

# SHARING NATURE





## **30-Bed Stroke Rehab Center**

DESIGN TO CREATE A HOMELIKE  
ENVIRONMENT FOR STROKE SURVIVORS

**SHARING NATURE**



# COMMITTEE

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COMMITTEE CHAIR | **ZHIPENG LU**

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COMMITTEE MEMBER | **CHANAM LEE**

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STUDIO PROFESSOR | **BRIAN GIBBS**

# DEDICATION

I want to express my gratitude to my parents for their constant support, which enabled me to complete my studies successfully, to all the professors from the College of Architecture at A&M University and my friends for their selfless help in my life and studies.

A special thanks to my sister, who has never left my side and has been my source of encouragement and movement.

You are all the most precious treasures in my life.





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# SHARING NATURE

## DESIGN BACKGROUND

## KEY POINTS OF REHABILITATION



Stroke rehabilitation is a **relearning** process.



Stroke Survivors may suffer from various **disabilities**.



Reduce **barriers** that prevent stroke survivors from receiving treatment.



Stroke survivors are largely **inactive** and **alone** and frequently **bored**.



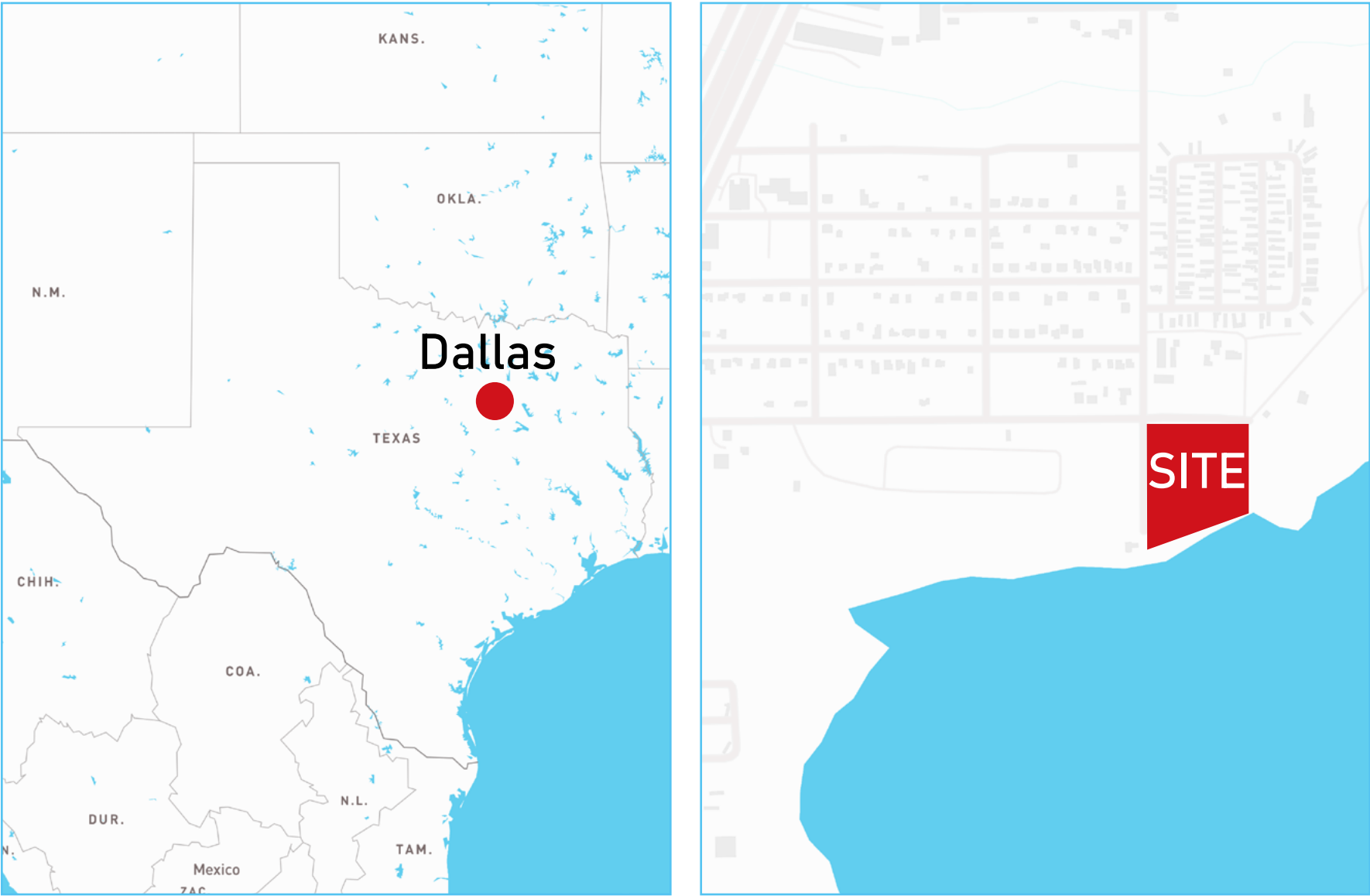
**Social activities** are helpful for their physical, mental, and cognitive recovery.



**Nature** can play a promoting role in the rehabilitation process.

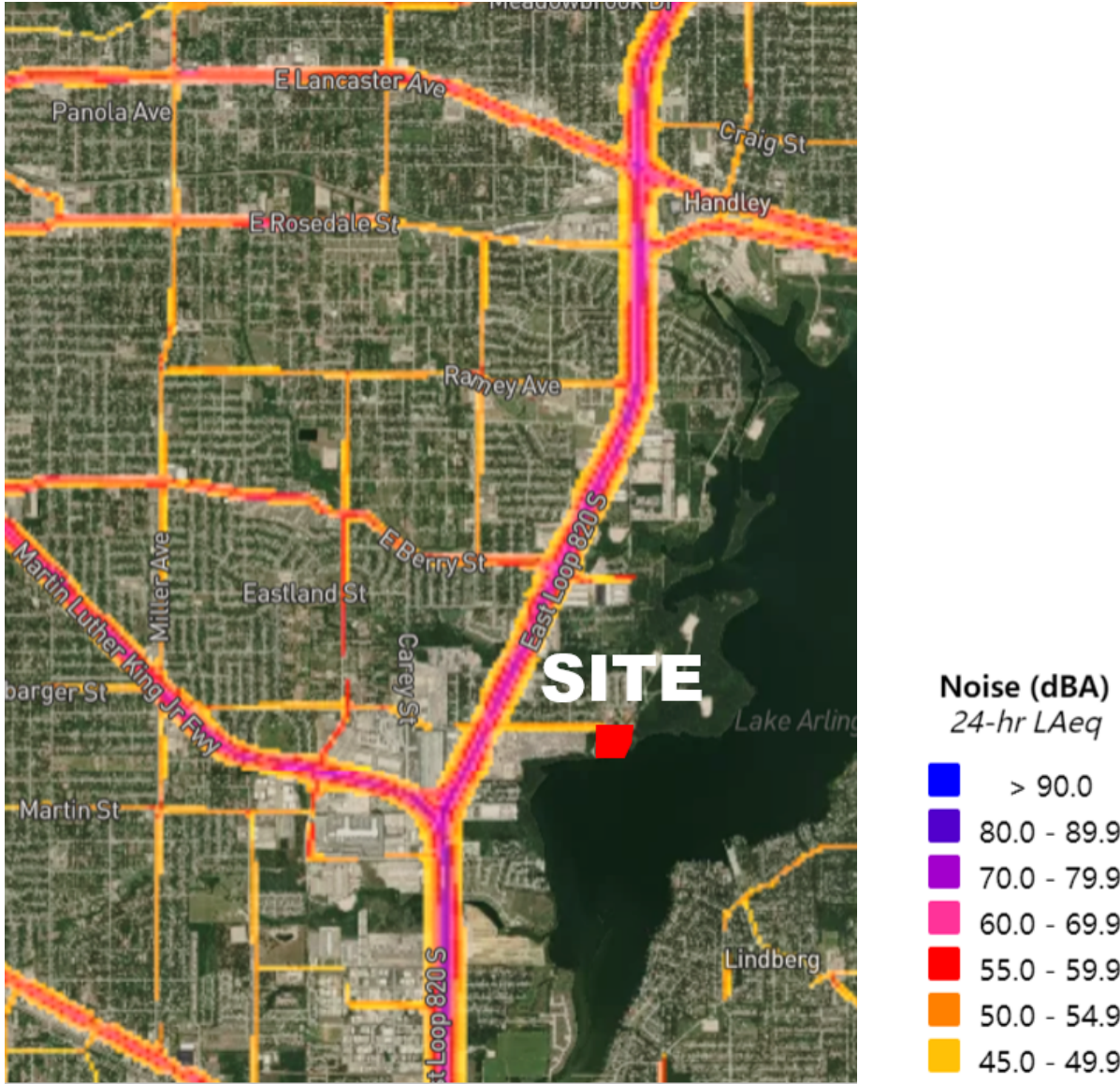


# SITE LOCATION



6000 Wilbarger St, Fort Worth, TX 76119

# NOISE MAP



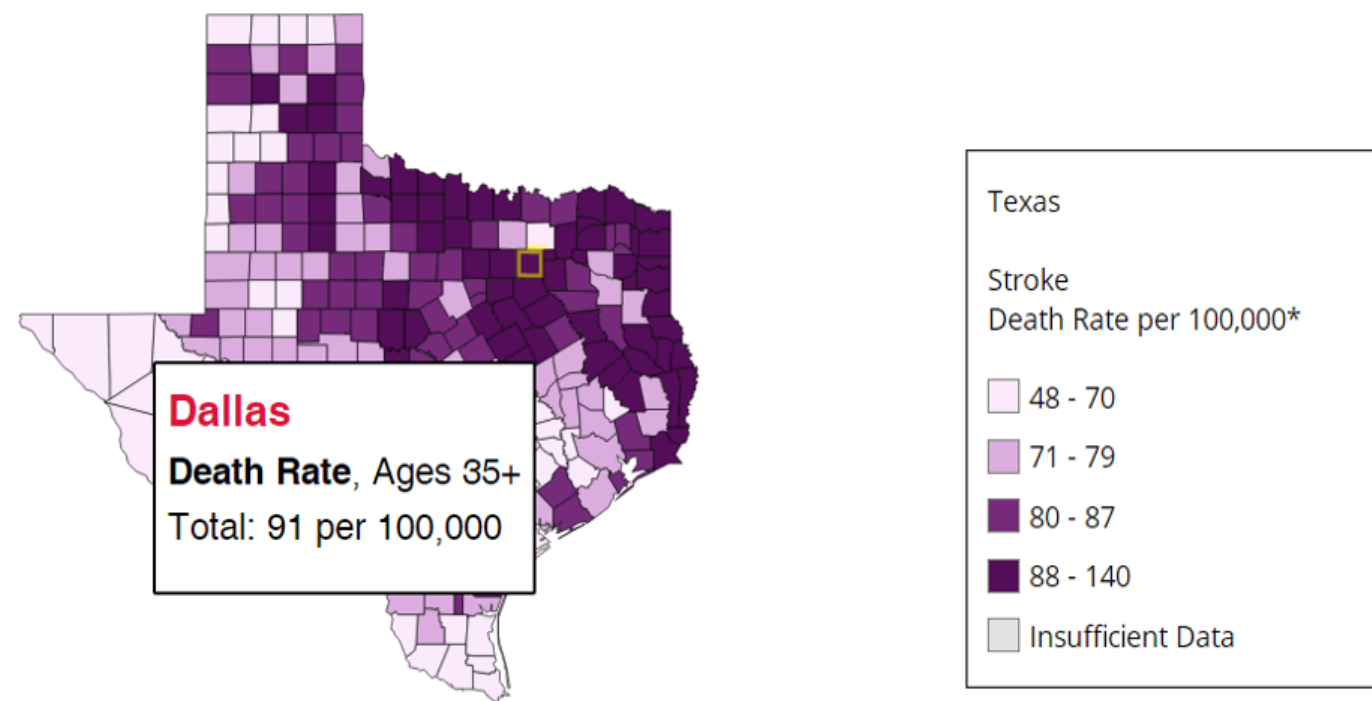
Far from Highway 820 S.  
Next to residential community.  
Minimal noise pollution.



# STROKE MAP

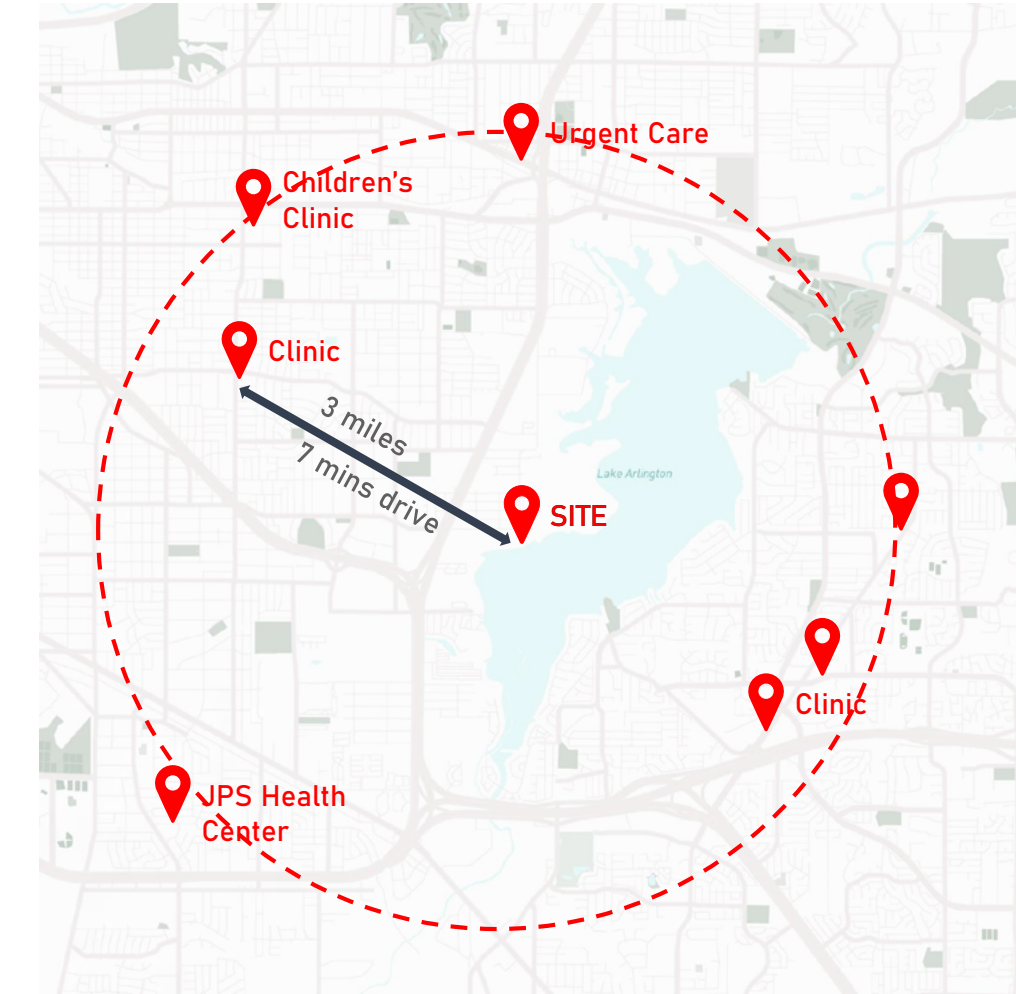
**Dallas** has a relatively high stroke death rate which is **91 per 100,000** and continually increasing.

The highest death rate is in **bowie** which is **104 per 100,000**.



Source: CDC

# SURROUNDINGS



- 0 Stroke Rehab
- 1 Urgent Care
- 1 Nursing Home
- 3 Clinics
- 2 Health Center

**The Nearest Stroke Center:** John Peter Smith Hospital, 7.7 miles away, 15 mins drive.

**Located in the center of red circle:** provides a more convenience choice for not only the family of stroke survivors who is living here, but also for those stroke survivors that need outpatient therapy services.

# SITE SELECTION

i. Residents have the highest average age in the DFW metroplex (>33 years old), and the incidence rate of stroke among the residents of Dallas Fort Worth, where the site is located, is relatively high;

ii. There are no similar facilities within 15 minutes' drive around the site, the nearest stroke center is 8 miles away, which needs 15 minutes to drive, and the most immediate stroke rehab is 14 miles away;

iii. The site has an appropriate distance from the highway: the distance of one mile is enough to block the noise caused by vehicles, and it is also not too far from the highway to cause inconvenience;

iv. The nature view around the site is good: surrounded by forests, the beautiful Arlington Lake is a famous fishing and boating spot with beautiful natural scenery and rich ecology;

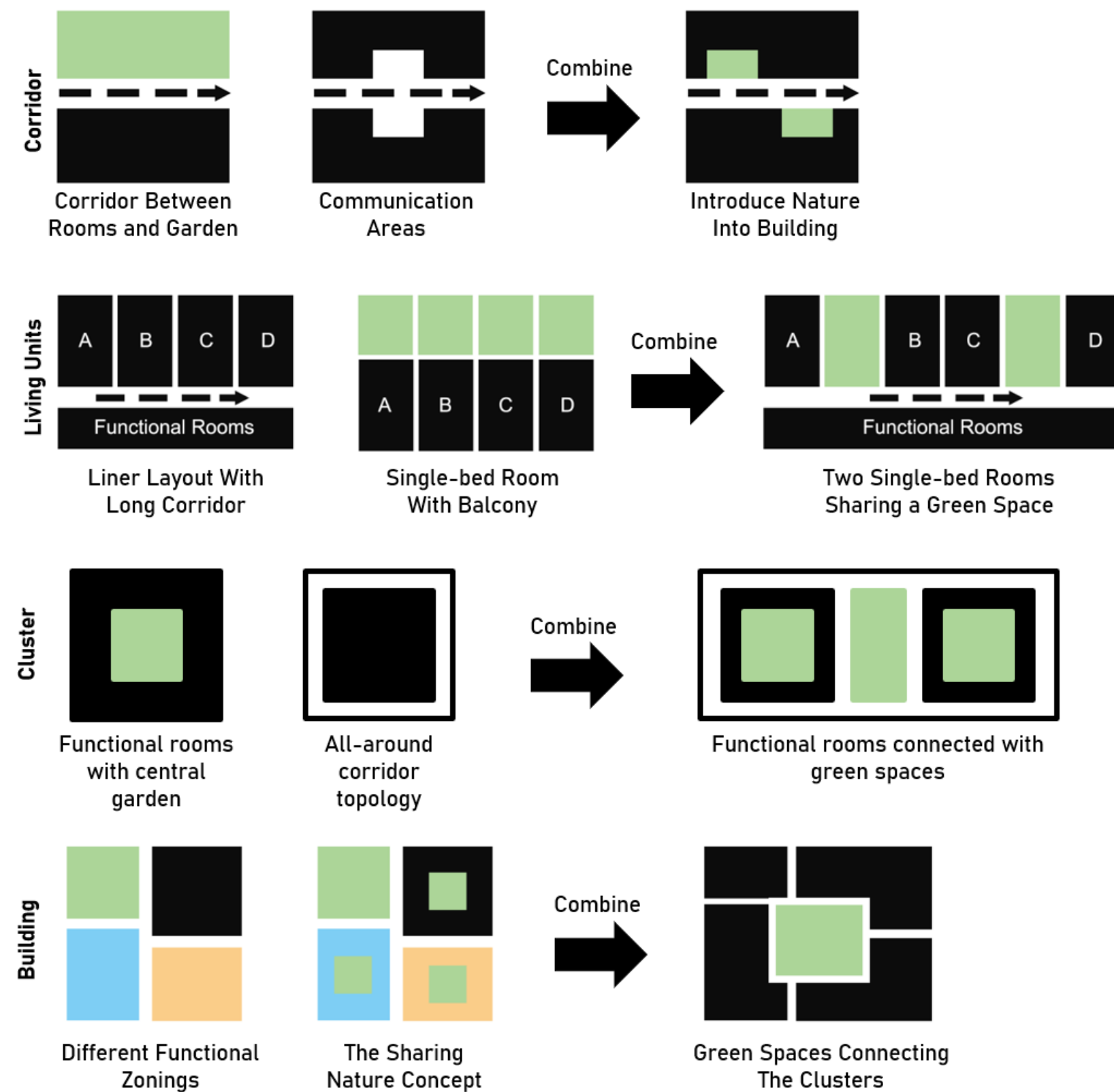
v. There is a high housing density (1530 compared to the United States average of 39.5) around the site;

vi. The site is far from the flooding zone; there is no need to worry about floods.

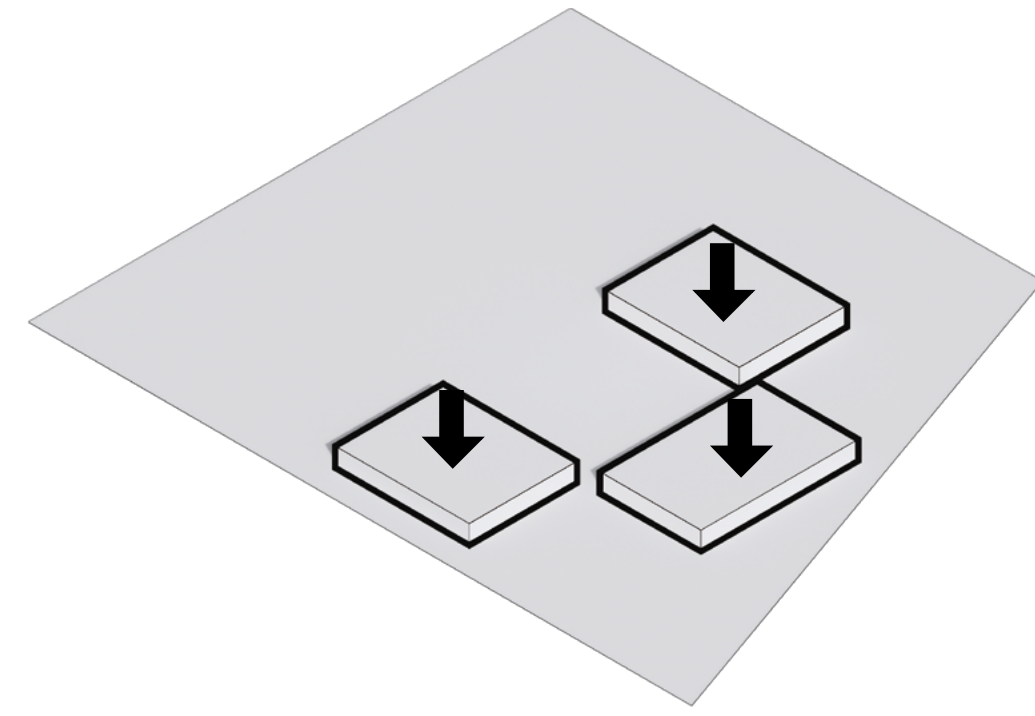
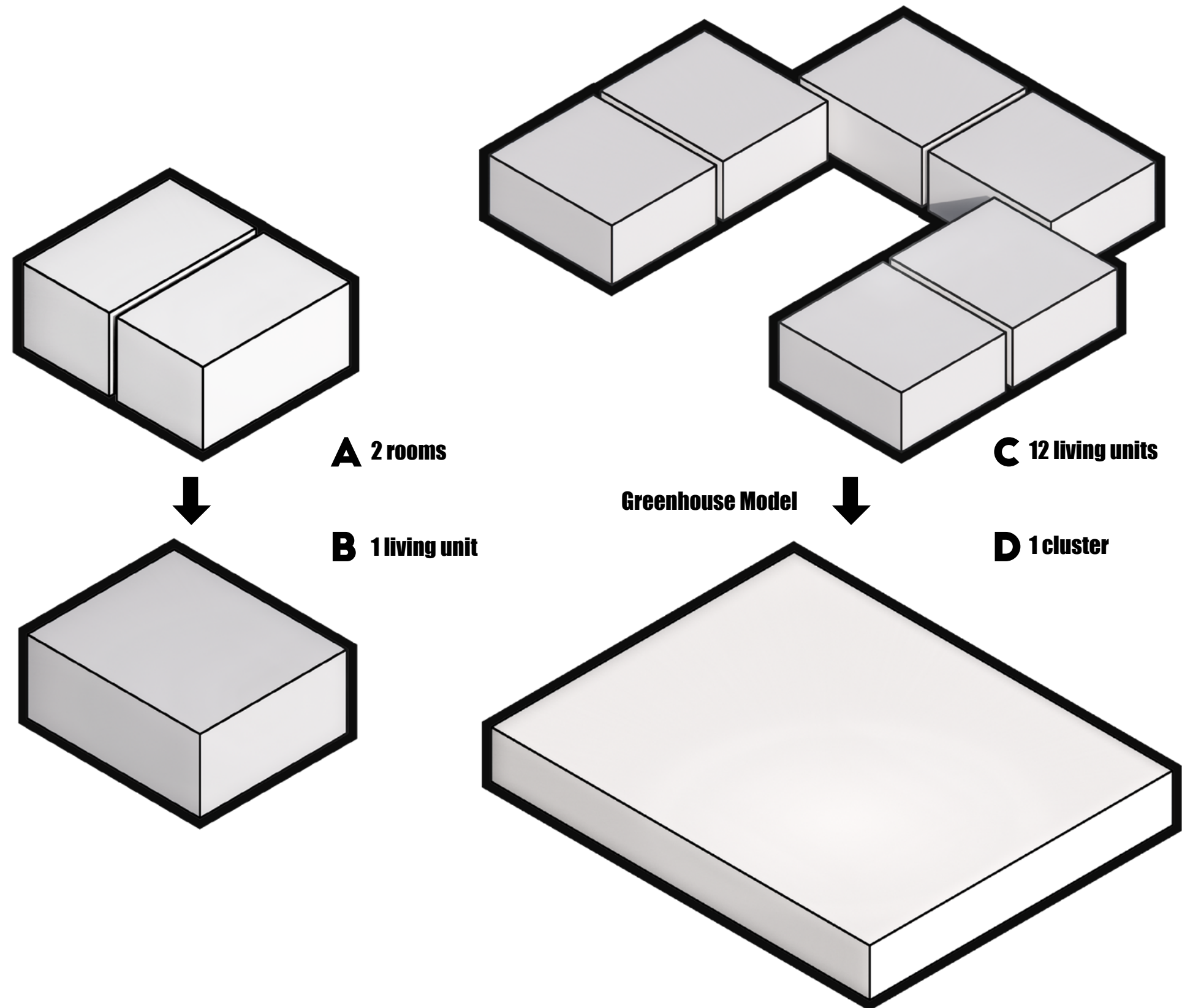


# SHARING NATURE

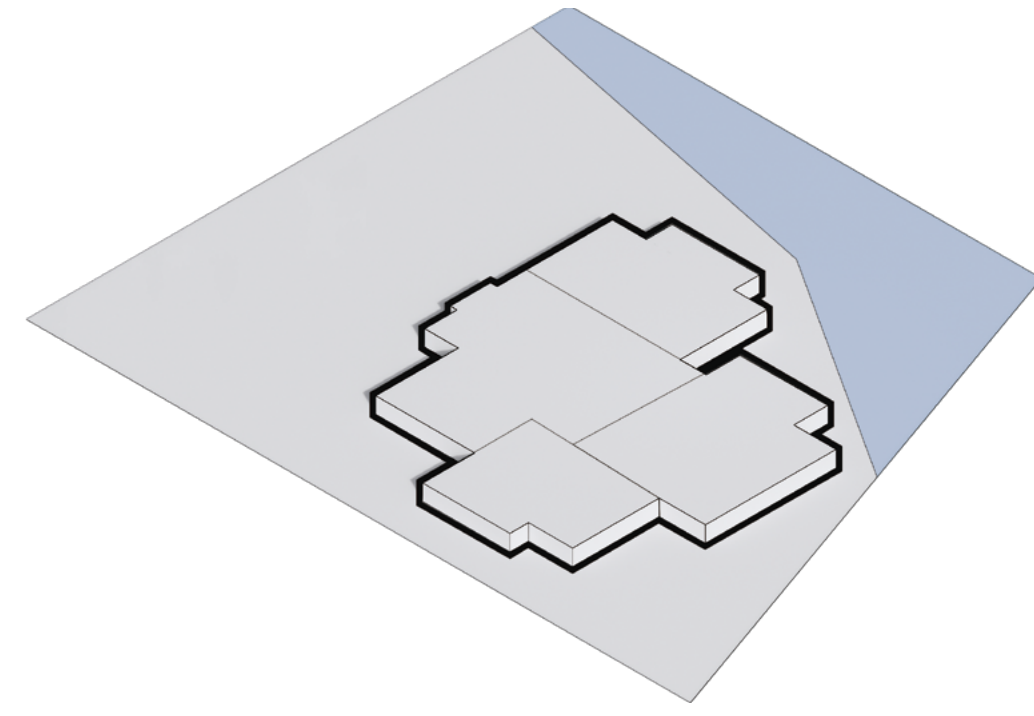
## DESIGN CONCEPT



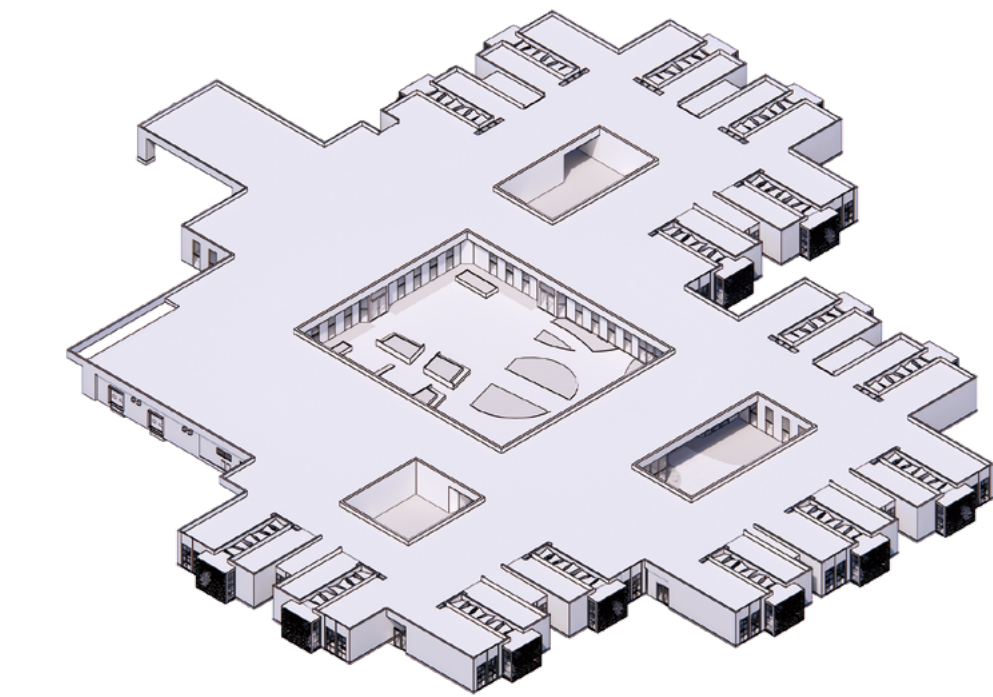
# MODEL GENERATION



**E** Place three clusters close to the Lake Arlington



**F** Connect three clusters with other function zonings



**G** Generate three levels of courtyards



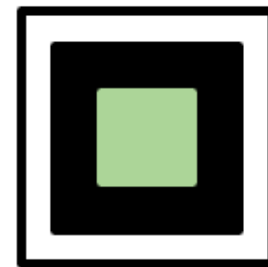
# 3 LEVELS OF COURTYARDS

## Level 1 Small Courtyard:



Shared by two private rooms to create a semi-private green area.

## Level 2 Medium Sized Courtyard



Shared by different functional areas in a single cluster to provide better visual connection.

## Level 3 The Biggest Courtyard



Shared by each clusters to provide a public space for residents, family and staff.



**Upper Left:** Level 3, for 20 people, total public;

**Upper Right:** Level 2, for 5 people, semi-public;

**Lower Left:** Level 1, for 2 people, the most private.

# SHARING NATURE

## PROJECT DETAILS

### SPACE PROGRAM

Program Area	DNSF	DGSF
Patient Unit	14,750	22,862
Dietary	1,760	2,376
Patient Intake	1,710	2,223
Support/Admin	3,990	5,187
<b>Total</b>	<b>22,210</b>	<b>32,648</b>



Patient Unit	
Departmental NSF	14,750
DNSF/DGSF Factor	1.55
Departmental Gross SF	22,862

Space	NSF	QLY	NSF
SSS	360	30	10,800
Centralized Nurse Station	50	3	150
Decentralized Nurse Station	15	6	90
Storage	100	3	300
Physician Dictation Room	100	1	100
Family Lounge	100	3	300
Office	80	3	240
Medication Room	60	3	180
Nourishment	30	3	90
Large Therapy Room	200	3	600
Therapy Room	100	3	300
Treatment ISO Room	100	1	100
Staff Toilet	60	3	180
Patient Toilet	60	3	180
Clean Room	120	3	360
Soiled Room	120	3	360
Decontamination Room	120	1	120
Staff Lounge	100	3	300

Dietary	
Departmental NSF	1,,760
DNSF/DGSF Factor	1.35
Departmental Gross SF	2,376

Space	NSF	QLY	NSF
Patient Dining Area	150	3	450
Staff Dining Area	150	1	150
Soiled Dish Room	150	1	150
Pot Wash/Clean Dishes	100	1	100
Food Prep/Food Storage	200	3	600
Staff Toilet/Lockers	160	1	160
Janitors Closet	50	1	50
Receiving Area/ Breakout	100	1	100

<b>Patient Intake</b>	
Departmental NSF	1,710
DNSF/DGSF Factor	1.30
<b>Departmental Gross SF</b>	<b>2,223</b>

Space	NSF	QLY	NSF
Public Entrance	80	1	80
Main Lobby Waiting	200	1	200
Reception/Business Office/Registration	100	1	100
Wheelchair Storage	80	1	80
Public Women's Toilet	80	1	80
Public Men's Toilet	80	1	80
Vending/ Coffee Room	120	1	120
Public Phone Alcove	25	1	25
Drinking Alcove	25	1	25
Consulting Room	100	1	100
Therapy Room	200	1	200
Pharmacy	120	1	120
Gym	400	1	400
Equipment Room	100	1	100

<b>Support / Admin</b>	
Departmental NSF	3,990
DNSF/DGSF Factor	1.30
<b>Departmental Gross SF</b>	<b>5,187</b>

Space	NSF	QLY	NSF
Receiving Room	1,500	1	1,500
Storage Room	400	1	400
Director Office	100	1	100
Manager Office	100	1	100
Mechanical Room	300	1	300
Electrical Room	240	1	240
Vacuum Pump Room	120	1	120
Medical Gas Storage	120	1	120
Centralized Trash Room	200	1	200
Lounge	150	1	150
Conference Room	200	1	200
Staff Toilet	60	2	120
EVS Admin	120	1	120
Support Admin	120	1	120
Clean Workroom	100	1	100
Soiled Utility	100	1	100





# SHARING NATURE STROKE REHAB

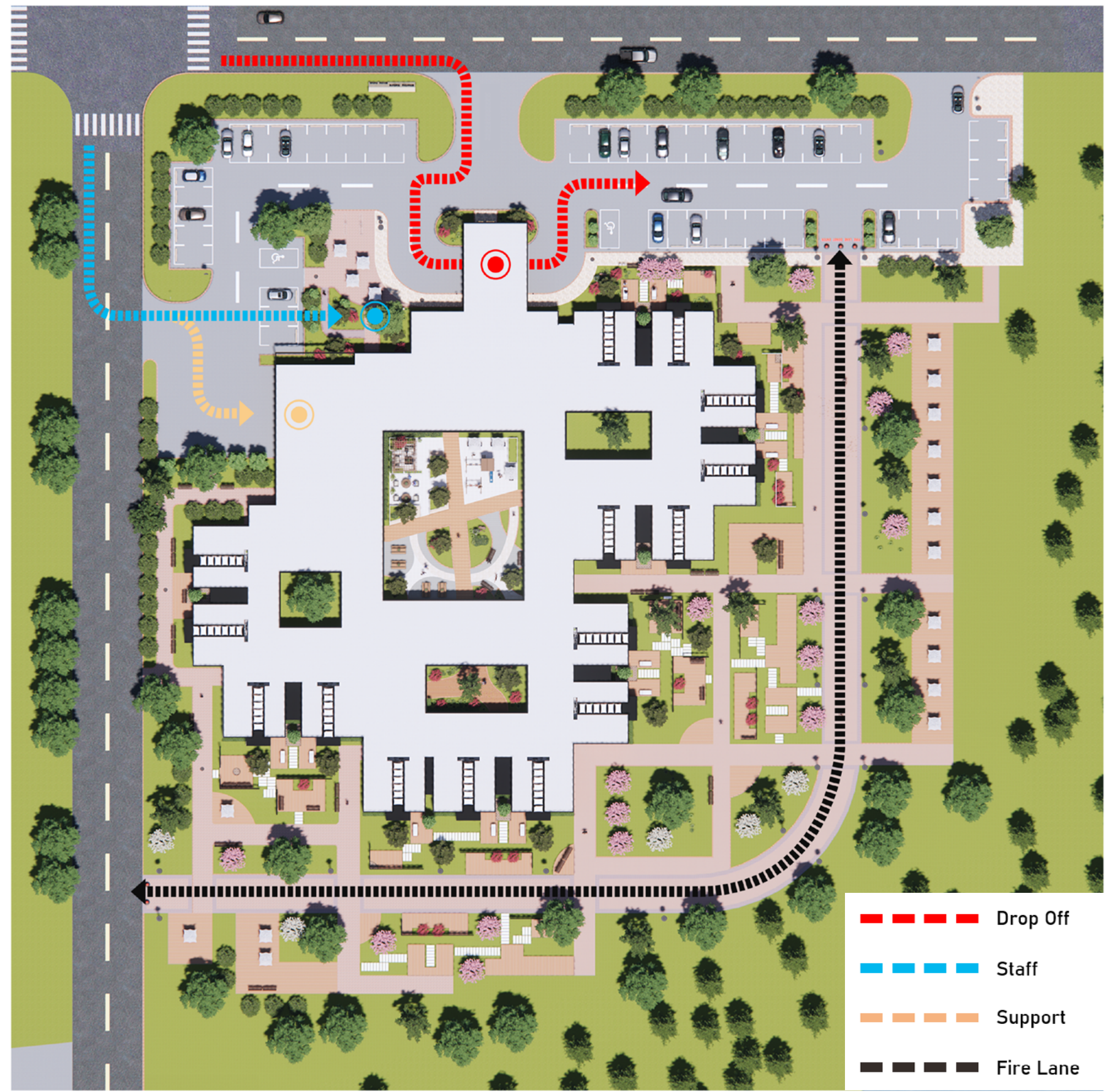
**A** 30-bed stroke rehabilitation center that provides outpatient physical therapy and inpatient care services and is specially designed for the follow-up rehabilitation of stroke survivors.

**T**he design goal of the building is to provide stroke survivors with a home-like living experience that addresses depression, loneliness, and other problems common to patients living in the rehabilitation center. This goal can be solved by the unique design of the internal environment, such as decoration style, building materials, and re-planning of the living units of stroke survivors, trying to build a new type of space for stroke





# CIRCULATION







# WAYFINDING SYSTEM

## Conspicuous physical and digital signage

The prominent signs set up at the entrance are crucial in the wayfinding system, as they can help visitors save valuable time. Including vehicle and pedestrian guidance at the entrance, eye-catching ground arrow guidance, and large signs indicating the location of entrances and exits.

## Optimizing for sight lines

We should consider designing roads and entrances like planning a city, as excessive choices can increase user stress. Visitors should be provided with an easy to follow path and clear signs placed in their field of vision to reduce their time thinking about finding the right path.

## Limited navigation and choices

Restricting navigation usually reduces the delay time for visitors at intersections. Sometimes, although there are multiple paths that can lead to the same destination, limiting them to one path usually allows visitors to find their destination faster.







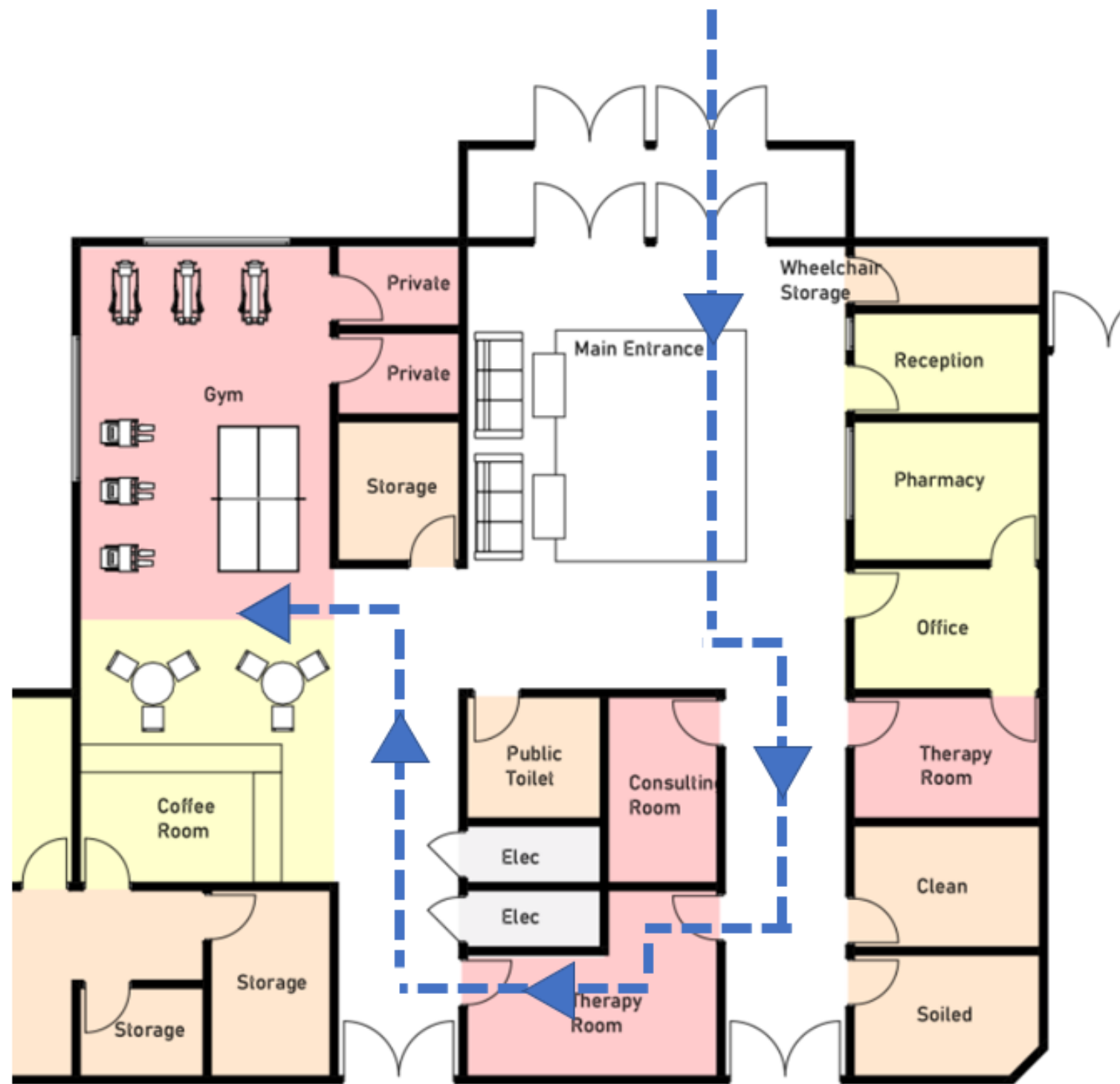
## **HEALING GARDEN**

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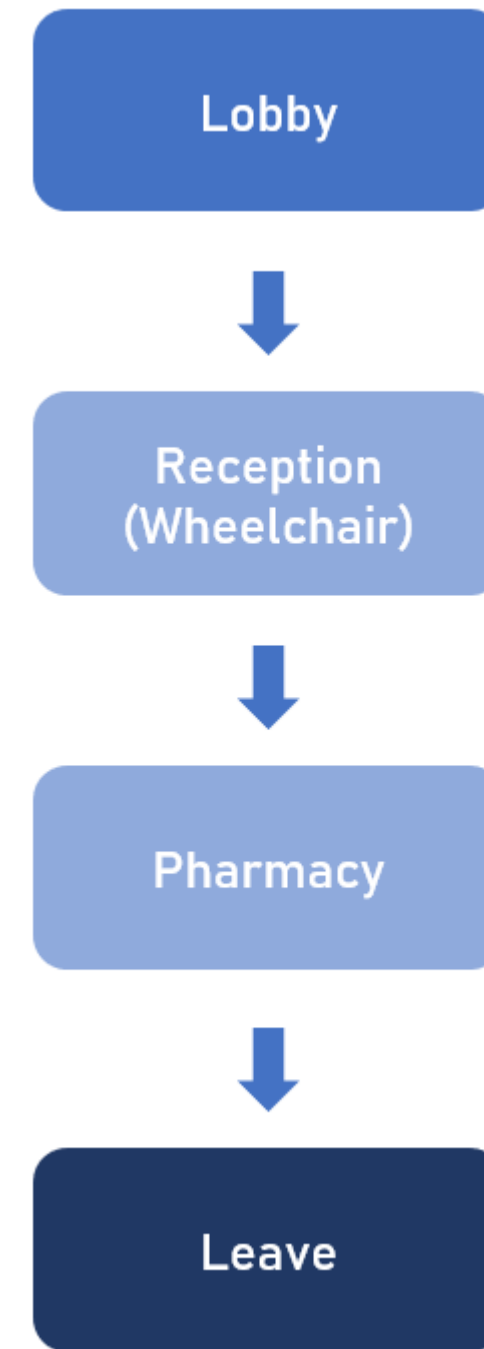
Maximizing natural light while protecting the privacy of residents, using home-like interior design to create a better place to live.



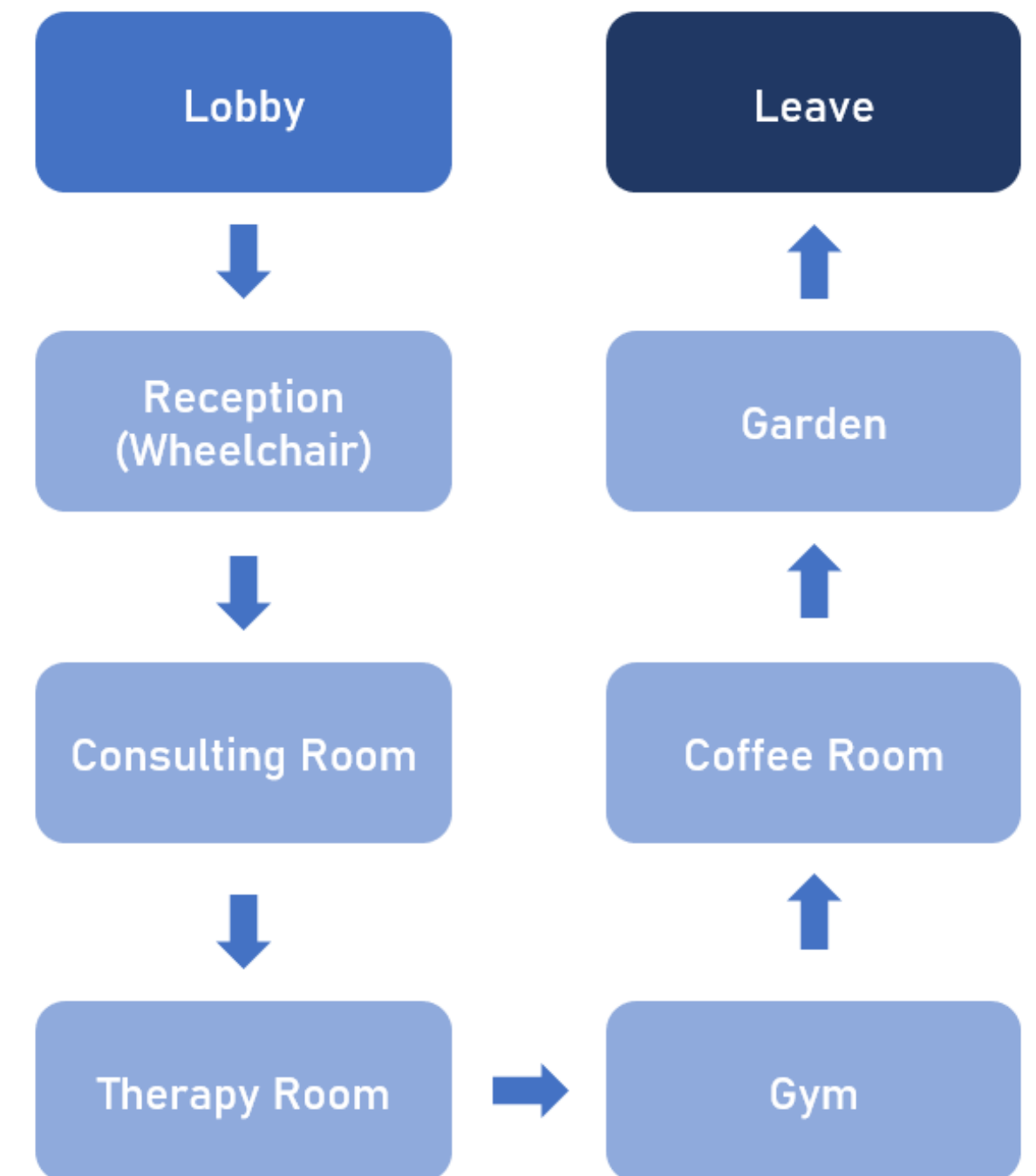
# OUTPATIENT DEPARTMENT



As a pharmacy



As a stroke rehab center

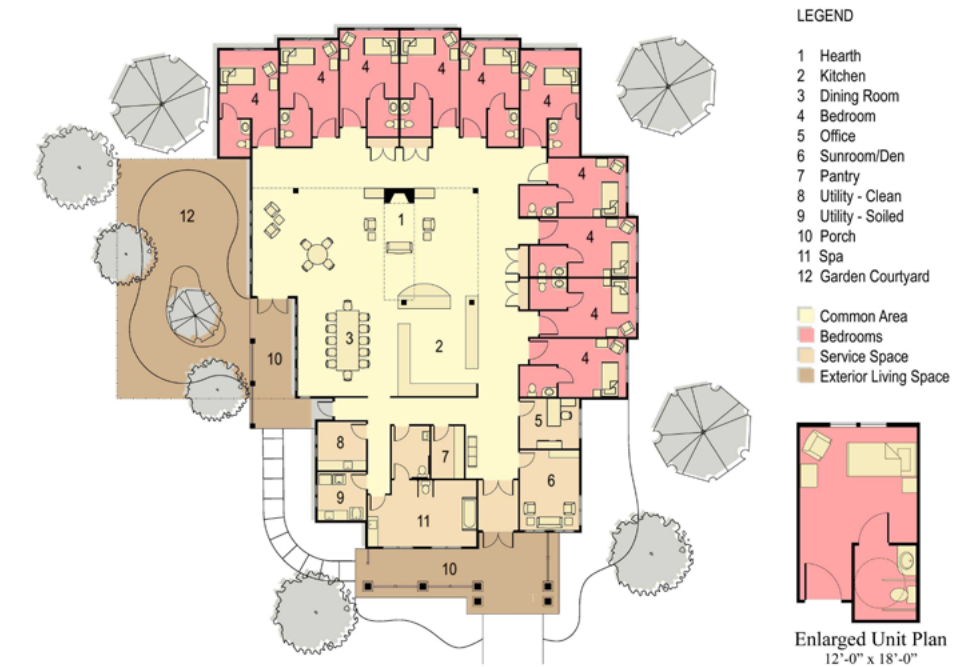




# INPATIENT CLUSTERS



# GREENHOUSE MODEL LAYOUT

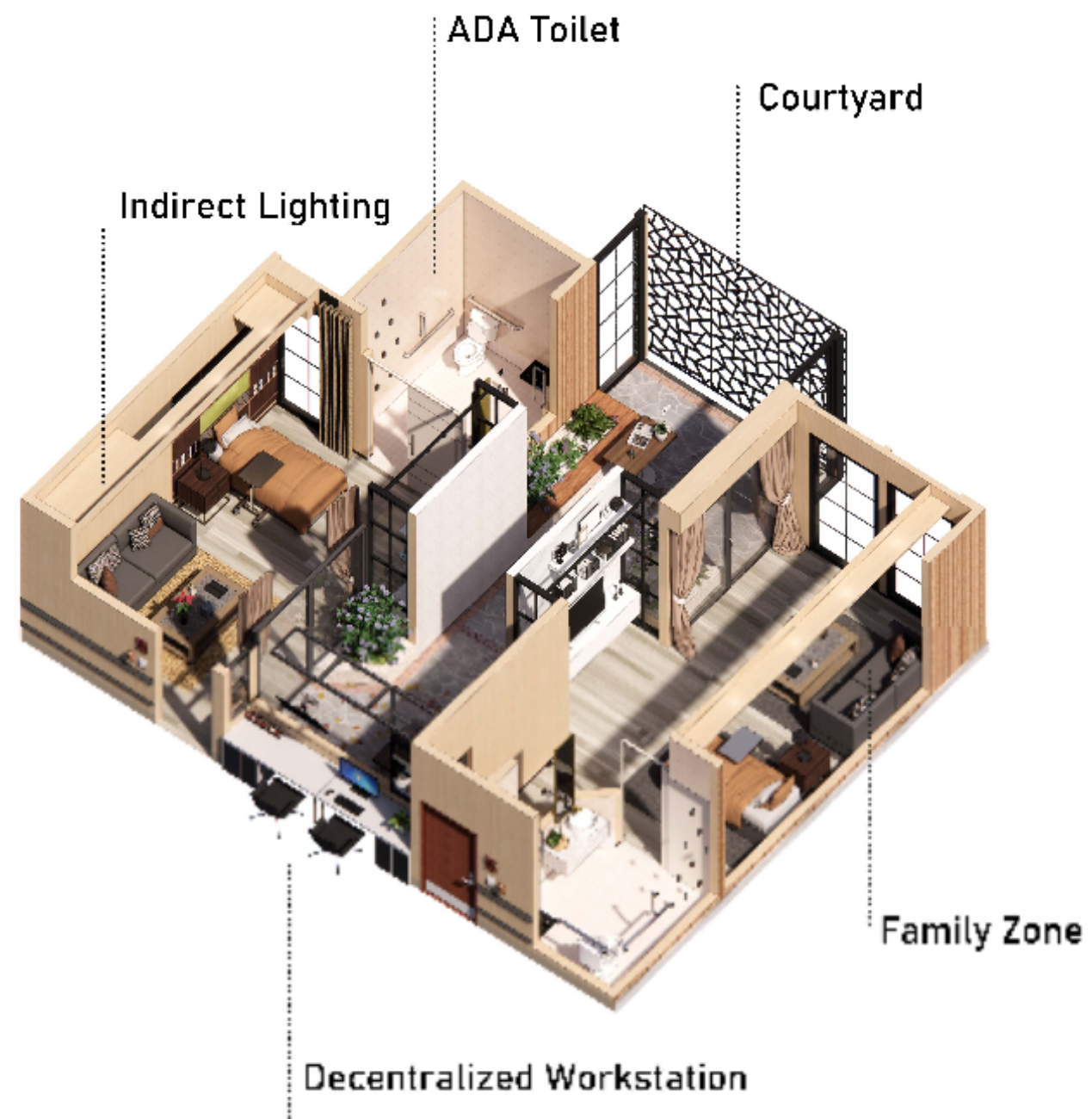


Source: <https://asourparentsage.files.wordpress.com/2010/09/floor-plan2.jpg>

Greenhouse model is a self-contained residential environments designed around what proponents call “warm, smart and green” elements. Residents' bedrooms flow into open living and dining areas with communal dining and fireplaces, a departure from traditional models.

In my project, 8-12 residential rooms are placed around the living and dining areas. A courtyard is located in the center of the cluster to provide natural light and visual connection to those functional rooms.

# LIVING UNIT



Each room has a door to the courtyard. The doors are staggered for privacy. When the stroke survivors in the two rooms want social engagement, they can interact in the courtyard. If they don't want to be disturbed by others, they just need to pull down the curtain at the door to turn their rooms to an actual single-bed room.

# DECENTRALIZED NURSING STATION



Living Unit Facade







## **HOME-LIKE DESIGN**

Maximizing natural light while protecting the privacy of residents, using home-like interior design to create a better place to live.





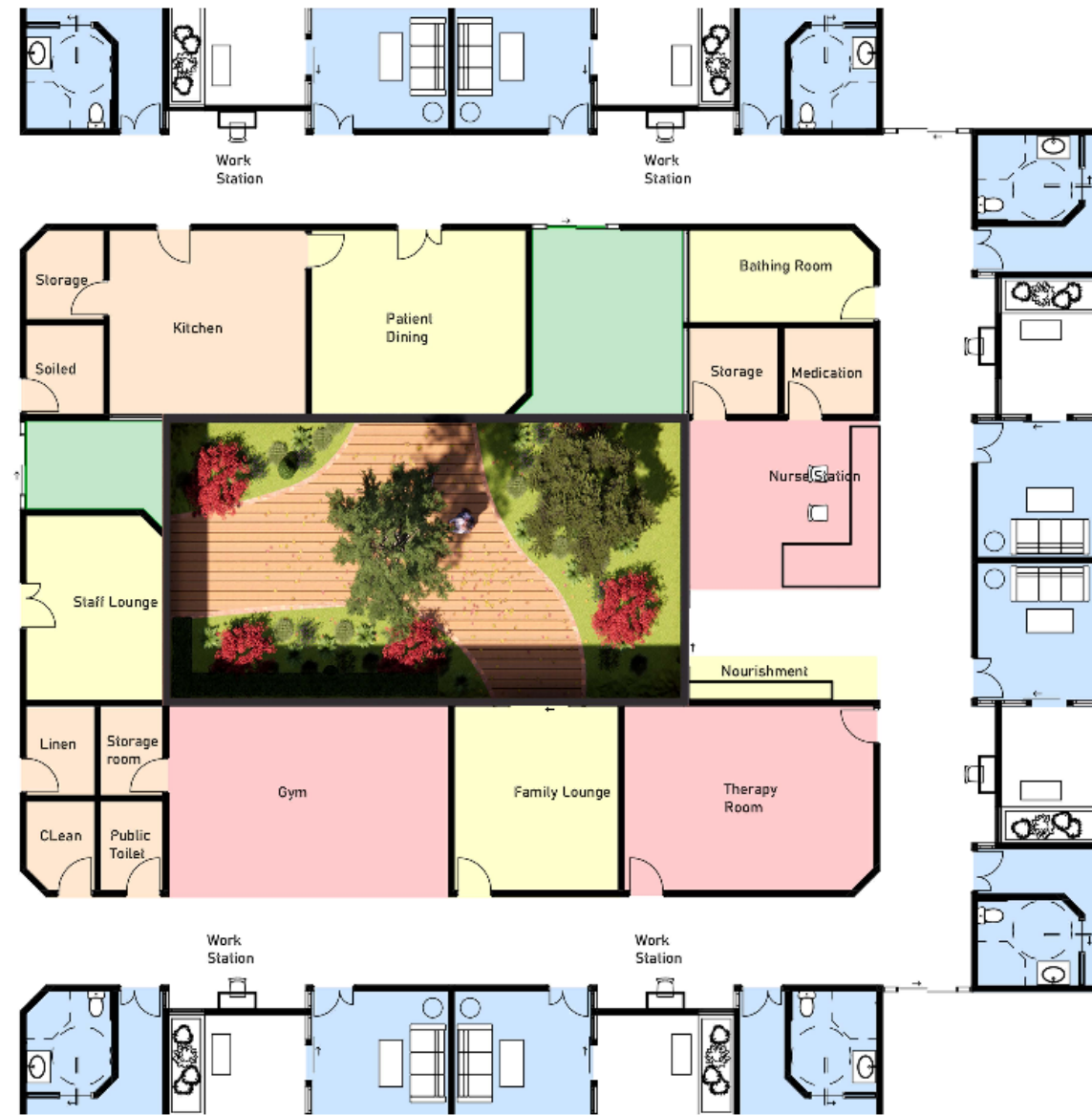
## **COMMUNICATION**

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Combine the advantages of single-bed rooms and double-bed rooms to encourage communication between stroke survivors.



# COURTYARD LEVEL 2



All 30 beds are distributed into three residential clusters to provide healthcare services for patients in three age groups; for example, there are 12 beds in cluster No.1 for older adults and 8 beds in cluster No.3 for teenagers. I applied the Greenhouse model in each cluster. In addition, 8-12 living units are arranged around several functional rooms, like the dining room and therapy room in the center, while those rooms share a medium-sized courtyard.

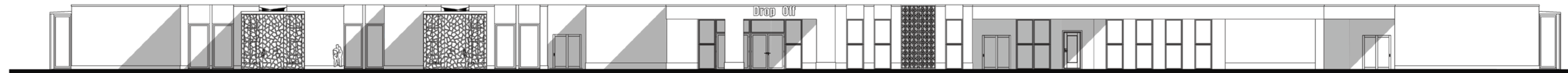
# COURTYARD LEVEL 3



The three residential clusters are arranged around the largest courtyard in the center of the building. There is a family space for residents and a rest space for staff. To encourage social activities, outpatient patients can also use this courtyard as a rest and exercise space.



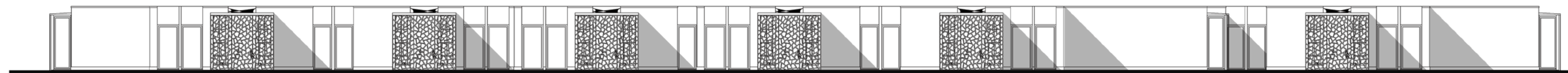
# ELEVATIONS



North Elevation  
Scale: 1/12" = 1'-0'



North Elevation Rendering  
Scale: 1/12" = 1'-0'



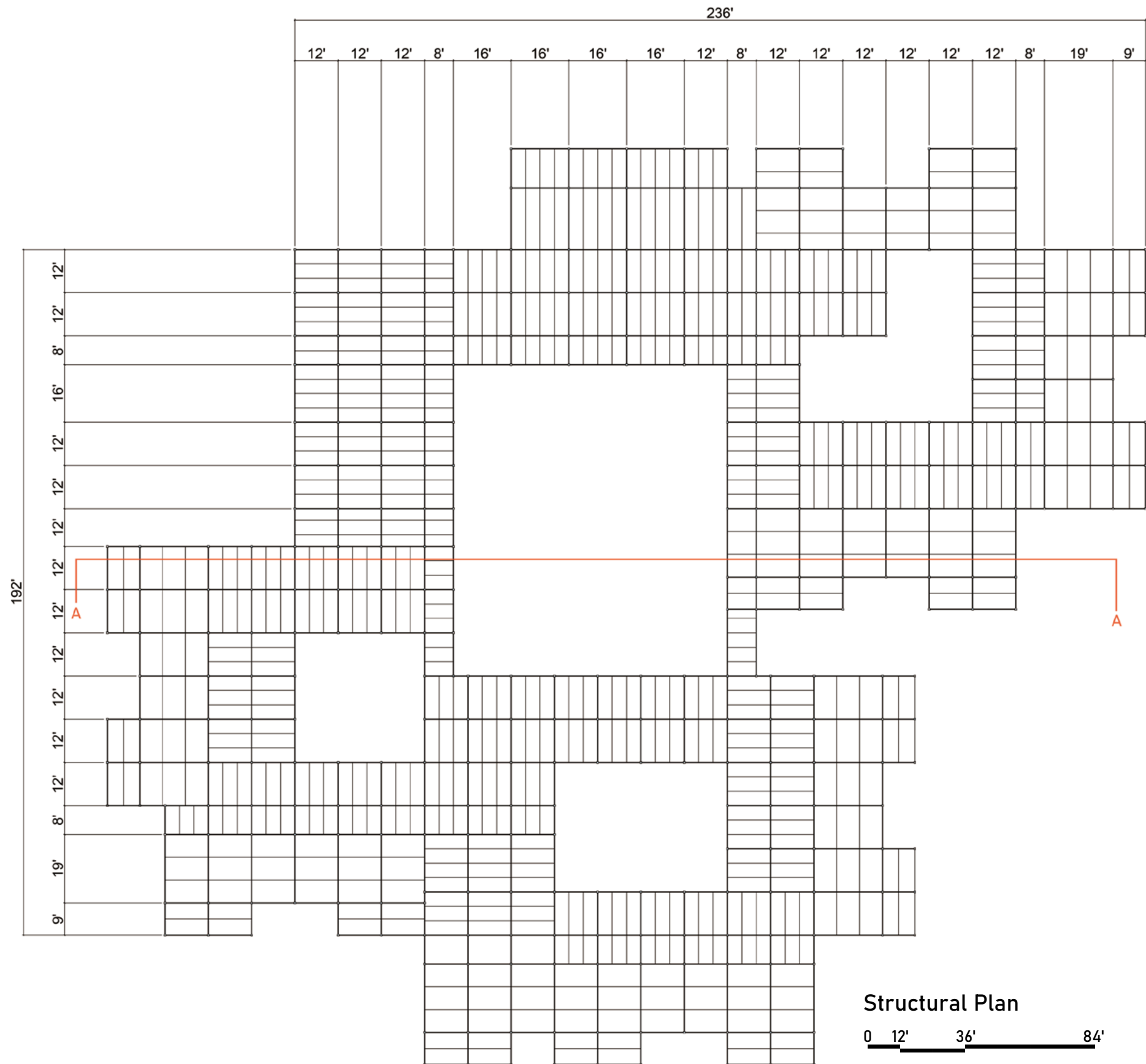
South Elevation  
Scale: 1/12" = 1'-0'



South Elevation Rendering  
Scale: 1/12" = 1'-0'

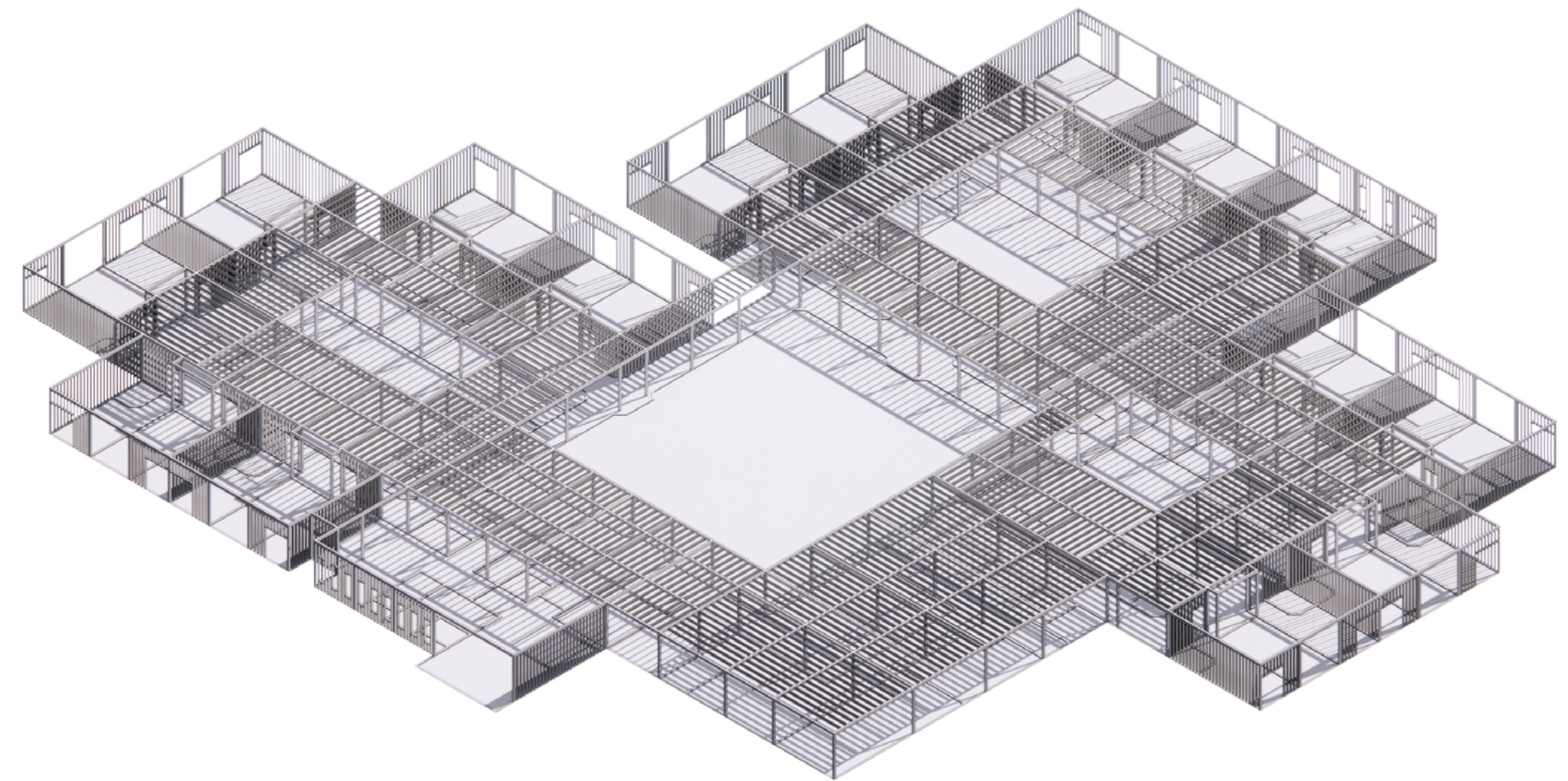


# STRUCTURAL PLAN



Structural Plan  
0 12' 36' 84' N

# STRUCTURE MODEL



# SECTIONS



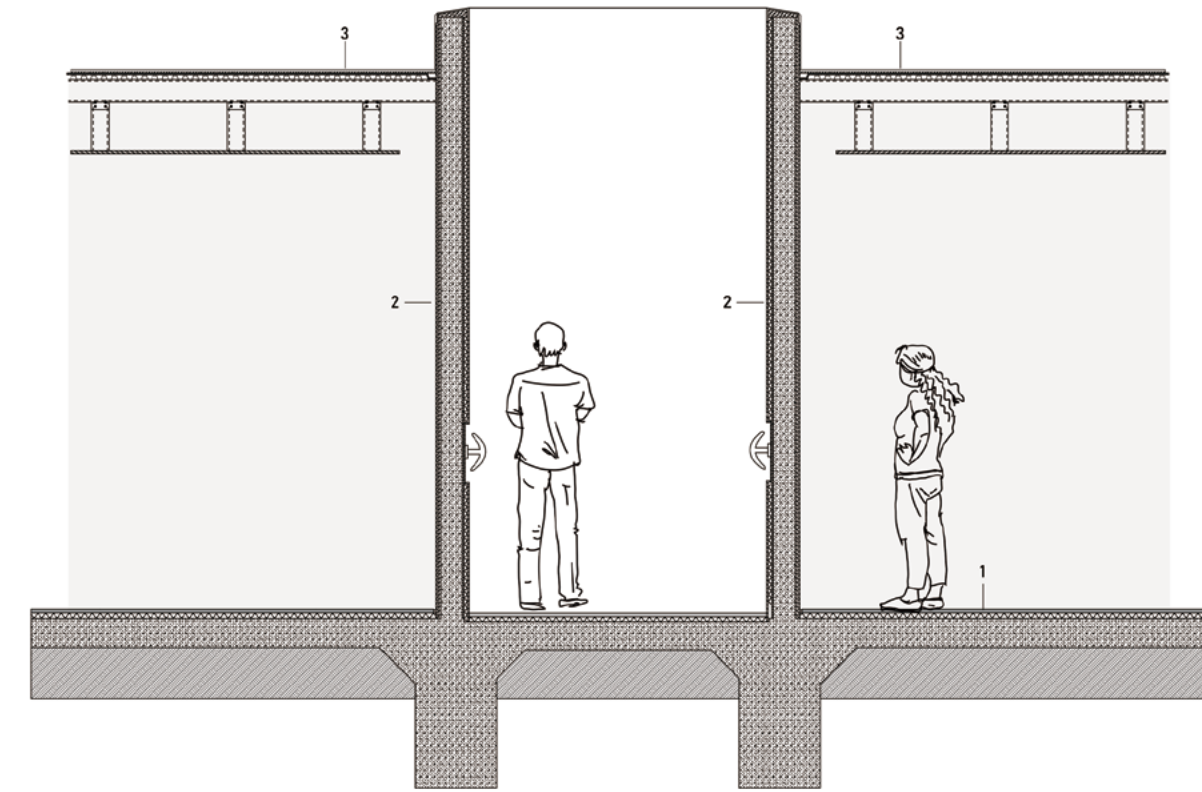
A-A Section  
Scale: 1/12" = 1'-0"



B-B Section  
Scale: 1/12" = 1'-0"



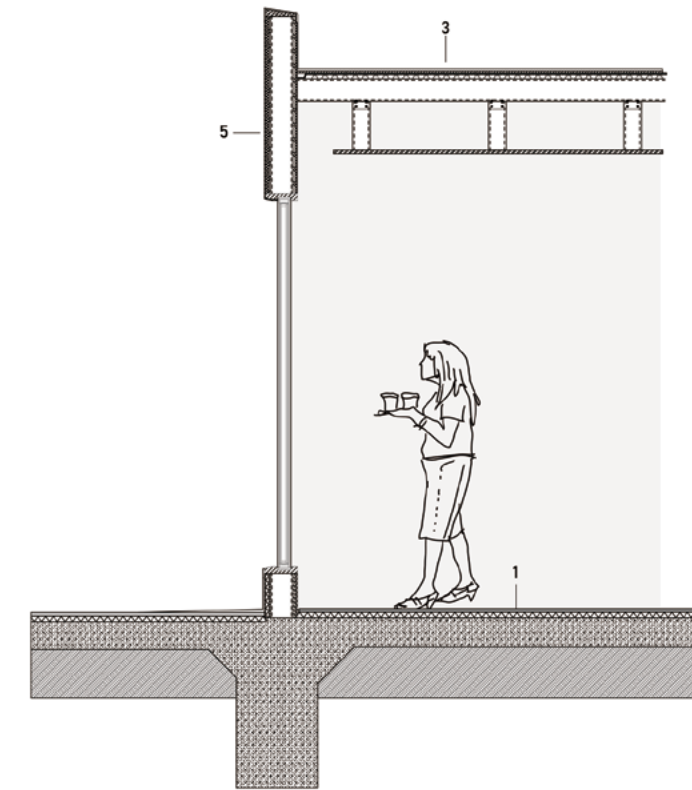
# COURTYARD



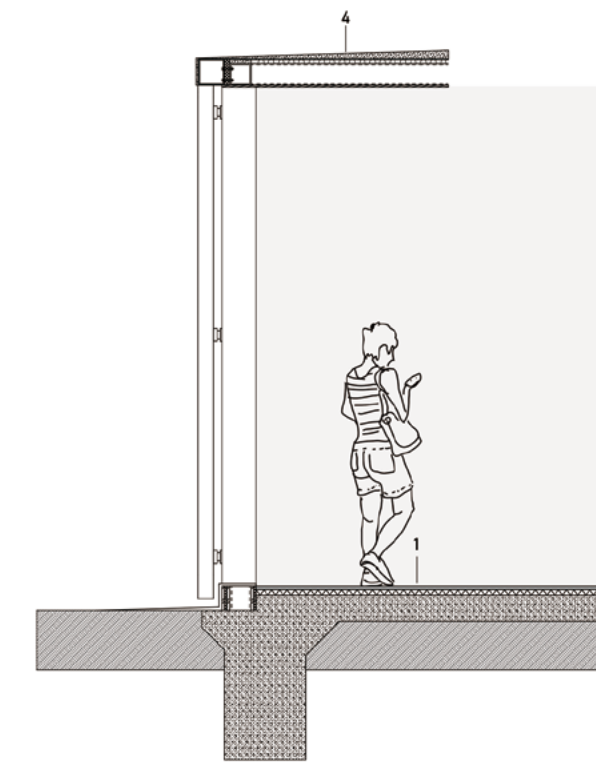
C-C Section  
Scale: 1/12" = 1'-0"

- 1 1" Floor tile;  
2" Screed;  
6" Concrete floor;  
Ground
- 2 1" Exterior cladding;  
1" Rigid insulation;  
1" Sheathing w/ air barrier;  
4" Concrete column;  
Cavity insulation;  
Interior finish.
- 3 Roof coping;  
1/2" GYP protection board;  
Rigid insulation;  
Steel c-joists;
- 4 1" Exterior cladding;  
1" Rigid insulation;  
Light gauge steel studs @ 16"OG;  
Cavity insulation;  
Interior finish.
- 5 1" Exterior cladding;  
1" Rigid insulation;  
1" Sheathing w/ air barrier;  
Light gauge steel studs @ 16"OG;  
Cavity insulation;  
Interior finish.

# GARDEN



D-D Section  
Scale: 1/12" = 1'-0"



E-E Section  
Scale: 1/12" = 1'-0"



# REFERENCES

Lipson-Smith R, Churilov L, Newton C, Zeeman H, Bernhardt J. A Framework for Designing Inpatient Stroke Rehabilitation Facilities: A New Approach Using Interdisciplinary Value-Focused Thinking. *HERD*. 2019 Oct;12(4):142-158. doi: 10.1177/1937586719831450. Epub 2019 Feb 25. PMID: 30799632; PMCID: PMC6745610.

Pena, William M., et al. *Problem Seeking: An Architectural Programming Primer*, John Wiley & Sons, Incorporated, 2012. ProQuest Ebook Central, <https://ebookcentral.proquest.com/lib/tamucs/detail.action?docID=817374>.

MILLER-SCOTT, C. Stroke Rehab Enriched By Technology. *Rehab Management: The Interdisciplinary Journal of Rehabilitation*, [s. l.], v. 29, n. 2, p. 16-22, 2016. Disponível em: <https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=118335257&site=eds-live&scope=site>. Acesso em: 26 ago. 2022.

OLK, K. A.; PERSAUD, S. Repeat After Me: Stroke rehab technologies leverage repetition and natural strength to optimize neuroplasticity. *Rehab Management: The Interdisciplinary Journal of Rehabilitation*, [s. l.], v. 34, n. 2, p. 12-14, 2021. Disponível em: <https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=149823592&site=eds-live&scope=site>. Acesso em: 31 ago. 2022.

Quatic Therapy as Part of Effective Stroke Rehab Program. *APTA Magazine*, [s. l.], v. 14, n. 4, p. 50, 2022. Disponível em: <https://search.ebscohost.com/login.aspx?direct=true&db=cui&AN=156898243&site=eds-live&scope=site>. Acesso em: 31 ago. 2022.

LYTER, E. Integrated Interventions for Stroke Rehab: How the use of technology for post-stroke patients leads to better assessments, more effective interventions, and efficient care outcomes. *Physical Therapy Products*, [s. l.], v. 32, n. 3, p. 14-16, 2021. Disponível em: <https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=150760241&site=eds-live&scope=site>. Acesso em: 31 ago. 2022.

Anåker A, Morichetto H, Elf M. The physical environment is essential, but what do the design and structure of stroke units look like? A descriptive survey of inpatient stroke units in Sweden. *Scand J Caring Sci*. 2022 Aug 8. doi: 10.1111/scs.13112. Epub ahead of print. PMID: 35938614.

Anåker, Anna & Koch, Lena & Heylighen, Ann & Elf, Marie. (2018). "It's Lonely": Patients' Experiences of the Physical Environment at a Newly Built Stroke Unit. *HERD*. 12. 10.1177/1937586718806696.





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