UNIQUE STAIRCASE

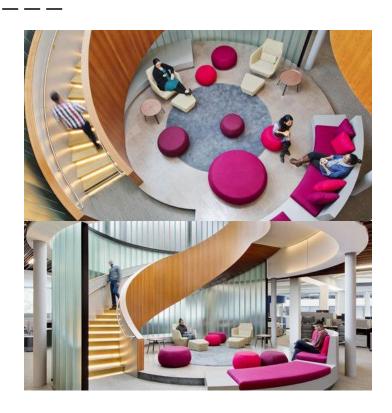
- TRON KIRK LIBRARY PROJECT -

ECE GUL

MOODBOARD

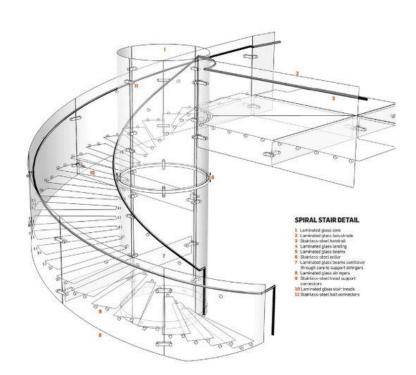


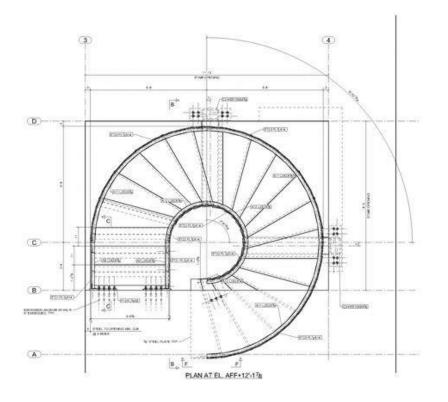
HELICAL STAIRCASE



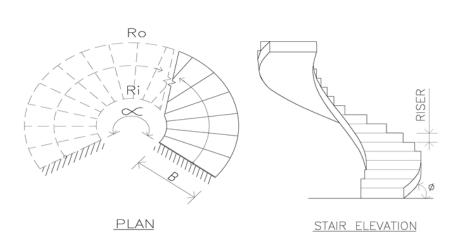
- P Spiral and helical stairs; Due to their designs and maximum efficiency in the application area, they are widely preferred and known as the stairs that add aesthetics to the area where they are applied.
- Metal materials are used in spiral staircase designs, while steps obtained from glass, composite materials, wood and tree roots can be used in parts other than the keel and frame.

STRUCTURAL DETAILS





HELICAL STAIRCASE DETAILS



Geometrical Prope	rties	
Riser "R"	0.175	m
Tread "T"	0.35	m
width of steps and Landing"B"or $b_{\rm w}$	1.95	m
Inner radius " Ri"	5.562	m
Outer Radius "Ro" = Ri+B	7.512	m
Thickness of slab "h"	280	mm
Eff. Depth "d"	248.5	
Plan angle of the stair "α "	132	degrees
Vertical angle at the step centreline with horizontal " Φ "	36	degrees
Loading		
Self Weight of slab	8.1984	kN/m ²
Floor Finish	1	kN/m ²
weight of steps	2.1	kN/m ²
Total dead Load "U _{dl} "	11.2984	kN/m ²
Live load	4	kN/m ²
Total service Load "tsl"	15.2984	kN/m ²
Total Ultimate Load "w"	19.95808	kN/m ²
Total Ultimate Load for full width"w _u	38.918256	kN/m2

Mat	terial I	Properti	es		
Weight of reinforced concrete "γ _{rc} "			24	kN/m ³	
Strength of concrete "f _c "			35	N/mm ²	
Strength of steel "f _v "			420	N/mm ²	
Clear cover to concrete			25	mm	
Flexure strength reduction factor			0.9		
Shear strength reduction factor			0.75		
Modulus of Elasticity of steel "Es"		200000	N/mm ²		
Modulus of Elasticity of concrete "E		27805.6	N/mm ²		
Modular Ratio "n = Es/Ec"		7.19			
Reinforcement					
Dia of top of bars		20	mm		
Dia of bottom of bars			20	mm	
Dia of closed hoop bars as distribut		14	mm		
	Required		Pro	ovided	
	Nos	Spac	Nos	Spac	
Ast top full width	12.16	160.31	13	150	
Asb Bottom full width	5.12	380.74	13	150	
Closed hoops per m	5.53	180.69	7	143	
Top steel "A _{st} " mm ²	3819		4	1082	

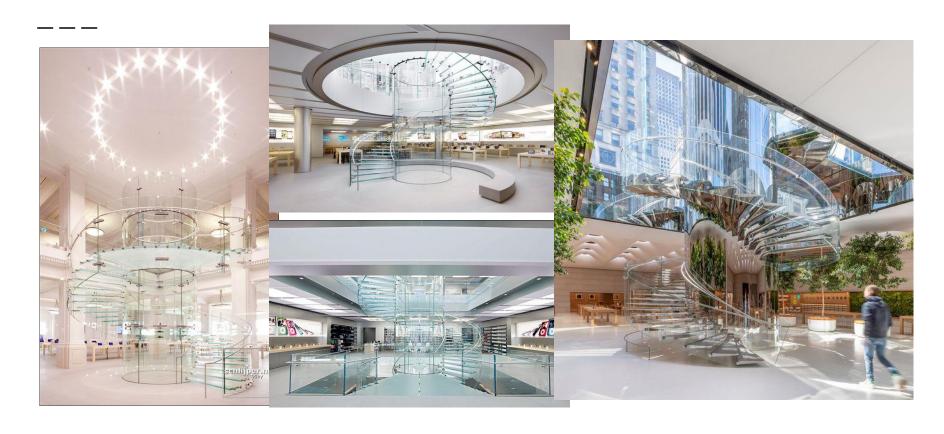
1608

2 legged Closed hoops

4082

2154

GLASS STAIRCASE



GLASS STAIRCASE

- In order for glass stairs to remain safe, the treads are made of tempered glass, which is also referred to as "toughened" glass with a minimum thickness of 21,5 mm or 27/32 inches. The tempered glass is additionally laminated for glass stairs. These reinforcements make sure that the glass treads can support the weight of consistent foot traffic. This design also resists wear and tear, which can make the glass stairs easier to clean.
- Glass will also last much longer than traditional wood, which is subject to become severely weakened over time.



COLORED GLASS

Glass is "stained" through the manufacturing process, not by coloring it afterwards. The recipe for producing colored glass usually involves the addition of a metal to the glass. This is often accomplished by adding some powdered oxide, sulfide, or other compound of that metal to the glass while it is molten. The table below lists some of the coloring agents of glass and the colors that they produce. Manganese dioxide and sodium nitrate are also listed. They are decoloring agents - materials that neutralize the coloring impact of impurities in the glass.

Metals Used to Impart Color to Glass			
Cadmium Sulfide	Yellow		
Gold Chloride	Red		
Cobalt Oxide	Blue-Violet		
Manganese Dioxide	Purple		
Nickel Oxide	Violet		
Sulfur	Yellow-Amber		
Chromic Oxide	Emerald Green		
Uranium Oxide	Fluorescent Yellow, Green		
Iron Oxide	Greens and Browns		
Selenium Oxide	Reds		
Carbon Oxides	Amber-Brown		
Antimony Oxides	White		
Copper Compounds	Blue, Green, Red		
Tin Compounds	White		
Lead Compounds	Yellow		
Manganese Dioxide	A "decoloring" agent		
Sodium Nitrate	A "decoloring" agent		

COLORED GLASS

THE CHEMISTRY OF COLOURED GLASS

Glass is coloured in 3 main ways. It can have transition or rare earth metal ions added; it can be due to colloidal particles formed in the glass; or it can be due to particles which are coloured themselves. This graphic shows some of the typical chemical elements that are used to colour glass.

SODA-LIME GLASS

COMPOSITION

SiO, 70-74%

SILICON DIOXIDE

CaO 10-14%

CALCIUM OXIDE

Na₂O 13-16%

SODIUM OXIDE

Soda-lime glass is the most common glass type, making up an estimated 90% of all manufactured glass. Its uses include containers, windows, bottles, and drinking glasses. The above percentages are a general composition only; other compounds are also present in smaller amounts.



These are typical colours, and can be affected by the type of glass as well as the concentration of the colourant. Combination with other elements and compounds can also have an effect on the final colouration of the glass.





COLORED GLASS

