An Intergenerational Housing Community: Enhancing Aging-in-Place Ideologies and Senior Care in a North American Urban Context

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RAIC 690B

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1.0 EXECUTIVE SUMMARY

The design contained within this document intends to highlight the strengths of an Intergenerational Housing model as it relates to the North American context. The site chosen is in Edmonton, Alberta, Canada and has on it a pre-existing building that has been left vacant for some time. This design intends to incorporate as much as possible the existing structure into the design of the new housing model concept. This design is intended to appeal to a multitude of people from various age groups, so to accomplish this, the building houses many different services and program spaces that can be adaptable and engaging to the building occupants but also members of the community at large.

By considering the research as part of this thesis and through comparison of various precedents, the different program elements have been identified that would make for a successful project. Six fundamental principles will drive the design concept forward, these include;

1. **SAFETY** - Provide a safe living space for people of all ages to interact, collaborate and explore the values of each generation on an ongoing basis.
2. **DIVERSITY** - Enable people of different ages to live side by side as good neighbours in a purposeful effort to share their talents and resources, develop meaningful relationships and support each other.
3. **ENGAGEMENT** - Foster programs, policies, and practices that promote engagement, cooperation, interaction, and exchange between residents of different generations.
4. **SUPPORTIVE** - Provide adequately for the safety, health, education and necessities of life for people of all ages by taking a partnership of community-led approach to the delivery of services and activities.
5. **COMMUNITY** - Provide private spaces and communal areas intended for individual and collective use.
6. **SUSTAINABILITY** – Provide a facility that is socially, environmentally, and economically sustainable.

2.0 ACKNOWLEDGEMENTS

I wish to thank the following members of my thesis committee for their guidance and patience.

- Bonnie Dong
- Jane Kondo
- Troy Holloway

3.0 FUNCTIONAL PROGRAM

The functional program serves as an overview of the Intergenerational Housing Model. The functional program includes descriptions of services and programs offered in the facility as well as site and planning constraints, concept options and space summary.

The Functional Program serves some vital purposes.

- Serves as the basis for the design of the Intergenerational Housing Model, and
- Documents the scope of services offered in the Intergenerational Housing Model as well as functional relationship between spaces.

A presentation held in December 2019 reviewed a detailed overview of the site analysis and early concept development.

INTERGENERATIONAL HOUSING - FUNCTIONAL PROGRAM

Description of Space	Units		Area (m2)	Remarks
Student Units	**20**	**41**		
Living/sleeping space		22		
Kitchen		14		
Bathroom		5		
Net Area Sub-Total			820	
Component Gross Factor	1.40		328	
Component Gross Area Sub-Total			**1148**	
One Bedroom Units	**28**	**56**		
Living space		24		
Kitchen		10		
Bathroom		6		Bathroom to accommodate wheelchair
Bedroom		16		
Net Area Sub-Total			1568	
Component Gross Factor	1.40		627	
Component Gross Area Sub-Total			**2195**	
Two Bedroom Units	**32**	**69**		
Living space		20		
Kitchen		13		
Bathroom		6		Bathroom to accommodate wheelchair
Bedroom 1		16		
Bedroom 2		14		
Net Area Sub-Total			2208	
Component Gross Factor	1.40		883	
Component Gross Area Sub-Total			**3091**	
Four Bedroom Units	**4**	**142**		
Living space		21		
Kitchen		15		Shared kitchen space for all generations
Sub-Kitchen		12		
Dinning		12		Shared dinning space for all generations
Bathroom 1		10		Bathroom to accommodate wheelchair
Bathroom 2		8		
Bedroom 1		18		
Bedroom 2		14		
Bedroom 3		16		
Bedroom 4		16		
Net Area Sub-Total			568	
Component Gross Factor	1.40		227	
Component Gross Area Sub-Total			**795**	
Common Space				
Community Theater				
Seating (100 person capacity)	**1**	**200**	**200**	
Stage	**1**	**50**	**50**	
Walkway Link	**1**	**40**	**40**	
Storage	**1**	**35**	**35**	
Net Area Sub-Total			325	
Component Gross Factor	**1.85**		276	
Component Gross Area Sub-Total			**601**	
Workshop	1	200	200	
Video and Integrated Media	2	65	130	
Multipurpose/Classroom	8	90	720	
Small Meeting Room	1	25	25	(4-6 seats)
Large Meeting Room	1	40	40	(10-12 seats)
Kitchen (commercial and teaching)	2	130	260	
Public Washrooms	2	6	12	Bathroom to accommodate wheelchair
Fitness Center				
Pool	1	150	150	
Workout	1	45	45	
Change Rooms	2	50	100	Bathroom to accommodate wheelchair
Sauna	1	12	12	
Net Area Sub-Total			**1694**	
Component Gross Factor	**1.65**		**1101**	
Component Gross Area Sub-Total			**2795**	
Health Centre				
Exam Room	6	20	120	
Reception	1	45	45	
Meeting Room	1	20	20	
Consult Room	2	11	22	
Office	3	9	27	
Administration	1	65	65	
Net Area Sub-Total			**299**	
Component Gross Factor	**1.65**		**194**	
Gross Area Sub-Total			**493**	
Total Component Net Area			**7157**	
Total Component Gross Area			**10518**	
Building Grossing Factor @	**1.65**		**6837**	
Total Building Gross Floor Area (m^2)			**17,355**	

4.0 SITE PLANNING

4.1 ZONING

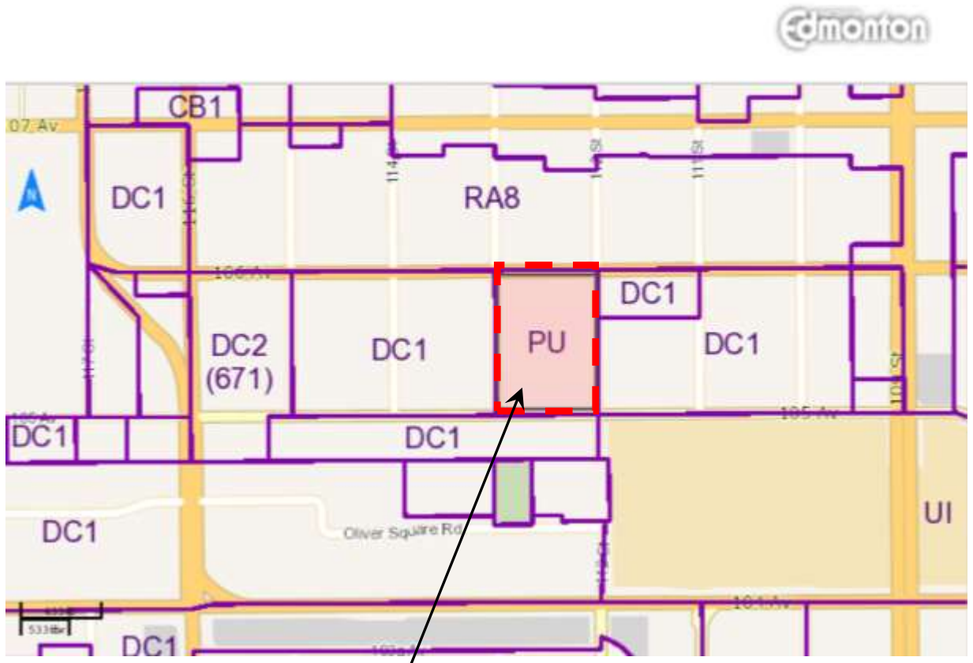
The zoning for the intended site is as a Public Utility. This designation is most likely due to its prior use as the Northwestern Utilities office and service yard. The current zoning is to provide for systems or works that provide for public consumption, benefit, convenience. Permitted uses could entail minor or major utility services, public parks, and urban indoor farms. A rezoning application will have to be submitted to the City of Edmonton to permit the intended development.

The suggested change in zoning would be to a Direct Control (DC2) classification. This classification applies to areas with an Area Structure Plan or Area Redevelopment Plan. Fortunately, for the Central McDougall / Queen Mary Park neighbourhoods, the Area Redevelopment Plan, approved last July 2019, encourages livable and dynamic communities that value the history, diverse cultures, vibrant arts community, and excellent educational institutions. The Redevelopment Plan encourages a strong community spirit and pride with residents and businesses, working together to provide a clean, secure and comfortable environment. In addition the plan also speaks to a wide variety of activities for seniors and young people. Many precedents already indicate that a Direct Control classification is achievable, as many of the surrounding sites already have obtained that designation.

The DC2 regulations require pre-application notification to landowners within 60 metres of the development site, as well as to the President of each affected Community League and the President of each Business Revitalization Zone Association operating within the distance described above. The notification must outline the proposal and allow affected parties to submit feedback or comments. The comments received, as well as applicant responses to the issues raised, are documented and filed with the application.

Items from the Area Redevelopment Plan addressed in this thesis design include:

- A mixed-use, livable and dynamic development that offers a place to live, shop, work, learn and play
- A diverse and inclusive facility that provides a range of housing types and welcomes a variety of age and income groups.
- An attractive and inviting urban design
- A safe building where residents feel secure
- Strong, functional pedestrian linkages in all direction – to the Downtown and neighbourhoods to the north, east and west
- A design that respects existing established business and also provides redevelopment opportunities
- Provides adequate open space and park facilities for resident's enjoyment
- A pleasing, pedestrian-friendly environment that encourages walkability and accommodates alternative forms of transportation



Site of Intergenerational Housing Model

4.2 URBAN DESIGN

This thesis contemplates the construction of a mixed-use facility that is contextually appropriate to the neighbourhood and would represent a significant architectural addition to the area. The thesis design utilizes an existing building that is currently vacant and repurposes it to anchor a mixed-use development that supports an intergenerational housing model.

The thesis proposal contributes to the neighbourhood fabric in several ways. Firstly, it will reuse existing building stock that has a significant connection to the neighbourhood, thus keeping the neighbourhood look and feel at street level and contributing to a culture of preservation and longevity as good sustainable design. Secondly, the development will serve to bring in community members through a developed pedestrian environment, bicycle laneways, and public transit corridor. Thirdly, extensive landscaping will elevate the current site to a more pleasing experience for the residents and community members. Furthermore, the selection of a site in the urban centre is a priority to take advantage of urban core amenities, like shops and post secondary instiutions, as well as offer lower carbon footprint living for patrons.

Site Plan

Site Plan

Site Aerial View

4.3 SITE PLANTINGS

The landscape architecture expressed on the site through hardscaping patterns and planting design speaks to the metaphor of multiple generations crossing paths. The curved forms in the west gardens reference the strong interaction that can happen when people of different age groups come together and overcome obstacles. It is about removing barriers for each generation, be it young, middle or more advanced in years.

Outdoor spaces are primarily located on the west side of the site and comprise hard surfaces such as patios and sidewalks, along with soft landscaping interspersed with planting beds and trees. The intersections of the pathways provide an opportunity to display public art. Landscape lighting highlights the planted material and illuminates the west gardens in all seasons and light conditions. Additional green space surrounds the theatre that provides for a community park setting that draws a variety of people to enjoy the outdoors in this urban setting.

The thesis design intends to be sustainable even in the choice of plant material to minimize maintenance and irrigation-heavy plant palette. The proposed plant palette emphasizes native and locally adapted plants that will thrive under the ecological and operational conditions of the design. Investment in trees improves over time with modest maintenance and will add demonstrated social, environmental, functional and aesthetic value to the site.

White Spruce

Tamarack

Deciduous and Coniferous Trees

Planted in pre-engineering soil cells, or continuous tree trenches of 1200mm depth, filled with approved planting soil and topped with 100mm of shredded bark mulch.

- Trembling Aspen
- Balsam Poplar
- Tamarack
- Balsam Fir
- Jack Pine
- White Spruce
- Brandon Elm

Deciduous and Coniferous Shrubs

Planted in 600 mm deep shrub beds, filled with approved planting soil and topped with 100mm of shredded bark mulch.

- Red Osier Dogwood
- Alberta Wild Rose
- Common Lilac
- Creeping Juniper
- Common Juniper

4.4 LIGHT, VIEWS, AND PRIVACY

Light, views and privacy concerns are addressed through a combination of spatial separation, orientation and mitigating measures between adjacent buildings, both current and proposed. Given the surrounding structures and the setbacks of the existing building, there are no significant concerns to daylighting. The residential component of the building is set back from the lower level, thereby ensuring significant daylighting opportunities remain even if the neighbouring vacant site is developed. The height of the new building elevates the residential component above street level to garner better vistas to the east and west. The classroom on the second floor has curved elements intended to capture the sun better as it travels east to west.

Trembling Aspen

Red Osier Dogwood

Common Juniper

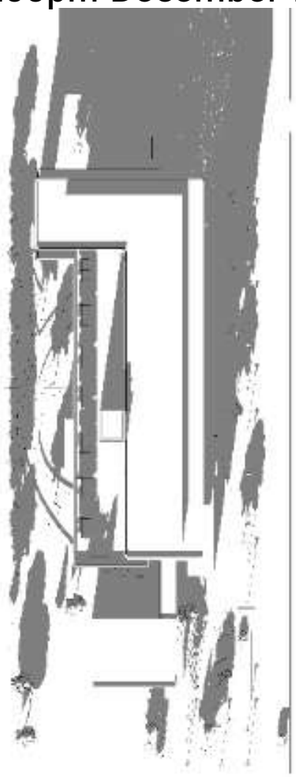
4.5 SHADOW IMPACTS

Shadow impact studies have been conducted on March 21, June 21, September 21, and December 21 to assess the impacts that this building would have on the surrounding architecture (see image below). The most impactful shadows occur in the winter and spring due to the corresponding low sun angle. The small structure to the north is impacted while the sun moves through its path at its peak. The building height and setback of the residential portion of the building aid to limit the shadow cast to the north.

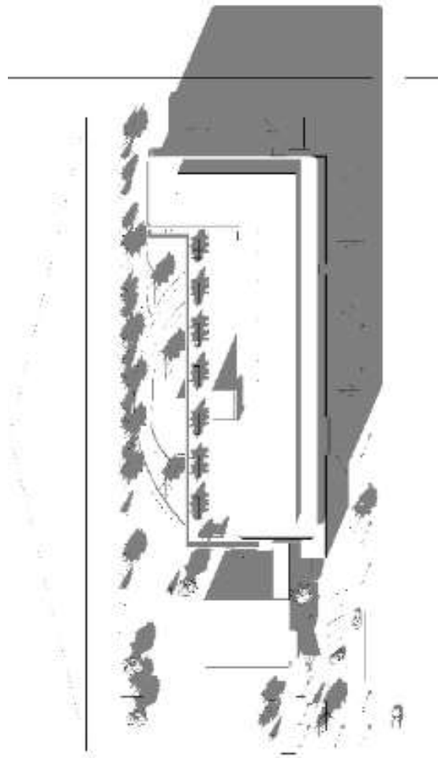
4.6 CONCLUSION

The proposed building in this thesis is in keeping with the policies and intent for the Queen Mary neighbourhood and the City of Edmonton. This intergenerational proposal is supportive of the City's plan to promote the densification of the area and builds a supportive space for all in the community to enjoy. The approach to the site design is rooted in the design principles for the project. It focuses on the creation of a restorative and beautiful site for residents and community members. From an urban design perspective, the use of existing building stock, along with the built form of the proposed building is contextually appropriate and compatible with surrounding metropolitan areas.

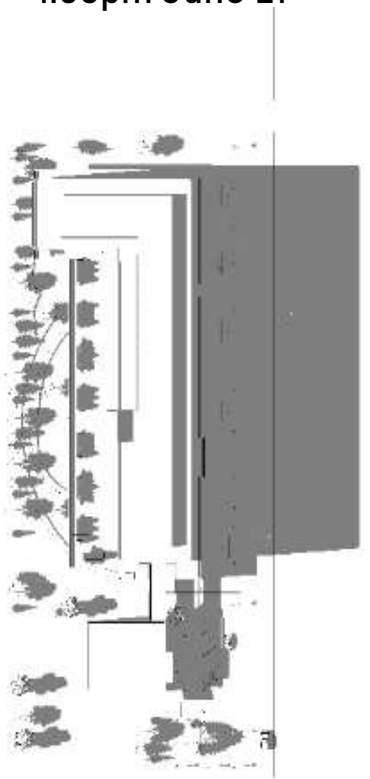
2:00pm December 21st



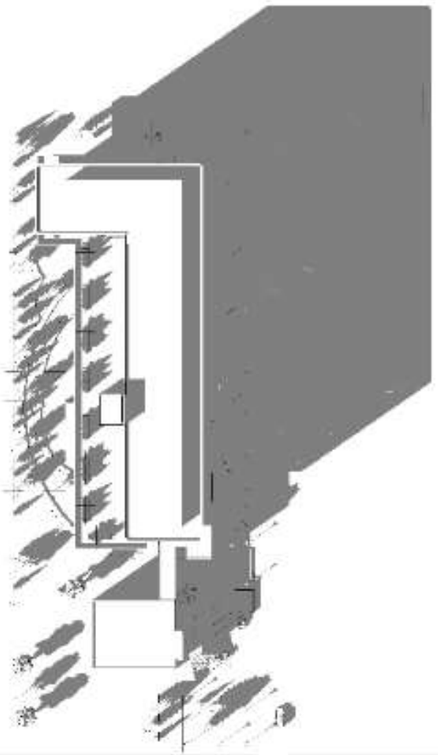
2:00pm March 21st



4:00pm June 21st



4:00pm September 21st



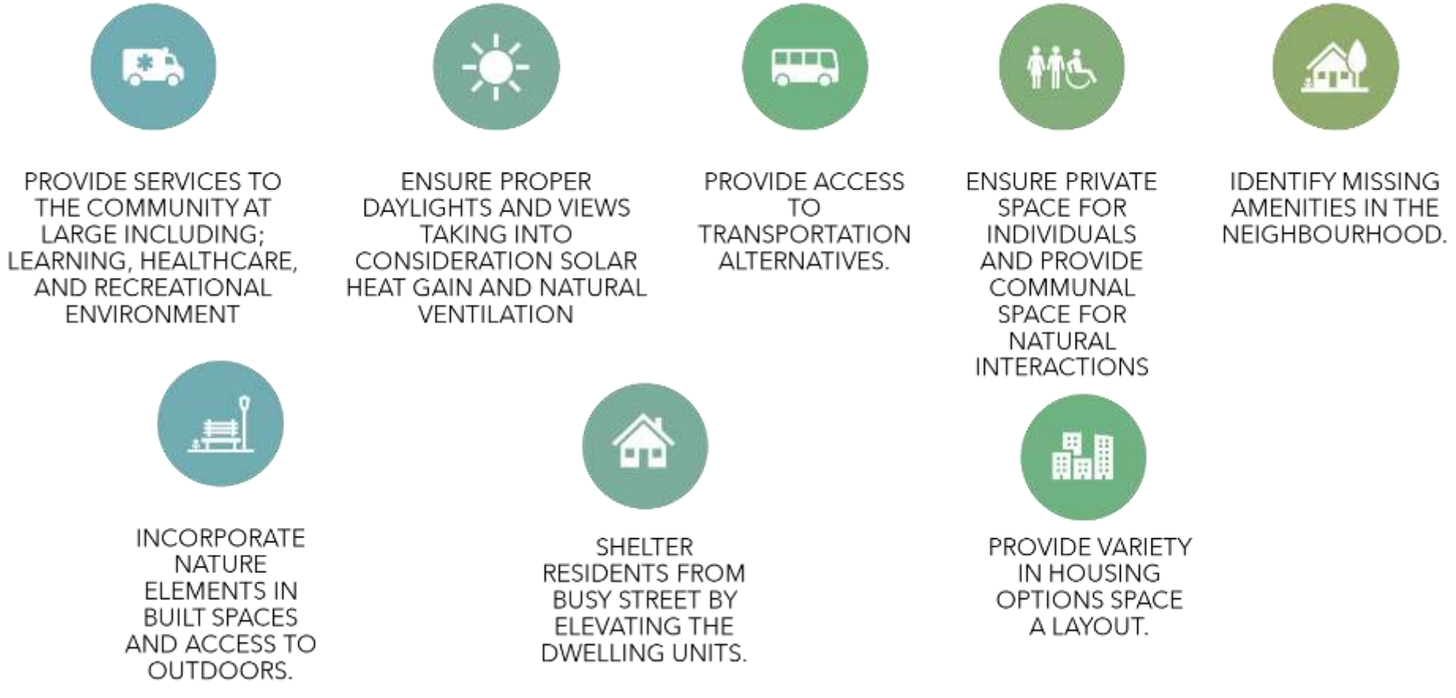
5.0 BUILDING ORGANIZATION AND DESIGN

5.1 OVERALL BUILDING ORGANIZATION AND DESIGN

The architectural approach for this Intergenerational Housing concept centers on the interactions of individuals of various age groups intending to enhance the quality of life and variety of experiences critical to human health, physically and emotionally. Success is achieved by providing a housing scheme that contains five success factors.

- Providing a safe housing alternative for all ages
- Housing that is engaging to the occupants and neighbours
- Multiple housing options and diversity of choices in living styles
- Providing a strong sense of community
- Providing a supportive living environment whereby all age groups can flourish and prosper

The intergenerational thesis design is based on overarching design principles established through research and best practice. These principles set out the intent, goals, and vision of the intergenerational housing model intended to support the concept through design, construction and occupancy.



5.1.1 Architectural Elements

Driving the building design is the reuse of existing building stock on the proposed site. The existing Northwestern Utilities office building, built in the 1960s, has a strong Bauhaus influence with modern lines and a low clean appearance free from any superficial adornment. By maintaining design elements of the existing building, it serves to ground the new structure to the neighbourhood.

There are several key design elements of the existing Northwestern Utilities building that are incorporated into the design. These include.

- Brown brick façade
    - Incorporated into the new construction elements such as vertical elements on the west elevation of the residential block and at the community theatre.
- Curved entrance on the east face
    - Incorporated at both the entrance of the theatre and the west elevation on the second floor of the.
- Long narrow shape
    - Incorporate long, narrow lines running horizontally through the form of the residential floors.
    - Align the vertical edges of the existing building with the new residential floors above.

From a neighbourhood perspective, the building design is to include inviting spatial elements that bring in people to share the space. Program elements such as classrooms, workshops, healthcare, community theatre, retail, and other flexible spaces are essential elements to bring in diverse age groups into the facility.

The services provided in this design are intended to add or support the services provided to the community at large, but with a focus to help the intergenerational residents that will occupy the building once built.

This critical interaction between the generations is what builds strong sense of community internal to the designed building. To accommodate this, the facility must provide pockets of space for individuals find solitude when required and for larger groups to assemble and grow intergenerational connections.

East Elevation of Existing Building

West Elevation of Existing Building

Southeast Elevation Rendering

Southwest Elevation Rendering

East Elevation

West Elevation

South Elevation

North Elevation

5.2 INTERIOR BUILDING ORGANIZATION AND DESIGN

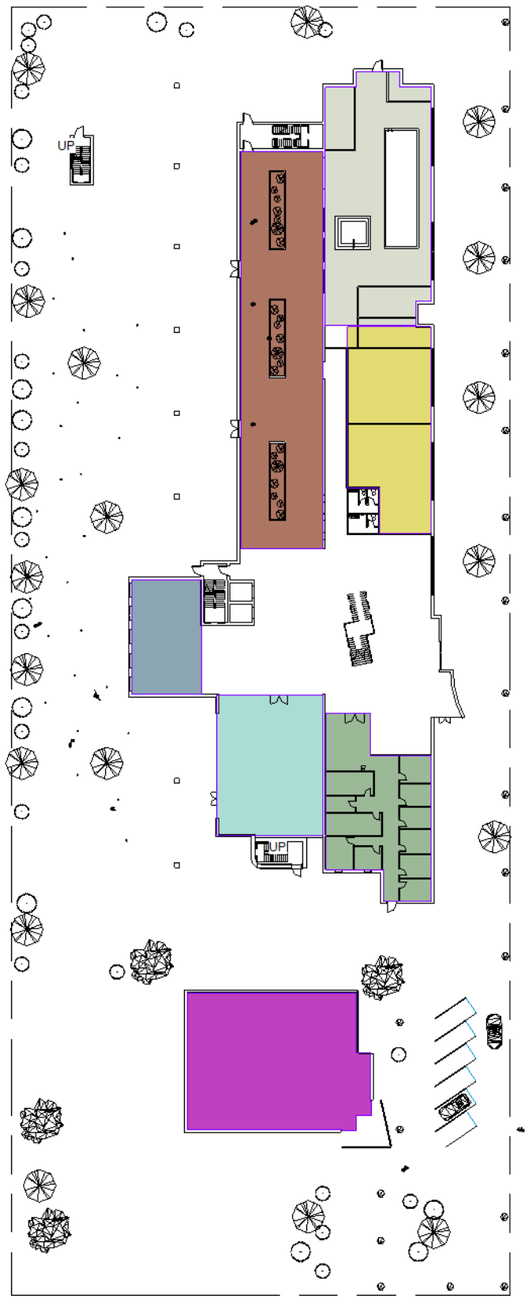
There were several lessons learned from various precedents examined through the research done on Intergenerational Housing. It is the intent of this thesis design to incorporate as many of the lessons learned into the current model. Some of these lessons learned from precedents are.

- Provide services to the community at large, including learning, healthcare, and recreational environments.
- Ensure appropriate exposures for the proper use of solar gain and natural ventilation.
- Provide natural daylight and views from each dwelling unit.
- Provide large internal gathering spaces.
- Shelter residents from the busy street by elevating the dwelling units where possible.
- Provide access to public spaces like parks and community gardens.
- Provide housing option sizes for different family or individual circumstances.
- Provide sheltered green space for more vulnerable residents.
- Incorporate universal design principles that bring flexibility into the spaces for easy reconfiguration as residences needs change over time.
- Provide public space for community gatherings.
- Incorporate natural elements into spaces to bring a connection with outdoors.
- Provide retail opportunities to attract the public to the facility.
- Keep public spaces to the lower levels and reserve the upper levels for private dwellings.
- Provide a safe outdoor space for younger generations to play.
- Provide enough space for intergenerational programs to be delivered at present and allow for modest future programs to increase.
- Design for lower-income residents.
- Ensure adequate private space for each member of the family unit.
- Ensure the family shares an effective common space.
- Provide separate entrances into each dwelling unit along with a separate entry into the common area.

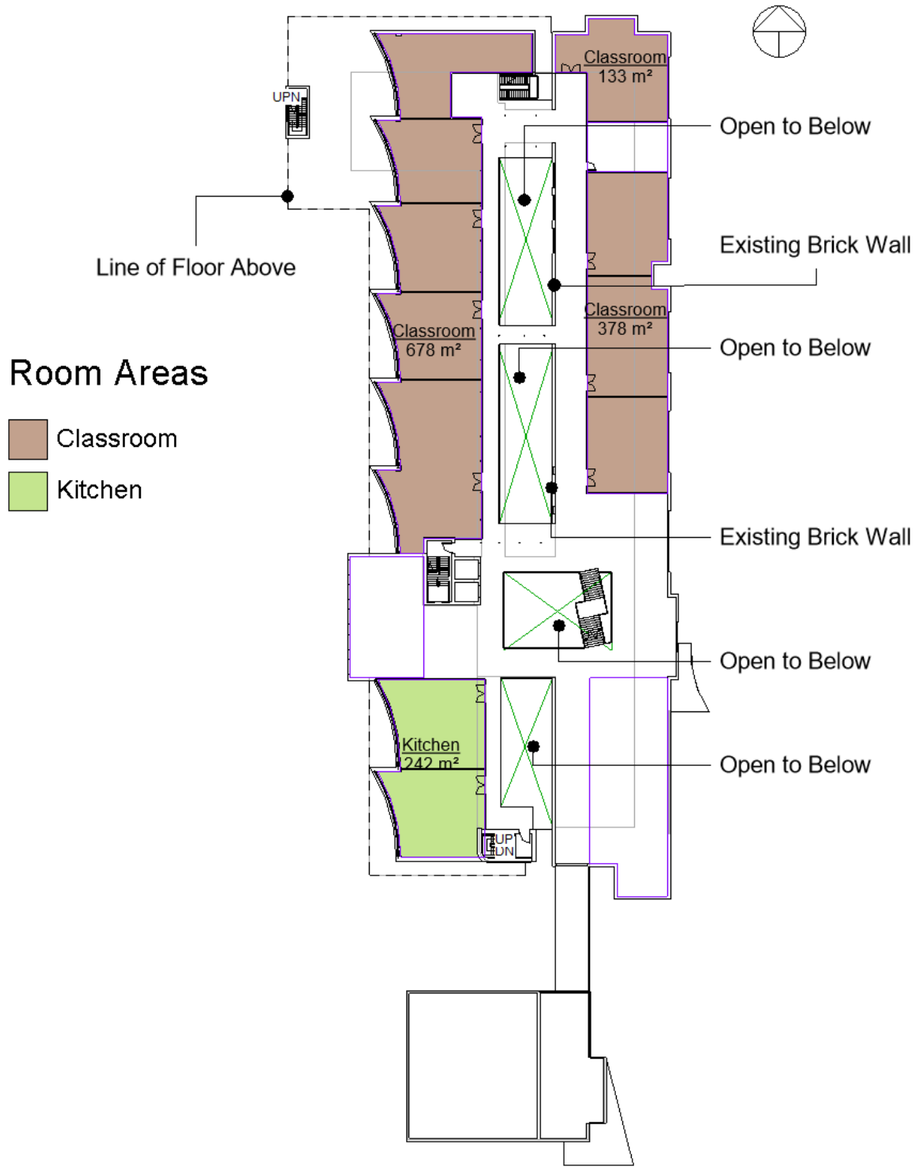
Main Floor

Room Areas

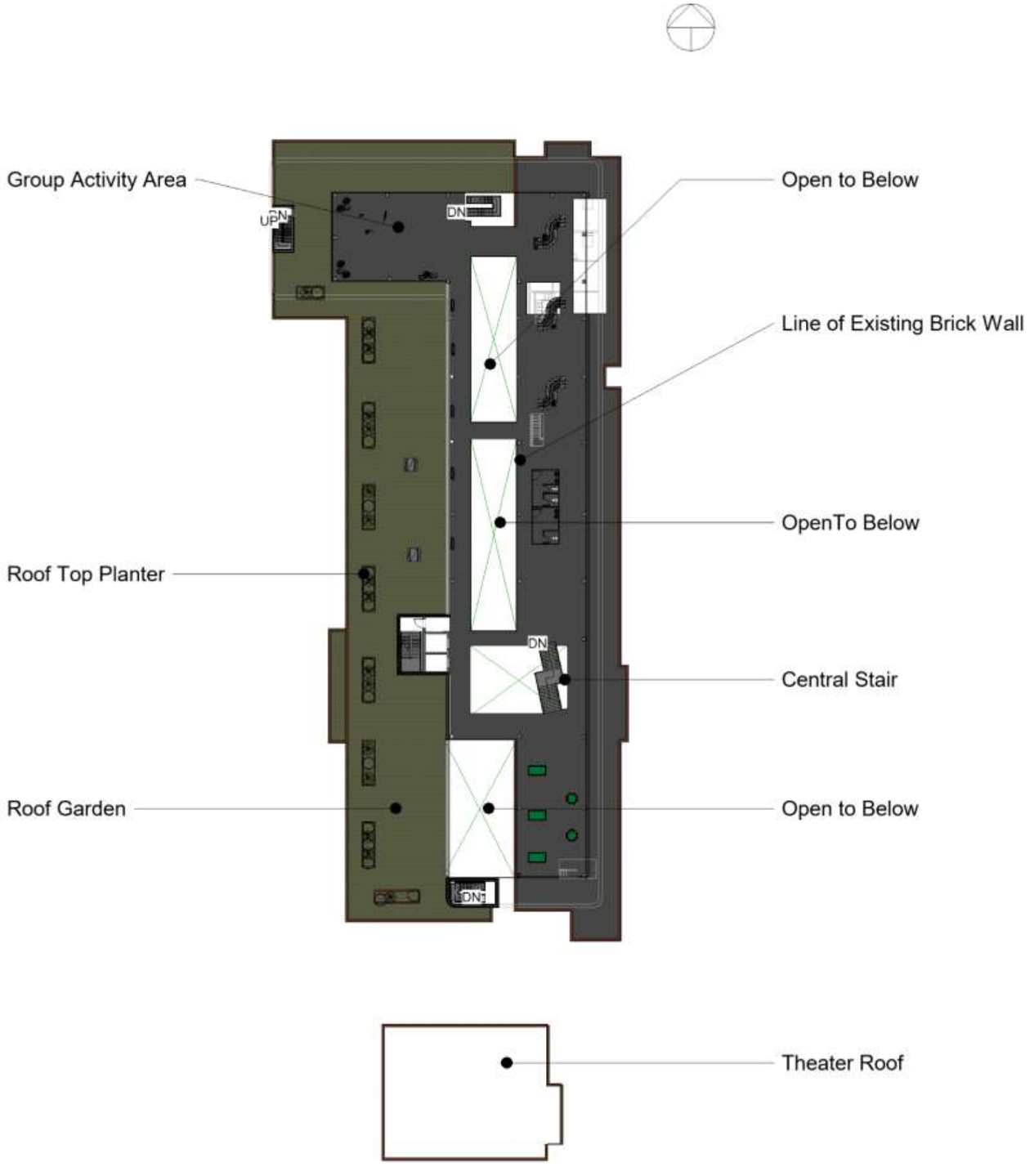
- Carpentry Workshop
- Health Clinic
- Library
- Public Gathering
- Recreation Area
- Retail
- Theatre



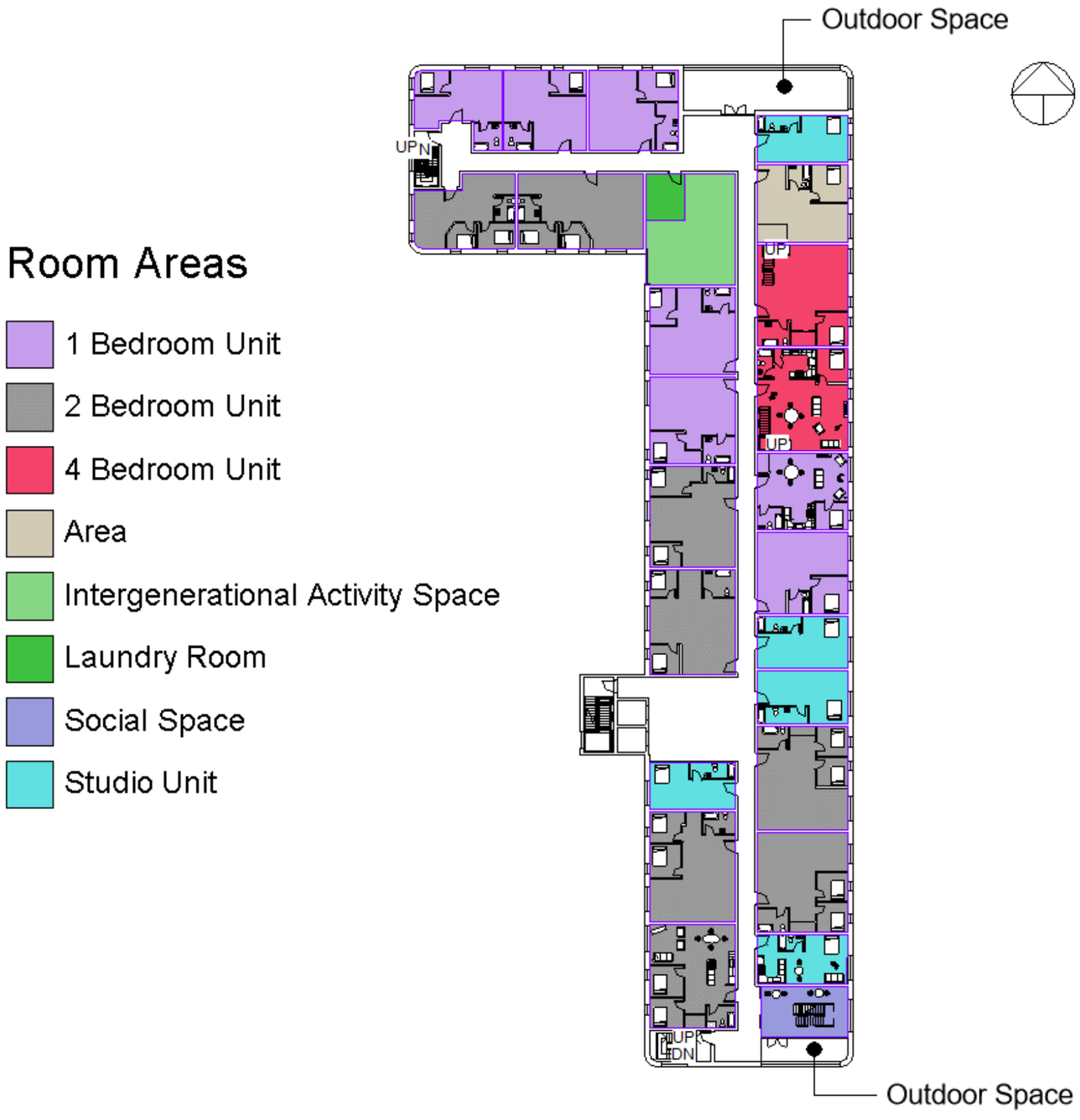
Second Floor



Third Floor


Group Activity Area
UP
DN
Open to Below
Line of Existing Brick Wall
OpenTo Below
Roof Top Planter
DN
Central Stair
Roof Garden
Open to Below
DN
Theater Roof

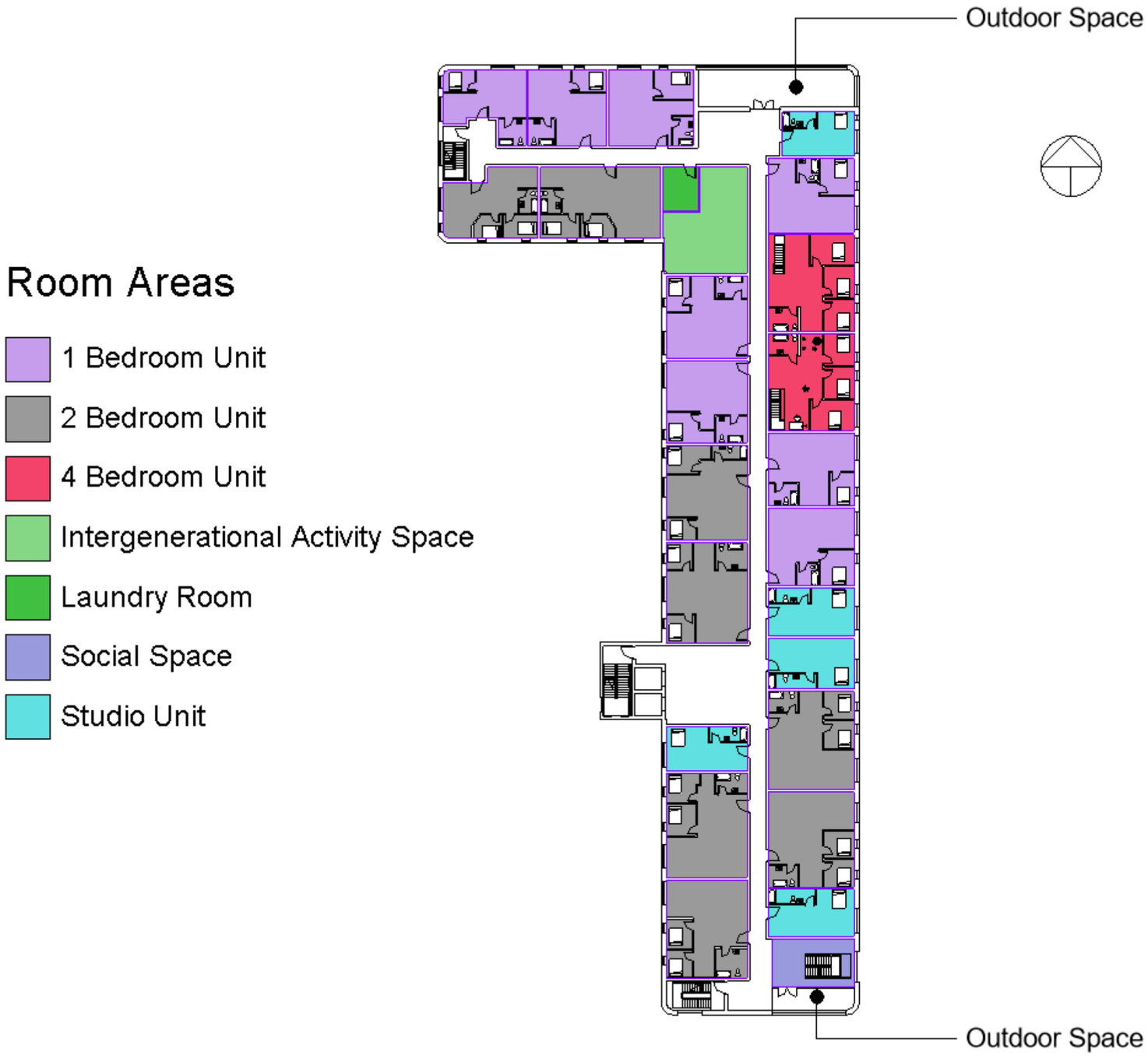
Fourth Floor



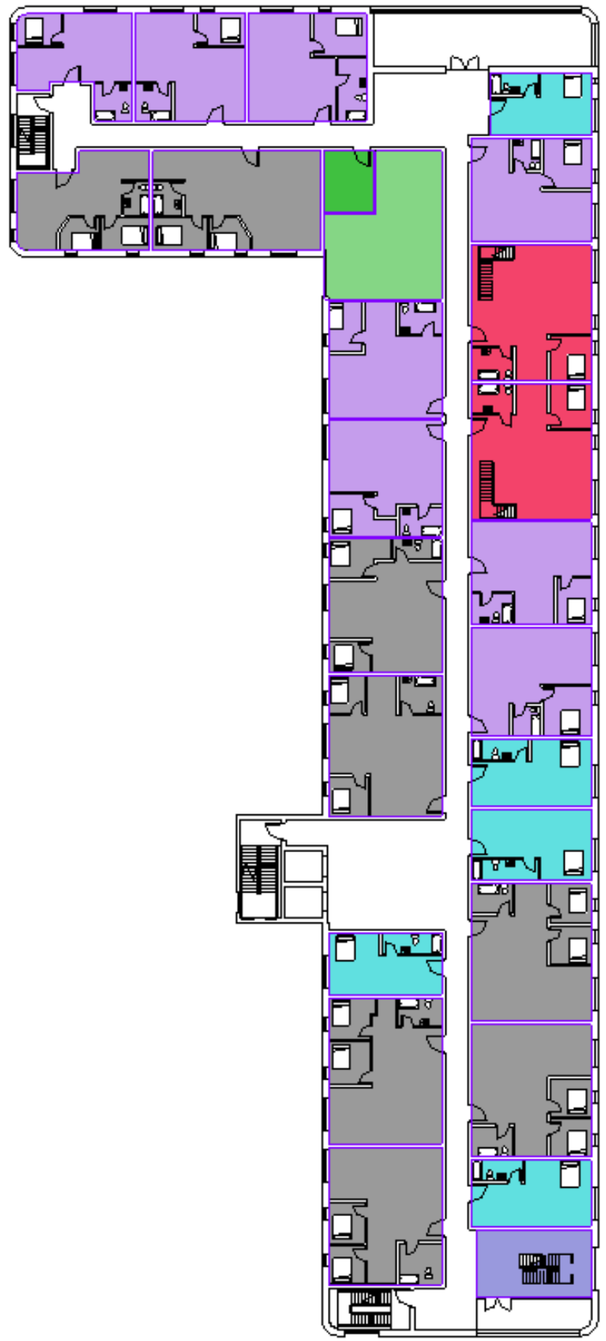
Room Areas

- 1 Bedroom Unit
- 2 Bedroom Unit
- 4 Bedroom Unit
- Area
- Intergenerational Activity Space
- Laundry Room
- Social Space
- Studio Unit

Fifth Floor


Outdoor Space
Room Areas
1 Bedroom Unit
2 Bedroom Unit
4 Bedroom Unit
Intergenerational Activity Space
Laundry Room
Social Space
Studio Unit
Outdoor Space

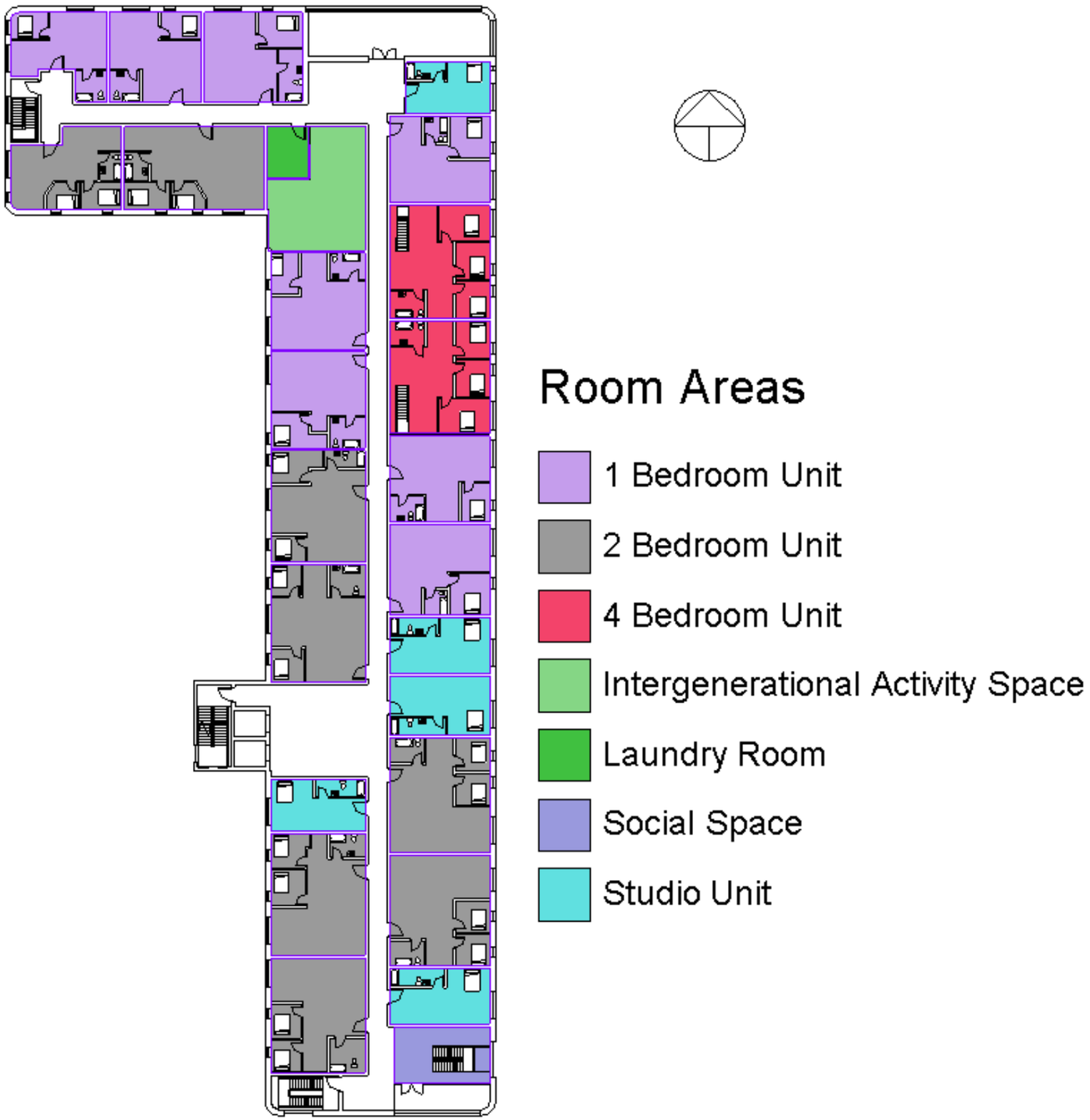
Sixth Floor



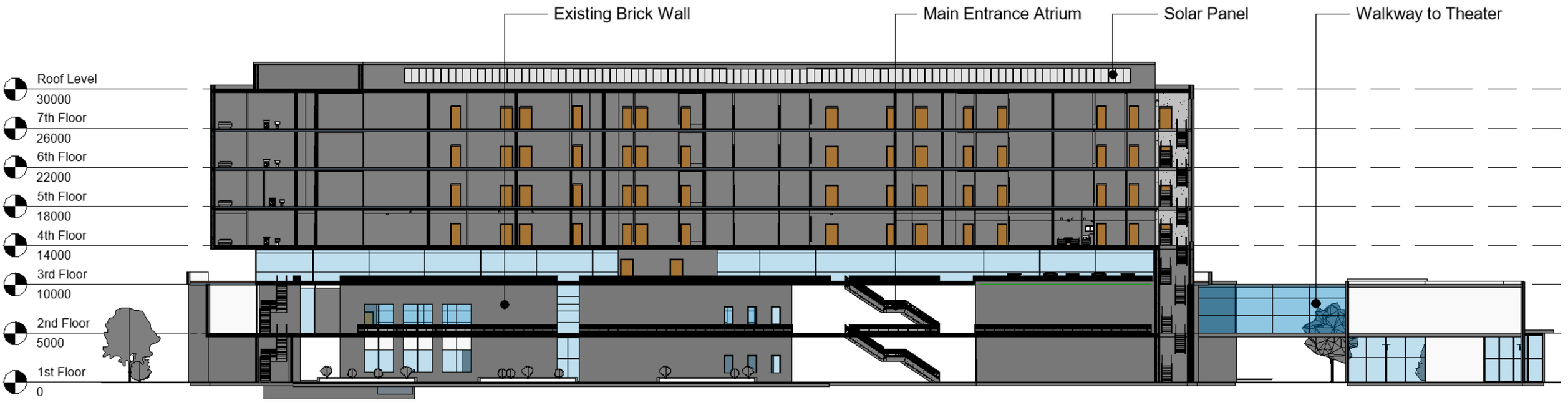
Room Areas

- 1 Bedroom Unit
- 2 Bedroom Unit
- 4 Bedroom Unit
- Intergenerational Activity Space
- Laundry Room
- Social Space
- Studio Unit

Seventh Floor

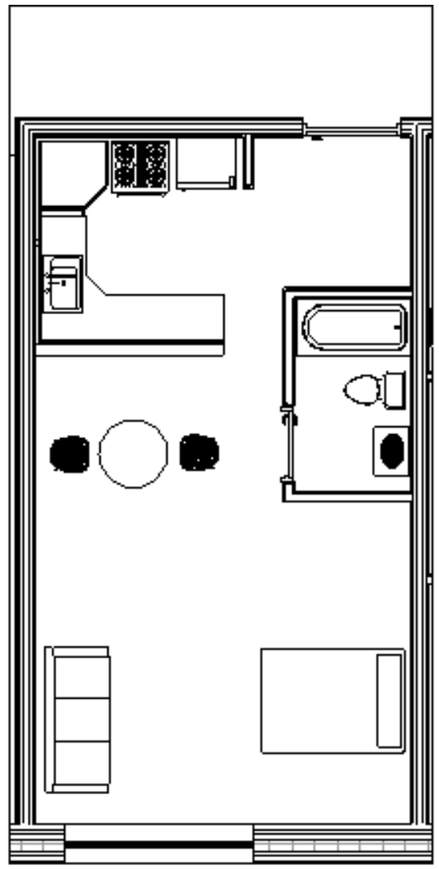


Building Section – View Looking West into Building

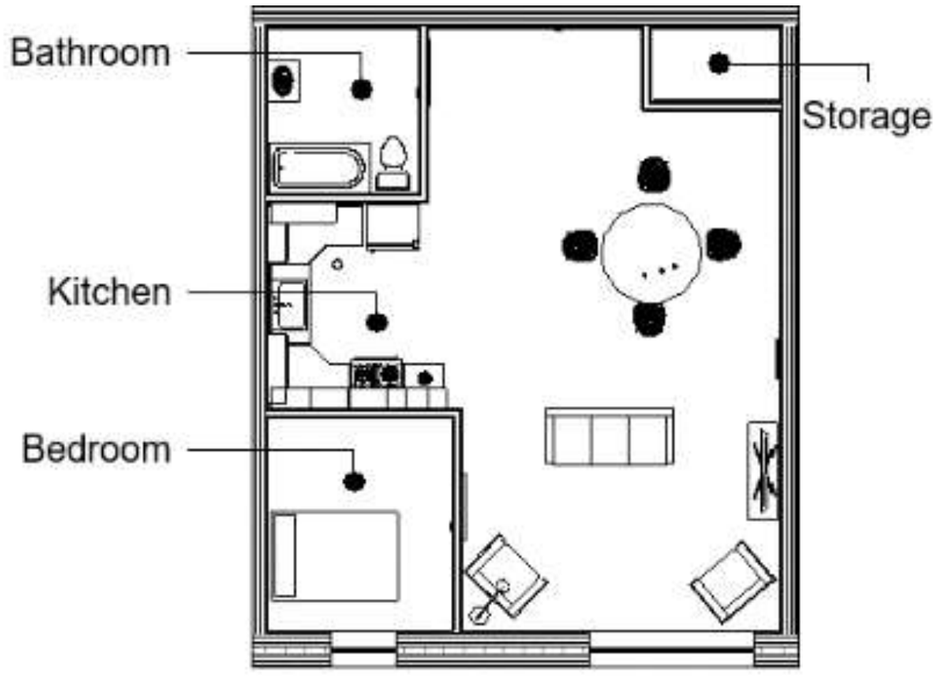


Building Section – View Looking East into Building

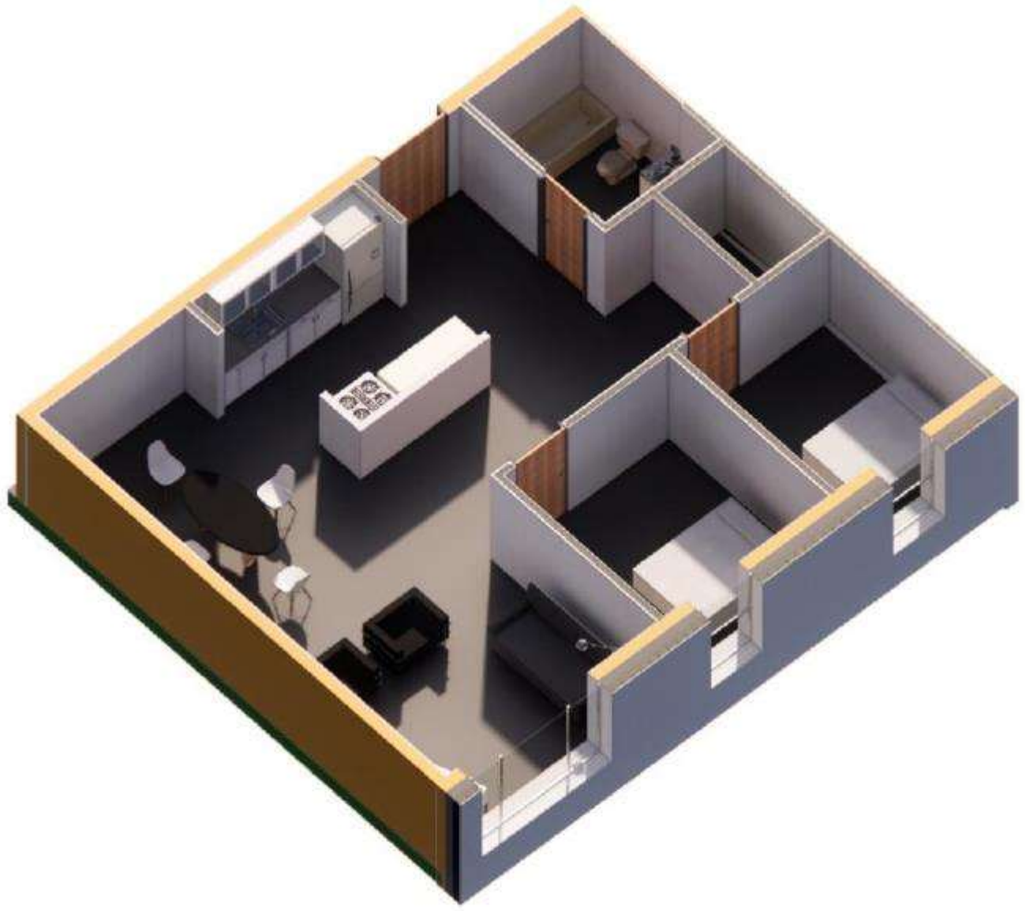
Studio Apartment – Approximately 40 sq. m

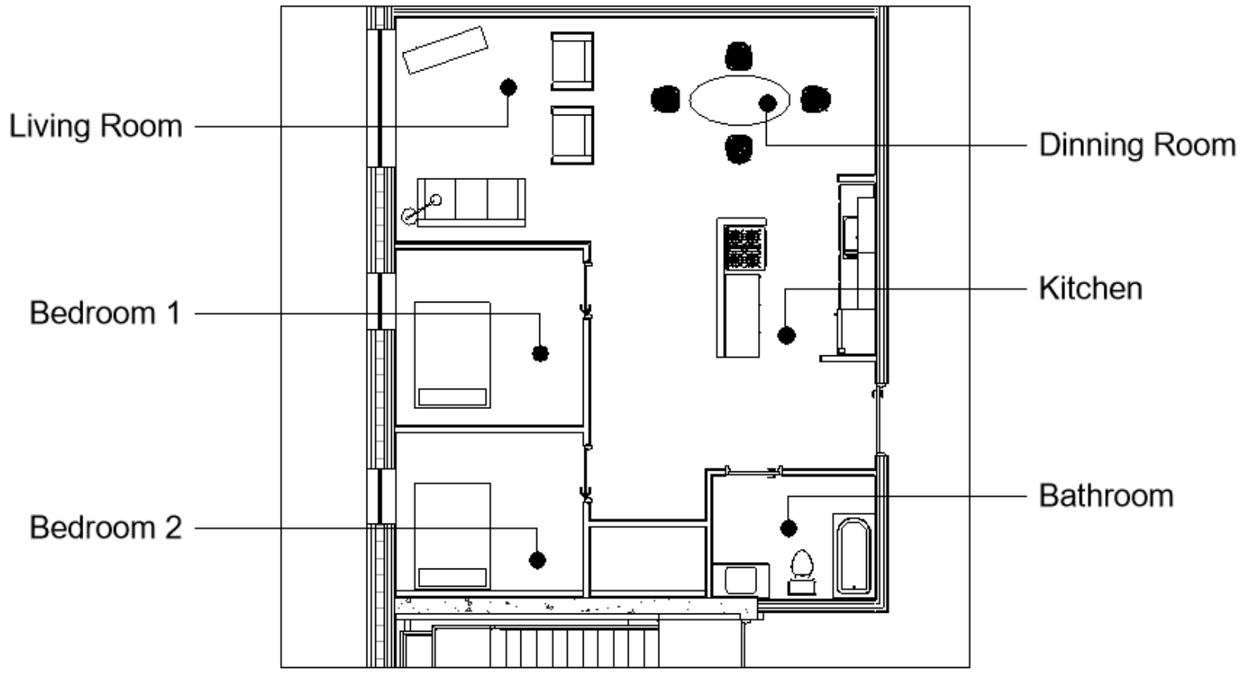


One Bedroom Apartment – Approximately 65 sq. m

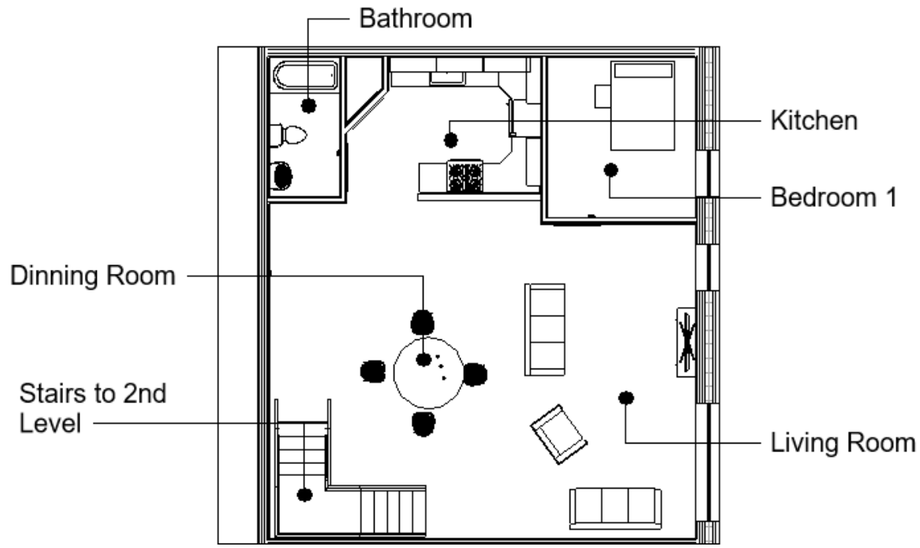


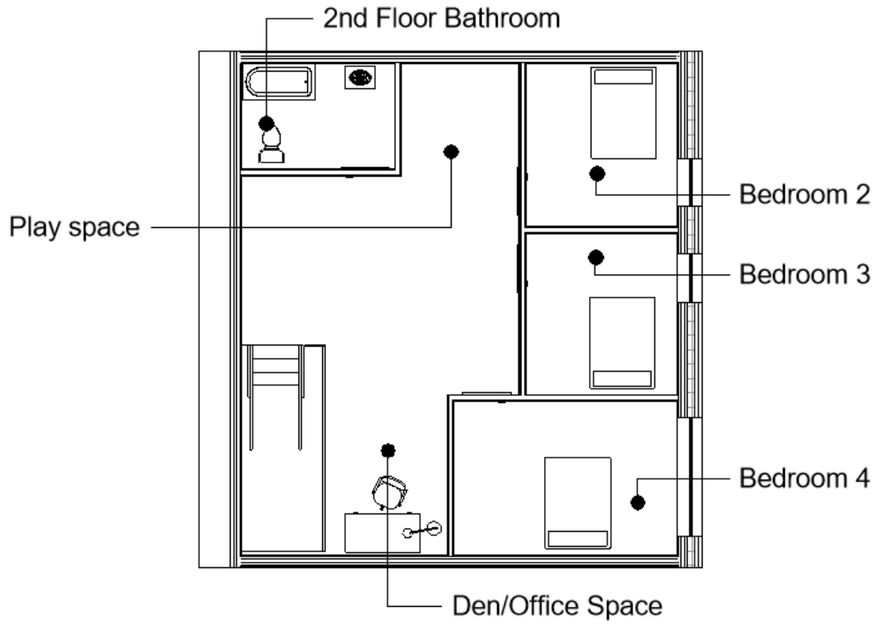
Two Bedroom Apartment – Approximately 78 sq. m



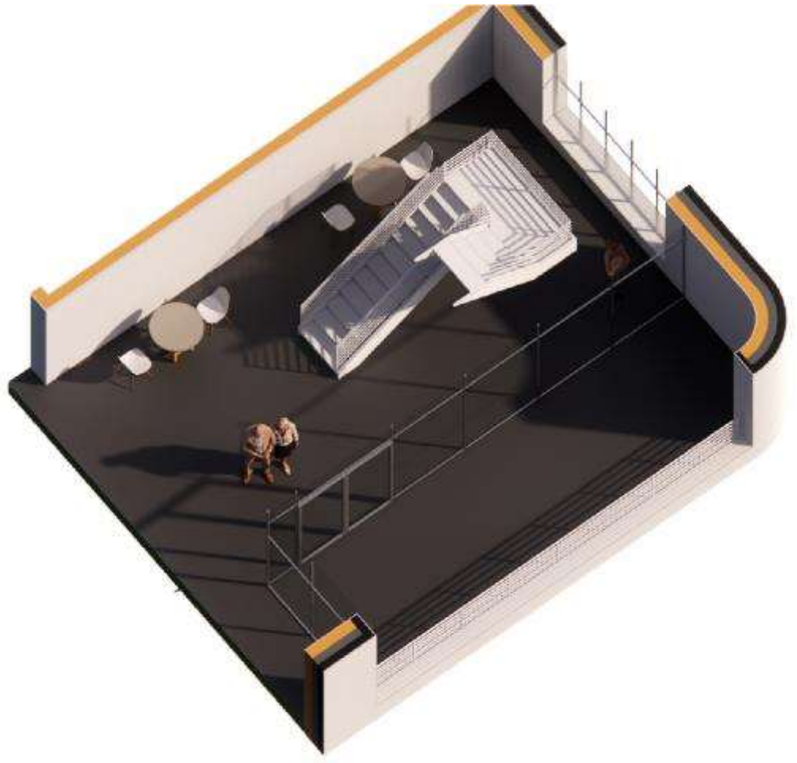


Four Bedroom Apartment – Approximately 110 sq. m





Social Space - Approximately 42 sq. m



First Floor

Main Street Concept – Socialize and Gather

Second Floor Concept – Learning and Retail

Third Floor – Outdoors and Recreation

6.0 BUILDING SYSTEMS

6.1 ARCHITECTURAL

6.1.1 Building Code Synopsis

This thesis design intends that it conforms to the requirements of the National Building Code – 2019 Alberta Edition. The Authority Having Jurisdiction is the City of Edmonton. For this building code review, the building is one building with multiple occupancies.

The building code review provides a brief description of the critical building code parameters that apply to the thesis proposal. The code review is organized by Code reference with additional comments as appropriate for each reference. It describes the primary fire and life safety requirements for the project relevant to the level of detail required for this submission. Included are types of construction and fire resistance rating required; exiting and egress requirements; major fire separations; and mechanical and electrical fire suppression requirements. The review is organized by Code reference with additional comments as appropriate for each reference.

Code Reference	Description	Comments
3.1.2	Major Occupancies	
	Residences	Division C - Located on Floors 4 through 7
	Retail/Classrooms	Division D - Located on Floors 1 through 3
	Theater	Division A2 - Located in separate building connected by enclosed walkway
3.1.3		Major Occupancy Fire Separation
3.1.3.1	Separation of Major Occupancies	According to Table 3.1.3.1 a 1 hour fire separation is required between C and D occupancies and a 1 hour fire separation is required between A1 and D occupancies.
3.1.4.7	Heavy Timber Construction	Heavy timber construction shall conform to Table 3.1.4.7
3.2.1.1	Building Height	Building height is 7 storeys
3.2.2.10	Number of facing street	Facing 2 streets
3.2.2.13	Occupancy on Roof	A portion of a roof that supports an occupancy shall be constructed in conformance with the fire separation requirements of Articles 3.2.2.20 to 3.2.2.90 for floor assemblies, and not the fire-resistance rating for roof assemblies.
3.2.2.38	Building Classification	Group A Division 2, Any Height, Any Area, Sprinklered - Non-combustible construction - Floor assemblies shall be fire separations with a fire resistance rating not less then 2 hours - Mezzanine shall have a fire-resistance rating not less then 1 hour - Loadbearing walls, columns, and arches shall have a fire-resistance rain g not less than that required for the supported assembly Group D, Up to 6 Storeys, Sprinkled - Non-combustible construction - Floor assemblies shall be fire separations with a fire-resistance rating not less than 1 hour - Mezzanines shall have a fire-resistance rating not less than 1 hour - Roof assemblies shall have a fire-resistance rating not less than 1 hour - Loadbearing walls, columns and arches shall have a fire-resistance rating not less than that required for the supported assembly
3.2.3		Spatial Separation and Exposure Protection

3.2.3.1	Limiting Distance and Area of Unprotected Openings	Building Face North South West East	Limiting Distance 9m 15m 23m 9m	Max Unprotected Openings 100 100 100 100
3.2.3.7	Construction of Exposing Building Face	Minimum FRR Construction Type Cladding Required	45min Combustible or non-combustible Combustible or non-combustible	
3.2.2.13	Protection of Exits	Unprotected opening in an exterior wall must be no more than 3 metres horizontally from exits where the angle between the exit and the unprotected opening is less than 135 degrees		
3.2.3.14	Wall Exposed to Another Wall	There is no restriction as to the location of unprotected openings in adjacent fire compartments as the building is sprinklered throughout		
3.2.3.15	Wall Exposed to Adjoining Roof	There is no restriction as the building is sprinklered		
3.2.3.19.1	Walkway Between Buildings	The theater and main building are considered two buildings connected by a walkway link, each building is separated from the walkway by a fire separation with a fire rating of not less then 45 minutes		
3.2.4	Fire Alarm	A single or two stage fire alarm is permitted and will be installed with the main annunciator panel located at the main entrance off 112 Street		
3.2.5	Provisions for Firefighting	The fire fighters primary access point will be off 112 street and will conform to Article 3.2.5.5. The facility will be equipped with a standpipe system that conforms to Article 3.2.5.8.		
3.2.6		Additional Requirements for High Buildings		
3.2.6.2		The main building falls under these requirements as its height is greater then 18m. The requirements of this section are as follows; - Smoke movement is controlled and limited - Exit Stairs serving floors above the main floor are vented to the outdoors - Measures are taken to limit the movement of smoke from fire in a floor area below the lowest exit storey for the upper storeys		
B-3.2.6.2(2)	Stairway Protection Below Lowest Exit Level	The Stairway is enclosed in a shaft that - contains a stairway serving upper storeys, but is separated from that stairway at the lowest exit level by a fire separation having a fire-resistance rating not less than that required for the shaft enclosure.		
3.2.6.4		- Manual emergency recall is provided for all elevators serving storeys above the first floor		
3.2.6.5		- All elevators are connected to emergency power. One elevator conforms to fire fighter use requirements		
3.2.6.5.5		- Each elevator for use by fire fighters shall be protected by a vestibule with a 45 minute fire resistance rating, or by a corridor containing no occupancy with a 1 hour fire resistance rating.		
3.2.6.6		- The building is vented to aid firefighting.		
3.2.6.7		- A centralized alarm and control facility equipped with a voice communications will be provided.		
3.2.7	Lighting and Emergency Power	The building will be equipped with emergency lighting and power systems sufficient to power the anticipated loads, including one elevator.		
3.2.8	Openings through floor Assemblies	The main lobby space incorporates an interconnected floor space conforming to 3.2.8.2.6 - Connects main floor to third floor - Contains A2 and D occupancy		
3.3		Safety with Floor Areas		
3.4.1.3.4	Means of Egress	At least two separate means of egress shall be provided from a roof used or intended for an occupant load more than 60, to stairs designed in conformance with the requirements regarding exit stairs stated in Section 3.4		

3.3.1.5	Single Means of Egress	Occupancy of Room of Suite A2 D	Max. Area (m2) 200 300
3.3.1.6	Travel Distance	The maximum travel distance to a means of egress or an exit is 45m.	
3.3.1.17	Capacity of Exits	The capacity of stair exits shall conform to Article 3.3.1.17	
3.3.1.21.3		Janitor's room is not required to have a fire resistance rating if the floor area in which the room or space is located is sprinklered throughout.	
3.3.2	Assembly Occupancy	The theater shall conform to the requirements as stated in Article 3.3.2	
3.3.3.5	Compartments and Fire Separations	The resident areas are subdivide into fire compartment. Each fire compartment is less then 1000 square metres. Exiting from each fire compartment is provided by one exit stair and a horizontal exit to the adjacent fire compartment	
3.4		Exits	
3.4.1.6	Restricted Use of Horizontal Exits	Each sleeping compartment referenced in 3.3.3.5 above is served by one horizontal exit and one exit stair.	
3.4.2.4	Travel Distance	Travel distance is permitted to be measured from the entrance of a suite provided the suite is separated from the corridor by a fire separation and egress door opens onto a corridor used by the public or a public corridor that is separated from the remainder of the floor.	
3.4.2.5.1	Location of Exits	For the roof garden, the maximum travel distance to the nearby exit is 30m as per 3.4.2.5.1 f) 30m in any floor area there than those referred to in Clauses (a) to (e).	
3.4.3.2	Exit Widths	Exits serving A2, C and D occupancies are sized to provide 8 mm of width per occupant.	
3.6.2.1.7	Minimum Exit Stair Widths	Minimum width of exit stairs serving Groups A, C and D is 1100 mm.	
	Minimum Exit Doorway width	Minimum width of exit doorway serving Groups A, C, and D is 800 mm	
	Electrical Rooms	Electrical equipment that is required to be located in a service room according to the electrical regulations made pursuant to the Safety Codes Acts shall be installed in a service room separated from the remainder of the building by a fire separation having fire resistance rating not less than 1 hour.	
3.6.2.7	Electrical Equipment Vaults	The primary electrical equipment vault is separated from the remainder of the building with fire separations having a 3 hour fire resistant rating.	
3.7		Health Requirements	
3.7.2.2.A	Water Closets in Assembly Occupancy	Minimum number of water closets in assembly occupancy with capacity of 100 is 2 Male and 4 Female.	
3.7.2.2.11		At least one water closet shall be provided for each dwelling unit.	
3.7.2.2.B	Water Closet in Business and Personal Service Occupancy	For number of persons of each sex over 50 the minimum number of water closets for each sec is 3, plus 1 for each additional increment of 50 persons of each sex in excess of 50.	
3.7.2.3.1)	Lavatories	At least one lavatory shall be provided in a room containing one or 2 water closets and at least one additional lavatory shall be provided for each additional 2 water closets.	
3.8.1.1.3	Accessibility	Residential projects should target 1 in 10 dwelling as accessible.	
3.8.2.2	Entrances	50% of pedestrian entrances shall be barrier-free	

6.2 WALL SYSTEMS

6.2.1 Interior Walls

Interior Shaft Wall Partitions

Typical Wall Shaft	S1	1 Hour Fire Rating	- 1 Layer 16mm Gypsum Wall Board -22mm Hat Channel at 600 mm o.c

Interior Wall Partitions

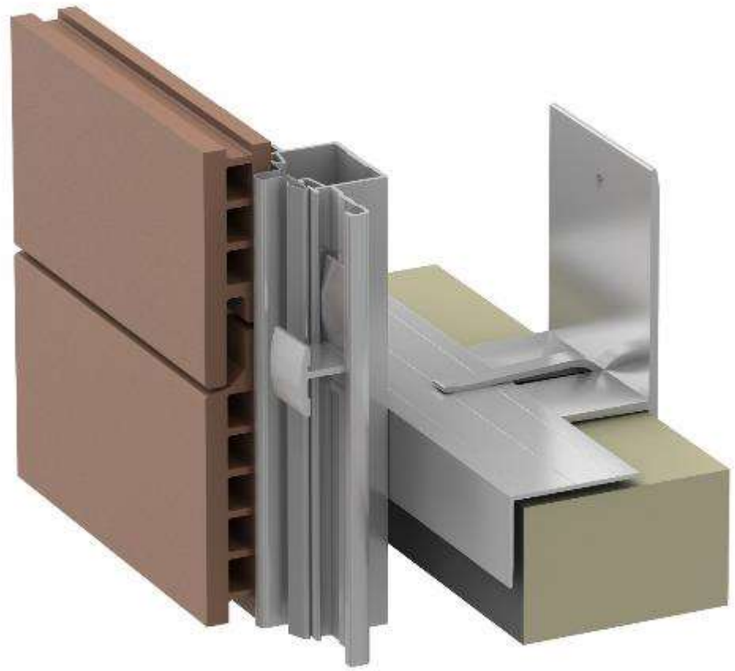
Typical Wall, that does not extend to u/s of deck	P1	Non-Rated	- 1 Layer 16mm Gypsum Wall Board - 92mm Metal Studs at 400mm o.c.
	P2	Non-Rated	- 1 Layer 16mm Gypsum Wall Board - 92mm Metal Studs at 400mm o.c. - 1 Layer 16mm Gypsum Wall Board
	P3	45min FRR STC Rating 38	- 1 Layer 16mm Fire Rated Gypsum Wall Board - 92mm Metal Studs at 400 o.c. - 1 Layer 16mm Fire Rated Gypsum Wall Board
	P4	45min FRR STC Rating 47	- 1 Layer 16mm Fire Rated Gypsum Wall Board - 92mm Metal Studs at 400 o.c. - 89mm Sound Batt Insulation - 1 Layer 16mm Fire Rated Gypsum Wall Board
	P5	1 hour FRR STC Rating 42	- 2 Layers 16mm Fire Rated Gypsum Wall Board - 92mm Metal Studs at 400 o.c. - 1 Layer 16mm Fire Rated Gypsum Wall Board
	P6	1 hour FRR STC Rating 52	- 2 Layers 16mm Fire Rated Gypsum Wall Board - 92mm Metal Studs at 400 o.c. - 89mm Sound Batt Insulation - 1 Layer 16mm Fire Rated Gypsum Wall Board

Interior Wall Partitions

Typcial Wall, that extends to u/s of deck	P7	Non-Rated	- 1 Layer 16mm Gypsum Wall Board - 152mm Metal Studs at 400mm o.c.
	P8	Non-Rated	- 1 Layer 16mm Gypsum Wall Board - 152mm Metal Studs at 400mm o.c. - 1 Layer 16mm Gypsum Wall Board
	P9	45min FRR STC Rating 41	- 1 Layer 16mm Fire Rated Gypsum Wall Board - 152mm Metal Studs at 400 o.c. - 1 Layer 16mm Fire Rated Gypsum Wall Board
	P10	1 hour FRR STC Rating 51	- 2 Layers 16mm Fire Rated Gypsum Wall Board - 152mm Metal Studs at 400 o.c. - 150mm Sound Batt Insulation - 1 Layer 16mm Fire Rated Gypsum Wall Board
	P11	1 hour FRR STC Rating 48	- 2 Layers 16mm Fire Rated Gypsum Wall Board - 200mm Cros-Laminated Timber Panel - 2 Layer 16mm Fire Rated Gypsum Wall Board
	P12	1 hour FRR STC Rating 59	- 2 Layers 16mm Fire Rated Gypsum Wall Board - 200mm Cros-Laminated Timber Panel - 92mm Hat Channel - 90mm Sound Batt Insulation - 2 Layer 16mm Fire Rated Gypsum Wall Board

6.2.2 Exterior Wall Systems

Typcial Existing Wall	EW1	R-Value R-27	- 1 Layer of 16mm Gypsum Wall Board - Existing 152mm Metal Studs at 400 o.c. - 150mm Sprayfoam Between Exiting Studs - Existing Plywood Substrate - Asphalt Paper - 25mm Gap - Existing Brick Cladding
Typcial New Brick Ext. Wall	EW2	R-Value R-32	- 1 Layer of 16mm Gypsum Wall Board - 152mm Metal Studs at 400 o.c. - 16mm Exterior Grade Gypsum Wall Board - SBS Air/Vapour Membrane - 2 Layers of 100mm Z-Bars Perpendicular to Each Other place on Thermal Spacers - 200mm Semi-Rigid Mineral Wool Insulation - 25mm Air Space - 90mm Brick Veneer
Typcial Terracotta Ext. Wall	EW3	R-Value R-32	- 1 Layer of 16mm Gypsum Wall Board - Cross-Laminated Timber Wall - 16mm Exterior Grade Gypsum Wall Board - SBS Air/Vapour Membrane - 2 Layers of 100mm Z-Bars Perpendicular to Each Other place on Thermal Spacers - 200mm Semi-Rigid Mineral Wool Insulation - 25mm Air Space - 30mm Terracotta Ceramic Cladding
Curtain Wall	CW1	U-Value 1.36 W/m2K	- Sealed Triple Glazed Spandrel Panel - In Thermally Broken, Aluminum Curtainwall Framing, c/w Insulated Galvanized Back Pan - 50mm Air Space - Bent Steel Deck Edge Plate - Air/Vapour Barrier -100mm Mineral Wool Semi-Rigid Insulation



Terracotta Cladding Isometric, Image provided by Eco-Cladding Inc.

6.3 STRUCTURAL

6.3.1 Structural Design Principle

The principles in selecting the structural system for this thesis proposal were as follow.

- Safety – Design loads selected should be appropriate for the use and occupancy of the building. The structural systems should provide safe use for all occupants.
- Structural Serviceability – The effects of differential movement between the existing structure and the new construction can cause excessive deflection and movement.
- Value – The structural system must provide value, which can include not just the lowest cost option but also a consideration to sustainability measures, along with mechanical and electrical components.
- Appearance – Exposed structural systems in select areas are part of the architectural intent for this thesis.
- Green Design – Structural systems should be selected to give careful thought to the economic, environmental, and social benefits of the manufacturing and installation of the components.
- Integration of Building Systems – Location of structural elements is essential to align with mechanical and electrical systems to avoid conflicts and produce an efficient compact design.

6.3.2 Design Loads

Floor Loads

The loads noted here are in line with the National Building Code 2019 – Alberta Edition and are intended to be further refined as further engineering design progresses.

Live Load - Main Floor	4.8 kPa
Live Load - Residential Areas	2.4 kPa
Live Load - Corridors serving residential areas	2.4 kPa
Live Load – Mechanical Room	3.6 kPa
Dead Load – Typical	0.5 kPa
Dead Load – Mechanical Penthouse	3.6 kPa

Roof Loads

The loads noted here are inline with the National Building Code 2019 – Alberta Edition and are intended to be further refined as further engineering design progresses.

Uniform Snow Load	1.46 kPa
Live Load – Accessible Roof Garden	4.8 kPa
Live Load – Other Roofs	1.5 kPa
Dead Load – Typical Roof	1.5 kPa
Dead Load – Roof Over Mechanical Area	4.0 kPa
Dead Load – Intensive Green Roof	30 kPa
Dead Load – Theater Green Roof	2.5 kPa

6.3.3 Structural Systems

Foundations

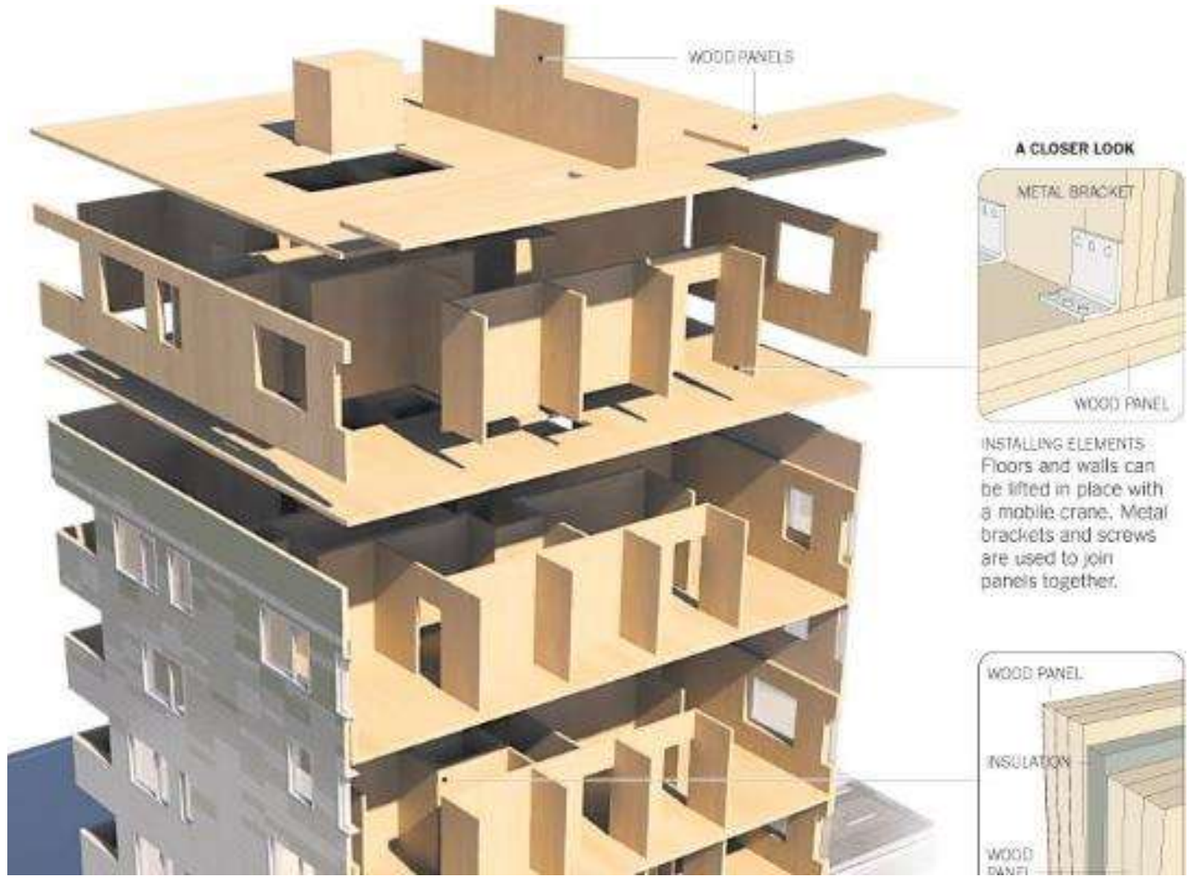
There are two central foundation systems in this design proposal. The first relates to the existing building. The existing Northwestern Utilities building is supported on strip footings with a shallow wall extending up to the slab on grade. The foundation for the new elements will be belled piles. Some additional belled piles will have to be installed in the footprint of the existing building to support the additional floors above.

Superstructure

The new construction elements will comprise primarily of cross-laminated timber construction. This structural system is made up of lumber, laid flat, and glued together on the wide dimension. These panels can range from three, five, seven or nine alternating layers of dimensional lumber depending on the application. The alternating directions of the cross-laminated timber provide it with dimensional stability. The panel thickness is anticipated to range from 200mm to 400mm on this design. These panels can span up to 19.5m in length and negates the need for internal columns within the residential units.

Benefits of utilizing the Cross-Laminated Timber material is.

- Simple assembly
- Quicker erection times
- Lighter structures
- Sustainability



Example of Cross-Laminated Timber Construction Proposed, Image by Nordic Structures Inc.

6.4 MECHANICAL

6.4.1 Mechanical Systems

The purpose of this mechanical section is to provide some preliminary information on mechanical systems and items to consider in choosing the appropriate system. This section is not a detailed analysis of system capacities or heating/cooling load calculation.

Code and Code Reference Standards

The following is a summation of applicable codes and standards that are referenced in the National Building Code 2019 – Alberta Edition. The table noted below may not be the exhaustive list of relevant standards and guidelines required to design an operational mechanical system for a building of this nature.

National Building Code 2019 - Alberta - References

Issuing Agency	Document Number	Title of Document	Latest Version
ASHRAE	ANSI/ASHRAE 62-2001	Ventilation for Acceptable Indoor Air Quaility	2016
CCBFC	NRCC 56169	National Fire Code 2019 - Alberta	2019
CCBFC	NRCC54435	National Energy Code of Canade 2017	2017
CCBFC	NRCC 53302	National Plumbing Code of Canada 2015	2015
CSA	B52-18	Mechancial Refirgeration Code	2018
CSA	B139-2009	Installation Code for Oil-Burning Equipment	2015
NFPA	10-2010	Portable Fire Extinguishers	2018
NFPA	13-2013	Installation of Sprinkler Systems	2016
NFPA	14-2010	Installation of Standpipe and Hose Systems	2016
NFPA	20-2010	Installation of Stationary Pumps for Fire Protection	2016
NFPA	96-2011	Ventialation Control and Fire Protection of Commercial Cooking Operations	2017
NFPA	214-2011	Water-Cooling Towers	2016

6.5 ELECTRICAL

6.5.1 ELECTRICAL SYSTEMS

Lighting

The lighting design intends to provide a comfortable environment of various age groups that will utilize this building. Given that this facility will accommodate an older generation, attention must be given to the light levels, as ageing eyes require significantly more light. Another essential aspect to keep in mind is to minimize glare.

In general, the goal of the lighting design is to provide the following light level throughout the facility.

Room Name	Lighting Levels
Residential Apartments	200 lux ambient
Corridors	200 lux ambient
Activity Area	300-500 lux
Examination Rooms	500-1000 lux
Offices	300-500 lux
Classrooms/Workshops	300-500 lux
Open Spaces	300-500 lux

Lighting Control

An addressable low-voltage control system will be employed over most of the facility. This style of control system comprised of a central controller that manages lighting levels in connection with the lighting and control devices allows for maximum flexibility of the lighting using different technologies and strategies for lighting control. Daylight harvesting and occupancy sensors will be employed to maintain a minimum light level while at the same time saving energy when spaces are not occupied.

Within the residential apartments, the use of local switches and dimmers will be used to control the lighting. This system gives the residents the greatest level of control and comfort within their apartments.

Fire Alarm

The following standards will guide the fire alarm design.

- National Building Code 2019 – Alberta Edition
- CAN/ULC S 524 Standard for the Installation of Fire Alarm Systems
- CAN/ULC S 537 Standard for the Verification of Fire Alarm Systems.

The appropriate engineering discipline will determine the full technical description of the system configuration and function as well as the types of devices deployed throughout the facility.

7.0 SUSTAINABILITY

7.1 SUSTAINABILITY GOALS

The project is intended to be a sustainable development that fulfills the three essential pillars of sustainability: social impacts, economic impacts, environmental impacts. This is accomplished through 1) revitalizing a brownfield site and improve the urban fabric of the Queen Mary neighbourhood, 2) meeting Passive House principles providing a very efficient and comfortable dwelling for occupants, 3) Exceed LEED Energy targets by 25%, 4) promote a richer urban environment that supports greater community and social sustainability.

High priority goals with respect to sustainability include:

- Reduce embodied carbon by reusing existing building elements.
- Dark skies compliant lighting and reduce light trespass on adjacent properties.
- Reduce interior and exterior lighting power density with LED lighting.
- Exceed LEED Energy targets by 25%.
- Review parking densities and consider providing services for alternative energy vehicles.
- Utilize advance lighting control systems throughout the facility. Daylighting control will be reviewed and considered in common spaces. Occupancy/vacancy sensors will be provided in areas that don't impact residence safety.
- Review the opportunity to provide sub-metering to electrical panels to incorporate measurement and verification process.
- Encourage on site food production.

HEATNG AND COOLING LOAD ASSUMPTIONS

The updated load calculation has determined the approximate total cooling and heating load for the CCN to be as follows:

- Total Cooling Load – 2,835 kW (900 Tons)
- Total Heating Load – 5,135 kW (15,200,000 BTU/hr)

Updated load calculation model based on the following assumptions:

CEILING HEIGHTS:

Existing Building

- Level 1: 3.2 meters
- Level 2: 3.2 meters

Third Floor: 3.5m

New Residential Construction:

- Level 4: 3.2 meters
- Level 5: 3.2 meters
- Level 6: 3.2 meters
- Level 7: 3.2 meters
- Penthouse: 4 meters

MINIMUM AIR CHANGES PER HOUR:

Residential Component = 4 Air Changes
Corridors and Circulation Spaces = 5 Air Changes
Health Clinic = 7 Air Changes
Indoor Recreation Spaces= 7 Air Changes
Library = 5 Air Changes

THERMAL PERFORMANCE OF EXTERIOR ASSEMBLIES CONSTRUCTION:

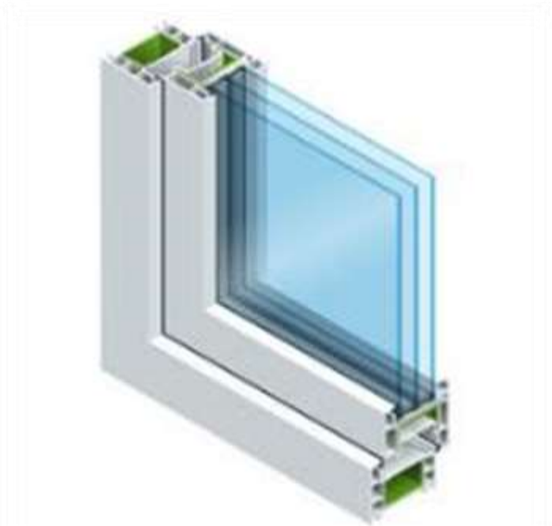
Overall Thermal Performance of Assemblies As Prescribed in the NECB 2017			
Building Assembly	Thermal Transmittance (W/m2*K)	RSI Value	R-Value
Walls	0.210	5	27
Roofs	0.138	7	41
Floors	0.162	6	35

Thermal Performance Values Targeted in Intergenerational Housing Design Thesis				
Building Assembly	Thermal Transmittance (W/m2*K)	RSI Value	R-Value	% Better then NECB 2017
Walls	0.177	6	32	18%
Roofs	0.117	9	49	18%
Floors	0.137	7	41	18%

PASSIVE HOUSE PRINCIPLES TO BE INCORPORATED

1. Insulation – Above average insulation values
2. Airtightness – Seal in the warm air
3. Orientation – Harness the sun for best warmth potential and limit overheating
4. Heat Exchanger – Bring in fresh air through heat exchanger
5. Window Performance – Increase performance with higher quality windows and glazing elements

+ Solar Energy – Produce as much energy on site as possible to offset carbon footprint



GLAZING:

Triple pane
Effective USI = 1.36 W/m2·K (Aluminum Curtain Wall)
Effective USI = 1.02 W/m2·K (Fixed and Operable Windows)

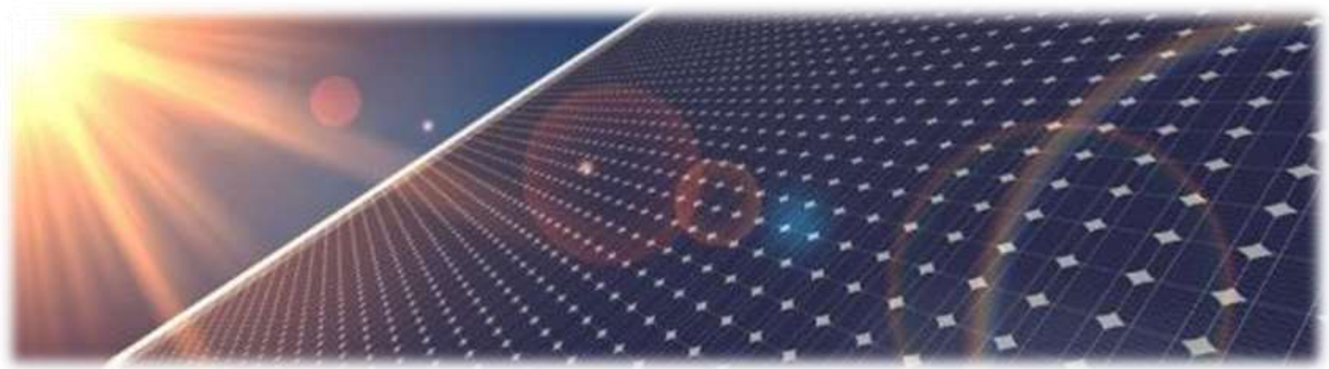
INTERNAL LOADS:

Residential, Classrooms, Corridors, Clinic, Library, Recreation Spaces:

- Lighting (Sensible Heat): 11.7 W/m2 – 90% of ASHRAE Value (Target)
- Plug Loads (Sensible Heat): 4.4 W/m2 – Estimated Based on Furniture/Equipment Layout
- People (Sensible Heat): 75 W/person – ASHRAE Fundamentals 2005
- People (Latent Heat): 70 W/person – ASHRAE Fundamentals 2005
- Occupancy Density: 48 m2/person – Estimated Based on Functional Program

Penthouse Mechanical Room:

- Lighting (Sensible Heat): 13.4 W/m2 – NEC 2011
- Plug Loads (Sensible Heat): 1 W/m2 – NEC 2011
- People (Sensible Heat): Negligible
- People (Latent Heat): Negligible
- Occupancy Density: Negligible



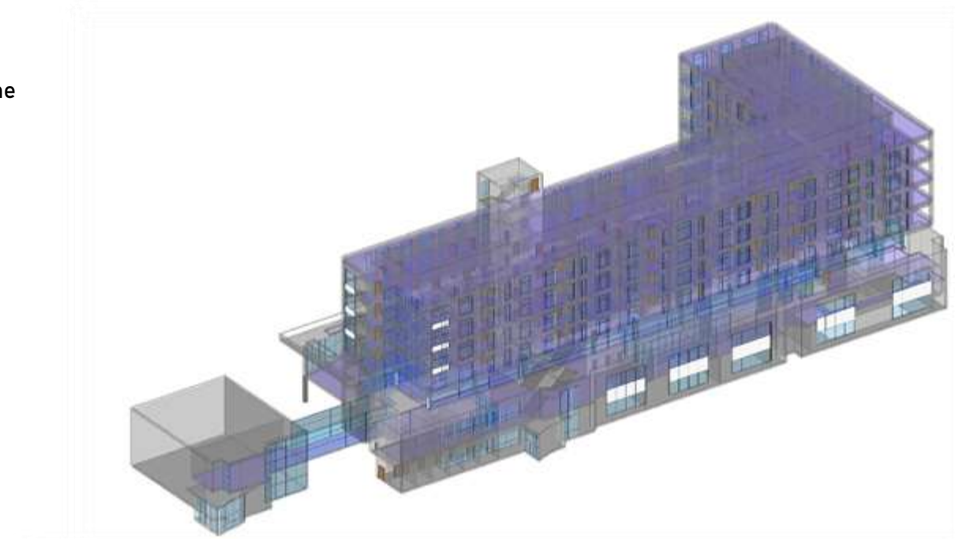
7.2 PRELIINARY ENERGY ANALYSIS

The energy model is to be updated throughout the design process to determine the energy consumption of the building.

The proposed model was compared to the ASHRAE 90.1-2010 baseline to assess the amount of energy the building is expected to save compared to the baseline.

The following energy conservation measures contribute to the energy savings:

- R-32 effective exterior walls
- R-49 effective roof
- Triple pane, low e exterior glazing
- Air handling units with 72% efficient heat recovery
- 6.27 COP water cooled chillers
- Primary-secondary variable flow pumping arrangements for both heating and cooling loops
- 95% efficient condensing domestic hot water heaters
- 20% reduction over LEED baseline fixture flow rates
- 10% interior lighting power density reduction over the ASHRAE 90.1-2010 baseline
- 50% exterior lighting power density reduction over the ASHRAE 90.1-2010 baseline



Appendix A – Site Analysis and Early Conceptual Design

An Intergenerational Housing Community: Enhancing Ageing-in-Place Ideologies and Senior Care in a North American Urban Context

RAIC 690B – Midpoint Presentation

Allan Colpitts (AB110001)

Success Factors of Intergenerational Housing

#1 *SAFETY*

#2 *DIVERSITY*

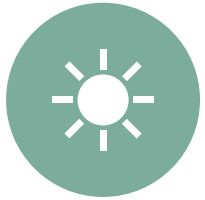
#3 *ENGAGEMENT*

#4 *SUPPORTIVE*

#5 *COMMUNITY*

Key Design Criteria

PROVIDE SERVICES TO THE COMMUNITY AT LARGE INCLUDING; LEARNING, HEALTHCARE, AND RECREATIONAL ENVIRONMENT



ENSURE PROPER DAYLIGHTS AND VIEWS TAKING INTO CONSIDERATION SOLAR HEAT GAIN AND NATURAL VENTILATION

PROVIDE ACCESS TO TRANSPORTATION ALTERNATIVES.

ENSURE PRIVATE SPACE FOR INDIVIDUALS AND PROVIDE COMMUNAL SPACE FOR NATURAL INTERACTIONS

IDENTIFY MISSING AMENITIES IN THE NEIGHBOURHOOD.

INCORPORATE NATURE ELEMENTS IN BUILT SPACES AND ACCESS TO OUTDOORS.

SHELTER RESIDENTS FROM BUSY STREET BY ELEVATING THE DWELLING UNITS.

PROVIDE VARIETY IN HOUSING OPTIONS SPACE A LAYOUT.

1.0 Functional Program

Description of Space	Units	Area (m2)	Remarks
Student Units	**15**	**37**	
Living/sleeping space		20	
Kitchen		12	
Bathroom		5	
Net Area Sub-Total		555	
Component Gross Factor	1.30	167	
Component Gross Area Sub-Total		**722**	
One Bedroom Units	**15**	**54**	
Living space		19	
Kitchen		13	
Bathroom		6	Bathroom to accommodate wheelchair
Bedroom		16	
Net Area Sub-Total		810	
Component Gross Factor	1.30	243	
Component Gross Area Sub-Total		**1053**	
Two Bedroom Units	**21**	**69**	
Living space		20	
Kitchen		13	
Bathroom		6	Bathroom to accommodate wheelchair
Bedroom 1		16	
Bedroom 2		14	
Net Area Sub-Total		1449	
Component Gross Factor	1.30	435	
Component Gross Area Sub-Total		**1884**	
Three Bedroom Units	**9**	**126**	
Living space		21	
Kitchen		15	Shared kitchen space for all generations
Sub-Kitchen		12	
Dinning		12	Shared dinning space for all generations
Bathroom 1		10	Bathroom to accommodate wheelchair
Bathroom 2		8	
Bedroom 1		18	
Bedroom 2		14	
Bedroom 3		16	
Net Area Sub-Total		1134	
Component Gross Factor	1.30	340	
Component Gross Area Sub-Total		**1474**	

Community Theater				
Seating (100 person capacity)	**1**	**170**	**170**	
Stage	**1**	**18**	**18**	
Storage	**1**	**15**	**15**	
Net Area Sub-Total			203	
Component Gross Factor	**1.40**		81	
Component Gross Area Sub-Total			**284**	
Workshop	1	35	35	
Video and Integrated Media	1	14	14	
Multipurpose/Classroom	2	20	40	
Small Meeting Room	1	11	11	(4-6 seats)
Large Meeting Room	1	20	20	(10-12 seats)
Public Washrooms	2	6	12	Bathroom to accommodate wheelchair
Fitness Center				
Pool	1	75	75	
Workout	1	25	25	
Change Rooms	2	20	40	Bathroom to accommodate wheelchair
Sauna	1	6	6	
Net Area Sub-Total			**278**	
Component Gross Factor	**1.40**		**111**	
Component Gross Area Sub-Total			**389**	
Health Centre				
Exam Room	6	11	66	
Reception	1	35	35	
Meeting Room	1	11	11	
Consult Room	2	8	16	
Office	3	9	27	
Administration	1	22	22	
Net Area Sub-Total			**177**	
Component Gross Factor	**1.40**		**71**	
Gross Area Sub-Total			**248**	
Total Component Net Area			**4403**	
Total Component Gross Area			**5769**	
Building Grossing Factor @	**1.25**		**1442**	
Total Building Gross Floor Area (m^2)			**7212**	

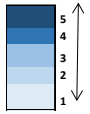
2.0 Site Evaluation

	Proposed Site	Parcel Size/ Available Area	Physical Characteristics	Architectural Compatibility	Land Use Compatibility	Program Relationship	Safety and Access	Utility Access	Views and Physical Assets	Recreation Potential	Public Transport	Total Score
1	105th Avenue and 112th Street	5	4	3	3	4	4	4	2	4	3	36
2	103rd Avenue and 108th Street	3	1	1	2	2	2	4	2	2	4	23

Fulfills requirements for intergeneration housing

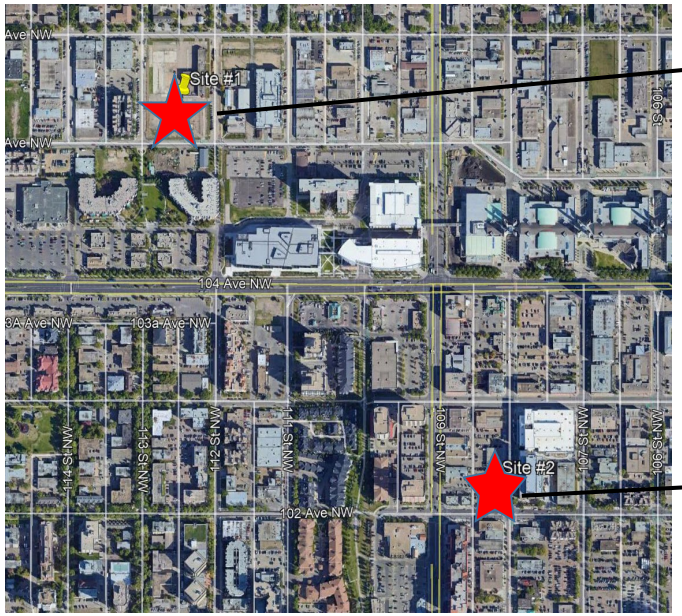
Partially fulfills requirement for intergenerational housing

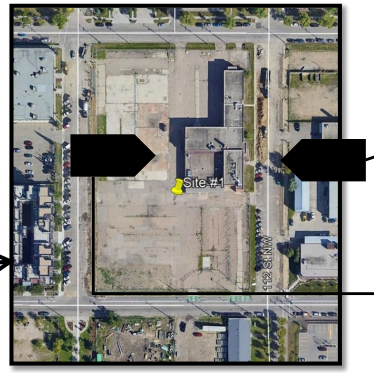
Does not fulfill requirements for intergeneration housing



Criteria

Parcel Size	Is the size large enough to accommodate the proposed facility?
Physical Characteristics	Do the site's physical characteristics afford ease in consruction of the proposed facility?
Architectural Compatibility	Does the proposed facility relate well to the visual quailty of surrounding facilities?
Zoning	Does the proposed land use relate to surrounding land uses and general land use priorities
Program Relationship	Will locating the proposed facility at this site functionally enhance the program?
Safety and Access	Does the site have adequate user access?
Utility Access	Are the required main utility lines avaialbe at this site?
Views and Physical Assets	Will this site offer characteristics desired for this program?
Recreation Potential	Does this site allow for occupants to enjoy recreation facility both indoors and outdoors?
alternative/Public Transport	Does the site allow for easy access to public transportation or alternative forms of transportation?

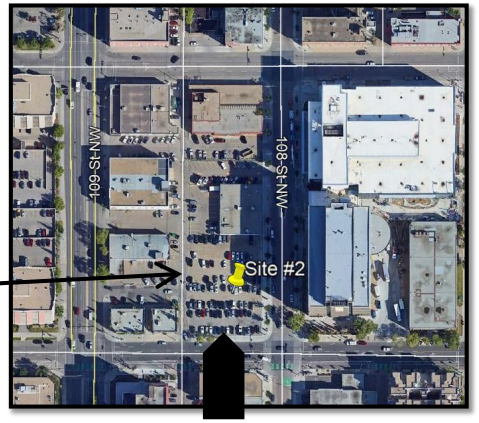




SITE #1

East Elevation

West Elevation

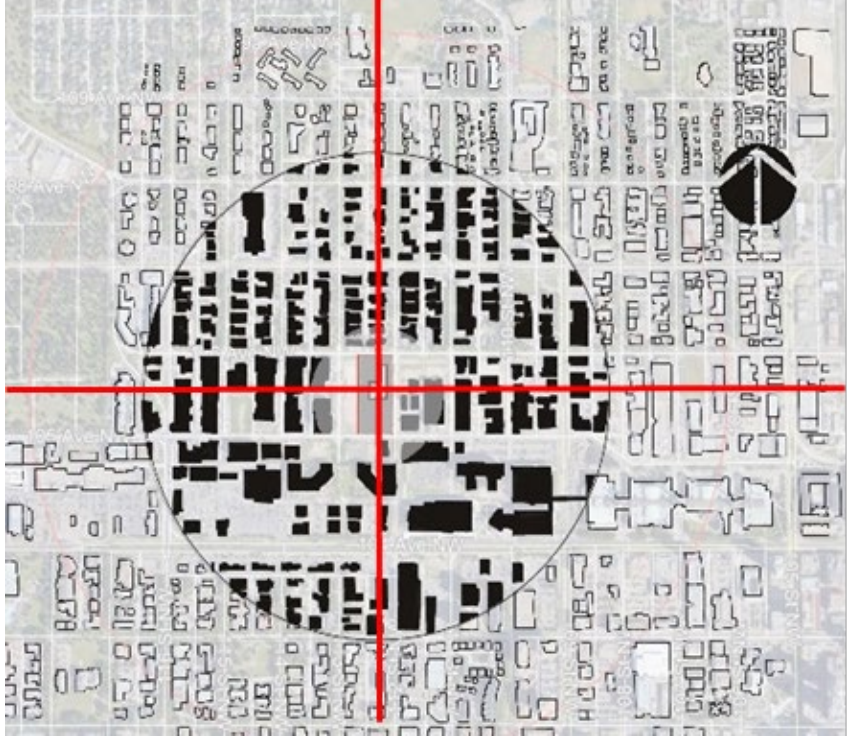


SITE #2

View Looking North From 102nd Street

2.1 Site Analysis

The proposed site of the intergenerational housing project is located between 105 avenue on the south, 106 avenue on the north, 112 street on the east, and 113 street on the west. The subject site is the former Northwestern Utilities complex constituting a brownfield site with a two-storey concrete structure located on the north-easterly half of the property. The site is approximately 1.28 hectares or 1.84 acres and measures 190 meters by 65 meters.



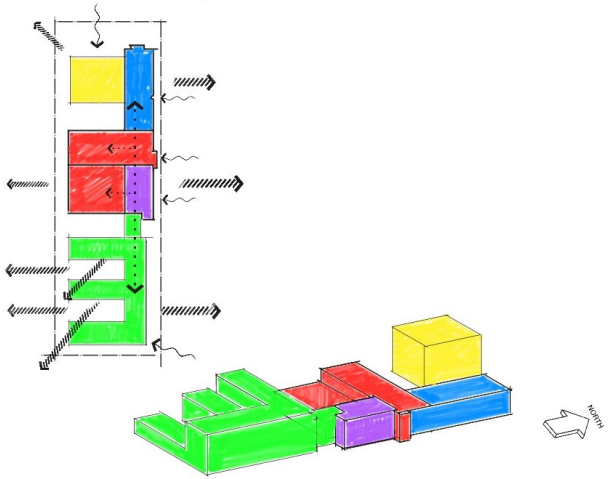
2.1 Site Analysis Continued

2.1 Site Analysis Continued

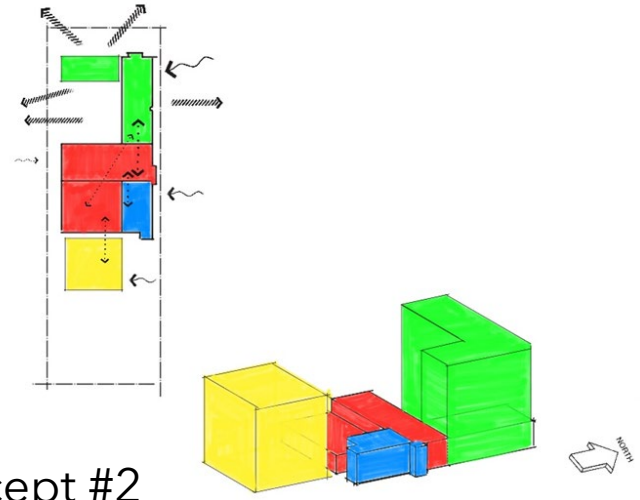
2.1 Site Analysis Continued

3.0 Massing Concepts

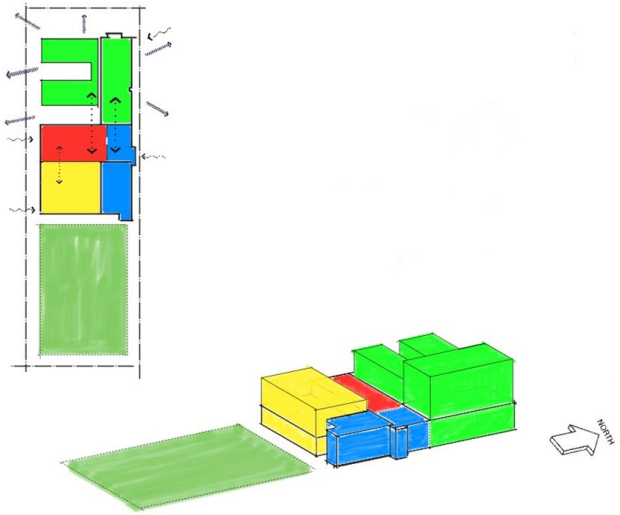
Site Plan



Concept #1

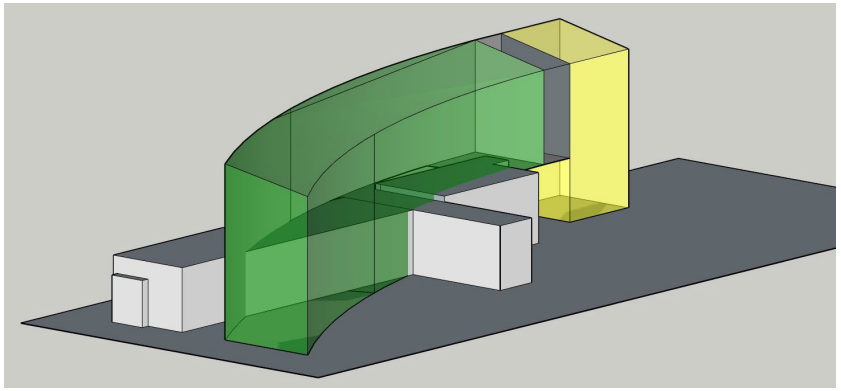


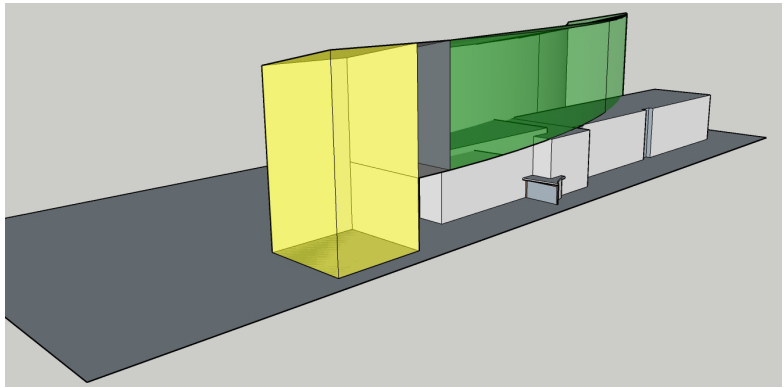
Concept #2

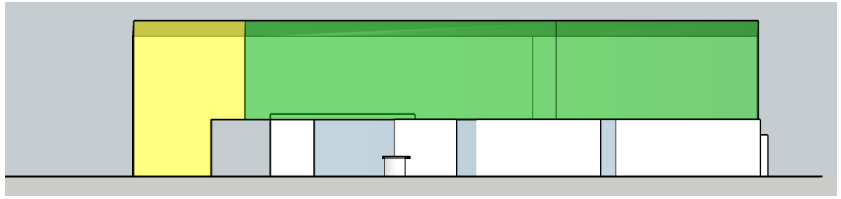


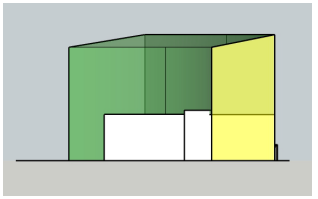
Concept #3

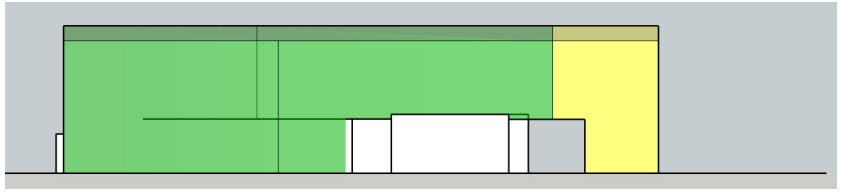
3.1 Massing Continued

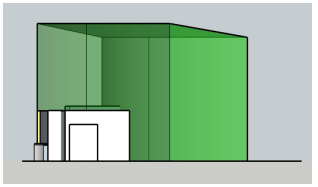




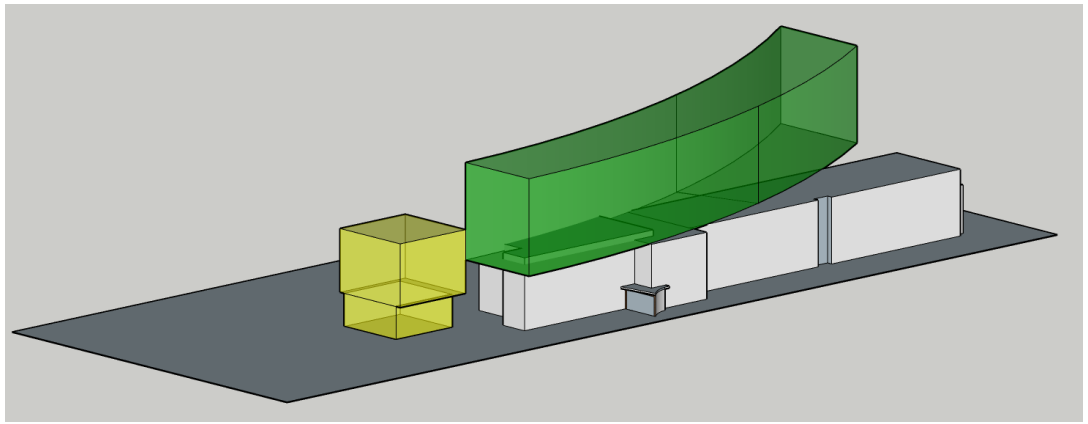


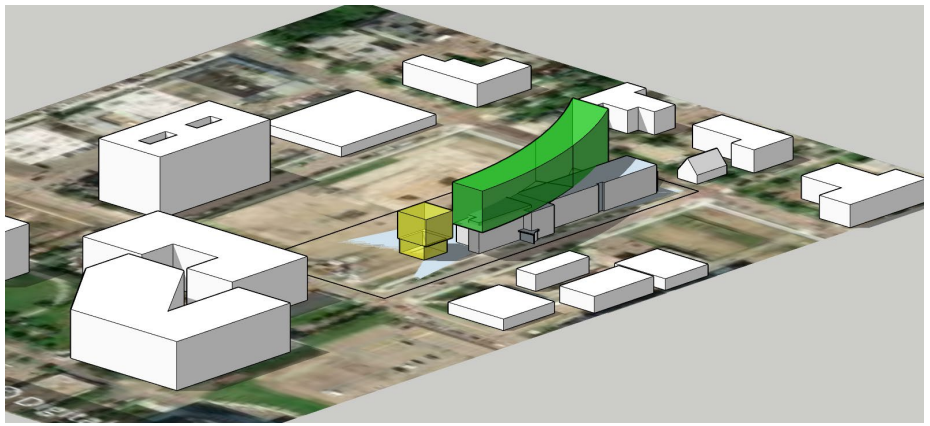


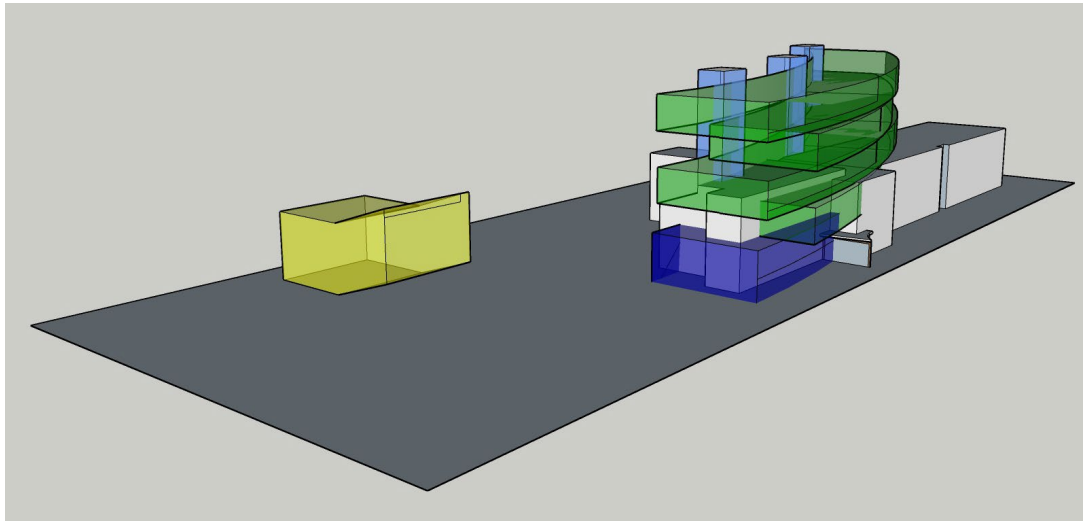


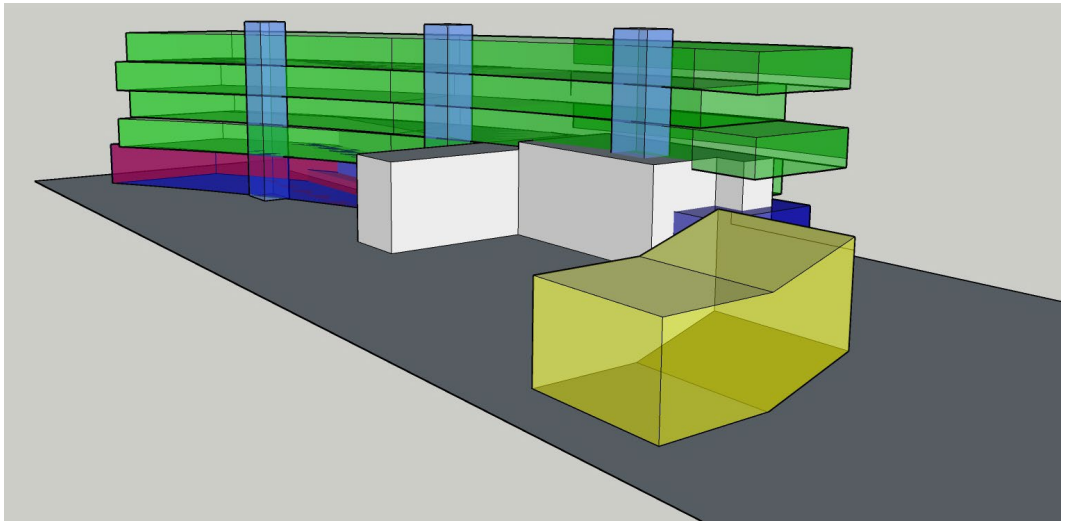


3.1 Massing - Variations









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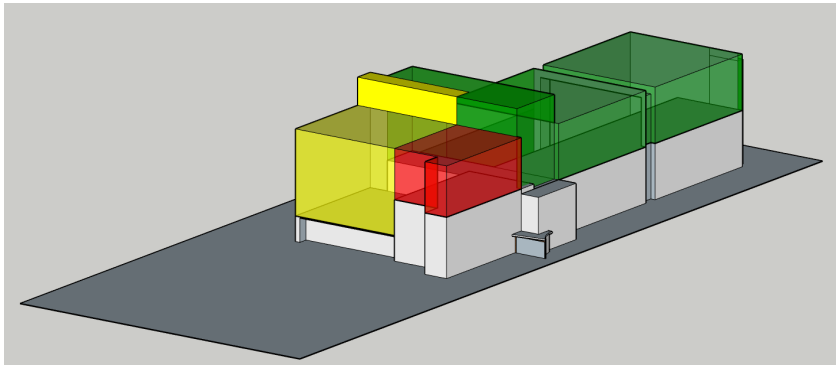
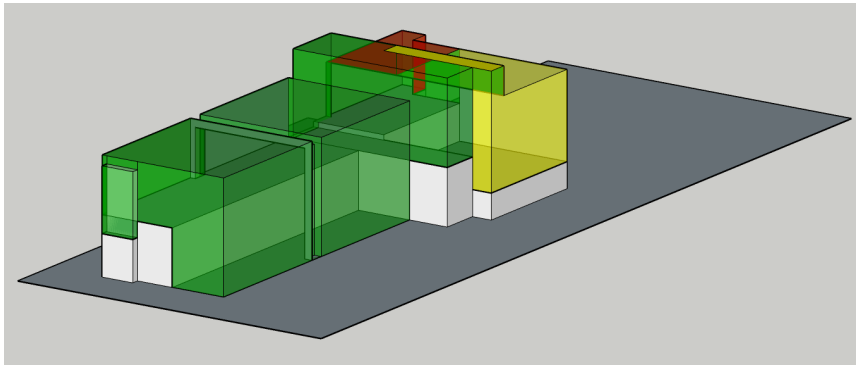
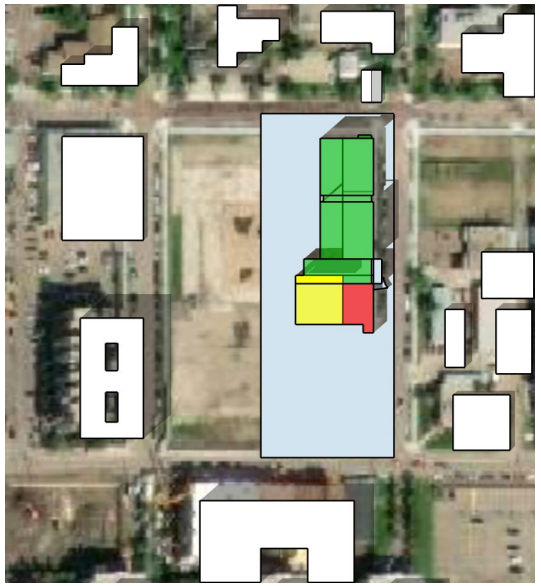
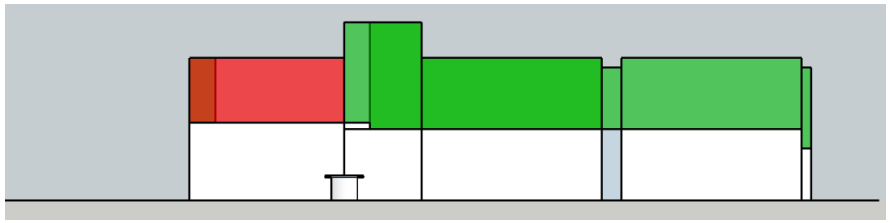
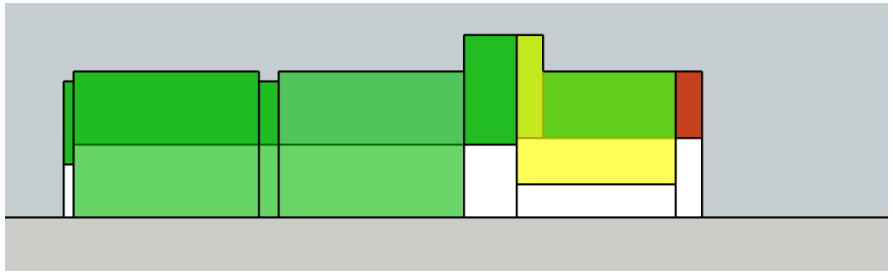
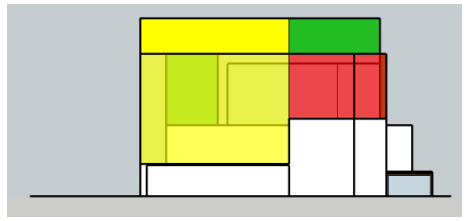


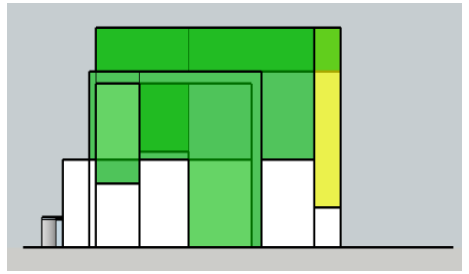




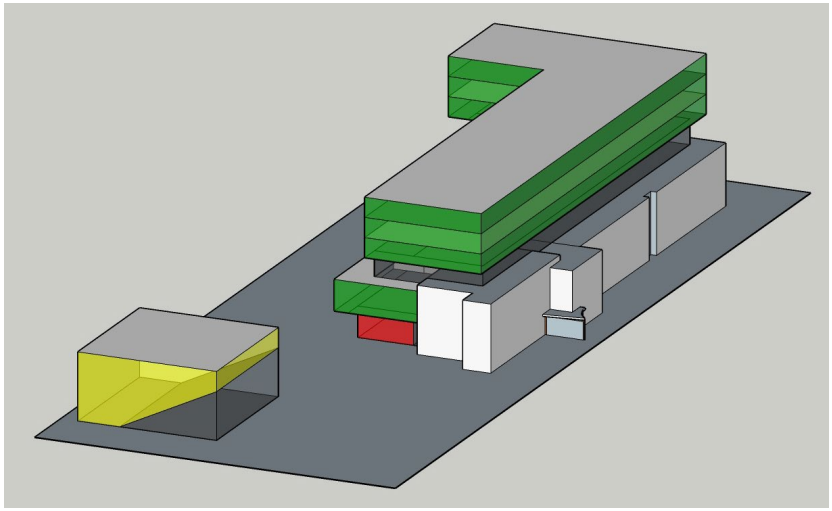


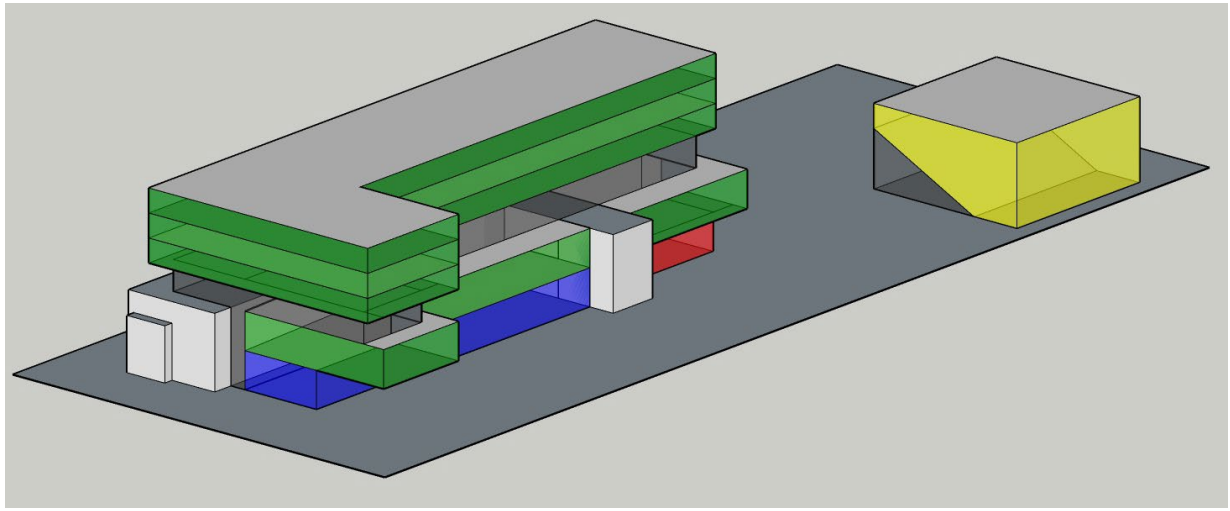


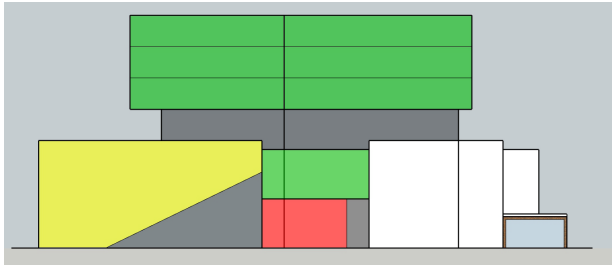


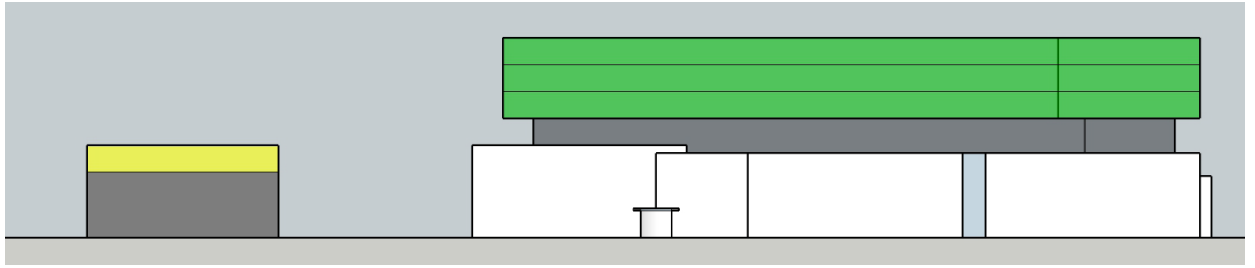


3.1 Massing - Variations

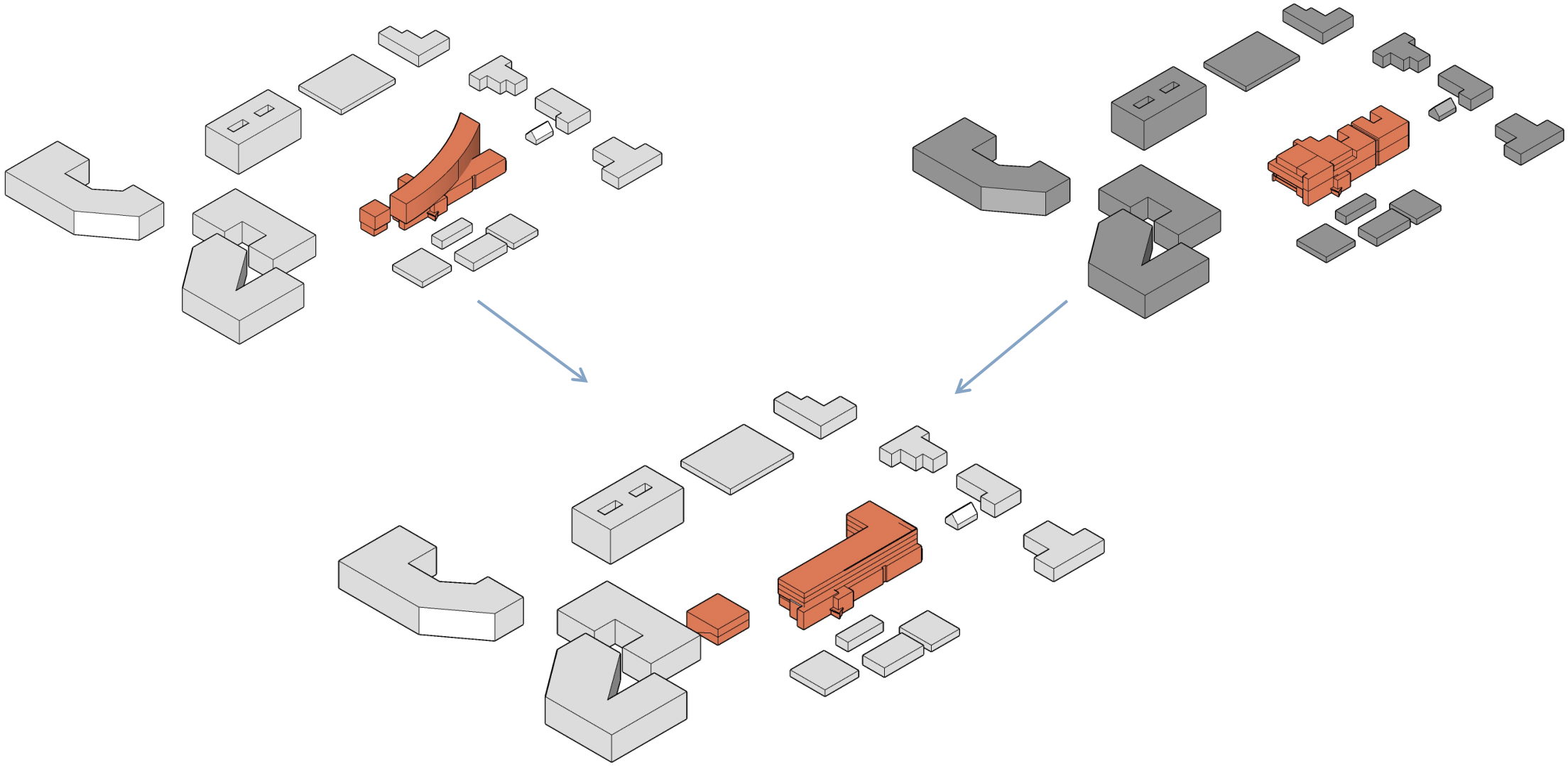






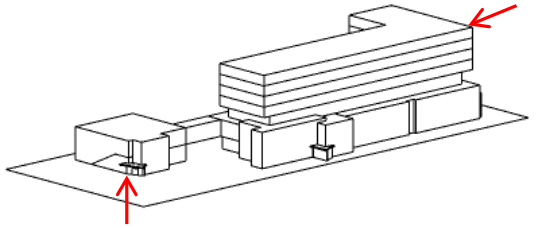


3.2 Massing Progression

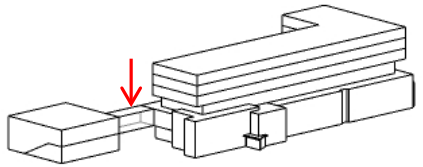


3.2 Massing Progression

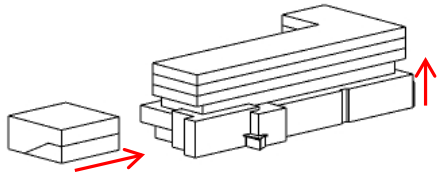
4. Incorporated Design Elements From Original Building Into Theater Thereby Tying the Theater Back to the Original Building and Expanded the Residential Block by One Storey.



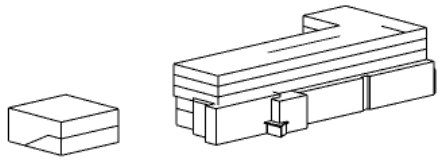
3. Linked Building With Theater



2. Pushed Theater and Elevated Residential Block

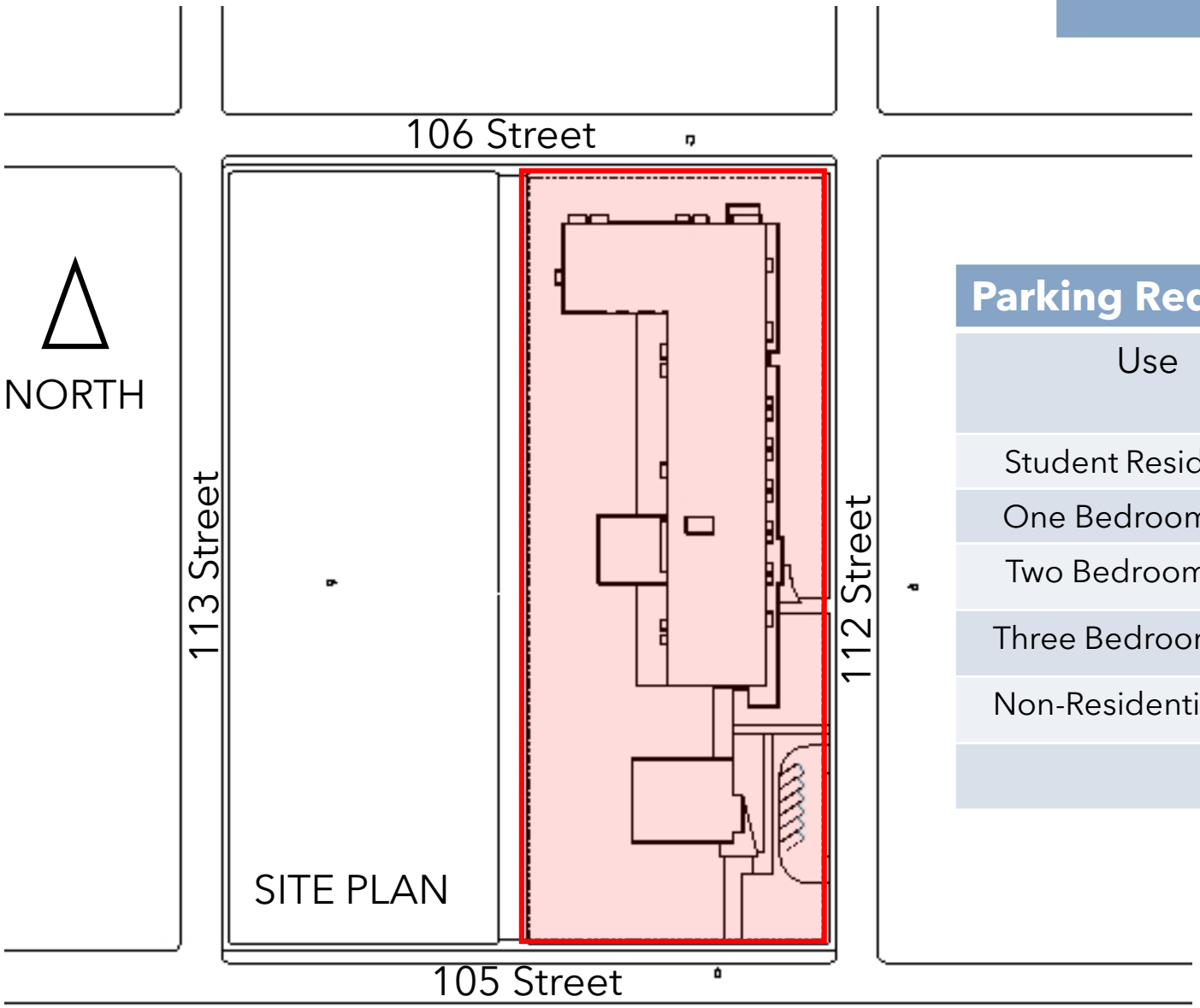


1. Starting Massing Concept



4.0 Building Development

Site Area	12,780 m2 (1.28 hectares)



Parking Requirements

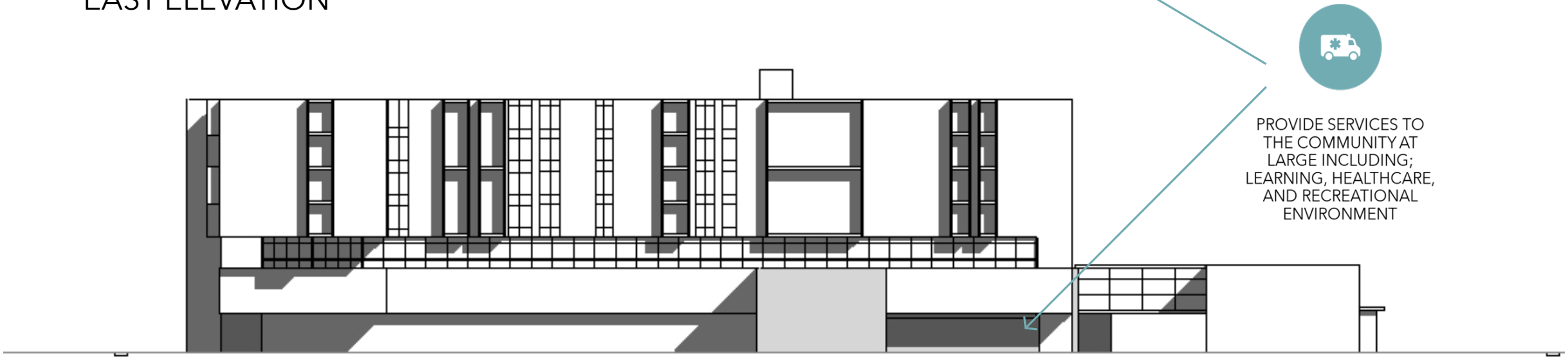
Use	Room Count	Requirements	Total Stalls
Student Residences	15	0	0
One Bedroom Units	15	0.4	6
Two Bedroom Units	21	0.8	17
Three Bedroom Units	9	0.8	8
Non-Residential Uses	921m2	1 per 60 m2	20
		Total # of Stalls	51

4.0 Building Development

Elements of Intergenerational

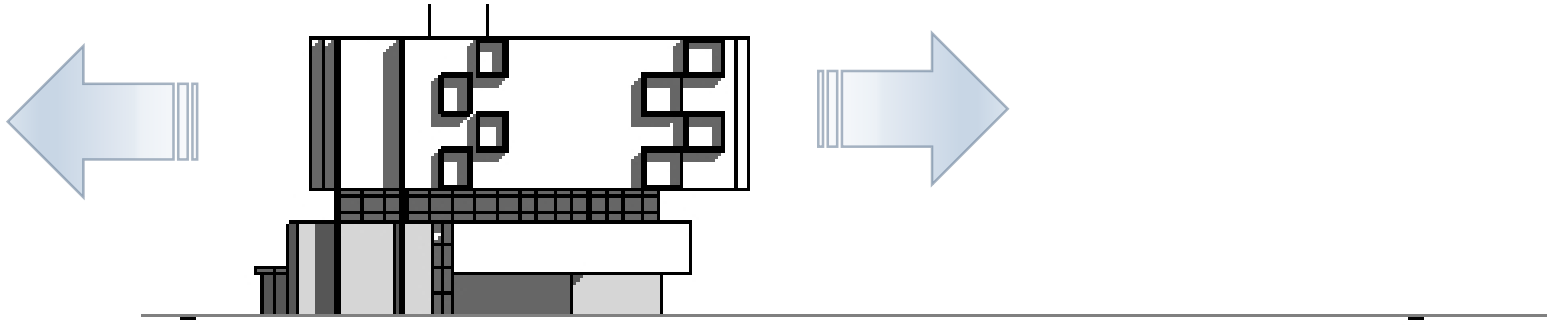
1. Safety
2. Community
3. Diversity
4. Engagement
5. Supportive

EAST ELEVATION



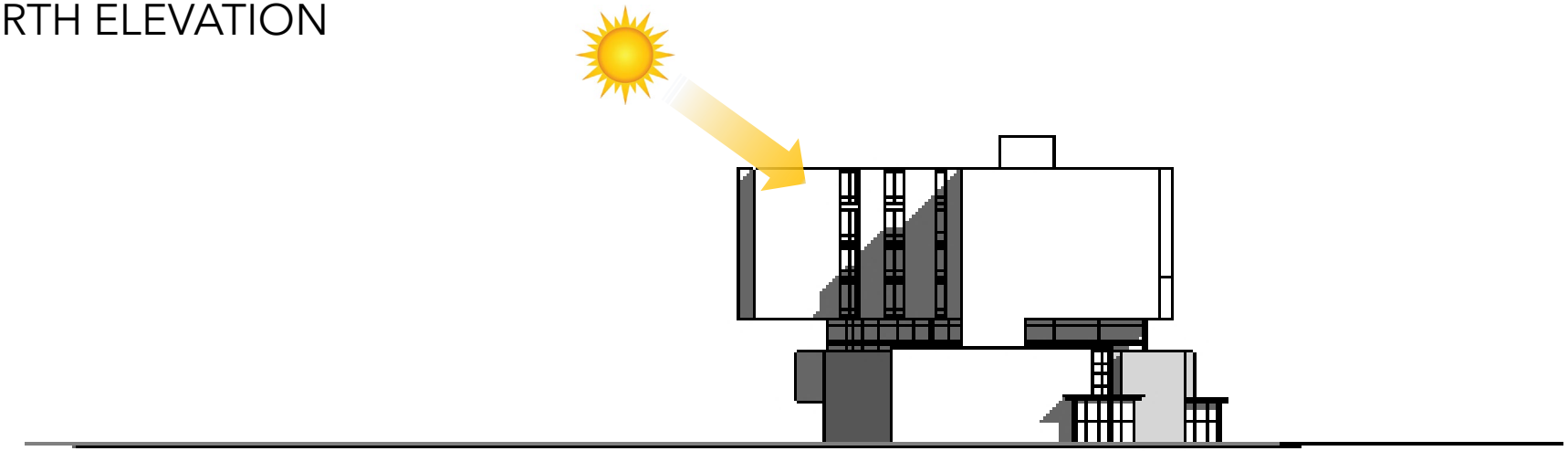
WEST ELEVATION

4.0 Building Development



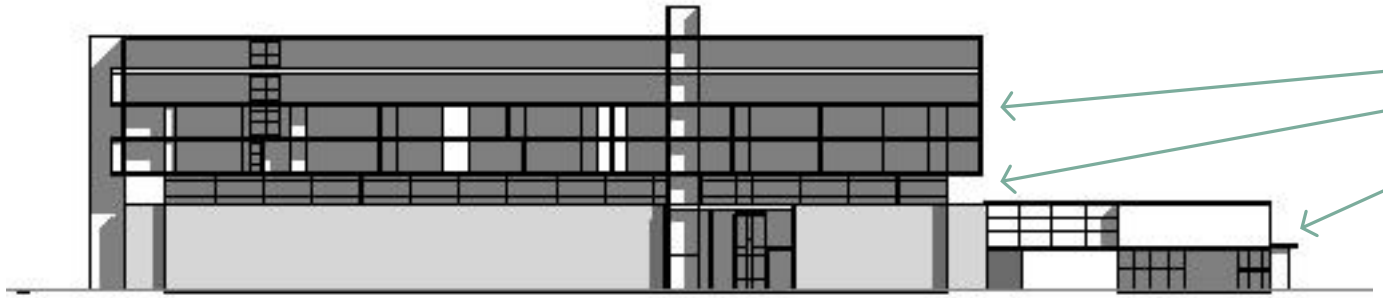
ENSURE PROPER DAYLIGHTS AND VIEWS TAKING INTO CONSIDERATION SOLAR HEAT GAIN AND NATURAL VENTILATION

NORTH ELEVATION



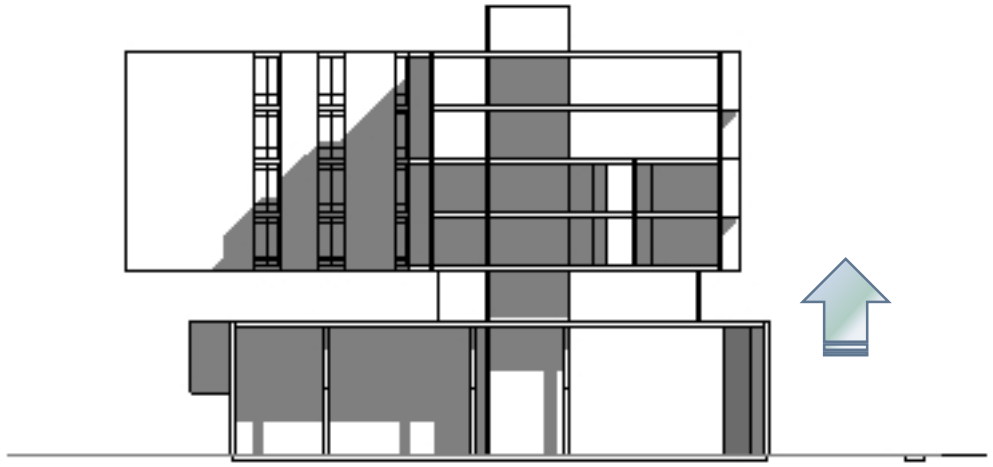
SOUTH ELEVATION

4.0 Building Development



ENSURE PRIVATE SPACE FOR INDIVIDUALS AND PROVIDE COMMUNAL SPACE FOR NATURAL INTERACTIONS

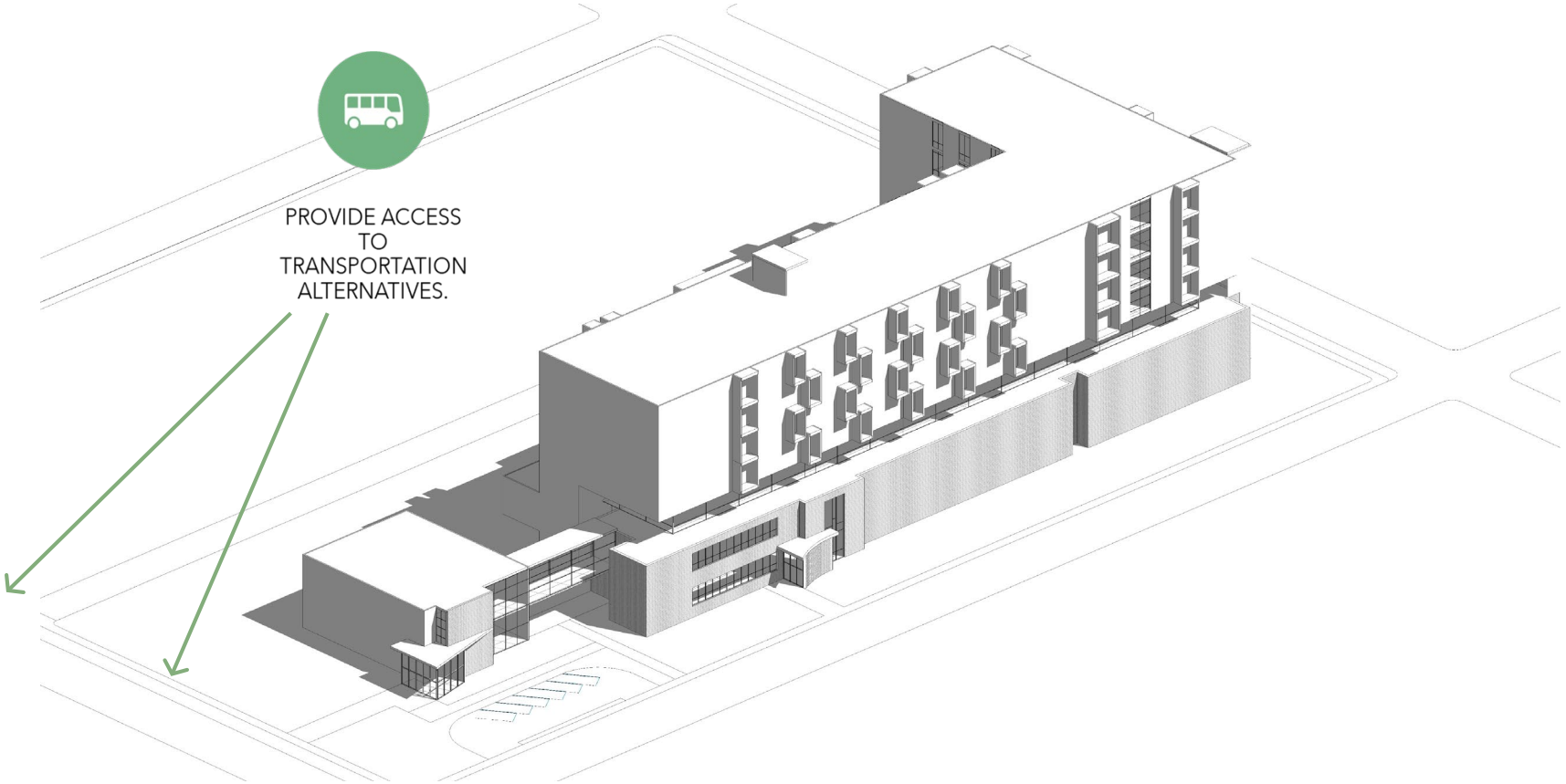
NORTH-SOUTH SECTION



SHELTER RESIDENTS FROM BUSY STREET BY ELEVATING THE DWELLING UNITS.

EAST-WEST SECTION

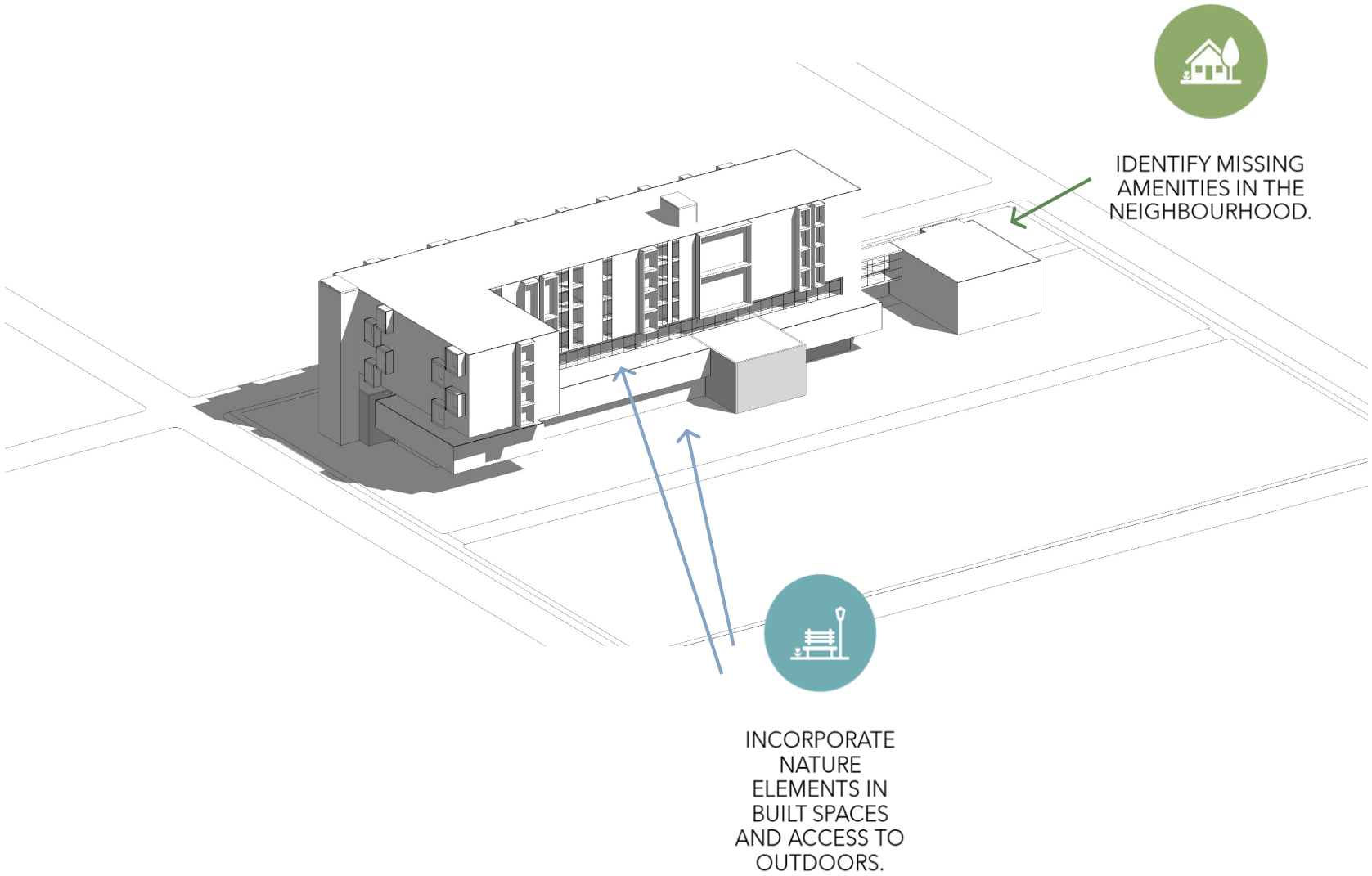
4.0 Building Development



Elements of Intergenerational

1. Safety
2. Community
3. Diversity
4. Engagement
5. Supportive

4.0 Building Development



Elements of Intergenerational

1. Safety
2. Community
3. Diversity
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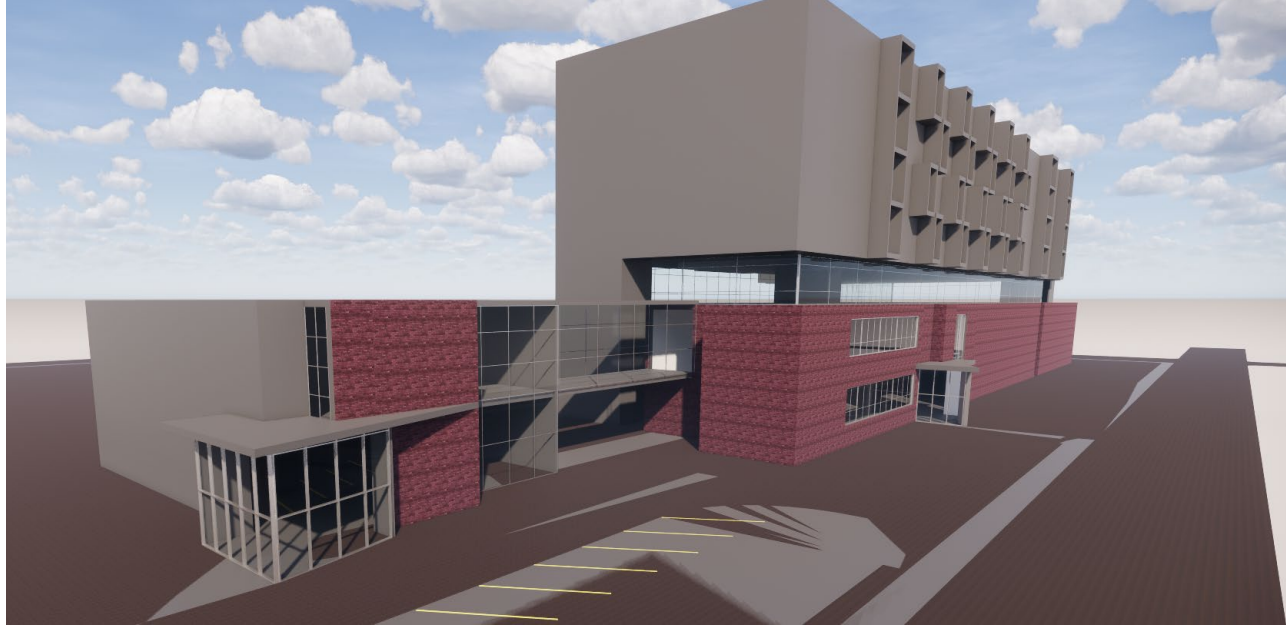
5. Supportive

4.0 Building Development



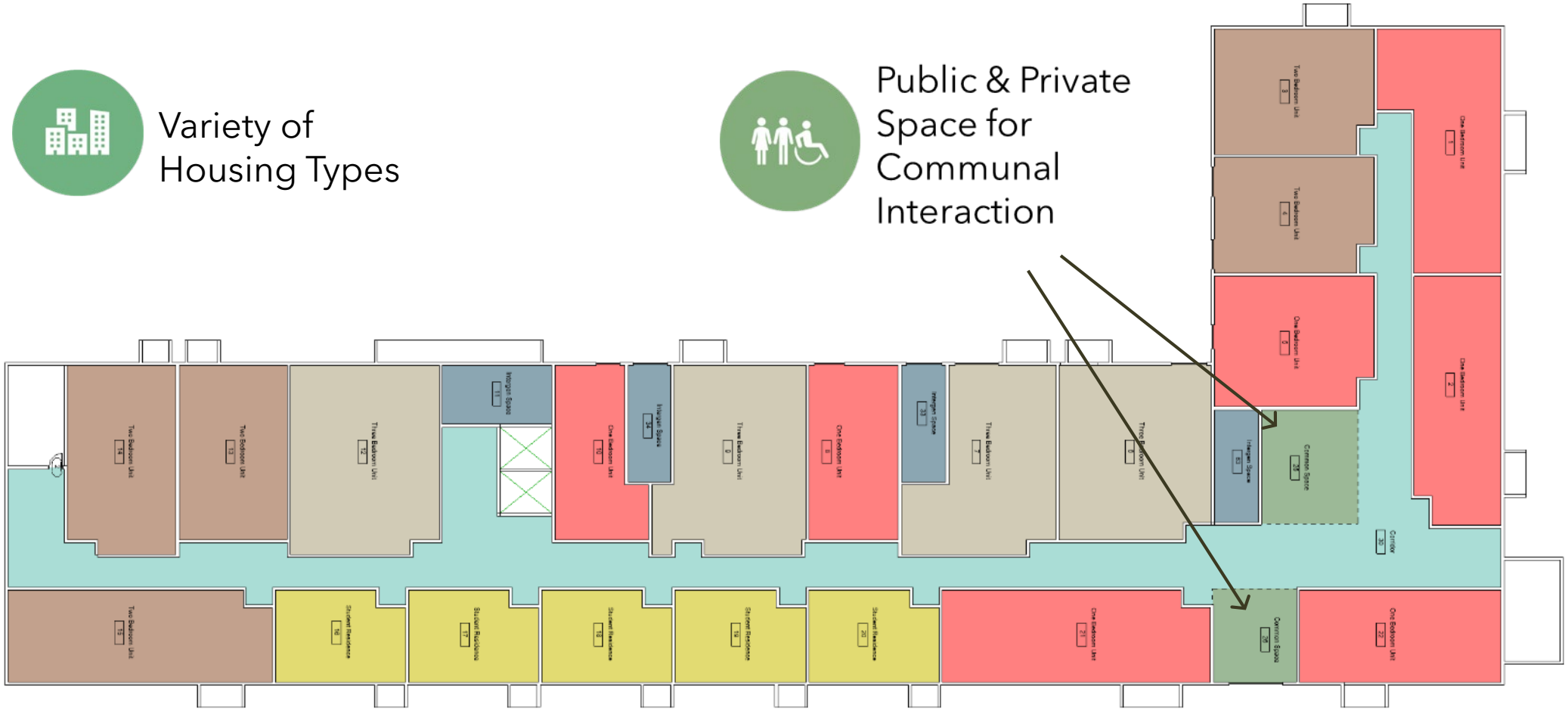
SOUTHEAST RENDER

SOUTHWEST RENDER

4.0 Building Development

Variety of Housing Types

Public & Private Space for Communal Interaction



TYPICAL RESIDENTIAL FLOOR PLAN

Appendix B – RAIC 690A Research Paper

Royal Architectural Institute of Canada Syllabus Program

RAIC 690A THESIS

Enhancing Ageing-in-Place Ideologies in Edmonton, Alberta Through an Intergenerational Housing Design

Allan Colpitts (AB110001EDM)

October 11, 2019

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RAIC Studio Coordinator

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Avery Temofychuk
RAIC Studio Coordinator

RAIC 690A THESIS

Enhancing Ageing-in-Place Ideologies in Edmonton, Alberta Through an Intergenerational Housing Design

Allan Colpitts (AB110001EDM)

Figure 1. Cover photo of various generations in a park setting. Photo by Allan Colpitts

Table of Contents

KEY TERMINOLOGY

Adult	An adult is a fully developed human. This term can also relate to levels of maturity or one who has reached a point where they are legally responsible for their actions and choices.
Child	A child is a young human and generally below the age of puberty or the legal age of the majority. Oxford Dictionary indicates that a child is a human being between the stages of birth and puberty or the developmental period of infancy and puberty. A child is also a minor in the context of the majority of the community.
Community	A community is a group of people that are connected by a shared location, activity or belief. The size of a community varies and may comprise a single family group or a community may be many individuals connected by something other then genetics or familial relations. According to the Merriam-Webster Dictionary, the term community means a unified body of individuals living with a common interest in a common area. Typically, a community arises from some a shared common belief, tradition, or custom (Cambridge Oxford, 2014).
Elderly	In this document, elderly relates a person who is showing outward signs of ageing. While physical impairments may be evident, they are not required for a person to be considered elderly. I This term is synonymous with senior (senior citizen).
Generation	A generation, in the context of this research, is the length of time from one being born to when one becomes an adult. Generally, this is a period of approximately 30 years.
Intergenerational	Intergenerational describes something that impacts or relates to several generations. In this thesis, intergenerational relates to a connectedness among people from various generations outside of the family ties. According to the Michigan Family Review, intergenerational relationships characterize the reciprocity shown to the various generations. (Brubaker & Brubaker, 1999). Younger generations support older generations while the older generation is assisting younger generations (Brubaker & Brubaker, 1999).
Multigenerational	Like Intergenerational in that it relates to several generations but is specific to the support provided to members of the same family unit. According to the U.S. Census Bureau, multigenerational families are defined as families that consist of more than two generations living under the same roof.
Sandwich Generation	This expression refers to people typically in their thirties or forties and has the circumstance of caring for their own children as well as for ageing parents.
Senior (senior citizen)	The definitions for a senior tend to vary widely but for the purposes of this thesis a senior is defined as one who is over the age of 65.

Tenure	The expression tenure carries with it a connotation of time. Generally, it relates to a long period of time. In the context of this thesis, Tenure relates to humans that are advanced in years. It can be synonymous with elderly or senior.
Young adult	A young adult is a person typically in their late teens through to early thirties. Generally, they are characterized by a certain vitality.

THESIS STATEMENT

The ever-changing population dynamics of decreasing birth rates and rising population of seniors require a new approach to senior care outside of the hospital-centric systems we are familiar with (National Council For Aging Care, 2018). The rising cost of living for families, high rates of unemployment, care responsibilities, and greater multiculturalism requires that families take a different approach to housing. The nuclear family, defined by societal norms, now includes, in many cases, aged parents and/or in-laws (Silverstein, 2018). This changing societal dynamic requires housing and care options to change and adapt to current and future trends in the consumer base. Is there a housing option that can meet the demands of an ageing population and the generation that desires to care for them? What would the design of an intergenerational housing community, that enhances ageing in place ideologies and senior care, look like in an urban setting? This thesis is intended to answer those questions by considering as the topic: **Enhancing Ageing-in-Place Ideologies in Edmonton, Alberta Through an Intergenerational Housing Design.**

INTRODUCTION

What is Old is New Again – Intergenerational Housing Model

A different category of housing model is proposed to fulfill an evolving need in our society. Before the industrialized age the prevalent housing model comprised large family groups that were made up of multiple generations sharing living accommodation or living in close proximity to one another. However, since World War II, the demand has primarily for single-family dwellings. This style of housing has tended to consist of two generations of families (parent & children) under the same roof, while most senior generations live at a distance or separate from the younger members of the family.

Figure 3. Young man walking with senior. Photo by John Moses Bauan

The trend in single family homes has brought along with it many challenges to cities and communities. This model of housing continues to contribute to the growing footprint of cities across North America. Single family homes promote stratification in society, as we see age-defined developments, gated communities, and very densely populated urban cores often occupied by lower-income families that cannot afford the single-family dwellings in suburban settings. However, what if an alternative housing model existed that served to break down age and income stereotypes and promoted cross-generational interactions for the benefit of all, whether from within or outside the family. That model would be the intergenerational housing model.

There are two key definitions to consider when trying to structure who, and how, this intergenerational housing model will be accommodated. The first is more "family-based" which some may define more as a multigenerational housing model (Garlan, 2018). Within this model, there is typically three generations of the same family sharing a home. The first generation is the grandparents, followed by the parental generation, and thirdly the children. The second definition, the primary focus of this thesis, is implemented within the community at large to allow for multiple generations to interact, not just kin. This second may be classified as the typical intergenerational model as it has been accepted more as a community-based housing definition (Cambridge & Simandiraki, 2006).

There are five components that an intergenerational housing concept should encapsulate. First, an intergenerational housing model needs to provide a safe living space for people of all ages to interact, collaborate and explore the values of each generation on an ongoing basis (ARUP, 2014). Second, this housing model

should enable people of different ages to live side by side as good neighbours in a purposeful effort to share their talents and resources, develop meaningful relationships and support each other (Garlan, 2018). Third, the intergenerational housing model should foster programs, policies, and practices that promote engagement, cooperation, interaction, and exchange between residents of different generations (Garlan, 2018). Fourth, this housing concept needs to provide adequately for the safety, health, education and necessities of life for people of all ages, by taking a community-led approach to the delivery of services and activities (Garlan, 2018). Fifth, this model is required to have private spaces and communal areas intended for shared use (Garlan, 2018).

To accomplish these five success factors the intergenerational model will define a housing type whereby households will comprise of individuals of multiple generations and family groups with independent and diverse incomes and private lives, but as neighbours work collaboratively to plan and manage community activities and shared spaces (Garlan, 2018). The model will facilitate spontaneous and planned intergenerational interaction between neighbours of different generation groups. These activities are intended to be meaningful to all generations that occupy the development and are typically volunteer based (Garlan, 2018). The settings for these activities can vary from the home environment to community settings to educational venues and even healthcare centres (Springate, Atkinson, & Martin, 2008).

5 Success Factors of Intergenerational Housing Model

#1 ***SAFETY*** **- Provide a safe living space for people of all ages to interact, collaborate and explore the values of each generation on an ongoing basis.**

#2 ***DIVERSITY*** **- Enable people of different ages to live side by side as good neighbours in a purposeful effort to share their talents and resources, develop meaningful relationships and support each other.**

#3 ***ENGAGEMENT*** **- Foster programs, policies, and practices that promote engagement, cooperation, interaction, and exchange between residents of different generations.**

#4 ***SUPPORTIVE*** **- Provide adequately for the safety, health, education and basic necessities of life for people of all ages, by taking a partnership of community-led approach to the delivery of services and/or activities.**

#5 ***COMMUNITY*** **- Provide private spaces and communal areas intended for the individual and collective use.**

NEED FOR A NEW HOUSING MODEL

The intense urbanization of major cities is placing pressures on municipalities and is driving the need for changes in the housing supply available to consumers. One such issue facing urban centres today is that changing demographics show a shift in the average age of the population. Secondly, social dynamics and family connectedness are driving a need for change in how we care for both the elderly and younger generations. Thirdly, economic forces are driving change in how individuals and families gain and maintain and then distribute wealth to current and subsequent generations.

Demographic Characteristics of an Ageing Population

Statistics are showing a change in the population dynamics in developed countries. The United Nations forecasts that the population of people over 60 years of age will rise from 688 million in 2006 to nearly 2 billion by 2050 (Alzheimer's Australia, 2010). This rise in the aged population is primarily due to advances in medicine that have taken the average age of death significantly higher (Decady & Greenberg, 2014). In Canada, from 1921 to 2011, life expectancy rose from 57.1 years to 81.7 (Decady & Greenberg, 2014). Almost half of that gain in life expectancy occurred between 1921 and 1951 due in large part to a reduction in infant mortality (Decady & Greenberg, 2014). This reduction in infant mortality, along with economic prosperity and post-war development, resulted in the generation termed the 'baby boomers,' logically in reference to the explosion of babies after world war II and extending into the 1950s.

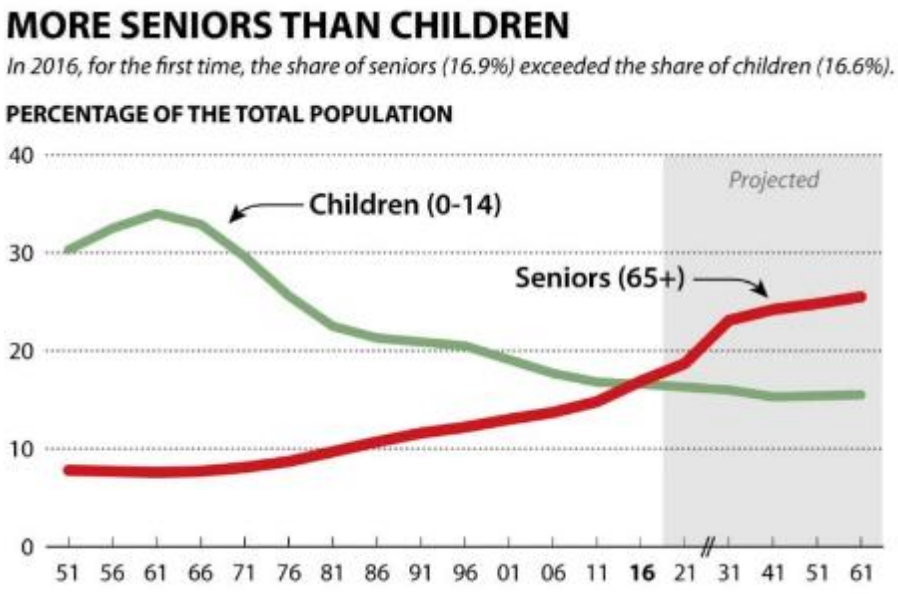

Figure 4. Age projection for Canada showing the increase of aged ones growing in the future. Image by Canada Press

Homeownership demographics are also changing to accommodate the growing ageing population. Current estimates indicate that 64% of the general population, regardless of age category, are homeowners (Joint Centre for Housing Studies of Harvard University, 2018). For those over 70, homeownership rates soar to 81% (Joint Centre for Housing Studies of Harvard University, 2018). It is estimated that in the United States the number of households headed by a person aged 65 or over will grow from 24 million in 2015 to

32 million by 2025 and then to 38 million by 2035 which equates to an overall increase of 62 percent (Joint Centre for Housing Studies of Harvard University, 2018). This growing population of homeowners will demand a different type of housing that can better accommodate the ageing process.

By 2035, AN ASTOUNDING 1 OUT OF 3 AMERICAN HOUSHOLDS WILL BE HEADED BY SOMEONE AGED 65 OR OLDER – Joint Centre for Housing Studies Harvard University

Advances in healthcare have resulted in other consequences that are driving the population statistics of an increasingly aged population. In the early 1900s, the leading causes of death were infectious and acute diseases (ARUP, 2014). Today, however, given the advances in healthcare and medicine, those previous causes have been significantly reduced, and now we deal with more protracted health ailments such as cardiovascular disease, diabetes, cancer, vision and hearing loss, and dementia (ARUP, 2014). The World Health Organization (WHO) projects that 15% of the world's population is going to live with some form of disability (World Health Organization, 2007). These changes in medical advancements and the change in medical acuities have led many to conclude that they will need to care for their ageing parents at some point in the near future. One survey found that 80% of middle-aged children said they would either provide housing for parents and in-laws or care for them in their own homes (Harper, 2006). In Canada, 24% of Canadians that provide some form of care or assistance to their aged parents do so with the care recipient living with the child (Battams, 2017). By 2035, 17 million households in North America will have at least one elderly person with mobility constraints that limit the use of stairs, narrow corridors and doorways (Joint Centre for Housing Studies of Harvard University, 2018).

65%

Of Elderly Receive Their Long-Term Care Needs From Family & Friends (Aging.Com, 2018).

Social Demand for Intergenerational Housing

Social connectedness can influence the quality of life and health in all generations. For those advanced in years, having a connection to the neighbourhood and belonging to a social network through connection with others has been proven to be good for the heart and mind (Battams, 2017). For the less tenured generation, social connections can go a long way in developing a sense of responsibility and belonging that aids in mental and social developments.

A robust social network is critical in the physical and mental wellbeing of older adults (House, Landis, & Umberson, 1988). We use the terms social isolation and social integration in the context of this discussion because they define how people do, or do not, relate to others. Social isolation is a term used to describe the state an individual finds themselves in which they lack a sense of belonging socially, lacks engagement with others, has minimal social contacts, and may lack fulfilling and quality relationships (Nicholson, 2009). Studies have concluded that there is a correlation between social isolation and mental illness, distress, dementia, suicide, and premature death (Ellis & Hickie, 2001) (Berkman & Syme, 1979). Social Integration is the general opposite of social isolation and refers to the extent to which people maintain close relationships with others in their community and family groups (Berkman, 1995). These concepts are critical to understanding the social demands required to develop a sense of belonging and the development of meaningful relationships with other people and a shared social commitment.

Figure 5. Various multigenerational statistics that indicate the increasing trend in multigenerational households. Figure by Aviva Insurance

Financial and Economic Demands for Intergenerational Housing

The home is becoming a thriving centre for long-term care for many families for financial reasons. The home can be a more affordable means to provide additional healthcare needs as the family member ages. The reality for many is that they have not accumulated sufficient savings to ensure a comfortable place to live in their senior years. In the United States, more than nine million older homeowners have less than $50,000 in non-housing assets (Joint Centre for Housing Studies of Harvard University, 2018). The median older homeowner in the United States has just over $103,200 in non-housing assets (Joint Centre for Housing Studies of Harvard University, 2018). This amounts to approximately two years worth of typical home-health aid expenses. To keep funding at this level of care would result in the ageing person having to sell their home or dip into their home equity.

Another financial concern is the increased levels of mortgage debt that is being carried by an ageing population. The rising price of homes is putting pressures on household incomes. In 1995, 22 percent of American households 65 and older carried mortgage debt, and by 2013, that number rose to 38 percent (Joint Centre for Housing Studies of Harvard University, 2018). Another sobering statistic is the amount of debt carried into retirement. During that same period, the amount of debt rose from $27,000 to over $73,000 (Joint Centre for Housing Studies of Harvard University, 2018).

Figure 6. Image of nest egg depicting saving for the future. Image by unknown author but licences to CCBY

The financial pressures are felt by more than the older segment of the population. The middle segment of the population, the 'sandwich generation,' is having to come to terms with intense financial pressures. Job loss, increased costs to homeownership, healthcare expenses, childcare expenses, and rising utility costs are all factors for living in intergenerational households. Of those individuals or families living in an intergenerational home, 66 percent indicated that the current financial climate was a factor in their deciding to live in that arrangement (Generations United, 2011). In that same survey, 20 percent cited healthcare costs as a reason to form an intergenerational household, and 14 percent indicated foreclosure or housing loss as their reason for living in an intergenerational household (Generations United, 2011).

The economic conditions have been, and continue to be, a significant factor in driving the increase in the demand for a housing option that can both reduce costs of ownership as well as other daily living expenses such as childcare costs, healthcare costs, and utilities.

BENEFITS OF AN INTERGENERATIONAL HOUSING MODEL

An intergenerational housing model brings with it many benefits that address the needs just considered. Intergenerational programs have been shown to promote well-being through building relationships, changing negative attitudes, and increasing community cohesion (Pain, 2005). The economic conditions have been, and continue to be, a significant factor in driving the increase in the demand for a housing option that can both reduce costs of ownership as well as other daily living expenses such as childcare costs, healthcare costs, and utilities.

There are other pressures that families, our ageing population, and communities contend with. An intergenerational housing model can serve these groups and overcome some of these challenges. For example, many of the ageing population, fear a future housing prospect that will result in isolation and feelings of social abandonment. For young people, they are facing ever-increasing social pressures that are confusing and frustrating. Various forms of media, and modern social networks can result in young people having unreasonable expectations of themselves potentially resulting in the need to conform and adapt to trends and peer pressure. Those feelings, left unchecked, can result in a moment of poor judgment that can have long-lasting consequences in the future. For the sandwich generation caught in the middle, these ones are being torn between the need to care for ageing parents on one hand and their young children on the other. The time and energy demands result in pressures that can bring on stress-induced ailments both physically and mentally.

The next section will discuss how the intergenerational model can result in savings in human and environmental resources, also, how the intergenerational

housing model can improve the day to day lives of those that live in this intergenerational environment.

Benefits to the Community

An intergenerational housing model may serve to improve the value and access to human resources. For example, by involving themselves in the lives of young people, older more mature ones can assist younger ones in tutoring for schoolwork, skill development in using technology or tools, even various health-related matters (Vliet, 2009). These areas are essential to the development of young ones, as older ones are an untapped resource waiting and wanting to be shared (Vliet, 2009). The opposite can be just as true as well; children and youth can be valuable members of the community resource pool. Younger ones can contribute to the benefit of older ones through volunteering. For example, in Seattle, Washington, GernerationLink is a classroom-based program whereby high school students volunteer their time to teach the seniors how to use the internet (Vliet, 2009). Another resource to be spared through an intergenerational housing model is dollars. Providing physical space in numerous locations may be wasteful when space can be provided in one building that offers maximum flexibility in a single location. For example, a multiuse facility can be used to cater to older ones, but also shared for the delivery of other social and community programs, such as before/after school care programs that appeal to the needs of a younger generation (Vliet, 2009). The flexibility built into space can reduce the cost of building physical infrastructure for each separate use.

Figure 7. Five Hands. Community is made up of a diversity of people. Photo by Clay Banks

In addition to the resource side of the argument, the intergenerational housing model can serve to help develop and implement community programs and policies. Rather than arguing competing interests and alternatives, policymakers and community leaders will have a more integrated view of the diverse connection that can mutually reinforce and support different generational interests (Vliet, 2009). Youth and elderly interest groups can unify their policy agenda and use their pooled resources to be more effective in lobbying for community and civic issues (Vliet, 2009).

Other community benefits of intergenerational programs include (Springate, Atkinson, & Martin, 2008):

- Improved community cohesion
- Reduction in negative stereotyping, enhancing community safety
- Improved perceptions of young and old people
- Improved understanding of the intergenerational practice
- Improved skills of local organizations and communities

- Improved use of educational institutions / Community facilities
- Healthier lifestyles and eating habits of families
- Improved partnership working between organizations
- Increased civic participation
- Enhanced pride in local community / Area
- Increased social capital through volunteering activity by young and old
- Increased meaningful interactions between people from different backgrounds.

Benefits to the Elderly

Figure 8. Elderly man holding picture of two younger generations. Photo by Unknown author

Many benefits are enjoyed by the senior population that live and participate in an intergenerational housing model. These can range from improved health and well-being, reduced isolation, and a renewed sense of worth. Intergenerational programs make a positive contribution through a sharing of knowledge, skills, and experiences (Springate, Atkinson, & Martin, 2008). Opportunities existing for the elderly to volunteer at schools, act as mentors, tutor, or assisting in overall wellbeing by being a positive role model. In return, this senior generation can learn such things as computer skills, digital photography, and creative writing (Springate, Atkinson, & Martin, 2008). All of which can help them to live a more independent and fulfilled life.

Some other benefits to the elderly include;

- Enabling older ones to express and collaboratively make use of experiences gained through the years (Arentshorst, Kloet, & Peine, 2019),
- Autonomy and happiness through enabling individual options, qualities, interests and, possibilities (Arentshorst, Kloet, & Peine, 2019),
- Living in an environment where they do things they really can do and enjoy doing (Arentshorst, Kloet, & Peine, 2019), and
- Enjoy conversational topics that include the lightness that youth can bring; topics can include such things as school studies, holidays, and romances. Bringing back memories of the residents own youth and romances (Arentshorst, Kloet, & Peine, 2019).

Figure 9. The Sandwich Generation. The middle generation that has both parents and children to care for. Photo by Share Magazine (Financial Planning Tips for the Sandwich Generation, www.sharesmagazine.co.uk/article/finanical-planning-tips-for-the-sandwich-generation

Benefits to the 'Sandwich' Generation

The middle generation in the intergenerational picture also benefits from the strong interactions of the community. The proximity to numerous caregivers can help provide a respite for family members that sacrifice many things daily to care for ageing family members. Enhanced relationships come from having similar goals and shared ideas. A shared living environment, accompanied by the common desire to care for ageing family members, can add much to overall community cohesion and bring a greater sense of security and peace of mind. There are more significant opportunities for interactions between neighbours and families. This greater familiarity helps to breed trust and tolerance amongst all generations (Springate, Atkinson, & Martin, 2008). This middle generation feels more engaged and empowered to help their families.

Benefits to the Younger Generation

The younger generation continues to battle misconceptions and tainted viewpoints. In one survey conducted in the United Kingdom, 71 percent of news media that referenced youths or young people had a negative connotation (Vliet, 2009). Similar stereotypes have been found to exist in vastly different cultures. Research in the United States, China, and Nigeria found that the media portrays young people as alcoholics, drug abusers, criminals, lazy, complaining, and aggressive (Vliet, 2009). The intergenerational housing model may do a great deal to battle such misconceptions. The intermixing of various generations can combat "ageism" across various age groups by placing everyone on a shared path based on mutual respect.

The Beth Johnson Foundation has been leading the charge in intergenerational research work for nearly 20 years and has developed a summation of the benefits that young people have experienced as a result of participating in intergenerational programs (Beth Johnson Foundation, 2009). They have discovered that intergenerational programs offer young people a range of opportunities to participate in positive activities and be respectful contributors to their community (Springate, Atkinson, & Martin, 2008). By engaging with older people, younger ones improve their communication skills, self-confidence, and self-esteem, and can also help them avoid anti-social and risky behaviour, such as crime and substance abuse (Springate, Atkinson, & Martin, 2008). This positive interaction can increase motivation and improve attendance at school or college, which in turn has a more positive impact on academic performance and increased employment prospects (Springate, Atkinson, & Martin, 2008). Other positive outcomes for young people include (Springate, Atkinson, & Martin, 2008):

- Improved perceptions of young people by older people
- Improved relationship with older people
- Young people made a positive contribution
- Young people engaged in volunteering
- Young people developed healthier lifestyles
- Young people improved their social skills
- Young people learned new skills
- Young people shared/taught skills to older people
- Young people's self-esteem/self-confidence improved
- Young people have enhanced educational opportunities
- Young people have improved understanding of the past / their roots
- Young people improved understanding of other cultures
- Contact with positive role models leads to raised aspirations
- Young people's stronger engagement in education
- Young people's enhanced achievement
- Young people supported to avoid failure
- Young people are more motivated
- The improved emotional health of young people
- Increased sense of belonging to the local neighbourhood.

PRECEDENTS

The next section of research pertains to several precedent studies that highlight intergenerational and multigenerational concepts. These projects range from large developments of a hundred people or more to single family dwellings. They are intended to illustrate the interactions that are possible when multiple generations come together. They are also intended to illustrate design concepts that make an intergenerational housing model a success. No one precedent is the perfect example of a multigenerational model, but rather they each contain attributes that the design concept will endeavor to incorporate.

The precedents are broken down into two categories. The first has to do with multi-family developments that link various generations together in either residential proximity or the availability of services. The second area of precedents relates to the dwelling unit themselves and the opportunity of housing multiple generations of the same family in proximity. The two areas of precedent studies are intended to take both a macro and micro look at the intergenerational housing model.

PRECEDENT #1 – Alicante Intergenerational Housing Project

Project Description:

The Alicante Intergenerational Housing and Community Service project has been designed to accommodate the housing needs for low-income occupants, including old and young generations. The project accommodates 72 intergenerational housing units in a central urban area in Alicante, Spain. The units are designed to be accessible for all who may occupy a unit, including allowances for those with disabilities and age-related infirmities. The project was intended to help older residents to maintain their independence while at the same time promoting a family-like atmosphere and a deep sense of belonging.

The social context of the Plaza de America was that the residents were to enjoy the Socio-community intervention and social cohesion that intergenerational living can produce (Kaplan, 1997). The main architectural challenge was the resolution of the shared services, public housing type of infrastructure, social interventions, and accommodating accessibility and personal autonomy (Garcia & Marti, 2014). The social programs were to be united with the architectural program, thereby promoting sociological and anthropological criteria such as dependency, awareness of identity and permanence (Sanchez-Martinez, 2007).

Project Intent:

Provide low-income housing options for seniors and young people.
Help the elderly overcome isolation and loneliness.
Assist older persons to live happy and independent lives.
Provide young people with a vibrant housing option in urban areas.
Provide a range of services to the Community.

Figure 10. Plaza de America northwest elevation. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Figure 11. Plaza de America southeast elevation. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Site:

The housing project is in the dense urban metropolis of Madrid, Spain in the district of Alicante. The project is fronted by the Plaza de America, which is a public square to the west of the building. The building is surrounded by numerous amenities such as cafés, food markets, banks, schools, and restaurants. To the north of the site, approximately 600 meters, is the Hospital General Universitario de Alicante, which happens to be one of the largest acute care centres in the region. Further to the west, approximately 700 meters, is the large football stadium in which the local football team, Hercules FC, plays. The housing around the precedent building is typically six to eight stories in height and clad in materials such as concrete, stucco, or stone. The precedent has massing and an exterior appearance that is not out of scale for the Plaza.

Figure 12. Plaza de America urban setting. Photo by google earth.

Figure 13. Plaza de America urban context and surrounding features. Illustration by Allan Colpitts

Building Orientation and Climate:

Figure 14. Plaza de America building cross section showing winter and summer sun angles and prevailing wind exposure. Illustration by Allan Colpitts

The project is situated on a north-south axis along the adjacent street that fronts the building. The building has prevailing summer winds coming from the east and winter winds coming primarily from the west. To take advantage of these prevailing winds and to shelter the western side of the building from the intense summer heat, the western façade is double layered. These architectural features limit solar heat gain and allow for occupant controlled cross ventilation. On the roof are solar panels that take advantage of the intense sun that the Spanish coast receives annually. A large courtyard forms a spine that runs the north-south of the building allowing daylight to penetrate the inner rooms of the lower levels.

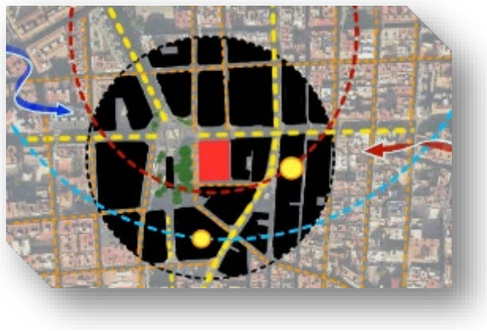

Figure 15. Plaza de America sun path diagram with winter sun path shown in blue and summer sun path shown in red. Prevaling winds indicated. Illustration by Allan Colpitts

Form:

Figure 16. Plaza de America basic forms consiting primarily of simple rectangular geometry. Illustration by Allan Colpitts

The Alicante Housing Project consists of strong rectangular shapes that make up the lower podium and upper residential tower portions. The lower podium levels are clearly articulated from the residential tower by using the larger flat rectangular forms and cladding material selections. The residential tower is rectangular as well but orientated such that it is taller and narrower and is broken in half; separated by an atrium that allows in daylight through a skylight above. The exterior claddings stone and wood serve to make the tower a distinct element of the building.

Figure 17. Plaza de America basic forms consiting primarily of simple rectangular geometry. Illustration by Allan Colpitts

Figure 18. Plaza de America west elevation showing the rectangular forms that are highlighted in the building shape. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Private Residences:

The average apartment size is 40m2 and rent for 160 Euros per month. Residents include low-income senior (over the age of 65) which make up about three quarters of the residents and low-income young people under the age of 35 (the remaining 25% of residents). All the units have adapted bathrooms, heating, and air conditioning. All the units are exterior and are enclosed by glazing the entire surface of the façade. The west exposures are protected by a second façade with adjustable blinds that regulate solar exposure and moderate the temperature. The units face either east or west separated by a 'Main Street' that provides access and simultaneously facilitate the internal aeration of the interior rooms and allows for cross ventilation (Garcia & Marti, 2014).

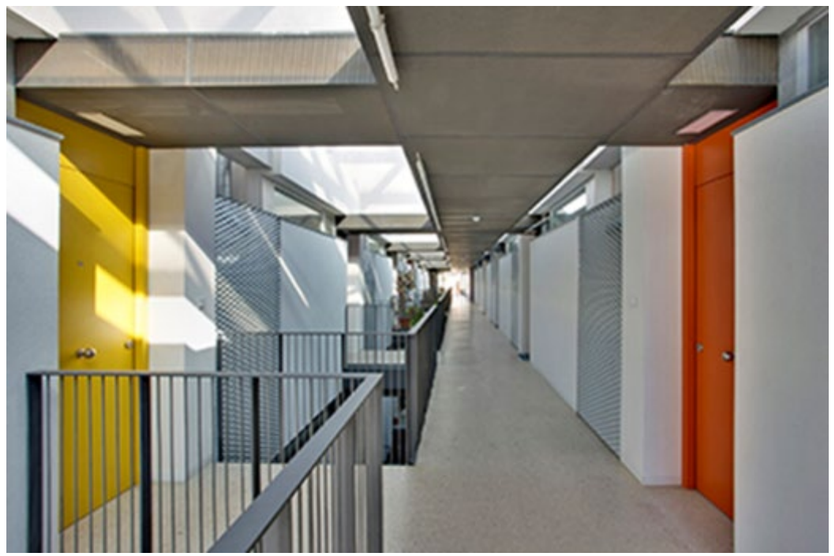

Figure 20. Plaza de Amercia interior view of corridors connecting the living units. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Figure 19. Plaza de America interior view of typical residenc suite. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Figure 21. Plazade America typcial floor plan of residences. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Common Spaces:

The apartments are enhanced by spaces dedicated to communal service such as;
- Library
- Computer Centre
- Area for Social Events and Workshops
- Solarium
- Roof gardens
- Laundry
- Local health services
- Recreational services

The program also provides for a regeneration of the wider area and provides facilities that can benefit the wider community, including;
1) Healthcare centre which attends a population of 30,000 people,
2) Public car park, and
3) Day centre.

Four Intergenerational committees have been created for the self-management of the program and activities:

1) Back to Earth project – Landscaping and vegetable gardening.
2) From Culture to Information project – library, life stories, writing workshops, video production, DVD cinema sessions, music, and dance workshops.
3) Fiesta project – community gatherings and celebrations.
4) Technology in your Hands project – Computer workshops and support in using the internet, mobile phones, heating, and air conditioning equipment, etc.

Figure 22. Plaza de America large interior public space. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Figure 24. Plaza de America common patio space for residences. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Figure 23. Plaza de America expansive roof top garden and patio space. Photo by Premiosdearquitectura (www.premiosdearquitectura.es/en/awards/30-avs-awards-2010/all-proposals/528-72-intergenerational-housing-health-centre-and-day-center-at-plaza-of-america-alicante)

Impact:

1) Residents have widely expressed how the project has increased their well-being, by allowing them to be independent yet not alone and, live in a decent home, with a family-like environment and have a wide range of activities within reach.
2) Relatives of residents are reassured that their parent/grandparent/relative can live independently, in a safe environment.
3) Young people have access to affordable rental rates and gain knowledge and establish real relationships of friendships with the older persons they assist.
4) There is a positive impact on the neighbourhood by contributing to the renewal of the local area and providing municipal services to residents.
5) The project has been conceived to empower older persons to become active agents in their own lives rather than passive recipients of services. Residents are involved in planning, developing and implementing programmes and activities, taking the lead in different committees and playing an active role in governance.

Innovations:

1) The Intergenerational nature of the occupation of the properties allows independence of each user. The building is shared, not the dwelling units.
2) Self-managed activities promote social integration and create the feeling of a 'big family' environment, which has been even more highly valued by residents than the accommodations themselves.
3) The project promotes the use of public land that has traditionally exclusively been used to establish single public service, with a significant loss of buildable area, economies of scale and the synergies provided by combining public services and housing (Viana, 2012).
4) Seniors interested in renting an intergenerational apartment must meet a series of requirements to be approved thereof. Likewise, the young people interested in renting an intergenerational apartment must meet similar personal requirements but must also guarantee their social willingness and commit by contract to dedicate four hours a week to community service and to boost the cultural and recreational activities. This coexistence is articulated through a social contract, complementary to the rental contract, in which each young person is responsible for four seniors and to alert social works in case of a problem or anomaly in their daily routine (Viana, 2012).

PRECEDENT #2 – Buccleuch House, England

Project Description:

The Buccleuch House, located in the Hackney neighbourhood in London, England, is intended to unite three diverse housing consumers in one community (Levitt Bernstein, 2015).

The three client groups were;

- First-time homebuyers who are priced out of the London market.
- Orthodox Jewish families
- Older tenured adults that may require additional care as they age in their homes.

Each group came with their own unique set of requirements that help form the clear design brief for each one resulting in three separate solutions (Levitt Bernstein, 2015).

Figure 26. Buccleuch House southwest elevation showing parking setting in front of building. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Figure 25. Succleuch House northeast elevation. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Site:

The site was a derelict bedsit accommodation that was not fulfilling the needs of many (Levitt Bernstein, 2015). The original building was constructed in the 1950s and comprised of a series of studio apartments. The site is located adjacent to Clapton park to the southwest and the Lea river to the north-east. There is a high density of Jewish population in the surrounding neighbourhoods, which gave rise to the need for more housing in close proximity to several synagogues in the neighbourhood.

Figure 28. Site context of Buccleuch House. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Figure 27. Condition of the the brown field site before construction of Buccleuch House. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Building Orientation / Climate:

The Buccleuch House is located on an east-west axis and given that the building was pre-existing, the designers had to work with that orientation. The southwest face of the building gets the majority of the sun in summer and winter, while the northeast face has the relatively limited sun in the morning hours. The prevailing wind direction is from the southwest and is strongest in the winter months.

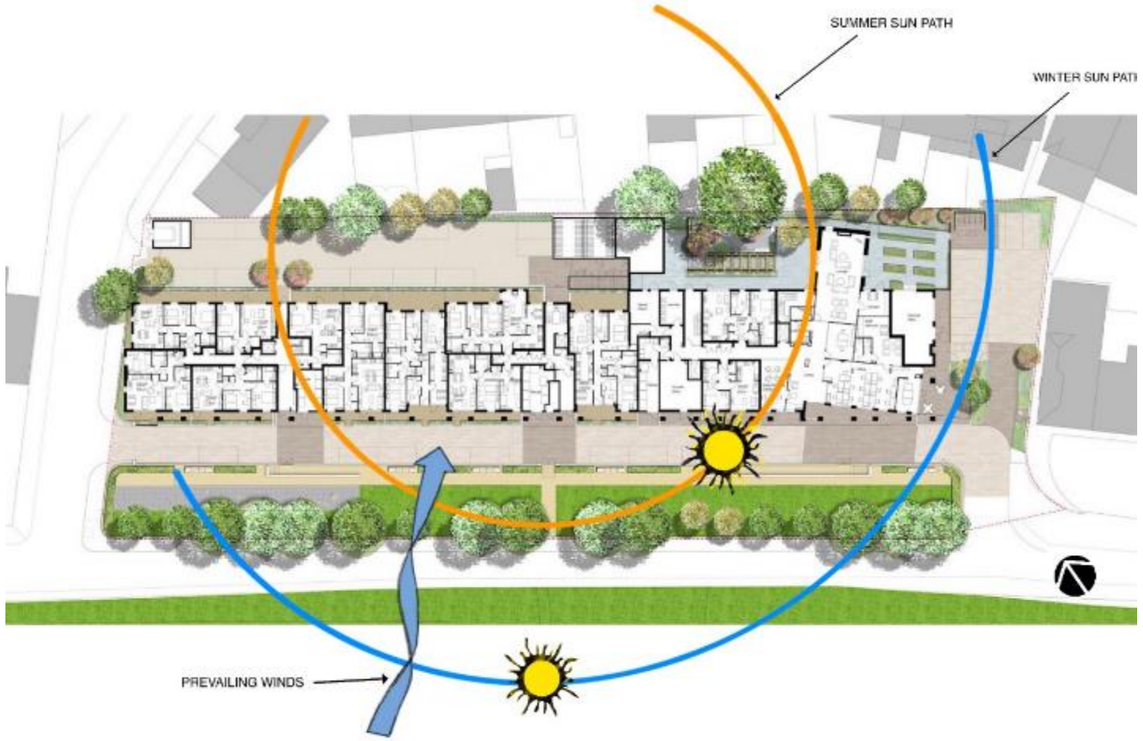

Figure 30. Winter and summer sun path for Buccleuch House. Illustration by Allan Colpitts

Figure 29. Building section of Buccleuch House. Illustration by Allan Colpitts

Form:

The Buccleuch House is primary an extruded rectangular form that stretches to six stories in height. There is little distinction externally between the three distinct groups of residences. To provide some subtle vertical distinction, the building is split into a top, middle and bottom section using differing brick masonry styles and colour. The massing of the building responds well to the surrounding built forms as it shares a similar scale, mass, and materials composition.

Figure 31. Balconies play a large part in distinguishing use of internal spaces. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Figure 32. Buccluech House south elevation. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Private Residences:

The suites within the Buccleuch House come in a variety of configuration and sizes depending on the three categories.

- First-time home buyers have a choice between one and two-bedroom units.
- Orthodox Jewish residents have three-bedroom units available that come equipped with a sink at the apartment entry for handwashing, and a second sink in the kitchen to prepare kosher meals and are two storeys in height.
- The units for the older tenure population are designed using the HAPPI (Housing our Ageing Population: Plan of Implementation) design guidelines which are comparable to the universal design principles incorporated into many housing developments for the ageing population.

A unique feature of each form of residence is the balcony style that was incorporated into the design.

- For the first-time home buyers, the balconies are stacked one on top of the other and allow for the occupant to be able to extend the living space outdoors.
- For the Orthodox Jewish residents, the balconies are staggered so to provide a clear view of the sky for Sukkot festival.
- For the older population, the balconies are enclosed in glass to allow for the safe and comfortable enjoyment of the outdoors.

In total there are;

- 38 First-time home buyers' suites
- 28 Orthodox Jewish units that are two storeys in height
- 41 Ageing in place and assisted living units.

Figure 33. Various apartment types in Buccleuch House. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Figure 34. Views from balcony looking southwest. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

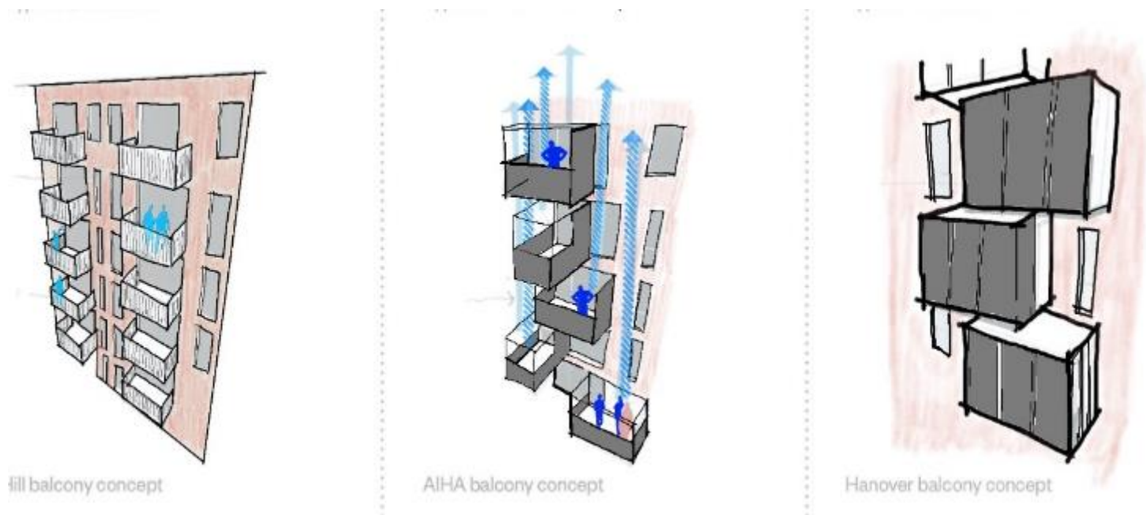

Figure 35. Various balcony treatments indicating occupants. Illustration by Allan Colpitts

Common Spaces:

Because Buccleuch House was an existing building, the opportunities to introduce large communal spaces were compromised. For the most part, the common areas are focused on the exterior of the building. At the front, the park-like setting is shared with Clapton Park. The park allows for the residents to interact as older and younger population intermingle. To the rear to the building are two common areas. The first is a shared garden space where residents can come down and care for their portion of the community garden. The planting beds are raised to help accommodate the older generation. The other common space in the back of the building is a landscaped area designed for residents to enjoy a private park-like setting. This area is wheelchair friendly so that all residents can enjoy the space.

Figure 37. Rendering of north outdoor space. Illustration by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Figure 36. North outdoor space. Photo by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Figure 39. South outdoor space. North outdoor space. Illustration by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

Figure 38. Rendering of south outdoor space. North outdoor space. Illustration by Levitt Berstrin (www.levittbernstein.co.uk/project-stories/buccleuch-house/)

PRECEDENT #3 – Kampung Admiralty, Singapore

Project Description:

The Kampung Admiralty, designed by WHOA Architects, was constructed in 2017 to provide integrated community services to the ageing population but also the population in general of the surrounding areas. Designed on a layered 'sandwich' approach, the community can access the community plaza, food court, and medical centre (Castro, 2018). The lower three floors are designed to foster diversity of cross-programming with the ground level being used as an activity generator (Castro, 2018). The gross area of the facility is 32,331 m2 on an 8,891 m2 site.

Figure 40. Southwest elevation of Kampung Admiralty. Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Figure 41. View of main plaza in Kampung Admiralty. Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Figure 42. Kampung Admiralty building section. Illustration by WOHA Architects Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Site:

The facility is located near other amenities such as healthcare, social support programs, commercial and retail areas and other intergenerational space that promote positive interactions with all age groups and active ageing in place (Castro, 2018). The community plaza is entirely public and pedestrian-friendly, designed to be a 'community living room' (Castro, 2018).

Figure 44. Urban site context. Illustration by Allan Colpitts

Figure 43. Kampung Admiralty site plan. Illustration by WOHA Architects (www.woha.net/#kampung-Admiralty)

Building Orientation / Climate:

The building is situated on a northwest axis that provides for good shelter from the main winds from the northeast. Smaller winter winds come from the southwest and are buffeted by trees that front the southwest entry to the building. The site gets almost equal amounts of daylight year-round as the building is situated close to the equator. The summer sun is indicated by the orange sun path whereas the winter sun is shown on the blue path.

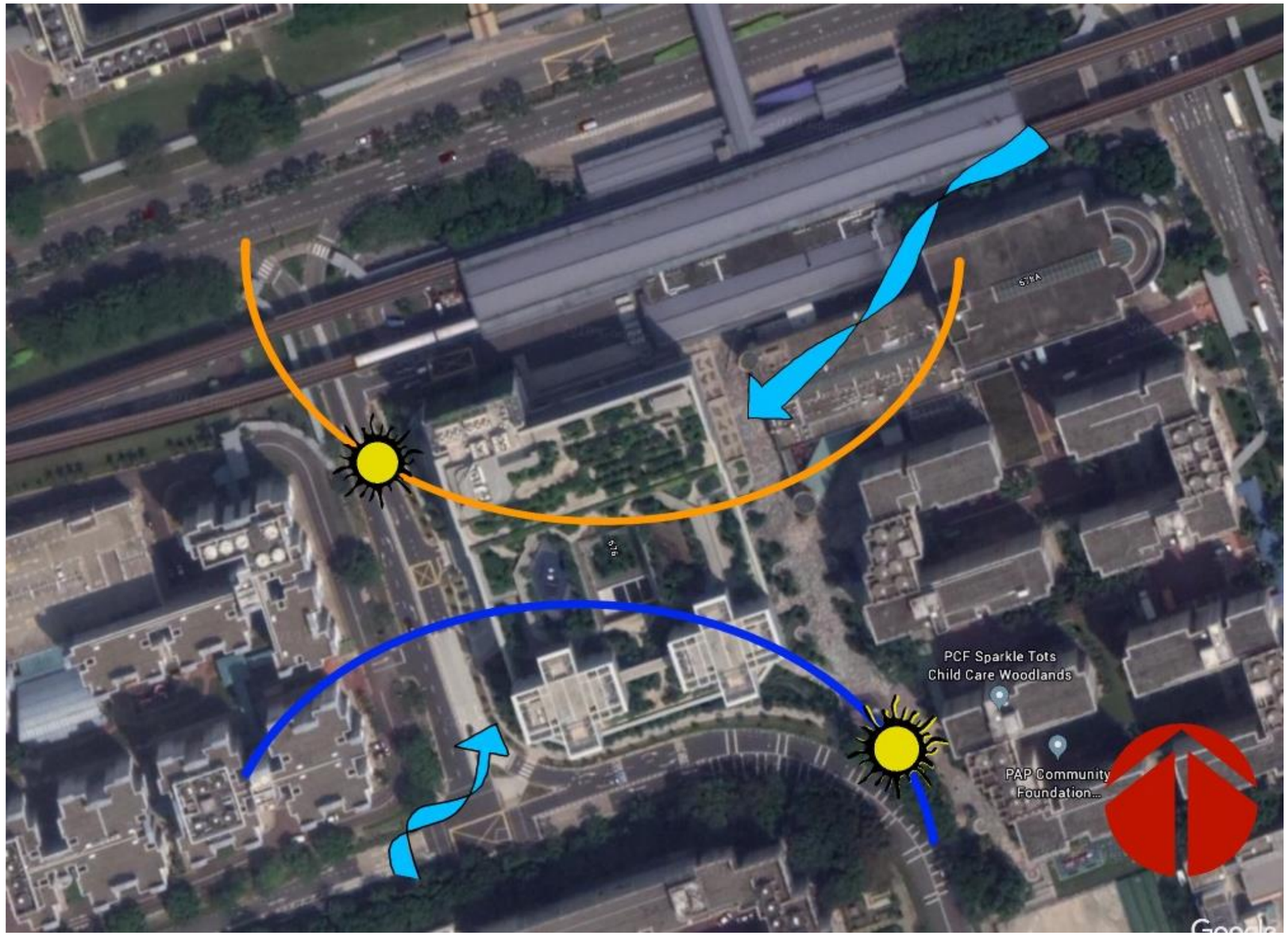

Figure 45. Summer and winter sun paths. Illustration by Allan Colpitts. Base photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Form:

The form of the building is relatively simple geometry. The two residential towers on the south side of the facility are formed by extruded crosses that extend from the third floor. The north side of the building is a terraced area of commercial, social and community space. The lower level forming the podium are simple rectangular shapes with curved edges that soften the approach and form a welcoming entry on the south side of the building.

Figure 47. Basic geometry of Kampung Admiralty. Cross shapes and stacked rectangles. Illustration by Allan Colpitts

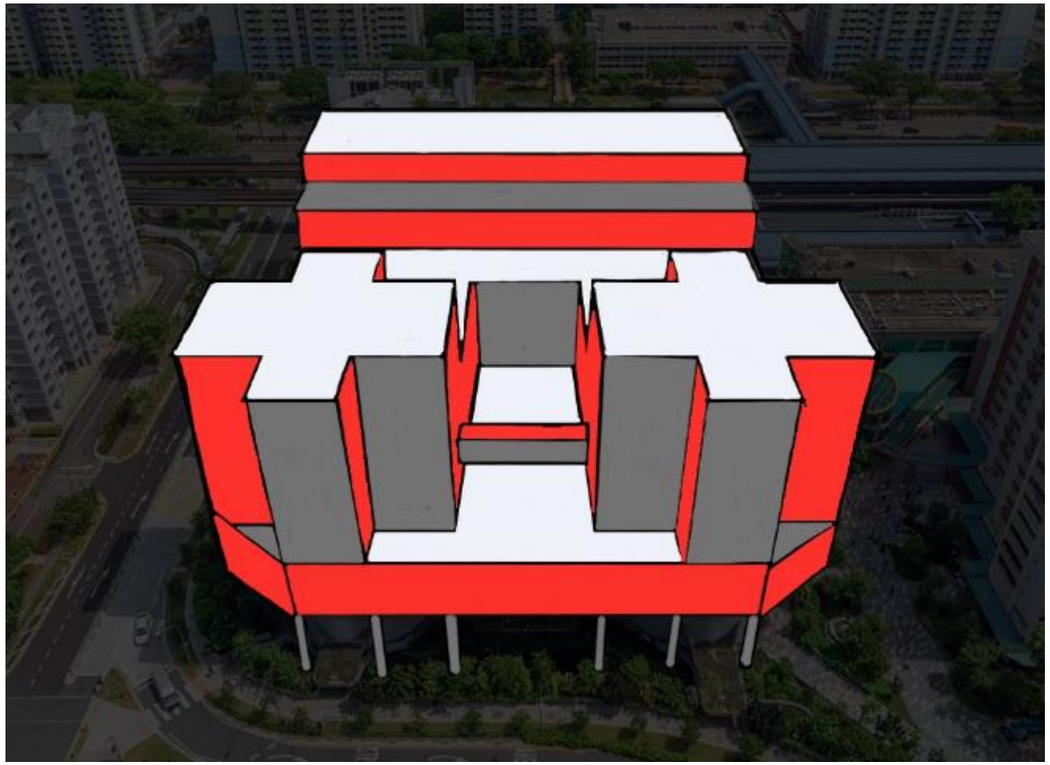

Figure 46. Basic geometry of Kampung Admiralty. Cross shapes and stacked rectangles. Illustration by Allan Colpitts

Private Residences:

The two 11 storey apartment blocks hold a total of 104 units that are intended to house the elderly singles and couples. The units are designed with universal design principles to accommodate ageing in place. Natural ventilation and access to daylight were critical in the design of the dwelling units. There is currently no housing for younger adults or young children, but it is intended to add an additional tower to the podium that will accommodate young families. For now, the multigenerational interactions are limited the shared services that are offered in the facility.

Figure 48. Interior view of private residence. Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Figure 49. Interior view of private residence. Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Common Spaces:

The strength of Kampung Admiralty is the community spaces. The openness of the space is welcoming and inviting to visitors of all ages. The public can participate in organized events, including seasonal festivities and exercise classes. The space also allows for the public to shop and eat at the hawker centre on the second floor of the facility. The community medical centre is located on the third floor and forms the sheltered area for community activities. The community park is located on the upper terraced area and accommodates programmes such as childcare and an active ageing hub that allows young and old together to live, eat and play together.

Figure 51. Interior view of public spaces. Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Figure 50. Interior view of public spaces. Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Figure 53. Interior view of public spaces. Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

Figure 52. Interior view ofpublic spaces. Photo by WOHA Architects (www.woha.net/#kampung-Admiralty)

PRECEDENT #4 – Armstrong Place, San Francisco, California

Project Description:

Design by David Baker and Partners, Armstrong Place was completed in 2011 to provide housing for all age groups. The design philosophy is to allow residents to age in place by addressing changing needs by moving residents into more accessible homes with added healthcare considerations within the same community and neighbourhood (Mann-Lewis, 2014). Different buildings represent different age groups and family sizes. The overall development encapsulates 131,800 square meters of residential housing.

Figure 55. Southeast elevation of senior block. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

Figure 54. Southwest elevation of townhouses. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

Site:

Armstrong Place is situated within a mixed-use neighbourhood of residential and commercial developments. The long narrow site is divided into family and senior housing phases. The site is bounded by a commuter train track to the west. The proximity to public transport is a valuable connector for seniors with limited mobility as well as for young families that may not be able to afford a car. Common green spaces allow for community interactions. The site is transit orientated and located along a light rail train line. Close to the site are a healthcare centre and neighbourhood retail services.

Figure 56. Site plan of Armstrong Place. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

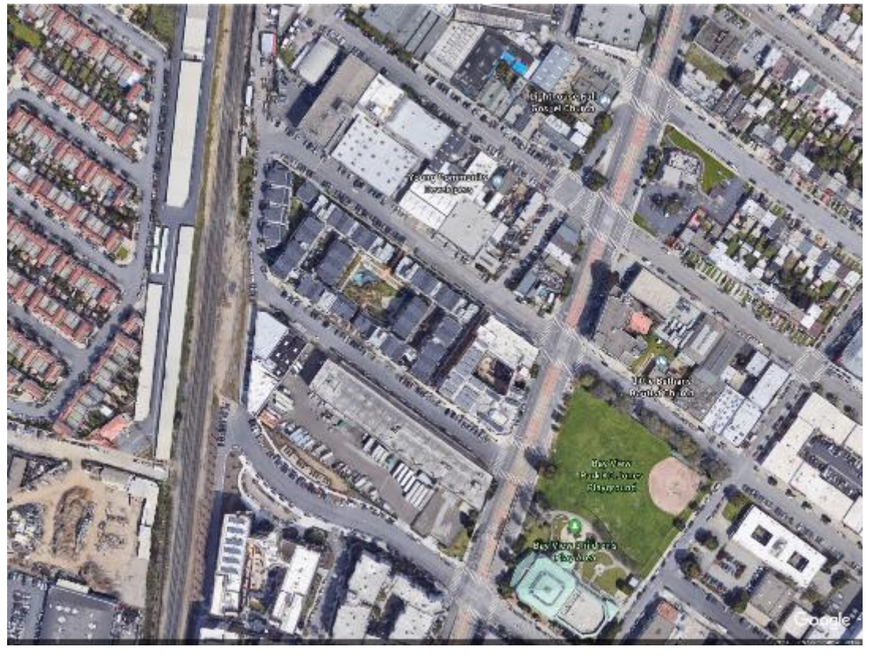

Figure 57. Google earth view of surrounding neighborhood. Image by google earth

Figure 58. Site context and neighborhood arterial road network. Image by Allan Colpitts

Building Orientation / Climate:

As the building is orientated on a northwest axis, the westerly winds that are prevalent in San Francisco are redirected down the adjacent avenue leaving the courtyards sheltered from the winds. The June sun path is shown in green, and the December sun path is shown in blue. San Francisco is one of California's more northern cities, and the divergence of the sun path is evident.

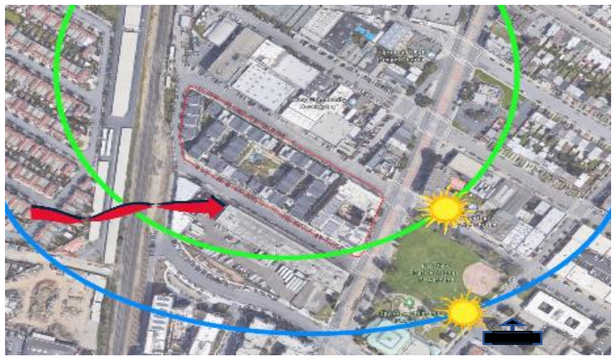

Figure 59. Winter and summer sun path and prevailing wind direction. Image by Allan Colpitts

Form:

The site is divided into a family side and seniors' side. The senior residence is a c-shaped structure with an internal courtyard that allows for outside activities for the elderly residences. The family residences are made up of townhouses that encircle a community play space for the children. Through the use of colour, the exterior cladding is reflective of the cultural traditions of the African American population in the neighbourhood.

Figure 60. Form of the townhouses contrasted with the senior block. Image by Allan Colpitts

Private Residences:

Armstrong Place accommodates 116 affordable senior residences. Rents range from $0 to $635 per month depending on qualifying income. The senior residences overlook the park, courtyard and landscaping pathways that run between the buildings.

There is a total of 124 family townhomes. The townhomes are equally mixed between three and four-bedroom units. Larger units are specifically designed for ageing in place and can accommodate wheelchair lifts and accessible living areas on the main floor of the townhome. The family townhomes sell from $175,000 to $345,000.

Figure 62. Site plan of the townhouse showing courtyards and connectivity between groupings. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

Figure 63. Street view of row of townhouses. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

Figure 61. Site plan of the seniors block. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

Figure 64. Street view of seniors block. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

Common Spaces:

The common area for Armstrong Place is mostly comprised of exterior spaces. The buildings do not have physical connections to one another, and the intermixing of generations is challenged because of this. The family townhomes surround a playpark, and green spaces and the seniors' residence has a sheltered courtyard that can host various functions and programs.

Figure 65. Courtyard spaces between townhomes. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

Figure 66. Courtyard of seniors block. Photo by David Baker + Partners (www.dbarchitects.com/project_details/102/Armstrong%20Place%20Senior.html)

PRECEDENT #5 – Courier Place, Claremont, California

Project Description:

Courier Place in Claremont California was completed in 2012 and design by WHLM Architects. The project is comprised of three apartment buildings co-located on one site. Two buildings are dedicated to two and three-bedroom apartments that are geared towards families. The third structure is dedicated to seniors. There are 38 one-bedroom apartments for seniors and 36 apartments for families (Mann-Lewis, 2014).

Figure 67. South elevation of Couirer Place. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Figure 68. Northeast elevation of Couirer Place. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Site:

The units encircle a courtyard that includes green spaces and a pool. Amenities, walkability, and affordability were three main focuses for success on this project. It was essential to the developers and the designers that seniors could leave the site by foot (Mann-Lewis, 2014).

Figure 70. Site context. Image by Allan Colpitts

Figure 69. Site plan of showing in the lighter colour the young adult suites and in the darker colour the senior units. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Building Orientation / Climate:

The buildings on the site are set either parallel or perpendicular to the north axis. The winds in Claremont California primarily come from the southeast coming off the ocean. The courtyard is sheltered from the winds by a stand of trees that limit the intrusion of the breeze. The placement of the swimming pool is well sheltered from winds.

Claremont California is near the southern edge of California and as such the sun paths are nearly identical all year around. The June sun path is shown in the purple line while the December sun path is shown in red. The sun path is one of the major determinants in the placement of the solar panels that are above the parking shelters located on the south side of the property.

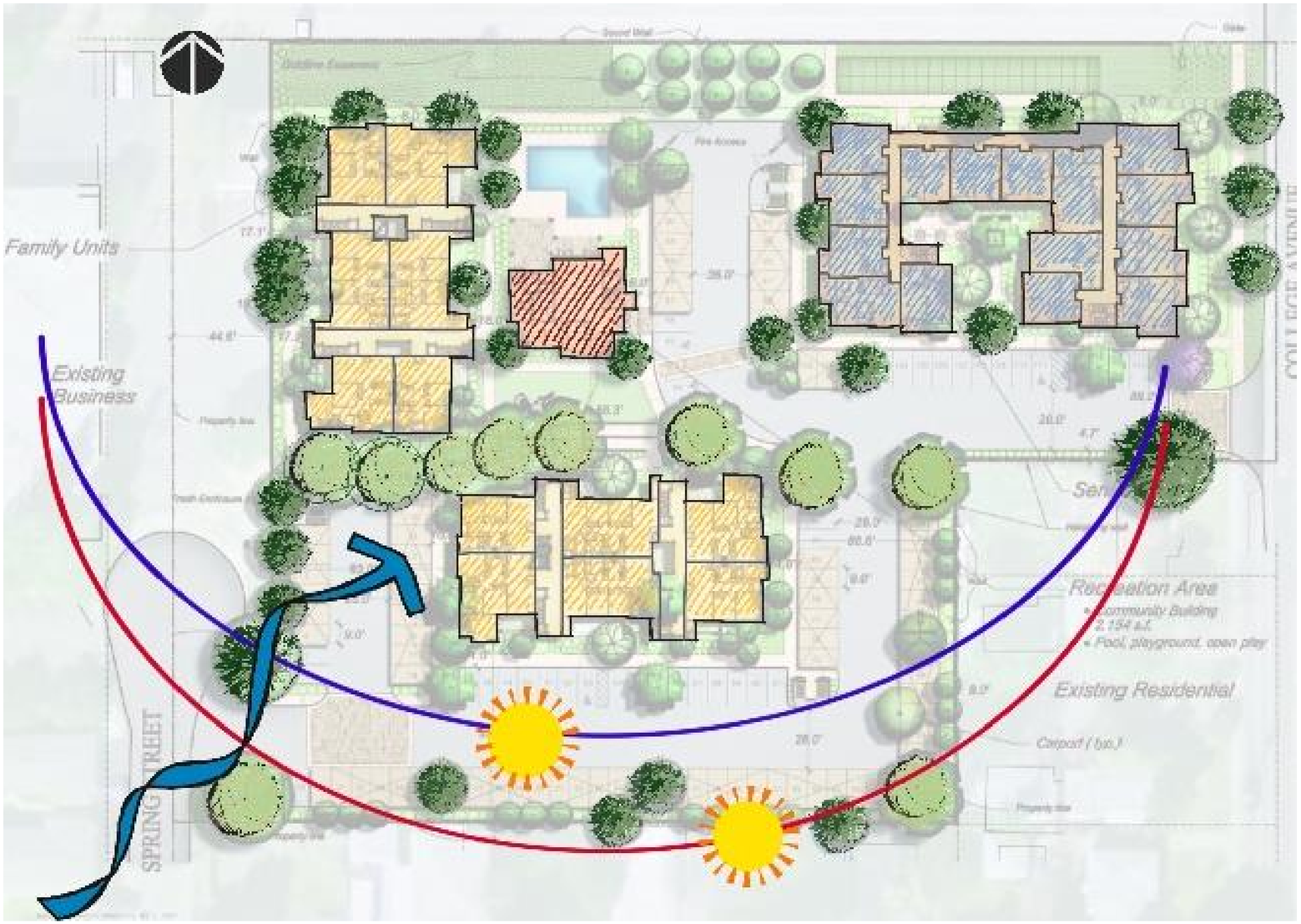

Figure 71. Climate information showing winter and summer sun paths and prevailing wind direction. Image by Allan Colpitts

Form:

The form of Courier Place is a compilation of rectangular shapes. This form is reminiscent of Spanish archetype and includes cladding stucco installed to mimic terracotta and adobo appearances.

Figure 73. west elevation of Couirer Place. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Figure 72. South elevation of Couirer Place. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Private Residences:

Courier Place has a combination of 38 one-bedroom apartments for seniors and 36 larger apartment units for families. The project's goal was to accommodate families of a lower income bracket for the area. In this example, families and seniors live in separate and distinct buildings leaving intergenerational interactions to community shared spaces.

Figure 74. Interior view of senior unit. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Figure 75. Interior veiw of young adult units. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Common Spaces:

The common spaces for Courier place make good use of interior and exterior spaces. The property firm that operates Courier Place run various intergenerational activities in various community rooms located on site. There are several shared spaces that accommodate opportunities for community events, but space is not dedicated to specific tasks.

Figure 77. common lounge area in senior residence. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Figure 76. Outdoor activity area common to all ages. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Figure 78. Common lounge area in the recreation building. Photo by William Hezmalhalch Architects (www.jamboreehousing.com/blogs/affordable-housing-communities/couirer-place)

Single Family Home Multigenerational Precedents

Queens, New York

O'Neill Rose Architects designed a home for an extended family by incorporating three separate homes into this one site. The neighbourhood is made up of the traditional single-family homes, so this project had to fit the neighbourhood context (Mairs, 2016). The first 'home' of the three is the three-story block that contains a pitched roof and white rendered walls and is situated closest to the street (Mairs, 2016). The remainder of the first and second floor is clad in wood and a flat roof and overlooks the garden and constitutes the second accommodation (Mairs, 2016). The first two residences are connected by a semi-basement level that contains a shared lounge and another smaller suite for the grandparents. The connected lower level contains the family lounge and outdoor pavilion, which are the primary gathering spaces for the whole family (Mairs, 2016).

Figure 81. New York House front elevation. Photo by O'Neill Rose Architects (www.oneillrosearchitects.com/choy-house)

Figure 80. Rear elevation. Photo by O'Neill Rose Architects (www.oneillrosearchitects.com/choy-house)

Figure 79. Rear courtyard. Photo by O'Neill Rose Architects (www.oneillrosearchitects.com/choy-house)

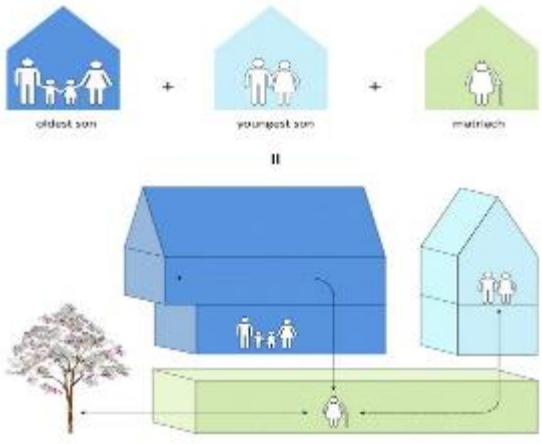

Figure 83. Diagram of the three family arrangement. Image by O'Neill Rose Architects (www.oneillrosearchitects.com/choy-house)

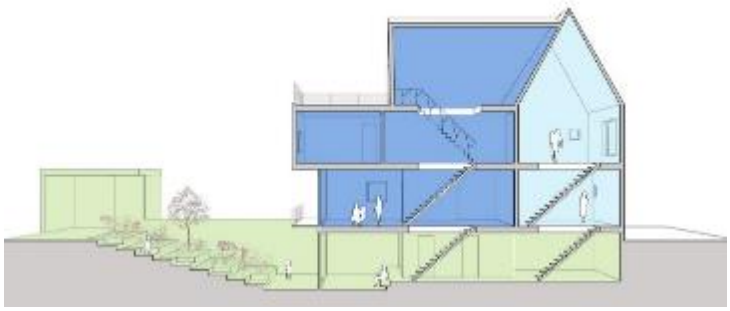

Figure 82. Diagram of the three family arrangement. Image by O'Neill Rose Architects (www.oneillrosearchitects.com/choy-house)

Amsterdam, Netherlands

3 generation house was intended to provide a solution whereby three separate generations of the same family could come together and enjoy each other's company but at the same time respecting the advantages of private family life (Beta, 2019). To accomplish this, Beta Architecture stacked two separate apartments on top of each other with the lone connection being a communal entrance. The house allows for changing spatial demands as circumstance dictate. For example, the open void spaces can be filled in to create another apartment intended for when the children reach a point in their life when they require additional independence. The bottom apartment is occupied by the young family as it is more conducive to their activities and lifestyles and is more apt for a working family with young children (Beta, 2019). The grandparents live in the upper apartment unit. The upper apartment has an elevator, level floors and broader door openings to meet the possibility of a wheelchair in the future.

Figure 86. Three Generation House rear elevation. Photo by BETA Architects (www.beta-office.com/project/3-generation_house)

Figure 85. Interior view of common kitchen space. Photo by BETA Architects (www.beta-office.com/project/3-generation_house)

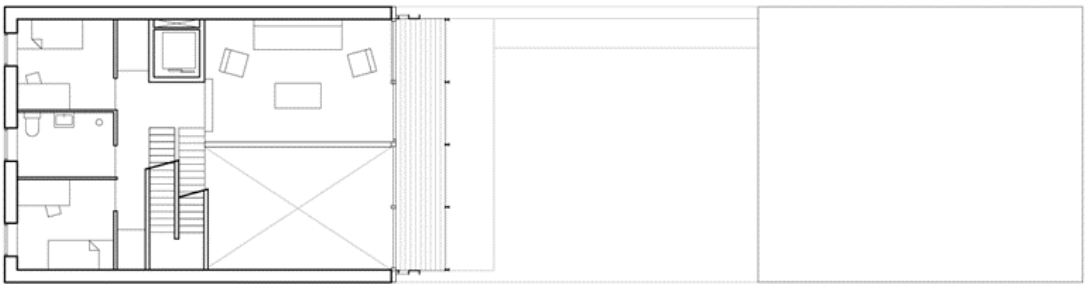

Figure 84. First floor plan. Photo by BETA Architects (www.beta-office.com/project/3-generation_house)

The floor plan is adaptable and allows for the various floor plates to be connected to create space as the circumstances require (Beta, 2019). There is room for two additional studio apartments to be added on the north side of the building to allow the young family's children to live in the building past their adolescence.

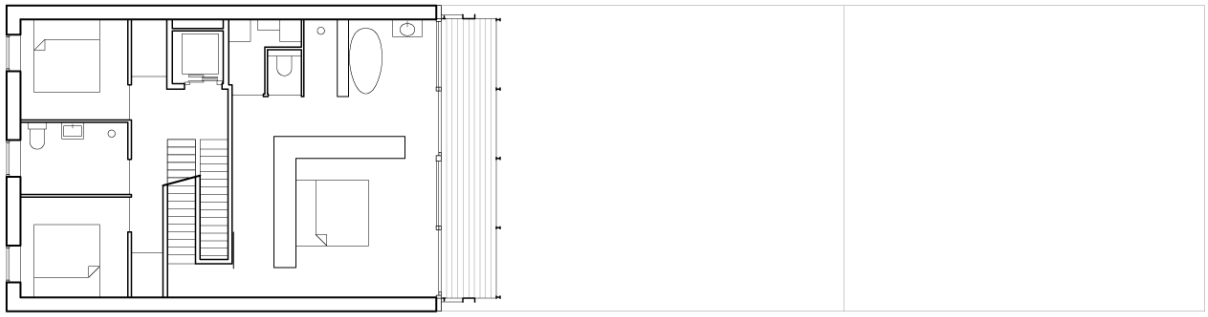

Figure 89. Second floor plan. Photo by BETA Architects (www.beta-office.com/project/3-generation_house)

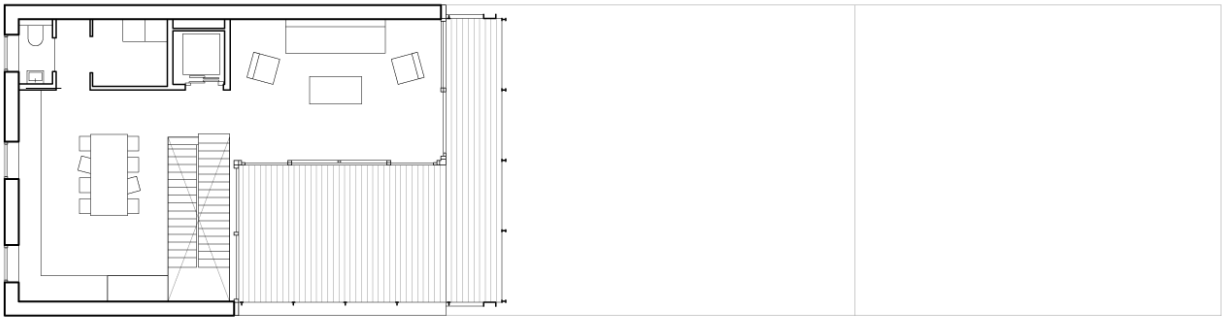

Figure 88. Third floor plan. Photo by BETA Architects (www.beta-office.com/project/3-generation_house)

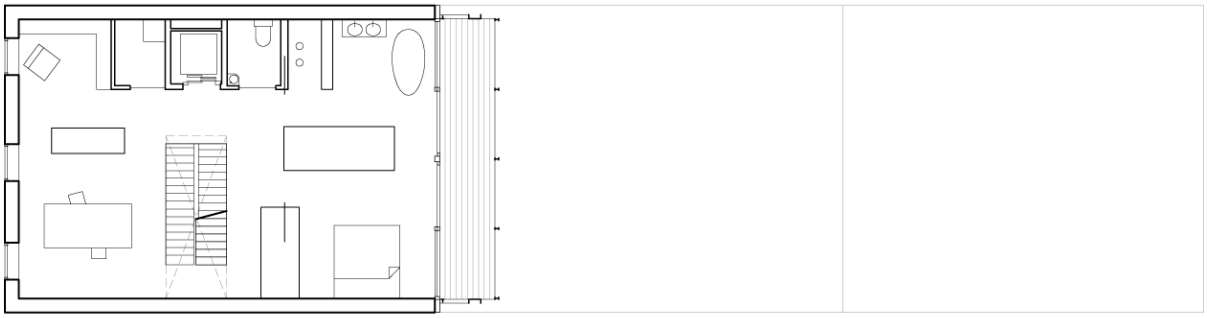

Figure 87. Fourth floor plan. Photo by BETA Architects (www.beta-office.com/project/3-generation_house)

The north façade is nearly completely closed to prevent thermal loss and reduce sound from the adjacent street. The south façade is nearly entirely open to take advantage of solar gain and the connections to the outdoors.

Virginia, USA

Figure 90. Rear elevation of bridge house. Photo by Jeff Wolfram (www.howleryoon.com/work/42/bridge-house)

Figure 91. Front elevation of bridge house. Photo by Jeff Wolfram (www.howleryoon.com/work/42/bridge-house)

The Bridge House, design by Howler + Yoon Architecture, is a concept that allows for large expansive spaces that almost disguise the multigenerational aspects of the home. The home has three distinct levels that are each accommodated by a different generation of the same family. The ground floor suite is occupied by the grandparents. The next level is occupied by the parents and their grown-up children and their grandchildren.

Figure 93. lower common family space. Photo by Jeff Wolfram (www.howleryoon.com/work/42/bridge-house)

Figure 92. Stairs leading to common kitchen. Photo by Jeff Wolfram (www.howleryoon.com/work/42/bridge-house)

The bridge concept creates structural divisions that create a sense of physical separation between generations. However, despite this apparent physical separation, the family comes together on the ground floor for meals.

Applicable Lessons from Architectural Precedents

Through the various precedents considered there are several lessons learned in the development of intergenerational/multigenerational housing options. The first five precedents were intended to illustrate the intergenerational concept as a large-scale development, whereas the last three examples are intended to focus primarily on lessons learned on the individual dwelling units that may be incorporated into a larger project. The following is a brief summation of those lessons that are applicable to the design of an intergenerational housing model in Edmonton, Alberta.

Plaza de Americas:

- Provide services to the community at large including; learning, healthcare, and recreational environments.
- Ensure appropriate exposures are considered for proper use of solar gain and natural ventilation.
- Provide natural daylight and views from each dwelling unit.
- Provide large internal gathering spaces.
- Shelter residents from the busy street by elevating the dwelling units where possible.

Figure 94. Image of Plaza de Amercia. Photo by premiosde arquitectura

Buccleuch House:

- Provide options for cultural diversity in housing if neighborhood has strong identifiable cultural groups.
- Provide access to public spaces like parks and community gardens.
- Provide housing option sizes for different family or individual circumstances.
- Reuse existing site (brownfield) where possible.
- Provide sheltered green space for more vulnerable residents.
- Provide a progression of care as residents age.
- Incorporate universal design principles that bring flexibility into the spaces for easy reconfiguration as residences needs change over time.

Figure 95. Buccleuch House. Photo by Levitt Bernstein Architects

Kampung Admiralty:

- Provide public space for community gatherings.
- Consider program needs of community. Identify missing amenities and services.
- Incorporate natural elements into spaces to bring a connection with outdoors.
- Provide retail opportunities to attract public to the facility.
- Located close to transportation alternatives.
- Provide a progression of care as resident's age.
- Keep public spaces to the lower levels and reserve the upper levels for private dwellings.

Armstrong Place:

- Provide access to transportation alternatives.
- Ensure strong connections between all age groups to ensure full benefits of intergenerational programs and services.
- Provide safe outdoor space for the younger generation to play.
- Provide sufficient space for intergenerational programs to be delivered at present and allow for modest future program increases.
- Ensure good access to natural light and views.
- Ensure the building's scale and aesthetics are appropriate for neighborhood.
- Pay attention to cultural make-up of the neighborhood.
- Design for lower income residents.

Figure 96. Armstrong Place. Photo by David Baker + Partners

Courier Place:

- Choose a site with transportation alternatives.
- Ensure the aesthetics of the building considers the neighborhood context.

Figure 97. Courier Place. Photo by Jamboree Housing

Bridge House:

- Ensure adequate private space for each member of the family unit.
- Ensure the family share an effective common space.
- Provide separate entrances into each dwelling unit along with a separate entrance into the common area.
- Provide views and access to the outdoors.

Figure 98. Bridge House. Photo by Jeff Wolfram

New York House:

- Ensure needs of each generation are met fully (NO COMPROMISE).
- Provide access to common space with preference given to older generation.
- Provide aesthetic common to the neighborhood.
- Provide private spaces for each family unit.

Figure 99. New York House. Photo by O'Neill Rose Architects

Amsterdam House:

- Shelter street facades from noise and commotion of traffic.
- Provide views and access to nature and the outdoors.
- Provide opportunity for growth and expansion as the younger generation ages and becomes more independent.

Figure 100. Three Generation House. Photo by BETA Architecture

Intergenerational Programs Precedents

There are many good examples of intergenerational programs and services that bring multiple generations together for mutual benefit that are not necessarily tied to a purpose-built facility. This section highlights several examples of intergenerational programs that indicate how communities are utilizing the power of intergenerational interactions.

Example #1 Housing Kitsap, Kitsap County, Washington USA

The local housing organization, Housing Kitsap, has developed a program that is designed to be a resource for at-risk youths within their public housing accommodations. The program is entitled "Teen Challenge" and unite at-risk teens and isolated older residents. This program is designed to be a leadership and mentoring program to the benefit of the young and old who participate. One of the first activities the group does together is organizes a community dinner. The popularity of this event has grown and now demands that this event happen as a monthly custom for this group to host (Henkin N. Z., Patterson, Stone, & Butts, 2017). This program also allows the younger generation to participate in workshops and visit colleges with the more tenured residents.

Example #2 Friendsview Retirement Community, Newburg, Oregon USA

The Friendsview Retirement Community is a not-for-profit group that has had a longstanding relationship with George Fox University, which is located in close proximity. The program is a bi-directional transfer of knowledge between tenured residents and the students and staff of the university. This program allows for students to develop friendships, job-related skills, and a comfort with older populations. Undergraduate and graduate students assist residents with technology and computer-based needs. Residents can audit university classes and are invited to give guest lectures. In addition, the residents also attend university sporting and arts events and participate in extracurricular clubs and activities.

Another partnership that Friendsview has is with Penn State University. The partnership allows student seeking a hospitality major an internship and accommodations at a Friendview residence for four months. These student assist with hospitality related tasks around the facility and with special projects.

Example #3 Time Out Caregiver Respite Program, Philadelphia, Pennsylvania

The Time Out Caregiver Respite program is a provision through The Intergenerational Centre at Temple University. Through this program, students are given a semester-long work opportunity to provide respite services for a family and thereby provide regular companionship and supervision for elderly family members that require some assistance to remain in their own home.

Example #4 Intergenerational Games, San Diego, California

The Intergenerational Games bring all age groups together to enjoy some physical activity, impart information about health and nutrition, healthy behaviors, and foster intergenerational relationships among the tenured and various younger age groups. These games were created to deal with issues in the community, such as the noticeable obesity crisis in young people and the high rate of seniors diagnosed with diabetes and heart disease. Active older adults serve as role models for youths to dispel any age-related stereotypes.

PROGRAM REQUIREMENTS FOR THE INTERGENERATIONAL HOUSING MODEL

The goal with the intergenerational housing model is to bring people together in a purposeful way, enhancing a higher degree of understanding and respect between generations, and contribute to a more cohesive community (Henkin N. Z., Patterson, Stone, & Butts, 2017). To accomplish this, there are several programmatic items that will be incorporated in the overall building programmed needs. Such programmed spaces include (Henkin N. Z., Patterson, Stone, & Butts, 2017);

- Arts Programs
  - Dance
  - Theatre
  - Writing and visual arts activities
- Tutoring and Mentoring Programs
  - Improving language and literacy skills
  - Mentoring and early career development
- Technology Programs
  - Build the skill sets of residents through technology tutors
  - Helping residents use such technology as Skype and email services
  - Technology clubs
- Healthcare Programs
  - Training programs for residents
  - Physical activities that respect the strengths, abilities, and challenges of each generation
  - Training programs in partnerships with post-secondary schools allowing them to practice clinical skills (checking blood pressure, vital signs, intake interviews, and providing physical and occupational therapy services)
  - Nutrition classes
  - Cooking classes

Solid design principles must be incorporated into the design of an intergenerational housing development. Given that there is intended to be multiple generations living and working within this one facility, the design must meet all their demands and requirements. The intended facility is to be divided into the following five sections;

1) Multigenerational Housing accommodating up to three generations (grandparents, parents, and children).
    a. Bedrooms must provide private space.
    b. Main entrances must give all generations a sense of independence.
    c. Each unit is to give a sense of place, transition, and privacy.

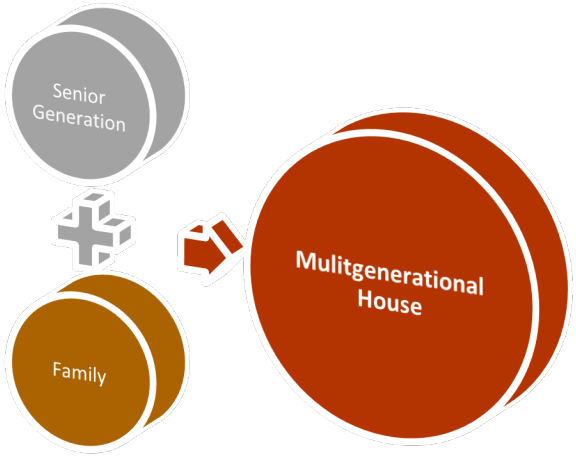

Figure 101. Image by Allan Colpitts

2) Overall Design principles.
    a. Optimize site context
    b. Positive visual effects and relationships.
    c. Design to Universal Design principles to promote flexibility in use.

3) Dedicated affordable housing options for both low-income seniors and students (Calgary, 2012).
    a. Build affordable housing in areas with good access to amenities and services.
    b. Create affordable housing that is indistinguishable in quality from other aspects of the project.
    c. Units are to be modest in size and vary between 70 -90 m2.
4) Component for more aged family members that require advanced nursing care 24 hours a day (Wrublowsky, 2017).
    a. Access to outdoors.
    b. Promote privacy and control over personal space but allow space for assistance from nursing care or family members.
    c. Residential style of kitchen for a group or family members to cook meals for their relative.

   d. Keep a residential character to the units and avoid institutional appearance as much as possible.
   e. Incorporate assistive measures to aid in the independence of the residence.
5) Support spaces for the various intergenerational community programs.

The term 'Universal Design' has been formulated to help coalesce ageing in place design principles. Along with the 5 primary design principles noted above, the following universal design principles are to be incorporated into a intergenerational housing model. (Connell, et al., 1997):

1) Equitable Use – The design must be useful and marketable to people with diverse abilities.

2) Flexibility of Use – The design is to accommodate a wide range of individual preferences and abilities.

3) Simple and Intuitive Use – The use of the design must be easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

4) Perceptible Information – The design should communicate necessary information effectively to the user, regardless of surrounding conditions or the user's sensory abilities.

5) Tolerance for Error – The design must minimize hazards and the adverse consequences of accidental or unintended actions.

6) Low Physical Effort – The design can be used efficiently and comfortably and with a minimum of fatigue.

7) Size and space for approach and Use – The design should include appropriate space for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

CONCLUSION

This research is intended to determine the need for an intergenerational housing concept that would fit within the urban context in North America. The research has demonstrated that there are various demographic trends that indicate a growing population of those advanced in years. These demographics along with the social and financial implications indicate a growing demand for a development of this nature. The apparent benefits to the senior generation along with the sandwich generation and the younger generation will no doubt continue to grow the desire for a housing model that can deliver the appropriate level of engagement and interactions amongst the three generations despite the age differences. Whether it is multigenerational or intergenerational, there is little difference in the positive effects that can be experienced by intermingling various generations. For this thesis, the ultimate design will accommodate multiple generations, whether they be family groups or community residents.

By considering the research as part of this thesis and through comparison of various precedents, the need and demand for an intergenerational housing model have been established along with the various program elements that would make for a successful project. Five key principles will drive the design concept forward, these include;

1. ***SAFETY*** - Provide a safe living space for people of all ages to interact, collaborate and explore the values of each generation on an ongoing basis.

2. ***DIVERSITY*** - Enable people of different ages to live side by side as good neighbours in a purposeful effort to share their talents and resources, develop meaningful relationships and support each other.

3. ***ENGAGEMENT*** - Foster programs, policies, and practices that promote engagement, cooperation, interaction, and exchange between residents of different generations.

4. ***SUPPORTIVE*** - Provide adequately for the safety, health, education and necessities of life for people of all ages, by taking a partnership of community-led approach to the delivery of services and/or activities.

Figure 102. Three generations togther.

5. ***COMMUNITY*** - Provide private spaces and communal areas intended for the individual and collective use.

The next stage in this thesis is to compile this research into a practical demonstration of how this program and its various components can be accommodated within an urban site in Edmonton, Alberta. This next stage will encompass the rationale for a selected site, a functional program highlighting the various components of this research, followed by design to demonstrate proof of concept.

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