COURTYARD URBANISM
A MODEL FOR NORTH AMERICAN CITIES?

By

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

The courtyard has endured as one of the most widespread architectural forms, transcending regional, historical and cultural boundaries to mediate open and closed, inside and outside, social constraints and environmental requirements. What role can the courtyard play in today's dense urban setting?

Historically the courtyard was the center of domestic life, production and activity for the family. As domestic priorities changed within the industrial setting of a North American city, the courtyard lost its value. The courtyard therefore has struggled to be realized as an effective building typology in North America. While the courtyard has historically been used for high density low rise housing, such as the Cerda block in Barcelona, building construction, such as in contemporary Toronto, is dominated by high-rise high density building typology.

As Toronto's population increases the city is seeing an influx of high-rise condo development. 55,616 units were built between 2009-2013. Meaning 79% of all residential units completed in this time were condos. The problem becomes that the rapid urbanization of these high rise towers increases density and overloads resources to the point where infrastructure cannot keep up. Through city initiatives such as the "Avenue and Mid Rise Study," the city of Toronto has tried to establish a mid rise building typology to accommodate a gradual transition of density and allow infrastructure to catch up. In parallel, these high rise condo towers fail to incorporate public green spaces which has reduced the number of green space per person down to 12m². With the increase in density over the coming years, and no new parks being added to the downtown core, this number will start to diminish.

This thesis aims to create a framework to test Europe's courtyard typological attributes against Toronto's main street development strategy in order to balance green space and density for future development. Toronto's main street frontage serves as a formal generator for the courtyard type and acts as a system of organization for a typological study matrix showing possible design outcomes within a volumetric framework. Through the application of parametric methodology using GIS (Geographic Information Systems) across Toronto to assemble sites suitable for development, three site types are considered as the references for the building variations. Providing a new approach to a traditional urban design problem of accommodating future growth in the city.

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INTRODUCTION

With Toronto‘s population projected to increase 23% (750,000 people) from 2.7 million to 3.45 million in the next 20 years, questions of how to distribute this density in an appropriate manner is becoming an issue that is in desperate need of discourse . Due to population growth of almost 6% (176, 080 people) in the past 5 years, Toronto has seen an influx of housing in order to accommodate this rapid growth. The city has proposed to target growth and intensification areas to the cities “Avenues“ or “Main Streets“. These “Avenues“ are considered to be important arterial corridors along major streets where re-urbanization is anticipated to create new housing and work opportunities. Each Avenue is unique and will need its own specific program in order to envision a plan that addresses; how the streetscape and pedestrian environment can be improved, where public open space can be created and existing parks improved and where trees should be planted and how the road allowance can be optimized and transit service enhanced. This densification of Toronto‘s main streets can be implemented gradually allowing infrastructure and funding to materialize over time.

Running in parallel to the issue of densification in Toronto is its severe lack of green space in the downtown core. The city of Toronto at the moment boasts that it has over 1600 public parks that cover 8000 hectares or roughly 13% of the city‘s land area. When broken down, this number only accounts for about 12m² per person of green space. According to Evergreen Canada, Toronto has the lowest allocation of green space per person in Canada. Compare this with a City like New York that has nearly double the amount of green space per person (23.1m²) and has more than double of Toronto‘s population density (10,725 people/km²). The World Health Organization suggests that an optimal amount of green space per person is between 10m²-15m² while Evergreen Canada suggests 27.9m ² of public green space in order to have a healthy, livable community is. Toronto‘s parks and recreation budget is only about 2.8% of the total municipal budget, lowest of all Canada‘s urban municipalities. This suggests that the priority of green space within the city is bottom of the list at a time where Toronto is at a tipping point of growth. If this problem of green space is not addressed the influx of population will start out-pacing the creation of public green spaces and the number will only decrease. This issue can be attributed to the high rise condo epidemic that is currently dominating Toronto‘s urban fabric.

Toronto saw 70,400 residential units completed between 2009 and 2013 and 79% (55,616) of these units were condominium apartments. Condo's as high rise building have accounted for over 60% of the supply of overall new homes in Toronto since 2011, compared to just 28% in 2000. Most towers bring high density populations to areas which are already deficient in publicly accessible space. Not to mention the impact of rapid densification on infrastructure, many of these condo towers are being constructed so quickly that local infrastructure can't keep up. These towers offer no connection to the streetscape acting as sitting objects in a field. The only spaces provided for social , ecological and cultural interactions are scattered balcony projections that offer none of these benefits. This creates a situation where the residents are isolated from the surrounding context and offer no value to the neighbourhood that surrounds them. 41% of the population already live in towers of this nature. Moving forward there has to be a design intervention to facilitate cultural, ecological and social needs. The city has implemented a mid-rise planning strategy to facilitate this growth called the "Avenues and Mid-rise Building Study".

The study suggests that the Avenues amount to approximately 324 kilometers of property frontage. About 200 kilometers of this frontage can theoretically be redeveloped through mid-rise built form. If half of these properties were developed over the next twenty years through mid-rise built form, the Avenues could accommodate a new population of approximately 250,000 residents.[1] Mid-rise redevelopment of the Avenues therefore has the ability to address a significant portion of the City's anticipated growth needs over the next twenty years. They classify mid-rise buildings to be no taller than the width of the street or 5-11 storeys. Working within the parameters and setbacks highlighted in this study there seems to lack the integration of publicly accessible green space. Although the Toronto green roof by-law requires all new buildings to have 20%-60% of their roof covered by a green roof, depending on the gross floor area, nowhere is there an emphasis on making this space accessible to the public. Furthermore nowhere in the study plan or Toronto Green Standards is a requirement for new buildings to provide publicly accessible green spaces to the city. With no strict zoning or by-law requirements, Toronto 's green spaces will continue to diminish.

While mid-scale typology offers a better transition from low rise to high rise, the idea of open space should be incorporated within the cities framework to better facilitate the needs of its ever increasing population. In order to build on the cities initiatives this thesis aims to showcase a mid-scale typological study that incorporates new design alternatives along Toronto's main streets. This study will test qualitative and quantitative parameters such as, height, program, daylight, density and accessibility. An emphasis on European block typology ie. the courtyard and publicly accessible green space will weave a narrative through the design iterations.

THESIS STRUCTURE

CHAPTER 1 is a look into the "Avenues and Mid Rise Study" and focuses on the key attributes that have the greatest impact on the architectural language along Toronto's main streets. A brief summary of 9 factors is followed by a critique of the study which highlights the issue of density driven design that faces the cities future. Chapter 1 also looks at current development along the avenues through GIS analysis to highlight the past present and future development and demographics associated with each avenue. Comparing each neighbourhood within the study area surrounding the avenue with Toronto as a whole. Running parallel to the study of the avenues is the green space narrative that will weave through the project, enforced by a GIS driven analysis on the neighbourhoods fronting the avenues mentioned earlier in the chapter.

CHAPTER 2 dives into Toronto's rich main street history, looking at historical development of its built urban form. This section also introduces the idea of what type of growth should occur along Toronto's main arterial corridors with respect to architectural typology. Typology through architectural precedent and investigation and analysis of such typology. Furthermore it questions the idea of introducing a new type to Toronto's existing urban framework.

CHAPTER 3 begins the analysis of the downtown Toronto study area. Using GIS tools, this chapter introduces a viability index that produces sites along Toronto's main avenues. Ten qualitative parameters are input in order to filter out the best possible site for the accommodation of future growth. The outcome of the GIS script produces combinations that narrow down the search field based on ideal parameters for mid-scale building typology.

CHAPTER 4 addresses the information of the previous section and generates a design matrix based on rules that are set for each site "type." Three site "types" initiate the testing of mid-scale typology where the end results are compared analytically.

CHAPTER 5 compiles all previous methods of design, narratives, urban generator, parameters and precedents and selects one outcome from the matrix to showcase a potential solution for future mid-scale development on Toronto's main streets that also incorporates green space.

01/ CITY DEVELOPMENT

Avenues & Mid-Rise Buildings Study

Brook McIlroy Planning + Urban Design/Pace Architects
with
E.R.A. Architects
Quadrangle Architects Limited
Urban Marketing Collaborative

May 2010

AVENUE & MID-RISE BUILDING STUDY

The introduction of the Avenue and Mid-Rise Buildings Study by the city of Toronto in 2010 has introduced a series of guidelines to incorporate mixed-use buildings back to its main streets. The objective of the study was to establish urban design guidelines that would encourage intensification along the Avenue's while maintaining the fabric and character found along its main streets. Previous attempts of similar framework such as "Building on Main streets,1991 was considered too rigid and limiting to developers. The new study intends to provide an expedited approvals process, update zoning that reflects the Official Plan and provide Compliance Alternatives for constrained sites. The study acknowledges that existing zoning constrains the developer from building on the Avenues because of its lengthy and expensive approval process. The recommendation therefore comes from the introduction of Performance Standards through zoning and urban design guidelines. Implementing the Performance Standards highlighted in the study becomes imperative to providing certainty to the public and the development community. They help encourage re-urbanization through mid-rise typology along the Avenues.

The study concludes with the discussion of potential problems and "compliance alternatives" that may address a solution. The time and costs associated with obtaining approvals in the context of zoning that is out-of-date with the Official Plan can be lengthy and considerable enough to dissuade developers from considering mid-rise building development as viable.[2] As a result, the development community has recently focused its attention on either low-rise townhouse projects which may fall within existing zoning permissions or high-rise projects which involve same costly approvals process as mid-rise projects-but costs can be better absorbed within larger projects." This trend toward high-rise development is more prevalent than ever. The study encourages the use of compliance standards that can be referenced early on in the development process to allow architects and developers a greater chance for achieving the city standards. A few examples of proposed compliance alternatives include: Innovative solutions for parking, lower parking requirements for visitor parking to encourage developers to come up with better solutions, adjacent bike posts should be included toward biking requirements to encourage cycling, indoor amenity space should not be required inside mid-rise development and rather put towards existing surrounding spaces already prevalent along its Avenues. These are only a few that may help encourage growth along the Avenues.

This thesis intends to identify the key factors from these performance standards which are deemed critical to the development for mid-rise typology along Toronto's Avenues. These factors have the greatest impact on the architecture and its formal language. It is imperative to understand and work within the existing framework laid out by the City in order to rethink what the true Torontonian block is, where the Avenue is not only a midscale highly intensified mixed used corridor but carries a quality only parallelled by its neighbourhoods.

KEY PERFORMANCE STANDARDS

1. Maximum Allowable Height
The maximum allowable height of buildings on the Avenues will be no taller than the width of the Avenue right-of-way, up to a maximum mid-rise height of 11 storeys (36 metres).

2. Minimum Building Height
All new buildings on the Avenues must achieve a minimum height of 10.5 metres (up to 3 storeys) at the street frontage.

3. Minimum Ground Floor Height
The minimum floor to floor height of the ground floor should be 4.5 metres to facilitate retail uses at grade.

4A. Front Façade: Angular Plane
The building envelope should allow for a minimum of 5-hours of sunlight onto the Avenue sidewalks from March 21st - September 21st.

4B. Front Façade: Pedestrian Perception Step-back "Pedestrian Perception" step-backs may be required to mitigate the perception of height and create comfortable pedestrian conditions.

4C. Front Façade: Alignment
The front street wall of mid-rise buildings should be built to the front property lines or applicable setback lines.

5A. Rear Transition to Neighbourhoods: Deep
The transition between a deep Avenue property and areas designated Neighbourhoods, Parks and Open Space Areas, and Natural Areas to the rear should be created through setback and angular plane provisions.

5B. Rear Transition to Neighbourhoods: Shallow
The transition between a shallow Avenue property and areas designated Neighbourhoods, Parks and Open Space Areas, and Natural Areas to the rear should be created through alternative setback and angular plane provisions.

5C. Rear Transition to Employment Areas
The transition between an Avenue property and areas designated Employment Areas to the rear should be created through setback and step-back provisions.

5D. Rear Transition to Apartment Neighbourhoods
The transition between an Avenue property and areas designated Apartment Neighbourhoods to the rear should be created through setbacks and other provisions.

6. Corner Sites: Heights & Angular Planes
On corner sites, the front angular plane and heights that apply to the Avenue frontage will also apply to the secondary street frontage.

7A. Minimum Sidewalk Zones
Mid-rise buildings may be required to be set back at grade to provide a minimum sidewalk zone.

7B. Streetscapes
Avenue streetscapes should provide the highest level of urban design treatment to create beautiful pedestrian environments and great places to shop, work and live.

8A. Side Property Line: Continuous Street Walls
Mid-rise buildings should be built to the side property lines.

8B. Side Property Line: Limiting Blank Side Walls
Blank sidewalls should be designed as an architecturally finished surface and large expanses of blank sidewalls should be avoided.

8C. Side Property Line: Step-backs at Upper Storeys
There should be breaks at upper storeys between new and existing mid-rise buildings that provide sky-views and increased sunlight access to the sidewalk. This can be achieved through side step-backs at the upper storeys.

8D. Side Property Line: Existing Side Windows
Existing buildings with side wall windows should not be negatively impacted by new developments.

8E. Side Property Line: Side Street Setbacks
Buildings should be setback along the side streets to provide transition to adjacent residential properties with front yard setbacks.

9. Building Width: Maximum Width
Where mid-rise building frontages are more than 60 metres in width, building façades should be articulated or "broken up" to ensure that façades are not overly long.

10. At-Grade Uses: Residential
Where retail at grade is not required, and residential uses are permitted, the design of ground floors should provide adequate public/private transition, through setbacks and other methods, and allow for future conversion to retail uses.

11. Setbacks for Civic Spaces
In special circumstances where civic or public spaces are desired, additional setbacks may be encouraged.

12. Balconies & Projections
Balconies and other projecting building elements should not negatively impact the public realm or prevent adherence to other Performance Standards.

13. Roofs & Roofscapes
Mechanical penthouses may exceed the maximum height limit by up to 5 metres but may not penetrate any angular planes.

14. Exterior Building Materials
Buildings should utilize high-quality materials selected for their permanence, durability and energy efficiency.

15. Façade Design & Articulation
Mid-rise buildings will be designed to support the public and commercial function of the Avenue through well articulated and appropriately scaled façades.

16A. Vehicular Access
Whenever possible, vehicular access should be provided via local streets and rear lanes, not the Avenue.

16B. Mid-Block Vehicular Access
For mid-block sites without rear lane access, a front driveway may be permitted, provided established criteria are met.

17. Loading & Servicing
Loading, servicing, and other vehicular related functions should not detract from the use or attractiveness of the pedestrian realm.

18. Design Quality
Mid-rise buildings will reflect design excellence and green building innovation, utilizing high-quality that acknowledge the public role of the Avenues.

19A. Heritage & Character Areas
All mid-rise buildings on the Avenues should respect and be sensitively integrated with heritage buildings in the context of Heritage Conservation Districts.

19B. Development in a HCD
The character and values of HCDs must be respected to ensure that the district is not diminished by incremental or sweeping change.

19C. Development Adjacent to a Heritage Property
Development adjacent to heritage properties should be sensitive to, and not negatively impact, heritage properties.

19D. Character Area: Fine Grain Fabric
New mid-rise buildings in Character Areas that have a fine grain, main street fabric should be designed to reflect a similar rhythm of entrances and multiple retail units.

19E. Character Area: Consistent Cornice Line
Buildings in a Character Area should maintain a consistent cornice line for the first step-back by establishing a "datum line" or an average of the existing cornice line.

19F. Character Area: Vertical Additions
Additions to existing buildings is an alternative to redevelopment projects on the Avenues, and should be encouraged in areas with an existing urban fabric.

19G. Character Area: Other Considerations
Additional "context sensitive" design and massing guidelines should be considered for development in Character Areas.

MAXIMUM ALLOWABLE HEIGHT
PERFORMANCE STANDARD #1

The first performance standard that is critical to identify is "maximum allowable height." The city defines mid-rise buildings as no taller than the street right-of-way or between 5-11 storeys. The official plan documented "average" right-of way widths along its major Avenues and identified seven different widths: 20, 23,27,30,33,36 and 45 meters. From those seven widths the most common four were identified as: 20, 27, 30 and 36 meters. Since tall buildings are defined as buildings which are taller than the right-of way width they are located on (design criteria for review of tall building proposals), the city concludes that mid-rise buildings will never exceed 11 storeys or 36 meters.

The map included shows the boundary framework in which this thesis is situated along with a colour coded highlight of the avenues within the boundary and their right-of way-widths. This map helps identify key focus areas and the potential for the biggest benefit of future growth through mid-scale density along Toronto's main corridors.

The table below identifies the maximum allowable heights based on R.O.W width. The optimal site conditions, as identified by the plan, in order to achieve the heights seen in table (2) minimum lot depths are required as per table (4). The mid-rise plan emphasized that the depths shown here assume the integration of all applicable performance standards (4,5,7) and proposals that don't comply, will not be accepted. This maximum height allowance supersedes other angular plane restrictions which could conflict with its height.

It is for this reason that maximum allowable height is a determining and key factor in order to maintain a sustainable mid-scale for future growth

Table 4

R.O.W. Width	Lot Depth
	Ideal Minimum
20m	32.6m
27m	41.0m
30m	44.6m
36m	51.8m

Assumes a depth of 11.6 metres at the uppermost height per R.O.W. (using a setback of 7.5m & 45-degree angular plane from 10.5m above the setback).

Table 2

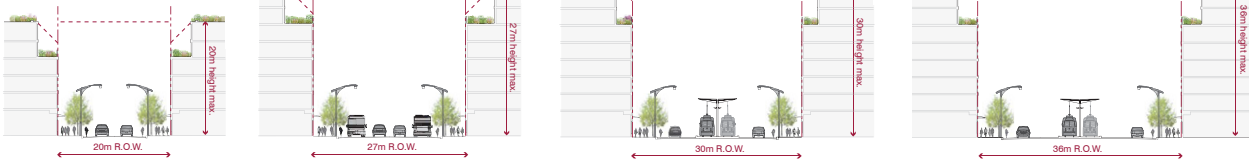
R.O.W. Width[1]	Mixed-Use		Commercial	
	storeys	height (m)[2]	storeys	height (m)[3]
20m	6	19.5	5	18.9
27m	8	25.5	7	26.1
30m	9	28.5	8	29.7
36m	11	34.5	9	33.3

Assumptions

1 - R.O.W. widths as identified in Official Plan Map 3

2 - Mixed Use heights assume 4.5m for ground floor and 3.0m for all floors above

3 - Commercial heights assume 4.5m for ground floor and 3.6m for all floors above



Maximum allowable height is determined by the width of the right-of-way (Note, in some cases, where sidewalk width is not sufficient, front setbacks from the property line will be necessary. This will not affect the overall height or angular plane provisions applied to the building).

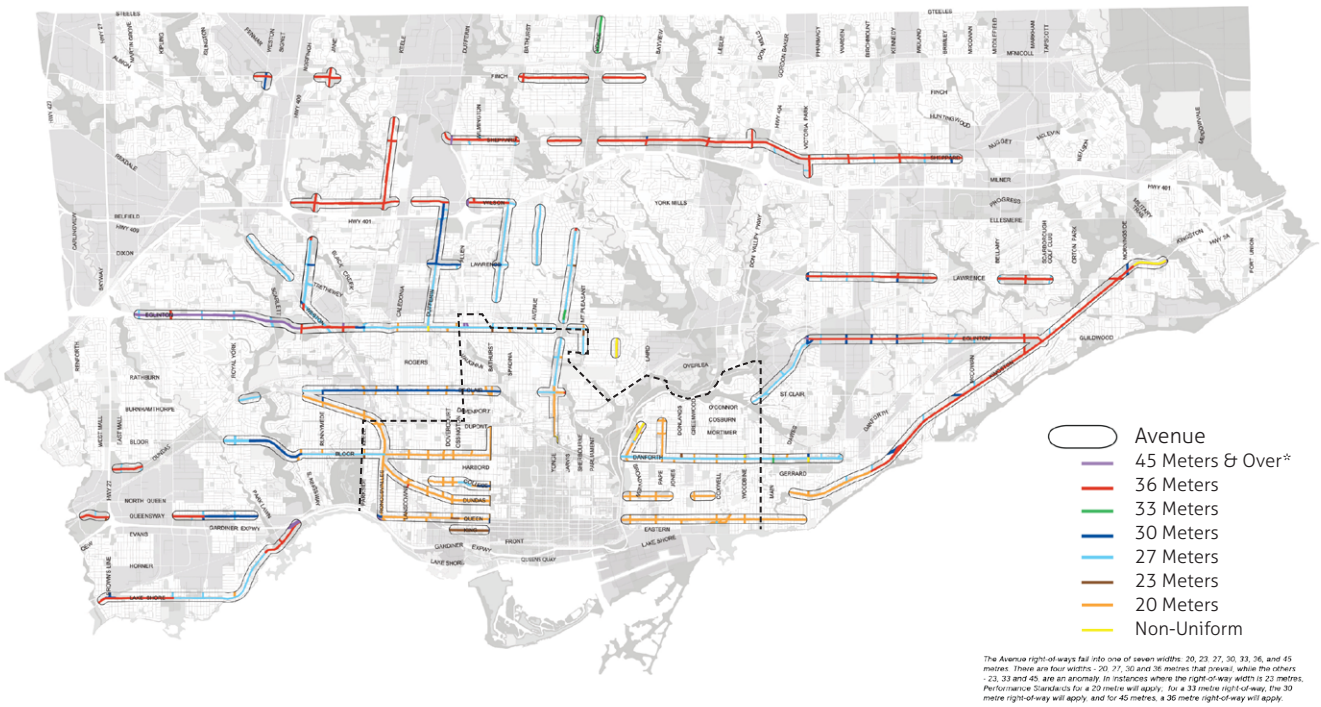
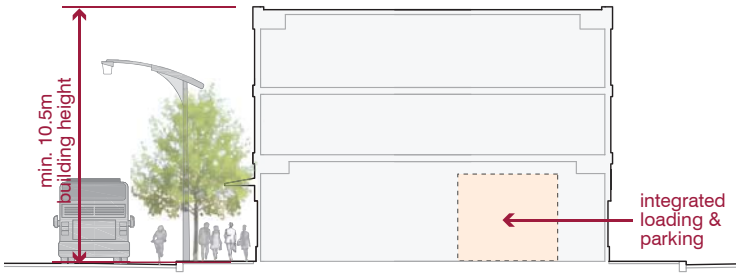


Figure 1-2 Avenue width map with highlighted boundary of the study area

Figure 1-1 **Left:** Table and diagrams showing right of way width identified in the Official plan for Toronto's Avenues.

MINIMUM BUILDING HEIGHT
PERFORMANCE STANDARD #2

Comparable to the maximum building height, the minimum building height is also required to maintain continuity along the Avenues. This means that any new building along the Avenue must achieve a minimum height of 10.5 meters (3 storeys) at street frontage. The plan explains that in order to maintain efficient development it must create a minimum building height to avoid low density development such as town-homes or one storey retail. This height also establishes a street wall that is consistent with existing Avenue buildings. The height creates a recognizable, pedestrian friendly scale along the Avenue to ensure the new buildings maintain a consistent language throughout the cities Avenues.



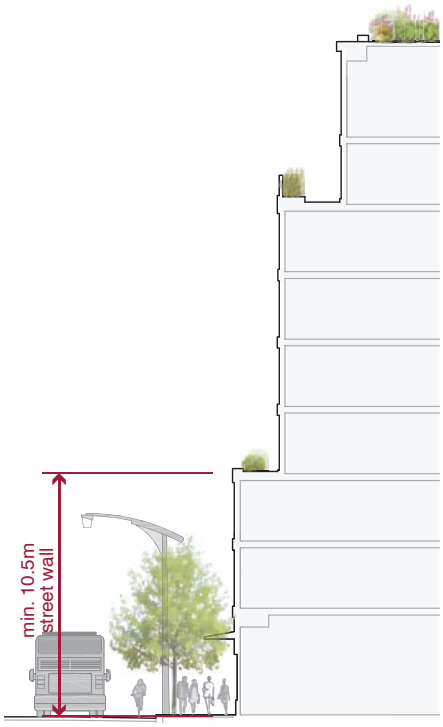
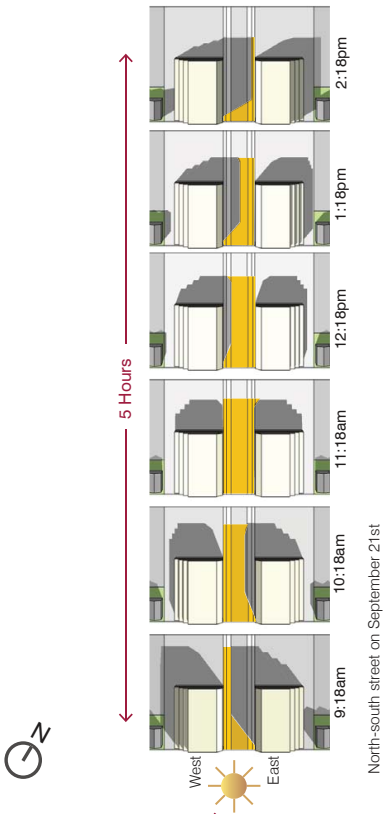


Figure 1-3 Diagram of street wall height minimum designated by the Avenue Plan

FRONT FACADE: ANGULAR PLANE
PERFORMANCE STANDARD #4A



The attention dedicated to more pedestrian friendly Avenues is highlighted by the amount of sun it receives throughout the day. Mentioned and researched thoroughly in "Sun, Wind, and Pedestrian Comfort: A Study of Toronto's Central Area" the book concludes that sunlight is essential for pedestrian comfort during the spring and fall equinox. The book also states that the avenues should maintain a minimum of 5 hours of sunlight based on a 1:1 ratio between building height and street width.[3] The performance standard creates a guideline for a building envelope that allows 5 hours of daylight to the opposite side of the sidewalk. In order to accommodate the required sunlight an angular plane is taken from the height equivalent of 80% of the R.O.W (right-of-way) width and subsequent storeys must fit within a 45 degree angular plane from this point. (See figure 1-4).

Buildings that abut the property line will need step back, at its upper storeys, to fit within the angular plane. In order to maintain consistency throughout the Avenues the plan emphasized that this Performance Standard should apply to diagonal streets, buildings that are setback from the property line and streets that have a grade difference from one side of the right-of-way width to the other.

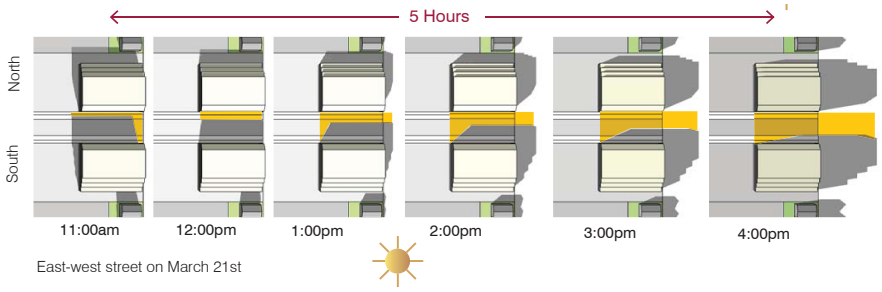


Figure 1-4 Daylight diagrams for the Avenues

REAR TRANSITION TO NEIGHBOURHOODS: DEEP
PERFORMANCE STANDARD #5A

Toronto's Official Plan emphasizes the need to protect its neighbourhoods, natural areas, parks and open space areas. Any new guidelines must also adhere to the policies enforced in the Official Plan and the mid-rise plan aims to protect these areas with appropriate transitions between the Avenues and adjacent residential communities.

The performance standard acknowledges the variation in depth sizes across a variety of lots along the Avenues. For this reason they've developed a 7.5 meter setback that allows for a two-lane (6 meter) and walkway (1.5 meters) or landscape buffer. This setback to the building face will include a 45-degree angular plane from the property line to a maximum height of 1:1. This ensures that the rear of the building will be lower and provide a better transition to the neighbourhoods behind. Where a site abuts an existing laneway, the laneway can be included within the angular plane. (see figure). The setback creates rear lane systems where they aren't currently available and allows for flexibility if a bigger landscape buffer is needed. The plan also suggests that no windows should be located 10 meters from the rear property line to minimize overlook as well as no balconies below the 10.5 meter suggested street wall.

The table shown demonstrates deep lots and any lot less than or equal to will equate to a shallow property.

R.O.W. Width	Definition of Deep Lot is
	greater than
20m	32.6m
27m	41.0m
30m	44.6m
36m	51.8m

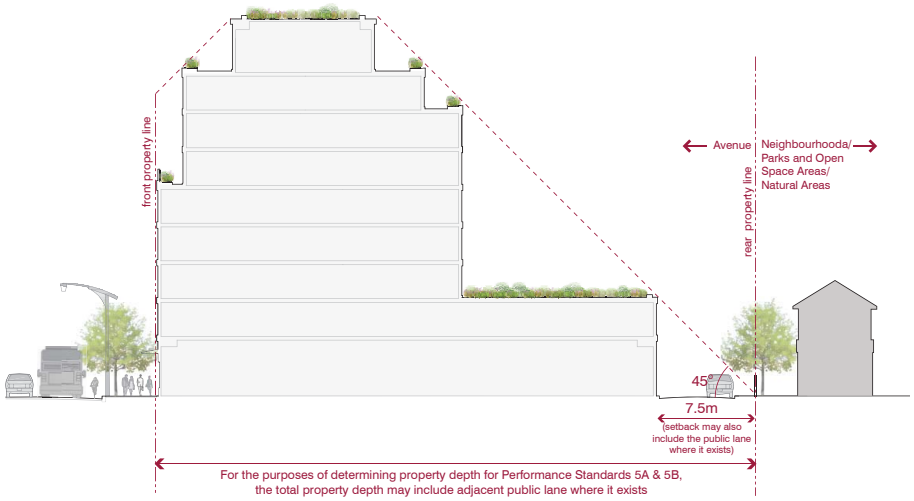


Figure 1-5 Diagram showing requirements for rear-transition to the neighbourhood :deep lots

REAR TRANSITION TO NEIGHBOURHOODS: SHALLOW
PERFORMANCE STANDARD #5B

The shallow property standard encompasses all guidelines mentioned in the deep lot performance standard. The main difference being that the 45 degree angular plane will be taken at a 7.5 meter setback from the rear property line starting from a height of 10.5 meters to a maximum of 1:1 (see figure). All other principals remain as previously mentioned in the deep lot standard and this standard only applies to properties that are equal to, or less than those shown in table. (see table below).

Enhancement Zone Option (Council Did Not Adopt Option)

Enhancement zones are parcels directly behind the fronting Avenue that contain a single detached home or semi-detached housing. (See figure 1-6) This zone provides the opportunity to help maximize the fronting Avenue's building height while maintaining the angular plane and rear setback requirements. The enhancement zone becomes the only option for shallow properties that aren't large enough to accommodate a 6 meter laneway, service area or parking. Without the consideration of an enhancement zone for lot properties shallower than 30 meters, a mid-rise development could not be achieved. The proposal suggested one residential property be considered in order to achieve the depth required. This option was luckily not adopted by council.

R.O.W. Width	Definition of Shallow Lot is
	equal to or less than
20m	32.6m
27m	41.0m
30m	44.6m
36m	51.8m

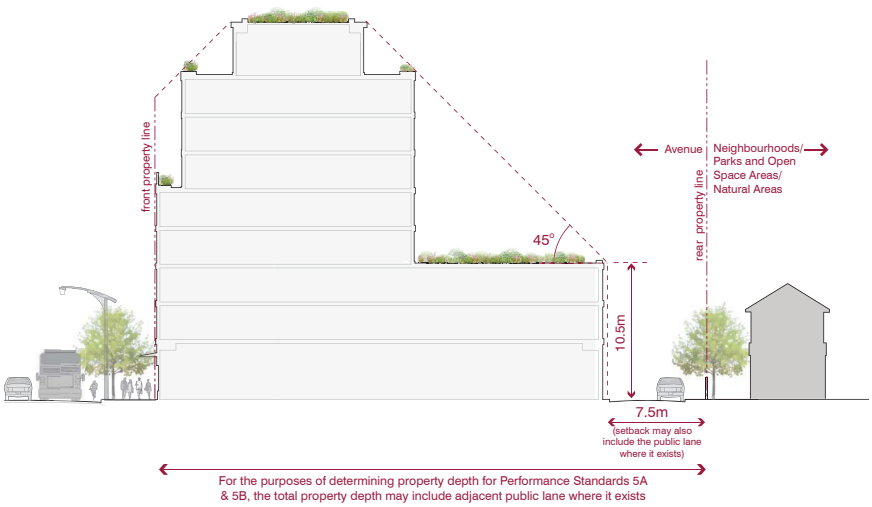


Figure 1-6 Diagram showing requirements for rear-transition to the neighbourhood: shallow lot

ROOFS AND ROOFSCAPES
PERFORMANCE STANDARD #13

The Avenue plan understands the need of mechanical services and designates that if a mechanical penthouse is needed, it must be kept within an angular plane in order to minimize shading and view from adjacent properties. This extension may exceed the maximum height allowed by 5 meters. If this cannot be achieved then the penthouse may need to be located within the uppermost storey of a building.

The city encourages that sustainable technologies, such as photo-voltaic panels, be promoted but will also need to be contained within the same angular planes.

Green Roof By-Law

Roofs that are not utilized by mechanical services should be developed as green roofs and be compliant with the Green Roof By-Law. Every building or building addition constructed after January 30, 2010, with a gross floor area of 2,000 square metres or greater shall include a green roof with a coverage of available roof space in accordance with the following chart. (see figure 1-7)

Gross Floor Area (Size of Building)	Coverage of Available Roof Space (Size of Green Roof)
2,000 - 4,999 m2	20%
5,000-9,999 m2	30%
10,000-14,999 m2	40%
15,000-19,999 m2	50%

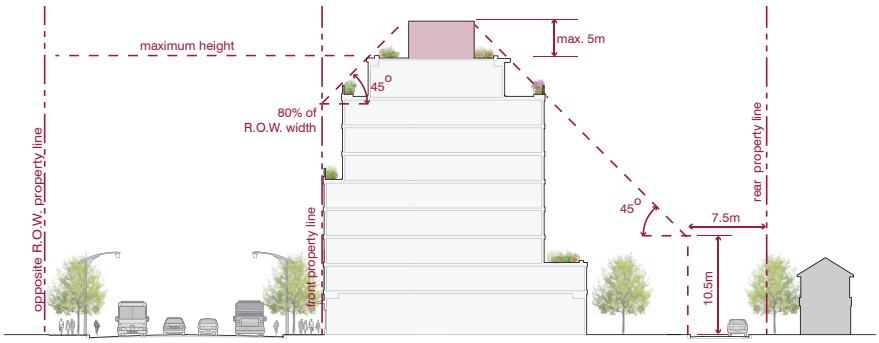


Figure 1-7 Diagram showing requirements for roof protrusions.

VEHICULAR ACCESS
PERFORMANCE STANDARD #16A

The Avenue plan encourages a more pedestrian friendly strategy. This strategy recommends that driveways, vehicular access, services and parking be located to the rear or side of the building. Side street access is recommended as the best alternative. While narrow sites and mid-block sites should seek laneway access.

If the only access is available is from the Avenue there may be options set in performance standard 16b for mid-block access. In order to improve access to these sites, it is suggested that the city acquire land to extend laneway systems to the full block length. Performance standards 5A-5C indicate guidelines for two-lane access laneways.

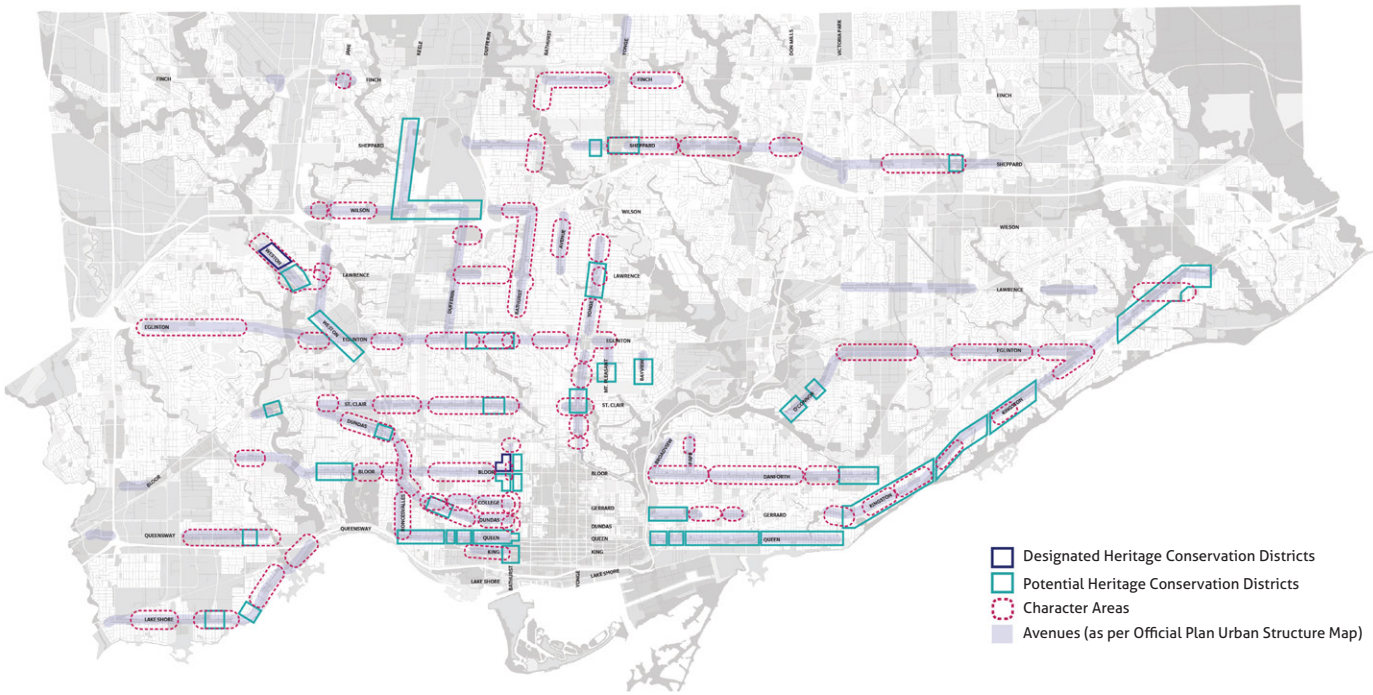
Figure 1-8 Diagram showing requirements for parking access.

HERITAGE & CHARACTER AREAS
PERFORMANCE STANDARD #19A

Within the context of Heritage Conservation Districts, the plan clearly states that the city has policies in place to protect it's valued conservation districts (HCDs). These include requirements on how to protect adjacent heritage elements while also having their qualities integrated into new developments. Buildings should be sympathetic to context and heritage characteristics such as step backs, cornice lines, facade articulation, building materials etc. All elements should be considered when planning new development.

Each Avenue has been studied to identify portions of Avenues where there is an existing character that should be considered in the development of new mid-rise buildings. Sections of Avenues may include significant built, cultural and natural resources. These can be designated, listed or simply identified as significant. Thus, a Character Area will be of significance for the Avenues if it demonstrates identifiable natural, built or cultural themes associated with the underlying historical development of the specific Avenue.

Figure 1-9 Map of character and heritage districts.



CHARACTER AREA: FINE GRAIN FABRIC
PERFORMANCE STANDARD #19D

The urban fabric found along Toronto's main streets contribute to the Avenues identity across the city. This fine fabric is often, due to its parcel separation, no wider than 6 meters. This articulation and rhythm of narrow fabric should remain consistent with adjacent facades. Any new development should create a similar pattern of retail frontages articulated through multiple entrances, windows, signage and canopies. This will help maintain a rhythm consistent with its existing contextual fabric throughout all Avenues

Figure 1-10 Images of Toronto's main street language.

The Mid-Rise Avenue Study clearly demonstrates the cities intent to accommodate future growth along its main Avenues. The city has also released an Addendum in April of 2016 revising the document to including new comments received from the Planning and Growth Management Committee meeting. The committee focuses on urban form and makes recommendations based on the development, planning and growth of the city. The feedback from the public, stakeholders, staff and council outline issues relating to clarity, flexibility, consistency of the document while offering recommended actions. The addendum focuses mainly on the performance standards I highlighted throughout the chapter to clarify their roles as well as a suggestion to rank performance standards based on priority with greater flexibility for use on a site specific basis. The summary of key concepts addressed throughout the chapter have also been flagged within the addendum. Feedback and recommended action can be found within the addendum.

While on one hand it is important to work within the framework of the city's plan it can also be said that the study itself is a stepping stone toward the potential offered by Toronto's main streets. This potential lies within the framework outlined in the study but , as demonstrated in the upcoming pages, is also limiting the architectural value of these sites and their development. In order to visualize the effects of this study, I've mapped out all ongoing and future development along ten key main streets to better understand its impact across the downtown area.

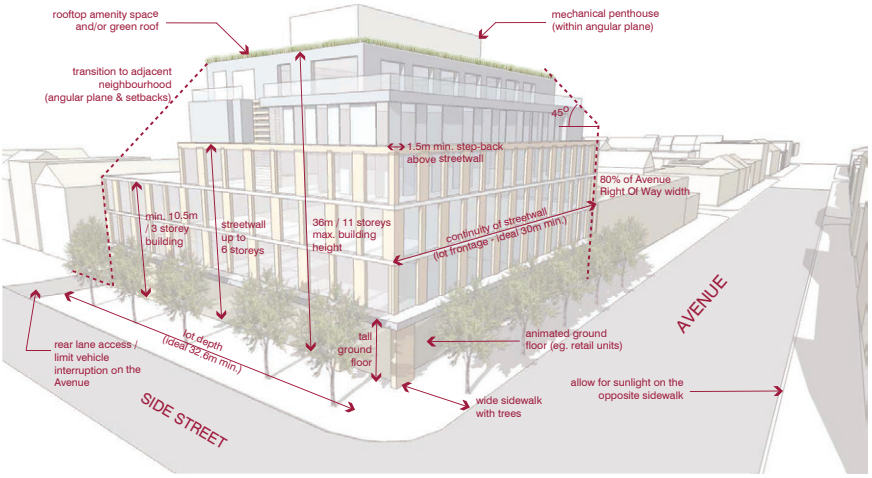


Figure 1-11 Top: is the avenue mid rise study diagram showing design guidelines implementation and result

Figure 1-12 Bottom: Nero Condos at 856 Dundas Street West showing the result of a proposal for a condo building that follows these exact guidelines

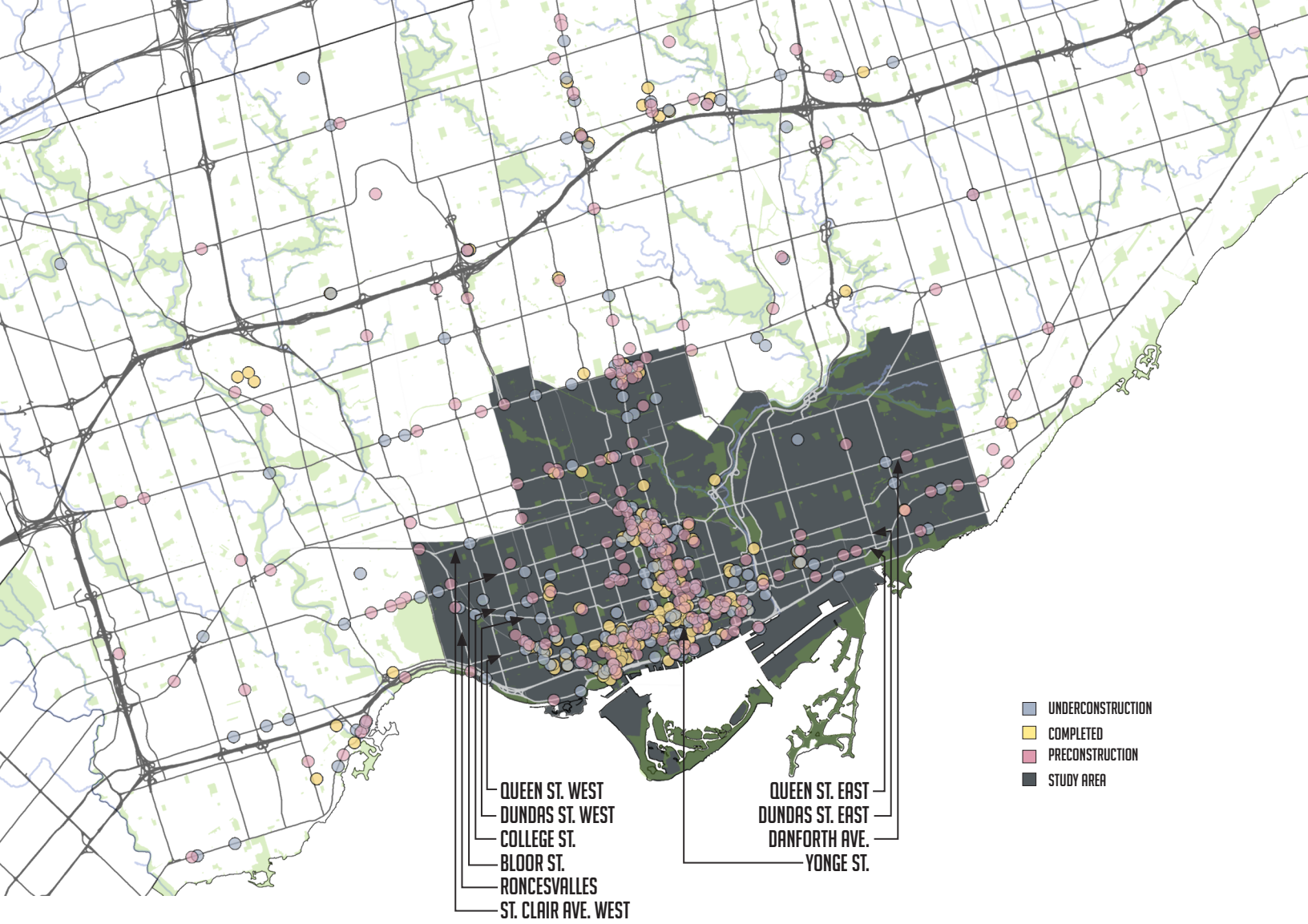


Figure 1-13 Map created with GIS showing development constructed, pre-construction and under construction for the City of Toronto since 2010. Study area focus highlighted in grey. Dataset provided by "Urban Toronto"

Figure 1-14 Map created in ArcMap using GIS. Highlighted Avenues in red with surroundong neighbourhoods and their respective number. Map created to calculate demographics surrounding the ten Avenues within the study area.

DEVELOPMENT ALONG THE AVENUES

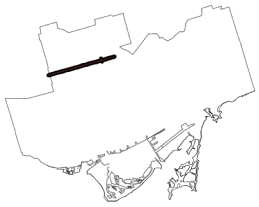
The framework laid out in the Avenue and Mid-Rise Study has started to influence development in the city since it's inception in 2010. These guidelines have started to take form along the Avenues in the years since. The goal in the following few pages is to illustrate the formal influence the study had on the buildings of the cities most popular main streets in an attempt to focus on the potential it may offer for growth and intensification.

In order to further understand the Avenues and effects associated to the study it was important to examine each Avenue in question to understand the type of development happening across the city. The following section will look at the ten avenues and categorize the development and type of buildings constructed, under construction or pre-construction. The map (see figure left) shows the location of all development in the city since the Avenue and Mid-rsie building study was implemented in 2010. This database of sites was collected by Urban Toronto which was then manually imported into ArcMap, a GIS (geographic information system) tool, in order to plot all the sites in their respective locations across the city. With built in information such as , construction status, year of completion and name of the buildings, it was critical to zoom into each relevant corridor and illustrate the effectiveness of Toronto's Official Plan.

The development identified in the following section also illustrates the demographics associated with each Avenue. Included is a key map of the Avenue, the neighbourhoods that surround it, the average population and a household type comparison of the avenue surrounding area compared to Toronto's. It also includes a small summary of studies initiated by the city at each respective avenue at the moment. The demographics comparison of household type lists four types. First is people that live in apartments of 5 storeys or more. Secondly are people that live in apartments of 5 storeys or less. Third are townhouses/row-houses and lastly are houses. This information was gathered by curating data from neighbourhoods surrounding the Avenues in question through information provided in datasets from the city through means of GIS. Figure (map left) shows the neighbourhoods with corresponding numbers and the Avenue's highlighted.

ST.CLAIR WEST DEVELOPMENT

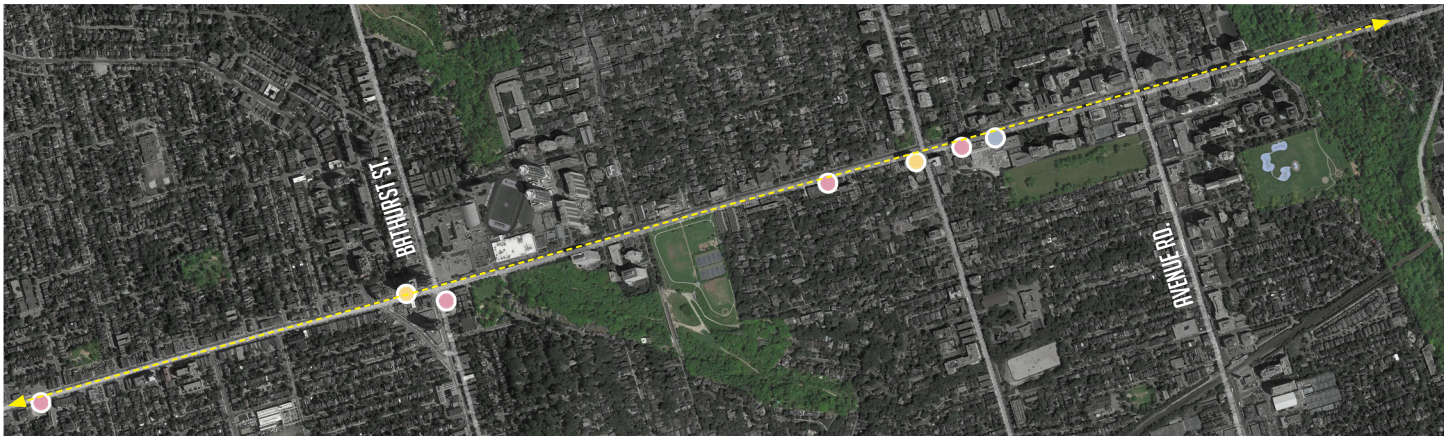
KEYMAP



NEIGH. AFF. = 94,96,97,101,106
AVG. POP. = 61,215

St. Clair Avenue West provides a unique case where the City of Toronto identified and conducted a comprehensive block by block analysis called the St. Clair Avenue Study (from Keele St. to Bathhurst Street). It's objectives were to determine appropriate height and massing, introduce transition strategies between new development and existing neighbourhoods, identify public realm improvements, make zoning recommendations that would accommodate future growth, provide parking strategies for the avenue and to develop urban strategies for the area. It is from this study that the "Enhancement Zone" concept, in the avenue study, was developed. (see city of Toronto website for more information.)

DEVELOPMENT MAP



829 St. Clair Ave W.
Nest Condos
Condo
Pre-Construction

501 St. Clair Ave. W.
Rise Condos
Condo
Pre-Construction

223 St. Clair Ave. W.
ZIGG Condos
Condo
Pre-Construction

129 St. Clair Ave. W.
Blue Diamond
Condo
Pre-Construction

111 St. Clair Ave. W.
Imperial Plaza
Condo
Under Construction

HOUSEHOLDS (NEIGHBOURHOOD)

38% live in apartment buildings of 5 or more storeys

28% live in apartment buildings of less than 5 storeys

12% live in row / townhouses

22% live in houses

VS.

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

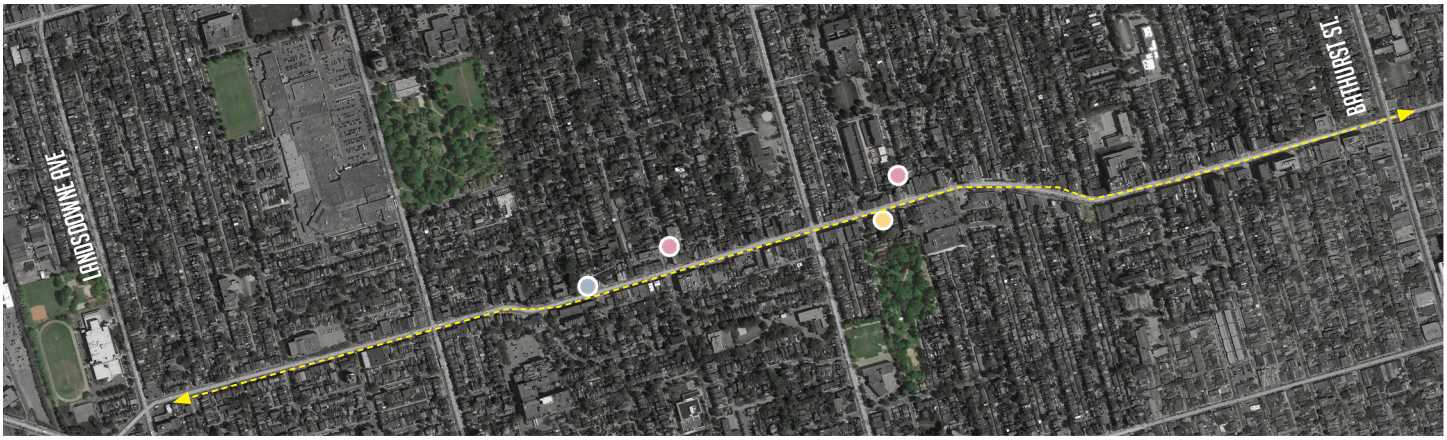
URBAN FABRIC

KEYMAP

NEIGH. AFF. = 80,81,83,84
AVG. POP. = 54,100

COLLEGE STREET DEVELOPMENT

The City of Toronto has targeted College Street to review the policy context for College Street from Bathurst Street to McCaul Street. The study addressed land Use, building scale and height and the public realm. The study is still ongoing but presentations have been made articulating the character areas, building massing, building articulation, recommendations on height and comprehensive studies identifying key factors for future development. While the area that this thesis is targeting deals with the avenue west of Bathurst Street to Landsdowne, the example set by the City to detail the area is a great first step to establishing future growth on College Street. (see city of Toronto website for more information.)



998 College St.
IT Lofts
Condo
Under Construction

455 Dovercourt Ave.
455 Dovercourt
Condo
Pre-Construction

456 Shaw St.
Jaedon Mews
Townhouse
Pre-Construction

HOUSEHOLDS (NEIGHBOURHOOD)

11% live in apartment buildings of 5 or more storeys

56% live in apartment buildings of less than 5 storeys

26% live in row / townhouses

7% live in houses

VS.

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

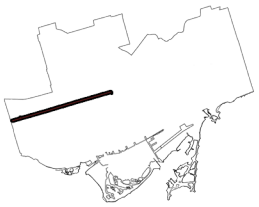
15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

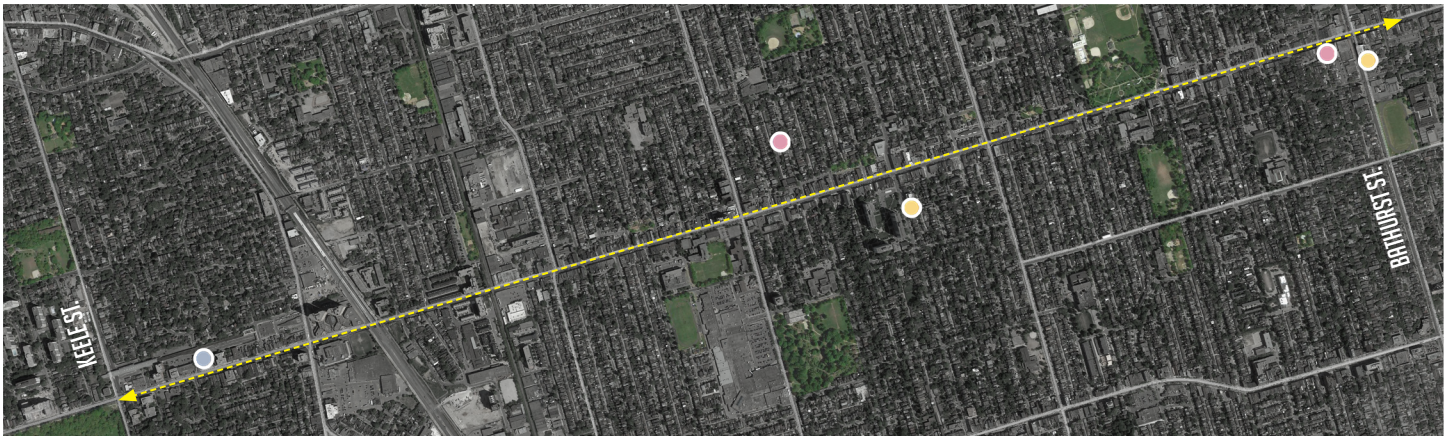
BLOOR STREET WEST DEVELOPMENT

The City of Toronto is undertaking an Avenue Study to assess the land uses, transportation and servicing infrastructure, community services and facilities, built form character and redevelopment potential for Bloor Street West between Keele Street and the Humber River.
This includes extensive community consultation and technical review in order to evaluate existing conditions, develop a vision for the study area and set out recommendations for an area-specific planning framework that will guide future development and infrastructure improvements. (see city of Toronto website for more information.)



NEIGH. AFF. = 80,83,87,88,93,95
AVG. POP. = 132,035

DEVELOPMENT MAP



ADDRESS:	1644 Bloor St. W.
NAME:	Address at High Park
TYPE:	Condo
STATUS:	Under Construction

	50 Bartlett Ave
	Lanehouse on Bartlett
	Townhouse
	Pre-Construction

	581 Bloor St. W.
	Mirvish Village
	Condo
	Pre-Construction

HOUSEHOLDS (NEIGHBOURHOOD)

33% live in apartment buildings of 5 or more storeys

38% live in apartment buildings of less than 5 storeys

18% live in row / townhouses

11% live in houses

VS.

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

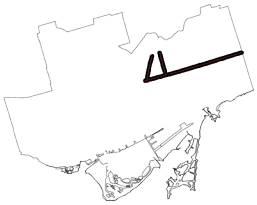
15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

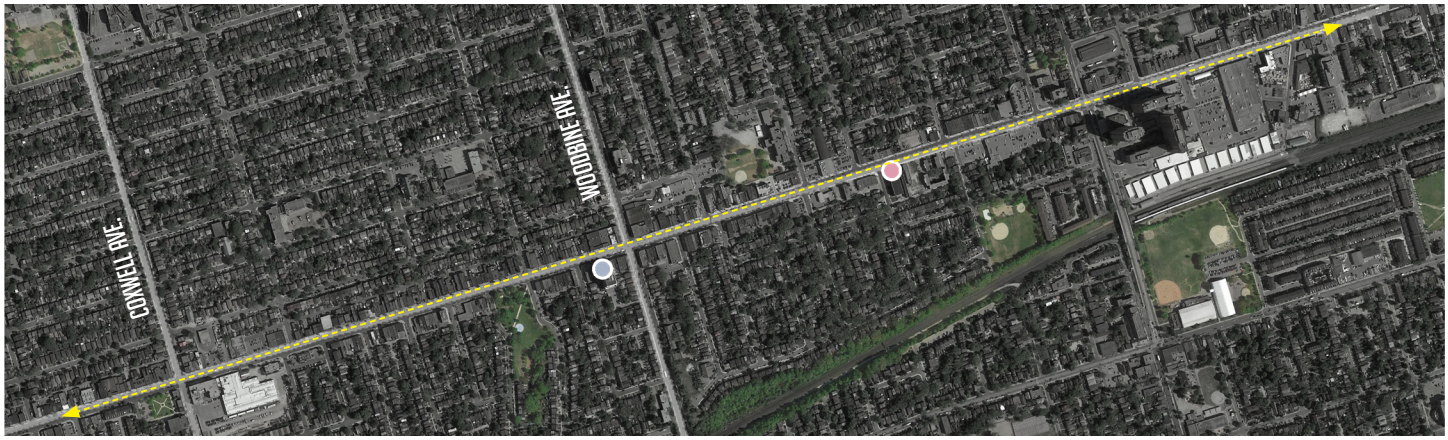
URBAN FABRIC

DANFORTH AVENUE DEVELOPMENT



NEIGH. AFF. = 62,64,66
AVG. POP. = 41,975

A comprehensive study of Danforth Avenue from Coxwell Avenue to Victoria Park Avenue was requested in 2014 by City Council to the City Planning Division. This study was initiated to implement new site and area specific policy, create urban design guidelines that would suppl ement the existing Avenues and Mid-Rise Building Guidelines, determine area demographics, identify public realm and streetscape improvements and outline areas of future investment to support growth. The area was finalized in February of 2017. (see city of Toronto website for more information.)



2055 Danforth Ave.
Carmelina Condos
Condo
Under Construction

2359 Danforth Ave.
On The Danforth
Condo
Pre-Construction

HOUSEHOLDS (NEIGHBOURHOOD)

16% live in apartment buildings of 5 or more storeys

30% live in apartment buildings of less than 5 storeys

35% live in row / townhouses

19% live in houses

VS.

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

DUNDAS STREET WEST DEVELOPMENT

Dundas Street West between Boustead Avenue and Sorauren Avenue. are to have had a study conducted in November of 2015. The intent is to clearly identify the character of the area, implement additional urban design guidelines, assess the heritage resources, improve streetscapes on Dundas Street West and potentially amend zoning/Official Plan. (see city of Toronto website for more information.)

NEIGH. AFF. = 81,83,84,86,88
AVG. POP. = 76,705

DEVELOPMENT MAP

2803 Dundas St. W.
Duke Condos
Condo
Pre-Construction

2376 Dundas St. W.
LNX Condos
Condo
Pre-Construction

383 Sorauren Ave.
Sorauren
Condo
Under Construction

1554 Dundas St. W.
Alto Rental Suites
Condo
Under Construction

856 Dundas St. W.
Nero Condo
Condo
Under Construction

HOUSEHOLDS (NEIGHBOURHOOD)

30% live in apartment buildings of 5 or more storeys

40% live in apartment buildings of less than 5 storeys

21% live in row / townhouses

9% live in houses

VS.

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

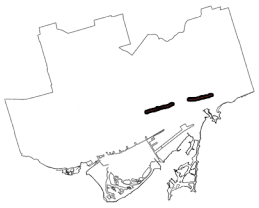
15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

URBAN FABRIC

DUNDAS STREET EAST DEVELOPMENT



There aren't any studies from the city being conducted along the dundas east corridor ,highlighted below, at the moment. Similar to the dundas west corridor, dundas east is still targeted to adhere to all official plan and avenue study guidelines for all new development .

NEIGH. AFF. = 70
AVG. POP. = 25,655

345 Carlaw Ave.
The Carlaw
Condo
Under Construction

1220 Dundas St. E.
The Taylor
Condo
Pre-Construction

HOUSEHOLDS (NEIGHBOURHOOD)

10% live in apartment buildings of 5 or more storeys

38% live in apartment buildings of less than 5 storeys

44% live in row / townhouses

8% live in houses

VS.

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

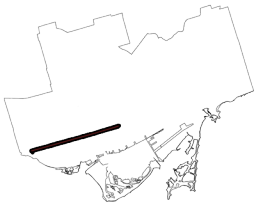
15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

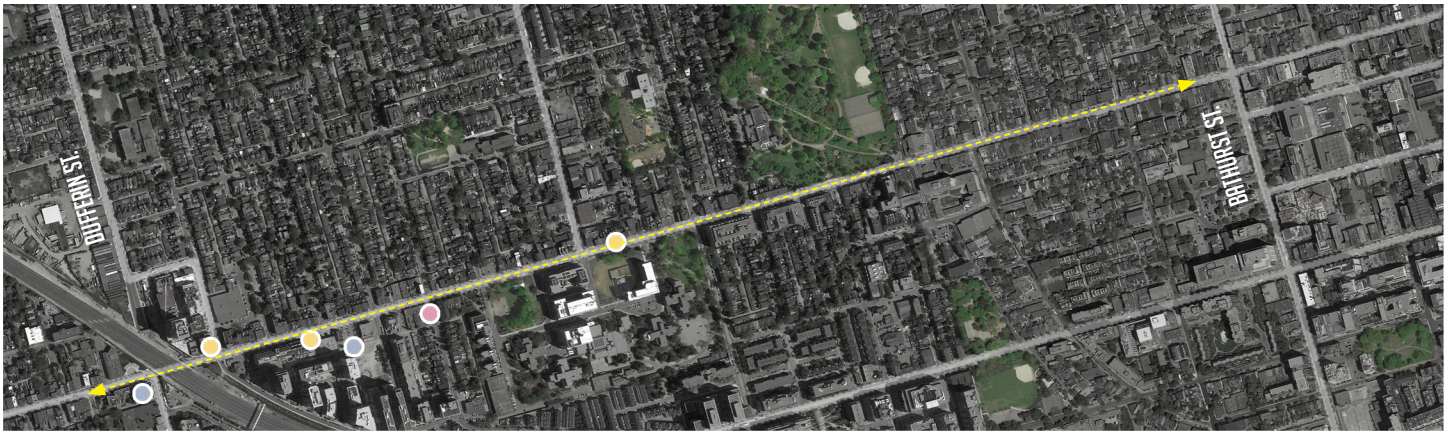
QUEEN STREET WEST DEVELOPMENT

In November of 2013, City Council requested that a planning study of Queen Street West, from Bathurst to Roncesvalles Avenue be conducted. Similar to previous plans this study intends to review context, built form, character areas, address transportation concerns and develop a vision for future growth. It may also address changes to planning framework to accomplish this. The study is still ongoing. (see city of Toronto website for more information.)



NEIGH. AFF. = 81,82,84,85
AVG. POP. = 71,165

DEVELOPMENT MAP



1205 Queen St. W.
Q Loft
Condo
Under Construction

48 Abell St
Epic on Triangle Park
Condo
Under Construction

1093 Queen St. W.
Ten93
Condo
Pre-Construction

HOUSEHOLDS (NEIGHBOURHOOD)

50% live in apartment buildings of 5 or more storeys

32% live in apartment buildings of less than 5 storeys

16% live in row / townhouses

2% live in houses

VS.

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

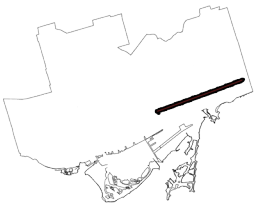
15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

URBAN FABRIC

QUEEN STREET EAST DEVELOPMENT



Queen Street East has seen seven application studies, plans and reports. The most comprehensive plan looked at an area fronting Queen street between Jimmi Simpson Park and Leslie Street. This study, finalized in 2014, was to establish urban design guidelines that could provide clarity to both the community and future developers regarding what was appropriate to be built with the study area. (see city of Toronto website for more information.)

NEIGH. AFF. = 63,65,70
AVG. POP. = 60,800

763 Queen St. E.
763 Queen St.
Condo
Pre-Construction

1001 Queen St. E.
1001 Queen St. E.
Condo
Pre-Construction

1075 Queen St. E.
Oben Flats
Condo
Under Construction

1331 Queen St. E.
George Condos
Condo
Pre-Construction

45 Connaught Ave.
Loft 45 Condos
Condo
Pre-Construction

1630 Queen St. E.
WestBeach Condos
Condo
Pre-Construction

1960 Queen St. E.
Lakehouse Beach
Condo
Pre-Construction

2000 Queen St. E.
Bellefair Kew Beach
Condo
Under Construction

HOUSEHOLDS (NEIGHBOURHOOD)

8% live in apartment buildings of 5 or more storeys

40% live in apartment buildings of less than 5 storeys

35% live in row / townhouses

17% live in houses

VS.

TORONTO (BOUNDARY)

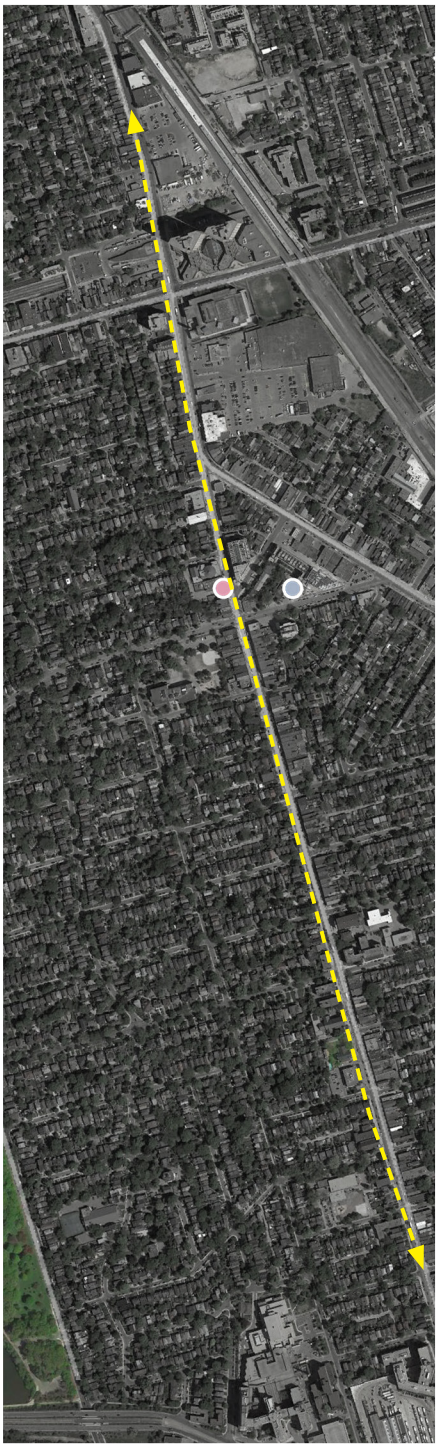
41% live in apartment buildings of 5 or more storeys

15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

RONCESVALLES AVENUE DEVELOPMENT



In November of 2015, City Council requested to review the Policy context for Roncesvalles Avenue between Queen Street West and Boustead Avenue and Dundas Street West between Boustead Avenue and Sorauren Avenue. The intent is to clearly identify the character of the area, implement additional urban design guidelines, assess the heritage resources, improve streetscapes on Dundas Street West and potentially amend zoning/Official Plan. The study clearly lays out the desire to strengthen and protect the area, create new public spaces and improve streetscape design. As of April 2017 the study can be found on the City of Toronto Website.

NEIGH. AFF. = 86
AVG. POP. = 15,030

430 Roncesvalles Ave.
The Roncy
Condo
Pre-Construction

24 Howard Park Ave.
Howard Residences
Condo
Under Construction

HOUSEHOLDS (NEIGHBOURHOOD)

24% live in apartment buildings of 5 or more storeys

40% live in apartment buildings of less than 5 storeys

25% live in row / townhouses

11% live in houses

VS.

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

YONGE STREET DEVELOPMENT

NEIGH. AFF. = 97,98,100,104
AVG. POP. = 71,490

The only study affecting Yonge street at this moment is based North of Finch Ave. and does not effect any development highlighted in this scope

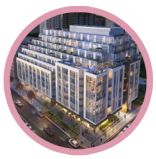
2131 Yonge St.
Art Shoppe Condos
Condo
Pre-Construction

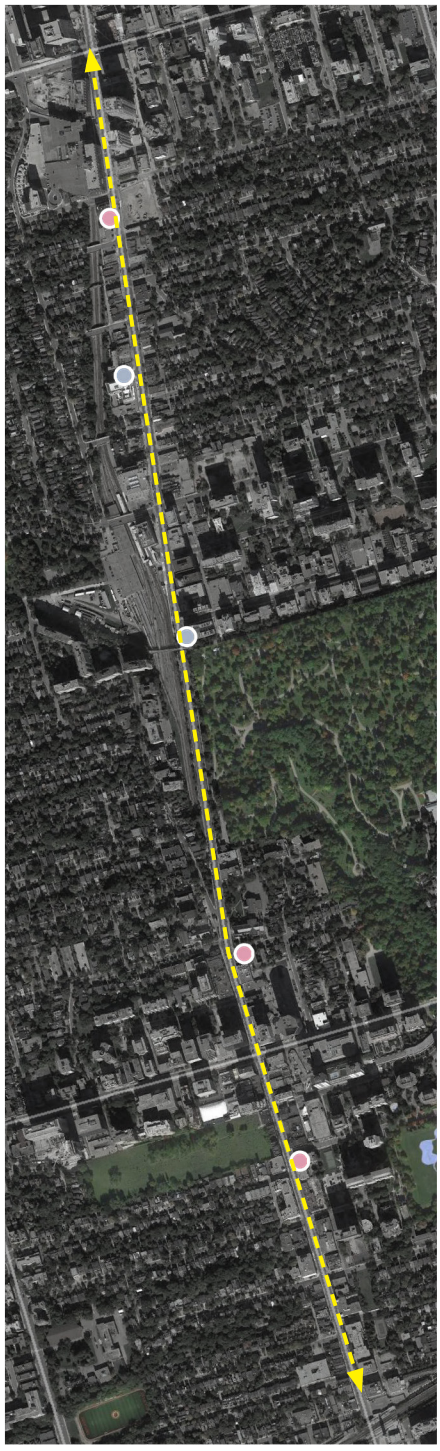
Glebe Road West
Allure Condos
Condo
Under Construction

1815 Yonge St.
MYC Merton
Condo

7 Heath St. E
7 Heath
Condo
Pre-Construction

1331 Yonge St.
Jack Condos
Condo
Pre-Construction





HOUSEHOLDS (NEIGHBOURHOOD)

63% live in apartment buildings of 5 or more storeys

16% live in apartment buildings of less than 5 storeys

8% live in row / townhouses

13% live in houses

TORONTO (BOUNDARY)

41% live in apartment buildings of 5 or more storeys

15.6% live in apartment buildings of less than 5 storeys

5.8% live in row / townhouses

37.6% live in houses

GREEN SPACE CRISIS

Running in parallel to the issue of accommodating future growth in Toronto is its severe lack of green space in the downtown core. The avenue plan for midrise development, while robust and well planned, never incorporated a need for green space accessibility to balance the density to which it targets.

The city of Toronto at the moment boasts that it has over 1600 public parks that cover 8000 hectares or roughly 13% of the city's land area. When broken down, as much as it sounds like a lot, this number only accounts for about 12m² per person of green space. Compare this with a City like New York that has nearly double the amount of green space per person (23.1m²) and has more than double of Toronto's population density (10,725 people/km²). The World Health Organization suggests that an optimal amount of green space per person is between 10m²-15m² while Evergreen Canada suggests 27.9m² of public green space in order to have a healthy, livable community. According to Evergreen Canada, Toronto has the lowest allocation of green space per person in Canada. Toronto's parks and recreation budget is only about 2.8% of the total municipal budget, lowest of all Canada's urban municipalities.[4] (See figure. 1-17) This suggests that the priority of green space within the city is bottom of the list at a time where Toronto is at a tipping point of growth. If this problem of green space isn't addressed the influx of population will start out pacing the creation of public green spaces and the number will only decrease.

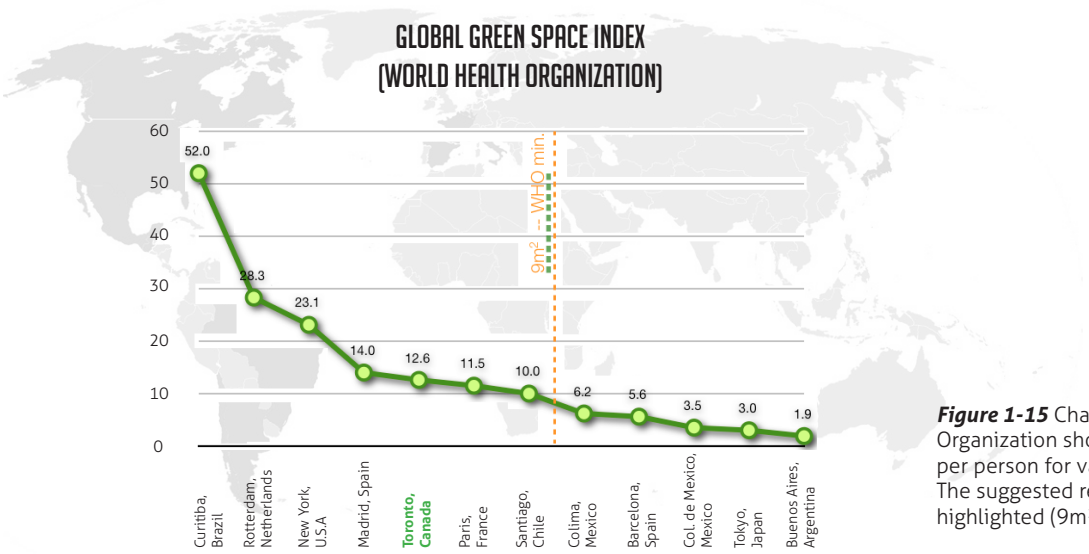


Figure 1-15 Chart from World Health Organization showing green space per person for various countries. The suggested required minimum is highlighted (9m²).

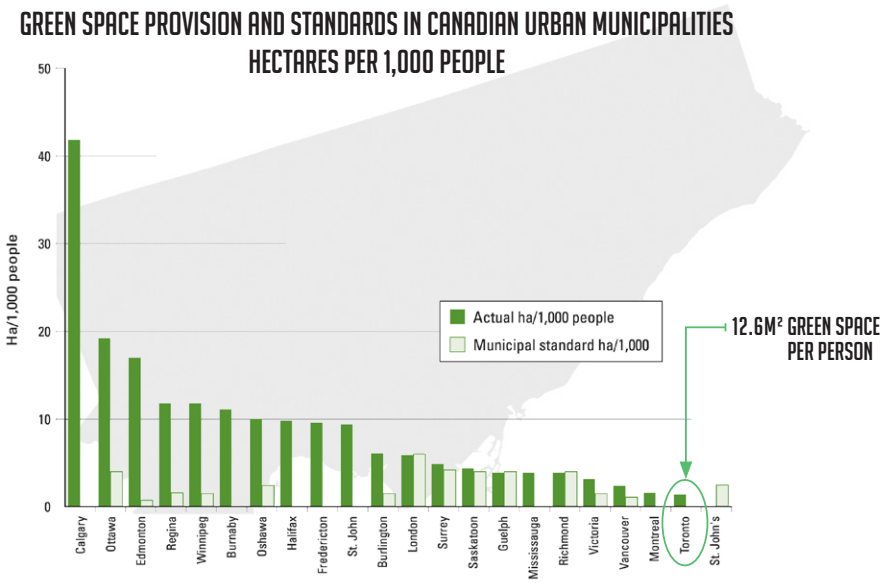


Figure 1-16 Bar graph showing Toronto's rank among major Canadian cities in terms of provisions and standards for green space.

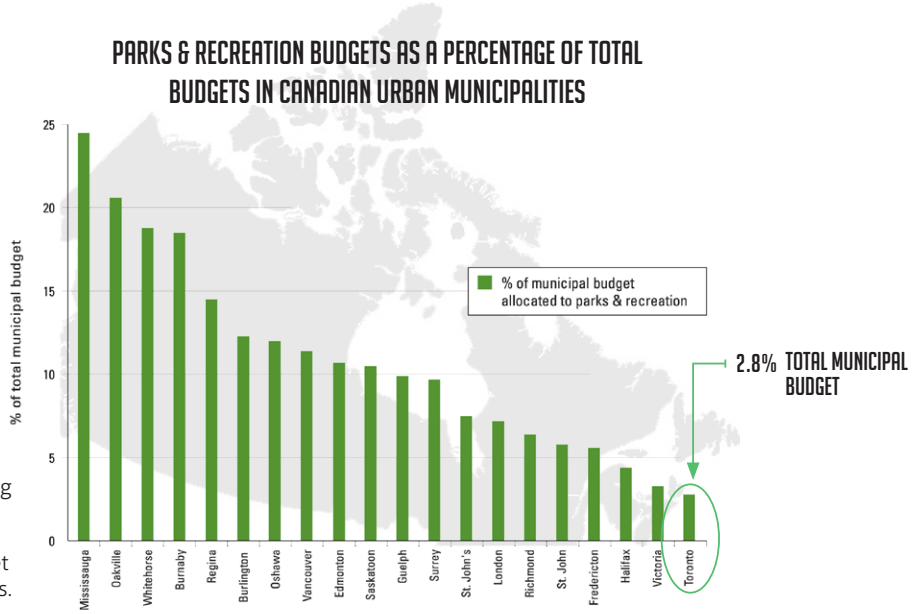


Figure 1-17 Bar graph showing Toronto's rank for parks & recreation budget as a percentage of the total budget for select urban municipalities.

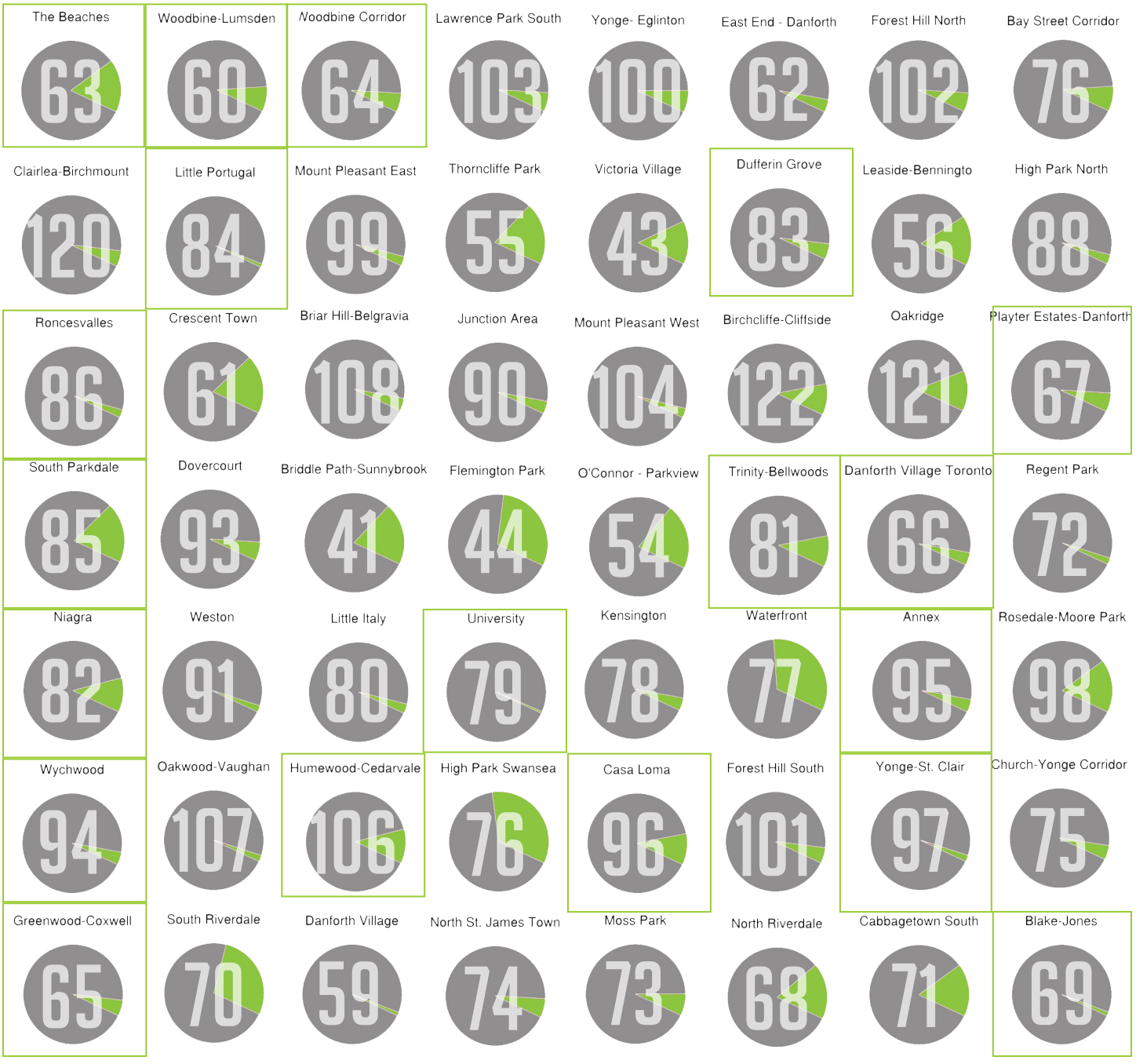
NEIGHBORHOOD GREEN SPACE ANALYSIS

To further analyze the green space crisis the intention was to specifically look at the green space in the target area, the downtown/East York district. Laying the population density over the neighbourhood map helps to correlate which areas may be more suitable for intervention. I was able to overlay population density and neighbourhood number to determine which neighbourhoods coincided with the avenues identified. Through the use of a "well-being environment" excel database linked into GIS, I was able to join information regarding area vs. public green space available for every neighbourhood. (See map below)

Highlighted are the twenty that effect the specific avenues in the target area and organized in order to understand the relationship between the neighbourhood green space and their respective main streets. Laying the population density over the neighbourhood map helps to correlate which areas may be more suitable for intervention.

POPULATION DENSITY MAP

1. THE BEACHES (63)	16%
2. WOODBINE-LUMSDEN (60)	8%
3. WOODBINE CORRIDOR (64)	7%
4. LITTLE PORTUGAL (84)	2%
5. DUFFERIN GROVE (83)	6%
6. PLAYTER ESTATES-DANFORTH (67)	7%
7. SOUTH PARKDALE (85)	19%
8. RONCESVALLES (86)	3%
9. DOVERCOURT(93)	6%
10. TRINITY BELLWOODS (81)	10%
11. DANFORTH VILLAGE TORONTO (66)	.1%
12. NIAGRA (12)	11%
13. UNIVERSITY (79)	.4%
14. ANNEX (95)	4%
15. WYCHEWOOD (94)	4%
16. HUMEWOOD (106)	12%
17. CASA LOMA (96)	9%
18. YONGE-ST.CLAIR (97)	2%
19. BLAKE-JONES (69)	2%
20. GREENWOOD-COXWELL (65)	5%


The Beaches
63
Woodbine-Lumsden
60
Woodbine Corridor
64
Lawrence Park South
103
Yonge- Eglinton
100
East End - Danforth
62
Forest Hill North
102
Bay Street Corridor
76
Clairlea-Birchmount
120
Little Portugal
84
Mount Pleasant East
99
Thorncliffe Park
55
Victoria Village
43
Dufferin Grove
83
Leaside-Benningto
56
High Park North
88
Roncesvalles
86
Crescent Town
61
Briar Hill-Belgravia
108
Junction Area
90
Mount Pleasant West
104
Birchcliffe-Cliffside
122
Oakridge
121
Playter Estates-Danforth
67
South Parkdale
85
Dovercourt
93
Briddle Path-Sunnybrook
41
Flemington Park
44
O'Connor - Parkview
54
Trinity-Bellwoods
81
Danforth Village Toronto
66
Regent Park
72
Niagra
82
Weston
91
Little Italy
80
University
79
Kensington
78
Waterfront
77
Annex
95
Rosedale-Moore Park
98
Wychwood
94
Oakwood-Vaughan
107
Humewood-Cedarvale
106
High Park Swansea
76
Casa Loma
96
Forest Hill South
101
Yonge-St. Clair
97
Church-Yonge Corridor
75
Greenwood-Coxwell
65
South Riverdale
70
Danforth Village
59
North St. James Town
74
Moss Park
73
North Riverdale
68
Cabbagetown South
71
Blake-Jones
69

FUTURE POTENTIAL

After taking a comprehensive look at each avenue within the study area, it is clear that the midrise study along with the official plan guidelines offer a great initial step toward creating a more livable main street. This is both a blessing and a curse. On one hand the city has created a very comprehensive guideline that frames key issues that need to be addressed as we move forward with the development of the main streets while on the flip side this creates a framework so rigid that the architecture produced becomes static. New development of mid rise typology now becomes a direct reflection of the guidelines the city has imposed. (See figure 1-12). This guideline driven architecture along the main streets offers little architectural value to it's residents or the avenue in which it sits. As more and more mid-rise buildings are created along these main streets, we'll start to see a departure from the urban fabric which makes these gateways to the neighbourhoods a valuable asset to Toronto's identity. This departure is already starting to mimic the high-rise condo trend of maximum density that is already changing the city's landscape.

The next chapter will explore Toronto's defining main streets. A brief history and built form. By understanding what the avenues offer, along with the high quality low scale neighbourhoods behind them , are a potential to rethink what the true Torontonian block is. If the city's plan is to develop along these streets than it is important that the avenue is not only a midscale highly intensified mixed use corridor but has the potential to carry a quality provided by the neighbourhoods in which it fronts. A look at alternative midscale typological models could help provide valuable insight into future developmental strategies.

02/ CITYSCAPE

TORONTO'S MAIN STREETS

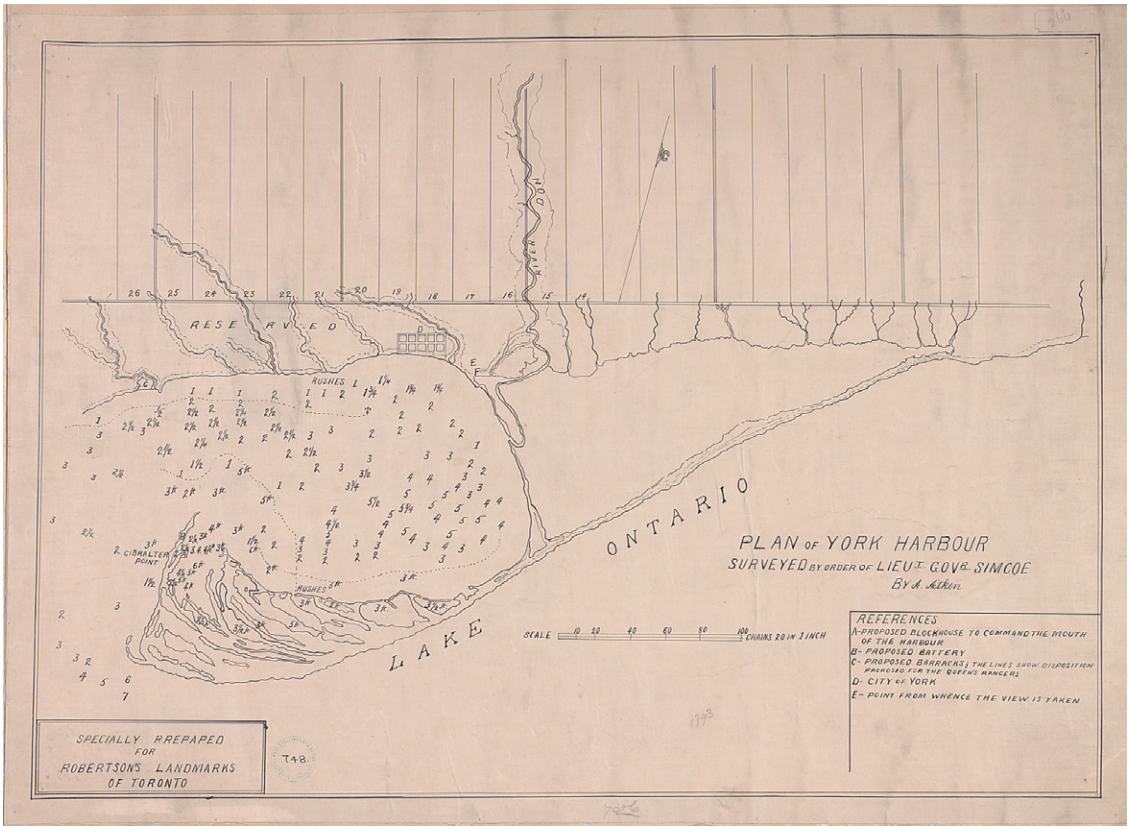
Main streets are defined as the main arterial corridors of Toronto that define the city's main arteries of movement, serviced by Toronto's public transit and lined with low density mixed use buildings that act as an anchor of service to Toronto's low-rise residential neighbourhoods directly behind them. This characteristics of low-rise creates an easy transition from public mixed use to quiet residential private neighbourhoods. Although not unique to Toronto, the main streets, have certain characteristics for which it has survived. Jane Jacobs describes this in Putting Toronto's Best Self Forward:

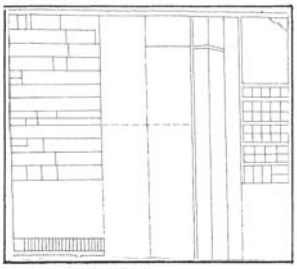
"Toronto is not different from other cities in having main streets, but those streets are especially important here, being part of the most basic "self" of the city. The city has many selves, as we acknowledge when we speak of the neighbourhoods, the downtown and the waterfront. But what holds them together is the structure of the city, the grid upon which the city is build, with the main streets occurring every so often in both directions. There are historical reasons why Toronto was laid out as a grid and why particular streets on this grid became main streets. But it isn't for historical reasons that these main streets retain their importance and vitality. They provide a congenial form for the city; if they hadn't, they would have disintegrated. They would have been blurred. But they remain the bones of the city and have much to do with its personality." [1]

Their flexibility of mixed use commercial needs and adaptability to a changing population over time adds to the vitality of the city's main streets. They provide variety of services to the immediate surrounding public as well as the city as a whole. The division of their lots and urban form characteristics throughout the city play a key role in their sociable and recognizable identity.

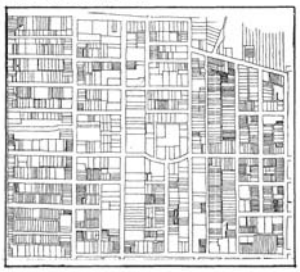
Historically, Toronto's mains streets, were shaped initially by a land survey conducted in 1793. This survey laid out a rectilinear grid that would give way to the pattern we see today, The new grid , however, ignored the existing natural landscape including ravines, topography and the waterfront.[2]

Queen street (lot street) became the main dividing line and ran east from Scarborough township to the humber river. Blocks, following the aitken/ simcoe plan (see map), were divided into a 2 km grid. These concession roads still remain as Toronto's main streets. (Queen, Bloor, St. Clair, and Eglington Streets running east west, and Yonge, Bathurst, Dufferin, and Keele Streets running north-south.) The city's original ten square blocks were situated south of Queen to the lake shore and were divided into 80m square blocks and subdivided into 20m wide and 40m deep building lots, which established the downtown pattern still visible today.

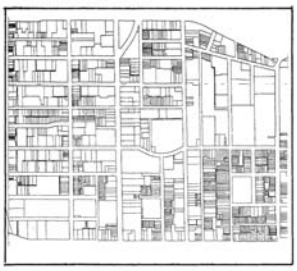




Lot Divisions, 1848



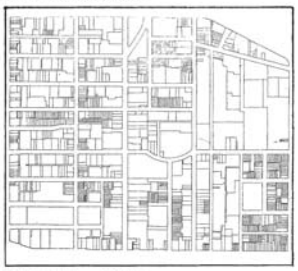
Lot Divisions, 1903



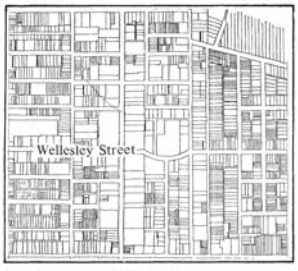
Lot Divisions, 1970

Lot Divisions, 1858

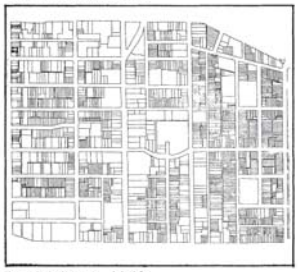
Lot Divisions, 1923



Lot Divisions, 1976



Lot Divisions, 1884



Lot Divisions, 1960

Figure 2 - 1 Top: Plan of York Harbour Surveyed by order of Lt Govr Simcoe in 1793

Figure 2 - 2 Bottom: Lot Structure 1848-1976.

While the lands north of Queen Street were subdivided into long narrow parcels 'park lots' of a 100 acres in size.

During the late nineteenth century, however, the city underwent a period of rapid industrialization and growth, as it began to expand north and west. This rapid expansion of the city presented an opportunity for landowners to subdivide the large 'park lots' and sell to private developers. These individual developers were then left to form their own layout between main streets. This resulted in the establishment of the standard narrow and deep plot in the downtown area, with a width of between 5 and 8 metres and a depth of between 30 and 45 metres. (See figure 2-3)

Development on main streets was influenced primarily by similar pressures of rapid economic growth and compactness that affected Toronto in the early stages of development.

As a pedestrian oriented city first, residents lived closer to work and not until the introduction to the street car system in the late 19th century, did the main streets primarily start to showcase characteristics still prevalent today. The streetcar system was introduced to these main streets, cementing them as primary retail hubs. Residents were no longer limited to local retail shops but were now able to access a variety of main streets *across Toronto. As highlighted by Richard Harris in his book, Unplanned Suburbs: Toronto's American Tragedy, 1900 to 1950, Creating the North American Landscape* notes the role of streetcars in the compact development of turn of the century Toronto: *"In the early twentieth century, Toronto was served by transit, but not well enough to promote streetcar sprawl. TRC's policy encouraged a compact pattern of settlement within and beyond the city limits."* [3]

By 1921, with the introduction of the Toronto Transportation Commission, saw the expansion of streetcars and with the growth of the personal automobile, development within the downtown core shifted outward. By mid-century, urban development practices shifted toward automobile mobility, but by then much of Toronto's urban form along the main streets was well established. [4]

Presently we see the effect of suburban sprawl that has plagued North American cities in the second half of the 20th century. The emphasis on intensification and redevelopment can be seen through initiatives launched by the city of Toronto, like it's official plan and mid-rise avenue study. Contrary to plans initiated a century ago the division of available land is no longer feasible and the trend is to assemble larger plots in order to erect larger and more economically viable building forms. This shift is starting to affect Toronto's main streets and the need for a stricter set of guidelines is imperative before it's identity gives way to economic pressures of development.

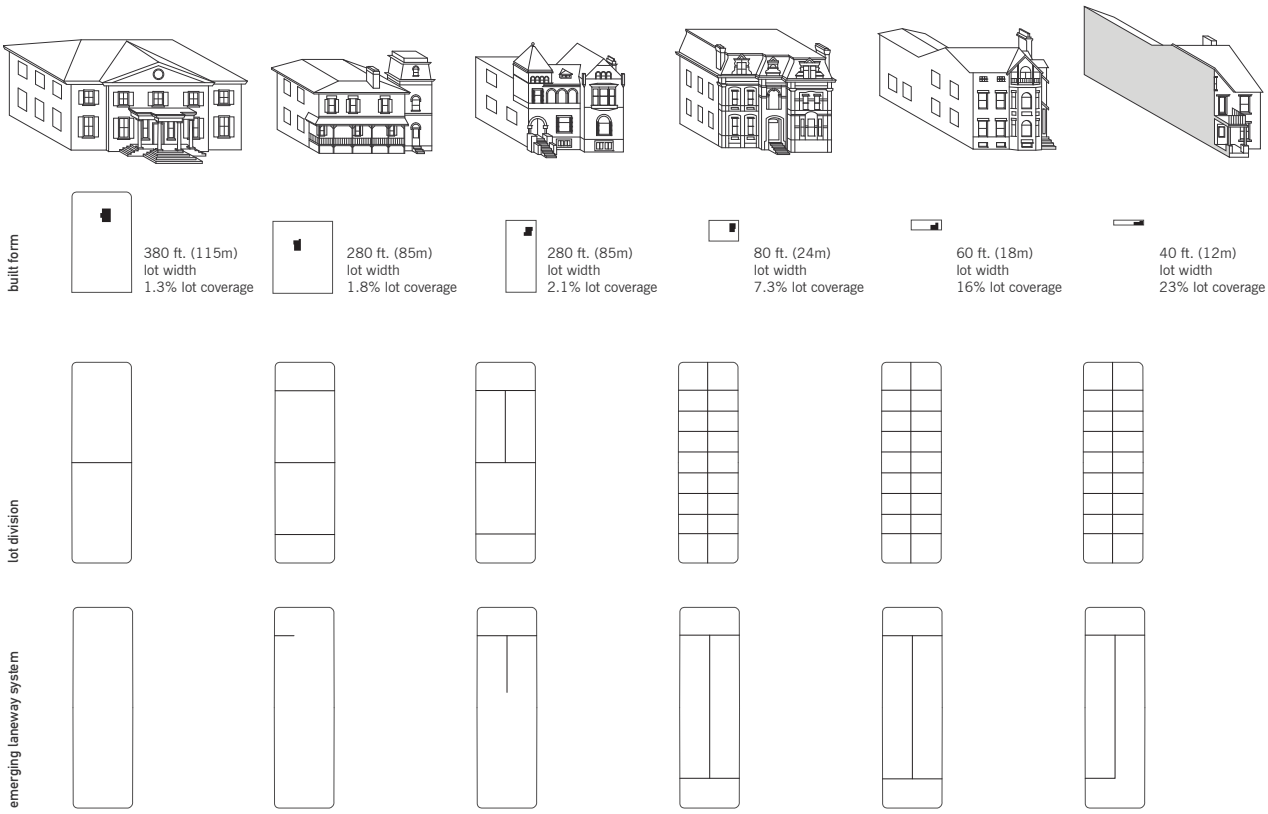


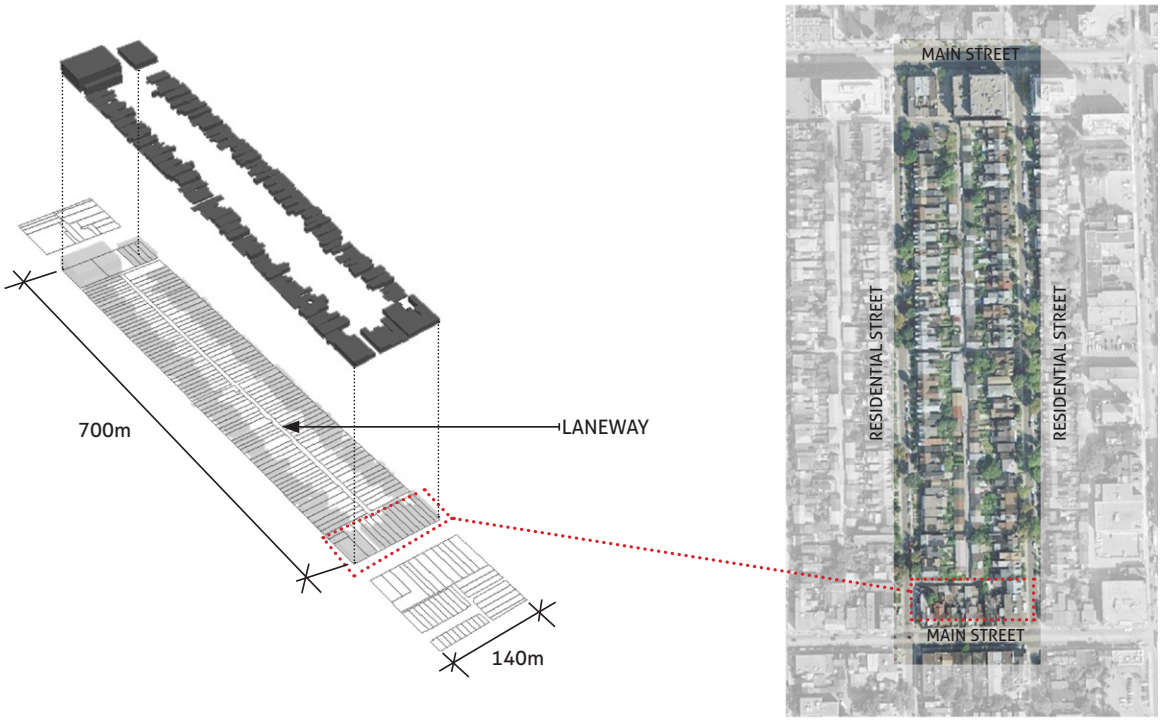
Figure 2 - 3. Subdivision of Toronto's residential lots and the evolution of the 'Toronto House'.

BUILT FORM

The overall composition of main streets, although developed differently over time, still provide a similarity in structure of the block that is native to it's identity. Similar to the neighbourhoods in which it fronts, main street lots are usually long and narrow and share similar patterns of growth and development. The average lot frontage on the street is approximately 10 meters with a depth of 30 to 40 meters.

Toronto's main streets are best known for its fine grained, diverse storefront composition at grade with either offices, storage, retail or apartments directly above. The retail at grade often includes recreational facilities, restaurants, service shops etc...

The prototypical main street building is a narrow, long building of 1-3 storeys, with a shop or some other public use on the ground level with residential units or office spaces on the upper floors accessed from a doorway beside the shop entrance. Buildings are typically built right along property lines, sharing a party wall with neighbouring buildings and fronting directly onto a sidewalk. They form a continuous street wall that is usually broken up by intersecting streets that penetrate into the residential block behind them. (see below)



This urban built form, as highlighted by the city's avenue plan, creates ample opportunity to develop along the main streets that serve the neighbourhood communities directly behind them. The historical composition of Toronto's built form provides with the opportunity to incorporate retail at grade, to provide services to the neighbourhood while also increasing the density above to further accommodate growth.

The opportunity to sensibly accommodate future growth on these streets will need to incorporate a mid-scale building typology that is both feasible and proven. This new type should also incorporate publicly accessible green space to it's tenants as well as the neighbourhood in which it serves. It must provide a midscale highly intensified mixed used corridor while carrying the high quality of the low scale neighbourhood in which it fronts.

This brings about the question: which midscale building typology will best suit Toronto's future growth?

Figure 2 - 4 Generic Toronto block. The frontage along the Main street is highlighted. Low-rise houses complete the block and in some cases a laneway cuts through it.

THE "EUROPEAN" COURTYARD BLOCK

If growth along the main streets is to come primarily from midscale building typology than there must be a precedent in which we can model this growth. Which mid-scale form can best accommodate density while simultaneously allowing for public space for it's residents?

The courtyard has endured as one of the most widespread architectural forms, transcending regional, historical and cultural boundaries to mediate open and closed, inside and outside, social constraints and environmental requirements. What role can the courtyard play in Toronto's dense urban setting?

Historically the courtyard was the center of domestic life, production and activity for the family. As domestic priorities changed within the industrial setting of a North American city, the courtyard lost its value. In Europe the courtyard block typology developed due to physical constraints of the city and an increase in density. It's form is limited by scale due to specific parameters that render it less desirable if exceeded. Parameters including light, density and scale. While the courtyard has historically been used for high density low rise housing, such as the Cerda block in Barcelona, building construction, such as in contemporary Toronto, is dominated by high-rise high density point towers. They provide no public space for residents or the city and sit isolated from their surrounding neighbourhoods as objects scattered on a plane.

Can the courtyard typology be introduced at a mid-scale to a city like Toronto as a new means of dealing with an increase in density?

Figure 2 - 5 Map of Vienna

CITY SCALE

A look at different city planning strategies and courtyard influenced building strategies, whether developed organically or planned, in comparison to Toronto reveals potential benefits that could shape growth moving forward. The idea is to compare statistics between five cities in which the courtyard is used as an urban strategy. To understand why the building type wasn't used in Toronto and what may be potential alternative strategies to implementing the type to one of North America's largest cities.

1. Firstly Damascus, Syria where the courtyard house was first introduced. The maximization of shading while creating a pleasant micro-climate made it appropriate for the arid climate in this region. The "stack effect" creates a pressure difference between outside and inside air, as the building heats up the hot air rises drawing air from internal spaces. The courtyard allows this hot air to escape. Natural ventilation became a guiding factor in the use within this region of historically dense urban fabric. These pockets of green space don't account for much green area, accessibility is also limited since the spaces are private.

2. Beijing, being one of the most populated cities in the world, adopted the courtyard as a more social aspect of the house. The form is uniquely conducive to daily life. The central court is like a multipurpose room where most of the family activities take place. It blends patterns of culture with nature, meets the requirements of function and the demands of climate, and balances the values of community with the need for privacy.

3. Barcelona block introduced in the mid 19th century by a civil engineer name Ildefons Cerda would serve as plan to accommodate the density and growth Barcelona was experiencing at that time. The idea was to unite the old city with seven important villages using a grid of streets. He intended to create a block that would only be built on 2 or 3 sides with accessible green space to allow maximum sunlight and ventilation, creating a green belt throughout the city. Over time the blocks were built up and grew further from his vision. It is for this reason that currently the blocks inner courtyards don't offer much green or accessible open space, bearing almost no resemblance to the initial intent proposed by Cerda.

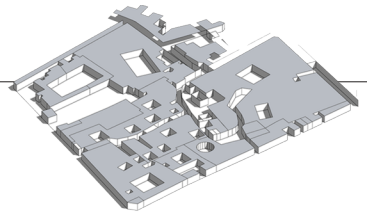
4. The Vienna "superblock" emerged from egalitarian principles in the early 20th century. Space was scarce as the working class started to develop around the inner city. It's architecture directly reflected this trend. As the working class moved in, the middle class moved out to the suburbs. The superblocks were massive building complexes that housed affordable housing as well as amenities that would serve them including schools, grocery stores and police stations. They were designed individually while still accommodating large quantities of people, making them unique architecturally. Sometimes having as much as three architectural teams working on the same block meant more diversity. They were all designed with inner courtyards that would serve as spaces for residents to escape the urban streetscape while also allowing for natural light to penetrate deep into every unit.

5. New York's central park is an interesting case because it serves as an urban courtyard for Manhattan Island. First proposed from a park design contest, the "Greensward Plan", of Frederick Law Olmsted, the park superintendent and Calvert Vaux, an architect began in 1857. It started from a city plan that bought up 843 acres in the middle of Manhattan Island because it's grounds weren't suitable for commercial building. Over time the use shifted from upper class to working class people into the late 20th century where it was open for recreational use as well as playgrounds. Density steadily grew around the park creating a unique urban courtyard condition you see today. The park now services millions of Manhattan residents and lays host to concerts, sporting activities, playgrounds as well as visitors all year round.

SITE CONTEXT | URBAN FOOTPRINT | TYPOLOGY

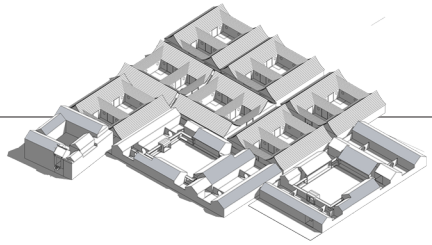
1. DAMASCUS



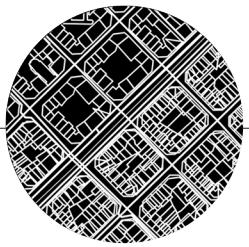


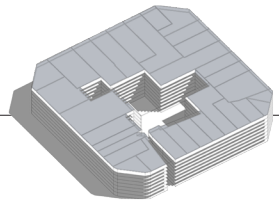
2. BEIJING





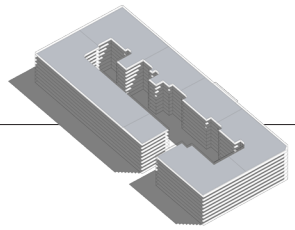
3. BARCELONA



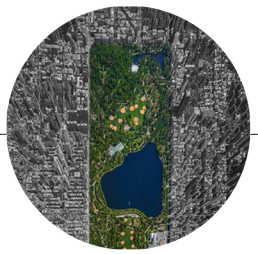
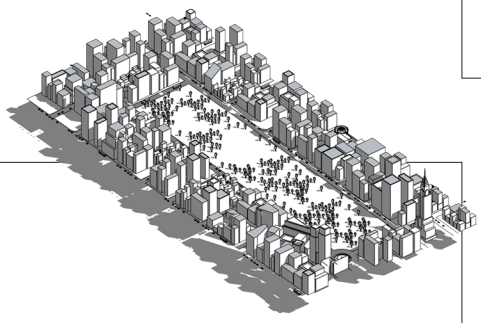


4. VIENNA



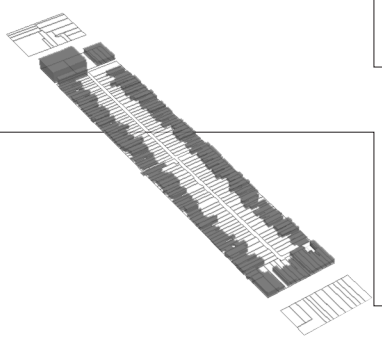


5. NEW YORK

TORONTO





URBAN STATISTICS

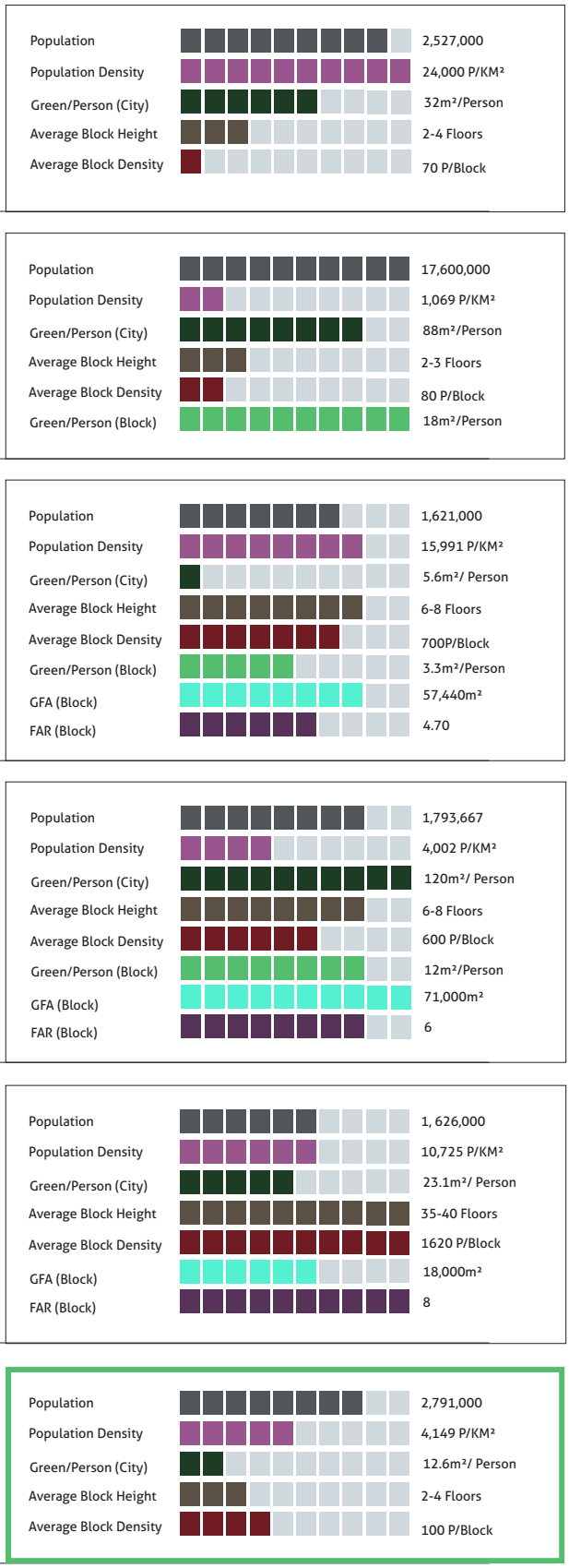


Figure 2 - 6 Analytical breakdown of different cities highlighting key attributes associated with block structure, density, green space and FAR. Each city has its own relationship to the courtyard block and through an analysis of their parameters we can compare them to the Torontonian block structure.

Each city's issue of open space and livability were addressed differently over time . Some grew organically i.e a centrally located park where density developed around it. Or as in Barcelona, where the unlivable space of the old medieval walled city was the catalyst to a new form of "urbanisation" that spawned an Engineer to develop a plan for it's future city.

The European models seem to offer the best alternate solution for mid-scale building typology in order to house more people as well as providing a decent shareable open space.

Could these models work in Toronto?

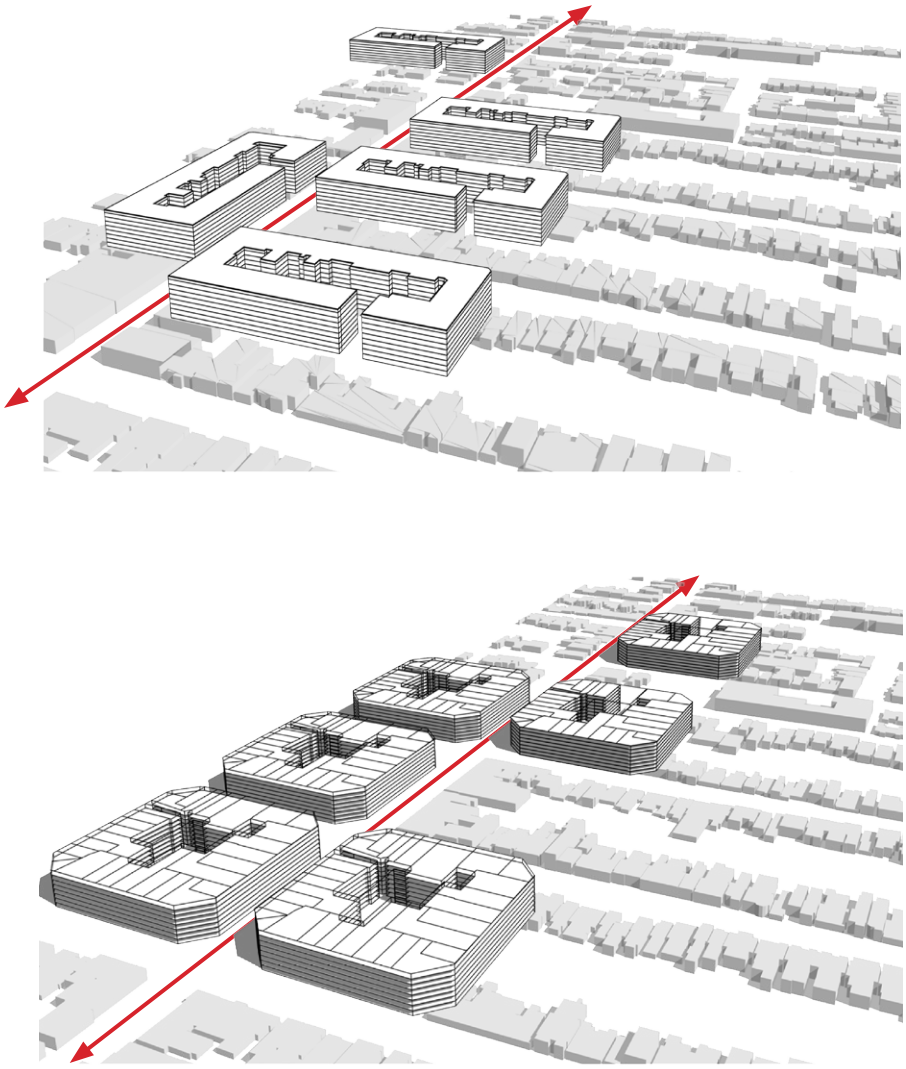
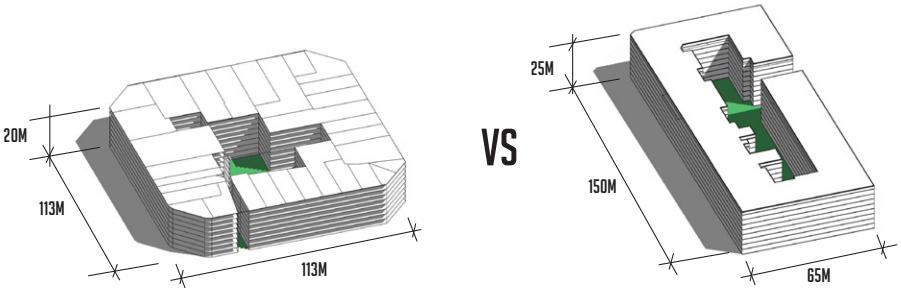


Figure 2 - 7 Speculative overlay of Viennese 'superblock' and Barcelona block onto typical Toronto city block

An overlay of these types on Toronto's block typology, clearly shows the difference in scale and density that the European types offer. More interesting is that the Barcelona block's size width, height and FAR (floor area ratio) seem to best align with what could become a viable solution to Toronto's inevitable population growth.



POPULATION (CITY) = 1,621,000
POPULATION DENSITY (CITY) = 15,000 P/KM²
BLOCK GFA = ± 57,050M²
HEIGHT = 6-8 FLOORS
COVERAGE = ± 70%
F.A.R = 4.7
ASPECT RATIO = 7.5
GREEN/PER = ± 6M²
DWELLING UNITS = ±280
PEOPLE PER BLOCK = ±460
ACCESIBILITY = SEMI - PUBLIC

POPULATION (CITY) = 1,793,667
POPULATION DENSITY (CITY) = 4000 P/KM²
BLOCK GFA = ± 71,050M²
HEIGHT = 6-8 FLOORS
COVERAGE = ± 75%
F.A.R = 6
ASPECT RATIO = 4
GREEN/PER = ± 12M²
DWELLING UNITS = ±300
PEOPLE PER BLOCK = ±600
ACCESIBILITY = SEMI - PUBLIC

The next few pages will look to Barcelona as a precedent and guide to adopting ideas for growth and open space management.

Figure 2 - 8 Comparison of the Barcelona Block and Viannese 'superblock' establishing which type best serves as a precedent for Toronto

LESSONS FROM CERDA

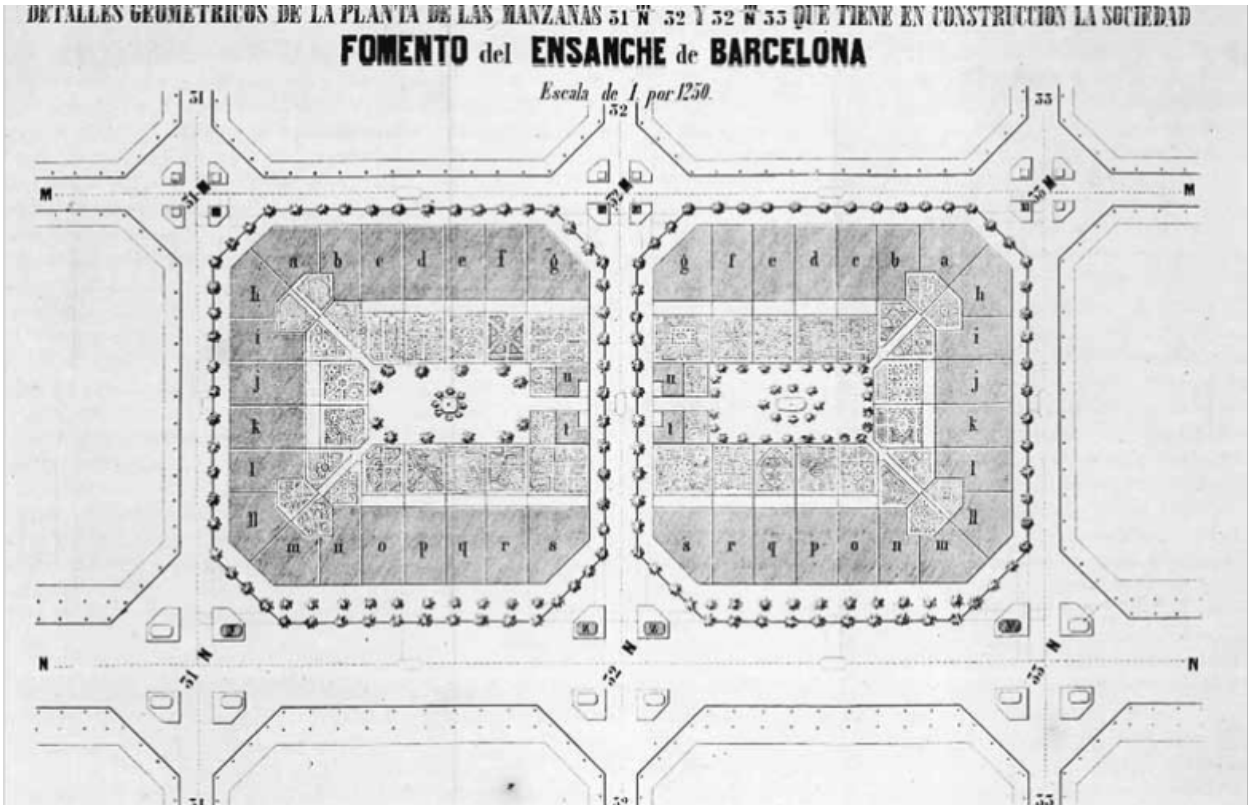
The Eixample master plan was devised as a necessary extension to Barcelona's medieval city walls during the second half of the 19th century. The old medieval city walls were confining growth and creating a density that was starting to effect the population. As the Industrial Revolution's influence began to rise within Spain, newly constructed factories and the subsequent increasing labour demands drew rural citizens to the urban centres of both Madrid and Barcelona . There was no open space left in the city. Houses were being built over the streets, arches were erected and built on and streets were becoming less than three meters wide. Due to poor living conditions, overcrowding, a rising cholera epidemic and a population density as high as 1500 inhabitants per hectare, the Madrid government authorized in 1854 the destruction of Barcelona's medieval walls and called for a competition for the design of a new expansion of the city.

Ildefons Cerda was an urban planner originally trained as a civil engineer who left his job in the civil engineering service to begin working on a grid based plan that would come to be known as the Eixample. At this time, grid or radial based urban planning principles were being implemented or experimented with in New York, Buenos Aires, Paris and London. Unable to find relevant planning precedents for his unique vision however, Cerda undertook the task himself. He calculated the volume of atmospheric air one person needed to breathe correctly. He detailed professions the population might do, and mapped the services they might need, such as marketplaces, schools and hospitals. He concluded that, among other things, the narrower the city's streets, the more deaths occurred.

He came up with the term "urbanisation" – a term which evolved to become urbanism and urban planning. Published in his General Theory of Urbanization the term built the foundation for an urban layout that would speak to both rationale and social structures as a responsibility to those who would construct and grow the city. He laid out how his new vision should materialize, while always considering the well being of both the people and the quality of the environment. Becoming the first urban proposal to engage society as whole rather than a single class.

Figure 2 - 9 Aerial view of Eixample district, Barcelona. Cerda block plan layout.

He planned for housing, public spaces, large metropolitan-scale parks, small squares, infrastructures and public facilities. He analyzed in exhaustive detail the relation between the buildings and the streets. Initially he called them intervías (interways). Which many have referred as Cerdà's 'basic unit for urban design'. The vía is the street, and the intervía, which has been loosely translated as 'block', is rather a more sophisticated, multi-functional take on what happens between the streets. The intervía (interway) was not just the buildings, but also the spaces between buildings, and more importantly, the relation of the buildings, public (open) spaces, and streets to each other. The interway was to be half open and half built. The height limit he chose was four stories, in proportion to the width of the standard street, 20 m, and the 56-m wide interior open spaces inside of each block. See Figure below for one example of the scores of interway arrangements that Cerdà diagrammed in his studies for the plan.



The main advances of Cerdà's plan, especially in comparison to the walled city of Barcelona, were numerous. He sought equal access for all citizens to quality housing, providing an average size apartment for the working class of 90 m2.[5]

The regular street grid, the fact that half of each intervía would remain unbuilt, and the distribution of small plazas, large parks, hospitals, and other facilities uniformly across the grid provided equal access for all to light, air, open space, services and other parts of the city. This attention to the working class and understanding of equality of access was the backbone of Cerda's belief system. In addition to a strong social conscience advocating for the poor and working class through equality of access, the theoretical and philosophical building blocks of Cerdà's plan were logical-rational thinking, analysis before action, engineered technological solutions, and a belief that coordinated and integrated thinking and action across a range of disciplines and scales would result in a more healthy, functional, and appealing city.

The literal building blocks that Cerdà employed in his plan were streets and housing. His studies contained many combinations of housing units that were organized into blocks, and streets and intersections into the overall grid. His housing proposals evolved over the 1855, 1859, and 1863 versions of the plan. The 1855 draft contained 1:200 scale drawings of four housing types for the middle and upper classes from 120 to 180 m2 each, and at least six housing types for working classes, from 69 to 103 m2. Both sizes represented enormous increases compared to the standards of the day. The 1855 draft showed typical street widths of 35 m and avenues of 50 m, significantly wider than the 4–8 m widths common in the old city.

The plan approved in 1859 maintained these housing types, and the implementing ordinances prescribed a 16 m/four storey height limit and a 28 m maximum building depth from the street . This last provision assured that half of each block or interway was left for open space, both private gardens and public parks and playgrounds. The 1859 plan provided for a three level hierarchy of streets, with a minimum standard street width (façade to façade distance) of 20 m. Larger avenues and boulevards were to have 30 and 50 m widths. For the standard street, fully half of the width – 10 m – went to sidewalks, street furniture, and trees. It was in the 1859 plan that the 113 × 113 m standard block dimension was introduced.[6] The 113 x 113 m standard block plan was derived from a formula that Cerda created. (see figure 2-11).

Figure 2 - 10 Example of pair of blocks, or "interways."

$$x = \frac{2pv - 2bd}{d} \pm \sqrt{\frac{4pv}{d^2}\left(pvf - 2bdf - b^2d - df^2\right)}$$

x is the length of the side of the block;
p is the number of square meters per person;
v is the number of inhabitants per house;
b is the width of the street;
d is the height of the facade; and
f is the depth of the building site.

Figure 2 - 11 Formula created by Cerda for the ideal block type,

It was in 1863 Cerdà that prepared the final version of his plan at the same 1:5000 scale in order to adapt it to emerging economic and property market realities, demonstrating its flexibility. The 1863 amended plan map added buildings built to date, new rail lines and, notably, increased building density in two ways. First, by extending the buildable area back from the street front from 20–24 m to 25–28 m [7], and second, by permitting three sides of each block to be built instead of two. He further increased the number of blocks drawn in the plan.

There were some other variations drawn on the plan maps of each of the three versions as to block length, building depth, etc., depending on contextual conditions such as existing roads and topography. While the street grid and chamfered blocks were followed rigidly, it was the building depths and heights that were violated, and increasingly so, until the 1980s.

Cerda's plan would change in a number of ways over the years. Cerda's theoretically planned, two or three sided, 20 metre high manzana lacked profitability and with no strict government controls in place, the majority of the blocks were soon built up on all four sides while far exceeding their originally planned height. Likewise, manzana blocks which were planned as public facilities (such as schools, markets and social centres) were instead developed without regard to the plan: private leasable space. In contrast to Cerda's original vision, the central courtyards were often closed off and are now commonly used as a car park.

In the early 2000s in a joint venture between the city of Barcelona and various Catalan banks, the "Pro Eixample" foundation was formed in an attempt to reinstate some of Cerda's original intentions. Pro Eixample's main directive was the recovery and conversion of the enclosed inner courtyard of the manzana into a publicly accessible, usable green space. In total, Pro Eixample attempted to recover 50 block interiors representing roughly 100,000m2 of space. In tune with Cerda's original intentions, Pro Eixample sought to transform Eixample so that 1 in every 9 manzanas would have a public courtyard and that all residents of the Eixample would have a publicly accessible green space within a 200m radius of their home.

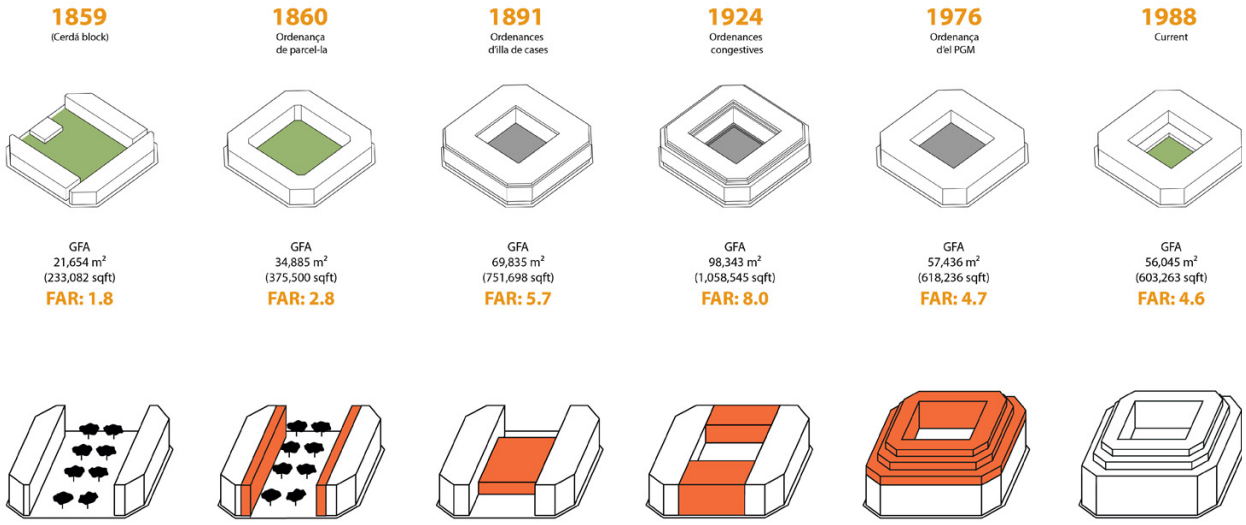


Figure 2 - 12 Progression of the Cerda block over time.

LESSONS LEARNED

Cerda's approach and philosophy can inform adequate responses to present day challenges that face our growing cities. We must implement similar strategies to cities like Toronto in order to contribute to the overall health and growth of it's inhabitants. These strategies include a strong social conscience through equality of access, logical-rational thinking, analysis before action, engineered technological solutions, and a belief that coordinated and integrated thinking and action across a range of disciplines and scales would result in a more healthy, functional, and appealing city.

Not unlike Cerda's theory of urbanisation, the city of Toronto, through their mid rise avenue study, incorporated similar urban design strategies to accomodate smart growth. Daylight access to the street, height restrictions on mid rise buildings relative to the avenue width and wider landscaped sidewalks are a few that closely resemble Cerda's plans. Toronto's guidelines for future growth, while extremely detailed and a proposal that is important for the city moving forward, has placed more emphasis on a "one size fits all" approach to urban development through midrise typology. Whereas through Cerda's vision, an emphasis was placed on the individual as he explained that we must take care of both the welfare of a cities inhabitants as well as the quality of the environment.

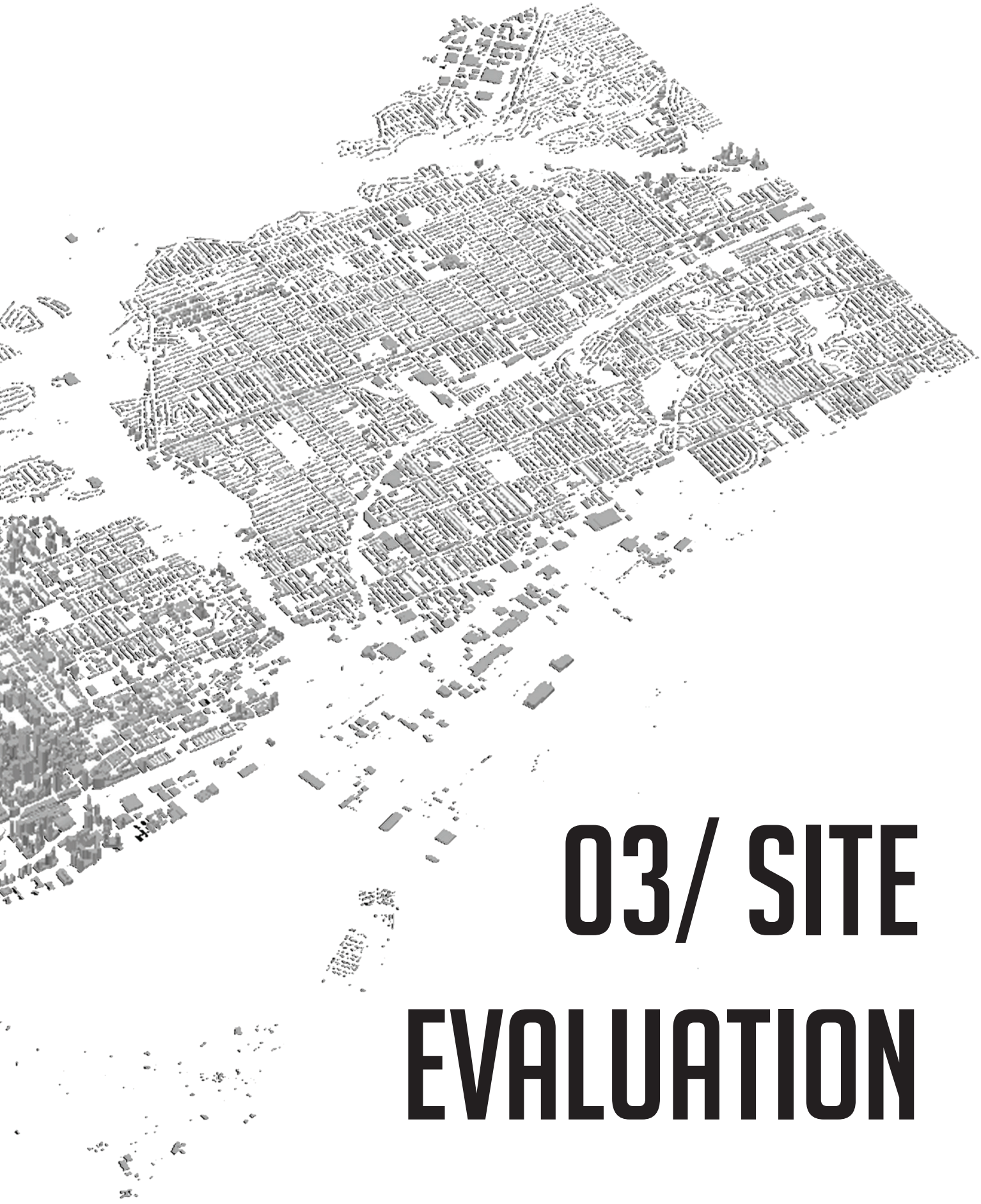
As Merce Conesa i Pages (President of Barcelona Provincial Council) explains in the introduction of the newly published "General Theory of Urbanization, 1867" translated to english;

"The development of smart cities and regions, as we avail ourselves of the extraordinary potential offered by the information and communication technologies, demands that we implement policies through which, as in Cerda's day, science must be placed in the service of the people and at the same time contribute to the sustainability of our planet. the primary setting of the new green economy, into which we are now moving, in a process that is already being described as the third industrial revolution, is the city."[8]

The relevance of Cerda's plan was his analytical and scientific approach to describe key factors that govern the city. Until then there hadn't been a study on the future city in a systematic way. Much like his urban calculator formula this thesis looks at using GIS (geographic information system) to create a viability index in order to narrow down potential sites for future development along Toronto's main avenues.

To further open architectural representation to the score, the map, the diagram and the script could establish a basis for exchange with other disciplines....The score allows for the simultaneous presentation and interplay of information in diverse scales, on shifting coordinates and even of differing linguistic codes. The script allows the designer to engage program, event, and time on specifically architectural terms. New maps and diagrams might begin to suggest new ways of working with the complex dynamics of the contemporary city.

-Stan Allen



03/ SITE EVALUATION

NETWORK & SITE ANALYSIS

This research aims to evaluate Toronto's key avenues in order to locate potential sites for future mid rise development. Toronto's greatest potential lies within its main street frontage. As highlighted in the Avenues & Mid Rise Buildings study, Toronto has already conducted a study to re-intensify its "main" streets through mid-scale building typology. It suggests that the Avenues amount to approximately 324 kilometers of property frontage, 200 kilometers of which can theoretically be redeveloped through mid-rise built form. With the population projected to increase 700,000 by 2040, if half of these properties were developed over the next twenty years through mid-rise built form, the Avenues could accommodate a new population of approximately 250,000 residents. [1] 75% of this frontage is designated for growth (See figure 3-2.)

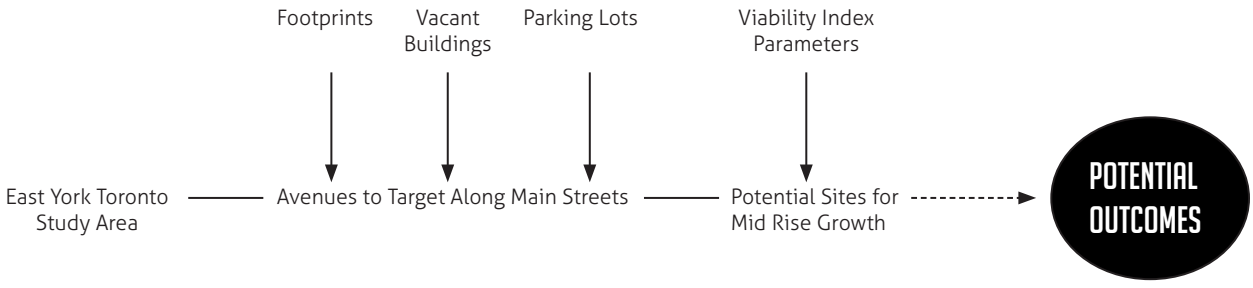
The following method of research is created to search and extract potential sites for future growth along Toronto's main street frontage. This thesis proposes that this growth be targeted at vacant buildings and parking lots fronting the Avenues. As Alan Berger describes in his book Drosscapes, "the internal frontier emerges from the composite of many landscape fragments within the local urbanized area: strips, lots, and unbuilt or unbuildable properties. With the exception of large public parks and protected open space, the unbuilt portions of the urbanized landscape have become smaller in aggregate size, increasingly marginalized in-between architectural objects in the urban fabric."[2] Although he is speaking to urban sprawl as it related to the American landscape, his idea of the horizontal city can be applied to most North American cities. These in-between spaces along valuable, transit accessible avenues become prime catalyst sites to Toronto's future urban growth.

The question becomes where are these optimal locations along Toronto's main streets that can accommodate mid-scale typology?

Method is laid out as shown (figure)

1. Isolate all applicable Toronto Avenues within the study area.
2. Extract vacant lots and parking lots from footprints
3. Zoom in to all sites to identify
4. Create viability index with parameters to filter optimal sites

Figure 3 - 1 Research Method



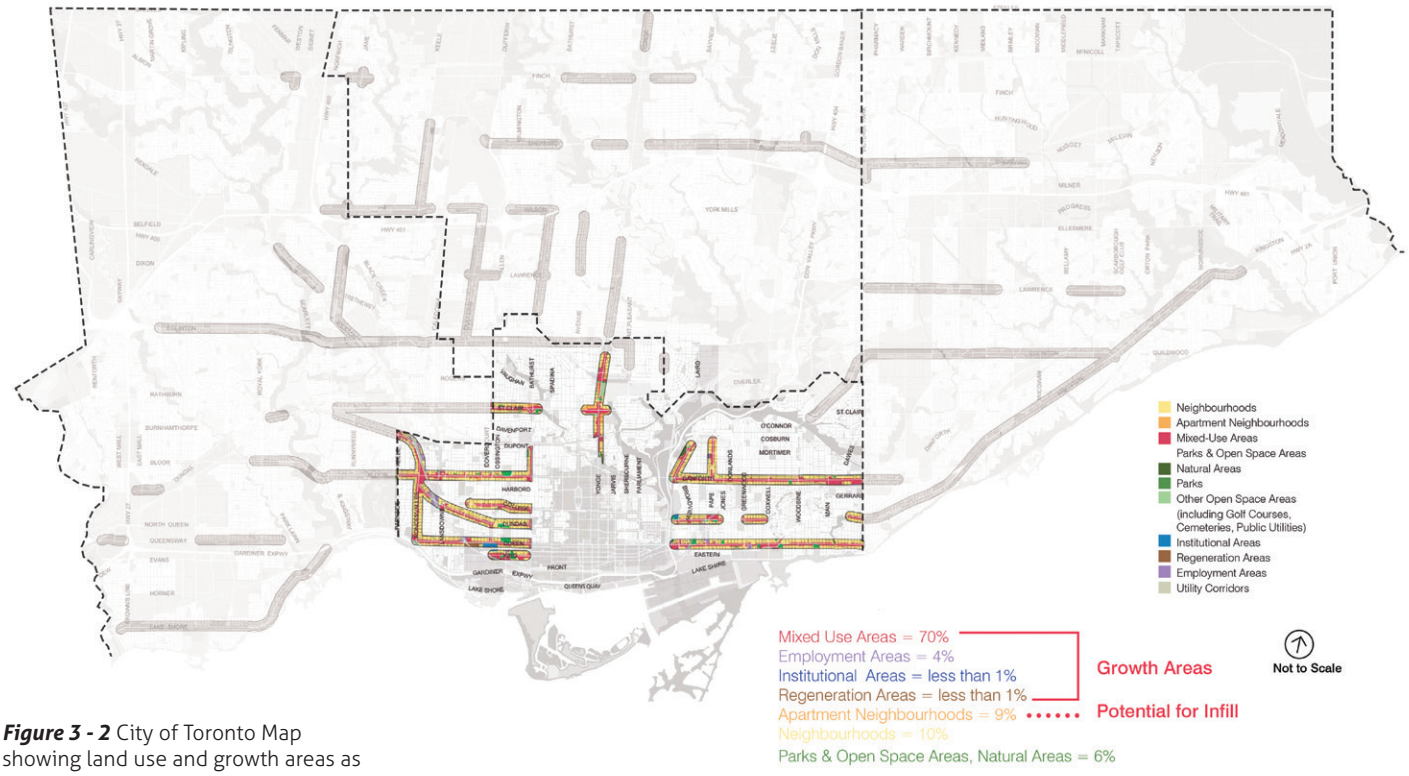


Figure 3 - 2 City of Toronto Map showing land use and growth areas as recommended in the Offical Plan. Study area is outlined.

GIS ANALYSIS

1. Isolate Toronto's Main Streets

As mentioned, the focus of the GIS analysis was narrowed down to include the ten key Avenues within the study area (Toronto East York District). Because of transit and existing infrastructure the frontage laid out by the city as key areas for mixed use growth was the target for the analysis conducted. (see map above). The analysis does not pertain to avenues that have secondary plans or other city-initiated studies already. Therefore the analysis excludes the City plan that pertains to the downtown area called "TOcore Planning Toronto's Downtown." The avenues targeted in the analysis are as follows;

St. Clair Avenue West - *Between Christie St. and Avenue Rd.*
Yonge Street - *Between Eglinton Ave. and Davenport Rd.*
Bloor Street West - *Between Parkside Ave. and Bathurst St.*

Danforth Avenue - *Between Broadview Ave. and Victoria Park Ave.*
Dundas Street West - *Between Roncesvalles Ave. and Bathurst St.*
Dundas Street East - *Between Broadview Ave. and Kingston Rd.*
Queen Street West - *Between Roncesvalles Ave. and Bathurst St.*
Queen Street East - *Between Broadview Ave. and Victoria Park Ave.*
Roncesvalles Avenue - *Between Dundas St. West and Queen St. West*

The isolation of all ten avenues within the GIS program allows for an in depth data based analysis which will help further dissect each avenue's potential for growth. Within this framework, the extraction and identification of catalyst sites becomes easier to manage. The footprints of existing buildings and lots along the frontage of the Avenue now hold data that can be isolated for further analysis. This data, acquired from the city of Toronto's open data source, can be filtered through site specific parameters in order to create a desirable site selection script.

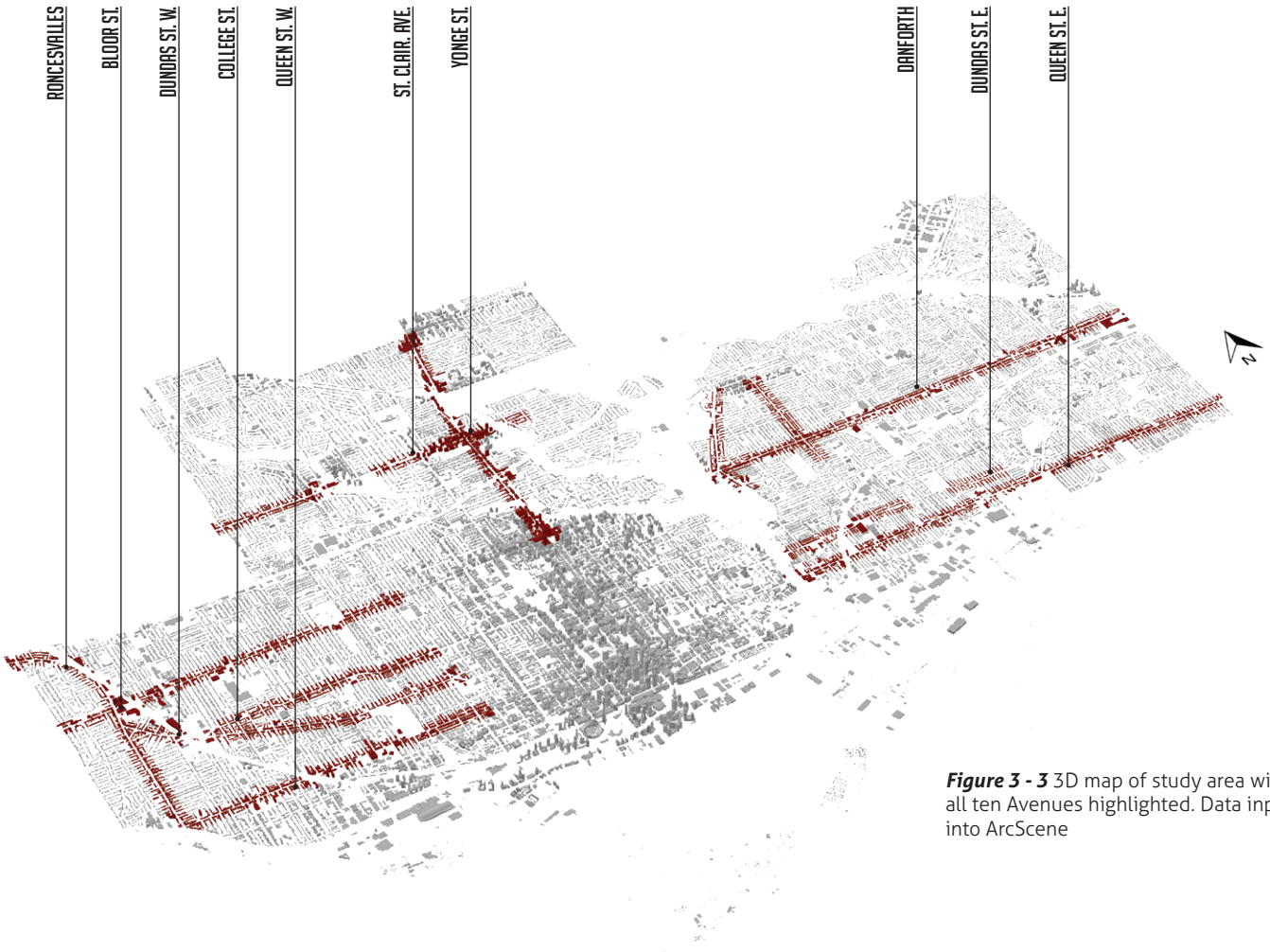


Figure 3 - 3 3D map of study area with all ten Avenues highlighted. Data input into ArcScene

2. Extract vacant lots and parking lots from footprint data

The next step takes on the strategy, mentioned in chapter 1, of urban consolidation. Barton Myers describes a method to accommodate urban growth through gradual consolidation. Meaning, recycling of old buildings, filling of vacant lots, and in appropriate areas, intensifying land-use.[3] This strategy led the analysis to incorporate and curate data pertaining to vacancy and parking lots directly fronting the Avenues. The city's open data for vacant lots, parking lots and buildings footprints was incorporated into the analytical model. From the data included in the model it was was important to isolate the pertinent information within the data in order to create a catalogue of all vacant lots, parking lots and vacant buildings fronting the ten Avenues selected. This was achieved by creating a script within the ModelBuilder function of the ArcMap GIS program.

ModelBuilder is an application in the arc map program that is used to create, edit and manage models. Models are work flows that string together sequences of geo processing tools, feeding the output of one tool into another tool as input. ModelBuilder can also be thought of as a visual programming language for building workflows.

The script works as an order of operations, based on input data to organize functions in sequence to create an end result. In this case the end result is to identify all vacant sites, parking lots and vacant buildings along the avenues within the study area. The script was created specifically for each Avenue, the sites were then curated into a map of all potential sites.

The basic tools used within the script were as follows;

Clip - Extracts input features that overlay the clip features.

Select - Extracts features from an input feature and stores them in an output feature

Make Feature Layer - Creates a feature layer from an input feature or layer file.

Select Layer By Location - Select features in a layer based on a spatial relationship to features in another layer.

Merge - Combines multiple input datasets of the same data type into a single, new output dataset. This tool can combine point, line or polygon feature classes or tables.

Buffer - Creates buffer polygons around input features to a specified distance.

The script also used input data sets from open data Toronto including;

3D Massing - This data set provides 3D massing as well as building footprint data and 3 height related attributes: Elevation, Elevation z (EleZ) and Z.
Elevation = Building height from Mean Sea Level
EleZ = Building Height
Z = Ground elevation/spot height

Address Points - The One Address Repository data set provides a point representation for over 500,000 addresses within the City of Toronto. Each address point is described with a series of attributes including street number, street name, address type, feature class, **vacancy** and real world coordinates.

Green P Parking - This dataset includes general information on the Green P and 17 TTC parking lots operated by the Toronto Parking Authority (TPA) about off-street parking (capacity, rates, location, type, operation method).

Property Boundaries (Parcels) - This data is a GIS file that outlines the geographical area of all properties in the City of Toronto.

Street Centrelines - The Toronto Centreline is a data set of linear features representing streets, walkways, rivers, railways, highways and administrative boundaries within the City of Toronto. Each line segment is described with a series of attributes including a unique identifier, name, feature code, and address ranges (where applicable).

The hierarchy of functions within the ModelBuilder is important. Therefore the specific study area extracted in step 1 of the method was the first variable. This was achieved by first "clipping" all ward profiles pertaining to the study area. Followed by a "clip" of all Avenues from the resulting study area and then applying a 100 meter buffer out from the centreline of the Avenue in question. All parcels, parks, streets, building footprints and address points were then "clipped" from that buffer and finally the parking and vacant lots were extracted. The diagram below shows this method.

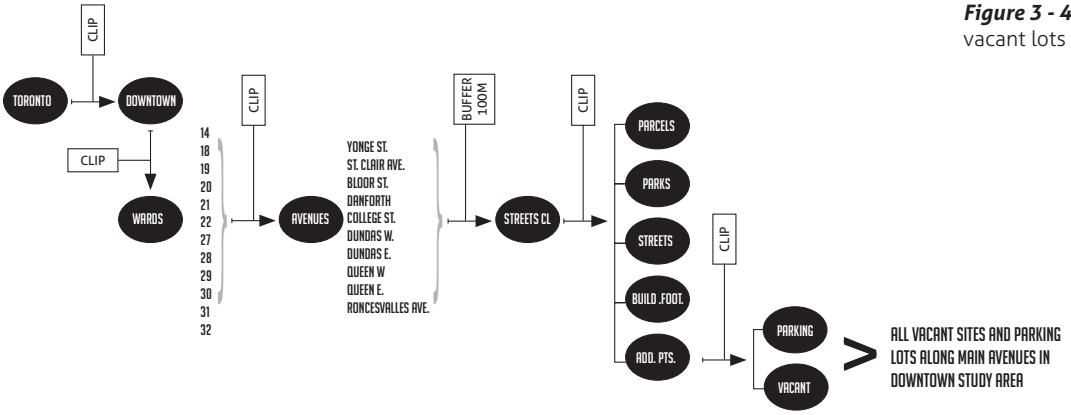


Figure 3 - 4 Method for extracting vacant lots along Avenues highlighted

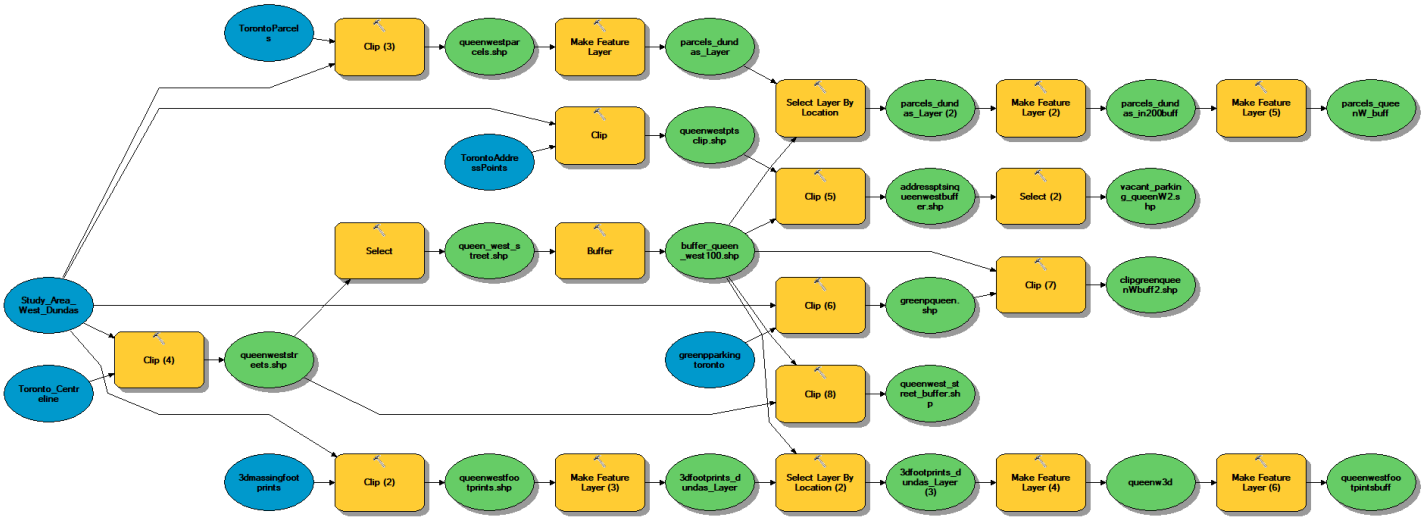


Figure 3 - 5 Example of script used for each Avenue in order to reveal all sites along avenues with potential for growth.

The input variable (the blue oval), the tool (the yellow rectangle), and the output variable (the green oval) change colors to indicate that all parameter values have been supplied and the tool is ready to run. Once you run the model it creates a drop shadow indicating that there were no bugs and the resulting output can be added to your model.

Once all models were executed for all Avenues within the study area the script generated roughly 194 sites fronting the Avenues that were either vacant, or parking lots. The next step would involve a shift in scale to a parcel by parcel analysis for appropriate sites that could accommodate midscale typology.

Figure 3 - 6 Map of output showing 194 sites within the Toronto East York Study Area.

3. Zoom in to sites to identify which are viable

Now that the sites are identified and selected it is important to shift scales to evaluate the outcome of the script. Although the script was able to output many sites, within the parameters of the model, it was important to zoom in and analyze the data. The simplicity of the script allowed for a basic output of all sites and because of the static nature of the input data, it didn't account for development changes while the work was being done. The sites were specifically selected for vacancy, parking lots and vacant lots but after comparing the data accumulated by the development analysis in chapter 2 it was clear that some sites were either under construction, pre-construction or already developed.

Other variables that wouldn't be conducive to mid-scale growth included sites too small to incorporate any type of development, unless it was within the same block as other vacant properties and could be amalgamated in the future.

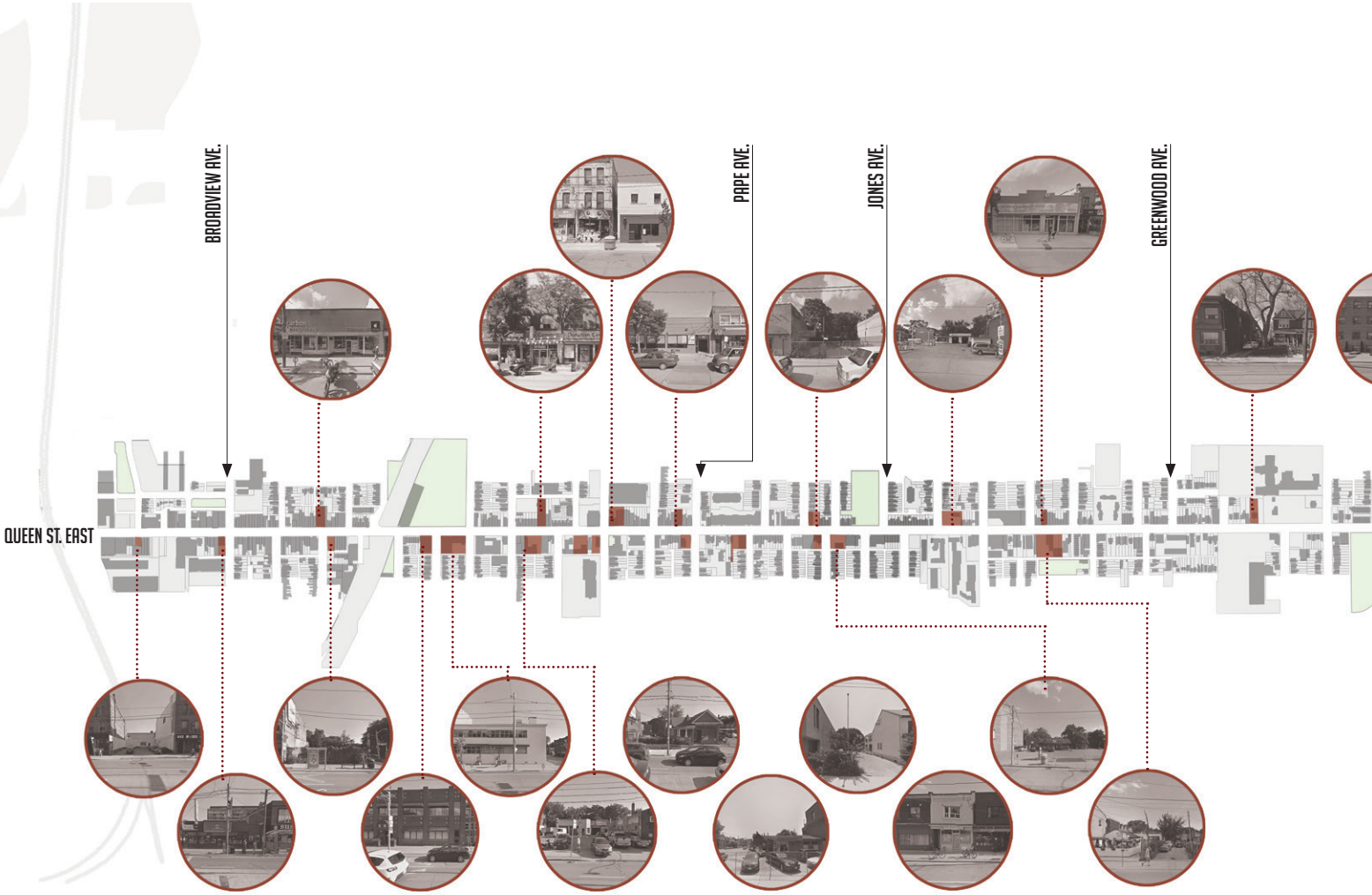
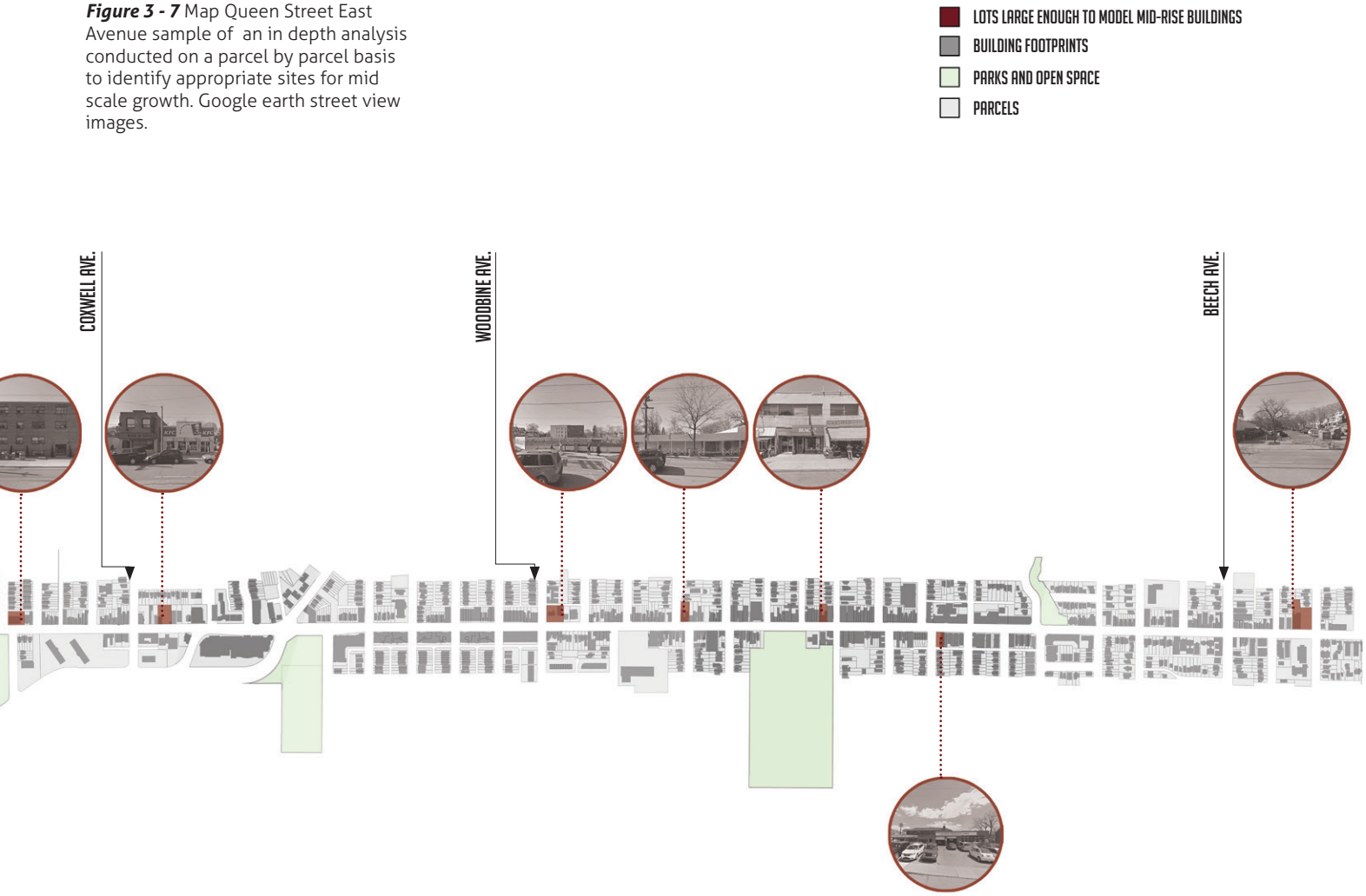


Figure 3 - 7 Map Queen Street East Avenue sample of an in depth analysis conducted on a parcel by parcel basis to identify appropriate sites for mid scale growth. Google earth street view images.



4. Create viability index with parameters to select optimal sites

The final step involved creating specific parameters to insert into the model to establish a method of filtering down sites. The parameters are based on attributes that will be conducive to mid-scale typological growth and the incorporation of desired elements such as orientation relative to the sun and proximity to park space.

Every site, while unique, also offers an opportunity to be grouped according to specific data driven parameters. When used in combination with each other, these parameters, can start to create groups of parcels with similar conditions that can begin to inform the user of the potential for appropriate intensification. Patterns will start to emerge from different combinations that will only enrich quality of site potential. The model becomes a tool that extracts groups of sites based on parametric attributes that establish a quality desired by both architects and developers.

The next few pages will show the outcome of integration between the viability attributes and GIS script outcome of potential sites. The integration of these specific attributes into the GIS program allowed for the capability to mix and match outcomes based on desired site conditions. These attributes included (see diagram left);

Scale - Size of parcel determines if the site is suitable for mid-scale intensification or if a parcel can be combined to create a consolidation situation. Feasibility is also a factor.

Density - Allowable density in a specific area calculated by FAR (floor area ratio) in order not create added stress on surrounding infrastructure.

Landuse - Important to know zoning requirements for allowed building type in any given area.

Proximity to park space - The distance from any given parcel to the nearest green space to keep a balance of green space in density for future development.

Location in the block - The physical location of the parcel relative to its position in the block. Corner, infill or whole block indicates desirability of development

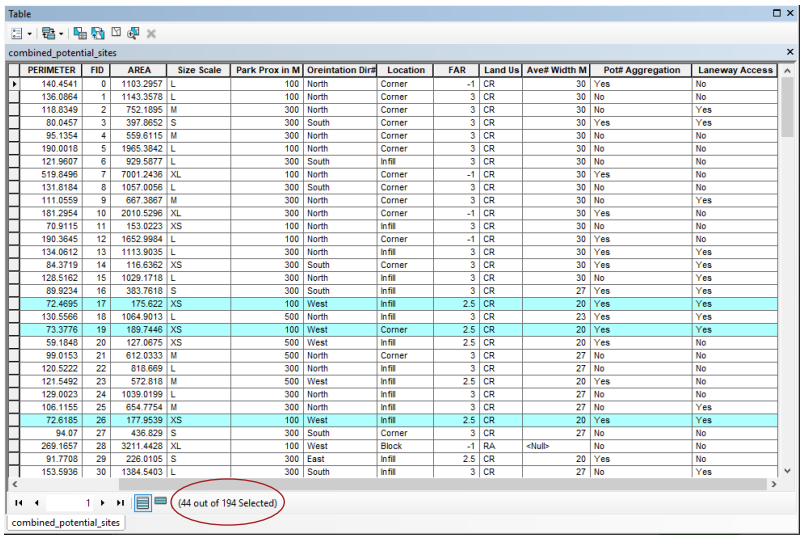
Orientation - The access to sunlight, especially for green space, creates an opportunity for higher quality development.

Laneway Access - As a unique part of Toronto's city fabric, the laneway lends itself as an urban resource and catalyst for new architectural possibilities.

Avenue Width - As highlighted by the city in the Avenue Study it is important to maintain a 1:1 building to avenue width ration for a more pedestrian friendly human scale.

Potential for - aggregation Development, especially for smaller sites, isn't desirable for sites that aren't large enough to accommodate the intensification. Therefore smaller sites within the same block can be amalgamated to create opportunity for a larger footprint in order to accommodate the necessary growth.

The process to add these attributes to the model was tedious in terms of manually inputting all 9 attributes and their respective qualitative values into a chart for all 194 sites. Once this was achieved the model was ready to allow for a "select by attribute" feature that could process all possible combinations based on an expression input into the program feature.



PERIMETER	FID	AREA	Size Scale	Park Prox in M	Oreintation Dir#	Location	FAR	Land Us	Ave# Width M	Pot# Aggregation	Laneway Access
140.4541	0	1103.2957	L	100	North	Corner	-1	CR	30	Yes	No
136.0864	1	1143.3578	L	100	North	Corner	3	CR	30	No	No
118.8349	2	752.1895	M	300	North	Corner	3	CR	30	No	Yes
80.0457	3	397.8652	S	300	South	Corner	3	CR	30	Yes	Yes
95.1354	4	559.6115	M	300	North	Corner	3	CR	30	No	No
190.0018	5	1965.3842	L	100	North	Corner	3	CR	30	No	No
121.9807	6	929.5877	L	300	South	Infill	3	CR	30	No	No
519.8496	7	7001.2436	XL	100	North	Corner	-1	CR	30	Yes	No
131.8184	8	1057.0056	L	300	South	Corner	3	CR	30	No	No
111.0559	9	667.3867	M	300	North	Corner	3	CR	30	No	Yes
181.2954	10	2010.5296	XL	300	North	Corner	-1	CR	30	Yes	No
70.9115	11	153.0223	XS	100	North	Infill	3	CR	30	No	No
190.3645	12	1652.9984	L	100	North	Corner	-1	CR	30	Yes	No
134.0612	13	1113.9035	L	300	North	Infill	3	CR	30	Yes	Yes
84.3719	14	116.6362	XS	300	South	Corner	3	CR	30	Yes	Yes
128.5162	15	1029.1718	L	300	North	Infill	3	CR	30	No	Yes
89.9234	16	383.7618	S	300	South	Infill	3	CR	27	Yes	Yes
72.4695	17	175.622	XS	100	West	Infill	2.5	CR	20	Yes	Yes
130.5566	18	1064.9013	L	500	North	Infill	3	CR	23	Yes	Yes
73.3776	19	189.7446	XS	100	West	Corner	2.5	CR	20	Yes	Yes
59.1848	20	127.0675	XS	500	West	Infill	2.5	CR	20	Yes	No
99.0153	21	612.0333	M	500	North	Corner	3	CR	27	No	No
120.5222	22	818.669	L	300	North	Infill	3	CR	27	No	No
121.5492	23	572.818	M	500	West	Infill	2.5	CR	20	Yes	No
129.0023	24	1039.0199	L	300	North	Infill	3	CR	27	No	No
106.1155	25	654.7754	M	300	North	Infill	3	CR	27	No	Yes
72.6185	26	177.9539	XS	100	West	Infill	2.5	CR	20	Yes	Yes
94.07	27	436.829	S	300	South	Corner	3	CR	27	No	No
269.1657	28	3211.4428	XL	100	West	Block	-1	RA	<Null>	No	No
91.7708	29	226.0105	S	300	East	Infill	2.5	CR	20	Yes	No
153.5936	30	1384.5403	L	300	South	Infill	3	CR	27	No	Yes

Figure 3 - 8 Map Table created with attributes added to all 194 sites.

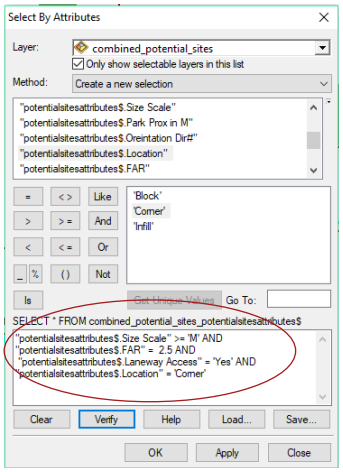


Figure 3 - 9 Select by attribute feature that uses an expression to narrow down search and isolate sites based on combinations.

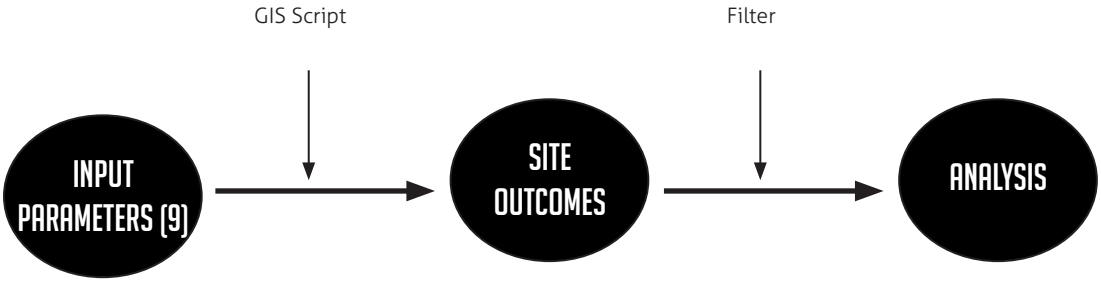
Expression expressed as an algorithm

APPLICATION

"The development of parametric design tools that generate, test, evaluate and iterate scenarios of growth will be a critical area of research. These scenarios will be driven by environmental, social, and economical factors unfolding from the scale of the region and infrastructural landscapes to the development of housing typologies. The next excursion on density needs to offer architectural types that are applicable for usage but are based on scenarios in which we manipulate the currently dominant market conditions toward a more sustainable future." [4]

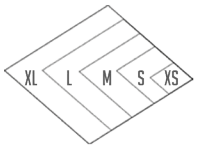
The site evaluator tool offers a top down approach for selecting sites across Toronto's main streets where the user can specifically determine which combinations are suitable to narrow down the search for a potential site for development. The following pages will highlight these nine parameters as well as visually depict three examples showing the result of the combination selected to determine the most desirable sites in which to accommodate future development. The ability to scan and output large amounts of potential sites allows for a quick view of what may be available. In this case, the examples that follow highlight parameters that are more suitable for a mid-rise courtyard typology while still allowing for the potential of discovering better alternatives for the neighbourhoods in which the sites are situated.

Figure 3 - 10 Method of running three test examples to illustrate how the site evaluator works



SCALE (XS,S,M,L,XL)

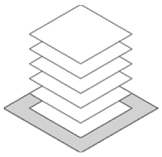
Every parcel has been represented by a letter that corresponds to the area.



Extra Small = ≤ 200m²
Small = 200m² - 500m²
Medium = 500m²-800m²
Large = 800m²-2000m²
Extra Large = ≥ 2000m²

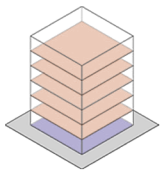
DENSITY (F.A.R)

Zoning identifies allowable density for the avenues, the range is between 1-3 in these areas (FAR). Average block density in Toronto is 3-5 du/acre a sufficient mid scale typology will allow 30-80 du/acre.



LANDUSE

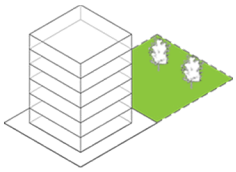
Zoning identifies landuse for specific areas along the avenues. The categories include;



CR - Commercial Residential
OR - Open Space Recreation
UT - Utility and Transportation
R - Residential
RA - Residential Apartments
E - Employment Industrial

PROXIMITY TO PUBLIC PARK

I've identified a distance in meters to the nearest public green space from each parcel identified. Ideal walking distance to any public green space is 5minutes or 500 meters. I've identified a range from 100m to 600m.

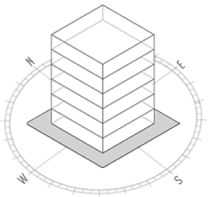


LOCATION WITHIN BLOCK

There are three postitions in which a parcel may find itself. Either the parcel within the block is a corner parcel, infill parcel or the parcel or parcels take the whole block

ORIENTATION

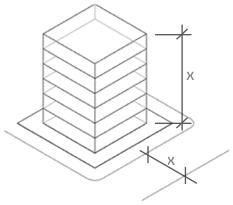
I categorized the location of the parcels relative to the direction in which they sit along the avenue. Either North, South, East or West. Each effects how much sunlight the site receives.



AVENUE WIDTH

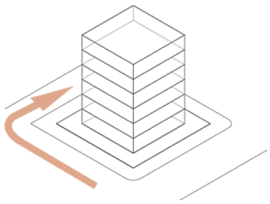
Height requirements suggest that the building be no higher than the right of way width. This means mostly 5-12 storeys in height along arterial corridors.

Avenue Heights are 20m, 23m, 27m, 30m



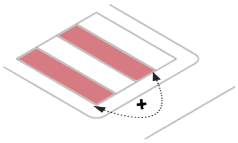
LANEWAY ACCESS

Laneway access refers to Toronto's unique laneways established from historical development. These laneways penetrate into the neighbourhoods and provide access to important services.



POTENTIAL FOR AGGREGATION

The final parameter identifies the sites which have the potential to aggregate in order to create sites large enough to accommodate development.



COMBINATION

SITE OUTPUT

SITE VIEWS

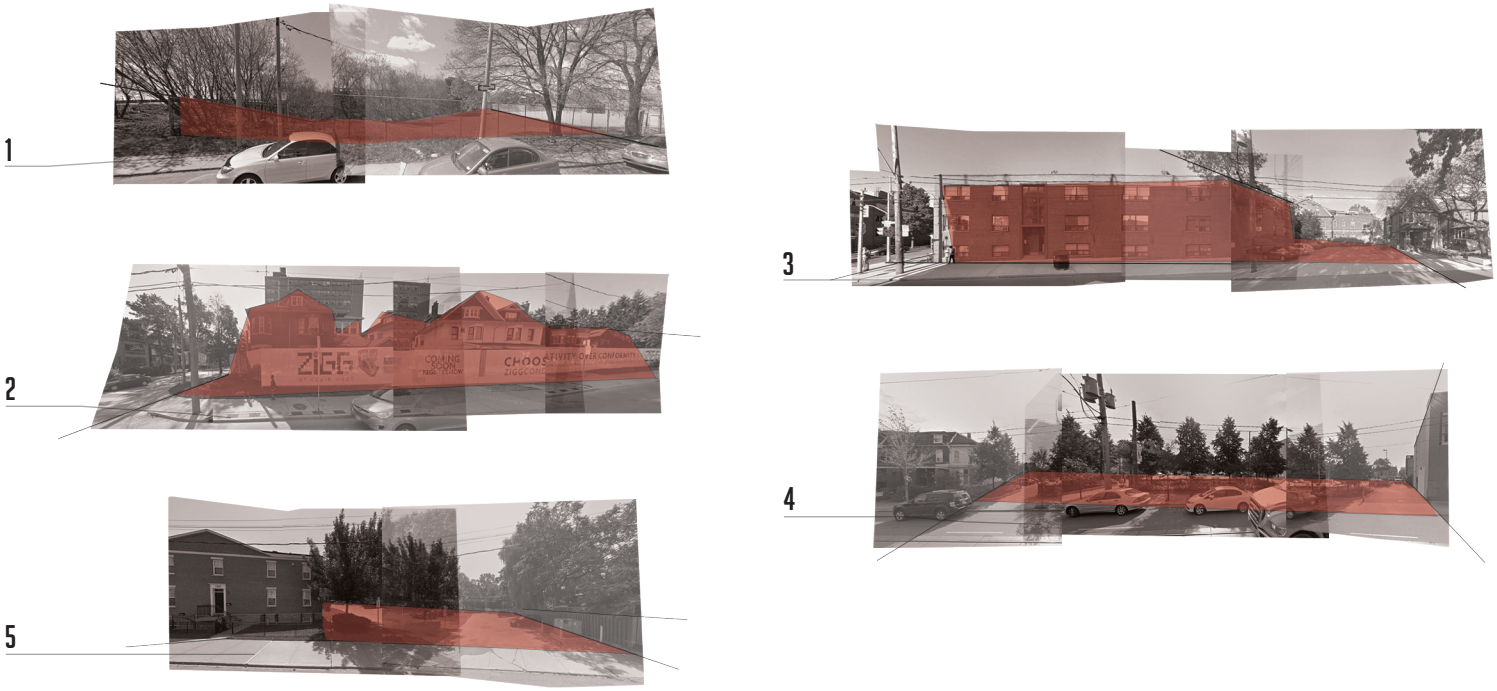


Figure 3 - 11 Select Example 1 demonstrates all corner parcels that are between 500m² - 2000m ² in size with a landuse of Residential/Apartments within a 5min walking radius to a public park.

COMBINATION

SITE OUTPUT

SITE VIEWS

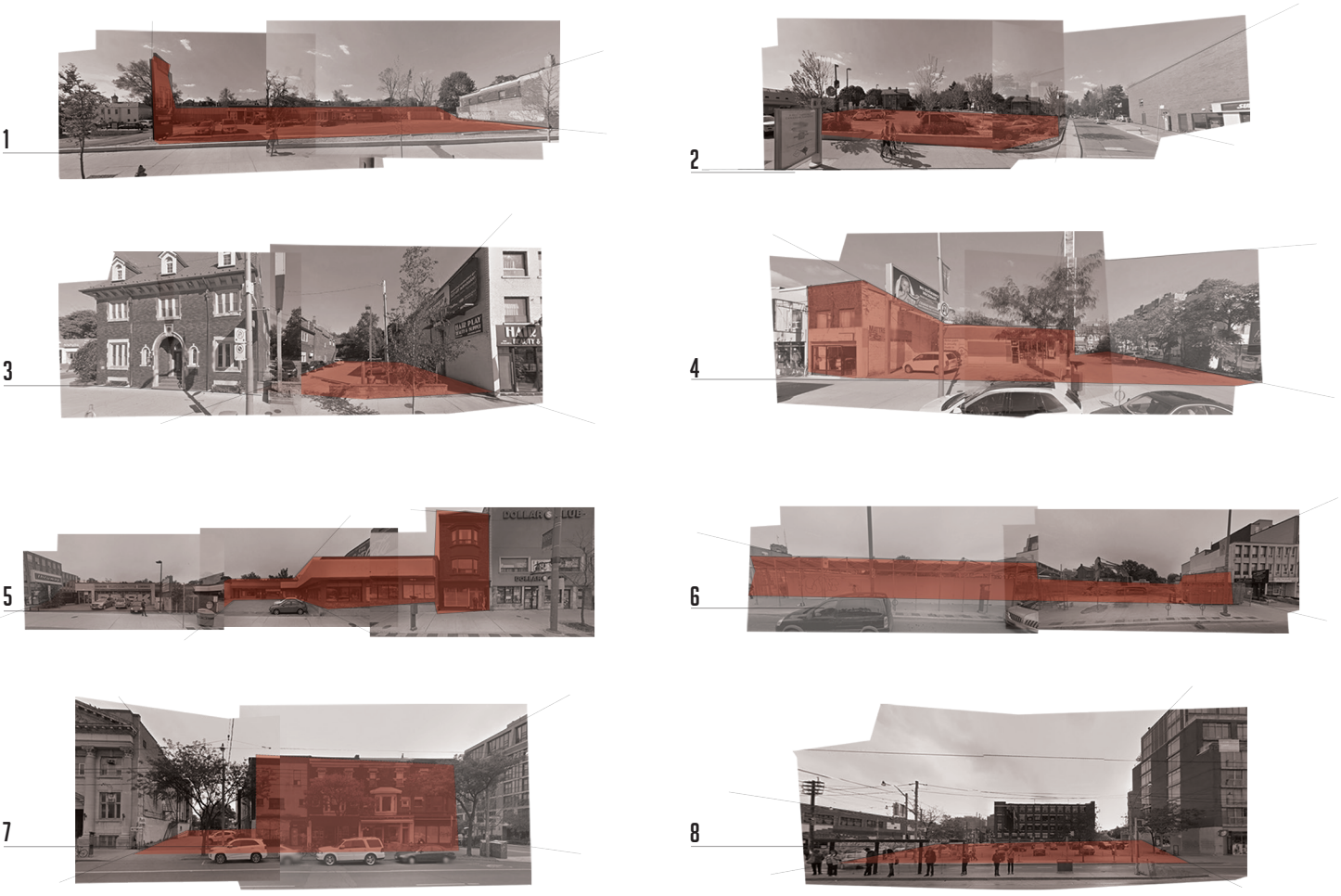


Figure 3 - 12 Select Example 2 demonstrates lots that are between 800m² - 2000m² in size with a floor area ratio of 3 that front an avenue width of 30 meters

COMBINATION

SITE OUTPUT

SITE VIEWS

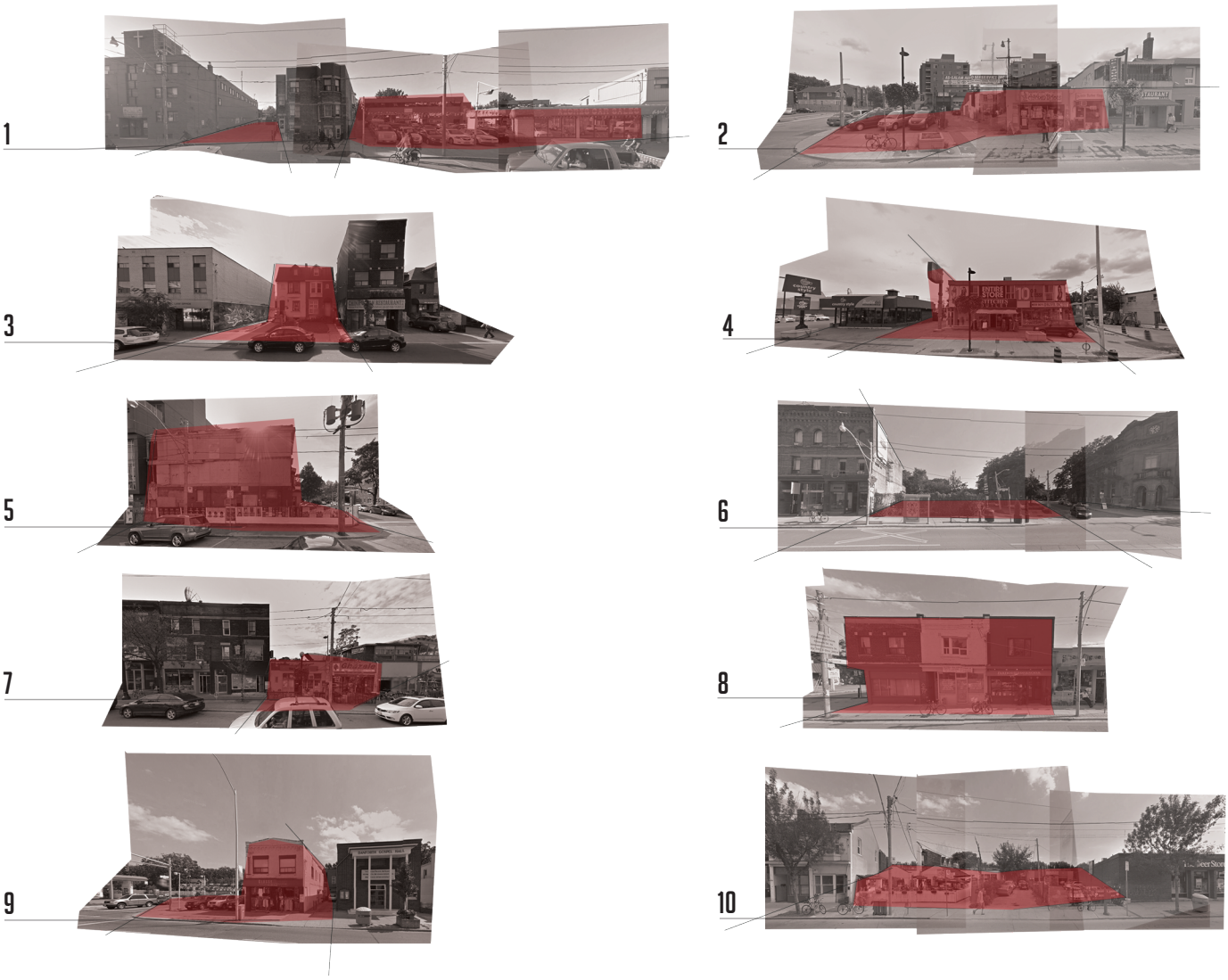


Figure 3 - 13 Select Example 3 demonstrates lots that are between 200m² - 500m² in size with zoning designated for commercial/residential orientated on the south side of the avenue and has a potential to combine multiple sites.

OUTCOME

The site evaluator tool is only one step in the process of evaluating Toronto's main arterial corridors. Looking at It depicts that every avenue contains a mix of parcels that can't be solved with one model of development. Three types continuously emerge with each iteration generated. The three site "types" are as follows;

Block - Where the whole block emerges as a site for future development, either through an amalgamation of multiple lots or where more than 50% of the site is vacant and/or open.

Infill - refers to a parcel that is situated between existing lots at the avenue frontage. These parcels are either open or vacant lots that can be re purposed or redeveloped locally.

Corner - A corner lot pertains specifically to parcels that are vacant or in need of redevelopment that face both the main avenue and a secondary roadway that penetrates into the residential block behind.

The question becomes, can we accommodate mid-scale European courtyard block typology to any of these site types?

The answer becomes clear from the site analysis that most if not all of Toronto's main street frontage is too shallow to house a courtyard block typology. Although the front lots that book end the residential block behind are too small we must rather think of the whole block as a courtyard and we should treat the book ends as a piece of the bigger block. Establishing the qualitative parameters of the European block to these sites and not the quantitative.

Therefore the next chapter will introduce a set of rules based on European block parameters in order to achieve a quality that better resembles the neighbourhoods in which it fronts.

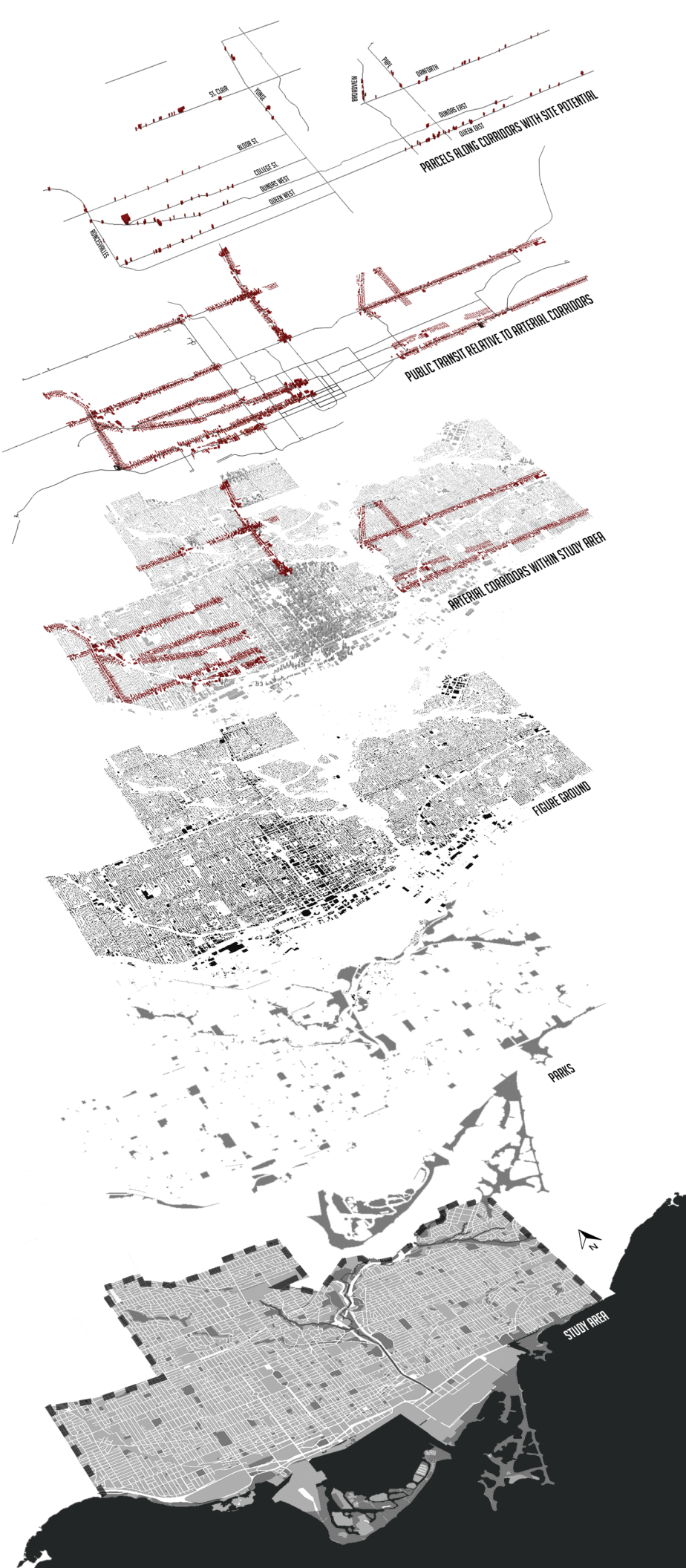
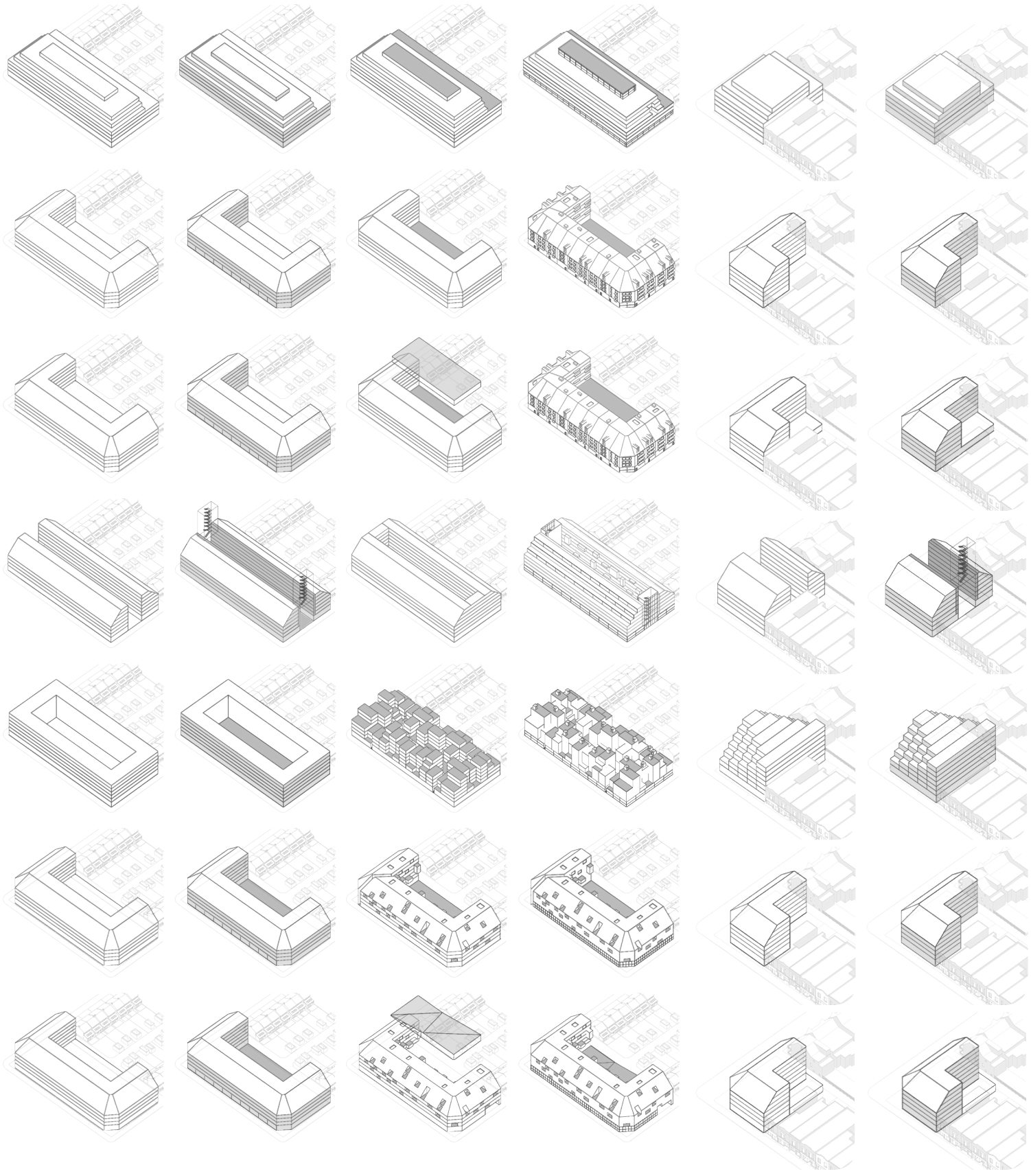
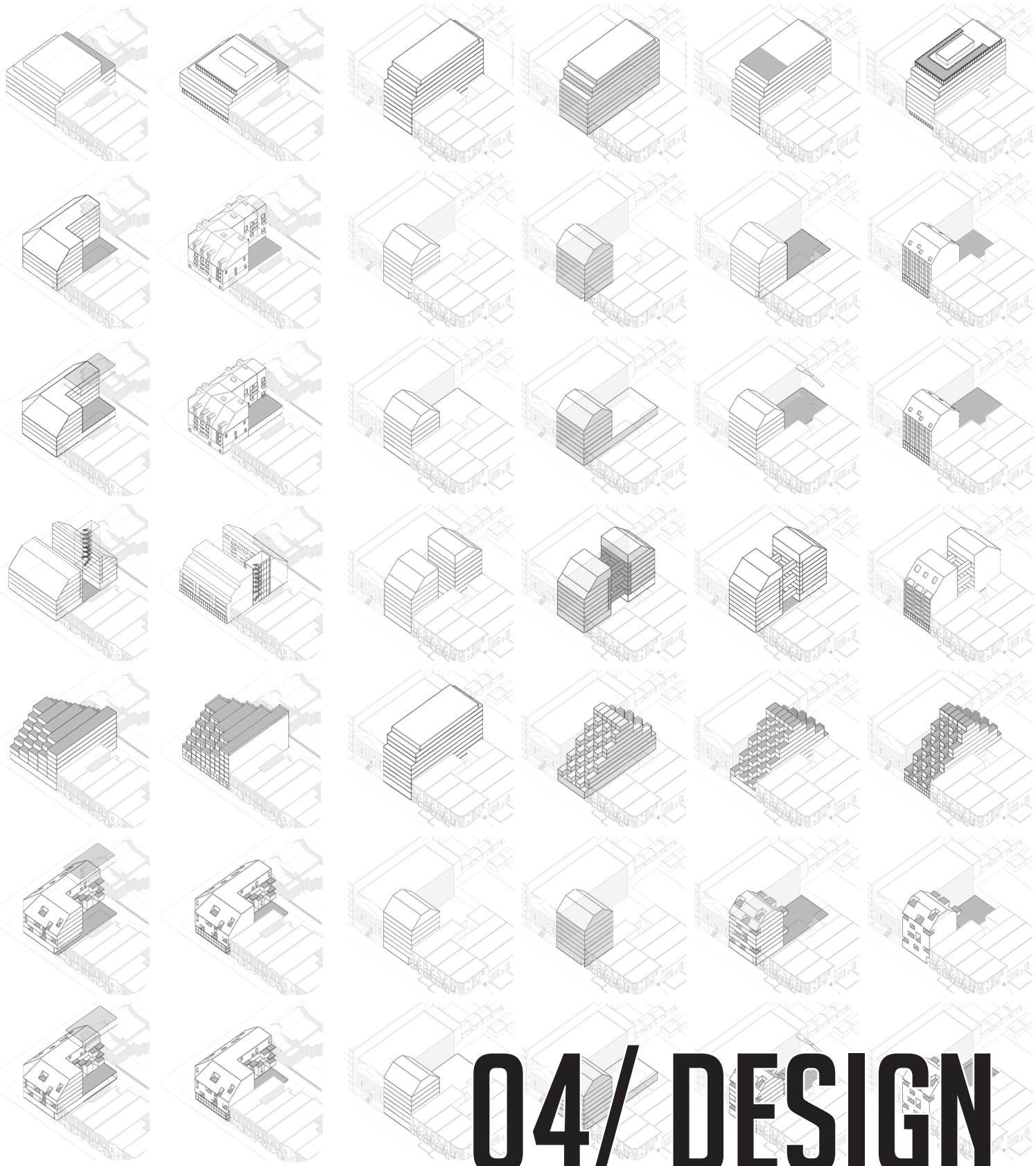


Figure 3 - 14 Graphical breakdown of layers that contributed to the GIS script that identified all sites along the avenues.





04/ DESIGN

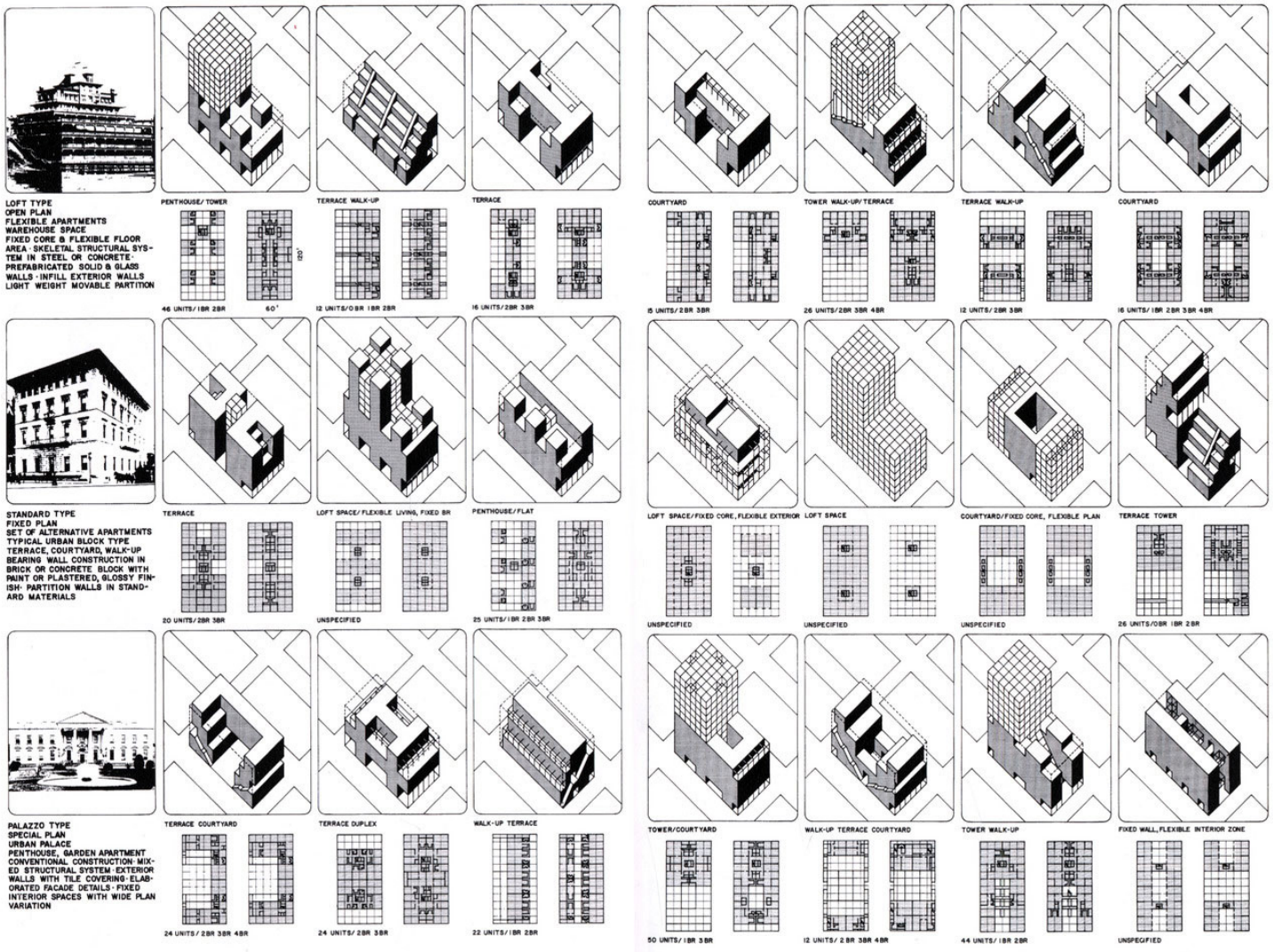


Figure 4 - 1 Select O.M Ungers "Roosevelt Island Housing Comeptition", 1974. Typological chart showing possible variations for a single block within the Manhattan grid in New York.

EUROPEAN BLOCK

O.M. Ungers morphological principles and processes shaped the making of urban form and space. They each differently understood that these principles are founded upon the transformation and distortion of precedents; ie. a historical past that holds value structurally, formally, and urbanistically.

In 1975, German architect Oswald Mathias Ungers took part in the "Roosevelt Island Housing", a competition sponsored by the State's Urban Development Corporation for the planning of a neighbourhood on the East River in front of Manhattan. Ungers' entry is a downsized and simplified Manhattan, adapted to the proportions of Roosevelt Island and with a direct morphological reference to the original. A system of urban villas and towers are distributed on a regular grid. While Manhattan's streets and avenues are transformed into pedestrian pathways, Manhattan's original Central Park is directly quoted at the center of the urban scheme for a system of public spaces and a swimming pool. Each housing block (60 by 120 feet) hosts from 25 to 35 apartments for different incomes.

The Manhattan grid serves as a formal generator for the building types and as a system of organization for a typological chart showing possible variations for the single blocks inside a common volumetric framework. Three main types, called "the loft type", "the standard type" and the "palazzo type", are considered as the references for the buildings variations.

Not unlike the work of Ungers in Mahattan, the three types that emerged from the site evaluator in Toronto were the "block" site, "infill" lot and "corner" lot. These three site types were most prevalent along the main streets. In order to best test the European block all three sites were to establish a set of "rules" that could be tested and compared for each site type. Rules that will enhance the ecological component of the avenue plan in relationship to green space , accessibility public and private.

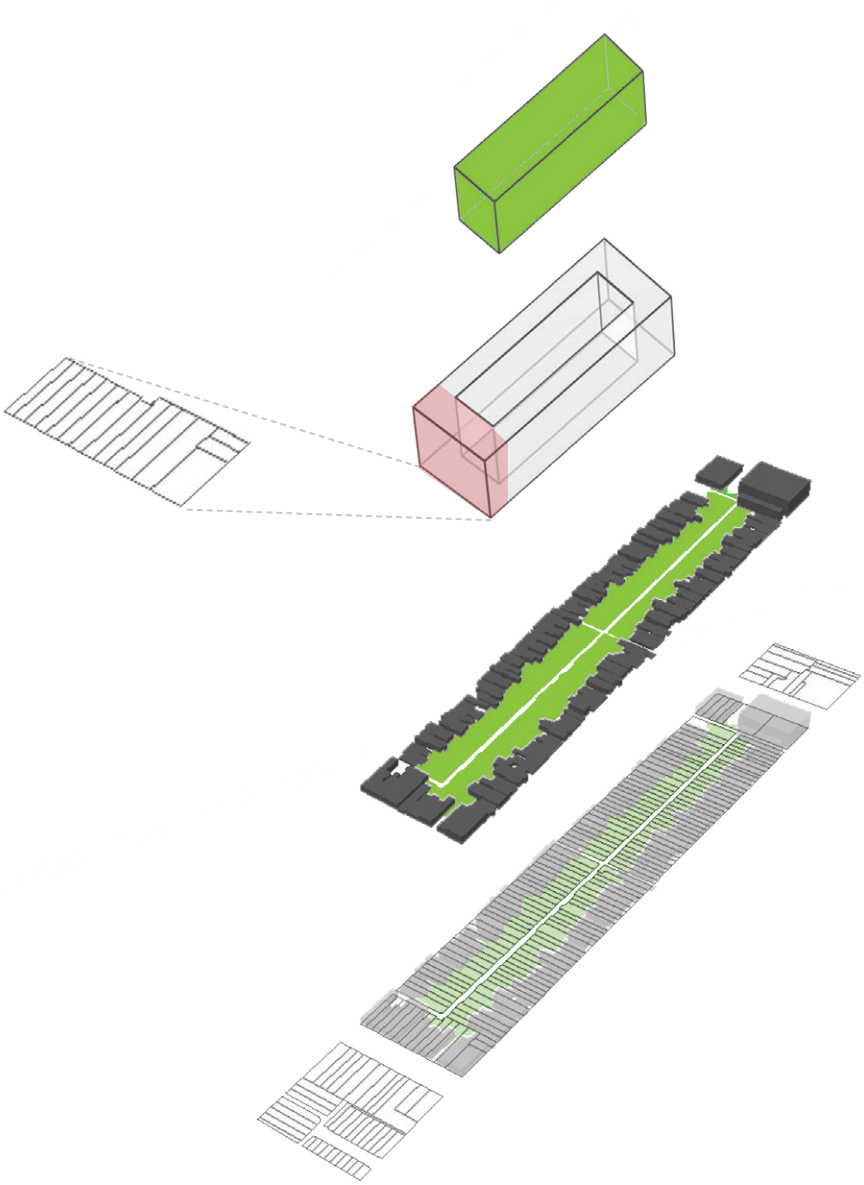


Figure 4 - 2 Diagram showing the relationship of the Avenue frontage to the neighbourhood. The block is the courtyard and the frontage highlighted acts as a slice of the courtyard block.

INTENT

The final step was to test the European courtyard block typology principles on each of these sites to highlight that the edge condition that fronts the Avenues act as piece of the greater whole. Encompassing not only the avenue front but the neighbourhood behind it.

The Toronto " courtyard" refers to the block as a whole. This courtyard block serves the public, along the avenue, as well as the private residential neighbourhood.

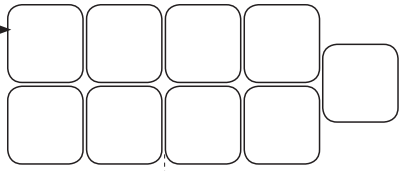
It was apparent that a European courtyard typology could not be implemented solely at the front lots designated for growth. The frontage to the Avenue's we're too shallow to accommodate such typology. The focus had to shift scales and take the approach that the whole block would act as a courtyard and that we could treat the edge condition as a piece of the greater whole. The book ends would mix commercial and publicly accessible green space to serve the neighbourhood in which it fronts. The edge condition should also establish the same quality of space found within Toronto's typical residential neighbourhoods.

Therefore, a framework was established that could be applied to test European courtyard block principles along Toronto's main streets through a typological design matrix.

Similar to the typological study conducted by Ungers, the design matrix would use the three site "types" as a system of organization to formally generate possible variations of the European courtyard typology within a common framework.

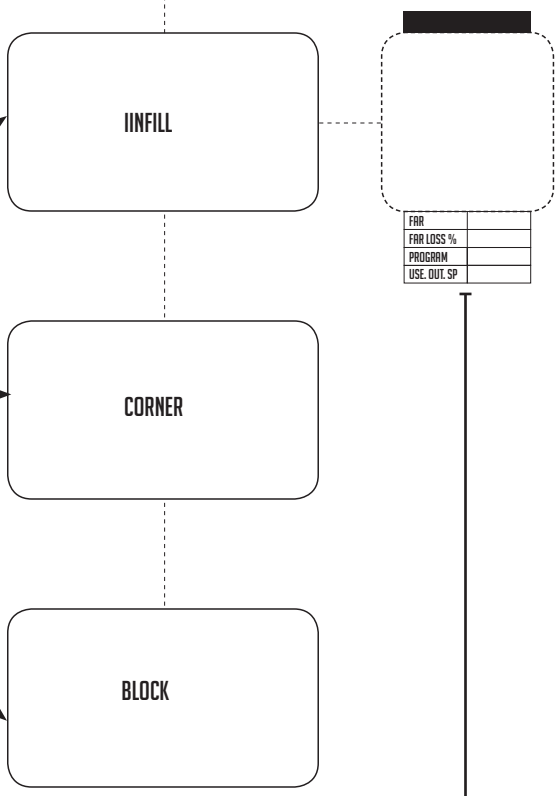
VIALBILITY PARAMETERS :

The 9 parameters that combine to create the 3 site "types" mentioned using GIS to narrow down ideal site conditions.



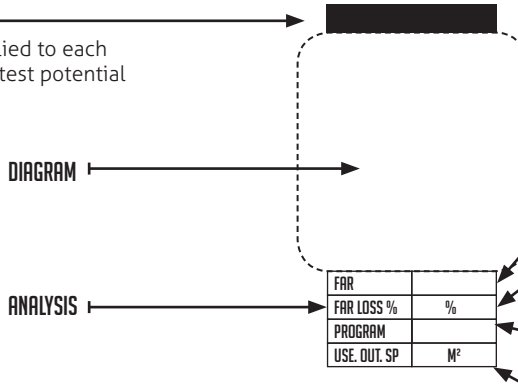
3 SITE TYPES:

Generated most often from the GIS evaluation tool, the three most prevalent site types emerge.



RULES:

7 Rules that are applied to each site type in order to test potential outcomes



FAR: Floor area ratio

FAR LOSS: is the percentage (%) of mass lost compared to the Avenue Plan which represents the maximum buildable area as per their guidelines.

PROGRAM: Represents if it's open space is accessible or not.

USABLE OUTDOOR SPACE: refers to the accessible open space in m² that is usable within the footprint of the site

CODE

Using Cerda's principles of ideal block typology, which incorporates an emphasis on the people who inhabit these city blocks, we can turn to Toronto's avenues to test these principles. Along with the GIS evaluator tool, we can begin to test potential outcomes of these "European block" parameters on the three site types I've narrowed down through the tool.

All three types provide different opportunities and outcomes that can be clearly shown through the different design iterations.

In order to test the European block type on Toronto's main streets it was important to establish 7 building "types" that could be tested through a set of rules that would demonstrate each building outcome. It was important to work within the cities existing framework to provide the best potential for a realistic intervention.

AVENUE PLAN: Avenue plan demonstrates the cities proposal through their mid-rise study guidelines.

EUROPEAN BLOCK: European refers to Cerda's preferred depth of no more than 18m for natural daylight to penetrate the entire space. It also provides the publicly accessible green space within the same plot, providing green space for it's residence and the city itself.

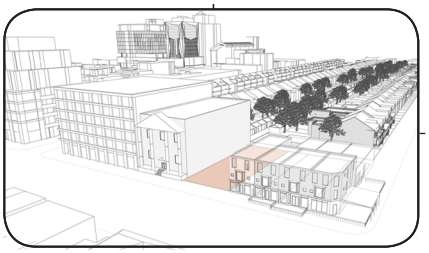
EUROPEAN : + PODIUM Refers to the same principles of the European block but where the green space is now only accessible to the tenants and the ground floor provides retail. Similar to the Cerda block with retail below, this hybrid also speaks to the city of Toronto's history of block structure and their preference to keep retail at ground level.

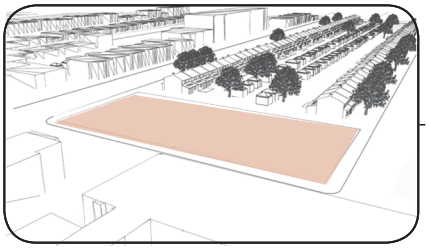
EUROPEAN : + DBL CORR. This rule marries both European block with double loaded corridor and while still maintaining a private courtyard access within the allowable 11m code requirement between buildings. This option allows for more units within the block.

GARDEN: The garden ensures that every unit has a garden of at least 12m² per unit in order to meet the requirements of a healthy green space laid out earlier in the thesis.

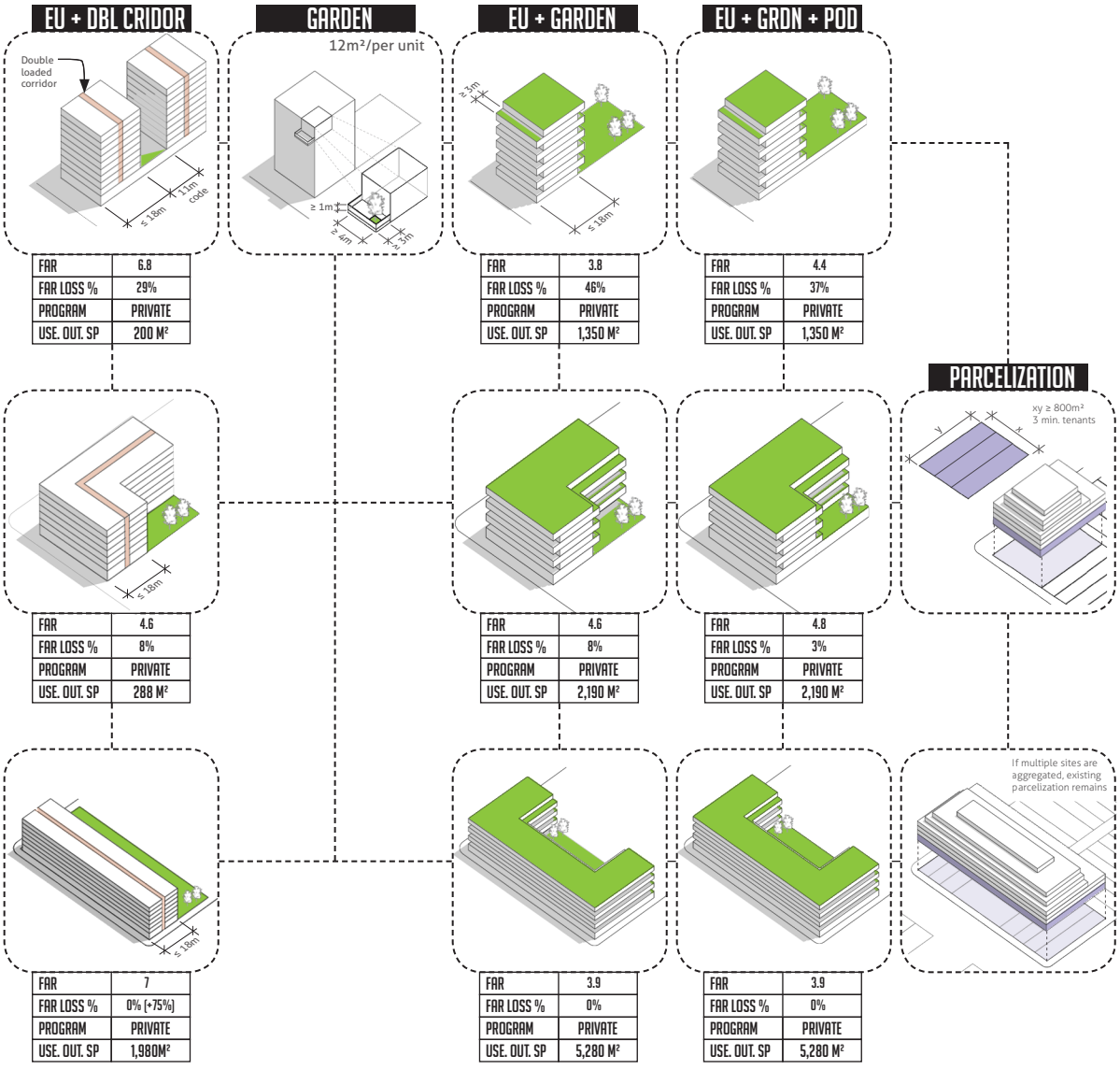
EUROPEAN : + GARDEN A hybrid of the garden and European block shows the potential of addressing the most desirable condition, a balance of green and density. Where the green space is both private and public

EUROPEAN : + PODIUM + GARDEN As previously mentioned in the European/garden hybrid this rule provides the opportunity for a private green space that serves only it's tenants.





SITE	AVENUE	EUROPEAN	EU + PODIUM
18m × 48m		≤ 18m	
	FAR 9.5 FAR LOSS % 0% PROGRAM PRIVATE USE. OUT. SP 260 M²	FAR 3.8 FAR LOSS % 46% PROGRAM SEMI-PUBLIC USE. OUT. SP 540 M²	FAR 4.4 FAR LOSS % 37% PROGRAM PRIVATE USE. OUT. SP 540 M²
30m × 42m		≤ 18m	
	FAR 5 FAR LOSS % 0% PROGRAM PRIVATE USE. OUT. SP 800 M²	FAR 4.6 FAR LOSS % 8% PROGRAM PRIVATE USE. OUT. SP 288 M²	FAR 4.8 FAR LOSS % 3% PROGRAM PRIVATE USE. OUT. SP 288 M²
42m × 90m		≤ 18m	
	FAR 4 FAR LOSS % 0% PROGRAM PRIVATE USE. OUT. SP 2,200 M²	FAR 3.9 FAR LOSS % 3% PROGRAM PRIVATE USE. OUT. SP 1,296 M²	FAR 3.9 FAR LOSS % 3% PROGRAM PRIVATE USE. OUT. SP 1,296 M²



FAR	6.8
FAR LOSS %	29%
PROGRAM	PRIVATE
USE. OUT. SP	200 M²

FAR	3.8
FAR LOSS %	46%
PROGRAM	PRIVATE
USE. OUT. SP	1,350 M²

FAR	4.4
FAR LOSS %	37%
PROGRAM	PRIVATE
USE. OUT. SP	1,350 M²

FAR	4.6
FAR LOSS %	8%
PROGRAM	PRIVATE
USE. OUT. SP	288 M²

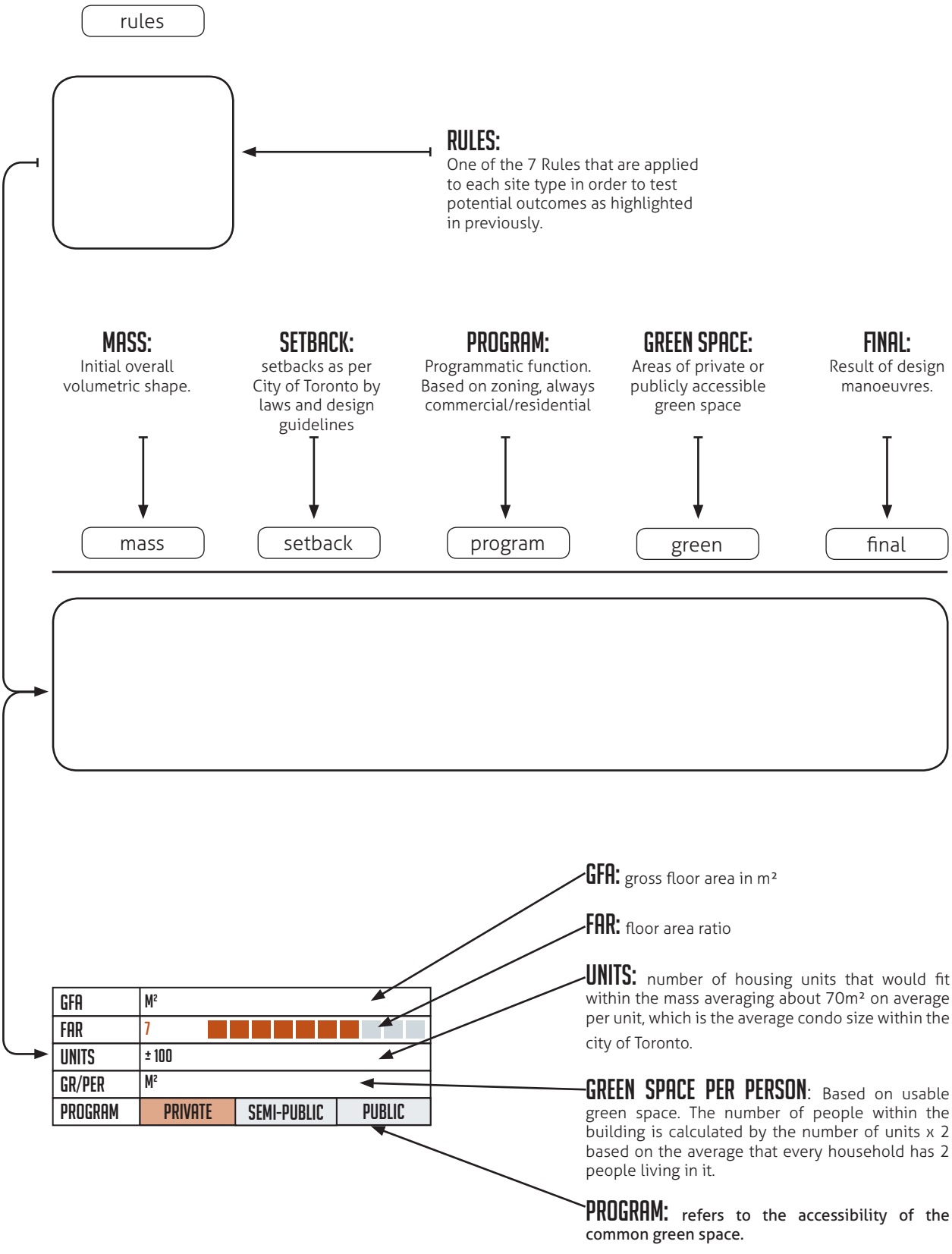
FAR	4.6
FAR LOSS %	8%
PROGRAM	PRIVATE
USE. OUT. SP	2,190 M²

FAR	4.8
FAR LOSS %	3%
PROGRAM	PRIVATE
USE. OUT. SP	2,190 M²

FAR	7
FAR LOSS %	0% (+75%)
PROGRAM	PRIVATE
USE. OUT. SP	1,980M²

FAR	3.9
FAR LOSS %	0%
PROGRAM	PRIVATE
USE. OUT. SP	5,280 M²

FAR	3.9
FAR LOSS %	0%
PROGRAM	PRIVATE
USE. OUT. SP	5,280 M²


rules
RULES:
One of the 7 Rules that are applied to each site type in order to test potential outcomes as highlighted in previously.
MASS:
Initial overall volumetric shape.
SETBACK:
setbacks as per City of Toronto by laws and design guidelines
PROGRAM:
Programmatic function. Based on zoning, always commercial/residential
GREEN SPACE:
Areas of private or publicly accessible green space
FINAL:
Result of design manoeuvres.
mass
setback
program
green
final
GFA
FAR
UNITS
GR/PER
PROGRAM
M²
7
± 100
M²
PRIVATE
SEMI-PUBLIC
PUBLIC
GFA: gross floor area in m²
FAR: floor area ratio
UNITS: number of housing units that would fit within the mass averaging about 70m² on average per unit, which is the average condo size within the city of Toronto.
GREEN SPACE PER PERSON: Based on usable green space. The number of people within the building is calculated by the number of units x 2 based on the average that every household has 2 people living in it.
PROGRAM: refers to the accessibility of the common green space.

DESIGN MATRIX

After determining the parameters and rule set to be applied to each site "type." A design matrix was created to play out each possible scenario. Emphasizing key factors such as mass, setback, program and green space. Each outcome was then calculated based on gross floor area, floor area ratio, number of housing units, greenspace / person and programmatic function of outdoor space.

The y- axis sets the specific building type rule ie. European or European + podium etc.. while the x-axis acts as a machine that molds the form with each parameter input until a final outcome is achieved.

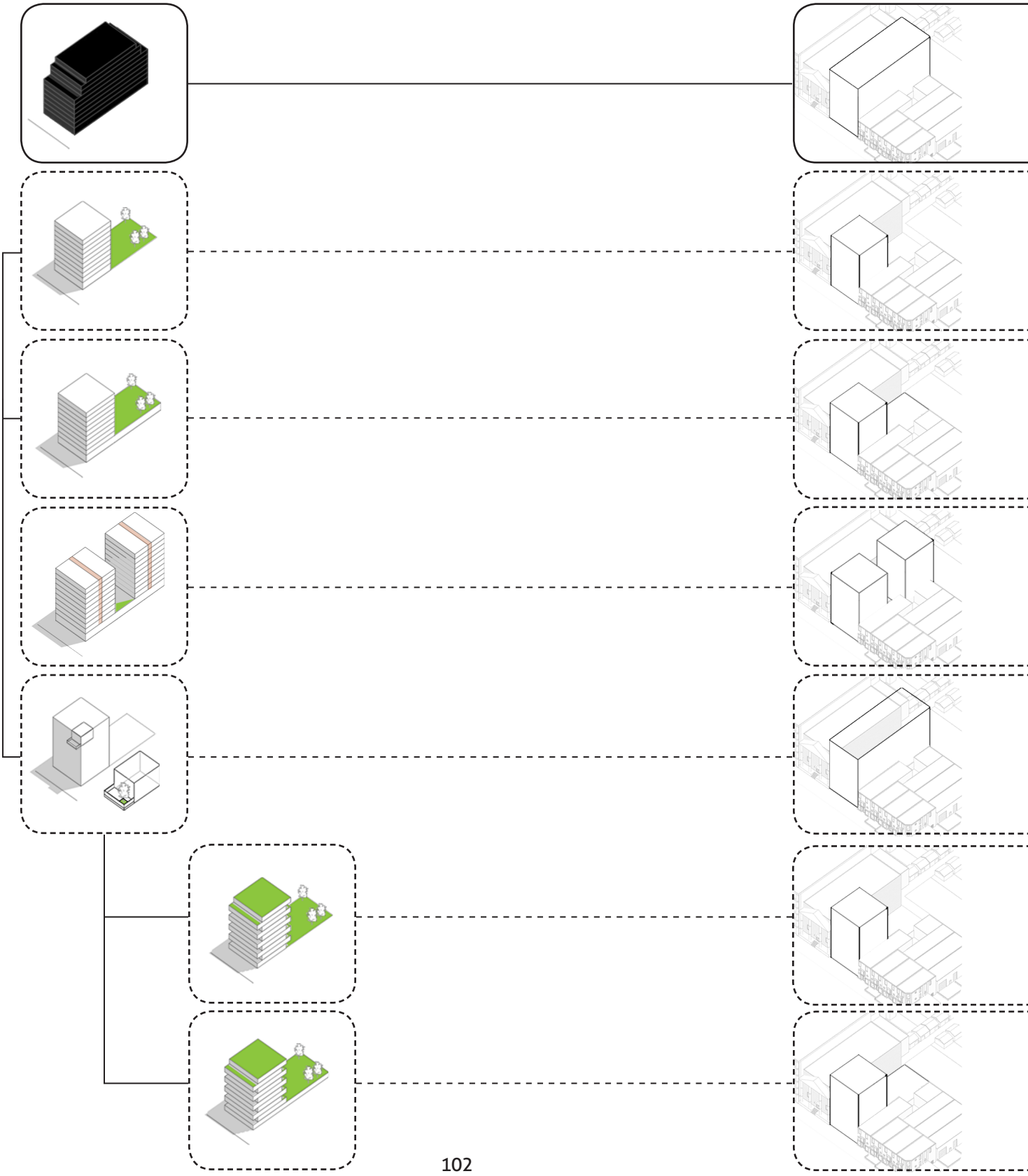
The design matrix has been tailored to incorporate qualitative parameters based on important factors established through European urbanistic sensibilities. Therefore the outcomes will more than likely resemble these physical constraints. It was important to evaluate each outcome, so that they could be compared analytically to one another. Each outcome represented a potential typology that balanced both density and green space.

These outcomes could serve as the initial proposal to any new development along the Avenues. Coupled with the GIS site selector each site could then be evaluated to incorporate further design parameters, generating numerous outcomes.

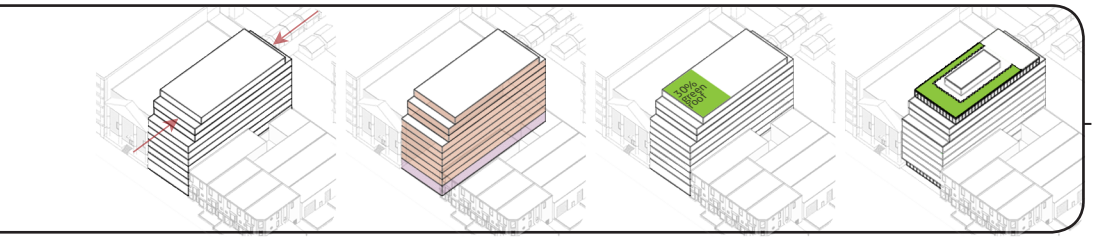
The next few pages will lay out the matrix. Playing out all typologies for each site type, resulting in an outcome that is then analyzed numerically for further comparison.

rules

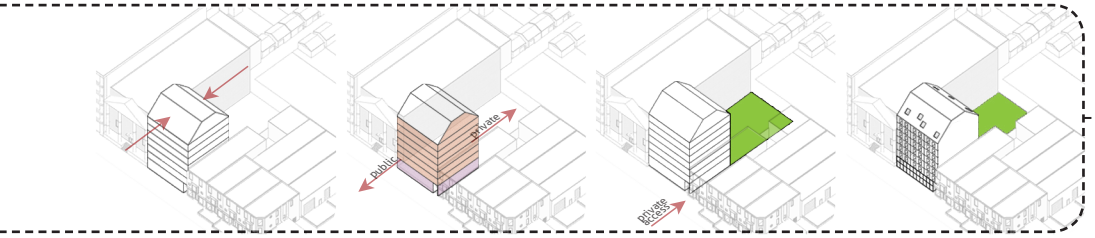
mass



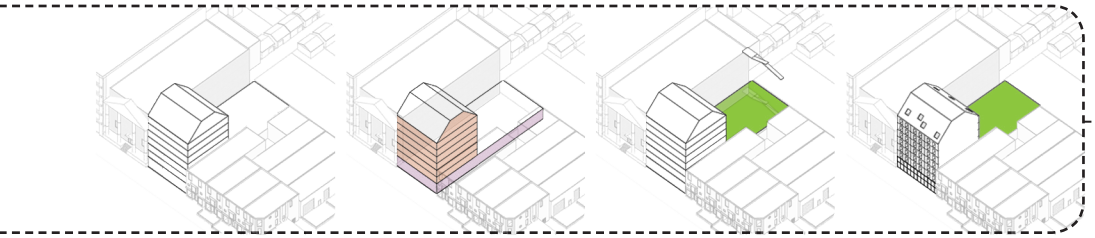
setback | program | green | final



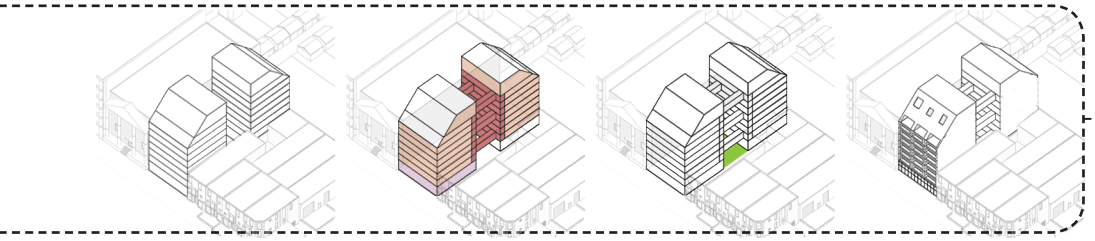
GFA	7,000M²
FAR	7
UNITS	± 100
GR/PER	4 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



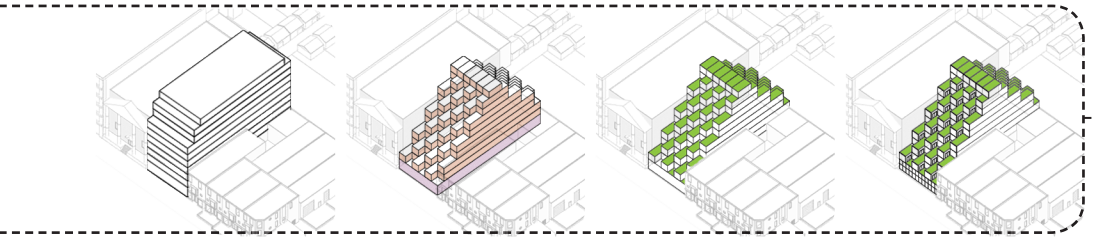
GFA	2,900M²
FAR	3.4
UNITS	± 24
GR/PER	11 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



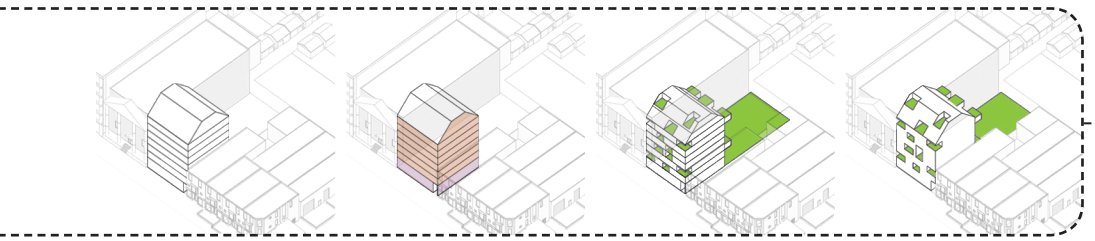
GFA	3,500M²
FAR	4
UNITS	± 24
GR/PER	11 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



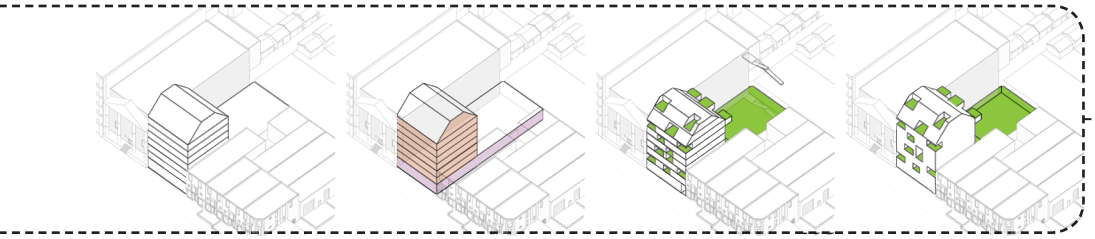
GFA	6,500M²
FAR	7.5
UNITS	± 50
GR/PER	2 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



GFA	4,100M²
FAR	4.5
UNITS	± 60
GR/PER	7 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



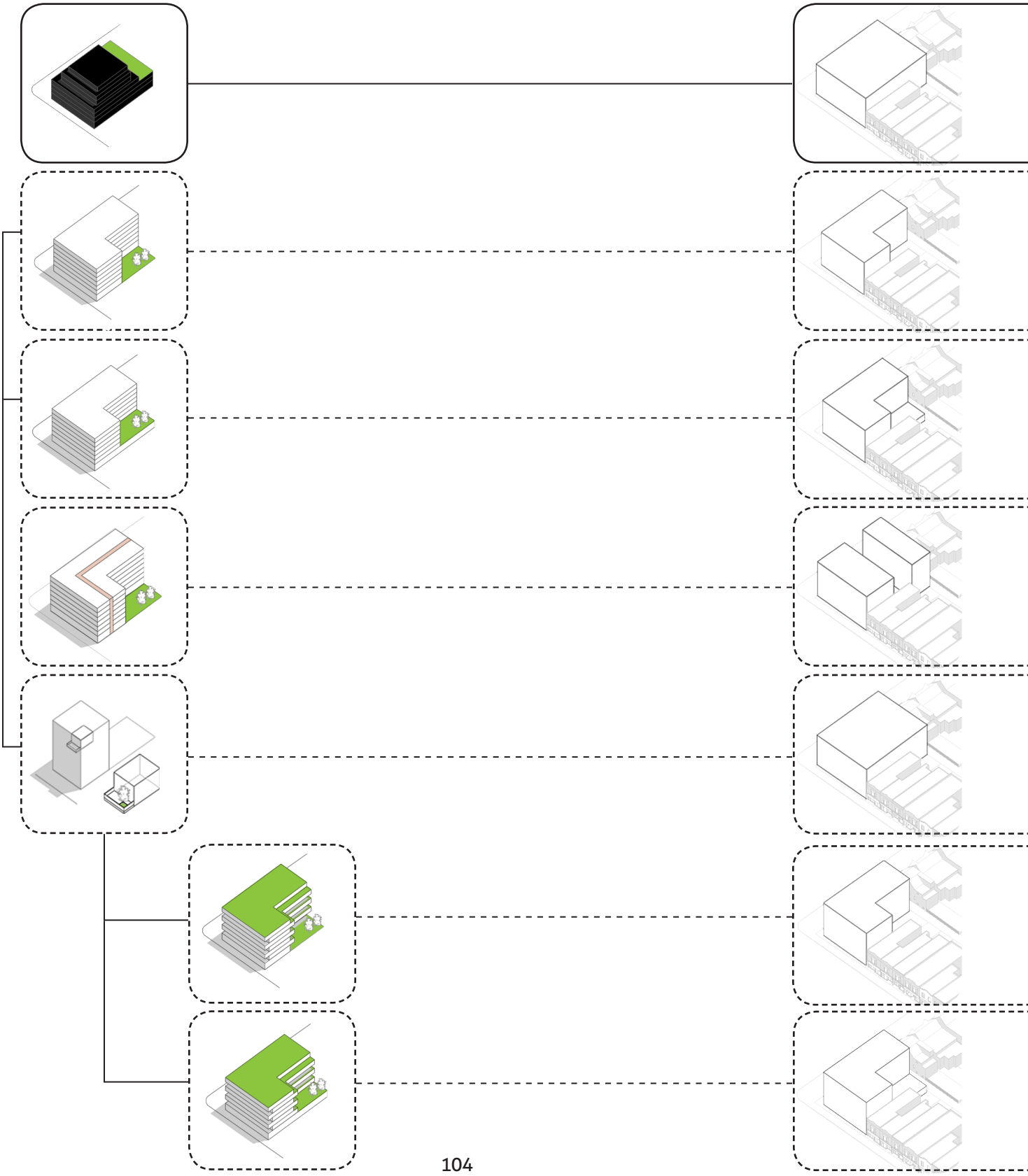
GFA	2,900M²
FAR	3.4
UNITS	± 24
GR/PER	15 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



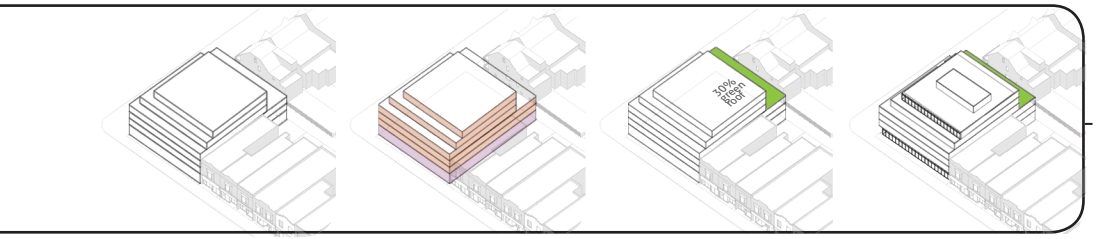
GFA	3,500M²
FAR	4
UNITS	± 24
GR/PER	15 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC

rules

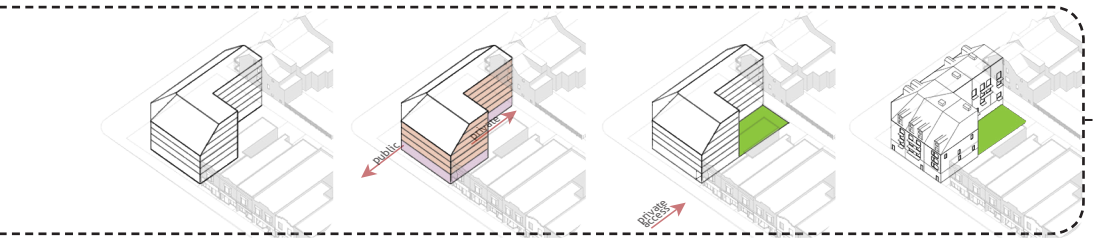
mass



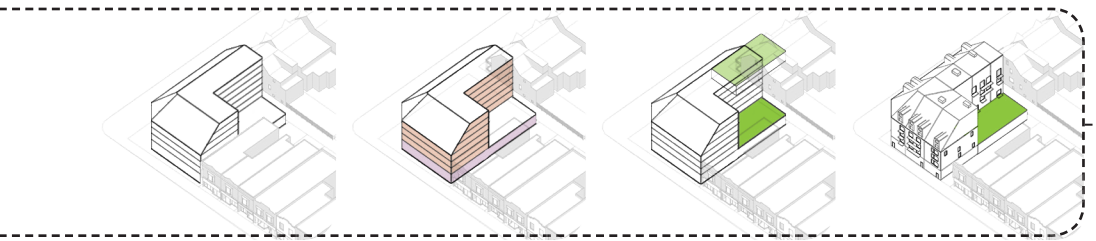
setback program green final



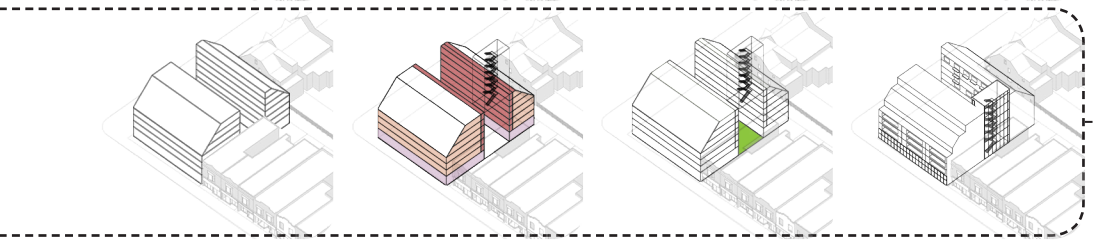
GFA	5,800M²
FAR	4.5
UNITS	± 80
GR/PER	1.5 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



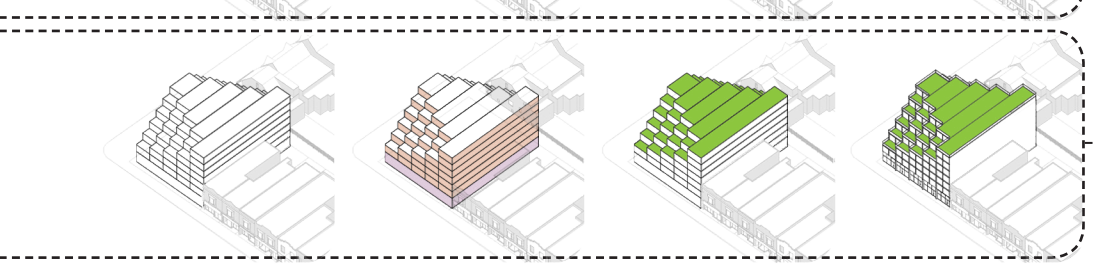
GFA	5,400M²
FAR	4.2
UNITS	± 48
GR/PER	3 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



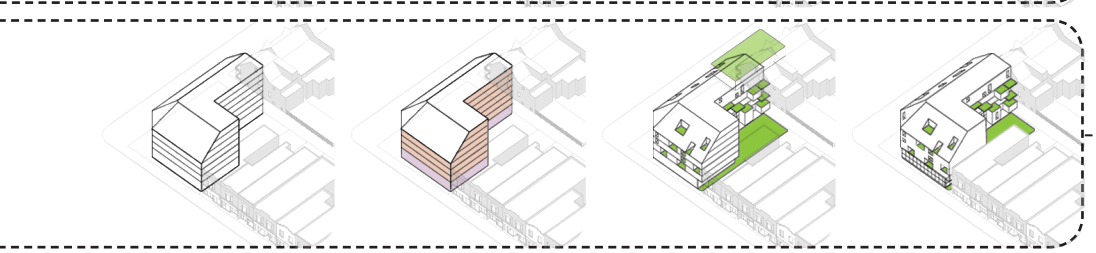
GFA	5,700M²
FAR	4.5
UNITS	± 48
GR/PER	3 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



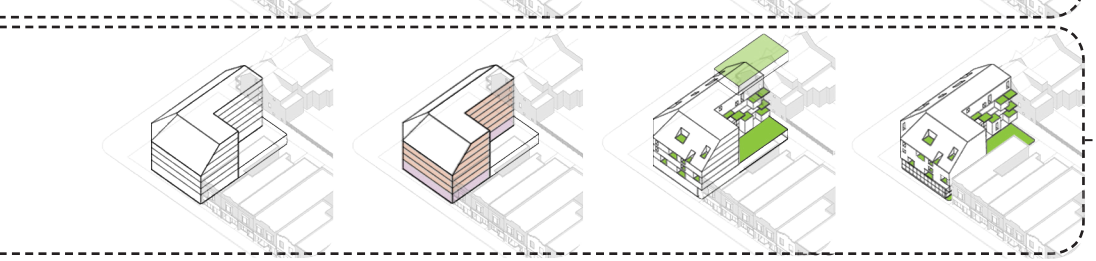
GFA	5,700M²
FAR	4.5
UNITS	± 30
GR/PER	3 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



GFA	5,800M²
FAR	4.5
UNITS	± 80
GR/PER	8 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



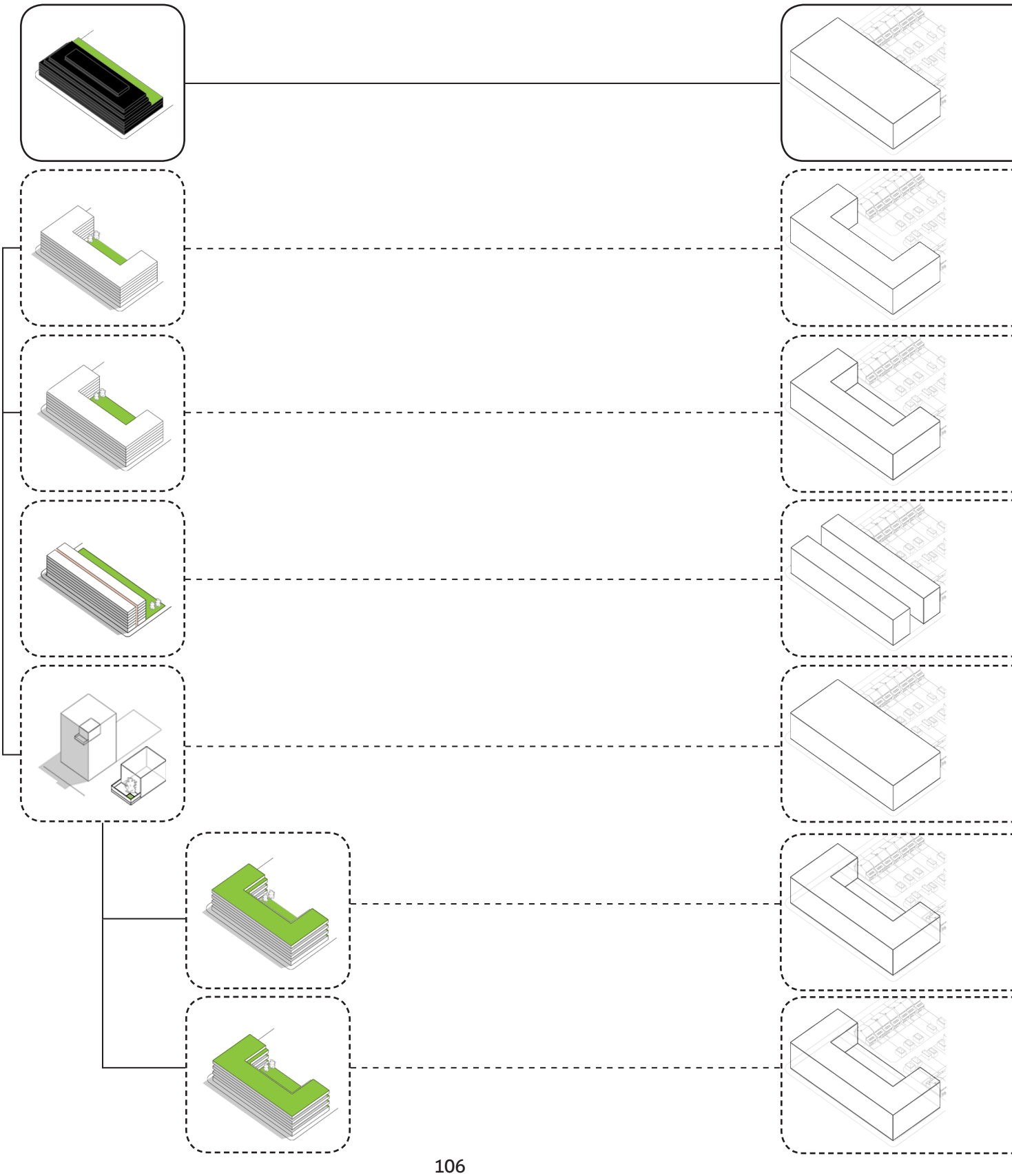
GFA	5,400M²
FAR	4.2
UNITS	± 48
GR/PER	7.5 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



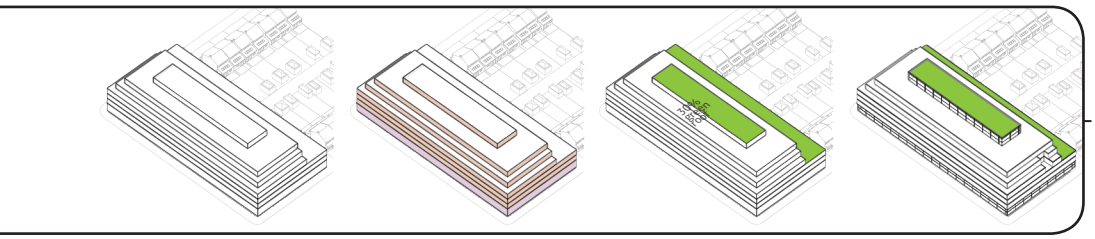
GFA	5,700M²
FAR	4.5
UNITS	± 48
GR/PER	7.5 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC

rules

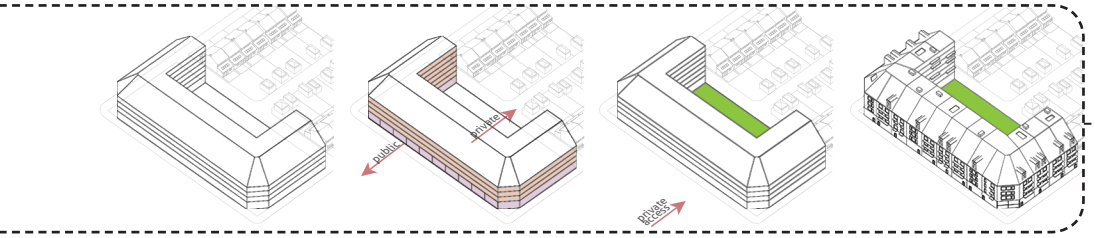
mass



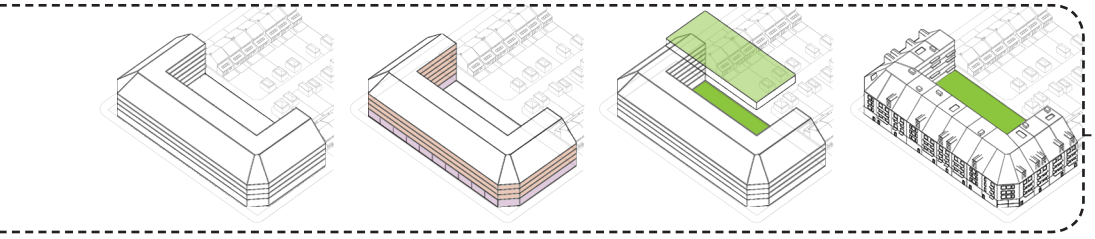
setback | program | green | final



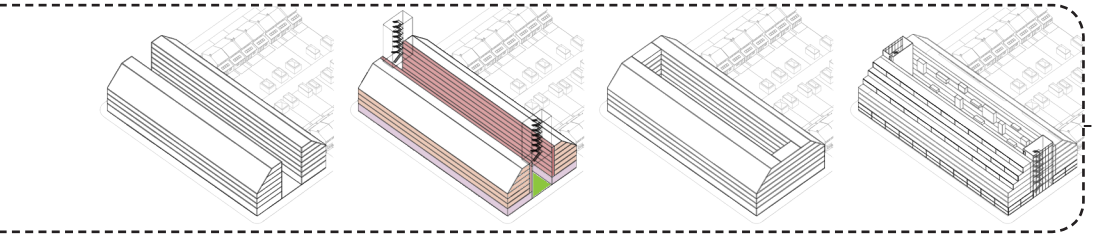
GFA	16,000M²
FAR	4
UNITS	± 160
GR/PER	6 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



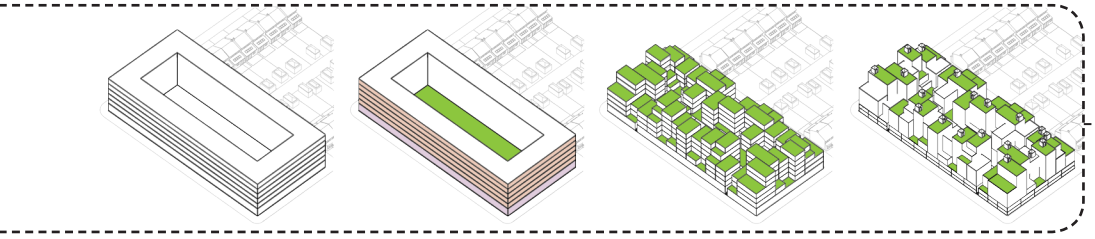
GFA	12,500M²
FAR	3.1
UNITS	± 140
GR/PER	5M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



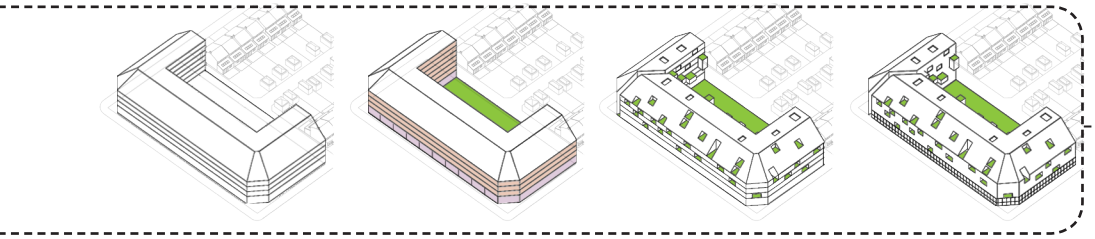
GFA	13,800M²
FAR	3.6
UNITS	± 140
GR/PER	5 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



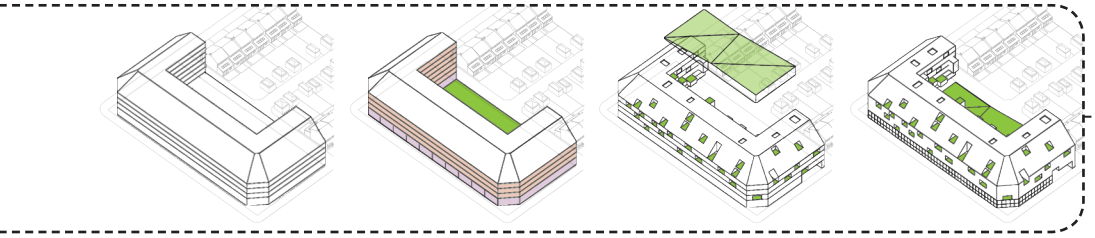
GFA	14,000M²
FAR	3.7
UNITS	± 180
GR/PER	3 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



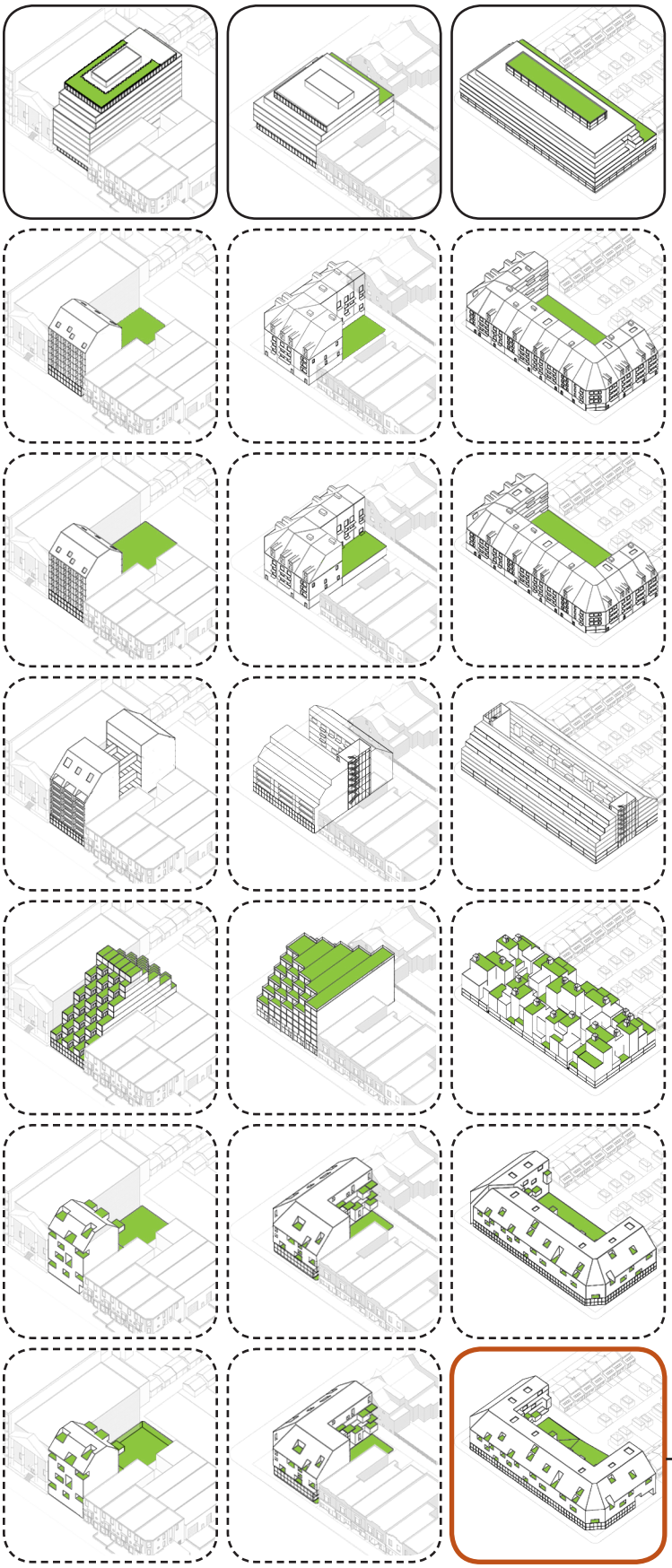
GFA	9,500M²
FAR	2.4
UNITS	± 130
GR/PER	15 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



GFA	12,500M²
FAR	3.1
UNITS	± 140
GR/PER	9 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



GFA	13,800M²
FAR	3.6
UNITS	± 140
GR/PER	9 M²
PROGRAM	PRIVATE / SEMI-PUBLIC / PUBLIC



GFA	13,800M²		
FAR	3.6		
UNITS	± 140		
GR/PER	9 M²		
PROGRAM	PRIVATE	SEMI-PUBLIC	PUBLIC

RESULTS

Six codes, not including the avenue plan proposal, were played out to form 6 outcomes for each site type, equalling 18 iterations in total.

The intent was to gain enough of a sample size in order to properly compare types. Each site type and iteration provided it's own challenges. Some traded off publicly accessible green space for higher FAR, while some minimized footprint for more green space.

The idea was not to select one specific outcome as the ideal outcome but rather to showcase a strategy for approaching development along Toronto's main streets.

When initiating any further development architecturally it's important to keep in mind that there must be two problems to solve. One being green space accessibility in the city and the other is developer property value. How can we incorporate one without losing the other?

Figure 4 - 3 Layout of all 18 outcomes from the typological design matrix. Highlighted is an example that will be developped further to highlight the potential of future development when green space and density are more equally balanced.

POTENTIAL OUTCOME

In order to balance both green space and developmental value, it is important to compare the statistics generated from the matrix to the actual Official Plan approach that would be built in it's place.

How can we transition from the low density townhomes to the high density street frontage without losing significant development value?

If we want to establish a "european" type quality we must compare the Avenue plan approach with that of the Cerda Block and finally an outcome that will balance both quality of space and density.

From this approach we can play out a potential outcome that could start to form an idea of what future development may look like when both green space and density are balanced.

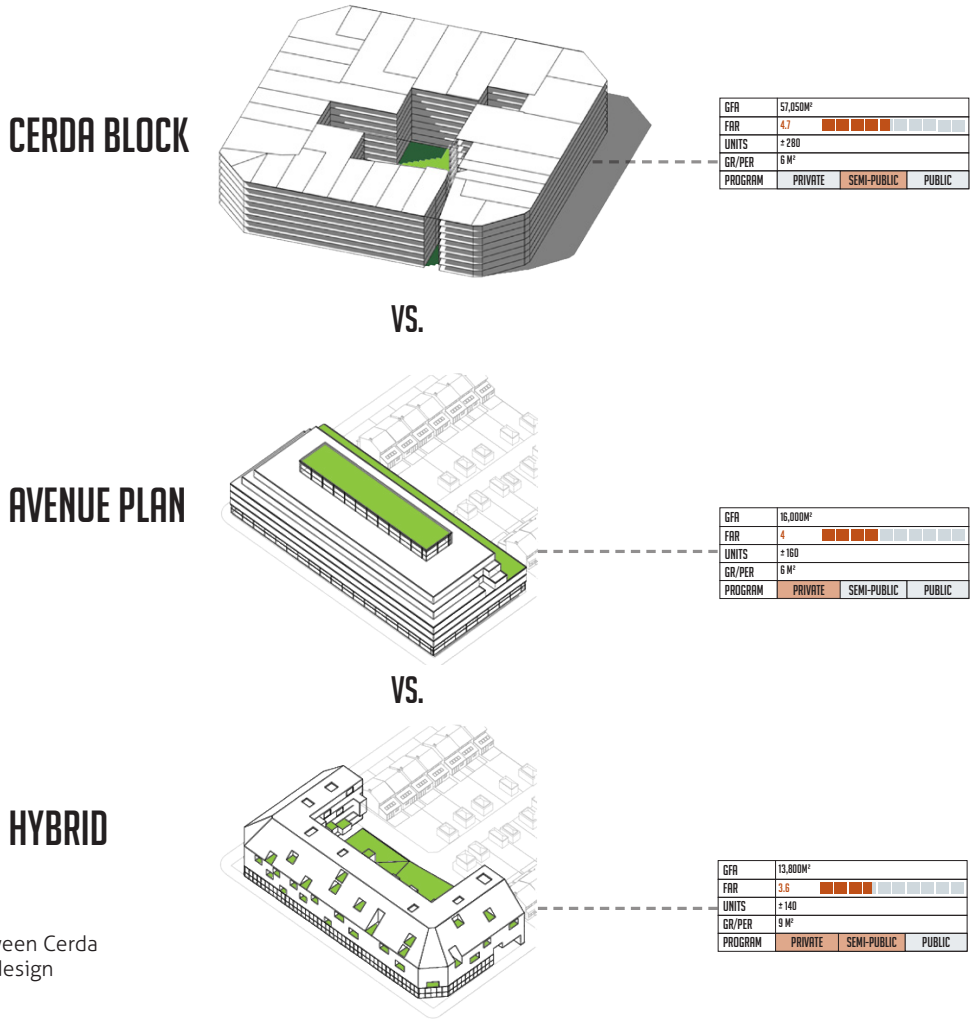


Figure 4 - 4 Comparison between Cerda block, Avenue plan and one design iteration from the matrix

Figure 4 - 5 3D view looking South-West depicting potential outcome of a hybrid between the avenue plan and European courtyard block typology.

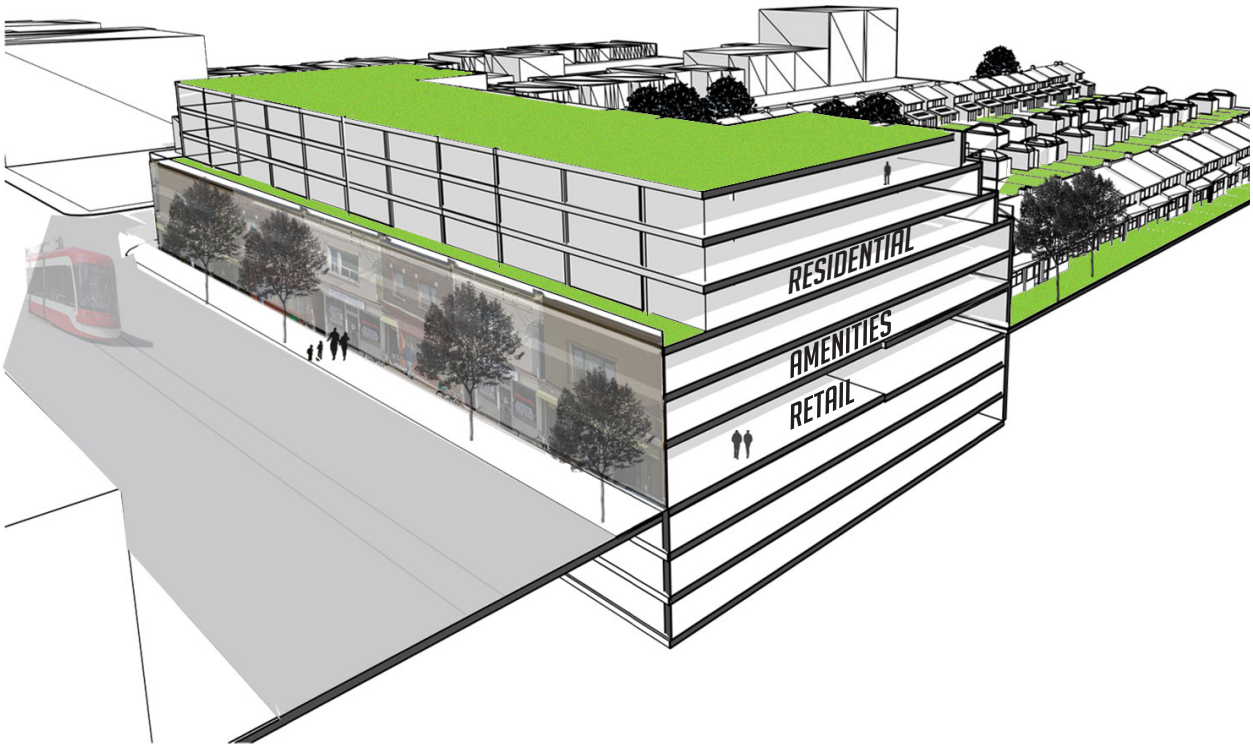


Figure 4 - 6 3D view looking South-East depicting potential outcome of a hybrid between the avenue plan and European courtyard block typology.

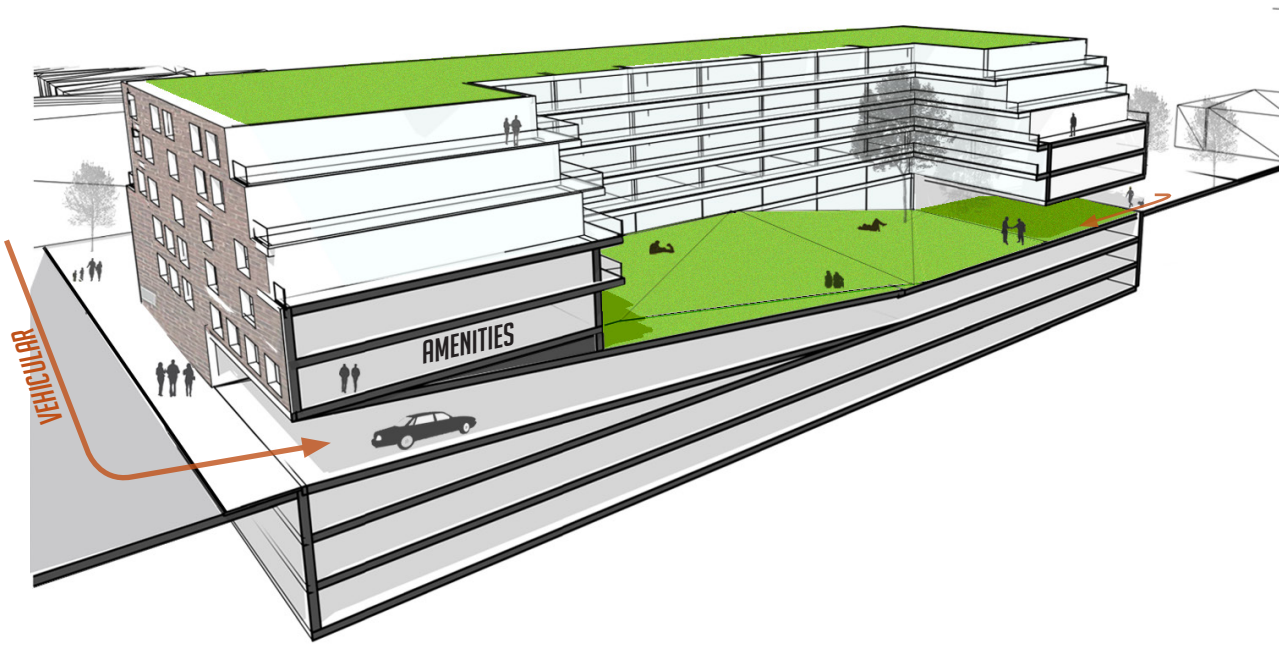


Figure 4 - 7 3D view looking North into depicting potential outcome of a hybrid between the avenue plan and European courtyard block typology. Highlighting the courtyard and access to parking.

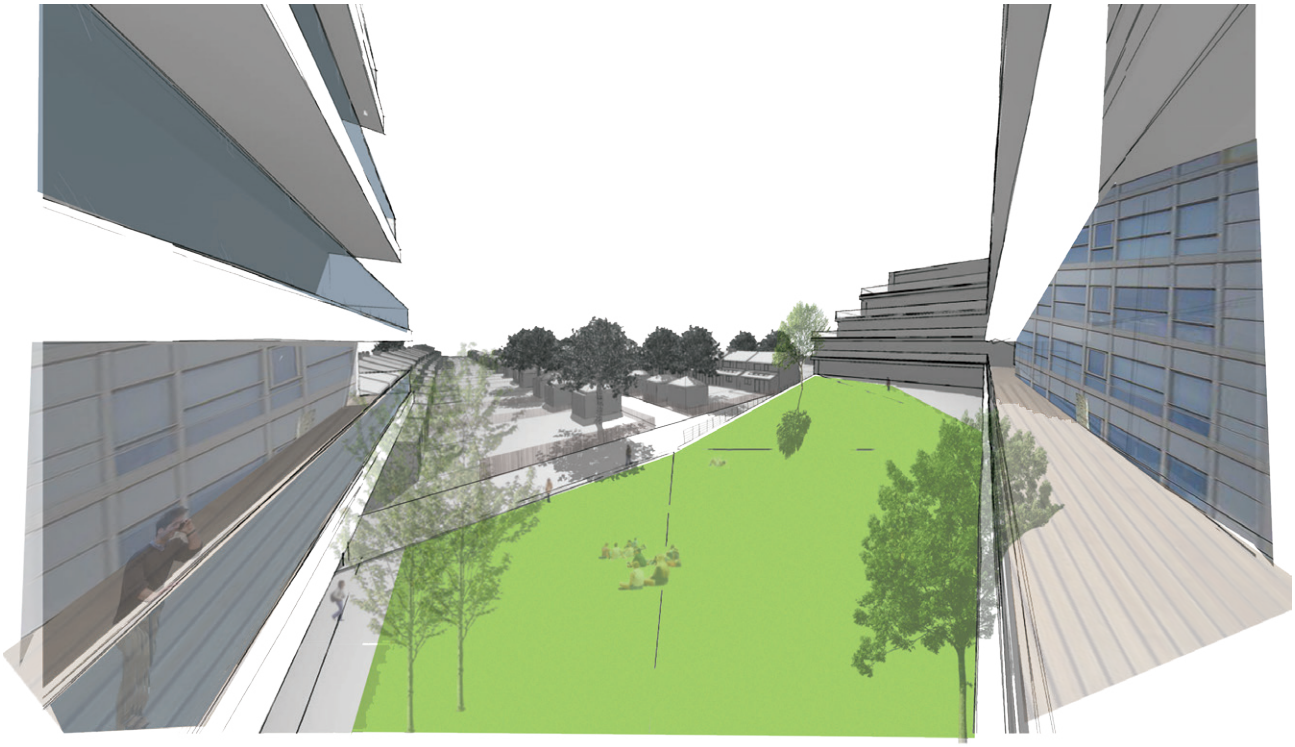


Figure 4 - 8 Perspective looking down into the courtyard with surrounding Toronto block context.

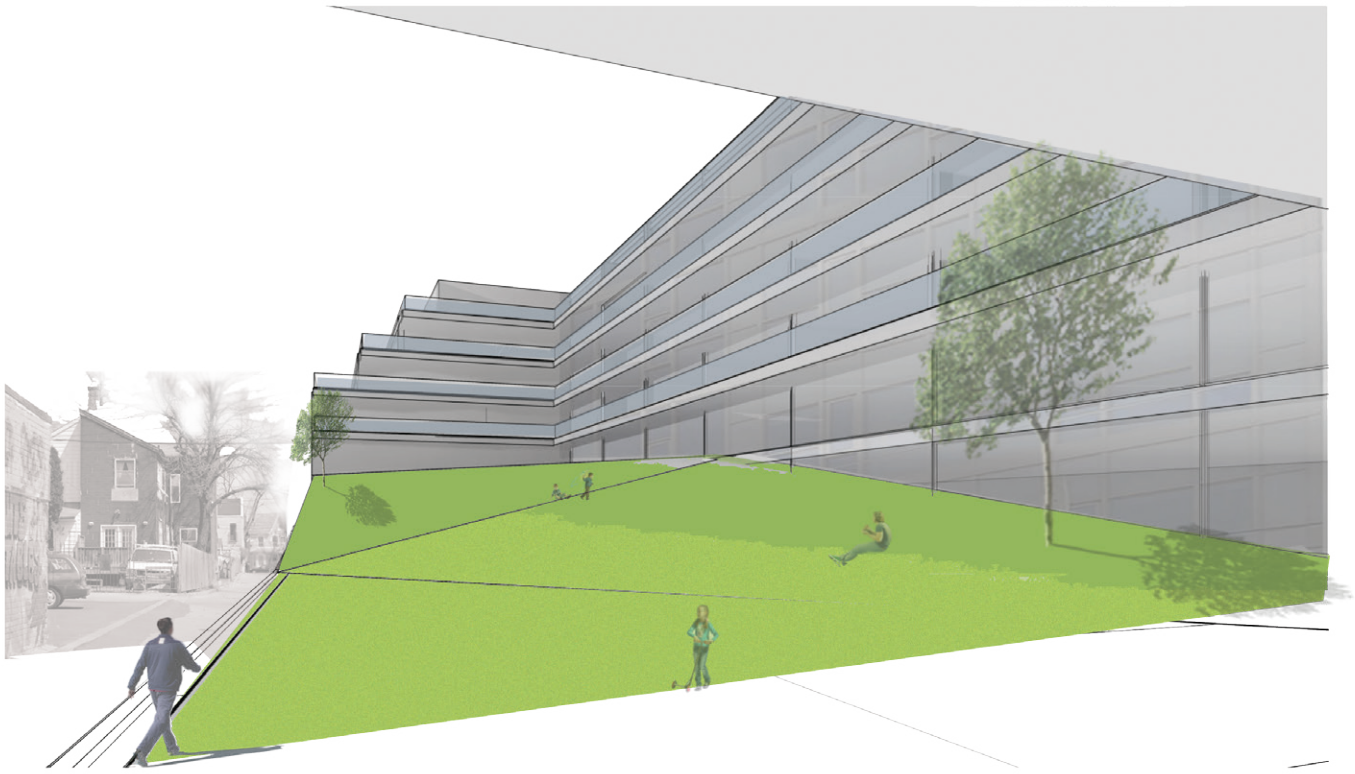


Figure 4 - 9 Perspective coming into the courtyard at street level. Access through the laneway and secondary street off of the Avenue.

05/ CONCLUSION

With the imminent growth and influx of population projected in Toronto, new modes of intensification and housing are required now more than ever. This presents us with an opportunity to challenge the current guidelines laid out by the Official Plan and other provincial and municipal planning and zoning regulations.

The opportunity to establish guidelines that balance green space and density need to be addressed if we want to promote a healthy future development along the Toronto's most prominent streets. Toronto already suffers from a lack of transitional density from low-rise to high-rise and midscale typology presents an opportunity to bridge the gap in a more social and ecologically sensible way.

We can tackle this problem with new mapping technology like GIS to target large portions of the city. Using a top down approach we can begin to develop new tools to identifying target areas of growth and areas which are in need of green space. Using tools like the one created in GIS in chapter 3, an emphasis on quality based parameters can be filtered initially in the design process to provide any new developer a tool in which a site can be narrowed down based on needs of the neighbourhood and city as a whole. A crucial first step of any future development is the analysis of specific site benefits and statistics that can help improve what type of development is best suited for any specific area.

This thesis looked to the European courtyard block typology as a precedent for the quantity and quality based parameters that needed to drive the site selector tool in finding specific sites that may benefit from a midscale building typology. Influenced by Cerda's approach to urbanization this thesis aimed to tackle this issue of development through it's own "urban formula" that could be applied throughout the city in order to test the quality of sites Toronto had to offer. The one size fits all approach that the city has taken through the Avenue plan will start to mimic the homogeneity we see with the high rise condo epidemic the city is already experiencing. Therefore similar to Cerda's plan for Barcelona, Toronto must get back to considering the well being of the people and quality of environment, engaging the city as a whole rather than one project at a time.

In order to test these parameters along Toronto's main avenues it was important to establish a study in which we could play out different design iterations showcasing the potential outcome of set parameters. A typological study of the European courtyard block typology on the main street frontage could never work as Ungers intended. The frontage would never accommodate such scale. Hence, the proposal was to treat the whole block as a courtyard and deal with the frontage on Main streets as a piece of the whole. This approach to Toronto's block structure allowed me to treat the edge condition, whether it be infill, corner or block, as an opportunity to establish a design matrix. The Matrix would take into account 7 codes that could be tested. These codes along with an emphasis on green space would showcase 18 iterations of potential outcomes that could be established along Toronto's main streets.

The intent of the matrix was never to narrow down one specific "ideal" outcome. But rather it served as an example of generative design where the inputs were influence by the European courtyard type. The results address the ability to have both density and green space while still maintaining the overall quality of the block as a whole.

The development of parametric design tools that generate, test, evaluate and iterate scenarios will become crucial for the future of growth in cities like Toronto. These scenarios will be driven by environmental, social and economic factors. This thesis is a proposal to offer an existing architectural type , the courtyard block, as a framework for the city to offer a more sustainable density for its future.

"We are leading a quiet but unyielding revolution to replace the dogma of resigned and compromised city living for one that enriches our lives and adapts to our needs. We can and must rethink our reliance on the extruded big box concept, and instead design permeable buildings to help restore our relationship to nature. Our collective and individual consciousness is constantly fluctuating by the context we actively shape. Radical change to the common built environment doctrine is a crucial element in maintaining both our physical and psychological wellbeing." - ODA Architects

ENDNOTES

CHAPTER 1

1 City of Toronto. "Avenue and Mid-Rise Buildings Study." Toronto, 2010. https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/design-guidelines/mid-rise-buildings/

2 Ibid., 104

3 Toronto Planning and Development Dept. "Sun, Wind, and Pedestrian Comfort: A Study of Toronto's Central Area" Cityplan '91 ; 2. (Toronto: Planning and Development Dept., 1990), 19-22

4 Evergreen Canada Nationwide Survey. "Green Space Acquisition and Stewardship In Canada's Urban Municipalities."

CHAPTER 2

1 Jane Jacobs, "Putting Toronto's Best Self Forward," Places 7, no. 2 (Winter 1991): 51.

2 Arthur Eric Ross and Stephen A. Otto. "Toronto: No Mean City." Toronto: University of Toronto Press, 1986.

3 Richard Harris."Unplanned Suburbs: Toronto's American Tragedy, 1900 to 1950. Creating the North American Landscape." (Baltimore: Johns Hopkins University Press, 1996), 40.

4 Ibid., 40

5 Arturo Soria y Puig. "Cerda: The Five Bases of the General Theory of Urbanization". Gingko Pr Inc, 1999.

6 Ibid.

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CHAPTER 3

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