LIFE VIA THE WALL
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ABSTRACT

The rapid pace of industrial growth in South Korea over the last few decades has radically altered the way people live. As the population began to shift from the countryside to the city to pursue a better life by working in manufacturing and services in lieu of agriculture, the dense urban condition began to arise as a result of this endless influx. There had been neither the time nor the technology available to take account of the occupants’ comfort. Moreover, after the Korean war in 1950, many families were split apart and this caused the longing to accommodate a family together to become stronger than ever. Since the 1970’s, mass production has greatly increased the availability of housing in terms of the quantity, not quality. Most new housing for the lower middle class was built as small spaces without much opportunity to enjoy interacting with neighbors or the outdoors.

This study was initiated to explore the potentials of habitable spaces and to understand the importance of bringing neighborhood life back and the chance to experience nature within the constraints imposed by a limited space. As a response to the analysis of the relationship between existing housing and the city, a design element is proposed: a wall that transforms itself from a feature in an individual living space to the neighborhood and to a facet of a city. Also this study includes the investigation of different ideas and examples of using small space efficiently.
At the very first day of my freshman year at college in South Korea (Mar. 02. 1995), I was asked to draw 3 line drawings (36x24 in) with a pencil, T-square, and a ruler. We were learning about how to draw a line with fine and even thickness. Also, the professor asked us to think about the use of a line. What it could mean in a building and how it could transform from one to another. Of course, there was no way I would even understand purpose of the question. Everyone was told to stay that entire night at a studio to finish the drawings. At 6 o’clock in the morning, a TA showed up and asked us to put up all of our drawings on the wall for grading. I remember I was one of the few people who were not yet ready to put mine up. I restarted so many times to get fine lines. It was a practice to understand the hardship of getting into an apprenticeship. Even though I tried so much, I wasn’t able to achieve a good grade. I was tired and really frustrated. That morning, for the first time, I felt really sorry that I got into architecture school. I guess even at that point I realized that being an architect is not a joke. Since then, it has been almost 13 years and I am about to get another master’s degree in architecture. As a matter of fact, I feel still nervous about designing overall. As I move my steps forward into architecture, I always realize that there are more things to learn about. Not to mention, things about architecture itself but the understanding of human beings and nature along with their progress. It was steps to the sky. Never ending process. Though, one thing I realized through the frustration is that once I overcame a challenge, I always find myself in a better place in architecture. In other words, reinterpreting a failure into a growth. Especially, studying at Virginia Tech was the biggest challenge I have ever faced in my life, I was exposed to the large surge of new culture with great deal of excitement and frustration. However, I feel really grateful to have an opportunity to be here to learn the way of accepting the conflicts with a positive attitude. I feel that I am ready to be a professional who knows of how to develop myself onto the next step. I found myself drawing lines over a blank paper to explain things to clients, co-workers, and consultants. As the lines being drawn onto a paper, I would smile and feel relieved about the fact that I know what the lines do in my drawings.

This book is dedicated to my family for their endless support and encouragement and my husband for his patient love and inspiration.
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1. INTRODUCTION

“Less is More” a quote by a German architect, Ludwig Mies van der Rohe still gives us a lesson in this era of affluence. To maintain our comfort, we demand more everyday in our lives which also leads to more requirements on nature. For instance, subdivisions for suburban families are being built which require cutting down forests and destroying farmlands to acquire additional spaces for living.

We compromise nature for our own sake whether we realize it or not by consuming the products derived from mother nature. It is also interesting to observe that some are unhappy with their 3,000sf (279m²) home while the others are managing their lives with the entire family in a space less than 300sf (28.7m²) which is easily a size of a room for some.

I grew up in a low income neighborhood, getting used to sharing a space with others as well as a room serving different functions. A room at night becomes a bedroom with blankets and once they are folded away in the morning, it becomes a breakfast room. Once the meal is over, it becomes a place for us to play or study. In the evening, it also serves as a TV room for family. A space keeps switching back and forth to serve different functions. With a bit of diligence, it is a way to live efficiently. Regarding the current issues rising around the world about the environment and the effort to be sustainable, living with a small footprint becomes more attractive.

Designing an effective low income housing is like a puzzle since the budget is limited and so is the land. My approach was to study a space that can be perceived as ample and effective which ultimately leads to avoid using so much natural resources.
An old couple on their way to their children’s home found a place for lunch. The wife made a sandwich with chicken breast considering how much her husband’s cholesterol has gone up recently. “Eating out is just killing,” she murmurs. When the bus stopped at a resting area, the husband saw crowds taking up all available picnic tables and then he worries that his wife has been suffering with knee pain and realizes that she wouldn’t want to sit on the lawn. Then he spotted the luggage compartment. He spreads the cloth for his wife and they squeeze into the space to enjoy their homemade lunch. They would talk about this to their children how much fun it was. The possibility to extend a space’s use can be in everyday life. While dealing with the problems we face, we encounter solutions that are sometimes so obvious that we have known all along.

“For what we need is an expansion of the possibilities of all the things we design so that they will be more useful, more applicable, and so more suited to their purpose, or suited to more purposes. The point is to increase this accommodating potential and thus to make space more receptive to different situations.”

- Herman Hertzberger
Improvising a function using limited resources with simplicity could be the best way of preserving mother nature. You would bring your parents and sister to a beach nearby. Enjoy the beautiful waves and sandy shore but don’t forget a folding table and chairs for your aging mother’s comfort. Your car blocks the blowing wind and acts like a nest. On the way back, you would pick up all of your stuff and pack it back into the car. Nothing left on the shore. Nothing permanent for this trip.

“A prerequisite for creating inviting form is empathy, the way hospitality is based on anticipating the wishes of one’s guests. Increasing the accommodating potential amounts to a greater suitability for what is required of form; a form therefore which is more orientated to people’s needs in different situations, and which consequently has more to offer.” - Herman Hertzberger
Private vs Public. This diagram illustrates a living unit that has open visibility from the inside to the outside while the view from the outside to the inside is limited. It keeps its privacy by raising the main floor height to a certain level yet still opens the view toward public space. Also, a roof garden will provide an opportunity to enjoy family tea break for soothing and relaxation. The concepts ‘public’ and ‘private’ may be seen and understood in relative terms as a series of spatial qualities which, differing gradually, refer to accessibility, responsibility, the relation between private property and supervision of specific spatial units.

Connectivity
From a dutch door, parents can watch their kids playing outside and neighbors pass by occasionally greeting each other. The architect, Herman Hertzberger, states the importance of connectivity for the elderly.

“In situations where there might be a need for contact between the inside and outside, for instance in a home for the elderly where some of the residents spend a lot of their time in the solitude of their own room due to diminished mobility.”

Herman Hertzberger / lessons for the students in architecture p.35
Human beings are the product of mother nature so our tendency is to return or to be near to it. There have been studies on its positive effect. For example, at school, students performed better with the natural light and views out to the greenery than those without. Also, in a hospital, patients recovered quicker when in rooms with views of the outdoors. The benefit of a garden is that it brings an opportunity to experience nature into today’s elevated homes. One of the main values of having a garden is to revitalize human life through observing the verve of plants. It is a life within a life; we witness the arrival and departure of their lives in relation to ours. Le Corbusier emphasized the importance of a garden, listing a hanging garden as one of his five principles.

'I FREEHOLD MAISONETTES'

The hanging gardens. Each garden is completely shut off from its neighbor.
The approach started while observing the lack of nature and interaction of residents in a typical low income housing in South Korea due to its space acquisition effort without considering much the quality of life or social interaction. This study was done to understand examples of housing projects with a design that started with modules but efficiently and beautifully explore with nature and the space which then can be re incorporated into this study.

The examples are below,

a. Ando Tadao’s Rokko Housing
b. Ando Tadao’s Azuma House
c. Moshe Safdie’s habitat 67
d. Piet Blom’s Kasbah housing & market
e. Azby Brown’s The very small home

These give inspiration to incorporate so called “Green” to the unit by using roof spaces and the opportunity for small talk while their spending time with their neighbors gets greater. The range of design time frame starting from the late 60’s to the beginning of the 80’s.
Rokko Housing is designed on a 60 degree sloping southern-oriented site on the edge of the Rokko Mountains in Kobe, Japan. By overcoming the difficulties of site constraints, the project was completed to harmonize with natural surroundings and fine vistas through the terraces that are provided at individual units.

“The building is designed as a symmetrical cluster of exposed concrete units measuring 5.4m by 4.8m in plan, arranged in section to fit the sloping site. The outdoor spaces provide terraces, open spaces, and stairways; these interact and serve to link the parts of the building in a whole.” - Tadao Ando
Figure 6. Rokko Housing Top View

Figure 7. A room asserts its own individuality

Figure 8. Open elevated roof garden
Tadao Ando’s Azuma House, a small two-story house built in 1976, is one of the houses and housing projects which begins to show elements of his characteristic style such as cast in place concrete.

The house has three equally sized rectangular volumes. Two enclosed volumes of interior spaces are separated by an open courtyard. By nature of the courtyard’s position between the two interior volumes, it becomes an integral part of the house’s circulation system.

The house fits quite nicely in the neighborhood with hardly any disruption to other buildings which are rather conservative Japanese style while the interior of the house is modern and has an exposed cast in place concrete inside and out around the house. The concept of the courtyard which is from the traditional houses, maximizes the experience of sunlight in the house. However, it is interesting that to move from one room to another one actually has to go on the elevated walkway which is outside considering the weather in Japan during winter.
Courtyard Section

Figure 11. Azuma House Bridge

Figure 12. Azuma House Section

Figure 13. Azuma House Courtyard
In this project, Moshe Safdie came up with 4 principles responding to the question posed by the need to maximize volume of construction at a minimum cost:

- The first was an adaptation to modular construction.
- The second was a similar arrangement of units but with the units projecting forward and backward to form roof gardens for each house.
- The third was the loosening-up of the assembly of dwellings with the modules grouped in two directions.
- The fourth ambitiously combined the looser cluster with gardens and a pedestrian street system.
Exploded axonometric drawing showing the array of precast elements that were used to build Habitat 67. There were eighteen unit types in all. (Source: For Everyone A Garden - drawing 46)
The architect, P. Blom pursued an active engagement of reciprocity between dwelling and street-space in 1973. However, the street space is too large to be filled in even though he envisaged nice living units separated from the busy market street below in the heart of Amsterdam. This became a question of how to engage a street to a living space, and furthermore, how to provide a public space that is adequate.
The architect Azby Brown did his doctorate degree at the University of Tokyo. He published a book titled “The very small home” which contains numerous Japanese ideas of designing and organizing a space and furniture with closely analyzed examples which is so practical that it can be applied anywhere there is a demand for a smart space usage. This book is a masterpiece as well as a smart guideline when designing a limited space.

e. Small Spaces

Figure 18 Retractable Bookshelves Open

Figure 19 Retractable Bookshelves Diagram

Figure 20 Retractable wardrobe
2. The site
The existing site has been analyzed to appreciate the actual housing condition in South Korea. From the analysis of a government-built neighborhood from the 1970’s, a design element was created to maximize connectivity; a wall that transforms itself from an element of a single living space and neighborhood to a feature of a city.

“For a house is a tiny city, a city is a huge house.” - Aldo Van Eyck (Orphanage, Amsterdam, 1955-60)

The site is located in Chongju, South Korea and existing houses were built in the early 1970’s. In the early 1950’s the government came up with a design to meet the housing needs of refugees from the Korean War, and the design later spread around the country.

It is interesting to see the improvements made from shortly after the construction to today. Some of the residents have been living there since the houses were built. I documented the alterations and additions to the houses and also analyzed the patterns of changes the residents made which gives us an idea of what their preferences were in such constrained conditions.
For my master’s thesis at a university in Korea in 2003, I analyzed this site. I did field research which included measurements of the current condition and interviewing some of the residents to document one of the historical housing projects that are now becoming extinct. For this thesis, I would like to propose a housing project based on what I learned and experienced from the earlier research.

The condition of the existing houses is very limited and depressing in terms of the space and the light. The residents seem reluctant to open themselves to a stranger as they are ashamed to be there. However, the interaction among the residents was vital. The housewives share their time and food with their neighbors in the 2m (7 feet) wide alleys and the children run around the complex together. In addition, I also witnessed that some inhabitants tried to optimize their living conditions by altering the spaces, a lot of them with illegal additions to the houses. Some of the inhabitants misunderstood me as a scholar involved in the city and assumed that their activity is being investigated and reported to the city.

One day I knocked on the door of an old man’s place and asked him if I could measure the house for my thesis and he didn’t seem happy to find a stranger there. He said “Do not report the alteration of my house to the city, they will charge me a penalty for this and I can’t afford that”. He seemed desperate and in the meantime hostile. It took me a few weeks of revisits to convince him that I had nothing to do with the city and for him to allow me to measure his house. It was heartbreaking to find his unwell wife lying on the bed which is also one of the reasons why he was adamant about not letting me in the house at first.

The residents of the complex saw everyday the high-rise apartment complex around them which fills up the city’s skyline. They are worried about the future of their houses. One of the residents, an old lady who has lived there for over 30 years and with whom I interacted most during the survey said “I wouldn’t live such a place (pointing at the high-rise ones). I’d better die before things happen. It would be like a nightmare to live in there”.

Almost 6 months after I had surveyed the place, they started to recognize me there. Some of them greeted and asked me in for a cup of tea. I felt the atmosphere had changed from cold to warm like the difference between a stranger and a neighbor. The motivation to propose a design for the neighborhood emerged as I feel I was becoming one of them.
Observation from a city

Observing the growth of a city which tries to reconcile its past with the upcoming developments seems to be getting difficult nowadays in South Korea. In other words, the city itself loses its own history and by failing to keep the remnants, it disconnects one generation from the next. The new massive developments are usually a quick resolution for a crowded city for the government, the developers and residents or tenants but there is likely to be something missing that we call “nostalgia”.

The approach of the study was to take into consideration how to make a gradual transition to the new and well established proposal while coexisting with the past between the current complex and the high-rise living spaces.
Overall Site Plan Model

Adjacent High-rise Apartment

City View

Church

Housing complex
Arrow “A” shows a typical alley of the complex. It is 8’ wide and the majority of the houses have an entry from this alley. The only vehicle that can access this is a motorcycle. When the complex was built, apparently there was hardly any demand for vehicle access nor concern about fire truck access. Arrows “B” & “C” show the main access roads of this community where most of the parking occurs.
The original plan of existing houses has 3 bedrooms (master bedroom, bedroom 1 and 2), a kitchen, and a little entrance area. The total area is slightly more than 300sf. The plan also has one storage room, outdoor toilet, and small garden area.

Observation:

Plan

1. The original plan doesn’t have a room where the whole family can be together. Cooking was done in the kitchen and brought into the master bed room where usually most of family gathering was happening. However, due to the expectation of greater privacy which arose from exposure to western culture and improved living quality, differentiating the private and public spaces in a house became important. Therefore, most of efforts were made to create and extend a living room. Also, their preference of altering living spaces was mainly made for improving kitchen conditions and achieving more living room space.

2. The original location of kitchen was replaced with an indoor bathroom. Due to the inconvenience of using an outdoor toilet, an indoor bathroom was introduced in the location of the kitchen and due to the limited accessibility the side door was removed in some of the houses.

3. The alleys between houses are about 2m (7feet) wide which causes a lack of sunlight.

- The site is being abandoned since the houses are getting old and present less opportunity to have a good neighborhood.

The use of master bedroom

In this house, the master bedroom played the role of a living room as well as a dining area which is possible due to the sitting culture in Korea, which is somewhat similar to Japanese Tatami culture. Radiant floor heating is also one of contributing factors of this culture. In the winter evening, kids would watch TV with father in the spot near the furnace where the radiant heat is most concentrated and wrap themselves with blankets and mom would bring a folding table out on which bowls of rice and soup and side dishes are arranged for dinner. The master bed is located adjacent to the kitchen which gives better control over the heating and a direct access for meal preparation. The master bedroom is also the least modified space in the house when considering alteration.
The use of kitchen

The kitchen was not only a place to prepare and cook food but also a place to provide the main heating to the house. A radiant floor heating system was used to heat the rooms. The furnace also served as a stove. Usually, a metal pot was installed on top of the furnace which was used for cooking food or boiling water for baths. Today, the traditional kitchen is rarely found in regular residences as the economy grows and western style kitchens are available. However, the principle of the radiant heating system is still ubiquitous in Korea.

The use of living room

The alteration from the original plan and current use of living spaces: alteration was mostly a relocation of the kitchen and separating the family gathering room from the master bedroom to give it better privacy. The family rooms mostly tended to be acquired by combining the 1st bedroom and the entrance.
Example sketches of the current use of living rooms

Living and Dining elements:
- A table with two chairs, refrigerator, rice container, kitchen cabinets and countertops

Living and Dining elements:
- A table with chairs, refrigerator, dish cabinet, kitchen cabinets and countertops
a. Penetrations into the city

The introduction of a ‘wall’ is proposed as a conceptual backbone. The physical and mental disconnection between the overall city representing the present and the neighborhood representing the past can be depicted as a wall. The resolution is to add sufficient openings in the wall which lead both to reconcile. The wall will re-frame the city to encourage the residents to explore and revisit the very city within which they live. Opening can be experienced at a unit level to neighborhood and even to a city scale, to control adequately the connection between existing complex and the city.
Open spaces in the complex and future development study:

The complex was developed in the 1970's without consideration for how a community or neighborhood would grow. Though it is understood that given the circumstance of society where the poor struggled to find a place to live, it was the government’s immediate act to resolve the issues at that time. Nowadays, as the demand for the quality of life emerges more than ever, it is vital to take into account the possible factors that could affect the community from every angle.

This study was to contemplate how to provide open gathering spaces for not only the residents of the complex but also the neighbors near the community. Green foam represents the outline of the current residences. As shown, the 2m wide alleys are so confined that there is only access for pedestrians, motorcycles or bicycles. Though, apparently, there were some efforts among residents to gather around a small sitting area that is installed in front of the entryway which caused the walkway to become even tighter.

This study model proposed the embedded open spaces which is outlined in red as well as widening the alleys in the community. The existing church could be a focal point for a pedestrian walk between the house complex and the rest of the community along with small shops that could serve the community such as a laundry, small convenience store, flower shops and tailors etc.
Different shapes of units have been considered for the initial study to create interesting and unique spaces for residents. However, due to the limitation of space, acquiring more spaces was a crucial aspect of the design process. Therefore the direction of the design concept was changed to be more unified, yet interesting, while obtaining more spaces for residents.

The model diagram above shows the idea of the proposed complex. The base module is a simple square block. However, when it is placed in a way as shown, it could create interesting spaces between units.

The idea is that each row’s footprint represents the current house’s area and additional area is added to double up the size of each residence.

It is supposed to be a smooth transition from the ground floor level one story house without going too far to become the box shaped high-rise apartments that are near this complex.
c. Section Study

A UNIT FOR A FAMILY

Relationship between an existing house and proposed housing

Concept of private garden at night
3. Life via the Wall
Before we step into this let us define what a “wall” is. How does it work in a life or an architecture? In this project, ‘wall’ will be interpreted as more than a literal term. One will explore the different types of walls and their characteristics. In this study, the types of walls are drawn in a hierarchy which is reflected in the degree of thickness;

- WALL between city and existing houses
  Enhancing the connection between the existing houses on the site and the city through “the wall”, of the proposed housing.

- WALL between living units
  Sharing a wall between living units will foster communication between living units.

- Wall within living units
  Providing elements to improve the interior of each living unit.
Proposed Complex on Site model along with the current existing low income houses.

- View from the city
- View between the existing houses and the proposed complex.

3.1 Wall Between City and Existing Houses

a. The city

The site is located on the hillside which can provide an interesting view out to the city. Though, the concern was raised that the proposed housing acts as a wall that would block the view of the existing houses from the city. The solution for this was relatively simple that thinking a wall. Various openings were provided in the complex as well as terraced roof garden.
Cross Section of the site to show relationship to the city

Key Plan

View "A"
One of the main aspects that was missing in this community, shown in the illustration below, was a neighborhood gathering area that is easy to access for residents. This low income complex was designed to maximize the efficiency of limited site area. Residences were located along a 2m wide corridor and once the entrance door is shut, the opportunities for neighbors to see each other are very rare. Besides, there is hardly any space for people to sit around and chat to open up themselves. Some wouldn’t even know who is living next door for a long time.

The proposed illustration shows the opportunity of opening up a residence while people are in the unit. Parents can still watch their kids playing outside through the large glass windows that are letting light and views inside and neighbors can encounter each other more often as they work on their patio gardens. The open space is also connected to the city view. While hanging out, can they not only see each other but also enjoy the city view.
1. Elevated garden
   - open to outside as well as to the next door which will create a chance for people to interact.

2. Framing the city view
   - opening the view from the inside of the complex to the city

3. Neighborhood piazza
   - for residents to sit around in normal days. This could be a space for formal weekly gathering. Also, a place for kids to play so that parents can watch their kid playing while they are working on their garden or talking to the neighbors.
3.2. Wall Between Living units

a. Unit Elevation and section

It was inevitable that the complex should go up vertically higher than a story to obtain additional living spaces and communal areas but determining how high was a challenge. Regarding the fact that the residents are mix of seniors and young couples or singles, it was assumed that 1 residence could go up to 3 levels. In Korea, as well as America, if a building is 4 stories or higher, it needs to have an elevator. 3 floors also will allow the old to stay at the ground level while younger people still are able to take advantage of the levels above if desired.
Different types of units are proposed due to the anticipated occupants which are a single, a couple and a couple with young children. Unit Type 1 is for a single or possibly for a couple. The 1st level is living-room, kitchen and dining combined space with a bathroom. The second floor is for the bedroom. Unit Type 2 is for a couple or for a family. The 1st level is more for family living-room and the 2nd level is the kitchen which can be converted to a bedroom at night. The 3rd level is for parents with a view to the city.
Unit Type 3 is for seniors with less mobility. It is a single level unit which has a combined living-room, & kitchen combined space with a bedroom and bathroom.

Unit Type 4 is for a couple or for a family. The benefit of this unit is that it has double story elevated gardens at the 2nd and 3rd levels. The 2nd level is more for family living-room which can also be converted to a bedroom at night, and the 3rd level is a bedroom for parents with a view to the city.
The wall transforms from outside to inside of a unit. When it is outside, it allows a place for a family to spend time outdoors which will also increase chances to talk to their neighbors and it could also accommodate shelving space so that outdoor items can be organized better.

The elevated gardens are open to outside as well as to the next door which will give more opportunity for people to interact. Also, by maximizing view, continuation of visibility to the city and to the neighborhood was achieved, which enhances the quality of a space.
A prefabricated concrete system was proposed for housing construction due to its efficiency and the common use of concrete in South Korea. By keeping the structure as simple as possible, the overall building assembly can be put together more effectively. Being affordable is a factor for choosing this structural system.

The illustrations show the idea of how the parts are coming together.
1. Pre engineered 0.6m thick Prefab walls are erected.
2. 45cm deep ceiling trusses are installed on which floors are installed in place.
3. 1m wide Stairs are added.
4. Window framing comes after that.
Metal deck is placed on top of the trusses and lightweight concrete and insulation (sound and heat) is added on top of it and radiant floor heating pipes are installed on top of the concrete. Finally, lightweight concrete covers the pipes and the finish floor is placed.
The original Indo-European root of the word “art” is “joint”. Louis Kahn once said:

"The joint is the beginning of ornament And that must be distinguished from decoration which is simply applied. Ornament is the adoration of the joint”.

It was still very hard for me to develop a joint into a meaningful thing. This time I would like to experience a joint in terms of a construction sequence which still seeks the possibility of being an ornament.

This is a joint which shows how the prefabricated load bearing wall panels, steel truss ceiling, and floor slab come together. One of the major issues in this joint was how to prevent possible water penetration from the outside. Therefore the bottom of one panel and the top of the next are designed to fit together in a way that makes it so that water would have to go up in order to get from the outside to the inside. The panels are connected by bolting reinforcing bars at rectangular pockets located in the lower edge of the panels.

After the connection, steel panels are embed by welding in the pocket to provide a track for steel trusses to sit on. Later on, the pocket is grouted completely. Next, corrugated metal decking is put on the trusses then radiant floor heating tubes are laid out and finally the floor slab is poured using lightweight concrete.

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1. Prefabricated Wall
2. Pre-engineered truss
   - Provide space for wiring and plumbing
3. Floor system
   - Metal. deck
   - Radiant floor heating embed.
   - Light weight Concrete
   - Bamboo flooring
4. Prefab wall anchor
5. Metal plate to accommodate truss system
6. Hanger for ceiling
7. Ceiling finish
3.3. Wall within the Living Units

a) Probing the opportunities in the wall

Inside of the unit, the wall becomes a part of living elements.

Instead of using interior design elements that are usually added later on and cost extra, parts of architectural elements themselves can serve as furniture. In this thesis, the wall becomes generous, intelligent, and versatile while acting as structure, partition, and shelves.

It could accommodate a space for
book shelves
seating area
flower pot
even a shower and washer.
Wall provides a place for different activities in the unit.

- Bedroom
- Kitchen
- Bathroom
- Flower pot shelf above the seating
- Seating along with window
- Kitchen cabinet
- Bookshelves
- Waterline for kitchen and bathroom
- Shower
1. Light color cement mixed with sand and small gravel aggregate
2. Pour content into the mixer
3. Pour water into the mixer
4. Mixing concrete ingredients
5. Form work is ready to go
6. Placing the concrete into the form
7. Adding reinforcement
8. Hammering to eliminate air pockets
9. Ready to cure

This experiment was done to understand the materials and process of making the concrete wall. The color of this concrete wall is a light brown rather than a dark grey so that when used, it gives lightness to the complex since grey could seem oppressive.
- Laundry room can slide in and out.
- closed.
- open.

View of the kitchen and dining area
Bedroom with a view of the city.

Full floor to ceiling glass walls help the room feel more spacious. The shelves, whose compartment size can vary, embedded in the wall give lots of spaces to organize the room. A futon bed can be used in the bedroom that can be converted back and forth and in Korea, using thick blankets that can be folded and put away in the closet is common.
b. Examples of efficient uses

- Folding bed
- Bed for a kid's room
- Bed folded back to be a cabinet
Examples of stairs

In small spaces, designing and using an efficient stair is crucial. Spiral stairs take up less and add a sleek look to a space. Ladder style stairs can be considered with a unique feature which also helps make a place interesting.

Regular stairs can be converted as a bookcase, a storage or a drawer for shoes.
Examples of a small bathroom

These are example photos of a half bathroom below stairwell in a residence in Montreal, Canada and these show that small bathroom can be an exciting design element of a small space. Sliding door can also come in handy.
Examples for kitchen cabinets

Examples for small furniture

When designing a small space, efficiency of furniture can really make the difference.

Examples show Kitchen cabinet drawers divided to adapt different uses of kitchen utensils and cook wares. Corners of cabinets can be designed to store the items that are used less frequently. Stacking of folding chairs can be an option for a small space as well. When more people are invited for dinner, chairs can be brought out and on normal days can be stored in a closet. Underneath a bench can be a small storage space for cushions and towels.
CONCLUSION

Living large and spacially becomes a question in this global world. Some are benefited by their abundant resources while not caring much that others are suffering due to lack of the very resources that they have wasted. As an individual who has moved from one side to the other, my interests are finding and understanding a balance between both.

In this study, the main focus was on exploring potentials of habitable spaces while understanding the importance of bringing neighborhood life back and delivering a chance to experience nature within the constraints imposed by a limited space, so an individual can be connected to neighbors and to a community without extra effort.

As a mediator of one aspect to another, a design element is proposed: a wall that transforms itself from various features within an individual living space to main structural elements between units and eventually to a facet of a city. A solid wall could be an obstacle from one side to the other but as we arrange openings accordingly, it could open up a space to another from moderate to extreme as we determine the sizes based upon our needs. Also, it could be an element in living: furniture to sit on while hanging out with family and friends, to put flower pots and arrange books and many more uses. Therefore, a wall is no longer a barrier but is a connector between lives.

As we move inside of the units, additional furnishing ideas and examples are proposed, some of which are from a book titled “The Very Small Home” by Azby Brown that collected brilliant ideas and examples of living small but gracious. After all, living small can just be as great as living large.
BIBLIOGRAPHY

Lessons for Students in Architecture
By Herman Hertzberger, 010 Publishers, Rotterdam, 1991

Space and the Architect: Lessons in Architecture 2
By Herman Hertzberger, 010 Publishers, Rotterdam 2000

Toward To A New Architecture
By Le Corbusier, Dover, New York, 1986

The small spaces
By Azby Brown
Kodansha International Ltd, 2005

Beyond Habitat
By Moshe Safdie, Tundra Books, Montreal 1970

For Everyone a Garden

Tadao Ando 1: Houses & Housing
by Tadao Ando, Toto, Japan 2007

-A Study on Improvement of LDK Dwelling Levels by Making Alteration of 3K 9Pyong Houses
By Ok-Hyun Lee Master’s Degree Thesis, Chongju University 2001

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