

# HIEU VO CELADON CITY





# CELADON CITY

## Densification of downtown Davis

2011 Senior Project- Hieu Vo

Presented to the Faculty of the Landscape Architecture Program at the University of the California, Davis.

In Partial Fulfilment of the Requirement for the Degree of Bachelors of Science of Landscape Architecture.

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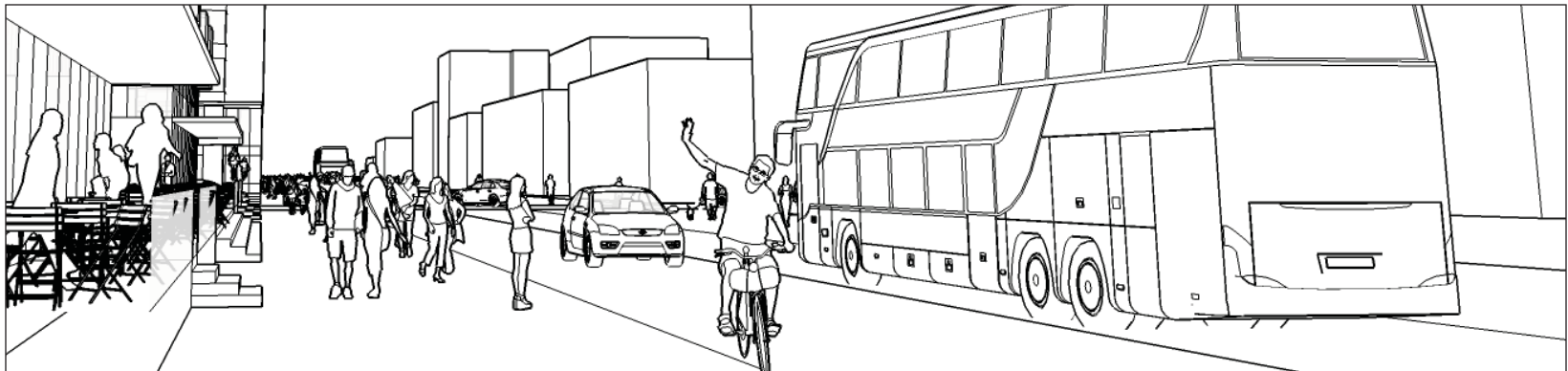
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# ABSTRACT

While the City of Davis pushes for green policies and lifestyle, it remain fairly sparse and low-density in it city planning. Unlike many cities in America, however, it is willing to try new things for the stake for sustainability. This project attempts to justify densification of Davis, attempts to dismiss the perception of high-density housing and argues that you can live relatively comfortable in a denser living environment.

Celadon is a pale-tint green and the project is named Celadon City as it serves as a vision for a brighter, greener future. It is not simply call Green City because the concept is that the city is attempting to be green.



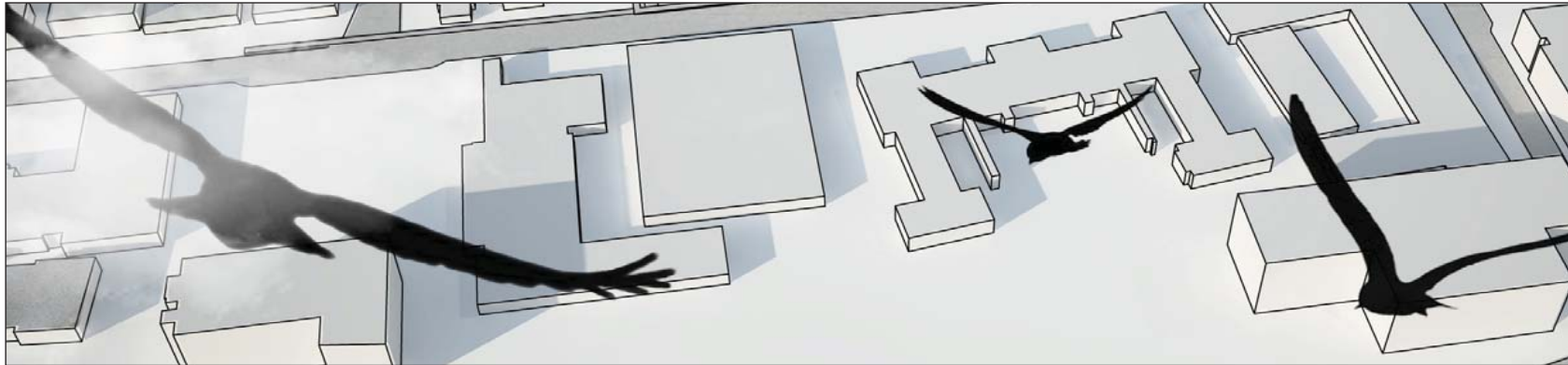
# DEDICATION

*To my graduating Class of 2011*

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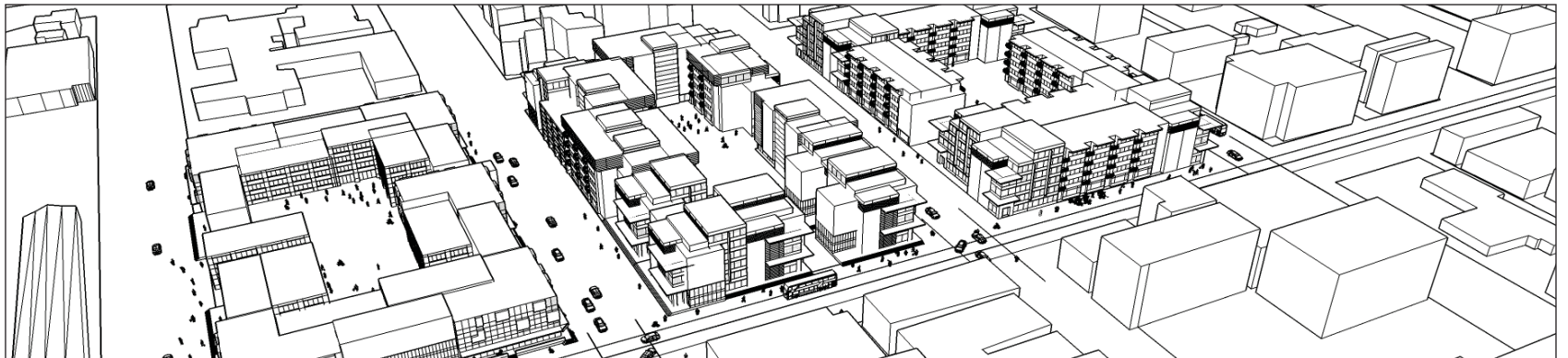
*And to the awesome*

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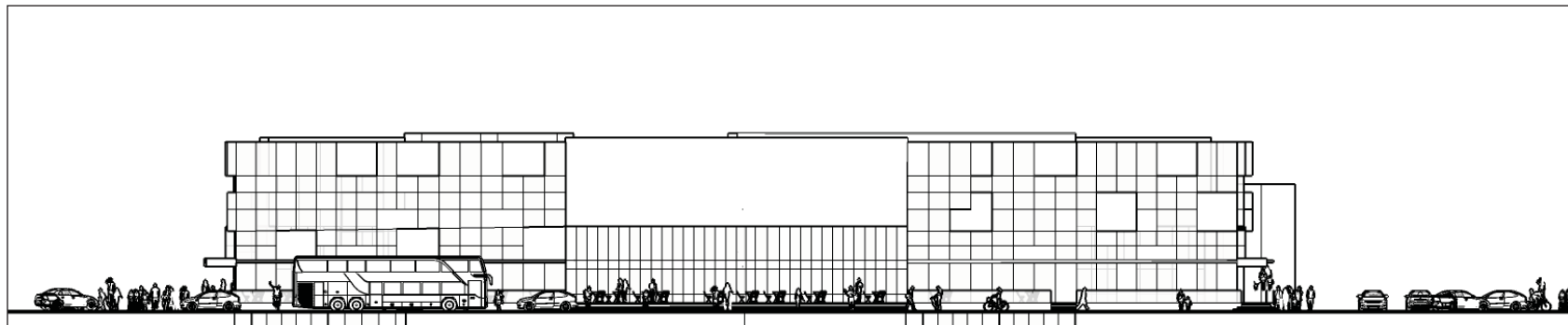
# ACKNOWLEDGMENTS

Every -freaking -one, you know what you did!



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## AN UNSUSTAINABLE FUTURE

The ideal home has adequate privacy, territory, and convenience. The single family home is design to optimize on all of these characteristics. It is private because it divides the living and sleeping space into two areas, it has a private, unshared outdoor space as well as an unshared street entry. Since it centers on a property it provides acoustic privacy, both incoming and outgoing. With defined property lines, public and private responsibilities have a visible border. And of course, no single family home can be complete without a garage and/or driveway. Either space gives the owner the ability to park adjacent to his/her home.

The result of optimizing for this type of dwelling is an urban sprawl, or suburbia, characterized by a low-density residential area separated from working and shopping areas. Following World War II, the popularity of a suburban home rocketed as returning veterans and a growing middle class in American desire for a private home. Fast forward to today, many of us live in an environment where we are dependent on the automobile to go anywhere. As the supply for fossil fuel reaches the end and dependency on the automobile has not subsided, we may be looking at a very troublesome future. An increase in public transportation options may work in a city but impossible in the suburban landscape.

The problem of low-density, auto-dependent nature of the American landscape makes walking, bicycling, and public transportation extremely difficult. As a result, a more sustainable lifestyle is more difficult to achieve in America than elsewhere. Existing problems includes:

- 1) Agricultural land will be overtaken by low-density urban development if we continue to build out not up.

- 2) Urban sprawl creates long distance travel making it difficult for cities to develop a practical public transportation system as transit has to create more routes to reach more people or there will be low ridership.

- 3) Automotive transportation not only increases traffic congestion but it also pollutes our environment.

- .4) Low-Development increased the cost of infrastructure maintenance as the service is has to reach deep into large residential properties (Spatial Planning and Urban Design Department, 2009)

- 5) There is a huge social inequality as some opportunities are out of reach.

Growing up in South Sacramento, I have experienced the auto-dependent nature of an urban sprawl first hand. While school was only a seven-or-so minutes walk, the closest shopping center is at least thirty minutes. Even then, it is a home improvement store surrounded by fast food chains and small retails. The closest grocery store was 3 miles away. That may be a 6 minutes drive but it is at least a 40 minute walk.

With many of our travel revolving around the automobile, the thought of an unaffordable gas price affecting every aspect of our lives becomes not only scary but very real one. If ever the price of gasoline becomes unaffordable or the supply ended without alternatives, suburban families, like mines, would suffer the blunt of the damage. Convenience will be a thing of the past as shopping becomes rather difficult and the "commute" to work each day may almost seem impossible. A domino effect would occur as one person struggles to get to work would affect someone else.

# THE SOLUTION

The future looks grim with global warming, over population, deforestation, and depletion of natural resources. While there is no one solution to all the problems, I believe, through densification we are able to accommodate an ever growing population, reduce dependency toward automobile, and improve the lifestyle of all city inhabitants.

## What is Density?

Cape Town's Spatial Planning and Urban Design Department best explain densification as the increased use of space both horizontally and vertically within existing boundaries

## What Density is Not

Increased density is not a one-fits-all design as not everyone wants to live in high risers or, alternatively, urban sprawl. It is then important to give opportunities through different types of housing type, life style, and choices. It does not imply high-risers as higher density can be achieved through three to five storey buildings (Spatial Planning and Urban Design Department, 2009). A process of group housing such as town housing and row housing allows a higher residential area without creating high riser. It is not the cause of poor quality living environment or overcrowding. While there are concern that higher density means unattractive high-rise buildings surrounded by poorly circulated spaced leading to a poorer quality of space. The perception of density, however, differs from person to person because there isn't an agreement between what is considered high, medium, and low density. Someone who resides in New York City or Tokyo may view a city of a few hundred thousand residents as low density while someone who is from

a less populated city will view a few hundred thousand as a medium density or high density place.

The desire for low density does not mean urban sprawl but rather the desired "living conditions that low density implies" (Kilbridge et al, 1970). The private, single house flats in suburbia is that result of maximizing these living conditions:

- 1) Privacy: A division between living area and sleeping area with acoustic barrier filtering incoming and outgoing noises. An unshared street entry with private unshared outdoor space.
- 2) Territoriality: A transitional area to the front door. A clearly defined area of responsibility between public and private.
- 3) Convenience: Adjacent automotive parking as well as the ease of maintaining it.

High population density does not increase criminal activities. While it has a negative association with crime, alcoholism, alienation, and many more, the fact is that none of this association can be separate from related phenomenon such as low income, lack of education, social prejudice and so on (Kilbridge et al, 1970). This is not a density problem, but rather a social equity problem.

## Motivation for Higher Density

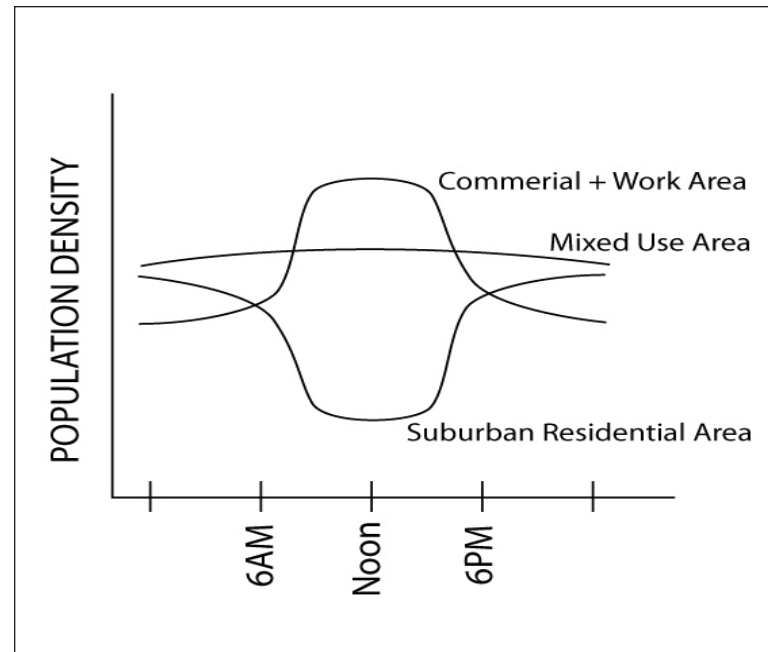
It ultimately reduces our consumption of non-renewable resources: by developing upward instead of outwards, densification reduces consumption of value resources such as agricultural land, aquifer recharge area, etc. It also reduced fuel consumption because of lessening auto-dependency.

It supports the development a viable public transportation: unlike low density development, the closeness of living and working spaces allows public transportation to serve the mass practically and economically.

Make the city more equitable: A dense city means all services, facilities, and jobs opportunity are within proximity for everyone. Furthermore, the City can rationalize cost of improvements of its amenities and facilities as there will be more users in a given area. The higher population threshold would push the City to create sufficient, cost-effective, and optimal infrastructure to support its larger population.

Contributes to urban place making and improves safety: With appropriate planning and design, higher density can provide an opportunity for place-making as well as making the urban landscape attractive and space. A good design would be able to prevent the buildup of negative environment.

A greener and healthy lifestyle: as the city becomes denser, many services and facilities come within walking distance, motivating people to leave behind their vehicle and walk to their destination of choice. As more and more people are choosing to walk, they are not only more active but fewer cars will be on the road.



Diurnal Graph (Fig 1.1)

## How do we Measure Density?

Area density measures are measurements used by developers and urban designers to understand and control the development of space. While density is a perception, for designing purposes it is measurable in terms of spaces. There are 5 types:

- 1) FAR (Floor Area Ratio) is the floor area/site area, most widely use.
- 2) SBS (Share of Build Space) is the building footprint/site area
- 3) SOS (Share of Open Space) open space area/site area
- 4) OSR (Open Space Ratio) open space area/ floor area
- 5) SCR (Spatial Compactness Ratio) open space area X Floor area/ site area (squared) = SOS X FAR

Location density measures. Similar to walkability and transportation research models, density measures can quantify the intensity and quality of urban spaces. While we could measure at a regional or city scale, for this project sake it will be a smaller, more human scale. There are 6 pedestrian-based location density measures:

- 1) Axial line integration: It is the network of public streets and pathways in which pedestrian move around in, connecting point A to point B. The way the network is organized creates or detains accessibility, distribute or compress densities and open space. The least amount of axial lines that cover the possible routes, the higher the accessibility, creating a more positive perception of density.
- 2) Entrance density: This measures the number of entry per 100 meters on main circulation paths. This measure can also determine the intensity of activities in an urban public space.
- 3) Floor area accessibility: It is the location measures of FAR (Floor Area Ratio). It represents the potential accessibility to floor area within a certain radius.
- 4) Ambiterritory: It can be called "no-man's-land" as it is where private and public space collide creating a territorial ambivalence. Ambiterritory is seen has the green space surrounding the building as there is an invisible 10-meter buffer around the building that is not cancelled by a 10-metter buffer from the street, pathway, or entrance.
- 5) Public open space proximity: Closeness to public open space is crucial to the attractive housing and urban density as 300 meter

is a limit for everyday green space use and axial step distance correlates to the frequency of usage.

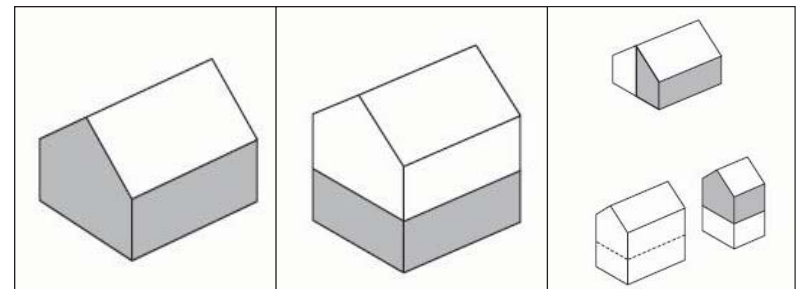
6) Public open space accessibility: The sum of all public space that is accessible within reach.

## Density Consideration

The living space is central to any city, different dwelling/building types offers different results. Consider the following:

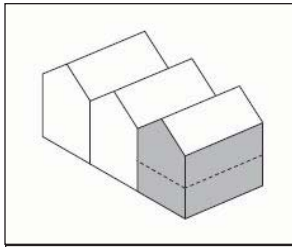
A single detached dwelling unit, commonly known as a house, is one of the most common housing types for families. It has a clear distinction between public and private spaces. Accessibility to city amenities, retails, and transits are limited as it usually sits among other single detached units.

A duplex or triplex unit can visually look like a single unit but increases the population density. Shared and unshared spaces are flexible.



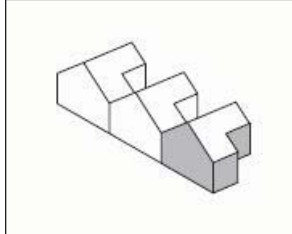
Single Detached Unit (Fig 1.2)

Duplex unit (Fig 1.3)

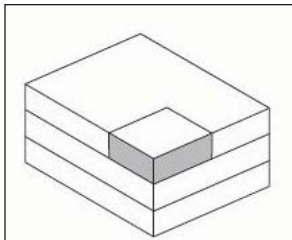


Side Attached Unit (Fig 1.4)

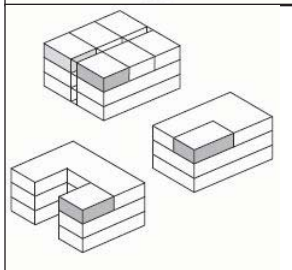
The side attached dwelling unit or rowhouse still allows the division between public and private space like the single detached but it is denser as the houses are closer to each other.



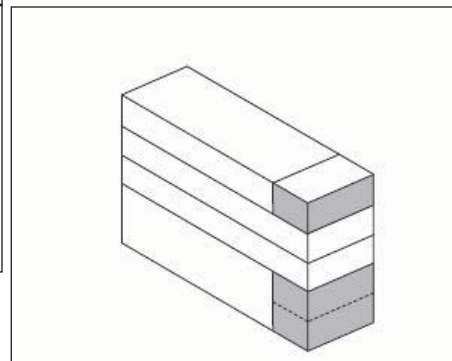
Apartments has many forms all characterized by a shared entry way, parking, and a common area. Unlike the previous types, apartments usually reside next to resources.



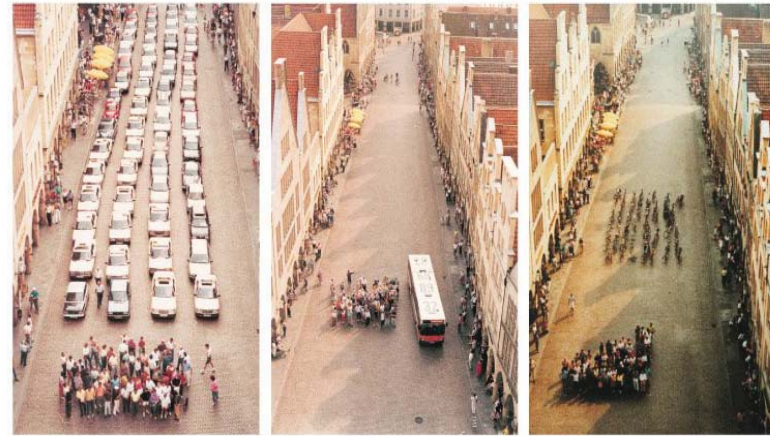
Apartment over commercial offers a unique interaction between the living and the working space. Parking may have to be balanced for day and evening usages. Like the regular apartments, it offers many shared spaces.



Apartment Unit (Fig 1.5)



Apartment over Commercial (Fig 1.6)



Transportation Comparison (Fig 1.7)

An experiment by the City of Muenster Planning Office (Germany) of what it takes to transport 60 people.

## GREEN, HEALTHY PEOPLE

A good design is not only green but it is healthy as physical inactivity plays a huge role in obesity. With obesity comes the increase of many other illnesses including diabetes, kidney failure, heart disease, etc. It is estimated that the government spends more than 100 billion dollars in health care relating to obesity and physical inactivity. Survey results imply that people are motivated to walk for exercise with the presences of sidewalks, busy streets, scenery and hills (Laura, 2003). In contrast, there is an association with physical inactivity in places with poor lighting, excessive noise, heavy traffic, and a lack of public transit. Both cases suggest a good design promotes people to be more active, ultimately living not just a green but healthy lifestyle.

While we blame fossil fuel and cars for global warming, there is also a direct connection between health issues and the widespread usage of cars. During the 1996 Atlanta Olympic Games, an experiment restricting driving in the downtown area showed that driving were decrease by 22.5%. At the same time, emergency room and hospitals saw a decreased of 41.6% in admission for asthma while the other medical events remain unchanged (Laura, 2003).

## A HOLISTIC APPROACH

While densification is a solution, by itself it does not solve all the problems we face today. In nature, nothing is wasted as waste of one organism becomes the product of another. Similarly, the same principles could apply to the function of a community and city. Organic household waste can become fertilizer while waste treatment system can extract biogas and use as a gas. In an industrial world, one company's waste becomes the productive contribution to the production processes of the other (Beatley, 2000).

A green city, is then, one that strives to live within their ecological limits. One that fundamentally reduce their ecological footprints and acknowledge their connection and impact with other cities, communities, and the larger planet.

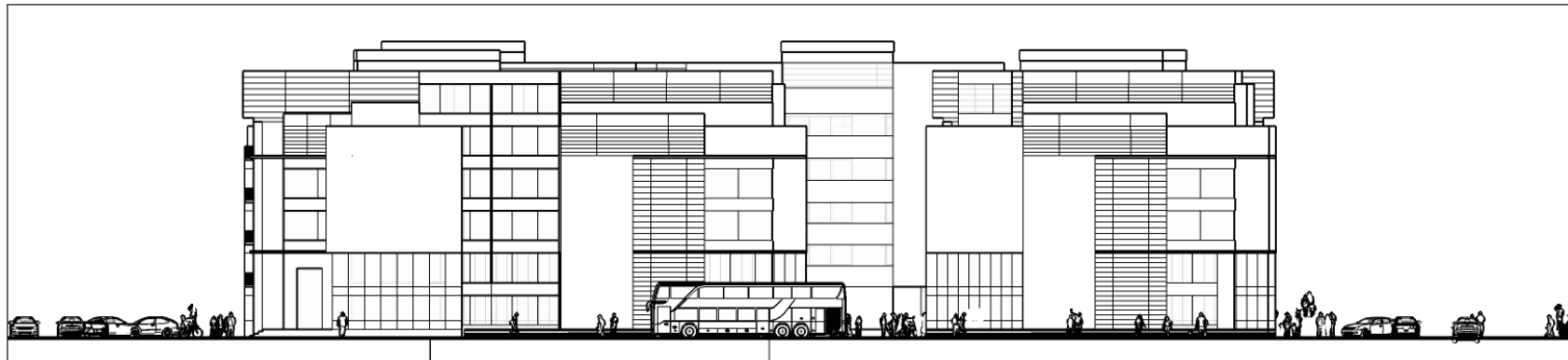
# DAVIS

Why Davis? Being a student at the University has given me many opportunities to study the campus and the city. Over the year, I've noticed that Davis has a very unique sense of place. I chose Davis for my project because it has three unique attributes that make designing it interesting.

First and foremost, Davis has a variety of transportation options. Very few places can you witness the coexistence of pedestrian, bicyclist, automobile, and buses sharing the same road. Historically built for the railroad, the rail has become one of the possible modes of transportation for getting in and out of the city. While Davis is relatively a small city, it does have its own airport as well.

Secondly, The City of Davis is a college town. As a college town, a good amount of its residents are students meaning dwelling will only be temporary. This is a stark contrast to many cities as citizens hold permanent residence to raise a family. The cityscape, as a result, will look different as families require different amenities than that of college students.

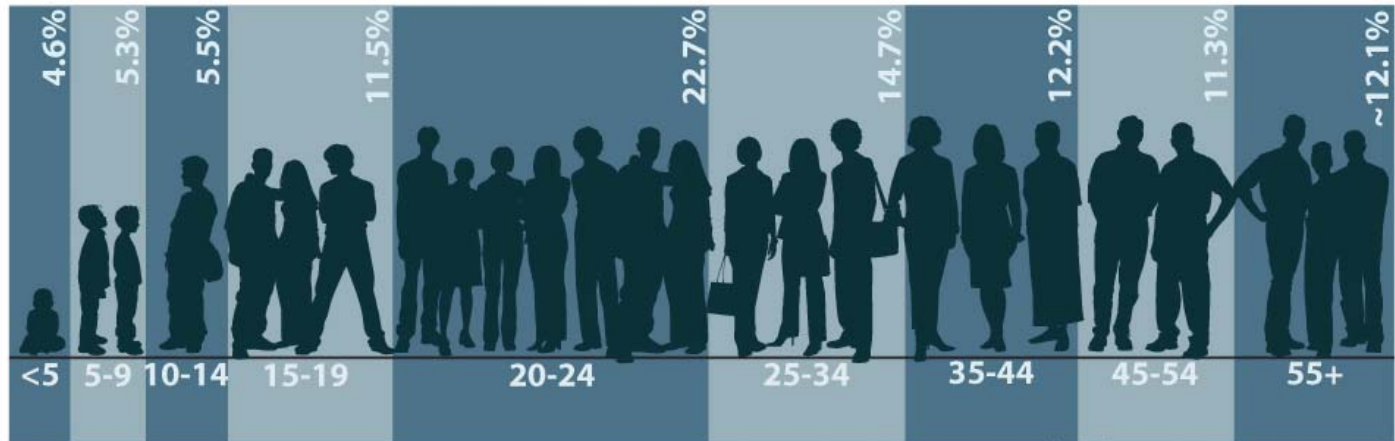
And last but not least, the city pushes for green policies. Davis has shown over and over again it is willing to push for a sustainable future. In the 1970s, the city decided to limit vehicular traffic into the University to embrace the usage of bikes. Fast forward 40 years and Davis has become the bike capital of America, with bicyclists dominating the University as well as the City.



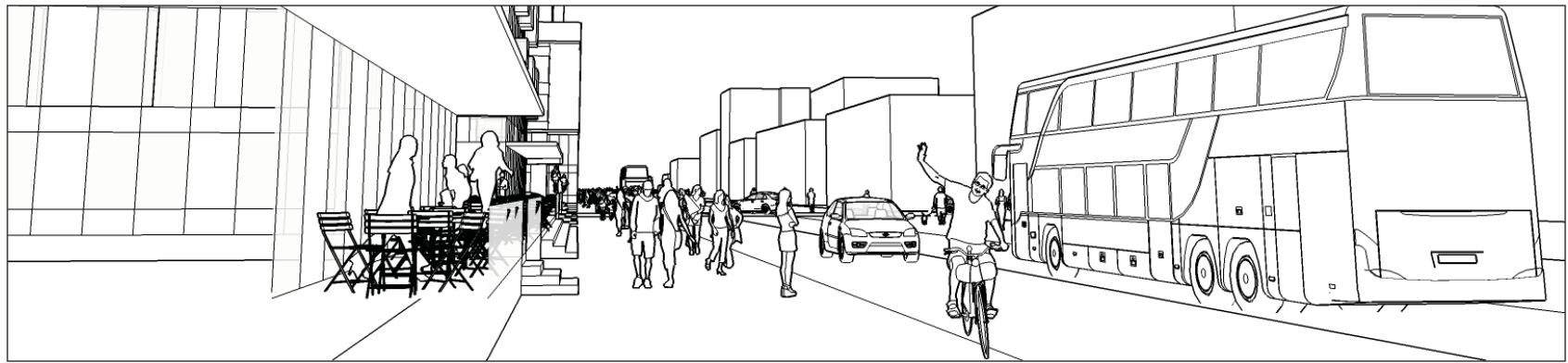




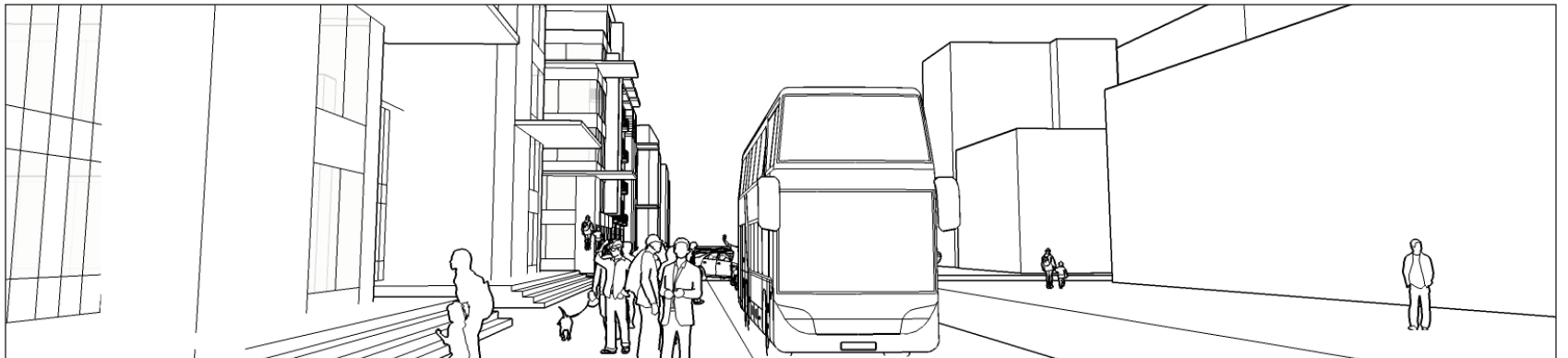
**Age Range Population 2000 -National**



**Age Range Population 2000 -Davis**



# SITE ANALYSIS



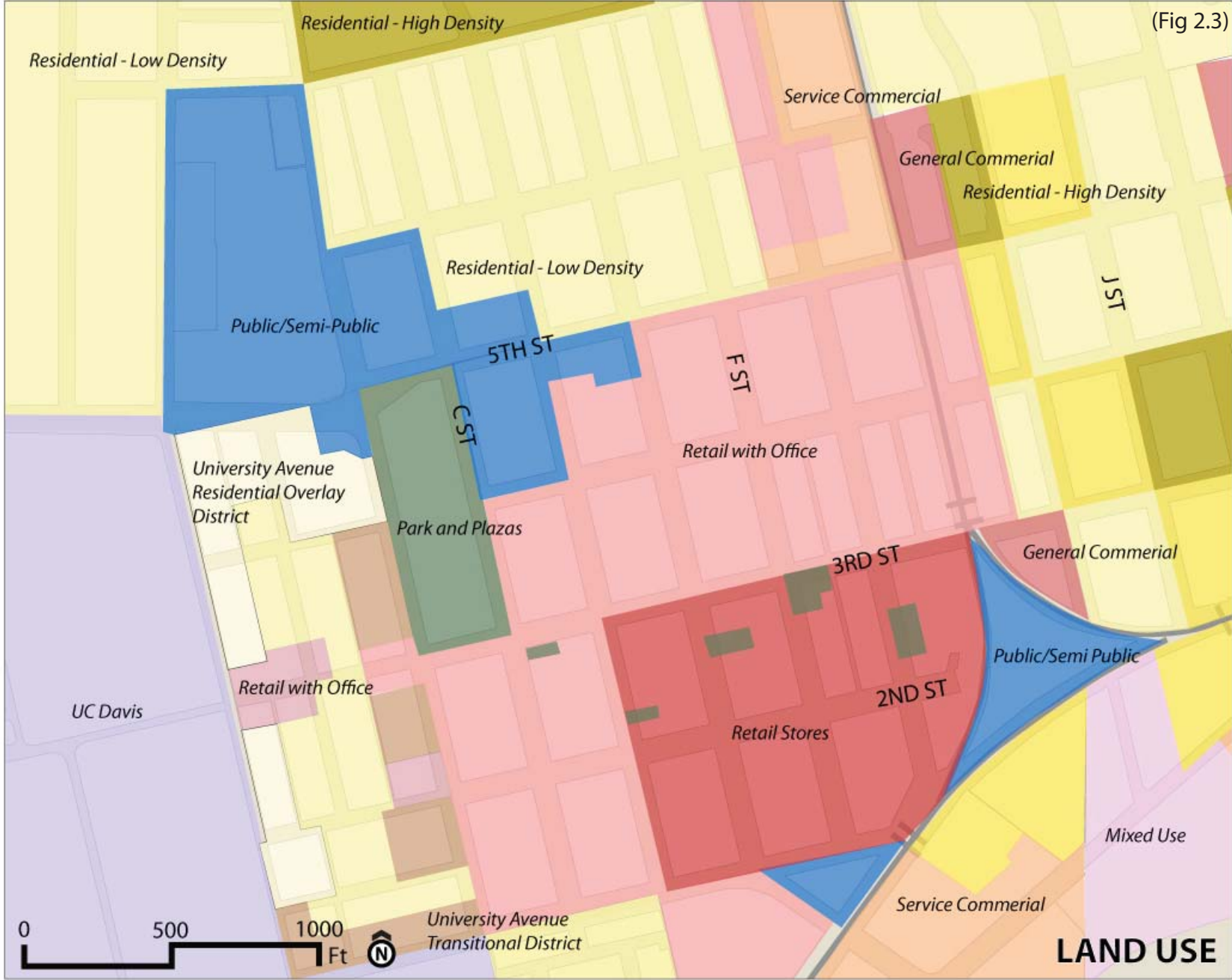


Davis Map (Fig 2.1)



Davis Core (Fig 2.2)

(Fig 2.3)



(Fig 2.4)



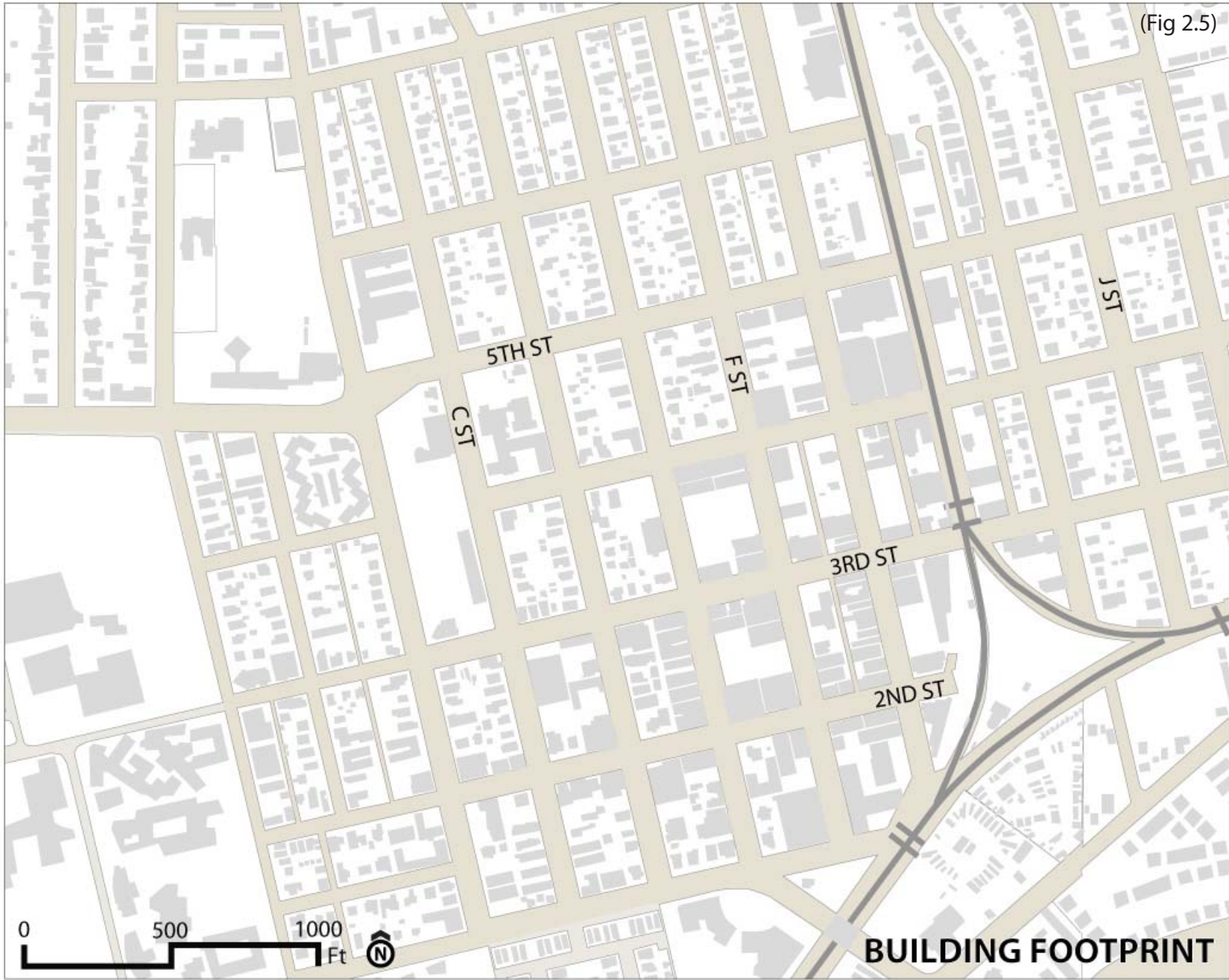
- Bike Route
- Public Transit Route
- ⊕ Rail Line

0 500 1000 Ft



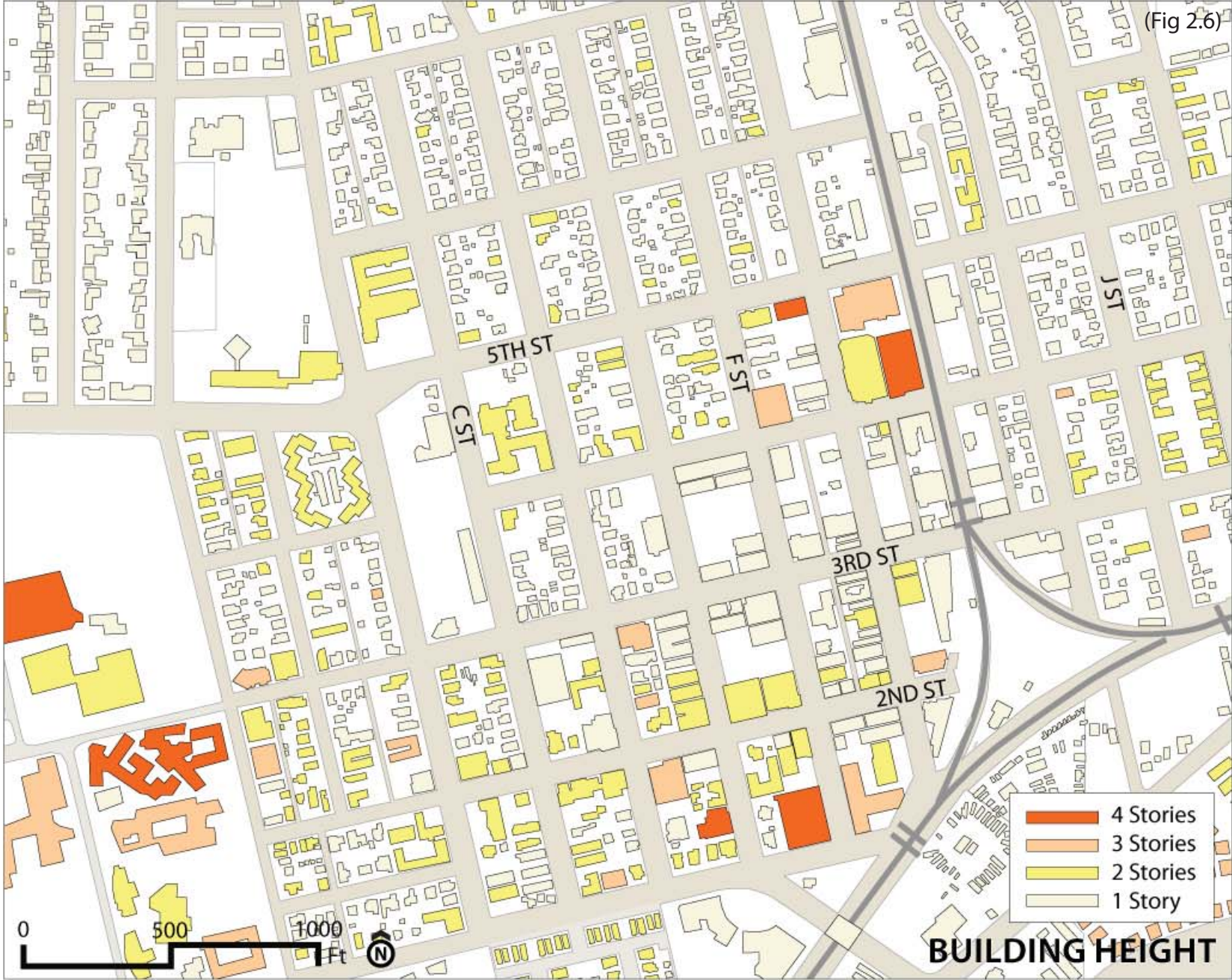
CIRCULATION ROUTE

(Fig 2.5)



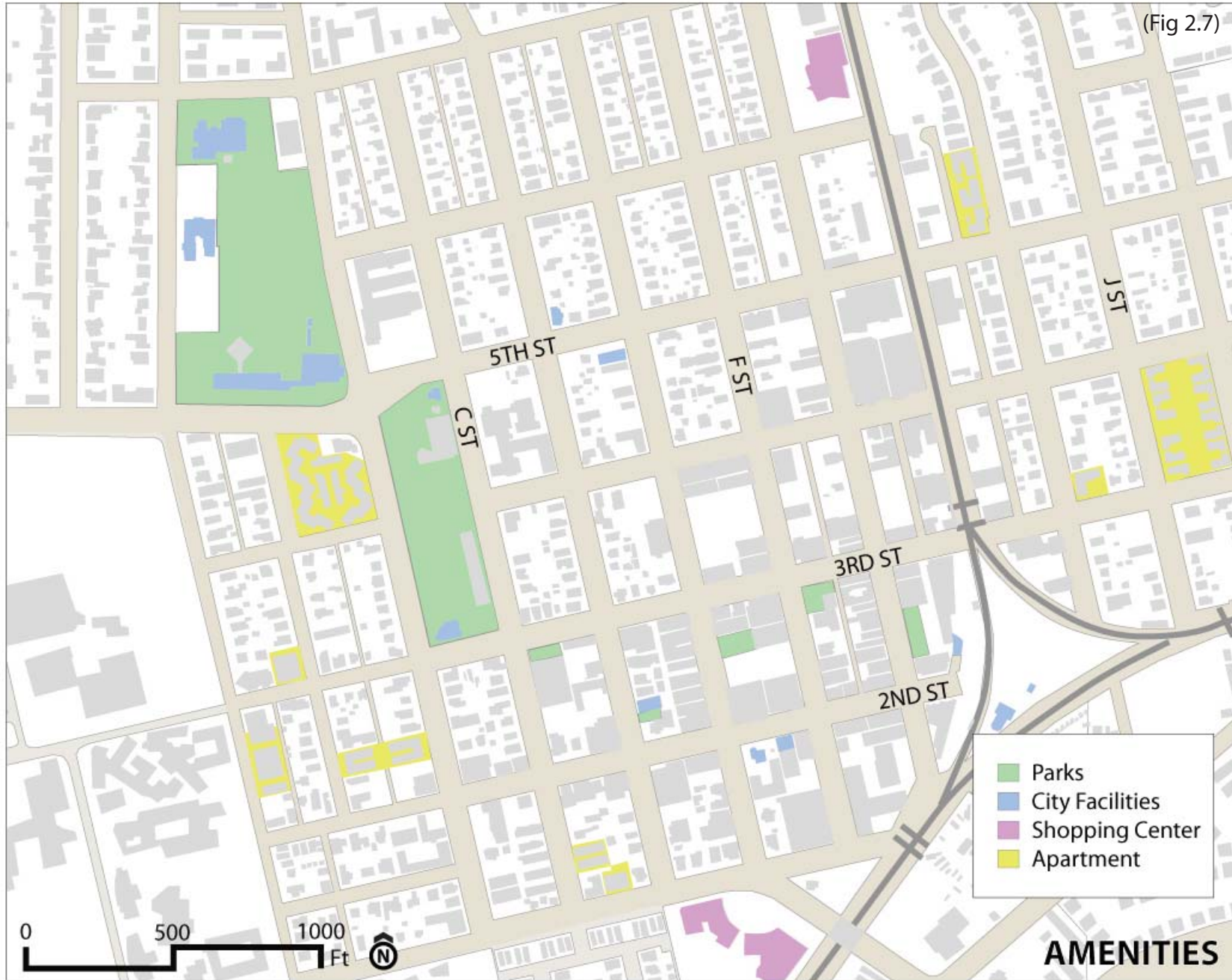


(Fig 2.6)

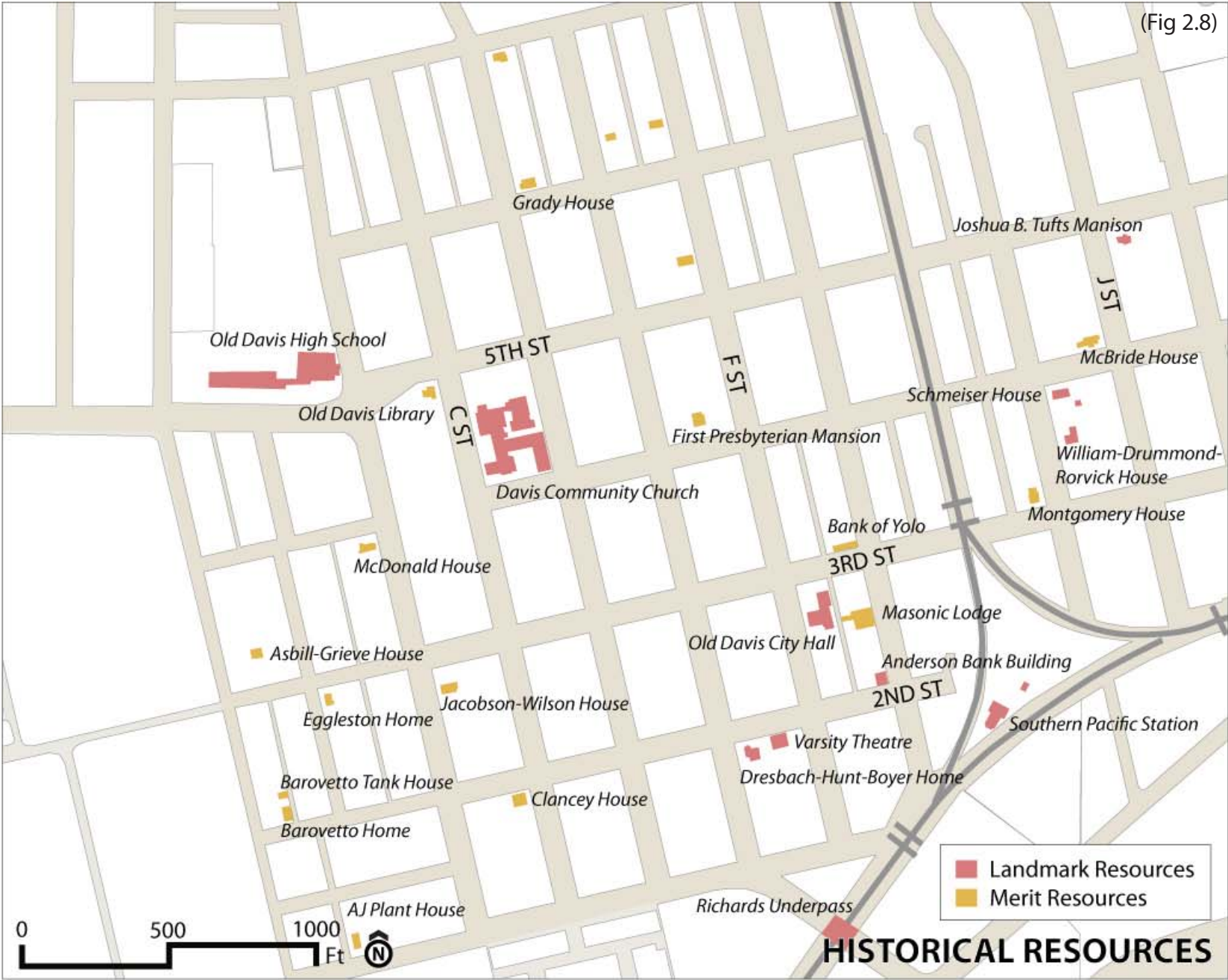


**BUILDING HEIGHT**

(Fig 2.7)

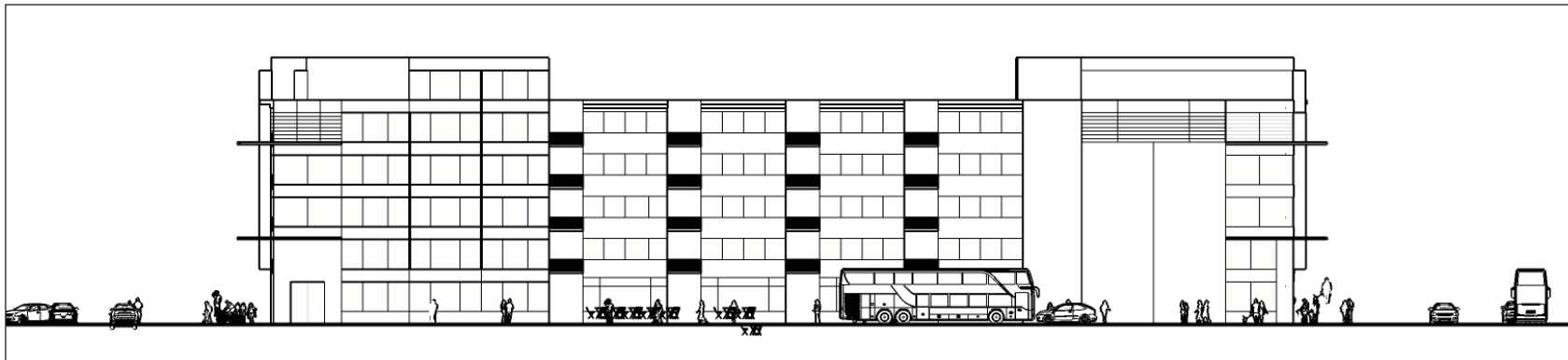


(Fig 2.8)



# OPPORTUNITIES & CONSTRAINTS

The opportunities and constraints map is a compilation of the previous analytical map combined. For the purpose of visualization, the colors and symbols have been modified uniquely for this map. Building that is less than two stories are not shown in the map to emphasize the flatter areas of the map. Furthermore, building with 3 stories or higher are visually more eye-drawing on the map as it serves as a reminder it is difficult to modify that area. Like the circulation map, car/vehicular traffic is ultimately ignore as this project attempts to de-emphasis the car and emphasis public transit, bicyclists, and pedestrian-friendly streets.



# OPP./CONSTRAINTS 1

(Fig 2.9)



# OPPORTUNITIES & CONSTRAINTS

The sites deemed Most Opportunistic are sites that are could easily be developed without too much difficult. It is usually characterized by having buildings less than two stories or no structures at all. It is a site that is close to public transit and/or street with dedicated bike lanes. Sites deemed as have Some Opportunities are fairly developed sites with a fair number of 2+ stories houses. These sites could be developed but not as whole site, but rather in parts as there may be huge structures and or historic resources within the site. Although Central Park a fairly good site to develop, it is ignored as a possible development site because it serves as

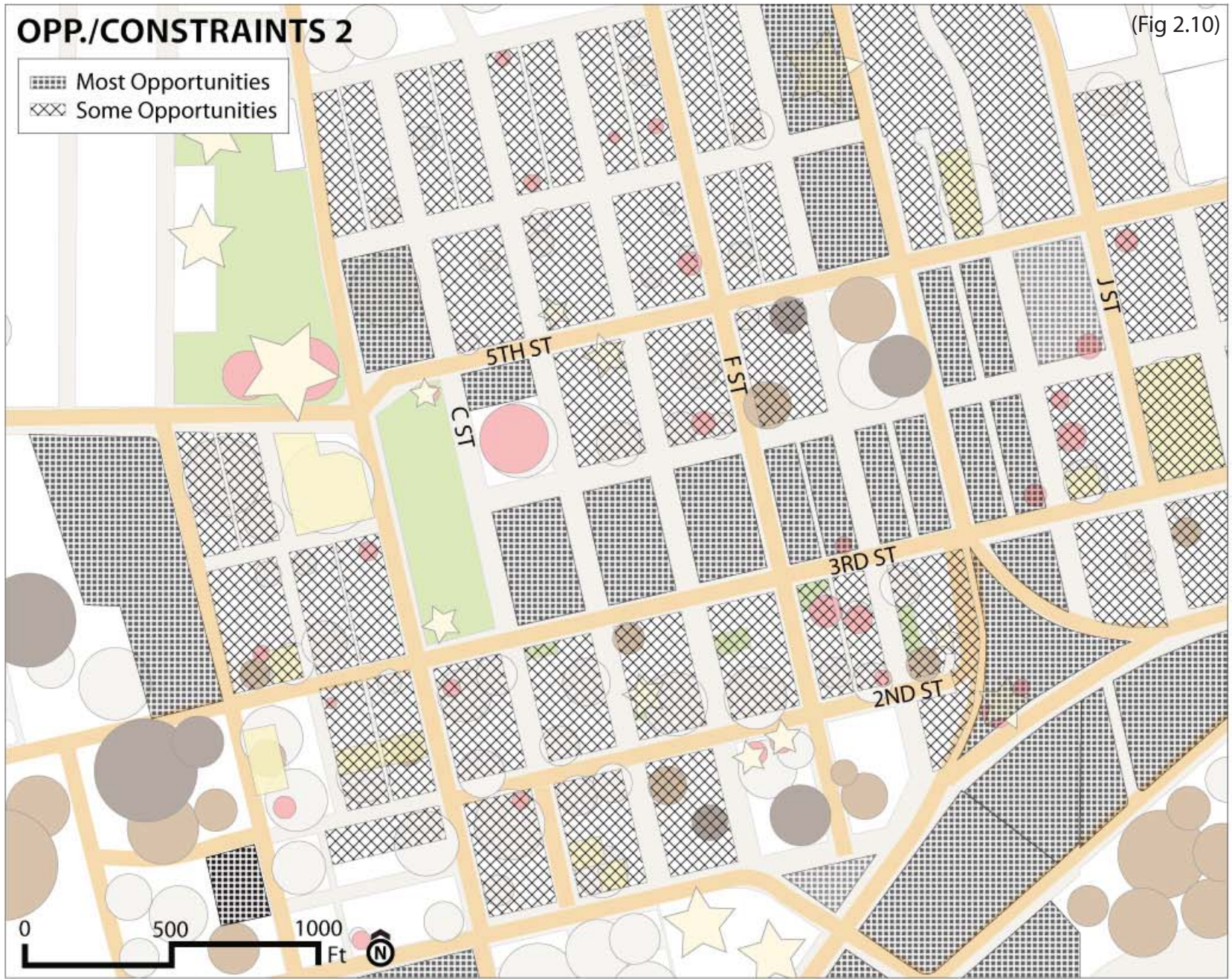
the outdoor gathering place.

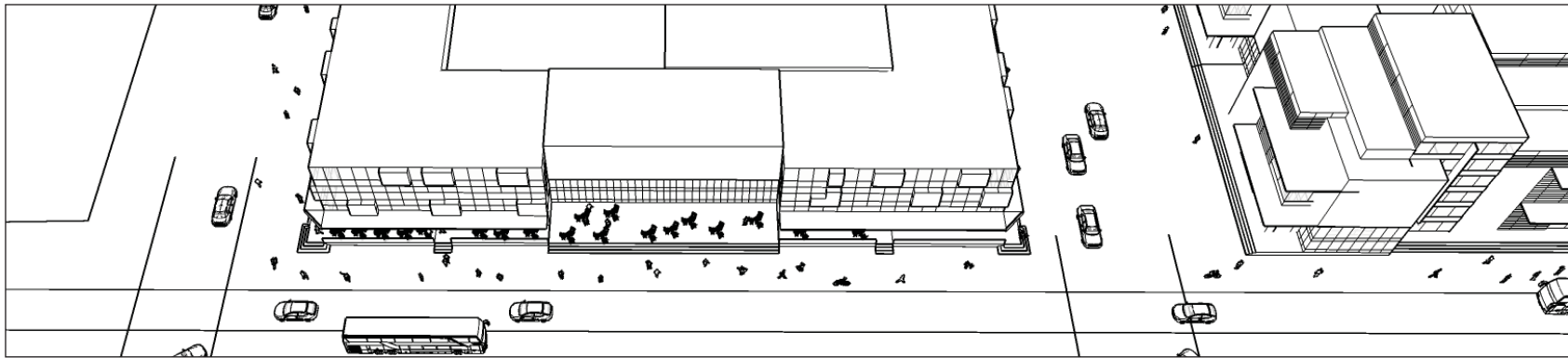
For this project I chose to develop the three blocks off of 3rd street between C Street and F Street. This is an ideal location as there is a currently project in developing 3rd street to be more pedestrian-friendly, connecting the University with downtown. These three blocks, then, would become one of many social nodes in downtown. Moreover, these blocks exist off of the local bus system, allowing quick access to transportation. And the most obvious- it is right in the center of downtown, making it the ideal location to develop a mixed use complex.

# OPP./CONSTRAINTS 2

(Fig 2.10)

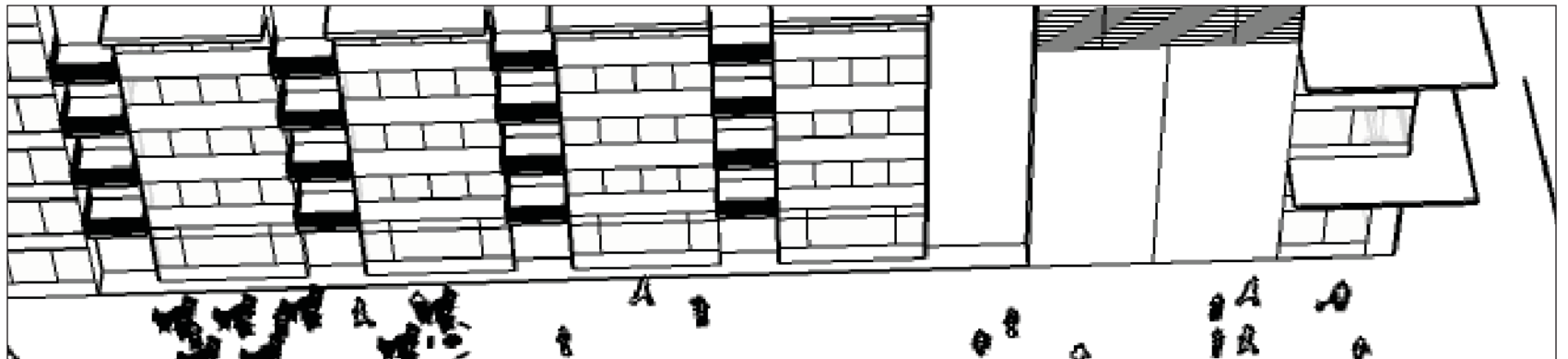
- Most Opportunities
- Some Opportunities

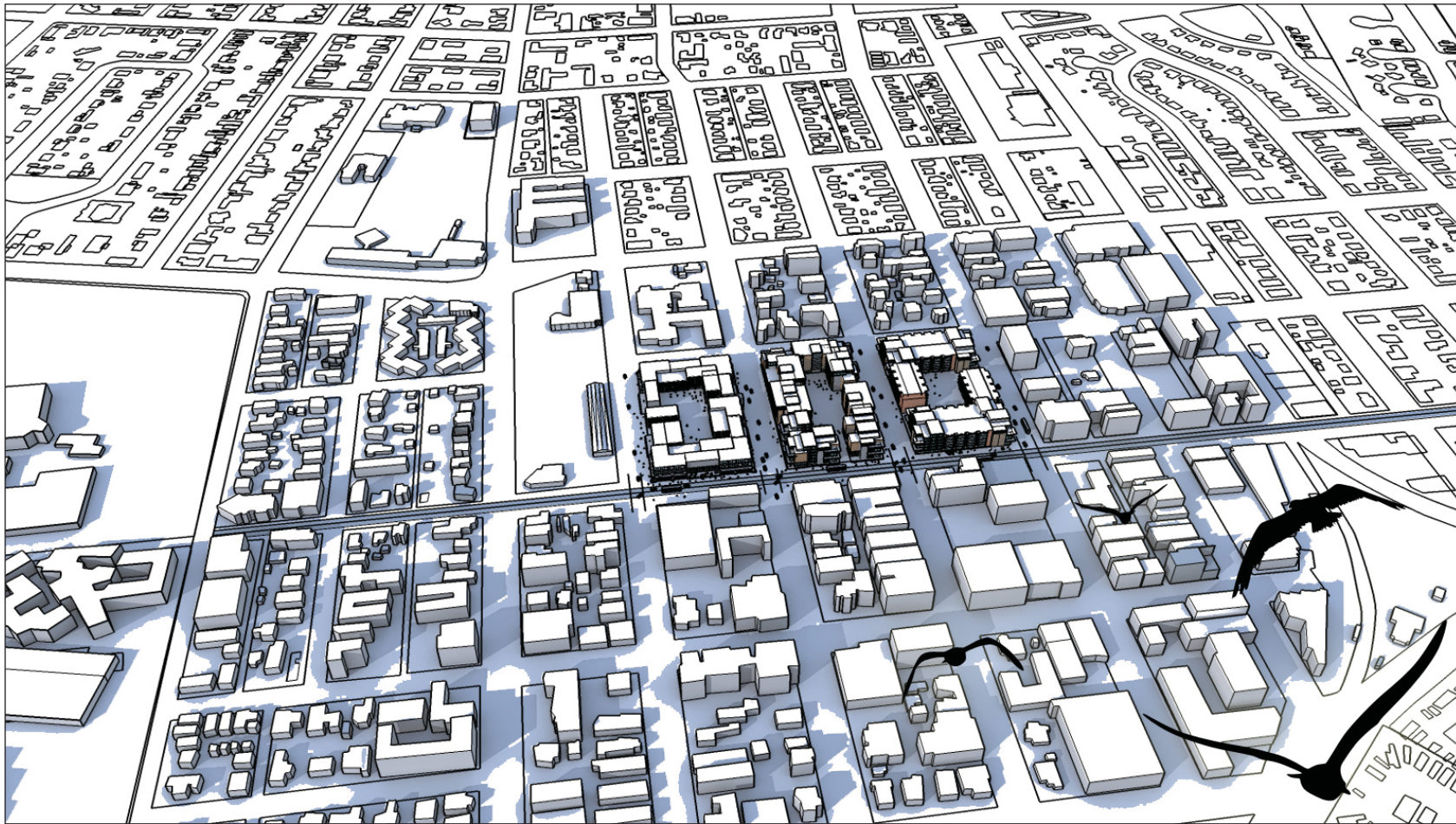






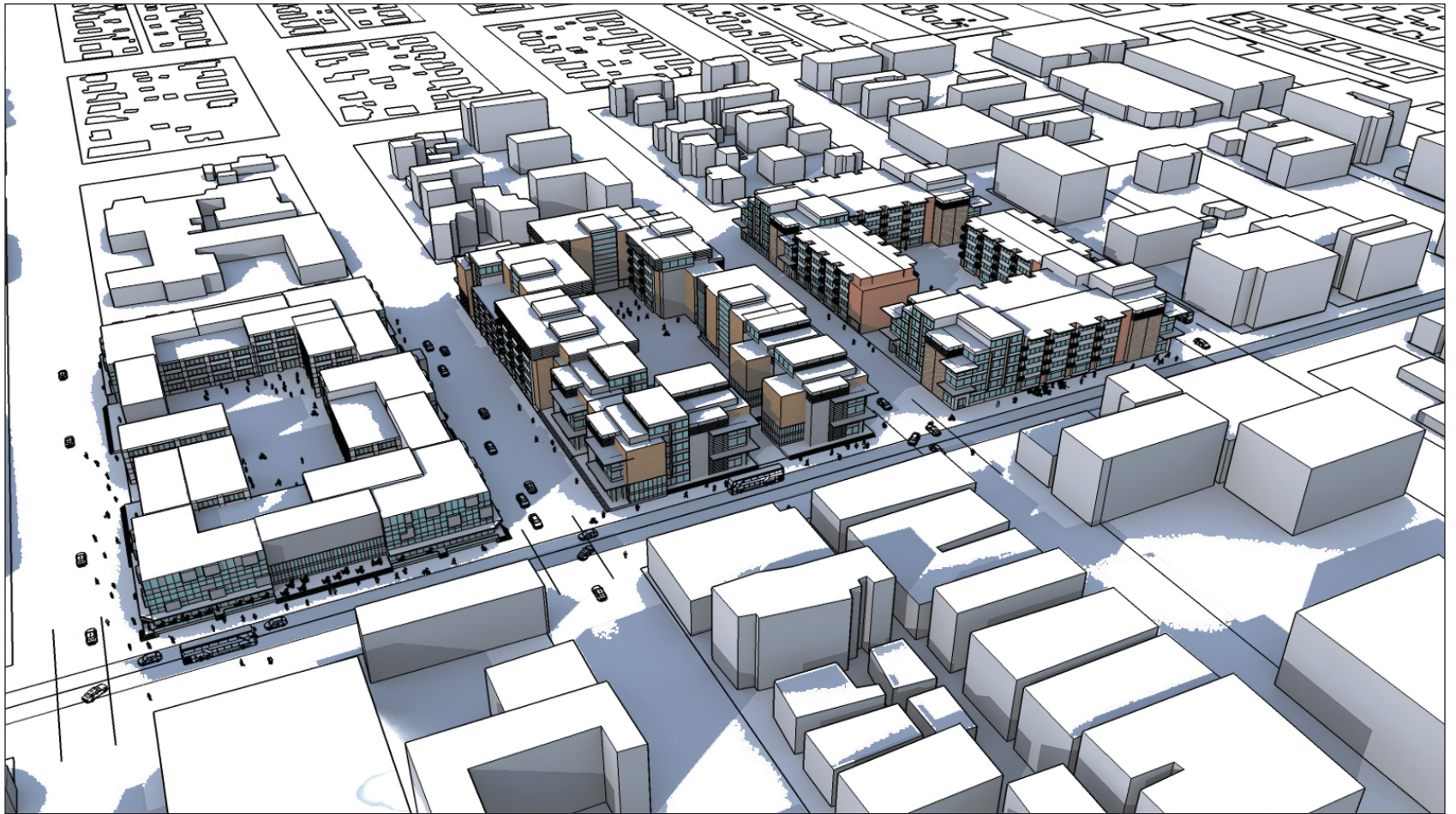
# DESIGN





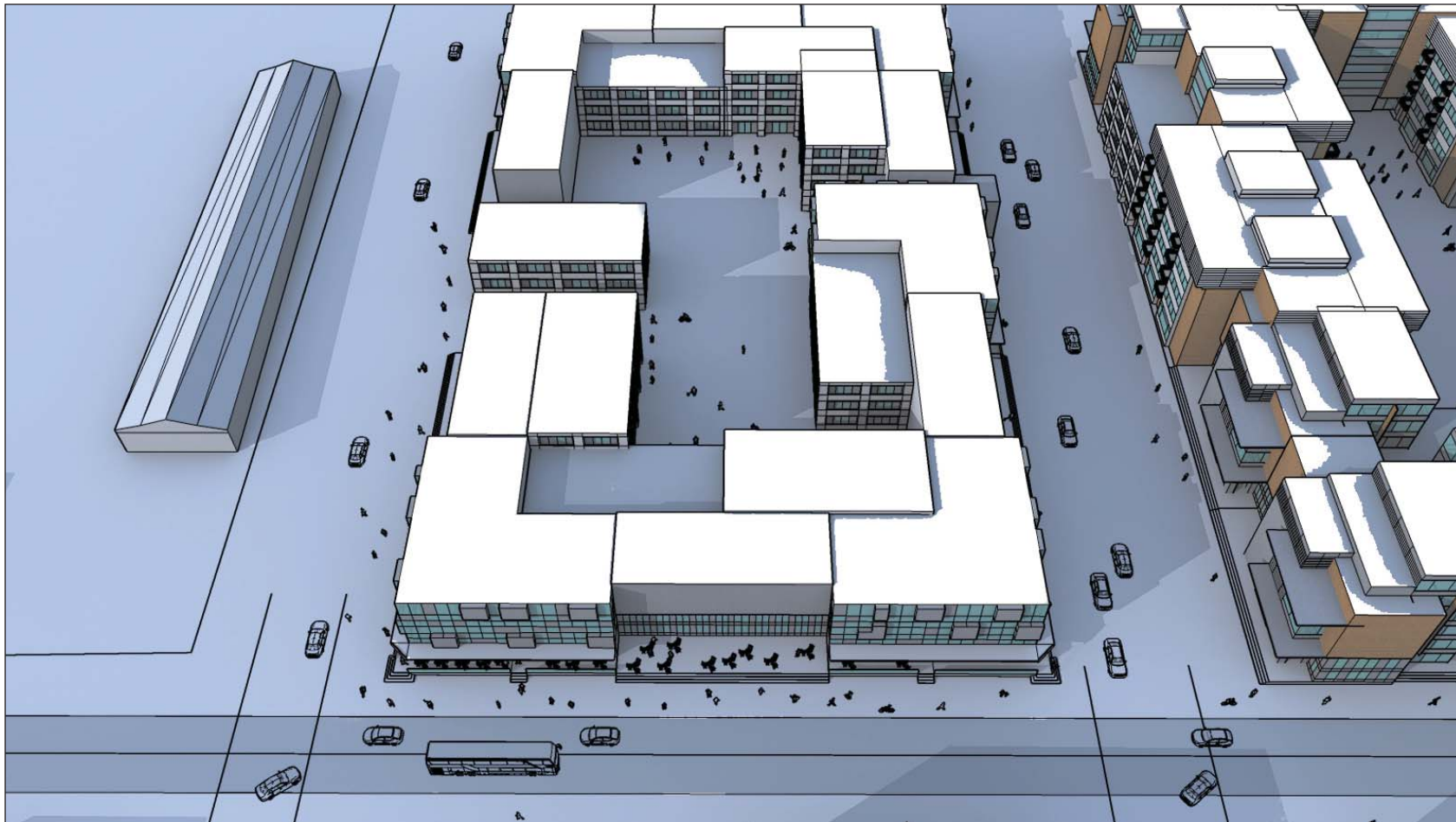
The City (Fig 3.1)

For visualization purposes, the context building has been raised 2-3 stories higher than the existing building to simulate a growth as a whole city. The designed site is located off of 3rd street, a street designated for bikes and pedestrians. This design maximizes on that fact, allowing stores to 'reach' the street for potential customers.



The Site (Fig 3.2)

The site is broken down into three blocks, the Western Block, the Central Block, and the Eastern Block. While conceptually all mixed use densification, each block are designed differently giving the residents different options.



The Western Block (Fig 3.3)

The Western Block, located adjacent to Central Park and the Farmer's Market, caters to a lower density lifestyle as retails and offices takes the outside while all the residential buildings are inside. This allows for a completely residential atmosphere. Furthermore, the main entrance faces Central park, instead of 3rd street, to further secludes the living space



The Western Block Section (Fig 3.4)

Unlike the two taller neighbors to its east, the Western Block consists of three to four stories building. This allows the block to stay relatively low and in context as the park is flat. Like its two counterparts, it offers underground parking.

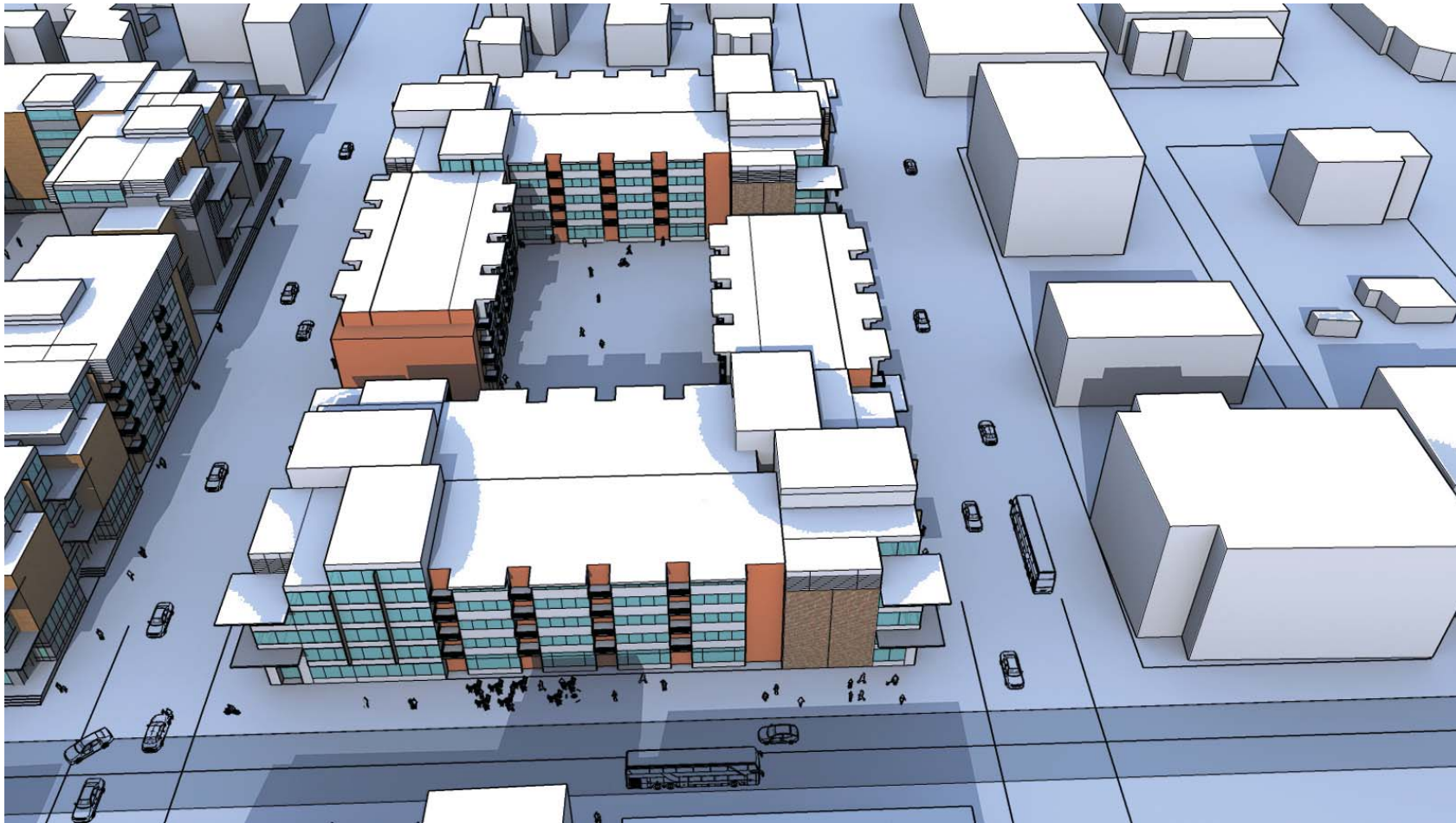


The Central Block (Fig 3.5)

The Central Block functions as a transitional area between the two blocks as it offers three to six stories.



The Central Block Section (Fig 3.6)



The Eastern Block Section (Fig. 3.7)

Facing two transit routes, the Eastern Block becomes ideal for having the most student-residents. As the Age Range Population Graph in Figure 1.8 shown, Davis has a high percentage of college-age students. Since many are going to school and not raising a family, the higher density is not a problem as well as the lack of open space surround the building.





The Eastern Block Section (Fig 3.8)



View from Intersection of C Street and 3rd Street (Fig 3.9)

The new 3rd Street takes away street parking, allowing a wider sidewalk, promoting walking and the storefronts more real estate serve its customers. The disappearance of street parking on 3rd will calm on vehicular traffic on 3rd street as it has less street width to navigate.



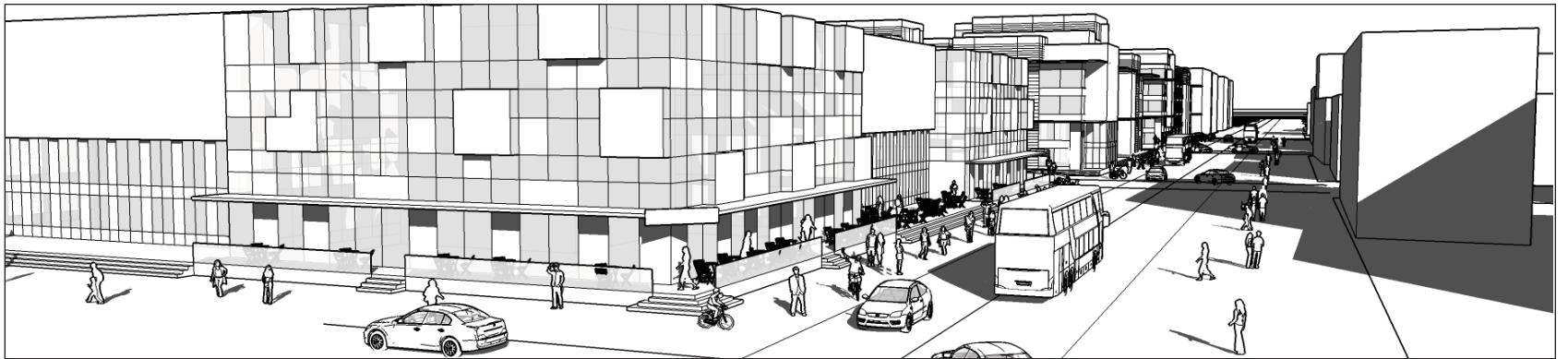
Storefront of Eastern Bock on 3rd Street (Fig 3.10)

The larger sidewalk means stores have the ability to set up café-like settings. This is case; it utilized the raised building front as the classic porch, making the atmosphere of the area friendlier.



Bus Stop in Front of Central Block (Fig 3.11)

The combination of pedestrian-friendly streets, storefront businesses, and a transit route allows 3rd street to become the city's social node, the ideal place to be.



# DEFINITION

Densification: Increased use of space both horizontally and vertically within existing boundaries

Non-renewable resources: natural resources that cannot be reproduced.

Pedestrian-friendly street: a street that is safe, walk-able, and with many people out and about

Social Nodes: activity centers.

Urban Design: The arrangement of spaces in a city or town to increase aesthetics and/or functionality.

Urban Sprawl: Also known as suburbia. Low-density residential areas separated from working and shopping areas.



# REFERENCES

Appleyard, D., (1981) *Livable Streets*. Berkeley: University of California Press.

Beatley, T. (2000) *Green Urbanism: Learning from European Cities*. Washington, DC: Island.

Bosselmann, Arens, Dunker, & Wright. (1995). *Urban Form and Climate*. *Journal of the American Planning Association*. Vol. 61, No. 2. Pp. 226-239. Retrieved April 01, 2011, from EBSCO database.

Diamond, J. (1976) *Residential Density & Housing Form*. *Journal of Architectural Education*. Vol. 29, No. 3. Pp. 15-17.

Kilbridge, M.D. , O'Block, R.P., & Teplitz, P.V. (1970). *Urban Analysis*. Boston: Division of Research, Graduate School of Business Administration, Harvard University.

Planning and Building Department (1996). *Infill Potential Study: A Technical Study for the Davis General Plan Update*. (Unpublished) Davis: City of Davis.

Rapoport, A. (1975) *Toward a Redefinition of Density*. *Environment Behavior*. Vol. 7, No. 2. Pp. 133-158.

SACOG (2008). *Metropolitan Transportation Plan for 2035: A Creative New Vision for Transportation in the Sacramento Region*. Retrieved March 03, 2011, from <http://www.sacog.org/mtp/2035/final-mtp/>

Spatial Planning and Urban Design Department. (2009). *Cape Town Densification Strategy*. Cape Town: City of Cape Town. Retrieved March 3rd, 2011, from [http://www.capetown.gov.za/en/sdf/Documents/Densification\\_Strategy\\_web.pdf](http://www.capetown.gov.za/en/sdf/Documents/Densification_Strategy_web.pdf)

Stahle, A, & Marcus, L. (2009) *Compact Sprawl Experiments*. Stockholm: KTH School of Architecture. Retrieved March 24th, 2011, from [http://www.sss7.org/Proceedings/05%20Spatial%20Morphology%20and%20Urban%20Growth/109\\_Stahle\\_Marcus.pdf](http://www.sss7.org/Proceedings/05%20Spatial%20Morphology%20and%20Urban%20Growth/109_Stahle_Marcus.pdf)