features I could use	• Glass door • Copper plating that oxidize ad take a greenish tone and blend into the park. • Ball Bearing Slide plates and viscous fluid dampers • Leg lighting

2.5

BROOKLANDS



Brooklands Leisure Centre and Restaurant

2.5

Location

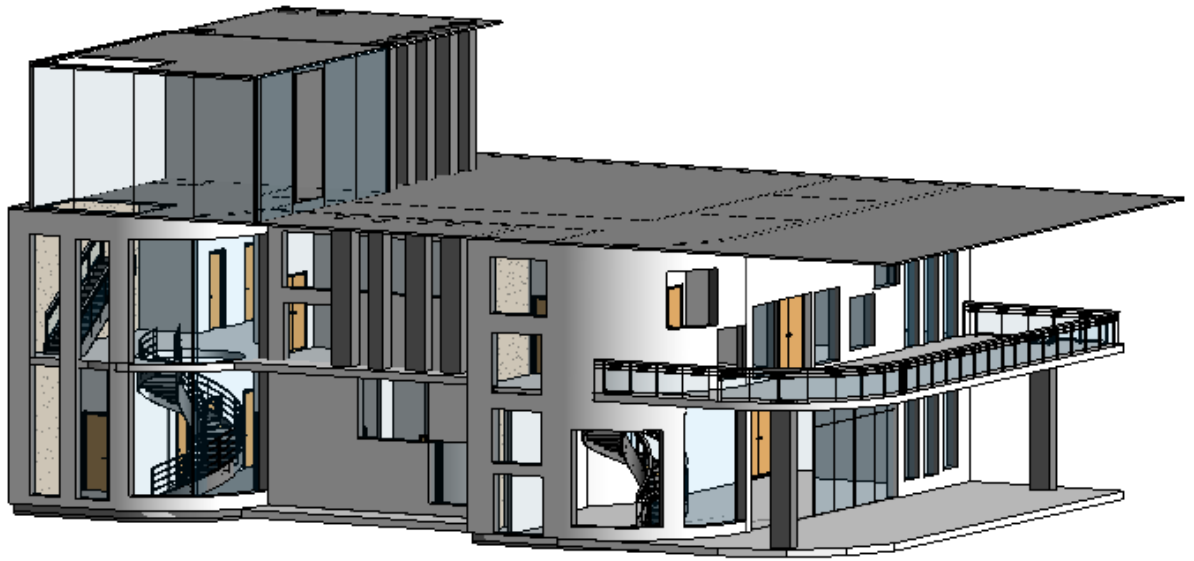
BROOKLANDS MUSEUM

- ✓ The building currently houses the stratosphere chamber building.
- ✓ It is located in Brooklands Museum, Weybridge.
- ✓ By road, the building can be accessed through the M25 and A3.
- ✓ It can be accessed through footpath.
- ✓ The building is surrounded by Aircraft factory, clubhouse, acoustic building and the race circuit.

2.5

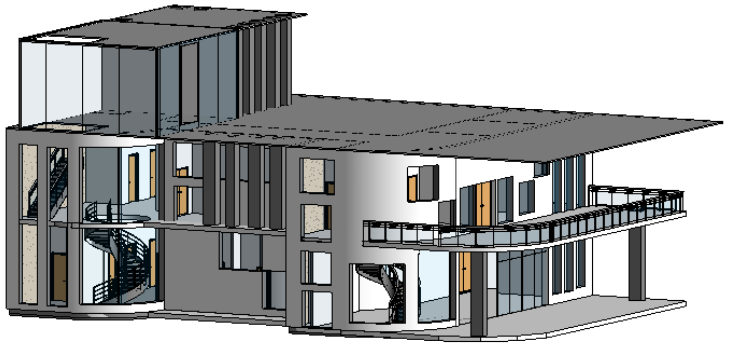
Design Brief

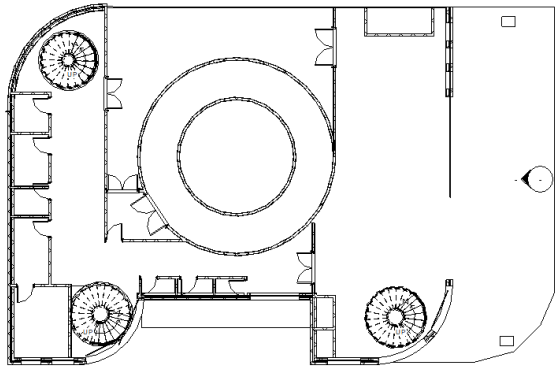
- ✓ The building would house a leisure centre and a restaurant.
- ✓ Ground Level: Ice Arena.
- ✓ Second Level: Restaurant (Train themed and Interactive Ordering System)
- ✓ Terrace: Roof top garden and swimming pool (infinity pool)
- ✓ Users: Local community, school use, new and old residents.
- ✓ Provides the people to spend quality time.
- ✓ The building is sustainable with low carbon footprint and minimal impact on environment.
- ✓ Create employment opportunities and running costs would be low.



Functional Requirements

2.5





- ✓ **The building can be used for school use such as for swimming and ice skating.**
- ✓ **The second level of the building has a conference room for important meeting.**
- ✓ **The building can be accessed by people during the day.**
- ✓ **It can be used by young children, teenagers, adults and elderly in the local community and new and old residents.**
- ✓ **The building can be accessed by disabled people.**
- ✓ **The building provides people to spend quality time and socialise.**

	Accommodation Schedule		Brooklands Leisure Centre
	Room Type	Number of Rooms	Total Area (m2)
Ground Floor	Stratosphere Chamber	1	110
	Ice Rink	1	880
	Changing Room	2	58
	Restrooms	3	94
	Medical Room	1	28
	Reception	1	36
	Locker & Equipment Service Room	2	68
	Lobby	1	60
	Office Room	1	52
	Tribune	1	200
	Staff Dressing Room	2	128
	Refrigeration Plant	1	36
	Technical Room - Mechanical & Electrical System	1	50
	Zamboni (x2) - Parking Space	1	35
Total			1835
1st Floor	Lounge	1	150
	Lobby	1	220
	Bar	1	104
	Restaurant	1	852
	Kitchen	1	120
	Office Room	1	55
	Restrooms	3	96
	Outdoor Garden	1	238
Total			1835
Top Floor	Lounge	1	220
	Reception	1	36
	Office	1	65
	Restrooms	3	96
	Changing Rooms	2	58
	Lockers & Equipment Service Room	1	40
	Café	1	110
	Kitchen	1	58
	Bar	1	60
	Medical Room	1	28
	Technical Room	1	50
	Pool & Spa	1	431
	Roof- Top Garden	1	583
Total			1835

2.5

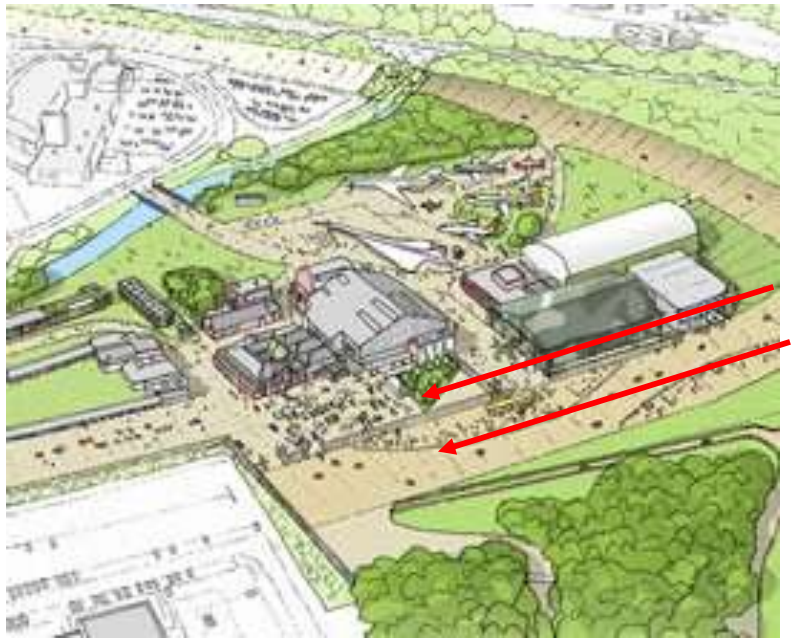
Design

- ✓ The building is three storey and as an open green roof.
- ✓ It has a rectangular single corner snipped shape.
- ✓ The roof of the building is partially green and is covered by a glass roof.
- ✓ It has an infinity pool extension on the roof.
- ✓ The building consist of large windows that allow ventilation and large amount of natural light.
- ✓ The second floor of the building has an extension that is used as a balcony to spend quality time as an open restaurant outside the building.
- ✓ Materials used in the building are SIPs, curtain wall, timber cladding, green roofs, render, triple glazing, eco door, UPVC

Component	Material	Supplier	Origin	Sustainability
Interior Walls	SIPs Plasterboard	Green Estate LTD	London	Good insulation for the building
Exterior Walls	1. Timber Cladding 2. Curtain Wall	Woodland LTD	Surrey	Renewable resources
Roof	1. Slate 2. Green Roof 3. Solar Panels	Build it Green	London	Provide insulation and takes in Carbon Dioxide so good for the environment
Windows	1. Triple Glazing Glass	DMK Glazing	London	Increase insulation and decrease noise pollution
Door	Eco Door	House Mill	Surrey	Long lasting and insulate well
Foundation and floor	Eco Concrete	HOPE Eco	London	Uses recycled concrete

2.5

Landscape



Footpath

Car Parking

- ✓ The building would have a modern look. It would be fitted with state of the art modern features.
- ✓ Entrance of the building would be large and have high celling with foldable door that moves upwards.
- ✓ Three exits all over the building in three different locations of the building.
- ✓ Footpaths lead to the entrance of the building.
- ✓ Separate car park area for the building.
- ✓ Vehicles enter the building through the Brooklands Museum main entrance.

2.5

Sustainability

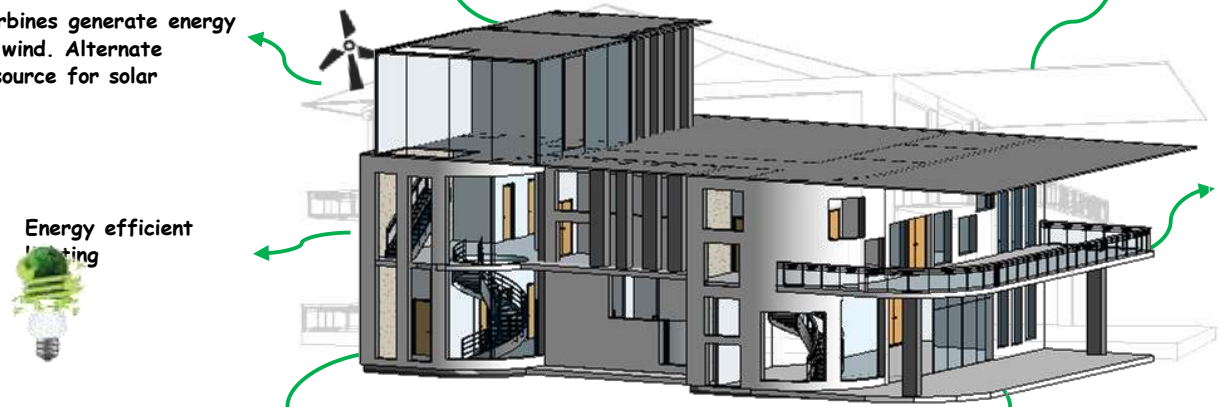
- ✓ Green roof for insulation.
- ✓ Creates employment opportunities.
- ✓ Fund for the client.
- ✓ Place for people to spend quality time and to socialise.
- ✓ Local material are procured to reduce carbon footprint.
- ✓ Motion sensors, sensor taps, led lightings to reduce the wastage energy.
- ✓ Maintain the building efficiency to minimise faults and ensure a long lasting life cycle.
- ✓ Rain water harvesting system reduces the wastage of water by collecting rain water.
- ✓ Wind turbines generate their own energy and is a renewable energy source.

Solar Panels generate renewable energy for the building

Energy Efficiency

Green Roof reduces the amount of carbon dioxide.

Wind turbines generate energy through wind. Alternate energy source for solar



Energy efficient lighting

Large windows to allow greater amount of natural light into the building.

Sensor-controlled taps to save the loss of water

1.3 Feedbacks

	Self	Peer	Professional
Will the accommodation proposed meet the functional requirements of the brief?	Yes, it provides a space for the community conference meetings, changing rooms and store rooms	Yes it meets the functional requirements	The accommodation meets the functional requirements
Is it likely that the building's users-of all kinds-will be satisfied with the design?	Yes, it has facilities of a all age groups	Meets the needs of the client	Wide range of facilities available
Can a stranger or visitor find the entrance and then find their way around the building? Is orientation clear enough not to need signs or maps?	Yes, it has a clear path lading to the entrance and the building layout is simple	Yes the building layout is simple	Visitors can access from footpaths, motor ways and through multiple entrance and exits.
Are the plans, sections, elevation and details of a building all of a pieces, visibly related to each other and to underlying design ideas.	Yes Revit is used to produce the 3D models of the building.	They all fit together	Wide range of detailed elevations and different versions of bubble diagrams to show the possible layouts of the building.
Does the design demonstrate that thinking about the requirements of building structures and construction and environmental services has been an integral part of the design process? Is there evidence that the different design discipline are working as a team?	Yes I've though about the designs and developed with knowledge of the different roles.	Yes, each aspect of the building has been highlighted.	Low carbon foot print with low running cost.
Will the building be easy to adapt or extend when the requirements of the building's user change? Are the floors plates suitable for other suitable in the future?	No, the rooms cannot be extended as they are in fixed positions.	No could not be changed r extended	The building rooms cannot be extended or changed as they are in fixed positions however the rooms can be used for multiple purposes.
Does the design taken into the account whole life costs?	Yes cost is considered	Yes	Tripe glazed large windows increase insulation and natural lighting into the building.
Can one imagine the building becoming a cherished part of its setting?	In sunny days, the building would let maximum amount of light energy in.	Most of the natural light is made use in the building	
Suggestion for improvements			
Comments			Rooms with extended walls could be installed for multiuse of the building.