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Overview

The following document looks into the analysis of buildings that use ramps as a primary spatial and circulatory feature. An analysis of architectural literature which provide information on ramp design and their effects on architectural design, and their perspectives on it.

Through visual and textual comparative analysis I will find ideas and design strategies which have been used in buildings to further develop and redesign the existing ramp within my building.

The outcome is to provide a thorough design which incorporates design ideas put forwards as well as a development which implicates construction, structure, and materiality.

1.1

Solomon R. Guggenheim Museum / Frank Lloyd Wright (1956)

Frank Lloyd Wright's Guggenheim Museum consisted of a spiral ramp which ran through all the levels of the building and connecting them to a single circulation as the main feature. "Here we are not building a cellular composition of compartments, but one where all is one great space on a single continuous floor."¹ It was this idea of continuity and journey allowing this "singular" space to form. Singular as in a non-stop experience of space due to the flow from one floor to another.

The continuous ramp coils upwards six stories for more than one-quarter of a mile.² It also creates a procession in terms of experiencing the artwork which was displayed along the adjacent wall. The section describes how the ramp is the main design of the museum. As one continuous floor the ramp overlooks the atrium and allows visual connection between the interaction of people on different levels.

The idea of the continuous ramp works well with a building purpose like this. As a museum people tend to move around and stop to watch. The ramp accommodates for this. It is big enough for people to gather on and for people to use as circulation to travel through the various levels. It adds to the experience of the building by linking floors rather than have the segregation of levels.

¹ Frank Lloyd Wright, *An American Architecture* (Michigan: Horizon Press, 1955), 215-217.

² "AD Classics: Solomon R. Guggenheim Museum / Frank Lloyd Wright," Adelyn Perez, ArchDaily, accessed September 9, 2014



Figure 1. The Solomon R. Guggenheim Museum in New York designed by Frank Lloyd Wright in 1956. The exterior showcases the ramp within the building.



Figure 2. Interior shot looking up from the atrium.



Figure 3. The Guggenheim Museum ramp as it seamlessly travels from one level to the next.

Solomon R. Guggenheim Museum

Click legend items for on-map display

KEY			
	Water Fountain		Wheelchair Access
	Coatroom, Wheelchairs, Baby Carriers		Information
	Lost and Found		Unisex Restroom
	Telephone		Women's Room
	Volume-Control Telephone		Men's Room
			Infant-Changing Area

Show Gallery Names

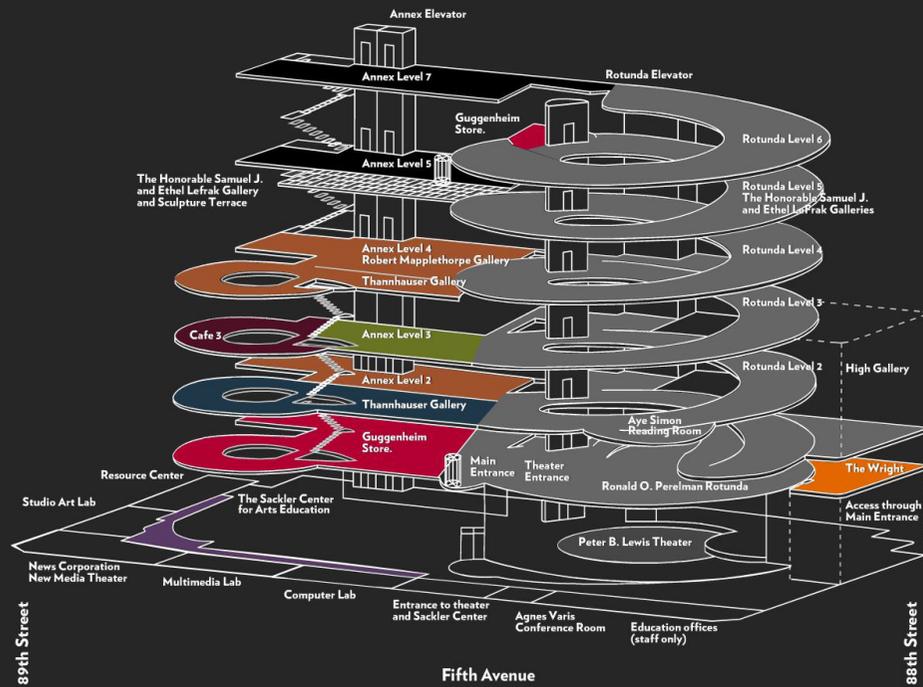


Figure 4. The Solomon R. Guggenheim Museum Map outlining the various areas in relation to the ramp. It indicates what and how the ramp connects to each space.



Figure 5. The ramp being utilised by the public as both circulation as well as space to view exhibitions on.

Cocoon / Camenzind Evolution (2006-2007)

The Cocoon utilizes the ramp as an innovative concept for a unique spatial configuration. It caters for a wide variety of workplace and occupancy concepts which with the ramp provides a seamless connection throughout the building.

Spaces are arranged along the ramp which dispenses the tradition concept of horizontal levels. The sense of the “journey” within the building is achieved by this seamless transition of spaces in the form of epileptically floor segments as shown in the floor plans. It opens for new spatial experiences as well as working environments for chance collaboration, interaction, and co-operation.

“The floorspace design is occupancy-neutral and provides for fully flexible partitioning together with the adaptability necessary to meet the shifting needs of future users.”¹ The fact that the use for these spaces is left varying, the ramp itself now becomes open to various functions. Whether it be used as a ramp solely or as an exhibition or congregational space, it would be determined by the spaces it latches on to.

The ramp is the main driver in terms of which levels the spaces are on. Each space is divided and follows a certain amount of ramp which determines the level for that particular space. Unlike the Guggenheim Museum where the ramp is merely an accessible route to a certain floor or level, the Cocoon provides an alternative connection between space and circulation.



Figure 6. The Cocoon by Camenzind Evolution utilizes the ramp as the main form of the building. It is represented through the spacial layout and exterior form.



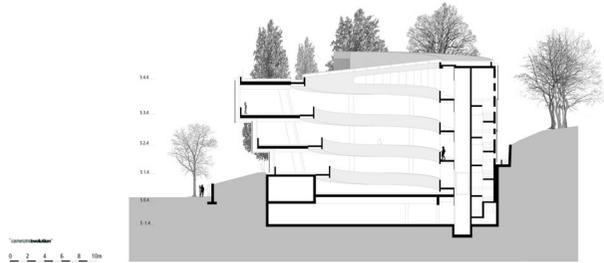
Figure 7. An image of the Cocoon showing the atrium, ramp, and space layout.



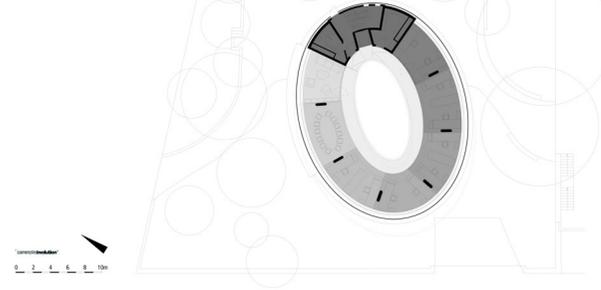
Figure 8. Spaces are arranged alongside the ramp.

¹ “Cocoon / Camenzind Evolution,” ArchDaily, accessed September 25, 2014,

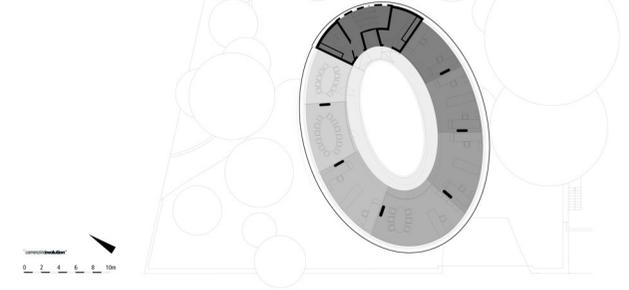
"Cocoon" Zurich, Switzerland "Cocoon" Zürich, Schweiz
Section A-A Schnitt A-A
Scale 1:250 M 1:250



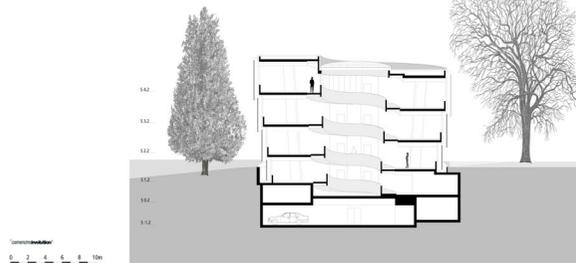
"Cocoon" Zurich, Switzerland "Cocoon" Zürich, Schweiz
1st Spiral 1. Spirale
Scale 1:250 M 1:250



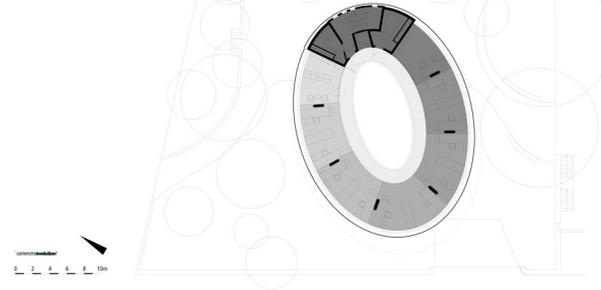
"Cocoon" Zurich, Switzerland "Cocoon" Zürich, Schweiz
3rd Spiral 3. Spirale
Scale 1:250 M 1:250



"Cocoon" Zurich, Switzerland "Cocoon" Zürich, Schweiz
Section B-B Schnitt B-B
Scale 1:250 M 1:250



"Cocoon" Zurich, Switzerland "Cocoon" Zürich, Schweiz
2nd Spiral 2. Spirale
Scale 1:250 M 1:250



"Cocoon" Zurich, Switzerland "Cocoon" Zürich, Schweiz
4th Spiral 4. Spirale
Scale 1:250 M 1:250

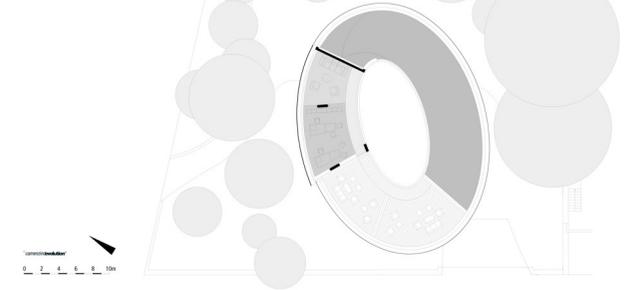


Figure 9. Sections through the Cocoon showing the connection between the ramp and spaces.

Figure 10. Floor Plans of the Cocoon. The following plans show the layout of each spiral rather than floors. Spirals 1, 2, and 3 have similar layouts but increase in area.

Baton Rouge Downtown Library / Trahan Architects (2009)

The Baton Rouge Downtown Library is a conceptual design to provide a better environment towards the existing library. Trahan Architects identified four primary design objectives for the project: to establish a relationship with the public square and engage North boulevard, the city's primary green axis; to activate the perimeter of the building by programming it with reading spaces and circulation; to create a vertical foyer connecting all floors; and to design a both physically and visually vibrant building with intimate spaces for a diverse learning experience.¹

The circulation is what surrounds the purpose of the building. The idea that the activation of people on the circulation route will provide a better connection to the surround areas and engage them.

This concept is the reverse of the previous two examples where the ramp is the centred and enclosed. It tends to breakout to reach an engagement 'outside' the building. Where the Solomon R. Guggenheim Museum and the Cocoon isolates engagement within the building. The circulation is activated by providing reading areas. This creates engagement between people who are reading and people who are simply using the ramp to get to levels.



Figure 11. An external view of the Baton Rouge Downtown Library.



Figure 12. Interior view showing the connection between the main library area and circulation surrounding it.

¹ "River Centre Library," Trahan Architects, accessed September 19, 2014.

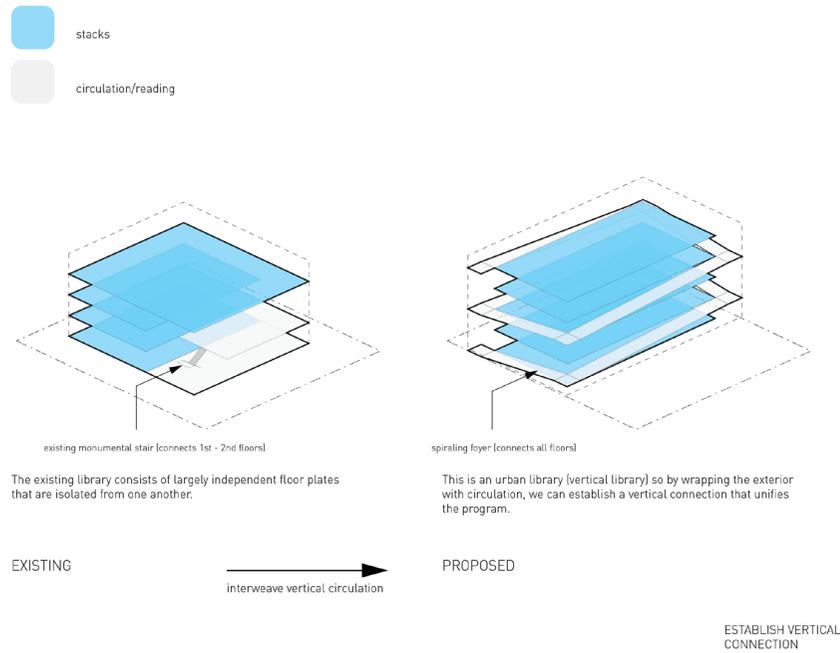


Figure 13. A diagram by Trahan Architects explaining the benefits of providing the circulation on the perimeter. It also showcases how the connections that would be made compared to the existing floor to floor disconnections of the existing library.

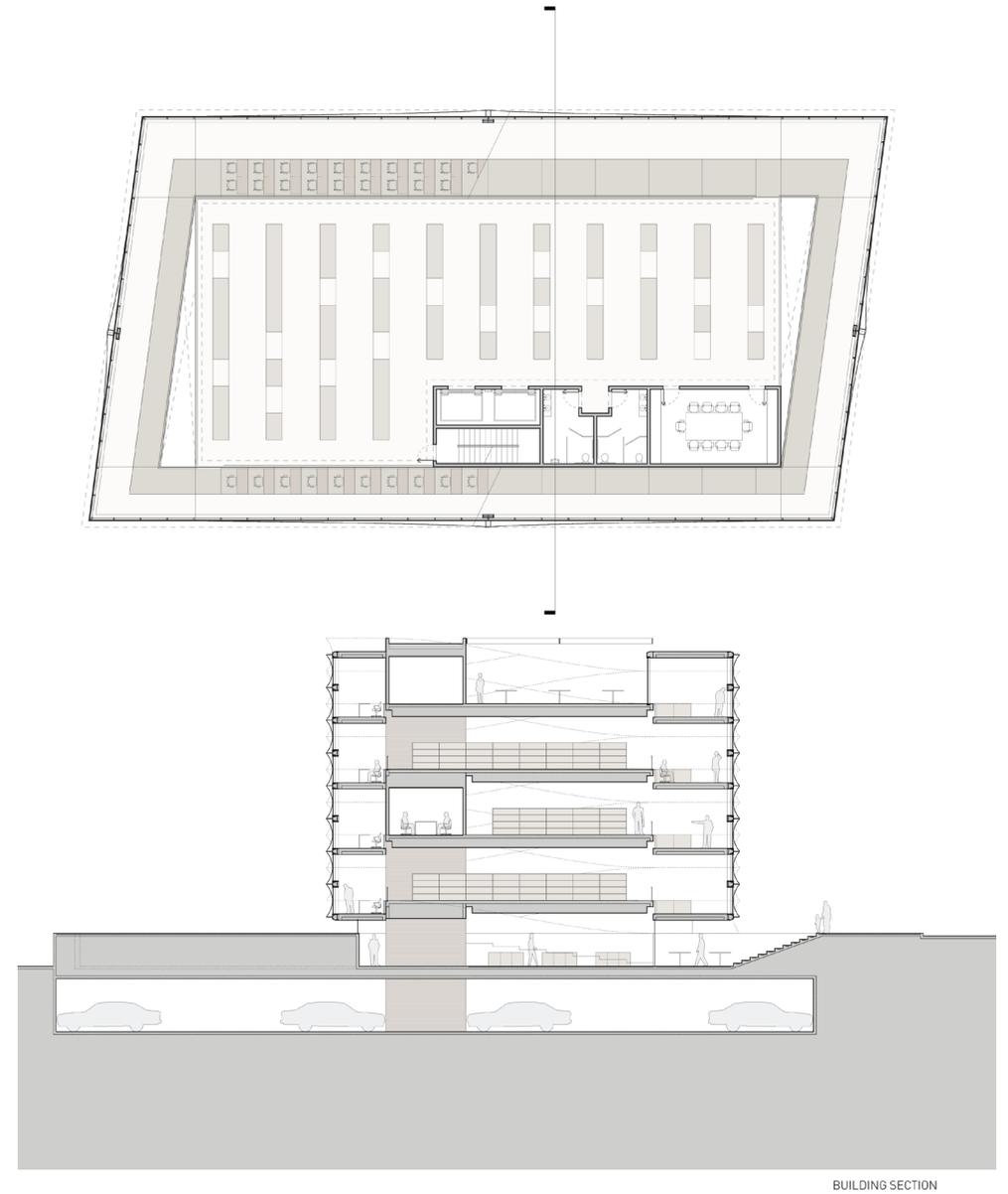


Figure 14. A typical plan and section of the Baton Rouge Downtown Library concept.

Lateran University Library / King Roselli Architetti
(2006)

The Lateran University Library was completed in 2006. Designed by King Roselli Architetti it was commissioned to provide a new library extension which was "to bring the activity of reading and the consultation of books as the central occupation of the university". The library as being the purpose of the building the arrangement of spaces such as reading spaces and book storage was important. Therefore the design led to the utilisation of the ramp within the spaces.

"The library is arranged so that for every two floors of book stacks one sloping ramp, "U" shaped in plan, connects them. The slope of the ramps is determined by joining the regularly spaced floors of the book stacks to the irregular cuts in the façade which creates the reality (not simply the effect) of volumes floating in light."¹

The ramp in this building was used as a connection which was determined by the book shelf heights. The idea was to create book stacks that were as low as possible to avoid the use of ladders to reach the highest shelves. The "U" shaped ramps adjusted to the height needed to make up for these book shelves as well as providing reading spaces in close proximity to the book shelves.



Figure 15. An external view of the Lateran University Library with the windows lineating the ramps.



Figures 16 + 17. Interior views of the ramp and reading spaces in relation to the book shelves.

¹ "Lateran University Library / King Roselli Architetti," ArchDaily, accessed September 1, 2014.



Figures 18 + 19. Views of the reading spaces that have been integrated within the ramp.

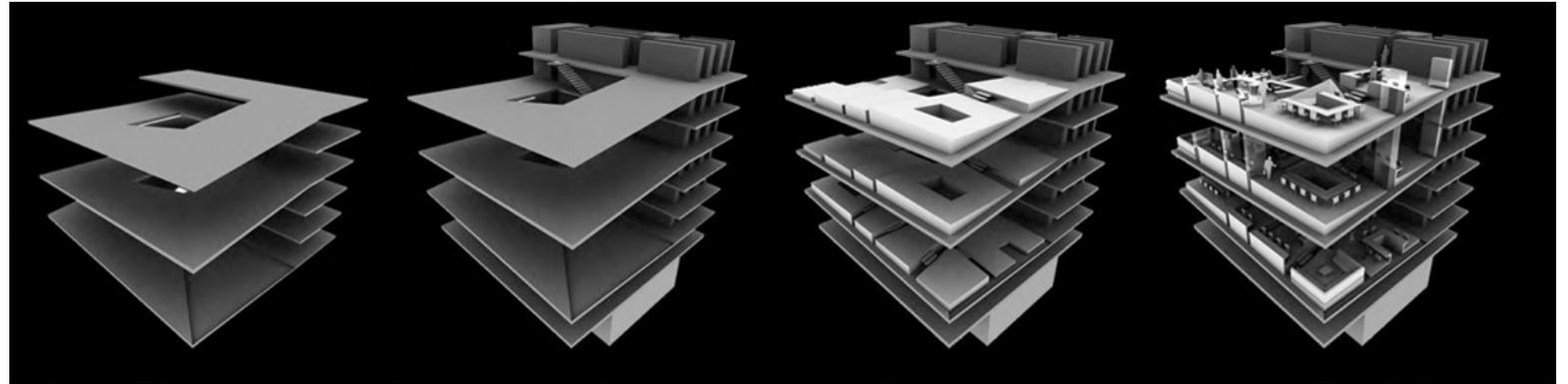


Figure 20. A diagram showing the ramp as the main feature and basis of the building and being developed to incorporate other features

A progression of development shows other features such as the book shelves, reading spaces, and furniture being incorporated on the ramp structure.

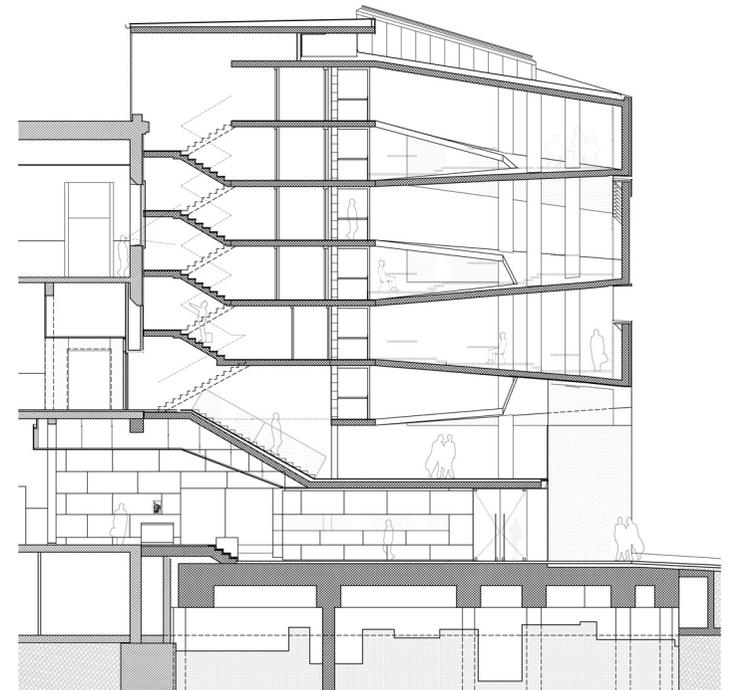


Figure 21. A cross section showing the position of the ramp within the building and the relation to the book shelves.

Summary

The four case studies each had their own individual take on the ramp in accordance to their program, use and purpose of the building.

This outlines the main ideas used to incorporate the ramp within the building and how spaces are affected due to this.

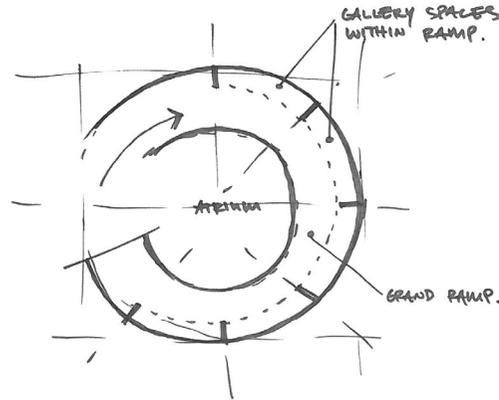


Figure 22.

Solomon R. Guggenheim Museum

The integration of gallery spaces with the grand ramp provides a unique, seamless transition and experience of space. The wide ramp provides space for people to gather and stand while continuing to be the vertical circulation.

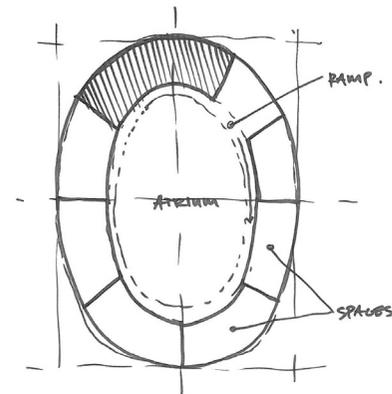


Figure 23.

Cocoon

Similar to the layout on the Solomon R. Guggenheim Museum, however the ramp is not as wide. Meaning the ramp was primarily put for circulation. The use of the round and curve ramp provides a 'never ending' experience within the building. Unlike straight ramps the level changes are subtle or even seamless.

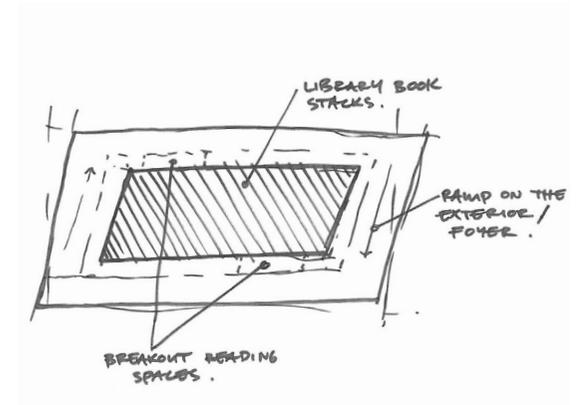


Figure 24.

Baton Rouge Downtown Library

The layout of the Baton Rouge Downtown Library looked to put the circulation ramp on the outside, surrounding its purpose. What this does is it activates the connection between the exterior and interior. It also provides a transition from the 'hectic' public outdoors to the 'calm' studying indoors.

'7.

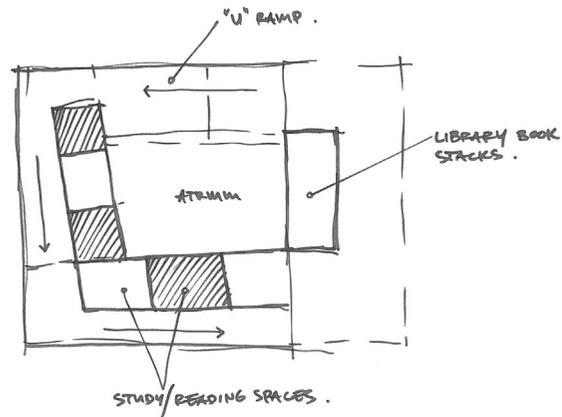


Figure 25.

Lateran University Library

Similar to the layout on the Guggenheim Museum, however the ramp is not as wide. Meaning the ramp was primarily put for circulation. The ramp is not round nor curved which delineates the study/reading spaces.

1.6

Summary Conclusion

The reason for using a ramp rather than a stair in my design is because of the function of the building. The ramp provides a platform for interaction while providing vertical circulation.

People can focus on what is around them rather than where their next step is on a stair. The Guggenheim Museum's ramp is the wrong model for it's function but the right one for my creativity centre.

Le Corbusier

Circulation in architecture is the way people move through and interact within a building. And dealing with a multi storey building, connection between levels is important.

There are two ways in architecture to connect levels, which is the stair and ramp. Both have their pros and cons, however, the ramp itself provides a further bodily experience in terms of the nature of the relationship between different levels.

Le Corbusier states in accordance to Villa Savoye, "By the pilotis one ascends surreptitiously via a ramp, a sensation totally different from one of a stair formed by steps. A stair separates one story from another: a ramp connects."¹(Figure 25)

Le Corbusier is implying that ramp provides an elegant transition between levels and that the stair acts to reinforce the distinction between two levels. The ramp which is a sloping plane tends to feel like a linking of two floors or areas and the stair is a series of steps along an angle of rise from one level to another.



Figure 25. Source: Le Corbusier. "A stair separates one story from another; A ramp connects", from *Oeuvre Complet de 1929-1934*, p.25.

The elevation of the stair and ramp shows on a visual level that difference in how the connection between levels is achieved. According to the bodily experience the 'stepping' action needed to use a stair exaggerates the separateness and distinctness to two different floor levels.

With the stairs the user would have to look down at the stairs while stepping down before being able to observe their surroundings. Unlike a ramp where it is a sloped plane, the user is able to observe their surrounding increasing the opportunity for visual connection.

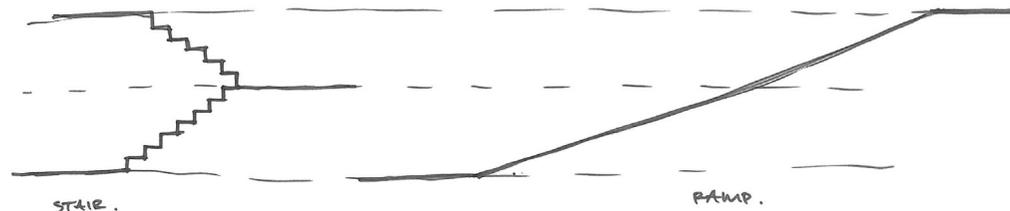


Figure 26. A sketch showing the difference between a stair and ramp in connecting two levels.

¹ "Le Corbusier and Pierre Jeanneret, *Oeuvre complete de*, 1929-1934 (Zurich: Girsberger, 1941), p. 25

New Zealand Building Code

D1 Access Routes

The Compliance Document for New Zealand Building Code has a set of guidelines for the construction of ramps under Clause D1 Access Routes. These would also determine any limitations towards the ramp design such as material use, safety, and slope.

The first part of this document has an extract from the New Zealand Building Code contained in the First Schedule of the Building Regulations 1992. This deals with the general requirements and performance of the access route.

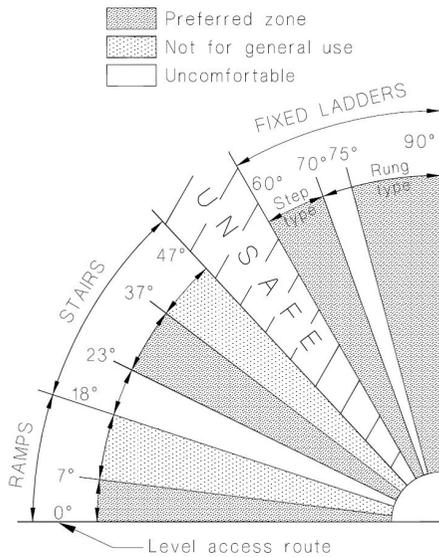


Figure 27. A diagram from D1 indicating the range of angles allowed and for what purpose.

According to D1 Access Routes, these are the limitations and requirements for the ramp design. (Figures 28 and 29.)

Type of ramp	Maximum slope
Accessible ramp	1:12
Common ramp subject to wetting	1:10
Common ramp normally dry	1:8
Service ramps	1:3

Figure 28.

Ramp type	Maximum rise between landings (mm)	Length of landing (mm)
Accessible	750 ⁽¹⁾	1200
Other	1500	Ramp width but need not be greater than 900

Note:

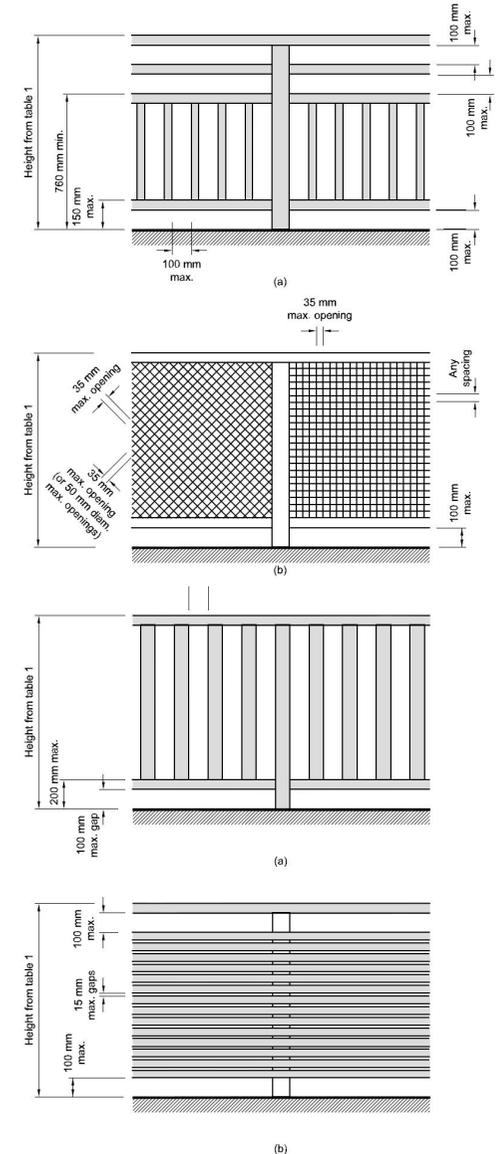
- 750 mm is the reasonable maximum level difference for a person to negotiate in a wheelchair.

Figure 29.

F4 Safety From Falling

The objective of this provision is to safeguard people from injury caused by falling and that buildings shall be constructed to reduce the likelihood of accidental fall. And the performance of F4 is based of where people could fall 1 metre or more from an opening in the external envelope or floor of a building, or from a sudden change of level within or associated with a building, a barrier shall be provided.

According to F4 the minimum barrier height for the ramp within my building needed is 1100mm. And this measurement is taken vertically from finished floor level (ignoring carpet or vinyl, or similar thickness coverings) on ramps.



Figures 30 + 31. Types of barrier construction suitable for in areas likely to be frequented by children under the age of 6.

3.0

Design

3.1 Current Design

This is the current design of the proposed ramp within the building. It's main idea is to provide a seamless connection between levels and also be wide enough to be able to cater for people to "spill out" onto the ramp from their spaces. This encourages chance interactions and collaborations between the people working and learning in the spaces with the people exploring the building.



Figure 32. An internal perspective view of the ramp and atrium.

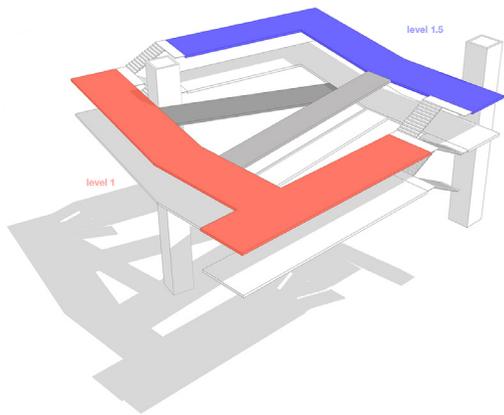


Figure 33. Diagram of the concept of split levels and the ramp bridging the two.

Split Levels

The ramp is the main connection between the split levels of each floor. Therefore, the ramp only needs to provide a rise height that is have of a floor to floor height.

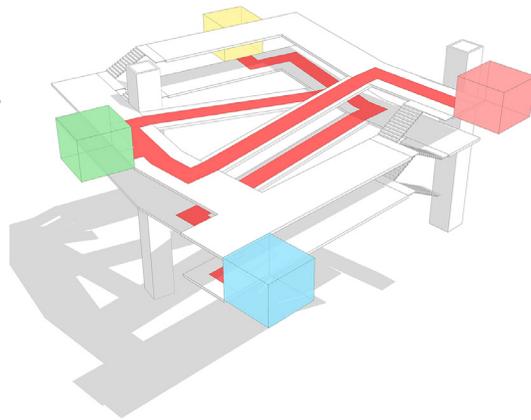


Figure 34. Diagram of a typical journey and connection from one space to another through the use of the ramp.

Connection

To get to spaces on various levels and at different areas of the building, the ramp is the primary circulation route to reach these destinations.

3.2 Develop Design

Taking into account the case studies of buildings using ramps and what literature says about the experience and construction of ramps, it has lead to a critique on the current design design.

Based on the case studies and literature discussed, ideas to explore are:

- the continuation of the ramp plane
- an assortment of level destinations at which the ramp can provide connection to
- the exploration of various ramp shapes
- the exploration of ramp widths and effects n the experience of the building
- ramp structure and materiality

This will lead to a development of the current design.

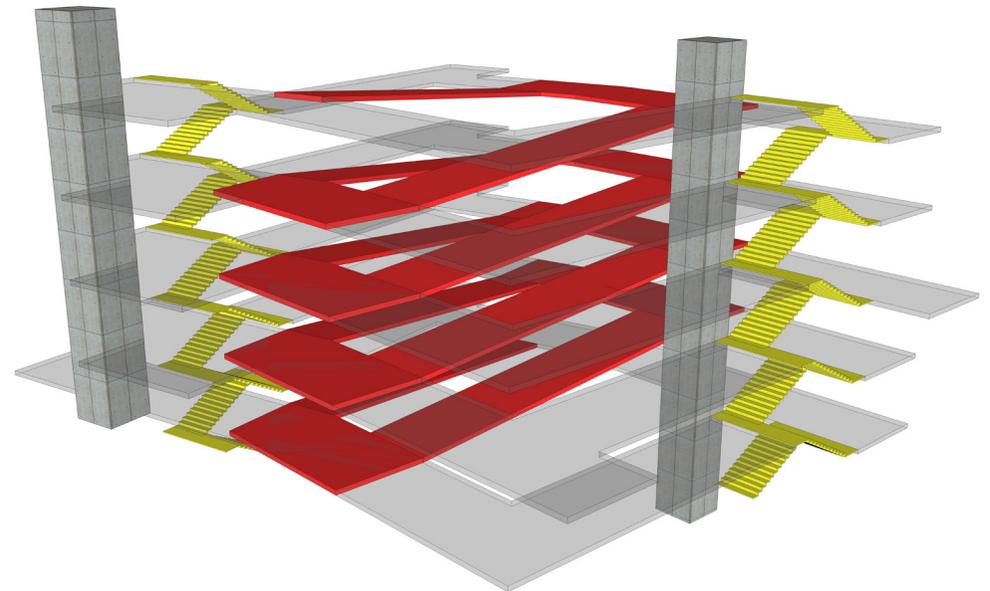


Figure 35. Diagram of the current design of the ramp.

3.1

The Ramp Design

The use of the ramp is important within my building. And accordance to Le Corbusier's view of the ramp, is an effective way to seamlessly transition two floor levels. In this building the ramp is the creative zone for individuals as it encounters random interactions between people while providing the right types of spaces for this to occur. (Figure 36)

Main ideas needed to emphasize in the ramp design such as the integration of the ramp with the spaces adjoining it, and how the ramp develops into more than just a "ramp" by being able to create spaces on its own.

The previous ramp design consisted of a large, straight, sloped plane. This didn't encourage any activity on the ramp and lacked the connection with the spaces it served to. (Figure 37)

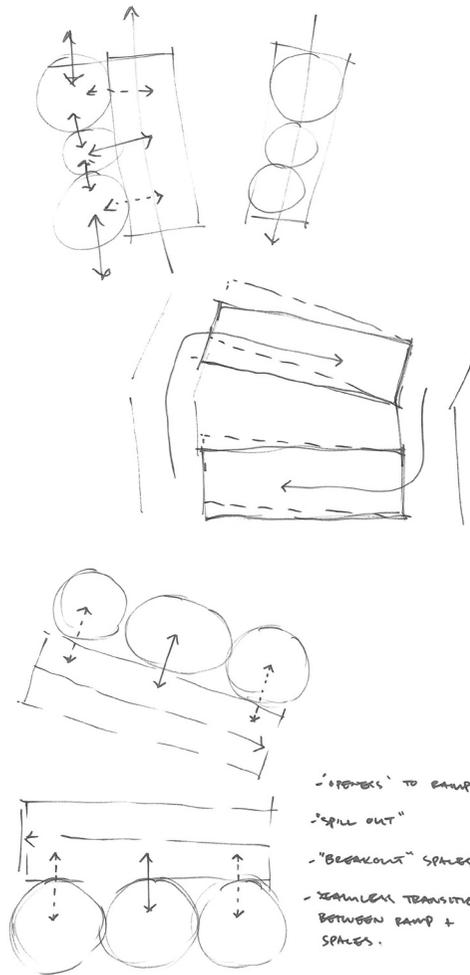


Figure 36. Sketches outlining the importance of the connection between space and the ramp.

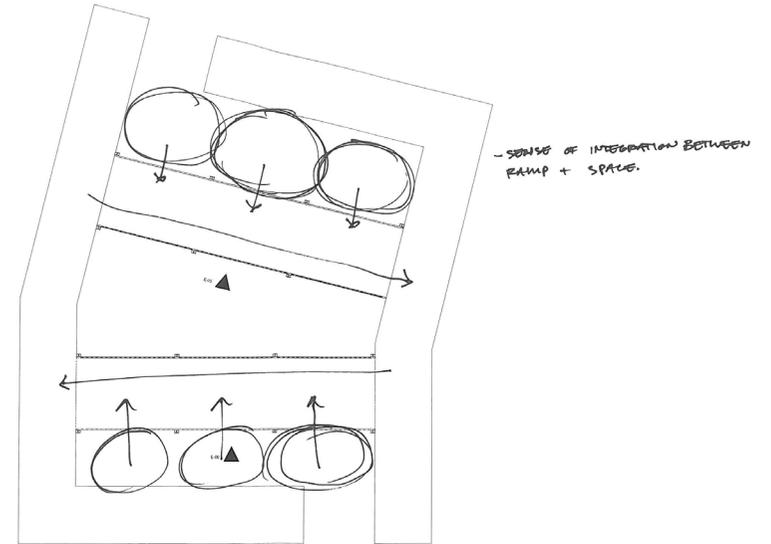
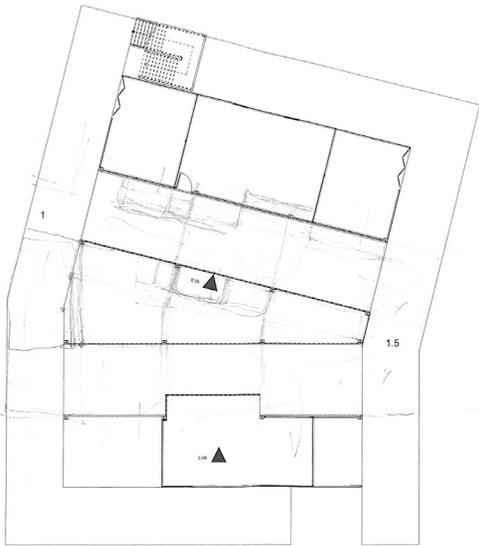


Figure 37. A plan of the current ramp design as it shows the lack of integration between ramp and space and the opportunities it did not provide.



The redesign incorporates the overlap between space and ramp and integrates the two. This breaks down the straightness of the ramp providing "pulses" and "points" on the ramp which opens up to spaces. (Figure 39)

- Possible spaces include:
- overlooking spaces
 - transitional spaces
 - rest spaces

How the ramp and the spaces connect is important to the experience of the user. The transition from ramp to spaces and vice versa has an effect on how the ramp is utilised. There are two transitions indicated within the new ramp.

Figure 38. A sketch looking for opportunities to break down the straightness of the ramp and finding links to the spaces the ramp provides to.

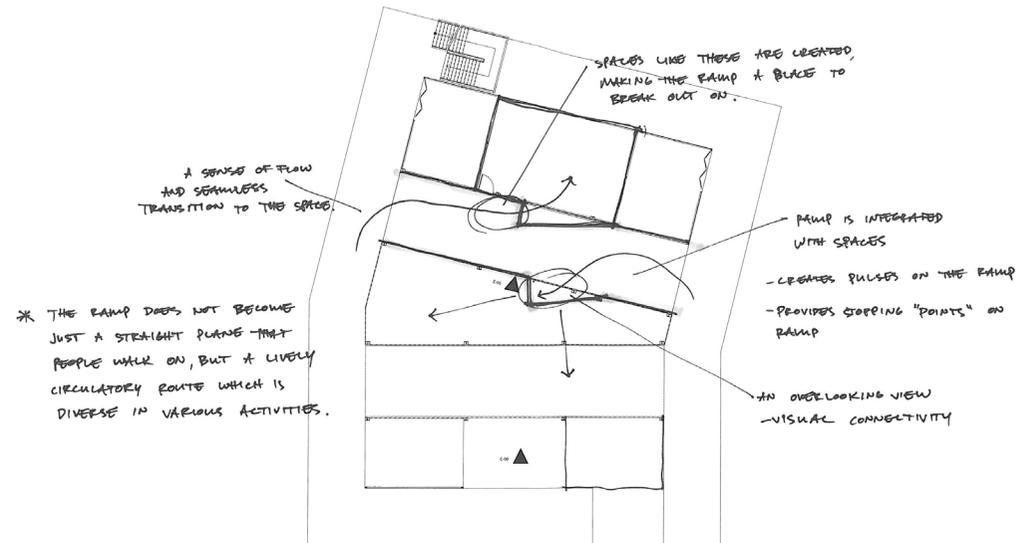


Figure 39. A sketch outlining the new main ideas in integrating space and ramp.

Transitions

Transition 1 takes the user from an upward incline of the ramp to a flat horizontal plane. The experience of space provides a destination for users, as if it was a stopping point on a climb.

Transition 2 takes a user from a downward slope to a flat plane. It is the subtle level changes from slope to horizontal plane providing a seamless transition from ramp to space and vice versa. (Figure 40)

The outcome is two different experiences. (Figure 41) This enhances how the ramp is utilized, rather than a straight ramp which butts up against a space which the previous design did.

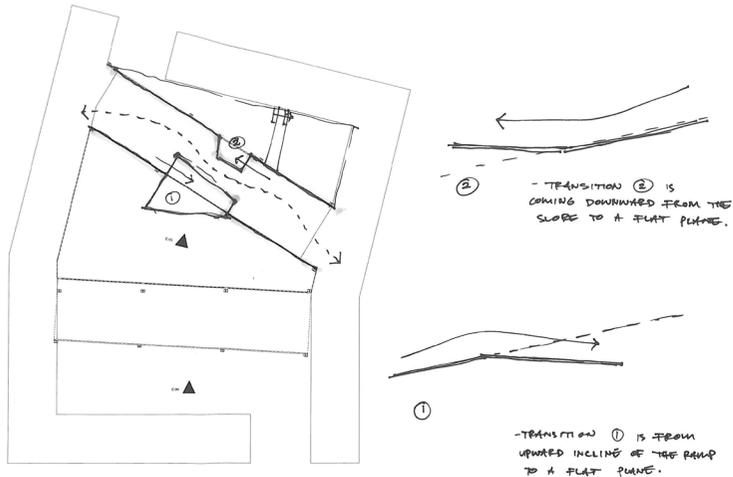


Figure 40. A sketch indicating the two types of transitions between the space and ramp.

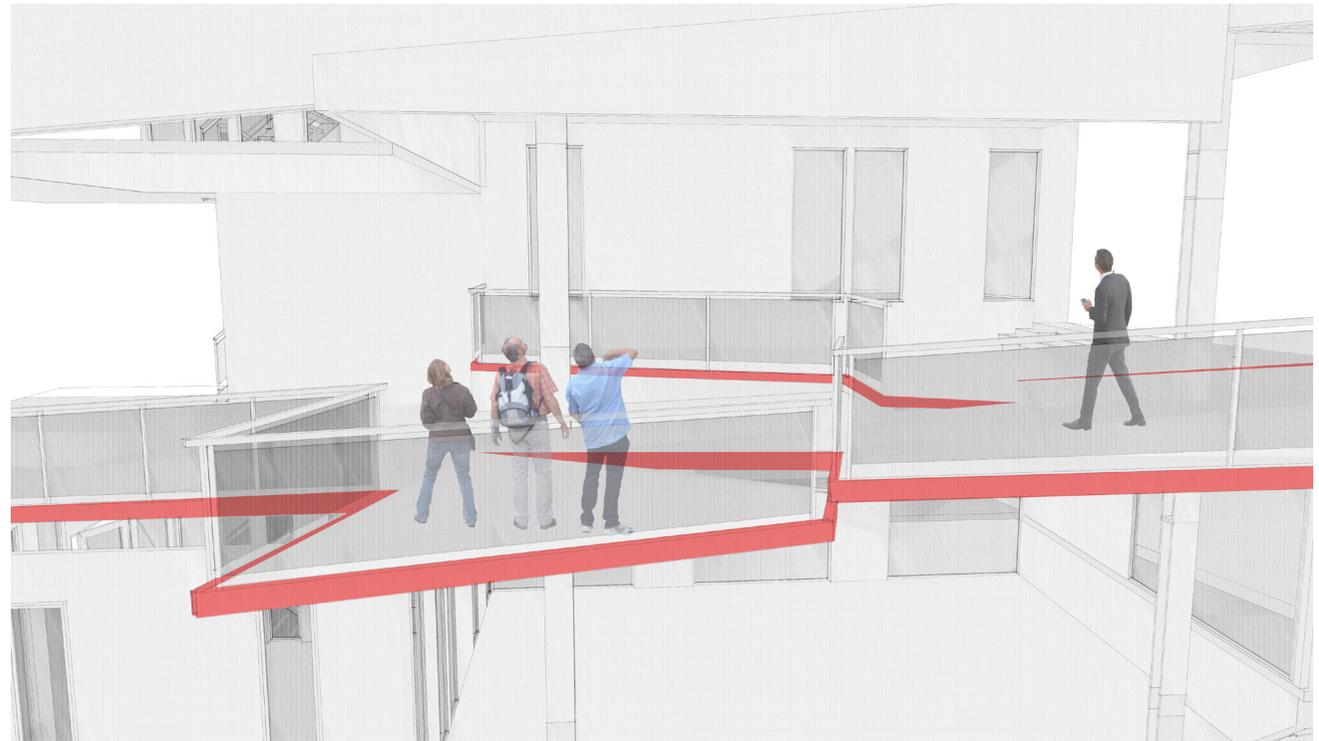


Figure 41. A perspective view on how the transitions can be used as it creates active space for people.

Materials

The structure of the ramp consists of using universal columns as the primary structure of the ramp. A Parallel Flange Channel would then be used to provide the lateral support. All steel members are to be intumescent painted according to the fire protection report.

The ramp plane is to be constructed of Tray-dec as it provides a thin profile and works well with the PFC installed. The floor finish is to be broomed concrete and in accordance to D1 Access Routes there should be a slip resistance of not less than 0.4. (Figure 42)

The balustrade consists of steel post and rail with panel inserts and must comply with F4 Safety from Falling with a minimum barrier height of 1100mm.

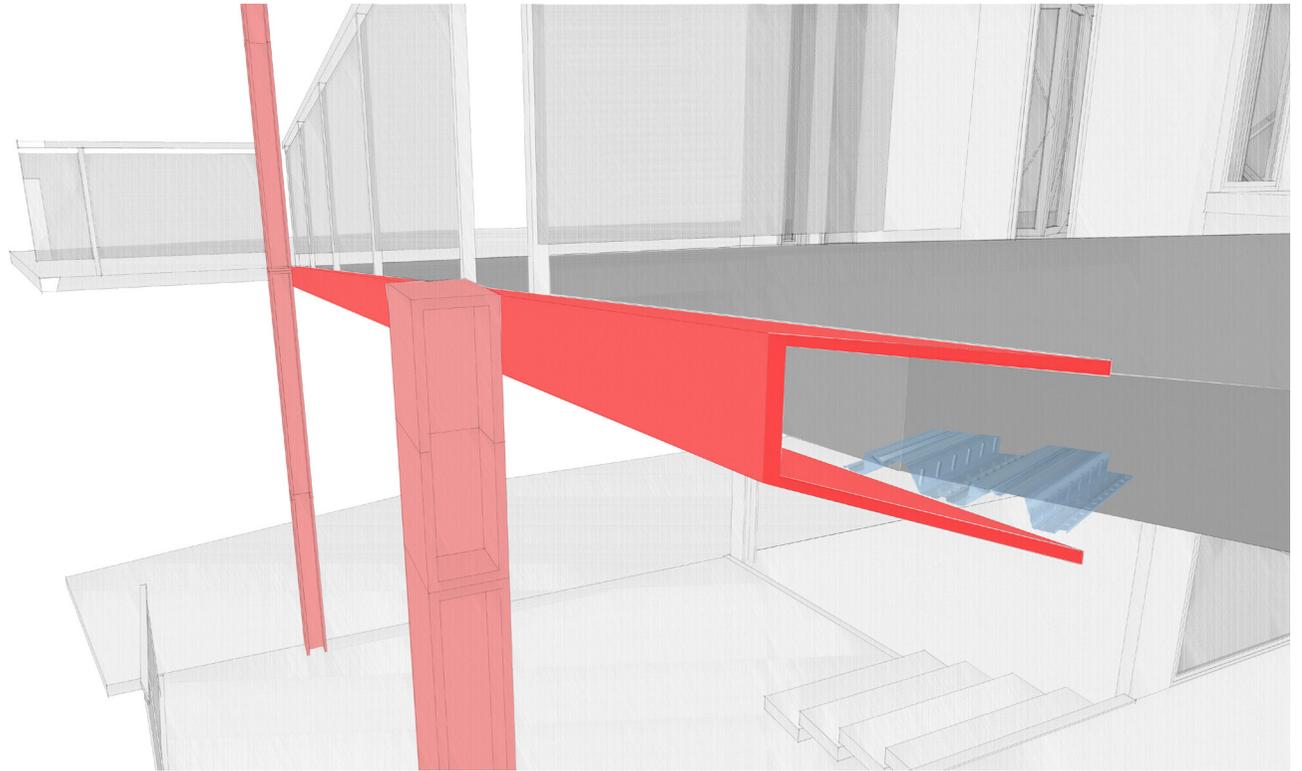


Figure 42. A view showcasing the materials used to construct the ramp including universal column, parallel flange channel, tray deck, and concrete.

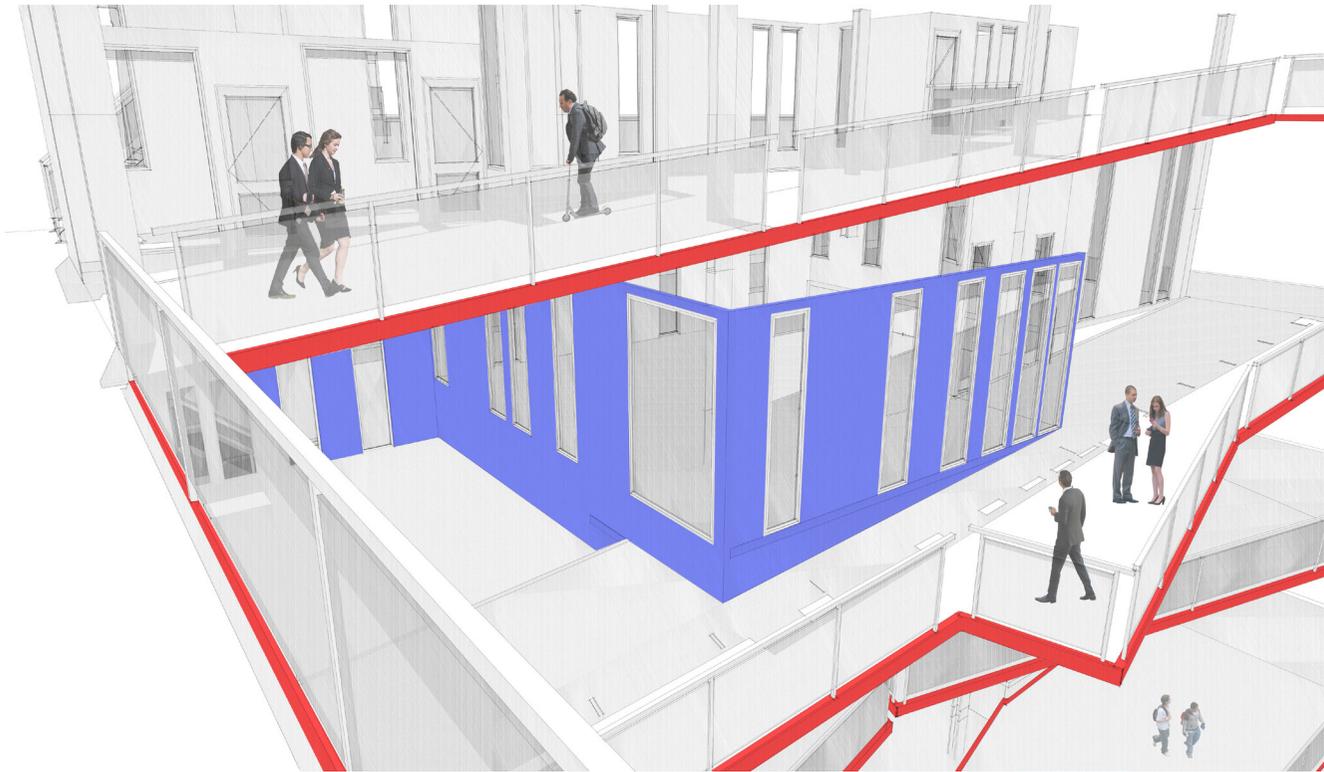
Children's Ramp

The overall layout of the creativity centre is to provide spaces for children and adults to engage in. How the ramp is shaped and designed has an effect on this. The first two floors are primarily for the children, and the further you go up floors, it tends to merge to an adult occupied zone.

The children's ramp tends to be more open and wider where there are less defined spaces to occupy, rather more open to the ramp. This gives children space and movement around these areas. Another benefit is that groups of children can occupy a particular space and be engaged with their surrounding environment. Adults can then overlook these spaces and can choose to engage with them. (Figure 43)



Figure 43. Perspective of a typical children's ramp.



Adult's Ramp

From the third level up the ramps change from being wide and open to thinner and enclosed. This is due to the adults primarily occupying these floors. Circulation is still the key here for interaction and chance interactions, but a wide ramp is not necessary. (Figure 44)

The office spaces are enclosed though open office spaces flow out towards the ramp. This still provides destinations and points on the ramp for adults. Breakout spaces, and overlooking spaces can also be found here.

Figure 44. Perspective of a typical adults ramp.

Overall Design

The ramp now has a multi purpose rather than just simply put for vertical circulation purposes. It has developed into an active ramp.

Compared to the previous design, this redesign has many spaces provided which incorporates and promotes the function of the building. As a creative centre for both children and adults, the connection between floor levels is important to stimulate them into being more creative. (Figure 45)

Primarily the ramp was vertical circulation, to get users from one level to another. Now, the ramp is able to transition seamlessly, just like how the connection between ramp and spaces in the Solomon R. Guggenheim Museum. The ability to travel through a ramp and to arrive to a destination smoothly is important. It gives the users the most opportunities to be able to engage with their surrounding without having to worry about looking down on where they are going.

Spaces on the ramp are the product of these transitions between space and ramp. These pockets of spaces break the ramp down into points, or smaller "destinations". Unlike previously where the ramp was a long plane with "destination" points on either end, it did not stimulate the users to pulsate. With the spaces created on the ramp, "pulses" are created for the users. How they experience the ramp now provides them with overlooks, seating, and small breakout spaces which helps activate the ramp and promotes interaction. (Figure 46)

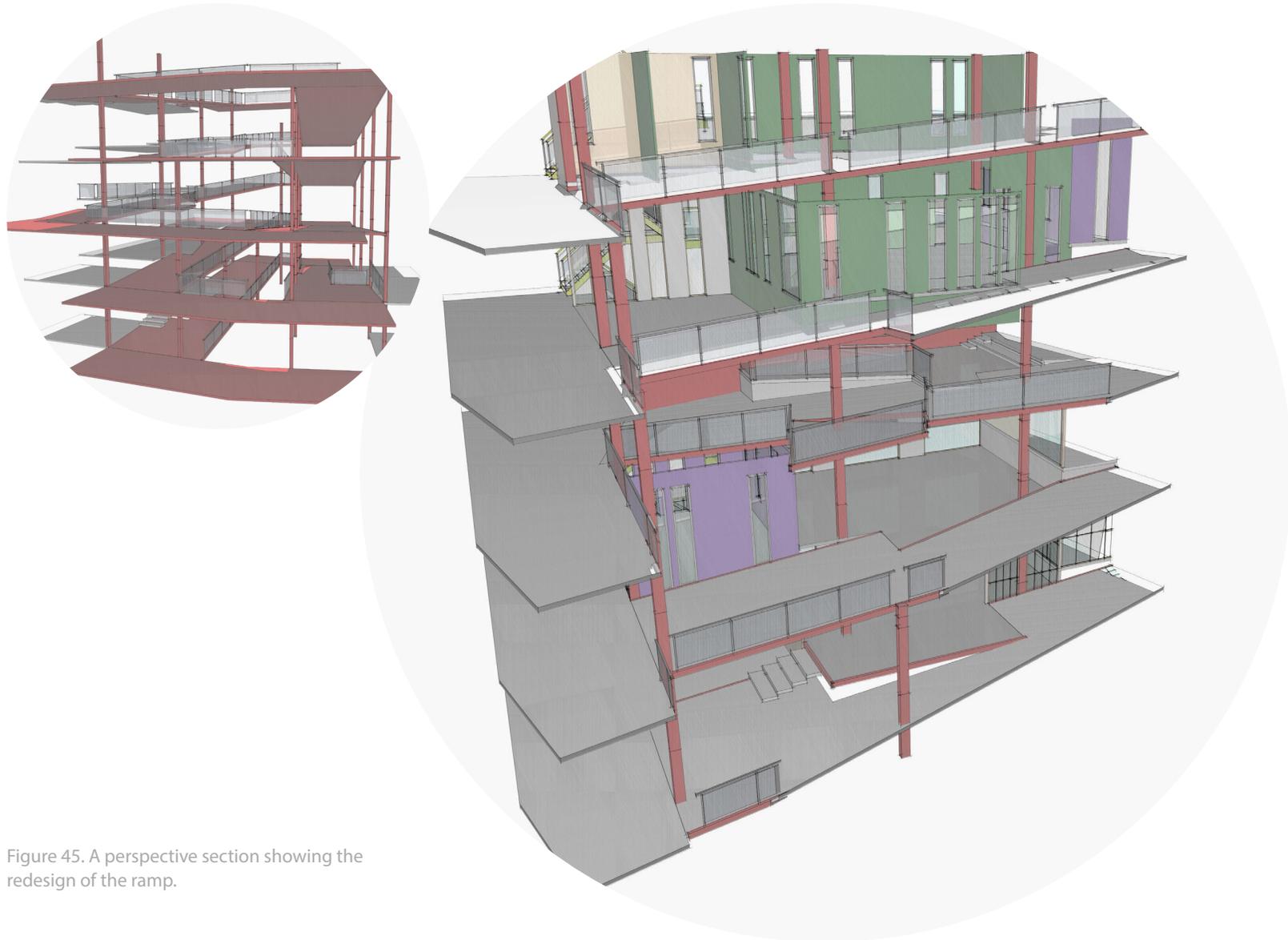


Figure 45. A perspective section showing the redesign of the ramp.

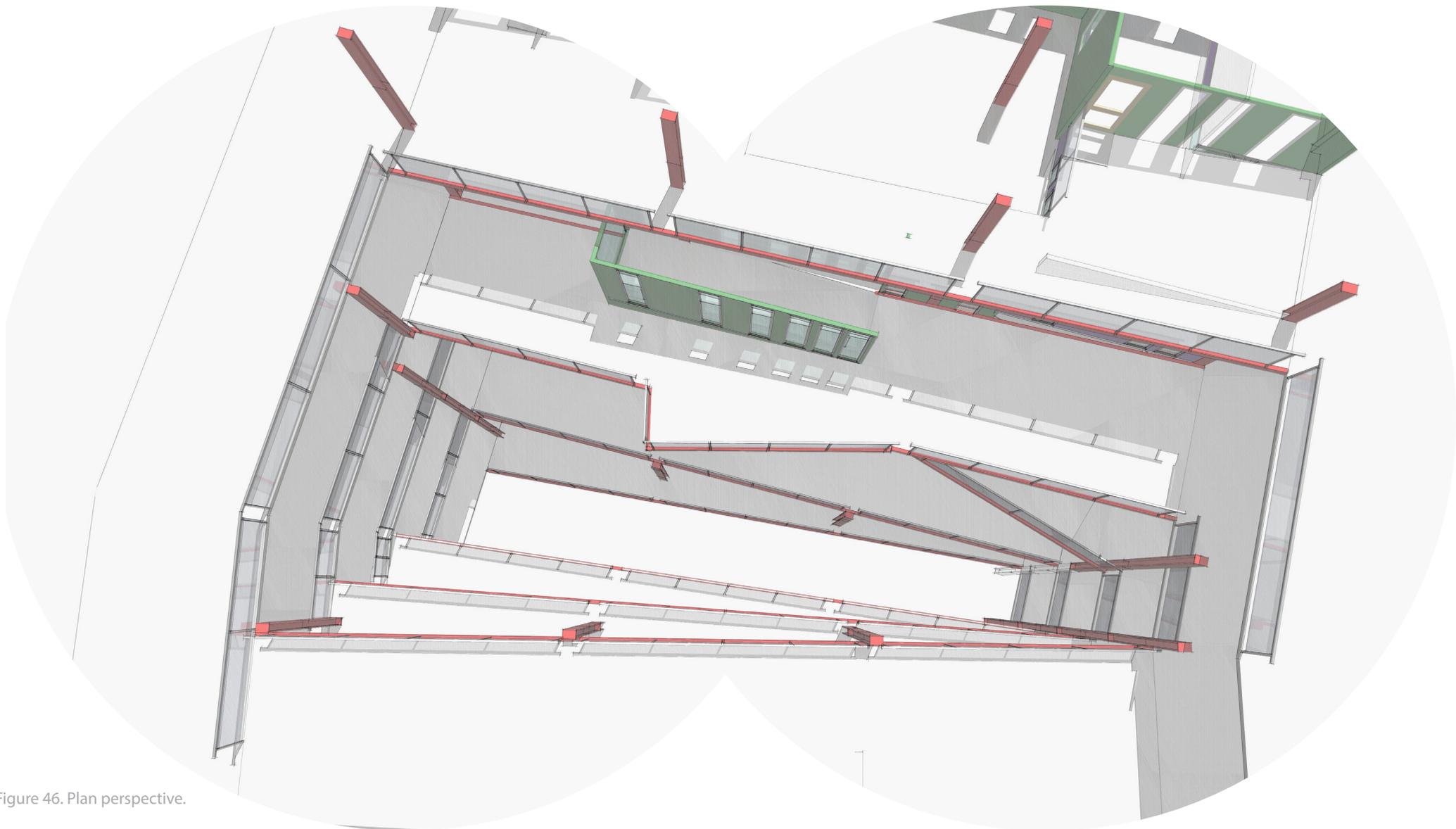


Figure 46. Plan perspective.

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