



A Study of Spatial Layouts for the Solomon R. Guggenheim Museum

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Abstract

This study aims to understand Gwathmey Siegel and Associate Architects, expanding the building's Wright concept in 1992. Museums were complex systems that seemed to affect visitor movement patterns stochastically in spatial layouts, thus influencing perception and experience. The paper implies Wright's introduction of three key concepts to the design of the Guggenheim; shaping how people move around its layout, assessing gallery arrangements as different social spaces, and maintaining an important role in visitor interaction in arranging spaces and artwork. Some findings also point to disappointments: the study finds that most visitors used the ramp to move in the area, contrary to Wright's concept of visitors moving up and down the ramp (main gallery). Thus, during the upward journey, more significant interaction with the artwork occurred. Visitors had little or no engagement with the art on the way down, preserving frequent contact with the atrium. Findings also question Peponis (1993) reflective research on the museum's impediment to stochastic spatial effects on the configuration's discovery and interaction. Visitors often stopped and took photos of the space, themselves, and their friends, even at different ramp levels.

Disciplinary: Architectural Engineering.

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1 Introduction

In New York, the Guggenheim Museum was designed to support the art collection of its founder, Solomon R. Guggenheim, by Frank Lloyd Wright. Wright was an environmental expert in

Organic Modern Architecture, so the museum engages in an apparent interaction between the downtown Manhattan city grid and Central Park's secret natural expanse (Srivastava et al., 2014).

The museum was named "The 20th-Century Architecture of Frank Lloyd Wright" (UNESCO, 2019) among eight properties on the World Heritage List (Tareen, 2019). The museums are structured around continuous spaces that implement a kind of story. The storyline in the Guggenheim is a revolution that represents Wright's ideal of space and material continuity. Thus, architecture is incorporated by structuring space to obtain intended impacts on users' perceptions and experiences (Siry, 2009).

Space syntax findings have shown that spatial layouts are likely to influence moving people and interaction patterns. This quantitative area analyses the general functions that go beyond a particular type of building and has proved very helpful in understanding motion patterns, awareness, and user social events (Peponis, 1993).

The spaces are different depending on the roles and functions of the user. It may differ in size, capability, interior equipment, transparency, and other conditions. As many spaces are combined to create a responsive complex for such purposes, the variety of these spaces leads to unusual architectural layouts. This study's objectives can be achieved by analyzing building planning based on the degree of permeability and wayfinding through various users. It is anticipated that the different building users may have different levels of permeability and wayfinding experience (Munir et al., 2019).

This study's purposes can be obtained by analyzing space design based on the permeability and wayfinding of multiple users. It is anticipated that users will experience different degrees of building permeability and wayfinding. The spatial layout of building typologies was evaluated in these findings, allowing users to see the collection of displays in a single continuous movement. The study's objectives are the following:

- i. The spatial layouts of studies are described by spatial syntax analysis in each consumer group.
- ii. To evaluate the space syntax of a research study for the movement patterns of users around the buildings.

2 Literature Review

2.1 Space Syntax

According to research by Tan et al. (2020), space syntax is a human-focused approach technique that lets people recognize the relationships between human experiences and spaces within an inhabited space (Lynch, 1986). It can estimate the socio-spatial data used in specific areas such as buildings or even on a larger scale like the whole city. In this study, the space syntax approach analyses the space's depth inside the original layouts (Rahaman et al., 2009). The level of permeability and wayfinding of the building is precautionary, although people can understand the level of wayfinding (Yusoff et al., 2019).

According to Hillier and Hanson (1984), the coherent system allows individuals to find their way into a complex building based on the relationship between local and global spatial characteristics. Immediate visual stimuli can provide insights into what is outside the primary visual field in an intelligible environment. However, local visual indications do not relate or deliberately mislead in an incomprehensible environment to their larger spatial structures. Intelligibility, the connection coefficient between connectivity and integration, helps define how effective it is for those in a local role to understand the overall structure (Al Sayed et al., 2014).

2.2 Case Studies: The Solomon R. Guggenheim Museum, New York, USA

The Solomon R. Guggenheim Museum is at 1071 Fifth Avenue in East 89th Street in Upskirts of Manhattan, New York City. The museum is also known as The Guggenheim. It is designed for public purposes (Foundation, 2024).

This building was designated by Wright as a modern gallery and was designed for the general public (Levine, 1998). The German consultant and future director, Hilla Rebay, designated it for the memorial of the founder of the Guggenheim Foundation. Hilla Rebay exhibits his work and his direct future relation with the avant-garde abstract art of Europe.

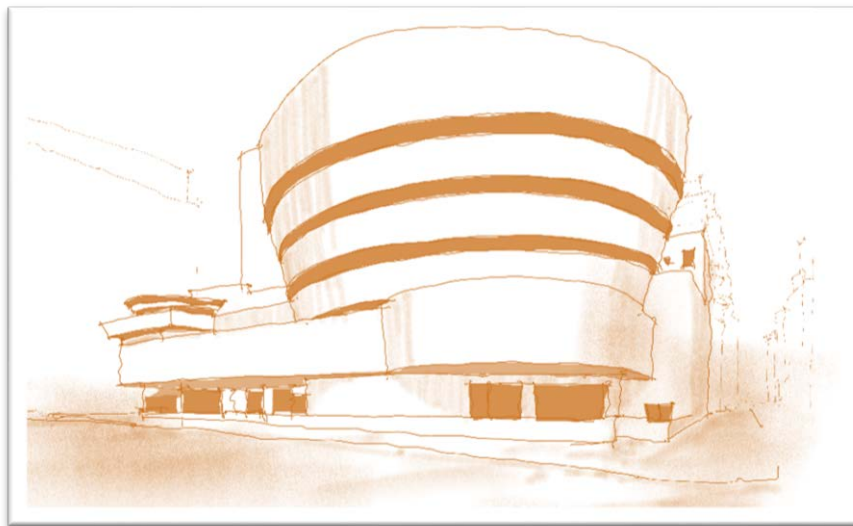


Figure 1: Solomon R. Guggenheim Museum, New York.

The design process was a long one, with four significant iterations called schemes A through D, and several modifications to Scheme A. Ideas remained in writing from June 1943 to early 1944. The first preliminary studies were submitted following the construction site's acquisition on 5th Avenue in Manhattan in March 1944. Levine (1998) stated that the same party was the basis for all these systems. The exteriors were differentiated only in geometry and the bright colors of marble. The main feature was an 8-story rise 'occupying the right half of the building in the center of which galleries were located around an open atrium, overlooking a glass dome.

In 1944, the "A" scheme showed two central circular volumes – the south and the administrative tower in the north, and a third one, a narrower cylinder, with an elevator that soared

to the west of a tower in the gallery (Levine, 1998; Pfeiffer, 1986; Siry, 2009; The Guggenheim, 2009).

At a 1945 press conference in New York City, a displayed model brought a significant change to the "A" scheme, namely that the two towers were turned north-south and the smaller cylinder rotated 30 degrees. The lift was probably the essential element of the design, surrounded by a slower ramp. After this presentation, several reviews were done, and the two main volumes were returned to the original N-S orientation in particular.

Following Solomon Guggenheim's death in 1949, the remaining construction site was bought. The foundation began to change direction leading to the resignation of Rebay and the job in 1952 of James Sweeney, former curator for the Museum of Modern Art (MoMA). Wright and Sweeney disagreed with improvements in the museum policies and schemes, particularly for the hanging of paintings. Construction started in 1956 with some more changes. Wright died later that year when the museum opened.

2.2.1 Schedule of Accommodation

In addition to Wright's imagined circulation layout, the interior is highly regulated with visitor visitors almost entirely separated from the outer visual interaction and put in an independent environment that is taken off the road, which was the only previously designed Wright project with a similar circuit in the VC Morris Gift Shop (San Francisco from 1948 to 1949) (Siry, 2009).

The monitor, the tour offices, staff rooms, and (subsequently removed) the Solomon and Hilla apartments, if a labeled space can reproduce specific kinds of social relations and power between different users (Markus & Cameron, 2002). After the renovation in the 1990s, when former offices were turned into exhibition spaces and shops, retaining their central gap, the previous vigilance of higher-level hierarchical staff in the upper floors over those employed below was replaced by that of security guards and staff in the ground-level store customers, often drawing potential shoppers from the upper galleries.

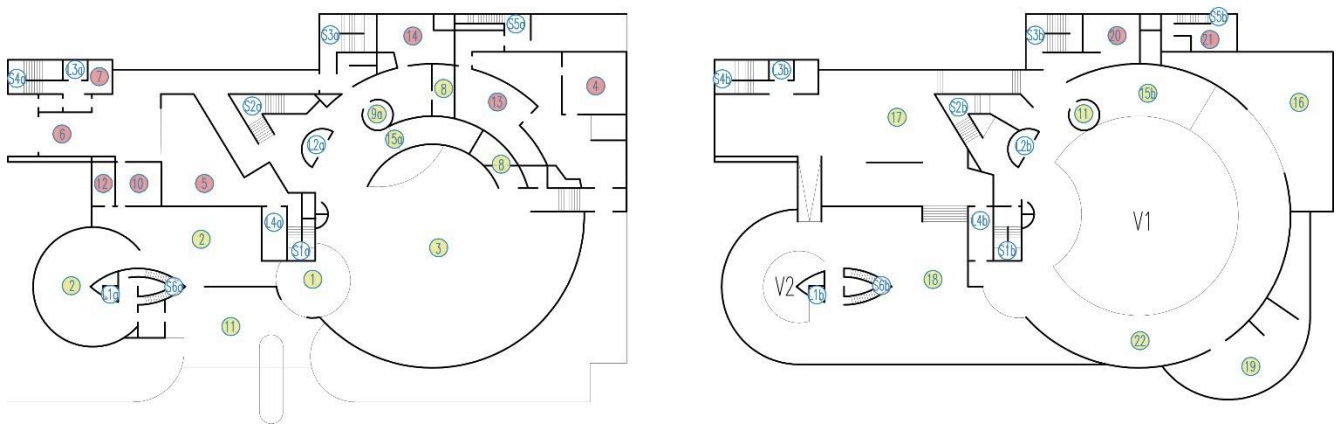


Figure 2: Ground (left) and upper main floor plans(right) by Gwathmey Siegel and Associate Architects.

Table 1: Schedule of accommodation for the ground floor and upper main floor.

No.	Name of Spaces (Ground Floor)		No.	Name of Spaces (Upper Main Floor)	
1	Entry vestibule	9	Restroom	15	Ramp/exhibition
2	Retail Store	10	Inspection	16	High Gallery
3	Atrium/exhibitions	11	Loggia	17	Exhibition
4	Conservation	12	Storeroom	18	Permanent collection
5	Loading dock	13	Storeroom	19	Reading room
6	Receiving	14	Storage area	20	Security
7	Control room			21	Office
8	Locker room			22	Temporary exhibition

3 Research Methodology

This work employs quantitative survey using the space syntax graph illustration. The literature review examines the space syntax and the building typology study to provide general data on the case study.

Next, the case study analysis was done by observing the spatial networking using the measurable scale graph (McLane, 2013). This method also has been used in the study by Hassan and Mustafa (2010). The diagram indicates the level of permeability and wayfinding of the spaces in the Solomon R. Guggenheim Museum.

An appropriate method of research must be established to analyze spatial networking. This research was carried out using a level of movement justified graph to show both the level of permeability and wayfinding of the spaces present in each case study. The graph is taken from an earlier survey of Hillier and Hanson's early Ottoman Mosque architecture (1984).

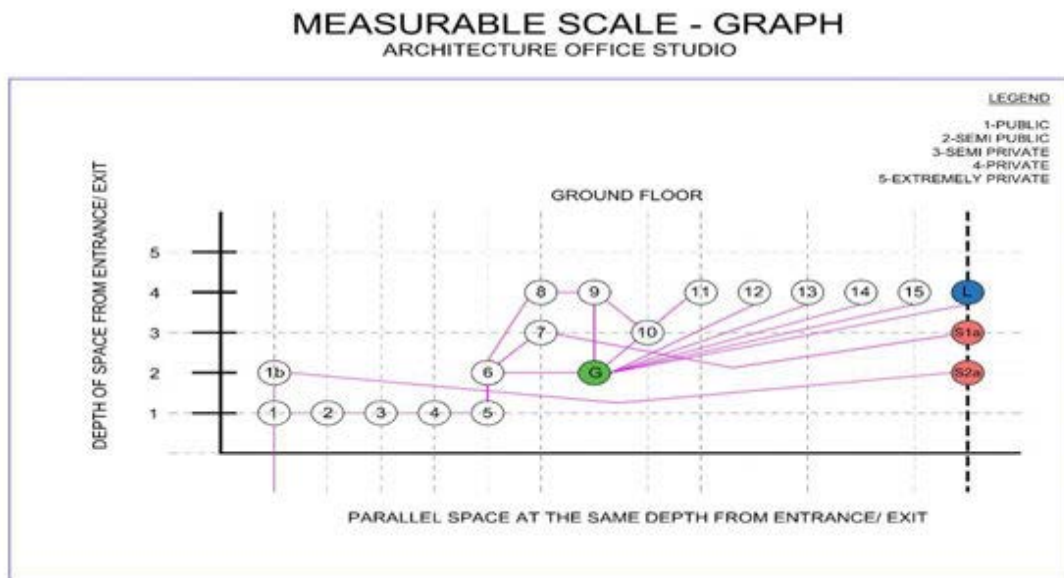


Figure 3: Example of a measurable scale graph used for space syntax.

The vertical scale reflects the permeability ratio from 0 (Entry Level) to 8 (Most Private). Each number in the circle refers to a space marked with the same number on the building's floor plan. The horizontal axis is used to match several areas of the same depth. Finding more than one space on the same level sometimes does not always imply that area before branching paths. The different lines linking the circles show that there is a relationship between the associated spaces.

Figure 3 shows the scales in the graph differ, given the different depths of access between

the entrance to the site and the building entrance. Generally, the higher the number, the lower the permeability, and the higher the depth of space.

3.1 Method of Analysis

The spatial structure of the building shall be analyzed by category of user. Two primary types of users (visitors and staff) have been identified for the museum. Each user category will have a graph showing their respective flows throughout the building. Where possible, the case studies' spaces have been labeled based on the technical information made available by the architects or the building owners. However, in some situations, the researcher's logical reasoning is used to infer the spaces' functions for this analysis.

3.2 Synthesis of Data (Findings)

After evaluating each user's permeability levels separately, each user's depth of entry to the building is assessed between these categories. Based on analysis and graphs, the space network's positive and negative factors are recorded after that.

A comparison will also be made to the museum's spatial structure to consider its visitors. This research would provide some recommendations based on the interpretation of the origins and assumptions of the literature. It could also reflect the real design intentions of the case study architects. But it follows the space syntax analysis conventions.

4 Result of Analysis

The level of permeability and wayfinding, divided into individual floor plans, ground floor plans, and upper floor plans, was studied in this study. The Solomon R. Guggenheim Museum is a space with extensive connectivity and has many connections to other areas. This building's types of use define the study of the level of permeability and wayfinding. The types of users are:

- i. Visitors (unauthorized access)
- ii. Staff (authorized access)

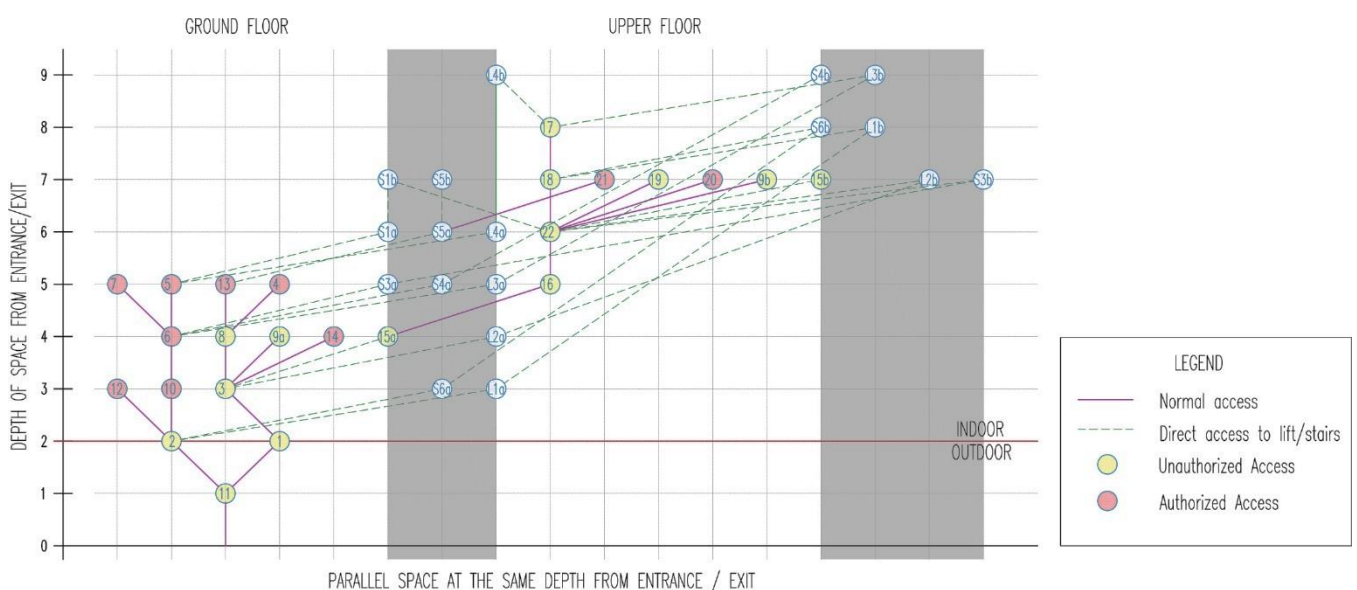


Figure 4: Overall measurable scale graph – Justified graph for visitors (unauthorized access) and staff (authorized access) of the Solomon R. Guggenheim Museum.

The general floor plan is illustrated in the measurable overall graph (Figure 4). The ramp merges with the building and connects to many spaces. Therefore, people can move through the ramp and along to the atrium. Each of the areas relates to the atrium. This type has positive implications and a high number of routes. Each space connects to the atrium, and people can choose various ways to move. Thus, the path selectively is very high.

4.1 Ground Floor

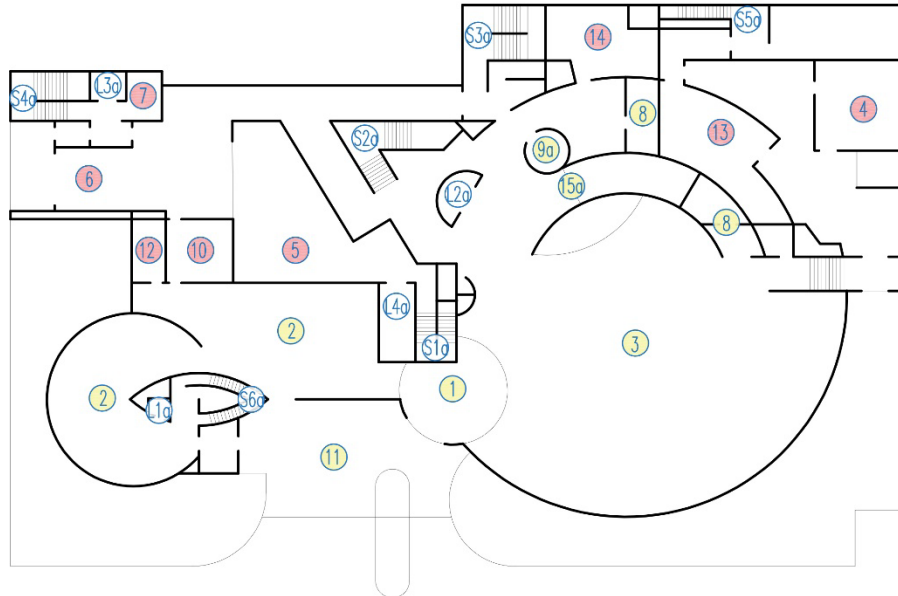


Figure 5: Ground Floor Plan indication.

Table 2: Schedule of accommodation for the ground floor.

No.	Name of Spaces (Ground Floor)	
1	Entry vestibule	9 Restroom
2	Retail Store	10 Inspection
3	Atrium/exhibitions	11 Loggia
4	Conservation	12 Storeroom
5	Loading dock	13 Storage area
6	Receiving	14 M&E room
7	Control room	
8	Locker room	

The visitor will need access to a building through the main entrance near the loggia(11) area with a retail store(2) area before entering the Solomon R. Guggenheim Museum. Then the visitor will enter through the entry vestibule(1). Visitors then stand directly in the middle of the atrium/exhibition (3). It is considered a public area because space has been created in the communal areas and ramp(15a) where the visitors circulate to the upper floor.

Meanwhile, the staff's circulation has the same entrance as a visitor. Still, the difference is that the staff will have more choice of access to the private zone area, specifically only for the authorization section area. The authorization section area consist of the storeroom(12), inspection(10), loading dock(5), receiving(6) and control(7).

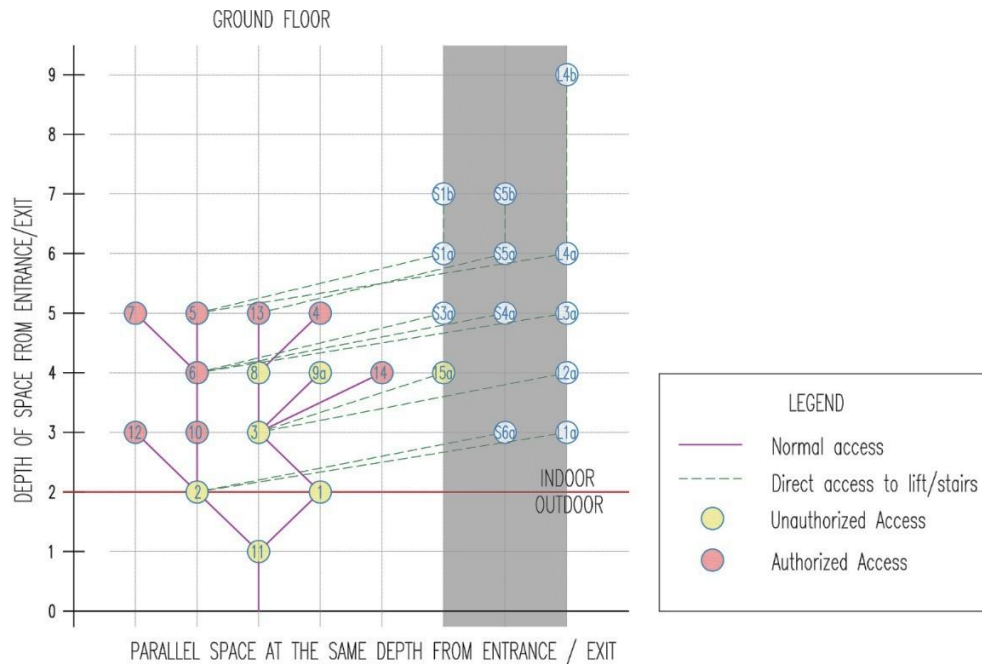


Figure 6: Justified graph for the staff and visitors circulation in the Solomon R. Guggenheim Museum ground floor

Figure 6 shows the level depth of space for the staff is at 5, while for the visitors is at level 4. It, therefore, shows that wayfinding for the staff is at a difficult level other than the circulation of visitors where the visitor's wayfinding levels are simple.

4.2 Upper Main Floor

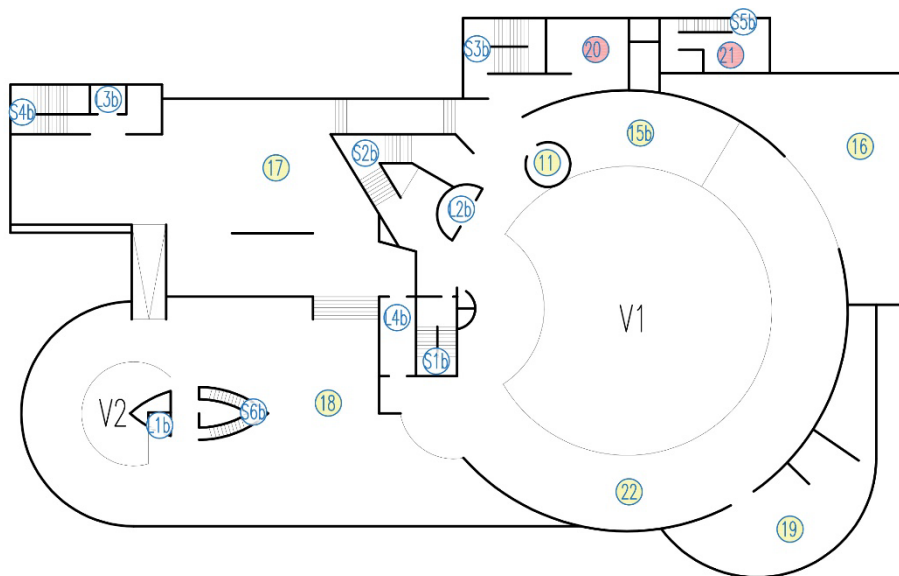


Figure 7: Upper Floor Plan indication

Table 3: Schedule of accommodation for the upper main floor.

No.	Name of Spaces (Upper Main Floor)
15	Ramp/exhibition
16	High Gallery
17	Exhibition
18	Permanent collection
19	Reading room
20	Security
21	Office
22	Temporary exhibition

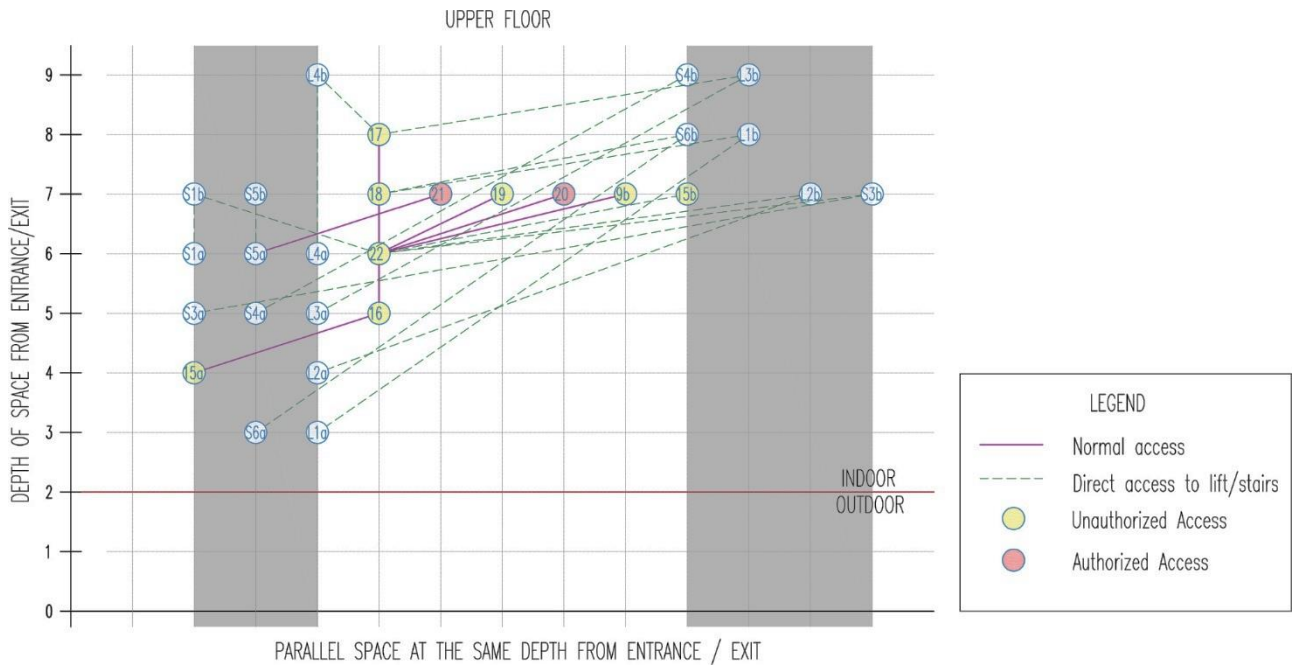


Figure 8: Justified graph for the visitor's circulation in the Solomon R. Guggenheim Museum's upper floor.

The visitor is accessing through the main ramp(15a), a public zone area on the upper floor. From the main ramp(15a), the visitors will have to route their journey into another space and find their way. Visitors can have various choices to enter any room they want. For example, they can go for a semi-public zone consisting of a high gallery(16) area and a temporary exhibition(22). At this stage, the visitor has a multiple choice of routes to go to a particular area. It consists of a permanent collection(18), reading room(19), ramp(15b), or even a restroom(9b).

For the staff circulation, there are only two rooms that have been designed exclusively for authorization purposes. Security(20) room and office(21) is considered the most private area on this floor level.

Figure 8 shows that the depth of space for staff is at level 7 on this floor while the visitors are at level 8. Thus this shows the depth level of wayfinding is straightforward.

5 Discussion

The research reveals that the accessible and visible properties of the spatial layout form behavior patterns. Space connectivity and the permeability of space are the basis of this research. A study of user usability has tested the wayfinding pattern of the Solomon R. Guggenheim Museum. This research focuses on locating people in a complex public building in the Museum of Solomon R. Guggenheim. It is not possible to reach all the places inside the building. Only the facilities' consent and permission and the building's private areas provide entry to those spaces.

On the ground floor, the highest depth of space is at level 5, revealing that the ease visitors can access the building is minimal. The graph showed that the degree of permeability was adequate, and there was good accessibility for wayfinding. There are also private areas at the back of the house for service and repair.

At the upper floors, the highest possible depth level is 8, indicating a high level of accessibility for someone attending the event. The conclusion is that the area on the upper floor is

semi-public and moderately accessible by specific visitors. The semi-private spaces are located on the upper level for visitors to explore, but some workers install and repair the facilities.

One thing to consider was the option to initiate the visit via ramp or elevator. Wright designed the art galleries based on the idea of spiral descent, wishing visitors would rise with the elevator, floating up to the glass dome above.

6 Conclusion

Building design planning is excellent for visitors and staff. For both users, the permeability and wayfinding are straightforward, so they may not understand the rooms' flow. Besides, because their access is only outside, they have easier accessibility than the visitors and staff.

For visitors, the permeability and wayfinding on the ground floor, from the outdoors to the museum, is straightforward. Even at the museum's ground floor level, the ability to understand the spaces' flow is good as it is direct. It only has lower permeability and wayfinding at the receiving area, which this area needs authorization to be accessed by the visitor. The spaces' arrangement for the visitors is more straightforward at the upper floor level as at some spaces such as a corridor, and they need to enter other spaces to reach there (exhibition and gallery). It is suitable for the public area because it has good permeability and wayfinding. So, the visitor may not lose, and they do not need a guide to explore at this level. At the upper floor level, there are just some spaces that need authorization to be accessed. So, even the permeability and wayfinding are good since it has a higher depth of space, but it is fine since it is not open access.

For staff, the level of permeability and wayfinding is lower as the depth of space is higher. The higher the level of the floor, the greater the depth of space at the entrance. However, they may not have any issues regarding their permeability and wayfinding because they understand the space better than the visitors. The main space for them to access the receiving area is located on the ground floor with direct access from the outside. So, the staff may have excellent experience in this building.

The space planning at the ground floor plan level will be better if the building has a different entrance for the visitors and staff. Visitors and staff also need to have separate circulation even if they access from the same area. It is essential to get their privacy, especially when the number of visitors is high, interrupting their movement.

Even though its pattern and symbolic nature relate to the 19th-century design of the museum, the unique and flexible characteristic of the Guggenheim visitor's movement offers an, unlike any other museum space experience, having a great context as people travel and see the piece of art on a continuous slope of the ramp, interacting simultaneously.

7 Availability of Data And Material

There is no information used or generated from this study.

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