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A STUDY OF SPACE SYNTAX OF SPACES FOR THE URBAN POOR: LARIMER COUNTY FOOD BANK AND CAPSLO HOMELESS SHELTER

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A B S T R A C T

The study intends to understand and review the spatial organizations of a selected food bank and homeless shelter as representations of their respective typologies. The roles of these typologies, which heavily focus on providing support to the needy, is discussed at length. The study is carried out by analyzing the space syntax of the case studies using measurable scale graphs. Through referencing source material and logical reasoning, the functions of the spaces are identified and mapped. The Larimer County Food Bank illustrates high segregation of circulation between different types of users. There is also significant prioritization to creating efficient flow throughout the building, which is most clearly illustrated by the provision of a catwalk for volunteers. The homeless shelter organizes its spaces using a central spine located on each floor. The use of corridors and sub corridors throughout the building helps define the different levels of access and privacy. This study shows the unique spatial structures of food banks and homeless shelters, revealing the nature of spaces designed to aid the needy.

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1. INTRODUCTION

It is normal for people in many parts of the world to spend most of their time indoors (Mehdipour & Nazamian, 2013). Buildings and the spaces within them are not merely backdrops for human activity. Instead, they represent an individual's memories, connections and shared experiences (Butterworth, 2009). The spaces people inhabit are varied depending on their functions and the roles of their users. They may be varied in terms of their size, capacity, internal fittings, openness, and others. The diverse nature of these spaces leads to unique spatial structures when several spaces are put together to create a functioning complex for any given purpose.

In this study, the spatial syntax of complexes in the service of the needy is examined. The

typologies that fall under this category include food banks and homeless shelters, which are the focus of this study. The unique relationship between user and space are explored, revealing various degrees of accessibility and choice of movement within a building. Through logic and reasoning, these spatial structures can be assumed and assessed to identify the best aspects of each case study in terms of spatial organization.

1.1   RESEARCH OBJECTIVES

This study looks into the spatial structures of building typologies that are designed to serve the urban poor. It seeks to understand the spatial networking unique spatial arrangements of the Larimer County Food Bank and the Community Action Partnership of San Luis Obispo County (CAPSLO) homeless shelter, each serving as representations of their respective typologies. For each building, comparisons are made between the spatial networking of different user categories within the building. The following are the objectives of the study:

1. To identify the spatial structures of the case studies by user categories through space syntax study
2. To evaluate the space syntax of each case study relative to the user's movements through the buildings.

2.   LITERATURE REVIEW

2.1   SPACE SYNTAX

The idea of space syntax is that there is presumably an identifiable structure that lies within the built environment as determined by human perception as they experience the spaces. It is about understanding and evaluating the spatial structures embedded in a social lifestyle (Peponis, 2005). Space syntax is ultimately concerned with the relationship between human beings and the spaces they inhabit. It includes identifying how spaces are designed and used by people in a way that conveys social or cultural significance (Dursun, 2007). Part of this understands the social nuances that are affected by various spatial configurations.   Space syntax does not look into the character of a place or building, but rather gives great emphasis on the shape of the networking between spaces (Nes, 2014). So instead of discerning identity through observation, the study of space syntax is rigorously guided by reason, which aids the intuitive process of design by adding rationale (Hillier & Hanson, 1984).   The practice of studying space syntax often involves a graphical representation of the spatial organization.   Figures 1 and 2 are examples of the descriptions of space syntax. These diagrams help illustrate the paths and permeability of the spaces concerning other spaces.
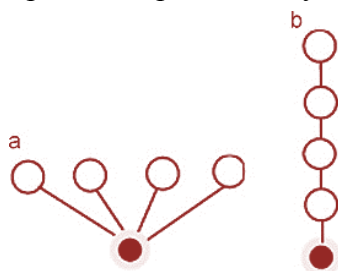

Figure 1: An elementary representation for space syntax analysis. 'a' represents minimum depth (symmetric system) while 'b' shows a linear sequence of maximum depth (asymmetrical system) (Hillier, 1984)
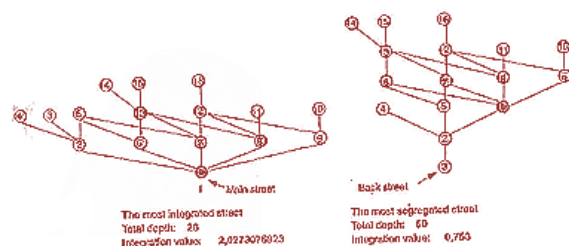
Figure 2: An example of a space syntax diagram assessing the street networks of a region in Amsterdam (Nes, 2014)

2.2 CASE STUDY: LARIMER COUNTY FOOD BANK AND THE FOOD BANK TYPOLOGY

Food banks are at the center of food aid initiatives, which are efforts to ensure food security intended as short term solutions (McKay & Dunn, 2016). McKay and Dunn also state that food banks refer to either a big redistributor of food surplus for charities that supply food to poor communities, or a provider of grocery items.
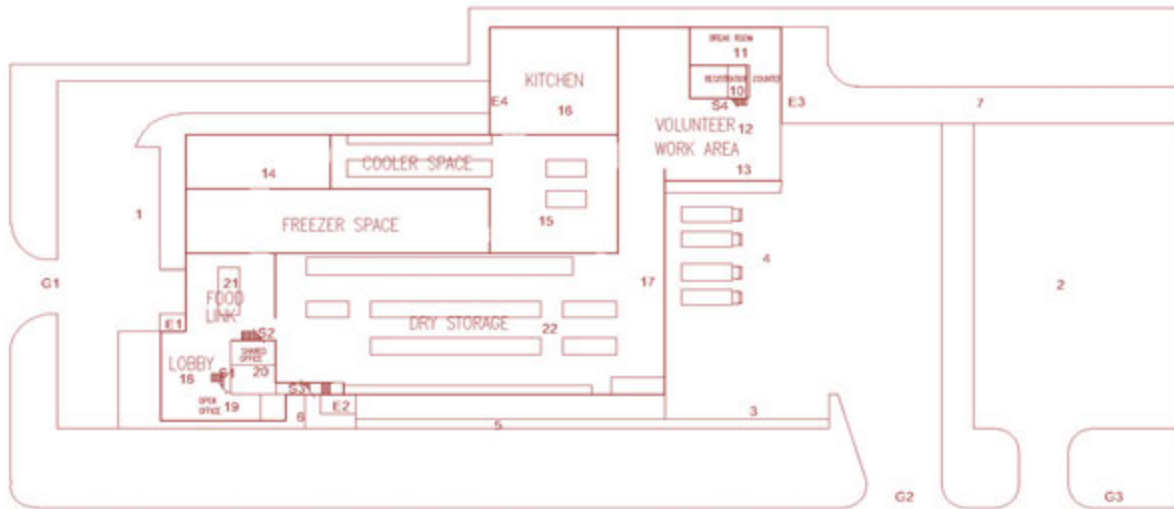
Figure 3: Site plan and ground floor plan of a food bank, drawn based on images retrieved from auworkshop.com
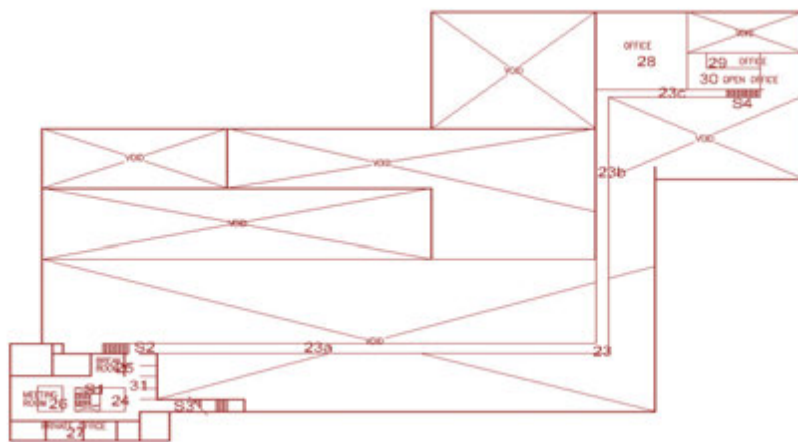
Figure 4: First floor plan of Food Bank, drawn based on images retrieved from auworkshop.com

The case study selected for this study, the Larimer County Food Bank, represents both these definitions. The Larimer County Food Bank is a food bank facility serving the Larimer County in Loveland, Colorado, United States of America. The website writes that the food bank serves the needy through food distribution in hunger relief programs (Food Bank for Larimer County, 2018). A news article mentions that the food bank serves 36,000 people in the area as of 2015. The building itself is a renovated existing warehouse, which was made cost-effective through strategic modifications. The renovation done by AU Workshop includes an upgraded exterior and interior spaces that are more spacious than before (Architects and Urbanists Workshop, 2018).

The spaces include a food link that deals directly with clients and a warehouse that stores and

redistributes cooked and uncooked food products that are rescued and/or donated. A large percentage of the building is dedicated to food storage, with a cooler and freezer space matching the size of the dry storage when combined. Figures 3 and 4 are the plans for the food bank with numbers that correspond to the provided list of spaces in Table 1 and the related graphs in the discussion section. The images are prepared to illustrate based on the images provided by the AU Workshop online portfolio.

Table 1: List of spaces in the food bank which correspond to the labelling in Figure 3 and 4

No.	Space	No.	Space	No.	Space
G1	Public entrance to the site	7	Volunteer walkway	20	Shared office
G2	Back entrance to the site	9	Pick-up driveway	21	Food Link
G3	Entrance to volunteer parking	10	Volunteer check-in	22	Dry Storage
E1	Main entrance	11	Volunteer break room	23	Volunteer catwalk
E2	Staff entrance	12	Sorting area	24	Meeting room
E3	Volunteer's entrance	13	Changing area	25	Staff break room
1.	Visitor's parking	14	Freezer space	26	Meeting room
2	Volunteer's Parking	15	Cold Storage	27	Private office
3.	Staff Parking	16	Kitchen	28	Office
4.	Loading Bay	17	Internal Loading Bay	29	Office
5	Staff walkway	18	Lobby	30	Office
6	Outdoor break area	19	Open office	31	Office
S1-4	Staircase				

2.3 CASE STUDY: CAPSLO HOMELESS SHELTER, SAN LUIS, OBISPO, CALIFORNIA, USA

Homeless shelters or in this case, homeless transitional housing is mainly dedicated to providing for individuals or households that face barriers that prevent them from getting shelter or maintaining a house without support (Burt, 2006). In many countries, these shelters are the primary vessel for service delivery to homeless people (Shier et al., 2007).
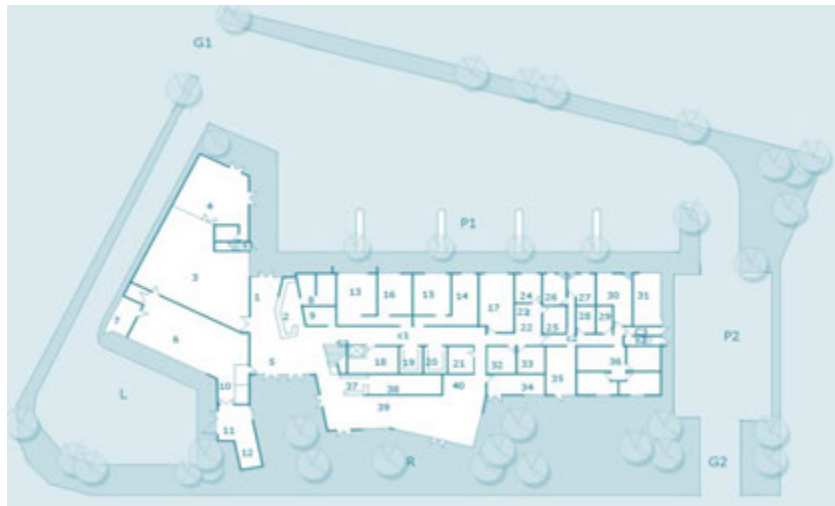
Figure 5: Site plan and ground floor plan of homeless shelter,
redrawn based on images retrieved from archdaily.com.

The Community Action Partnership of San Luis Obispo County (CAPSLO) aims to address issues of poverty and low-income groups. Designed by Gwynne Pugh Urban Design Studio, in partnership with Garcia Architecture + Design, the spaces are organized along a central spine from which users can be channelled into the many spaces (Winstanley, 2011). This site plan was designed by the researcher based on the assumption to provide material for analysis in this research, using information available from Archdaily.com. Figures 5 and 6, the homeless shelter is made up of two floors with the top floor being dedicated to dormitory space. The lower floor is more community-

oriented with offices, a library, recreational zones and medical and mental health consultancy spaces. Table 2 gives the list of spaces for the homeless shelter with numbers corresponding to labels in Figure 5 and 6.
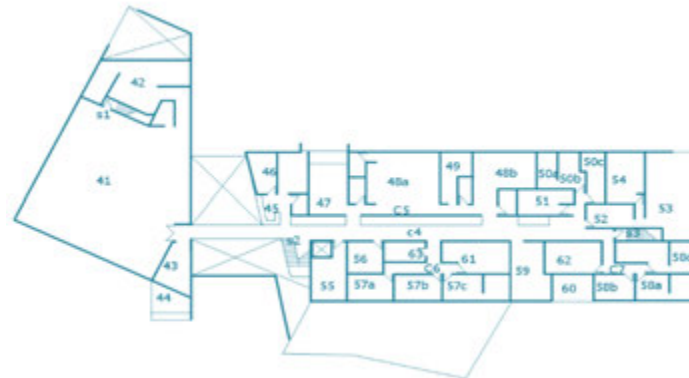
Figure 6: First floor plan of homeless shelter, redrawn based on images retrieved from archdaily.com.

Table 2: List of spaces for the homeless shelter.

No.	Space	No.	Space	No.	Space
G1	Public entrance to the site	19	Lockers	43	Reading nook
G2	Back entrance to the site	20	Lockers	44	Sun deck
P1	Visitor parking	21	Office	45	Security counter
P2	Staff Parking	22	Waiting area	46	office
L	Loading area	23	Restroom	47	Family lounge
R	Recreational area	24	Medical exam room	48	Family dorm
1.	Main Entrance	25	Medical exam room	49	Shared kitchen
2	Reception	26	Mental health room	50	Private dormitory
3.	Dining Hall	27	Mental health room	51	Shared washroom
4.	Community room	28	Washroom	52	Female dorm lounge
5	Lobby	29	washroom	53	Female dormitory
6	kitchen	30	Donation room	54	Women's washroom
7	Community enterprise	31	Mechanical room	55	Janitor's room
8	Front Office	32	Medical consultant office	56	Office
9	Office	33	Medical consultant office	57	Private dormitory
10	Preparation area	34	Children's classroom	58	Private dormitory
11	Loading-bay	35	Staff break room	59	Children's playroom
12	Refuse chamber	36	Main office	60	Play deck
13	Men's locker	37	Phone area	61	Shared washroom
14	women's locker	38	Mail/day storage	62	Shared washroom
15	women's washroom	39	Library	63	Storage
16	men's washroom	40	Computer area	S1-3	Staircase
17	laundry	41	Male dormitory	C1-7	Corridors
18	Janitor's room	42	Male dorm washroom		

3. METHODOLOGY

This study is an analytical study using quantitative analysis via graphs to identify the quality of spatial networking in terms of their permeability and level of wayfinding. A literature review on the academic discourse of spatial syntax and building typology is first carried out to provide a basis from which a proper investigation of the case studies can take place.

To examine the spatial networking, an effective analysis method must be developed. This study uses a level of movement graph to indicate both the level of permeability and wayfinding of the spaces present within each case study. Format of the chart is taken from a previous survey of Hillier and Hanson (1984) in which the graph was used to examine the layouts of early Ottoman mosques.

For each case study, separate graphs were produced to examine their level of permeability. These graphs represent the level of permeability for the site plan and the internal building layout, respectively.

Figure 7: Example of a measurable scale graph used for space syntax study

The vertical scale represents the level of permeability starting from 0 (Entry Level) up to 8 (Most Private). Each number in the circle corresponds to a space labelled with the same number on the floor plans of the building. The horizontal axis is used to fit multiple spaces of equal depth. Having more than one space on the same level often but not always means that the space preceding it has branching paths. The various lines connecting the circles indicate that there exists a relationship between the related spaces.

Figure 7, the scales on the graphs differ, given the different depths of access between the entry to the site and the entry to the building. Generally, the higher the number, the lower the permeability and the greater the depth of the space.

3.1 METHOD OF ANALYSIS

The building's spatial structure is be analyzed by user category. Four primary user categories have been identified for the food bank (visitors, staff, volunteers, and charities and suppliers) and three primary user categories for the homeless shelter (residents, administrative staff and consultants, and kitchen staff). Each user category will have a graph representing their respective flows throughout the building. Where possible, the spaces of the case studies have been labelled according to reference material made available by the architects or building owners. However, in some cases, logical reasoning by a researcher is used to assume the functions of the spaces for this study.

3.2 SYNTHESIS OF DATA (FINDINGS)

After analyzing each user's level of permeability individually, a comparison will be made between these categories to understand the depth of each group's access to the building. This section will record the positives and negatives of a spatial network based on the analysis and graphs.

A comparison between the spatial structure of the food bank and homeless shelter will also be made to understand the programs meant to serve the urban poor. This study will make some

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suggestions based on the understanding gained from literature sources and findings. It however, may not represent the actual design intentions of the architects of the case study. It does, however, obey the conventions of space syntax study.

4. RESULT OF ANALYSIS: FOOD BANK

The analysis will be carried out specific to each user category. Their circulation throughout the space will be translated into a graph format from which the depth permeability may be understood. The four user categories are Visitors, Staff, Volunteers, and Supply and Charities.

4.1 VISITOR'S CIRCULATION
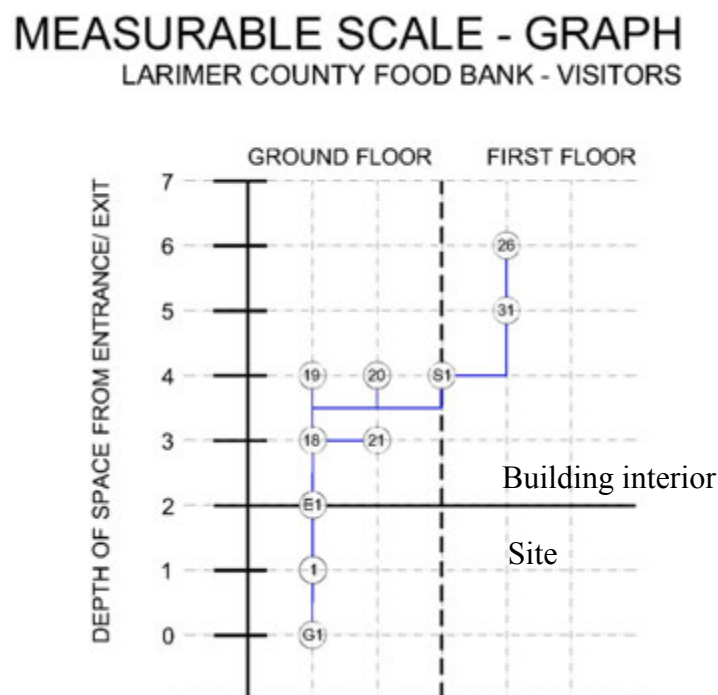
Figure 8: Space Syntax graph for visitors of Larimer County Food Bank

Figure 8, visitors have a generally straightforward flow that begins from the front entrance of the site. Their access to the building is limited to only one entrance (E1), allowing them to park at the visitor's car park (1) beforehand. The lobby (18), fluidly linked to the 'food link' space (21), branches into only two other spaces and a staircase (S1). The staircase leads to the office space upstairs, in which they are only permitted to access the meeting room, should they have an appointment with the staff. It is mostly a linear flow with the depth going up to only four on the scale for visitors with no agenda in the office.

4.2 STAFF CIRCULATION

The staff have the most elaborate flow, gaining access to multiple entrances. They can access the building via G2, before parking their vehicles at space 3. A dedicated entrance (E5) gives them a shortcut to the office upstairs and direct access to the center of the building, the dry storage space, 22. It is important to allow them to administer the building and monitor operations efficiently. There are multiple branches coming from space 22, which is believed to be the central space of the building.

Space 17 is another space with heavy networking, allowing access to the volunteer areas, 10 and 12 and the kitchen, 16.   The staff have full access to the office space that, while private to other user groups, is at a relatively low depth for the staff, thanks to the dedicated entrance E5. This allows them quick and secure access to the office.
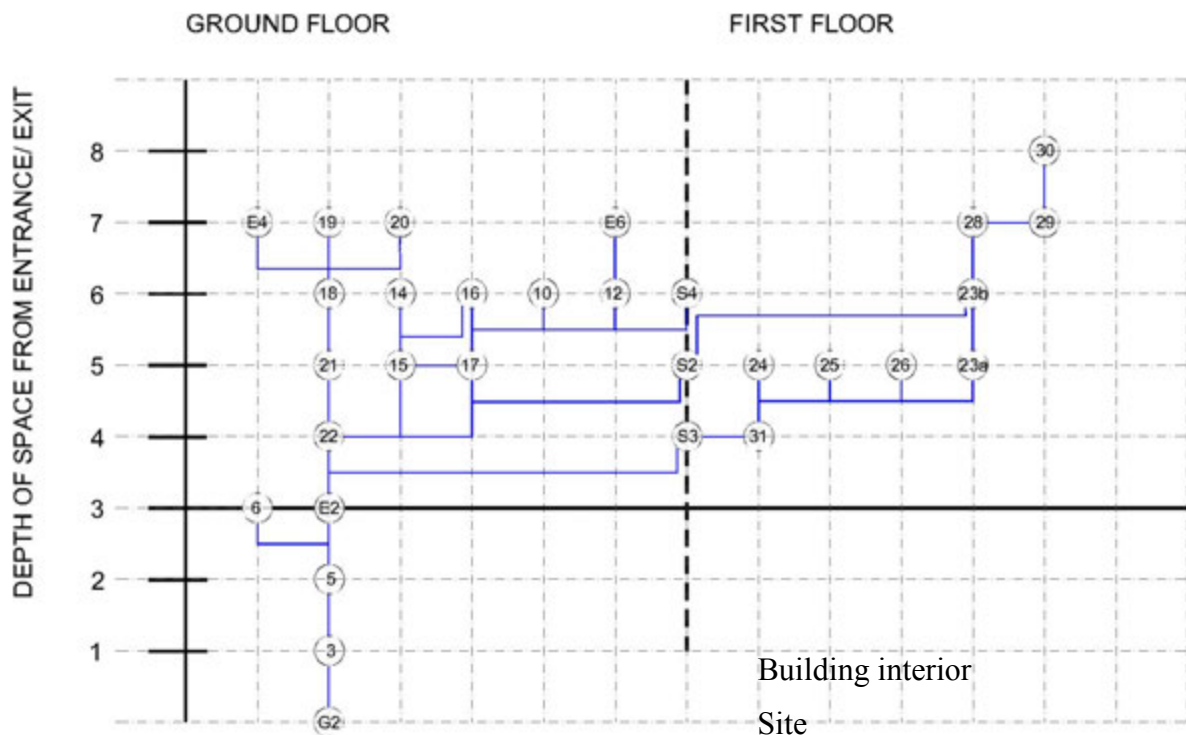
Figure 9: The space syntax graph for the staff circulation in the Larimer County Food Bank

4.3   **VOLUNTEER'S** CIRCULATION

Volunteers have a dedicated entrance and parking space, G3 and 2 respectively, see Figure 10. They are greeted at E3 and have to pass through the volunteer check-in desk (10) before gaining access to any other space.
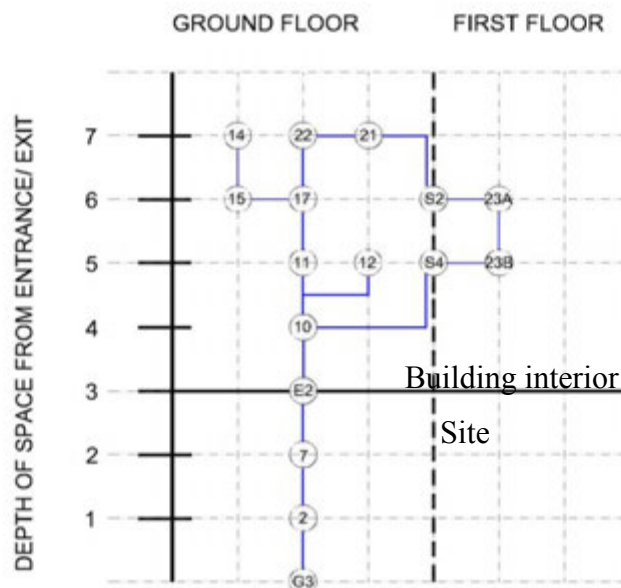
Figure 10: Space syntax graph showing volunteers' circulation in Larimer County Food Bank.

After accessing 10, they are allowed to enter other spaces with branching paths. This includes spaces 17, leading into 15 and 22, the storage veins of the building.   Volunteers are allowed quick access to space 21 via an elevated catwalk 23. The architects included this to allow the volunteers to

access the front of the building without having to navigate through the storage and sorting spaces. It illustrates prioritization of smooth movement for the volunteers that are expected to carry out many tasks which may require them to quickly move from one part of the building to the next. It is also to avoid congestion within the storage space.

4.4 SUPPLY AND CHARITIES' CIRCULATION

Supply and charities have the most limited access, Figure 11. They each have only one entrance to the site with only one space to access. They have picked up or drop off points but do not enter the building. Suppliers enter through G2 and load the food bank supplies at one of the five dedicated loading bays at 4. Smaller charities enter through G1 and drive to E4 to pick up cooked food to be distributed at their respective charity program. The spatial structuring for this user category is brief, organized and efficient.
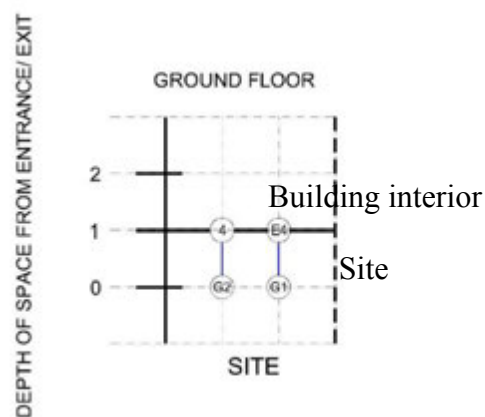
Figure 11: Space syntax graph showing circulation for Suppliers and charities

## 5. RESULT OF ANALYSIS: HOMELESS SHELTER

For the space syntax analysis of the CAPSLO homeless shelter, three user categories can be identified, namely residents, administrative staff and health consultants, and kitchen staff. Their circulation throughout the space will be translated into a graph format from which the depth permeability may be understood.

5.1 RESIDENTS

The residents have the most elaborate spatial networking, partly because their user category has been generalized to include all genders and resident types. The residents are divided by gender, with the inclusion of family units and dorms. Furthermore, there are also different spaces for sleeping, depending on the duration of the stay. Except for the spaces that are not for sleeping, the toilets attached to these spaces and the gender-specific washrooms, the circulation for all types of residents are generally the same.

The graph Figure 12 reveals that C1 and C4 are the primary conduits from which a majority of the spaces are accessed. Despite the dorm rooms and sleeping areas being on a separate floor, the permeability lies at the same level as many spaces on the ground floor. It is because the staircase S1 is at a low depth and S2 is at the same depth as C1. From a logical standpoint, it seems that the upstairs spaces have been made easily accessible to the residents, allowing them to go in and out without passing through too many spaces. This is an indication of good spatial organization that is optimized

for residents' convenience. Their access to the back office '36' has been restricted thanks to the separation between C1 and C2. This is a great security measure in design.
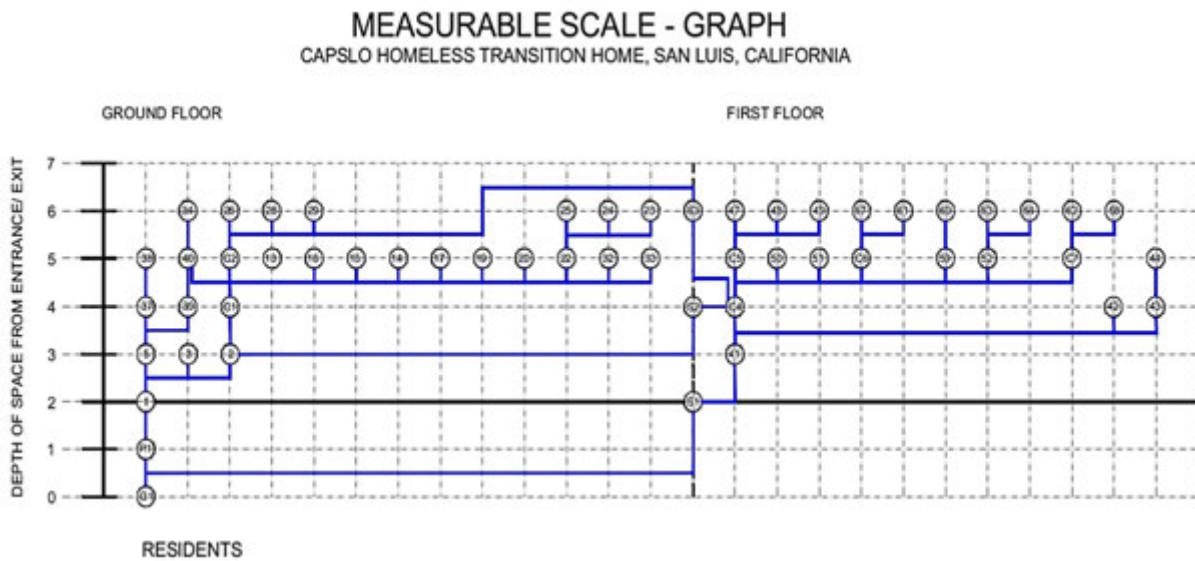
Figure 12: Space syntax graph showing residents' circulation through CAPSLO homeless shelter.

5.2 ADMINISTRATIVE STAFF AND CONSULTANTS

It is generally understood that the staff have free access to all spaces within a building. However, this graph is more representative of the kind of spaces that would typically be accessed by the staff in their day to day activity.
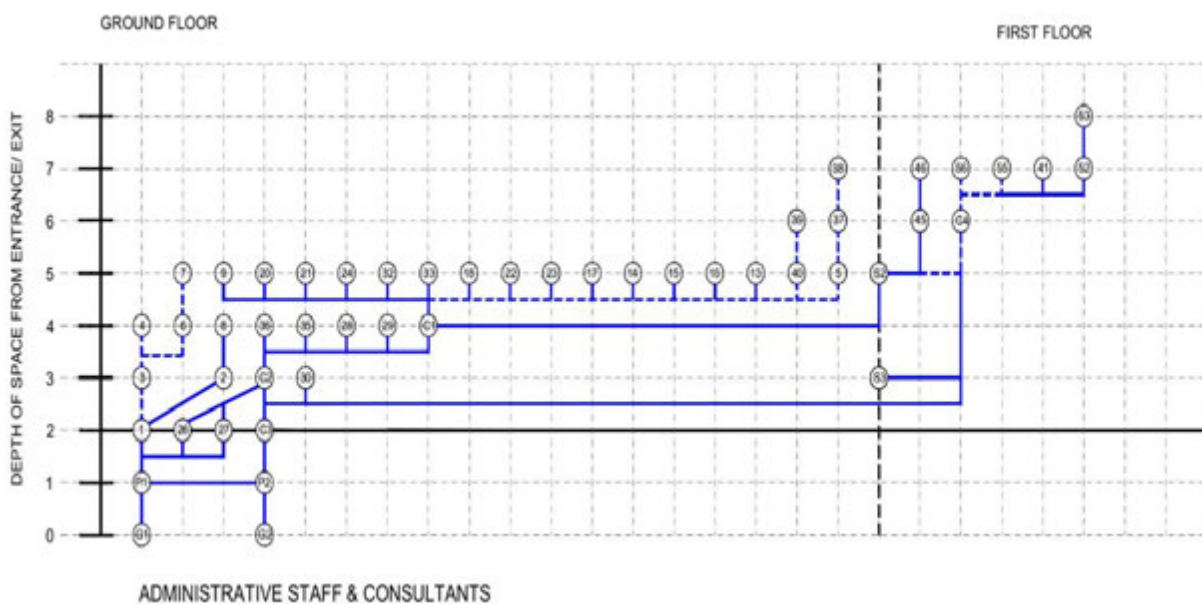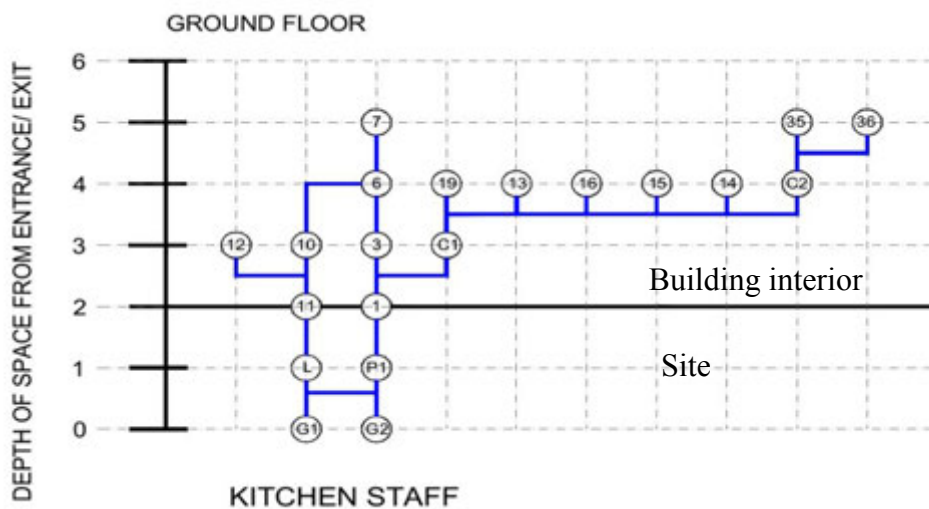

Figure 13: Space syntax graph showing circulation for administrative staff and consultants through CAPSLO homeless shelter.

Figure 13, the dotted lines represent spaces that the staff are suggested to be able to enter freely but may not be directly related to their typical work routine.   First of all, it is good to note that the staff have two parking areas and two suggested entrances into the building. It indicates greater control and access over the facility as compared to the residents.   The staff can quickly access the back office from the parking (P2) via C3, then C2. C3 also allows them quick access to the above floor from the office (36) and P2. Quick access is also given to mental health consultants, whose offices (26 & 27) are directly accessible from the parking space, P1.

For residents, C1 acts as the primary corridor into many of the spaces. The private dorm rooms (50, 56, 57, and 58) have been excluded from this graph, assumed by the researchers' perspective that the spaces are private and only accessible by the residents of the room, except with consent. Given the temporary nature of the residents' stay, however, they will be able to access these spaces when the rooms are vacant. However, that is not the norm and therefore, has been excluded from the graph.

5.3 KITCHEN STAFF

Figure 14, the kitchen staff have the simplest spatial structure of the three. However, they do have access to spaces exclusive to their roles in the building, save the administrative staff should there be inspection or any other need for it. What sets the kitchen staff's spatial network apart is the access to the loading area 'L' and consequently the loading bay, 11 and the refuse chamber, 12.

Figure 14: Space syntax graph showing Kitchen Staff circulation through CAPSLO homeless shelter

Given their role in the building program, the level of permeability goes only up to five on the scale of depth, as opposed to the eight for administrative staff and consultants.   Their work mostly takes place in the kitchen (6), the preparation area (10) and the dining/multipurpose hall (3). They are given access to the lockers, washrooms and changing lockers along C1 labelled 19, 13, 16, 15, & 14.

Just like the administrative staff, they have two ways of entry into the building. The first is via the main entrance (1), and the second is through the loading bay (11).

6. SUMMARY OF ANALYSIS

6.1 FOOD BANK

The food bank in the case study embodies a very open layout with a majority of the spaces being on the ground floor. The entrances for each user category are well defined and segregated, indicating a controlled circulation. The graphs representing each user category further prove this point, with each having a very distinct structure.   The staff have the highest level of permeability within the building. It is understandable as they are able to access all of the spaces within the building, followed by the volunteers, visitors, and lastly the suppliers and smaller charities.

A good thing to note is that the loading and pick up procedure is extremely efficient, with both processes involving only one interior component of the building each. It is the volunteers and staff

working within the building that work in tandem with this spatial organization to limit their access and movement within the premises. The volunteer circulation gains a dedicated elevated corridor that allows them to quickly bypass the storage area to move from the back to the front of the building and vice versa. This makes delegation of tasks efficient as volunteers can easily and quickly be stationed at their assigned positions.

There exists significant overlap in the spatial organization between the staff and the volunteers. However, the limitations of access for the visitors, suppliers and charities have been clearly defined. Their overlapping roles within the building are closely related. All parties are responsible for the operation of the food programs within the building.

6.2   HOMELESS SHELTER

The most prominent finding from this case study is the use of a central spine to organize access into the many spaces of the building. C1 and C4 are the central corridors which funnel users into many spaces, as illustrated in the graphs. The graphs also reveal that the residents and staff have an almost identical level of complexity to their spatial organization, with each having access to different spaces on either floor. While circulation for the residents is more dominant on the upper floor, the staff have balanced access between both floors.

Just like the food bank, the homeless shelter also makes use of multiple entrances to define different paths for each user. The staffs have been given a private corridor (C2) from which they may access their office space. They are provided with a dedicated entrance and staircase (S3) for quick access into the building and upper floor. The first level gives clear emphasis on safety and security, with many control measures to maintain those aspects of the circulation. The central spine on the upper floor (C4) utilizes several sub corridors or transition spaces before channelling the user into the private dormitory spaces. This is perhaps to increase the level of privacy to those spaces, putting them an extra level higher on the scale of depth. The male and female dormitories and placed on either end of the building, ensuring no trespassing occurs in either spaces. A security counter is placed opposite of S2 and in between the two gender-specific dorms, further reinforcing control and security.

7. CONCLUSION

Both case studies seem to embody a certain degree of segregation and focus in the spatial organization of each user group that their limitations of access are clearly defined. This is particularly helpful in buildings that are very community-oriented such as the ones in the case study. The case studies have a very different spatial organization with the shelter opting for corridors, whereas the food bank uses the primary storage area as the center of the warehouse space. The spatial structures are generally simple and fitting for the temporary nature of solutions the buildings aims to provide. Both volunteers and the needy do not wear these labels permanently.

8. AVAILABILITY OF DATA AND MATERIAL

No data is used or generated from this study.

9. ACKNOWLEDGEMENTS

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