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| **RESEARCH ARTICLE**

Research on the Plane Spatial Form of Economic Housing Based on Space Syntax Theory: Macau EDF. de Alameda da Tranquilidade as an Example

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| **ABSTRACT**

Since the reform and opening up, the city has steadily promoted the renovation of old maternity houses, towns and villages in response to the call of the state, thus promoting urban renewal, realizing urban economic development, industrial upgrading and people's livelihood improvement. The living density of economic housing is high, and the quality needs to be further optimized. However, the current urban renewal needs to improve the living quality of housing to serve the people. Therefore, when planning, constructing and renovating the interior space of public housing and meeting people's basic living conditions, people's intuitive feeling of the environment should be put first, rather than excessive attention to formal beauty—taking the EDF. de Alameda da Tranquilidade in Macau, as an example, based on the theory of space syntax, this paper conducts a convex space analysis and research on the interior space form of the first building of EDF. de Alameda da Tranqui-lidade, including the global integration degree, local integration degree (R=3,6), connectivity, intelligibility, control and Mean Depth, analyze the areas with higher integration, connection value and control value and lower areas, and make suggestions for future plane optimization, related The recommendations also apply to the second and third buildings of Yongning Plaza Building, providing better reference value and reference for relevant government departments.

| **KEYWORDS**

Space Syntax; Convex Space Analysis; Flat Space Form; Economic Housing; Macau

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1. Introduction
1.1 Location Analysis and Floor Plan
1.1.1 Spatial distribution in economic housing

EDF. de Alameda da Tranquilidade is located in the HR/HS area of Hipódromo in the northern district of Macau. It is adjacent to the entry and exit port and is an important northern gate from Macau to the mainland. The nature of the lot is government leased land. The total area of residential units is 13,155.77 square meters, the total land area is 7,452 square meters, the building height is 71.2 meters, the number of residential units is 880, and the number of office units is 12.

Floor arrangements and related uses are: the basement is for public parking, the basement is for offices and social facilities, the first floor is for social facilities, and the second to 25th floors are for residential use. The developer is Victory Real Estate Dvlpmt Company Ltd, and the general contractor is Xinmei Construction Engineering Co., Ltd. There are a total of 4 buildings with a height of 26 floors, providing a total of 880 economic housing units and 192 two-bedroom units. 352 three-bedroom units and 48 four-bedroom units.

The entrance of the first unit is No. 142 Alameda da Tranquilidade, the en-trance of the second block is 66E Rua da Tranquilidade, the entrance of the third unit is 94E Rua da Tranquilidade, and the entrance of the fourth unit is No. 209 Rua Direita do Hipódromo. The building is well-designed, and the basement is The public parking lot, the ground floor to the first floor is for offices and social

facilities, the ground floor provides greening and rest space, as well as transportation and commercial space, improve the social service facilities in the area, and optimize the living environment of the community. At present, there are Iao Hon Market, large supermarkets and many restaurants in the area, and there are facilities for daily life. At the same time, the transportation is convenient: adjacent to the bus terminal of Praceta da Serenidade, with multiple routes leading to the heart of Macau such as Avenida de Horta e Costa, Avenida de Almeida Ribeiro, Nam Van, Barra, etc. The social service facilities are complete, and related service facilities are provided, including kindergartens, mentally handicapped people Service center, youth and family service center, multi-purpose sports field (as shown in Fig. 1-6).

Fig. 1. Location map.

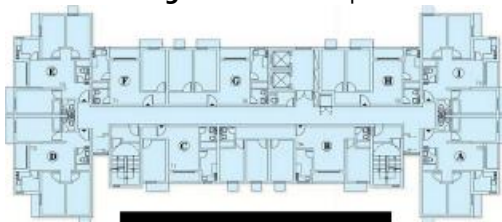**Fig. 2.** Ground Floor Plan.

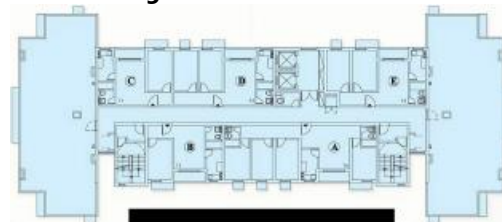**Fig. 3.** Floor Plan, Floor 2-23, Block 1, EDF. de Alameda da Tranquilidade

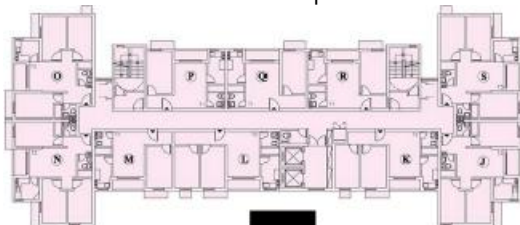**Fig. 4.** Floor Plan, Floor 24-25, Block 1, EDF. de Alameda da Tranquilidade

Fig. 5. Floor Plan, Floor 2-23, Block 2, EDF. de Alameda da Tranquilidade
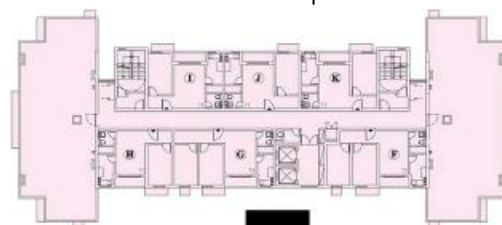
Fig. 6. Floor Plan, Floor 24-25, Block 2, EDF. de Alameda da Tranquilidade

Image source: Sales Brochure for Economic Housing in EDF. de Alameda da Tranquilidade

1.2 Research methods
In this study, space syntax is mainly used. The concept of space syntax was proposed in the 1970s and was first proposed by Bill Hillier in the United Kingdom. He believed that space could affect and determine the behavior of people to a certain extent. Space syntax is a spatial analysis method based on topology theory and quantitative research on space. It is based on people's perception of space and the relationship between people and space and analyzes different space segmentation methods for different types of space. Space syntax quantitatively analyzes the relationship between human activities and spatial organization, including spatial view analysis, spatial morphology analysis, and spatial organization relationship analysis. Fabrication simplifies complex spatial relationships and expresses them to people, which powerfully reveals the laws within the space and expresses them in a graphical way, which is helpful for people to understand the space. In the related software analysis of space syntax, axis analysis, viewshed analysis, line segment analysis, and convex space analysis can be performed on the space. From the macro to the micro, from the whole to the local, the spatial analysis is carried out in an all-round and multi-level manner.

2. Analysis Result: External Road of EDF. de Alameda da Tranquilidade
The axis analysis method is used first, and the external road of EDF. de Alameda da Tranquilidade is quantitatively analyzed first, which belongs to the analysis of the mesoscale. The parameters related to the space syntax include integration, average depth, intelligibility and synergy.

Then, the correlation analysis of the spatial morphological variables is carried out, and based on the theory of space syntax, the difficulty of understanding the external roads of EDF. de Alameda da Tranquilidade is analyzed, and the intelligibility of the space is inferred. The degree of integration is an important indicator reflecting the relationship between space and other spaces in the analysis of space syntax variables. In urban open space, the degree of integration refers to the inverse sum of the topological mean depths from any street in the system to all other streets. It can be seen from the figure that the places with the highest global integration and the lowest visual depth are the Rua Oito do Bairro Iao Hon, Rua Direita do Hipódromo, and Avenida Leste do Hipódromo, with red and dark blue colors, respectively. As shown in Figures 7 and 10, it shows that this road section has strong agglomeration and accessibility and has become the main passage for people outside the building. The three streets with lower depths indicate that the accessibility from one element to other elements is better, the line of sight needs to be turned less frequently, and the more people's attention is attracted. At the same time, the selection of external roads on East Road of Race-course is relatively high, and the color is red. The second is the Rua Oito do Bairro Iao Hon and Rua Direita do Hipódromo, which are yellow in color. As shown in Figure 9, the road with a higher visual field control value is Avenida da Longevidade, which is red in color, followed by Rua da Paz and Rua Dois do Bairro Iao Hon. The three roads with higher viewshed control values help to highlight areas where the viewer can see a large view of the spatial layout(Figure 8).
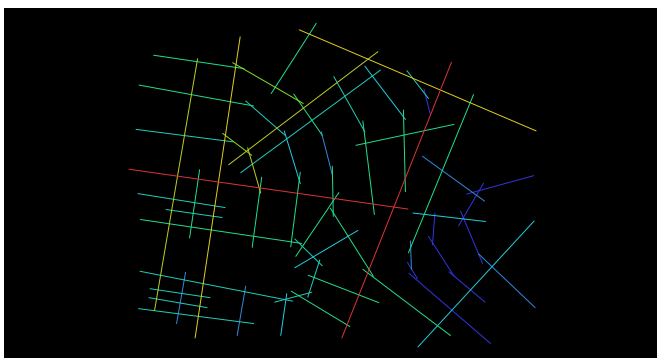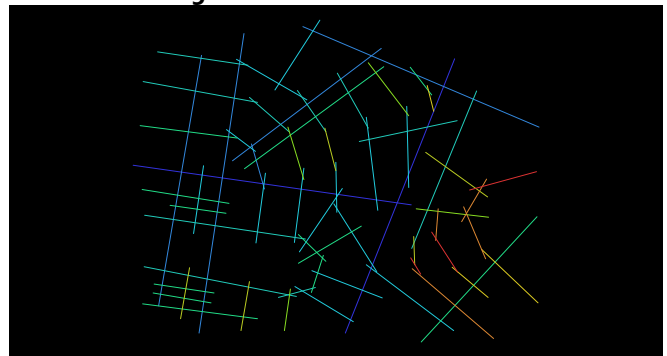

Fig. 6. Integration
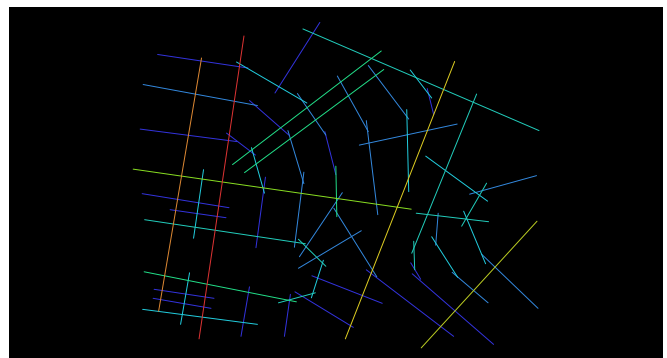
Fig. 7. Viewshed Control Value
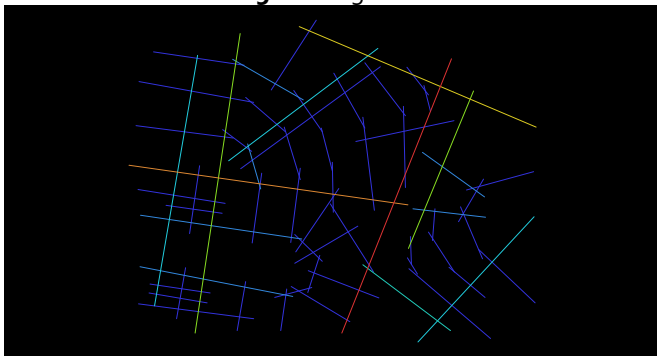
Fig. 8. Choice


Fig. 9. Visual depth

Image source: drawn by the author

3. Analysis Result: Interpretation of the Plane Space Morphology on Floors 2-23 of EDF. de Alameda da Tranquilidade Block 1

In the interpretation of the space syntax of the space form nodes in EDF. de Alameda da Tranquilidade, the convex space analysis method is used, and the nodes have a strong role in space limitation. Each convex space is regarded as a space node, and the relationship diagram is drawn according to the connection between the floor plan spaces. Computes convex space-syntax variables within the entire space system, including local integration degree, global average depth, local average depth, control value and selectivity, import the CAD-processed building layer into Depthmap, and calculate the viewport integration degree through the viewport correlation calculation tab, and observe that the color is darker The area of that is, the area with higher integration, the agglomeration effect is higher in this area; therefore, more nodes are observed in this area. Take the EDF. de Ala-meda da Tranquilidade plane as a direct analysis object, and perform convex polygon segmentation on it, or color map with convex polygon parameters.

As shown in Figure 11-18, by observing the plane space structure where the first floor of EDF. de Alameda da Tranquilidade is located; it can be seen that this point is centered on the middle corridor, and all spaces are evenly arranged in the east, west, east

and west of the corridor. The south, north and west sides generally present an axisymmetric spatial structure, and the interior of the corridor presents a back-shaped and L-shaped structure. From the perspective of global integration, the color of the horizontal corridor is red, and the L-shaped corridor on the south side is also red. It can be seen from the figure that the area with a high degree of integration of the viewing area is in the plane. The location of the interior living room of each unit is the A, B, C, D, E, F, G, H, I marked in the picture. In addition to sleeping, the area where people often shuttle is the most important area in everyone's home.
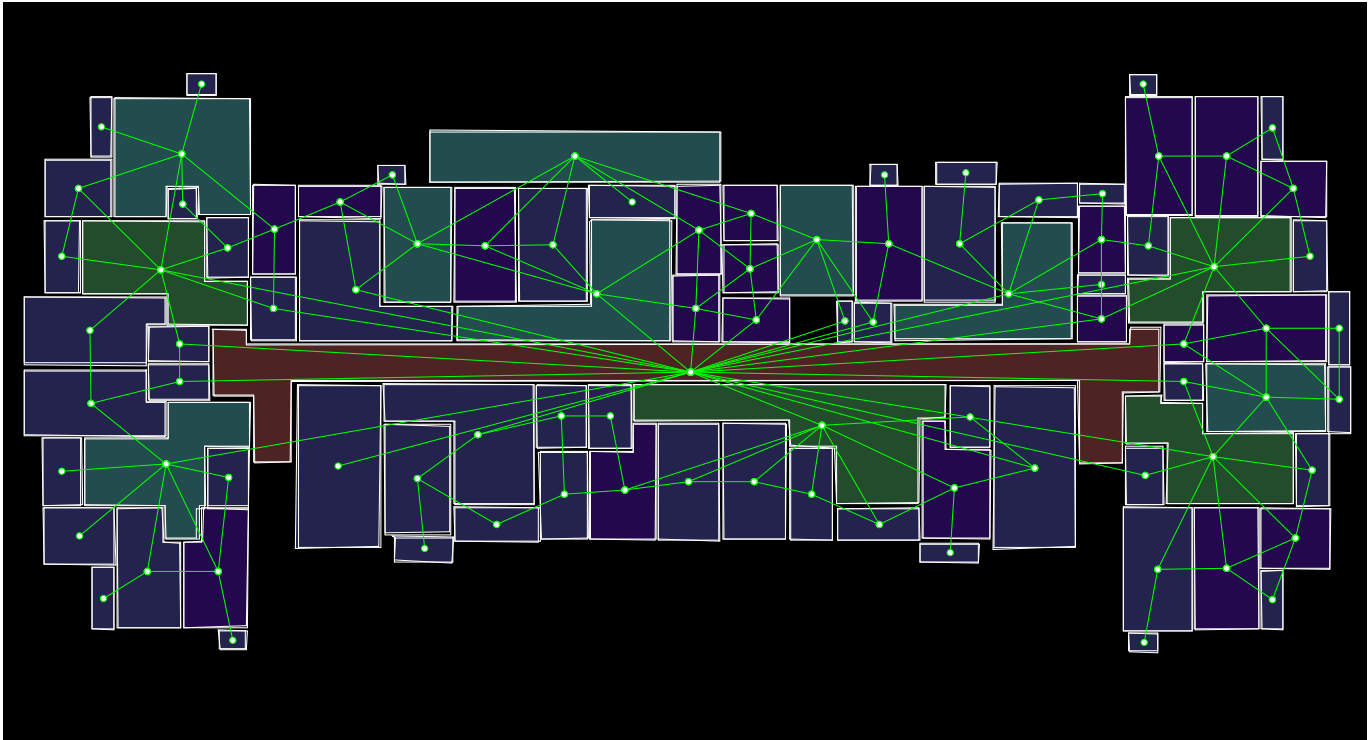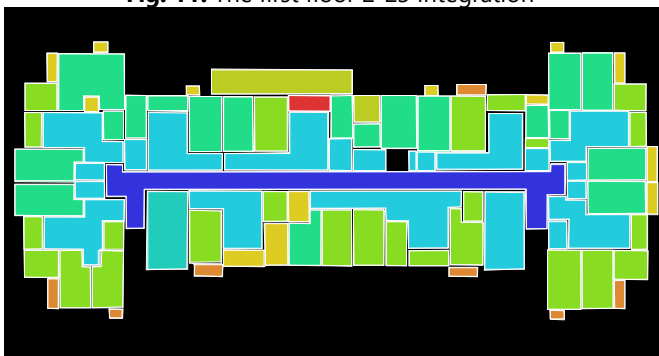

Fig. 10. Spatial connection map of the first floor 2-23. (Image source: drawn by the author)
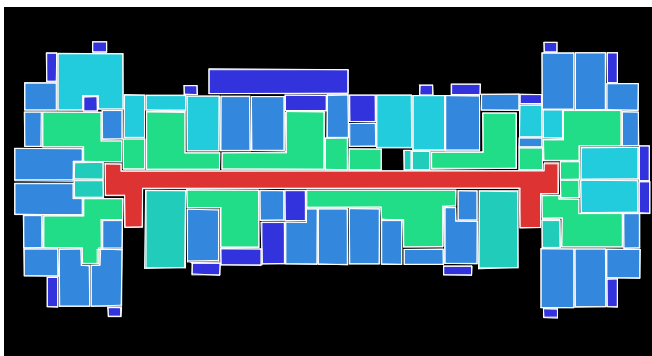
Fig. 11. The first floor 2-23 Integration
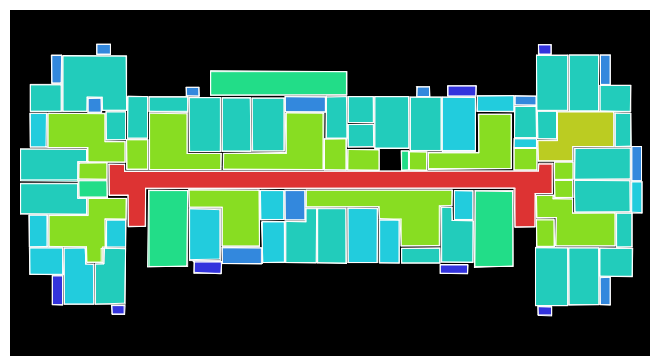
Fig. 12. The first floor 2-23 Integration(R=3)

Fig. 13. The first floor 2-23 Integration average depth
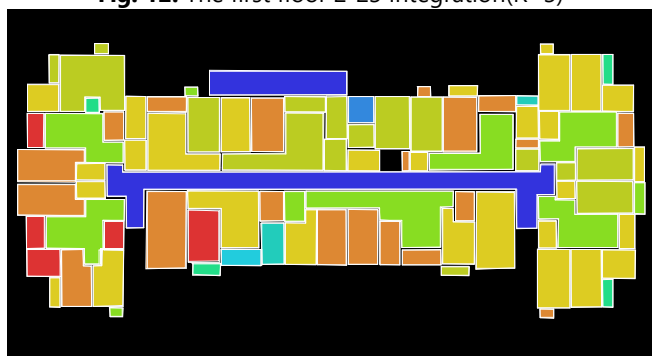
Fig. 14. The first floor 2-23 Integration average depth(R=3)
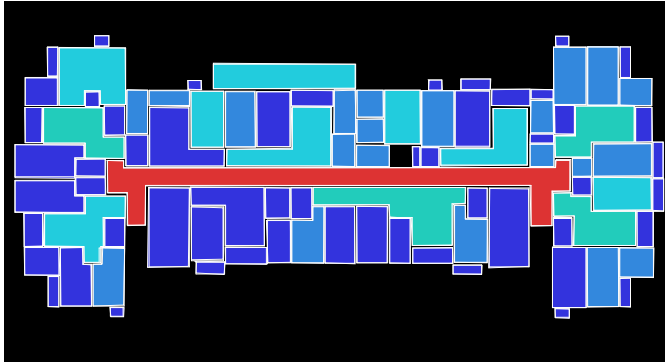
Fig. 15. The first floor 2-23 connection value
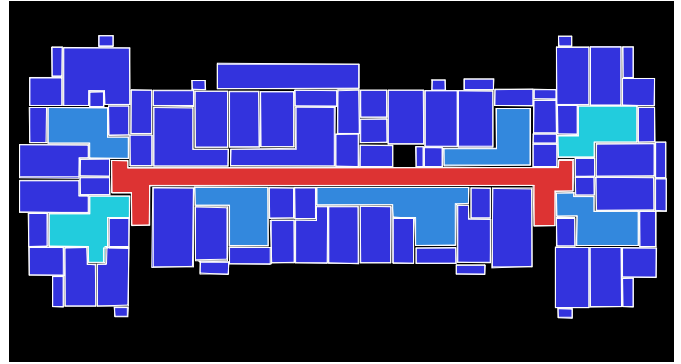
Fig. 16. The first floor 2-23 Chioce
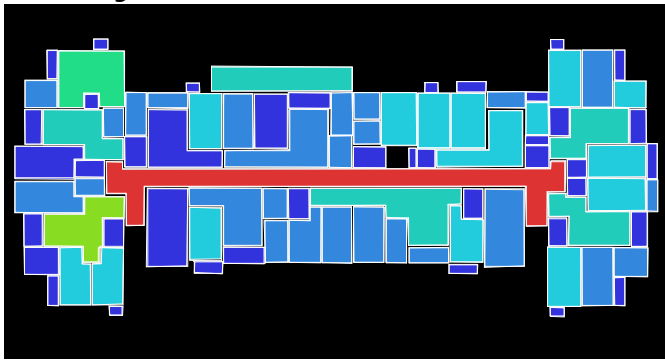
Fig. 17. The first floor 2-23 Viewshed Control Value
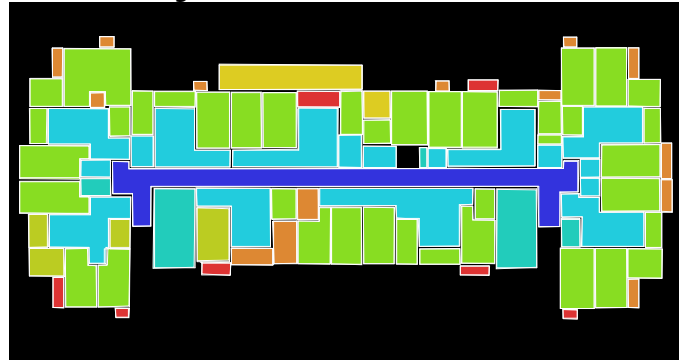
Fig. 18. The first floor 2-23 local mean depth(R=6)

Image source: drawn by the author

The second is the public service space area of the building, that is, the elevator shaft and the stairwell, which can gather a lot of people during peak hours, and the second is the bedroom area inside the apartment. People usually work and study outside most of the time. After returning home, in addition to living in the living room, Gather to eat watch TV; the bedroom is the place where each person takes a nap at noon and sleeps up to seven to eight hours at night.
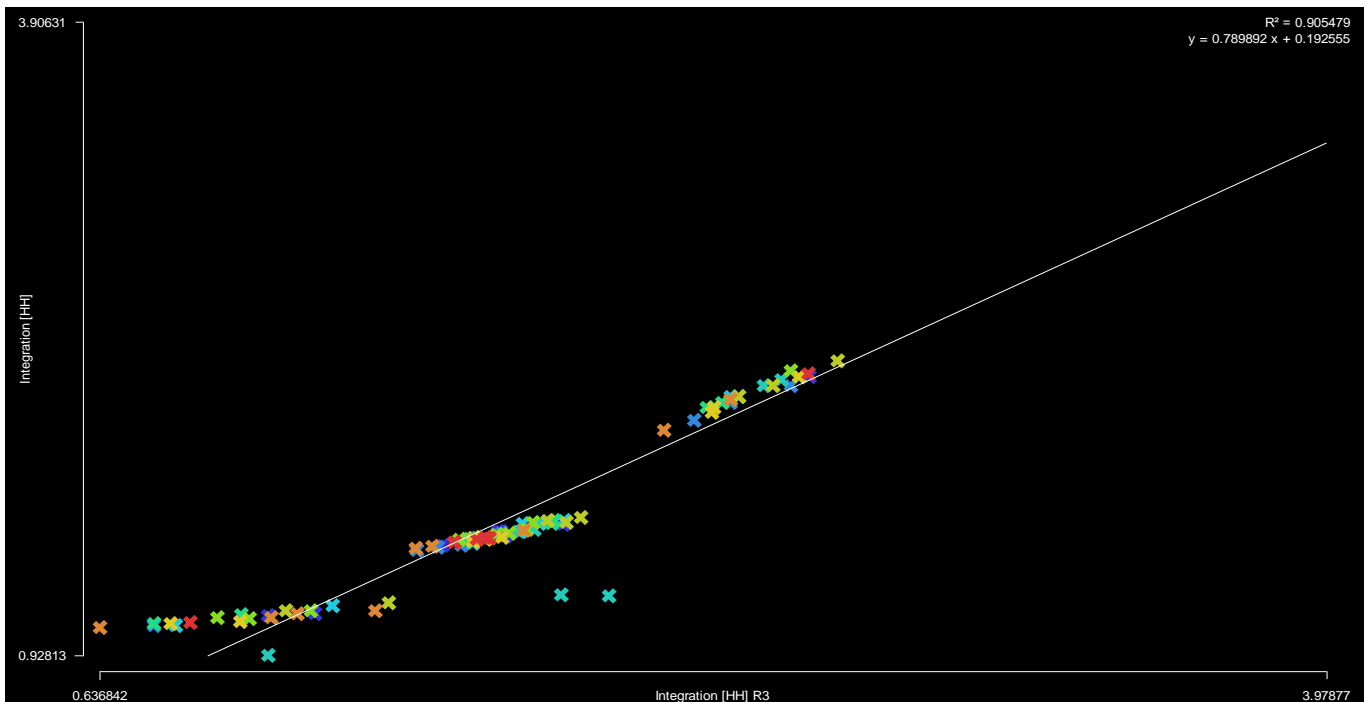
Fig. 19. Convex space integration and local integration degree (R=3) analysis of the first floor 2-23. (Image source: drawn by the author)

R² = 0.999978
y = 1.00215 x - 0.00426462
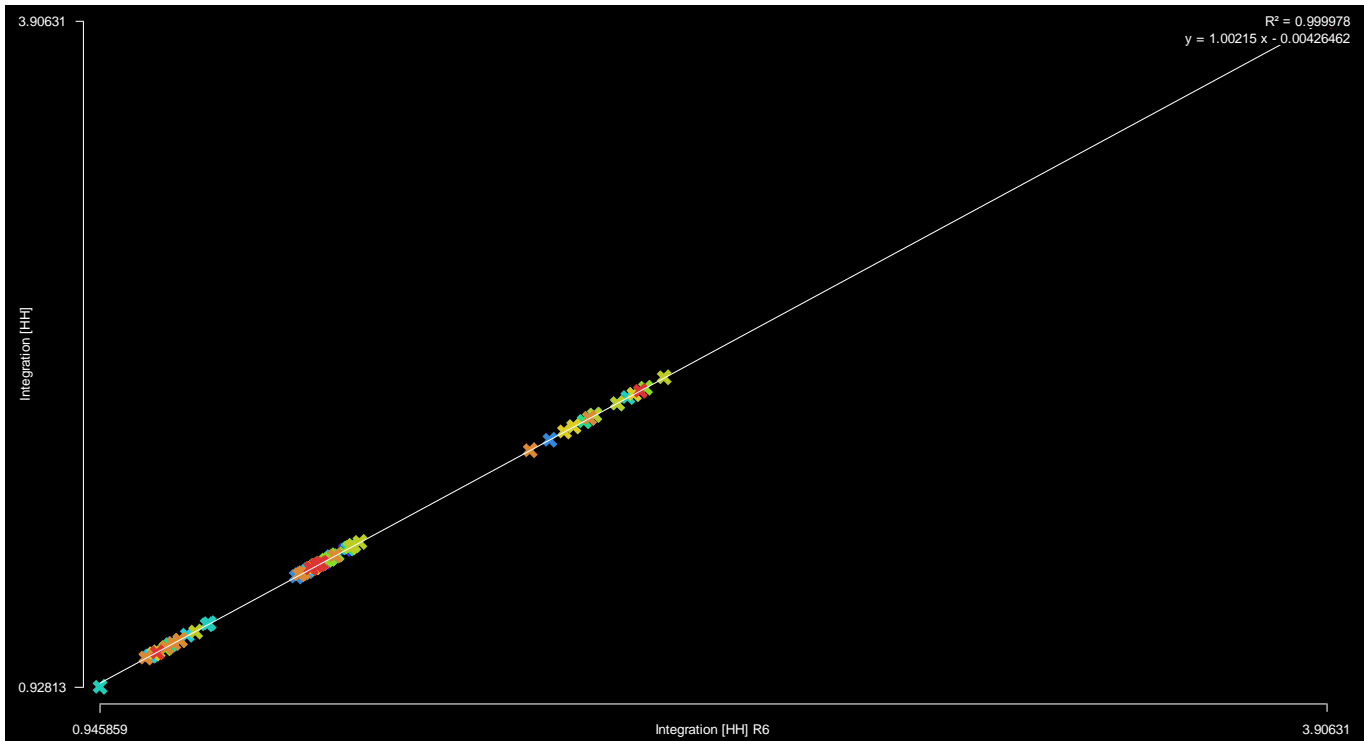
Fig. 20. Convex space integration and local integration degree (R=6) analysis of the first floor 2-23. (Image source: drawn by the author)

When the local integration degree is R=3, many plane spaces connected to the corridor appear dark yellow, which is darker than that of the global integration degree, indicating that the value of the integration degree is improved when R=3.

By constructing the linear equations of global integration degree and local integration degree as shown in Figure 20-21, it can be concluded that when R=3, R2=0.905749, Y=0.789892X+0.192555, the value of synergy is already high, which can be, It can be seen that the points show a state of regular distribution, and the points of different colors are distributed on both sides of the line.

When R=6, R2=0.999978, Y=1.00215X-0.00426462, indicating that the degree of synergy increases again, indicating that the correlation between the two increases again, the value of R2 is infinitely close to 1, and the point just falls on the straight line, indicating that The interior space of EDF. de Alameda da Tran-quilidade can be understood by people. When the radius of people is 6, that is, the number of steps of people is roughly 6, the interior space of floors 2-23 can be fully understood by people.

Table 1 Part of the parameters of the space system on the 2nd to 23rd floors of the first block of EDF. de Alameda da Tranquilidade

Ref	Choice	Connectivity	Control	Integration [HH]	Integration [HH] R3	Mean Depth	Mean Depth R3
0	0	1	0.1667	1.1143	1.0953	4.5843	2.4615
1	4	3	0.7917	1.4873	1.7429	3.6854	2.5455
2	0	2	0.4583	1.445	1.5734	3.764	2.6875
3	0	1	0.1667	1.1143	1.0953	4.5843	2.4615
4	496	6	3.2083	1.5388	1.8993	3.5955	2.4571
5	4	2	0.5	1.1214	1.2241	4.5618	2.3077
6	1219	8	2.5455	2.2357	2.5709	2.7865	2.4203
7	39	3	0.875	1.5062	1.7298	3.6517	2.6
8	17	2	0.4583	1.5062	1.7214	3.6517	2.6486
9	22	3	0.9762	1.4999	1.7298	3.6629	2.6
10	7	3	0.5038	2.1159	2.3546	2.8876	2.5507
11	31	3	0.7121	2.0313	2.2579	2.9663	2.5909
12	0	1	0.1429	1.4219	1.5015	3.809	2.7419
13	1281	7	3.4621	2.1943	2.5201	2.8202	2.4412
14	0	2	0.3929	1.4334	1.5592	3.7865	2.6774
15	0	1	0.1429	1.4219	1.5015	3.809	2.7419
16	0	1	0.3333	1.0643	0.7857	4.7528	2.5556
17	176	3	1.3929	1.445	1.6216	3.764	2.6129

Ref	Choice	Connectivity	Control	Integration [HH]	Integration [HH] R3	Mean Depth	Mean Depth R3
18	179	4	1.9762	1.4509	1.6547	3.7528	2.5806
19	0	1	0.25	1.0675	0.8462	4.7416	2.4444
20	87	4	1.0833	1.5455	1.8348	3.5843	2.5278
21	144	3	0.4205	2.1414	2.3791	2.8652	2.5429
22	106	4	1.25	1.5455	1.789	3.5843	2.6053
23	365	3	0.4621	2.1414	2.3573	2.8652	2.5571
24	0	2	0.4167	1.1579	1.2726	4.4494	2.4375
25	351	6	1.6667	1.5591	1.9041	3.5618	2.4722
26	44	4	0.8333	1.5062	1.7857	3.6517	2.5294
27	37	3	0.5833	1.475	1.6461	3.7079	2.6364
28	0	1	0.1667	0.9281	1.0953	5.3034	2.4615
29	640	6	1.1955	2.2217	2.4946	2.7978	2.4714
30	218	6	2.2	1.205	2.0258	4.3146	2
31	52	5	0.9833	1.5191	1.8207	3.6292	2.5
32	247	5	0.8621	2.1943	2.4471	2.8202	2.5
33	56	4	0.7333	1.2091	1.8959	4.3034	2.1
34	31	5	1.0667	1.5062	1.7778	3.6517	2.5152
35	85	4	0.6121	2.1286	2.3546	2.8764	2.5507
36	166	6	1.7833	1.5591	1.8751	3.5618	2.5135
37	91	2	0.2121	2.091	2.2904	2.9101	2.5942
38	221	4	1.6429	1.5455	1.8688	3.5843	2.5
39	0	1	0.25	1.1178	1.0234	4.573	2.6429
40	0	1	0.3333	1.0739	0.7857	4.7191	2.5556
41	176	3	1.4762	1.4629	1.6339	3.7303	2.625
42	45	3	0.9762	1.4629	1.6339	3.7303	2.625
43	213	3	0.4621	2.1159	2.3328	2.8876	2.5652
44	990	7	1.9121	2.2357	2.544	2.7865	2.4429
45	3	2	0.5333	1.1357	1.2123	4.5169	2.25
46	173	5	1.7262	1.5523	1.8188	3.573	2.5789
47	0	2	0.3429	1.4689	1.6162	3.7191	2.6667
48	200	4	0.4994	2.2642	2.5191	2.764	2.4795
49	0	1	0.25	1.104	0.9571	4.618	2.5833
50	182	4	1.6944	1.5191	1.8021	3.6292	2.5556
51	136	4	1.1111	1.4999	1.752	3.6629	2.5588
52	0	2	0.5	1.1005	1.0446	4.6292	2.3636
53	39	4	1.3611	1.4936	1.7196	3.6742	2.5882
54	45	3	0.5611	1.5591	1.8573	3.5618	2.5641
55	1346	9	2.3288	2.3083	2.6461	2.7303	2.3944
56	0	2	0.3611	1.4811	1.6582	3.6966	2.6471
57	208	4	0.5232	2.1943	2.4706	2.8202	2.4857
58	233	5	1.3611	1.5729	1.9488	3.5393	2.4737
59	0	2	0.5333	1.1357	1.1461	4.5169	2.5333
60	13	3	0.8667	1.1732	1.4255	4.4045	2.4211
61	161	6	1.575	1.5523	1.9092	3.573	2.4865
62	42	3	0.3371	2.1414	2.3791	2.8652	2.5429
63	1067	8	2.2121	2.2357	2.544	2.7865	2.4429
64	0	2	0.1705	2.091	2.3114	2.9101	2.5797
65	6	3	0.5417	1.4811	1.7339	3.6966	2.5313
66	176	3	1.375	1.4629	1.6547	3.7303	2.5806
67	52	4	1.2083	1.4689	1.6892	3.7191	2.5484
68	124	4	1.2083	1.4629	1.6547	3.7303	2.5806
69	0	2	0.5	1.0838	1.0208	4.6854	2.3
70	0	1	0.3333	1.0739	0.8294	4.7191	2.6
71	282	3	0.7955	2.0667	2.3049	2.9326	2.5672
72	0	1	0.0455	1.9859	2.175	3.0112	2.6515
73	326	3	1.8333	1.4276	1.499	3.7978	2.6897
74	0	1	0.3333	1.0548	0.6368	4.7865	2.3333
75	781	3	0.7121	2.1286	2.3573	2.8764	2.5571
76	157	3	1.1667	1.4392	1.5448	3.7753	2.6667

Ref	Choice	Connectivity	Control	Integration [HH]	Integration [HH] R3	Mean Depth	Mean Depth R3
77	3	2	0.5833	1.1214	1.1769	4.5618	2.4286
78	12	2	0.6667	1.104	1.1059	4.618	2.2
79	38	3	1.0833	1.1357	1.3873	4.5169	2.2667
80	212	4	1.2917	1.5127	1.7938	3.6404	2.5429
81	2	3	0.7083	1.4811	1.6883	3.6966	2.6176
82	1	3	0.7917	1.4569	1.6031	3.7416	2.6563
83	2	3	0.7917	1.4569	1.6031	3.7416	2.6563
84	2	3	0.7083	1.4689	1.6659	3.7191	2.5938
85	0	1	0.25	1.0805	0.8847	4.6966	2.5
86	182	4	1.7917	1.475	1.6993	3.7079	2.5625
87	2	2	0.4583	1.4569	1.6031	3.7416	2.6563
88	1167	8	2.3788	2.2498	2.5695	2.7753	2.4286
89	6403	22	6.5552	3.9063	3.9788	2.0225	2

Source of the table: drawn by the author

According to the data obtained from the quantitative analysis (as shown in Table 1), the author has drawn a total of 89 spaces in the space between floors 2-23 of the first block of EDF. de Alameda da Tranquilidade, and there is one space with the largest connection value, which is 22, which is the space NO. .89, the second connection value is 9, which is space NO.55, and the second connection value is 8, which are space NO.6, NO.63, and NO.88, respectively.

The space permeability is relatively good and similar, indicating that the space has a good impact on the flow of people. The higher the attractiveness of the city, the greater the potential for walking, and there are more people driving here. There are 14 spaces with the smallest connection value, and the value is 1, which are spaces NO.0, NO.3, NO.12, NO.15, NO.16, NO.19, NO.28, NO.39, NO.40, NO.49, NO.70, NO.72, NO.74, NO.85, the second connection value is 2, the second connection value is 3, there are 26 spaces, these spaces have relatively poor permeability and high similarity, indicating that the less attractive the space is to the flow of people, the smaller the potential for walking, and the higher the flow of people driving there. The place with the highest global spatial integration in this area is NO.89, with a value of 3.9063072, followed by NO.55, NO.48, NO.88, and NO.44, with values ranging from 2.2356851 to 2.3082724, and the place with the highest local integration is NO.89, followed by NO.55, NO.6, NO.88, NO.44, the value is 2.540118-2.6460943, the area with the highest control value is NO.89, the value is 6.551586, followed by NO.13, NO. 4. It shows that this type of space has a strong dominance over the surrounding space and has a large weight, which can well affect the activities of people in the building. Space No.89 is a relatively "prosperous" area on the 2nd-23rd floors of EDF. de Alameda da Tranquilidade. The main areas in the east, west, south and north directions have a large flow of people during peak hours and are connected to other aisles, so more people stay here.

In general, the connection value, global integration degree, local integration degree, and control value of space NO.89 are the highest areas in the 2-23 floor plan, which not only has a strong agglomeration effect on people, but also has a relatively high concentration of people in the morning and evening, after getting off work, and after school. There are a lot of people, and the line of sight is relatively wide. The line of sight in this space can see other elements in the space system after a few turns. Seeing a large variety and quantity of elements can attract people's attention to this direction. At the same time, the analysis result of the proxy robot of No. 89 in the prediction space is that the proxy robot travels the most times and walks the "back" font the most times. The permeability of the space is better, and the vitality is stronger. The perception of the flow of people is relatively good.

4. Analysis Result: Interpretation of the Plane Space Morphology on Floors 24-25 of EDF. de Alameda da Tranquilidade Block 1

As shown in Figure 21-29, by observing the plane space structure where the 24th-25th floors of the first block of EDF. de Alameda da Tranquilidade is located, the left and right sides can lead to the inner public platform. It can be seen that this point is still centered on the middle corridor. Each space is evenly arranged on the east, west, south, north and west sides of the corridor, and the plane shape is the same as that of the 2-23rd floor, which roughly presents an axisymmetric spatial structure, and the interior of the corridor presents a small-shaped and L-shaped structure. The platforms on both sides are large and can present a large back shape, serving the residents on the 24th-25th floors.
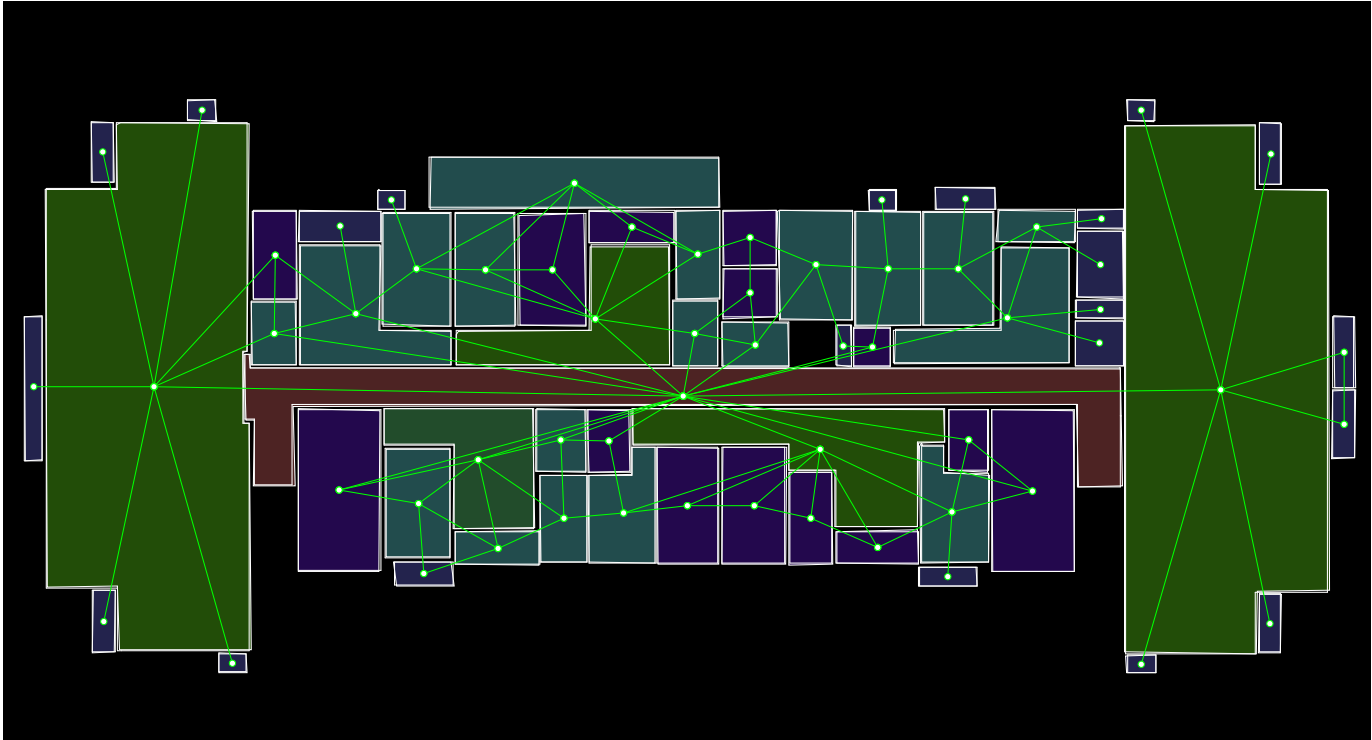
Fig. 21. Spatial connection map of the first floor 24-25. (Image source: drawn by the author)

From the perspective of overall integration, the color of the horizontal corridor is red, and the L-shaped corridor on the south side that is connected to it is also red. It can be seen from the figure that there are four fewer units on the two floors, but the same Does not affect areas with high viewshed integration. The area with a high degree of integration of the visual field is still the location of the interior living room of each unit in the plan, which is marked A, B, C, D, and E in the picture. People usually pass through the area except for noon and night breaks. Activities such as daily communication can be carried out here.

Secondly, it provides space for people in the building to go in and out and has the function of public services, that is, the elevator shaft next to the living room area on the D side and the stairwells next to the living room areas A and B. During the peak period, more people can be gathered. Internal master bedroom and secondary bedroom viewing area, when the local integration degree is R=3, and R=6, many plane spaces connected with the corridor realize the transition from light green to light blue, which is darker than the color of the global integration degree, indicating that the integration The value of degree increases when R=3.
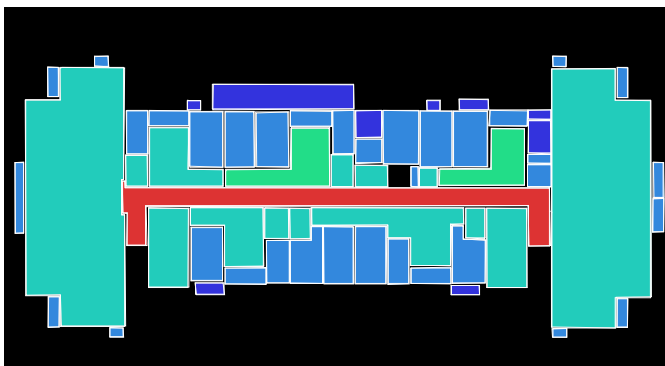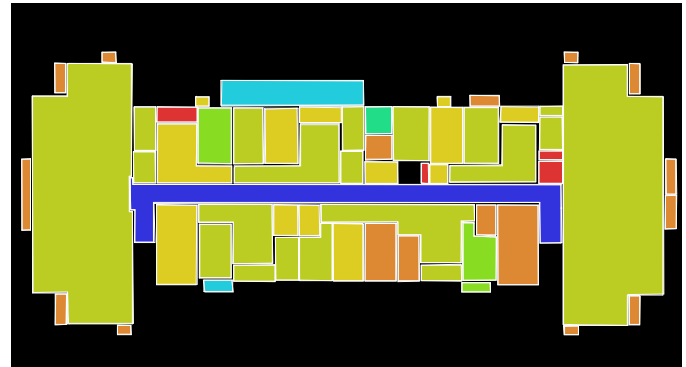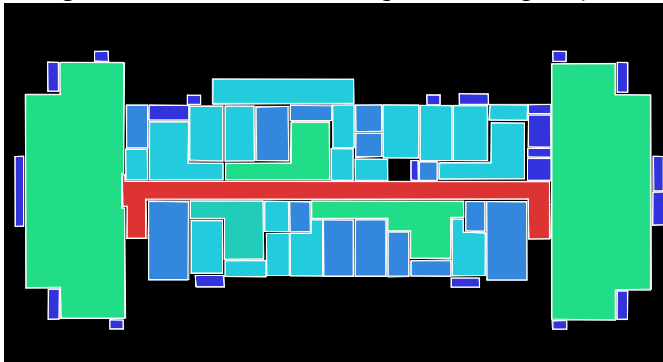

Fig. 22. The first floor 24-25 Integration
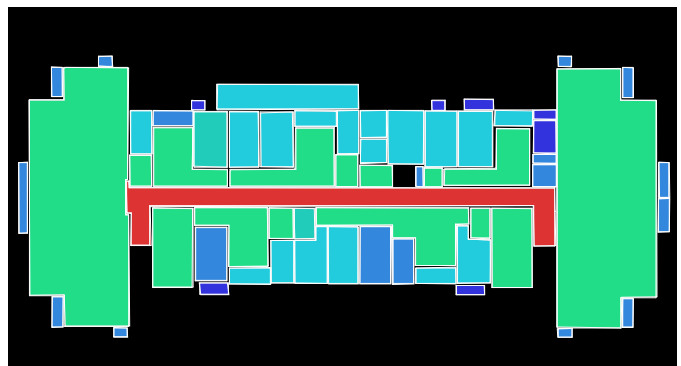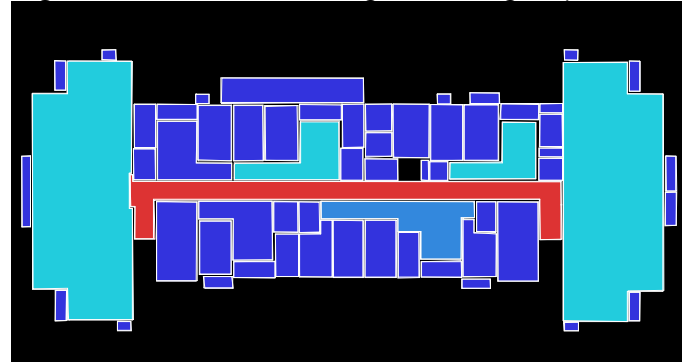

Fig. 23. The first floor 24-25 Integration(R=3)
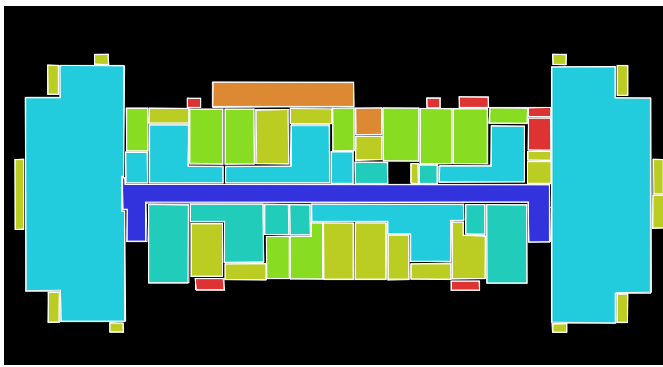
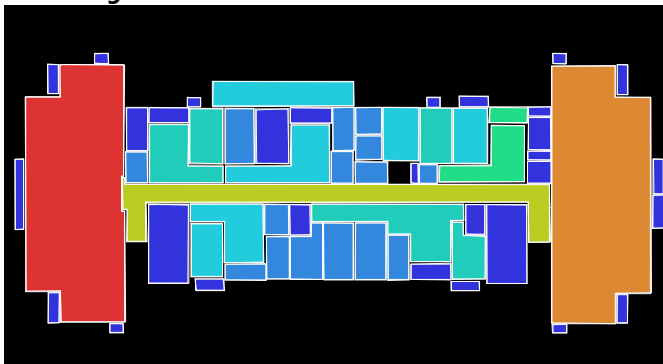**Fig.24.** The first floor 24-25 Integration average depth

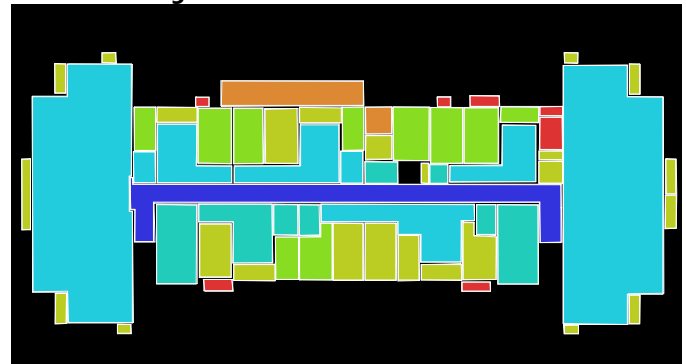**Fig. 25.** The first floor 24-25 Integration average depth(R=3)

Fig. 26. The first floor 24-25 connection value

Fig. 27. The first floor 24-25 Chioce

Fig. 28. The first floor 24-25 Viewshed Control Value

Fig. 29. The first floor 2-23 local mean depth(R=6)

Image source: drawn by the author

By constructing the linear equations of global integration degree and local integration degree as shown in Figure 30-31, it can be concluded that when R=3, R2=0.940972, Y=0.905807X+0.0421826, the value of synergy is already high, and it can be seen that the points show a state of regular distribution, the linear law is obvious, and the points of different colors are distributed on both sides of the straight line, close to the straight line. When R=6, R2=1, Y=1X+0, indicating that the degree of synergy increases again, which is consistent with the first-order function image. It shows that the correlation between the two is strengthened again, the value is exactly 1, and the intersection point just falls on the straight line, indicating that the interior space of Yongning Building can be understood by people. When the radius of people is 6, that is, the number of steps of people is roughly 6, the interior space of floors 24-25 can be fully understood by people.
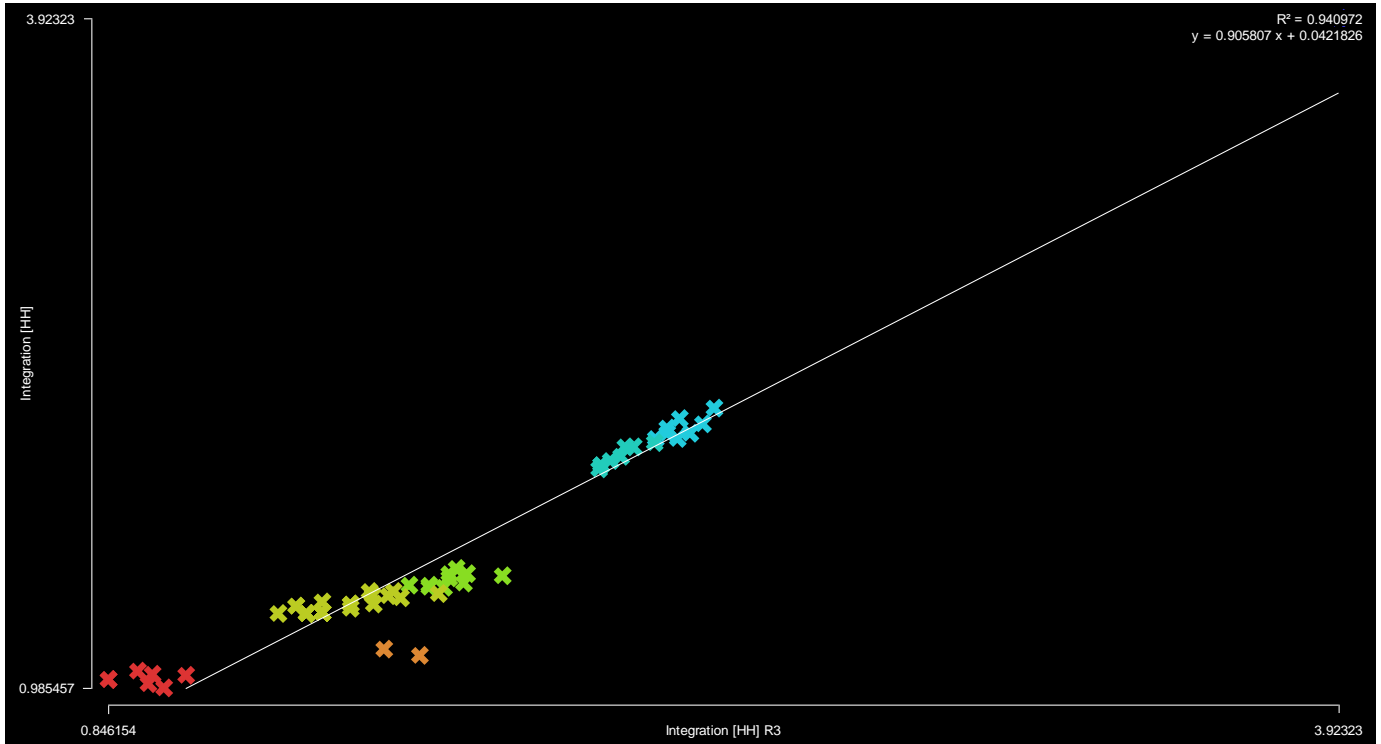
Fig. 30. Convex space integration and local integration degree (R=3) analysis of the first floor 24-25. (Image source: drawn by the author)
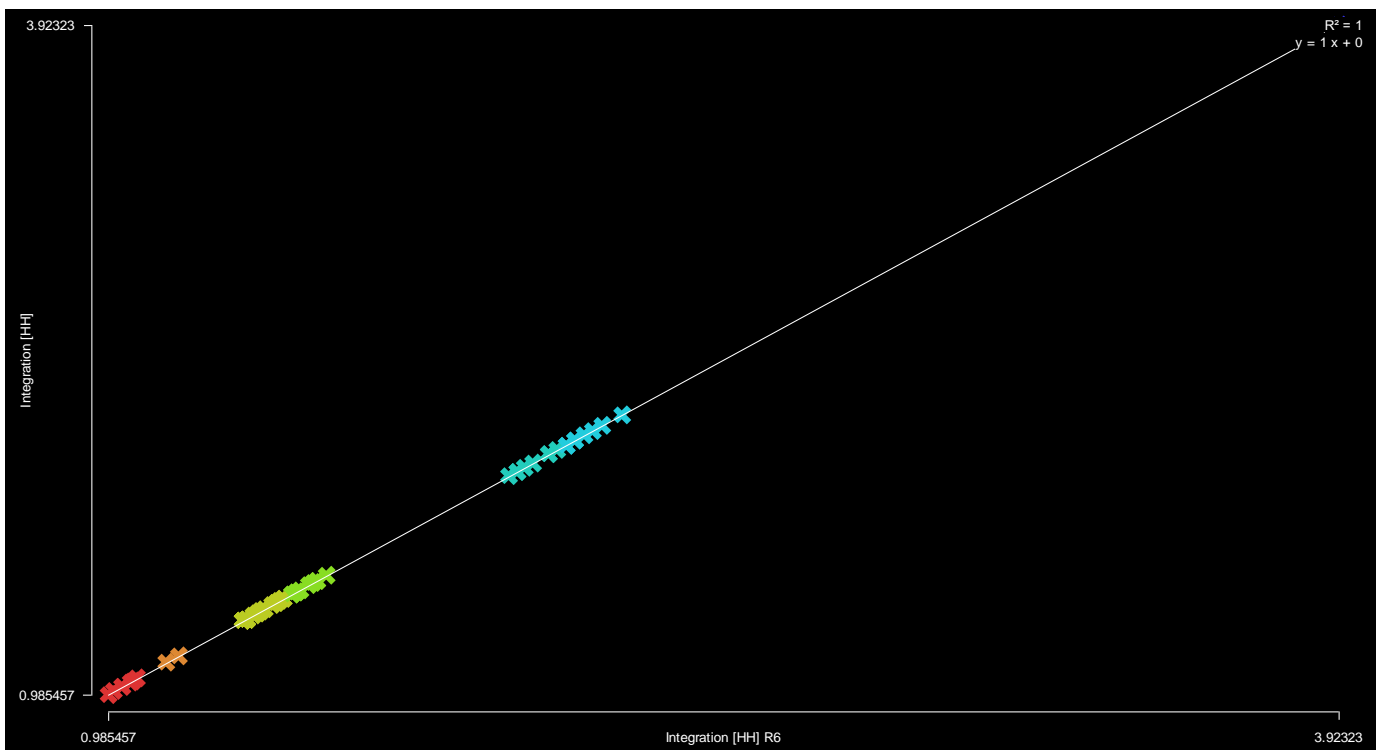
Fig. 31. Convex space integration and local integration degree (R=6) analysis of the first floor 24-25. (Image source: drawn by the author)

The integration of the visual field refers to analyzing the possibility of public space being observed by people based on the first perspective of people, which can well reflect the potential inside the space. The level of its value can be represented by different colors. The warmer the color, It means that the higher the integration degree of the spatial view, the stronger the agglomeration effect of the flow of people, and the better the potential. The agglomeration coefficient of the field of view is a judgment on the

strength of the visual limitation of the space boundary. The agglomeration coefficient is judged and distinguished by analyzing the color of the graph. The warmer the color, the higher the agglomeration coefficient, indicating that it interfaces with the surrounding space. The less visually defined, the less occluded in the system. The cooler the color, the lower the value, the lower the agglomeration coefficient, and the more shading in the system, that is, the stronger the oppression of the sight in the space.

According to the data obtained from the quantitative analysis (as shown in Table 2), the author has drawn a total of 60 spaces in the space on the 24th-25th floor of the first block of EDF. de Alameda da Tranquilidade, and there is one space with the largest connection value, which is 16, which is the space NO. .60, the second connection value is 8, which is space NO.5, and the second connection value is 7, which are space NO.14, NO.48, and NO.59, respectively.

The space permeability is relatively good and similar, indicating that this space is not conducive to the flow of people. The higher the attractiveness of the city, the greater the walking potential, and the more people drive here. There are 14 spaces with the smallest connection value, and the value is 1, which are spaces NO.0, NO.1, NO.2, NO.3, NO.4, NO.19, NO.8, NO.9, NO.23, NO.26, NO.31, NO.32, NO.33, NO.34, the second connection value is 2, the second connection value is 3, there are 14 spaces, these spaces have relatively poor permeability and high similarity, indicating that The less attractive the space is to the flow of people, the smaller the potential for walking, and the higher the flow of people driving there. The highest degree of global spatial integration in this area is NO.60, with a value of 3.9232333, followed by NO.14, NO.29, NO.48, and NO.18, with values ranging from 2.1217487 to 2.2120357, and the highest control value is NO.5, followed by NO.59, NO.60, NO.29, and NO.30, with values ranging from 2.45 to 5.0625, indicating that this type of space has a strong dominance over the surrounding space and has a larger weight, which can well influence the interior of the building. People's activities, the area with the highest connection value is NO.60, the value is 16, followed by NO.5, NO.14, and the space NO.60 is the more "prosperous" area on the 24th-25th floor of Yongning Plaza Building, which is the east, west, south, and north main areas, the peak flow of people is large, and it is connected with other aisles, so more people stay here.

Table 2 Part of the parameters of the space system on the 24th to 25th floors of the first block of EDF. de Alameda da Tranquilidade

Ref	Choice	Connectivity	Control	Integration [HH]	Integration [HH] R3	Mean Depth	Mean Depth R3
0	0	1	0.125	1.316021	1.381559	3.633333	2.590909
1	0	1	0.125	1.316021	1.381559	3.633333	2.590909
2	0	1	0.125	1.316021	1.381559	3.633333	2.590909
3	0	1	0.125	1.316021	1.381559	3.633333	2.590909
4	0	1	0.125	1.316021	1.381559	3.633333	2.590909
5	631	8	5.645834	2.100317	2.303279	2.65	2.411765
6	36	3	0.575	1.424187	1.65035	3.433333	2.481482
7	19	4	0.720833	2.100317	2.243708	2.65	2.471698
8	0	1	0.2	1.307744	1.272488	3.65	2.727273
9	0	1	0.2	1.039657	1.040526	4.333334	2.538461
10	223	5	1.845833	2.079314	2.215306	2.666667	2.490566
11	198	5	1.792857	1.474691	1.833722	3.35	2.333333
12	16	4	0.87619	1.434009	1.65035	3.416667	2.481482
13	5	3	0.592857	1.386209	1.507236	3.5	2.56
14	650	7	1.679167	2.212036	2.363632	2.566667	2.407408
15	19	5	1.366667	1.123953	1.626134	4.083334	2.125
16	5	3	0.592857	1.404942	1.559287	3.466667	2.538461
17	100	4	1.009524	1.464305	1.70019	3.366667	2.464286
18	53	4	0.78869	2.121749	2.24545	2.633333	2.481482
19	166	4	0.895833	2.038543	2.160607	2.7	2.528302
20	38	3	0.833333	1.155174	1.536447	4	2.235294
21	17	3	0.833333	1.404942	1.500318	3.466667	2.62963
22	73	4	1.333333	1.485224	1.70019	3.333333	2.464286
23	0	1	0.25	1.055489	0.921689	4.283333	2.545455
24	169	4	1.833333	1.506749	1.716497	3.3	2.5
25	171	4	1.7	1.485224	1.742695	3.333333	2.428572

Ref	Choice	Connectivity	Control	Integration [HH]	Integration [HH] R3	Mean Depth	Mean Depth R3
26	0	1	0.25	1.044881	0.957109	4.316667	2.583333
27	1	2	0.583333	1.359029	1.381203	3.55	2.666667
28	264	3	0.8125	2.038543	2.138524	2.7	2.555556
29	706	5	2.5625	2.165952	2.275173	2.6	2.472727
30	234	4	2.45	1.434009	1.599269	3.416667	2.5
31	0	1	0.25	1.019271	0.846154	4.4	2.444444
32	0	1	0.25	1.019271	0.846154	4.4	2.444444
33	0	1	0.2	1.341493	1.315432	3.583333	2.75
34	0	1	0.2	1.341493	1.315432	3.583333	2.75
35	130	3	0.479167	1.980299	2.103816	2.75	2.557692
36	77	4	1.25	1.332893	1.451613	3.6	2.476191
37	0	2	0.5	0.985457	0.98558	4.516667	2.125
38	201	6	1.395833	2.058726	2.213105	2.683333	2.480769
39	44	4	1.166667	1.350204	1.51108	3.566667	2.454546
40	76	4	0.8125	1.99934	2.130113	2.733333	2.538461
41	61	3	0.5625	1.943284	2.072951	2.783333	2.568627
42	30	4	0.916667	1.424187	1.685716	3.433333	2.423077
43	38	4	1.059524	1.443968	1.73721	3.4	2.407408
44	1	3	0.72619	1.386209	1.5469	3.5	2.52
45	2	3	0.809524	1.350204	1.453898	3.566667	2.583333
46	0	3	0.809524	1.350204	1.453898	3.566667	2.583333
47	3	3	0.676191	1.377029	1.578518	3.516667	2.458333
48	551	7	1.845833	2.143622	2.334371	2.616667	2.403846
49	78	3	0.595833	1.961617	2.078159	2.766667	2.576923
50	129	5	2.142857	1.395513	1.674186	3.483333	2.375
51	0	1	0.2	0.99967	0.947875	4.466667	2.4
52	38	3	0.595833	1.961617	2.078159	2.766667	2.576923
53	0	1	0.142857	1.307744	1.343182	3.65	2.636364
54	0	1	0.142857	1.307744	1.343182	3.65	2.636364
55	0	2	0.642857	1.316021	1.381559	3.633333	2.590909
56	0	2	0.642857	1.316021	1.381559	3.633333	2.590909
57	0	1	0.142857	1.307744	1.343182	3.65	2.636364
58	0	1	0.142857	1.307744	1.343182	3.65	2.636364
59	676	7	5.0625	2.079314	2.271727	2.666667	2.431373
60	2833	16	3.786905	3.923233	3.923233	1.883333	1.883333

Source of the table: drawn by the author

In general, the connection value, global integration degree, and local integration degree of space NO.60 are the highest areas in the 24-25 floor plan. Not only is the crowd gathering effect strong, but there are more gatherings in the morning and evening; after getting off work and after school, people flow, and the line of sight is relatively wide. The line of sight in this space can see other elements in the space system after a few turns. Seeing the variety and number of elements can attract people's attention to this direction. At the same time, the analysis result of the proxy robot of prediction space NO.60 is that the proxy robot has travelled the most times and walked the most times of the "back" type.

The permeability of the space is better, and the vitality is stronger. The perception of the flow of people is relatively good. In the areas with high control value of the outside view of the nine units A, B, C, D, E, F, G, H, I, such as the external corridor, you can set up corresponding signs here, indicating the direction of different units, to prevent building residents from going wrong. Propaganda boards can also be set up in elevator shafts and stairwells. Property management personnel should act as their own and change local news every day so that the residents of the building can understand local facts. A comment column is set up next

to the publicity column, and residents can also put forward constructive comments and suggestions on the property and government departments of the community. In the living room inside the space, the residents of the building can renovate their living room, including the choice of furniture color, to make their home into a warm family, which is more conducive to people's physical and mental health.

5. Conclusion

Based on the theory of space syntax and in the context of urban renewal, this paper analyzes the current internal spatial characteristics of Macau EDF. de Alameda da Tranquilidade and determines the overall spatial characteristics of the entire building through the distribution and characteristics of the changes in the plane. It is hoped that this research can provide a feasible example for scholars who use space syntax to study the interior space of economic housing types in the future.

Conflicts of Interest: The authors declare no conflict of interest.

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