Urban Transitions

Making connections between transportation to the livable environment

Design Thesis 2013

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Urban Transitions

Making Connections Between Transportation to the Livable Environment

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by
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Table of Contents

Statement of Intent

- Thesis Abstract 4
- Problem Statement 5
- Project Typology 6

Thesis Proposal

- Narrative 8
- User/ Client Description 9
- Major Project Elements 10
- Site Information 11
- Project Emphasis 13
- A Plan for Preceding 14
- Research Results & Goals 22
- Thesis Goals 26
- Site Inventory & Analysis 27
- Conceptual Development 45
- Final Proposal 48
- Discussion and Limitations 64

Thesis Resources

- Previous Design Studio Experience 67
- Reference List 68
- Personal Identification 69

Statement of Intent

Statement of Intent

Abstract

The dependence on personal vehicles for transportation continues to grow for Americans. This has changed the shape of our cities toward automobile oriented transportation over the past decades. In return cities have been designed to be vehicle friendly causing higher automobile traffic and lower pedestrian oriented neighborhoods; resulting in the expansion of the cities beyond the sustainable boundaries which depletes more agricultural lands and natural resources. This study explores the potential options available to reduce the automobile dependency and enhance multi-modal transportation within urban cores. This has been done by evaluating various case studies and their relevant implementations. This research evaluates case studies in transportation oriented developments along with revitalizing streets to hypothesize that redesigning core urban neighborhoods around public transportation will reinforce sustainable livable communities.
The case studies are analyzed quantitatively and qualitatively in order to make comparisons on the design elements. The elements analyzed include land use, public transportation, and street composition. This research concludes with the discussing different options cities can adopt, and what elements have been proven to create more sustainable livable communities.

Statement of Intent

Problem Statement

Large Scale Question -

How can cities transform from being automobile dependent to incorporating multi-modal transportation developments?

Small Scale Question -

How can a typical light rail station become more integrated into the surrounding environment?

Statement of Intent

Project Typology

At what point will people stop using their personal automobile for travel and turn to a more efficient type of transportation? People will choose the most efficient type of transportation possible (Filion, 2010). This study hypothesizes that until automobiles are too expensive for the majority of people to own and operate or automobiles become less convenient compared to an alternative mode of transportation, people are going to choose to use their automobile. The problem with the majority of American cities today is the ever growing dependence on people driving their vehicle for daily use. This has contributed to multiple adverse side effects of cities. This study focuses on finding alternatives for vehicle dependent cities. Alternatives that create more sustainable environments for people to live, work, and play; creating a more livable community. The goal of this study is to find sustainable, automotive independent solutions for cities to implement. This will be done by studying what has worked for other cities, and applying those successful techniques to a city of choice. This thesis program discusses how cities have become dependent on vehicles for the main mode of transportation, why it is a problem, and ideas for solutions to this problem. By the end, this study intends to answer this question: How can cities transform from being automobile dependent to incorporating multi-modal transportation developments?

Thesis Proposal

Narrative

Throughout my education at NDSU I have learned the importance of creating better, more sustainable urban environments. This include enhancing density and creating more walkable areas. I combined this knowledge with the idea of trying to find new ways to reduce our dependence on vehicle to create more sustainable living and promote multi-modal transportation.

In general, all larger cities can benefit from designing around transportation systems, instead of incorporating transit systems later. Many times transportation stops or shelters have little significance to the surrounding area and have little connection. This project looks into ways to better incorporate a transit stop into the surrounding context; creating a destination instead of a only stop.

User/ Client Description

Users -

Urban Dwellers - Light Rail users, residents, business workers, tourists, performers

This site has the possibility to connect to a wide variety of people. Since the site is in downtown Minneapolis, it can connect to anyone visiting, working, or living in the area. However, the majority of traffic will come from people utilizing the light rail.

Clients -

City of Minneapolis

The main client for this project would be the City of Minneapolis. The City owns the land around the site, along with the different types of transportation infrastructure. The City of Minneapolis could benefit greatly from projects that prioritize the light rail and enhance walkability to create a better urban environment.

Thesis Proposal

Major Project Elements

Light Rail Shelter

One large element in this design is a light rail shelter. Currently, the light rail shelter has no significance to the surrounding context. Creating a better connection and sense of identity is needed.

Transit Hub

Creating a sense of place for this light rail stop is needed. It is important to have a cohesive design that creates a destination.

Pedestrian Connections

Pedestrian connections are a large factor is determining the circulation of the site. Making pedestrian circulation efficient and thoughtful is a priority.

Performance Space

This area in downtown is known for being a performance and art district. Designing an outdoor space for performances could be highly utilized in the area.

Passive Seating

Seating areas are needed to provides places for people to sit and stay on the site. This should be done in with different type of passive and informal seating.

Green Space

Downtown Minneapolis could benefit in many ways from added green space. This would provide areas for seating, places for stormwater to filter, and add areas for recreation.

Density

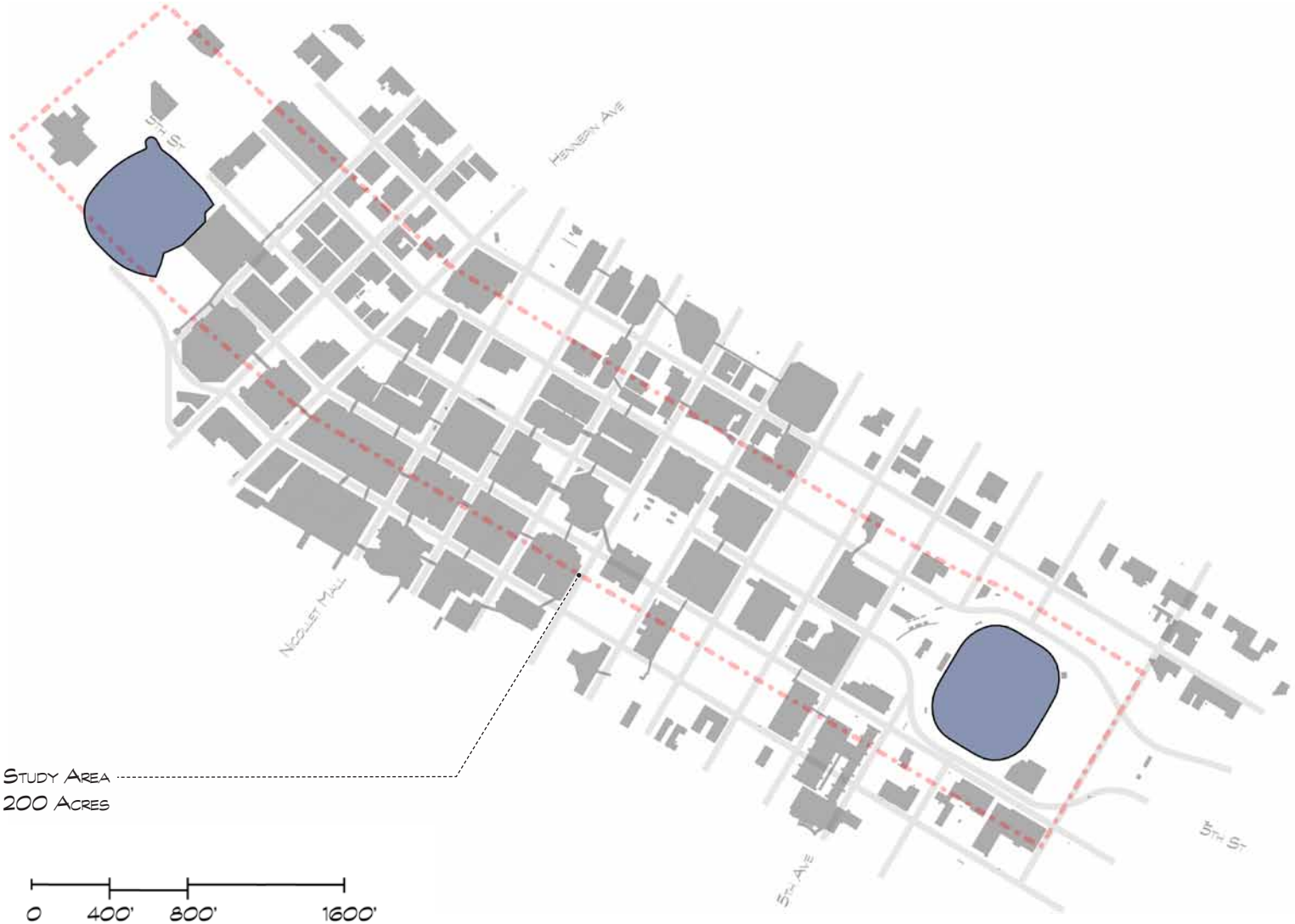
This site currently has few residents living on it, and many areas in downtown have low density. Increasing residential density in the area would create areas for people to live and utilize public transportation options in downtown.

Thesis Proposal

Site Information

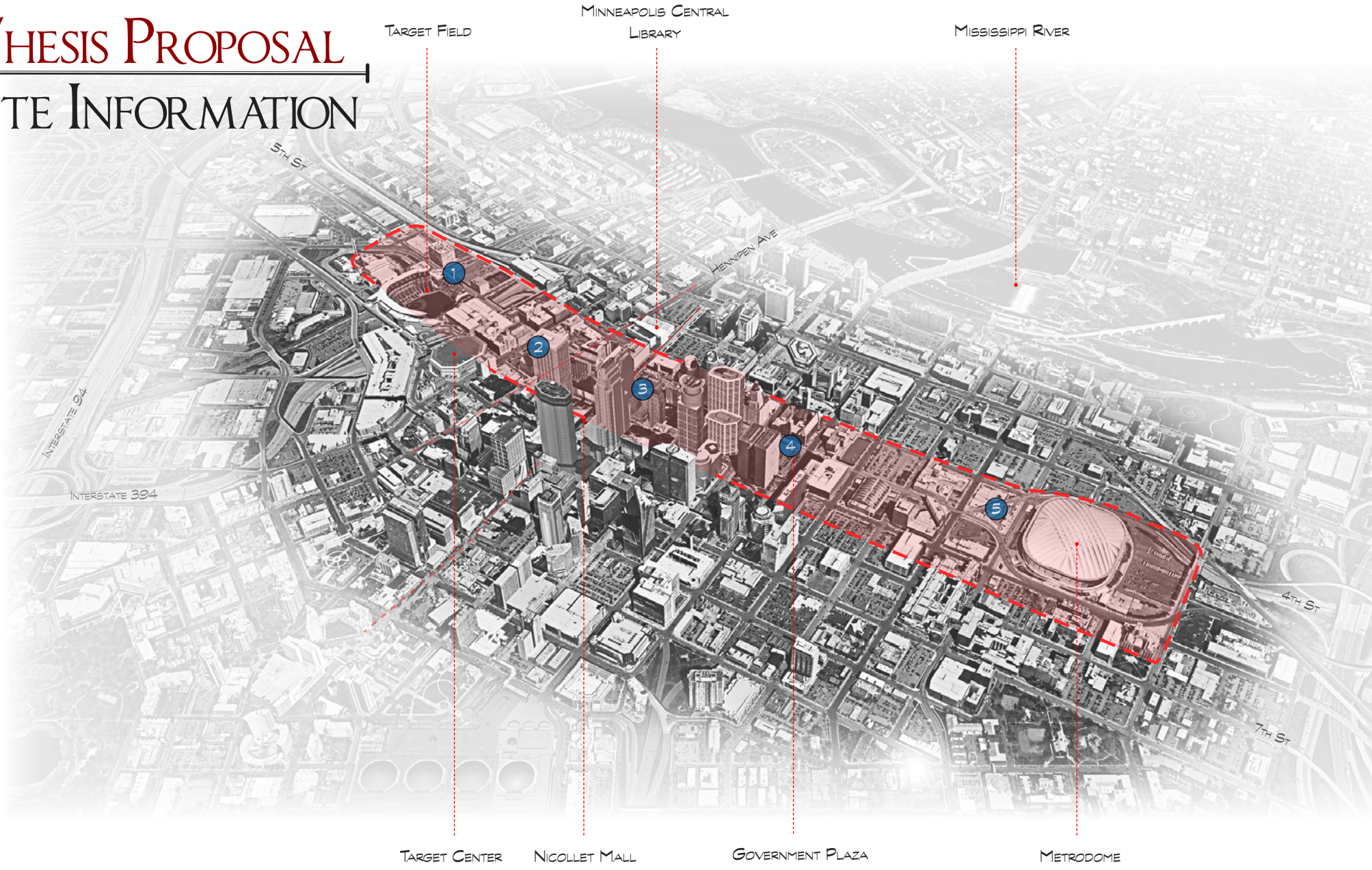
St Paul

This project originally starts with a large scale site in downtown Minneapolis. It was important to start at a large scale for this project to understand downtown as a whole. It was important to know where people are going and how they are getting to their destinations within the site boundaries.



Thesis Proposal

Site Information



Thesis Proposal

Project Emphasis

Transportation Oriented Developments area broad concepts, and there is not set guidelines when creating a site specific design. For this reason, this project starts with a large region of Minneapolis, and then focuses on a smaller site. This was done to understand the downtown corridor as a whole first, and design what is needed later in the project.

This project has two phases and scales to it. First it starts with studying the different transportation systems in downtown Minneapolis. This gave vital information on the existing multi-modal transportation systems. After analyzing the existing system, it was possible to chose a smaller site based on the large scale analysis. Once a small scale was selected, the project focuses on creating a destination out of an existing light rail stop. This was done by analyzing where people are going and how they are getting to their destinations.

Thesis Proposal

A Plan for Proceeding

The proposed site to design is located in Minneapolis, Minnesota. Minneapolis has many different transportation options available; however, overall the city is dominated by vehicular traffic. This city will be great city to study for transportation oriented developments due to the high vehicular traffic, non-prioritized public transportation use, and relatively low density outside of the urban core. First an investigation of the existing transportation systems will have to conducted within the city of Minneapolis. This will include studying arterial and subsidiary streets, bike lanes, and any other alternative transportation options. Taking an inventory of existing transportation options and the successfulness of each option will help conclude what needs to be improved within the city to decrease the dependence on automobile. Much of this data would be quantitative data; comparing the daily traffic numbers, bike lane users, public transit users. Average daily traffic numbers will be important numbers to collect to determine the main modes of transportation people use. Along with studying the transportation options, a study of destinations within the city will be important. Destinations will include daily amenities, such as places to work, shop, parks, and any destinations unique for the city. It will also be important to know where the densest areas of the city are; this will help connect popular destinations within the city. Knowing the location of the main destinations within the city, the densest areas, the transportation options available will be the determining factors for a new transportation oriented design.

Before this study is able to assess the study area in Minneapolis, it is essential to look into different cities to see what they have done for transportation oriented developments. Below is a list of the information that is going to be studied in various case studies from around the country.

Assessment Measures:

- Zoning
  - Building Use
  - Land Use
- Public Transportation
  - Light rail, heavy rail, bicycle lanes
- Street Composition
  - Street widths, sidewalk widths, buffer zones

The assessment measures above will be applied to the various case studies for this study. The case studies will give helpful information to apply to the site in Minneapolis. The information that will be taken from case studies will be mostly qualitative data, with a small portion of quantitative data. Some data may be universal and can be applied directly to the site for a design intervention, while other information will be to site specific to replicate. Since the case studies will be from different cities, it will be more beneficial to assess them by how successful certain design elements function. For example, looking at the street design guidelines for a development rather than the specific street dimension will provide for a better understanding of the design. The case study information will provide an understanding of what has been built, reasons for the design, and how it functions.

Zoning/Building/ Land Use:

When looking at successful communities, and the reasons why they have formed the way they did, it can largely be due to the zoning ordinance in the area. Many urban areas across the country are starting to redevelop zoning regulations, trying to provide for a better urban environment. Successful zoning laws can function close to form-based codes, creating design guidelines for future development. In general, zoning can hinder projects from being very successful to being a typical block or community but this is especially the case in creating livable communities. Livable communities and Transit Oriented Developments (TOD's) rely on zoning to encourage proper new development. Without proper zoning, TOD's would not survive due to little regulation on what types of land use and building use can be developed in the area. Zoning is a key element for analysis in this study. Studying the types of zoning that was put in place within case studies will give this study a base for creating a design intervention.

Another important factor to analyze which closely related to zoning is building and land uses. Looking at the uses of the buildings, such as mixed-use, single use, public, and private will be important when identifying a TOD. Transit Oriented Developments are based off creating a multi-purpose, multi-use area that is very functional and sustainable. Land uses also play a vital role in livable communities. Many successful urban communities have set aside different land uses, such as open space or park space, to incorporate a better place to live, work, and play. In return, with the proper zoning, building uses, and land uses put in place, it opens the door for successful new developments. Assessing the successfulness of zoning will be crucial when applying a new design intervention.

Public Transportation:
Public transportation plays a vital role is a livable community. According to Ray LaHood, U.S. DOT, Secretary of Transportation, "Livability means being able to take your kids to school, go to work, see a doctor, drop by the grocery or post office, go out to dinner and a movie, and play with your kids at the park—all without having to get in your car". This means that public transit is very important in the way people get around cities. Currently, public transit is not successful in many larger cities, even though there are many options available; the typical mode of transportation is the automobile. The different types of public transportation that are going to be assessed in this study are going to be light rail, heavy rail, bus, and trolley systems. This study is not going to assess how successful a transportation system is as a whole, but will focus on the proximity of transit stations and how accessible they are, in relation to a livable community or TOD. Typically a TOD will be designed around a larger transit option, such as light rail or subway, but also may be close to numerous bus stops. An important factor for TOD's is the proximity of living and businesses to the closest transit station. Typically, a half mile radius is ideal for livable developments around transit stations (Renne). Overall, public transportation will be assessed by the proximity of the development to transit stations and the reliability of transportation.

Street Composition:

The way that streets are shaped and used tells a lot about what it was designed for. This study has discussed the problem with cities being designed for automobiles, and efficiently moving automobiles through cities. Pedestrian oriented streets are needed to create a successful urban area. In order to fix this problem, it will be important to assess what makes a street successful, and what elements are included to make streets more pedestrian oriented. Studying the street composition of an area will determine the walkability and how livable the area is. There are many different aspects to take into account when talking about street composition. First, it is important to address vehicle traffic and the widths of streets. Many urban streets have been constructed to be two to four lanes across, leaving it very uncomfortable and unsafe for pedestrians to cross. Along with the width of street, the size of the sidewalks and buffer zones will need to be assessed. There are many different types of buffer zones or barriers between streets and sidewalks that create a safe environment for pedestrians. Two types of buffer zones are vegetation buffers and street furniture buffers. Both of these types of buffers create a safety or comfort zone for pedestrians, so people are not walking directly next to the vehicle traffic flow. This increases the walkability of an area and overall pedestrian safety.

Parking is always an issue when dealing with new developments in urban areas. Typically, parking is maximized to try and accommodate as many vehicles as possible. But in many of the literature discussed early, it is important to reduce the amount of parking in urban areas and promote alternative travel options. In this section, parking will also be assessed based on how certain case studies addressed the problem, and what the outcome was.

Along with assessing vehicle travel, it will be essential to look into bicycle travel in the area. Cities have developed more demand for bicycle lanes; however, many bicycle lanes are designed as a secondary option of travel to the automobile. Assessing how different case studies have incorporated bicycle lanes into an urban area will be vital in the design intervention.
Street composition will be assessed qualitatively, discussing how well the designs assess the importance of walkability and pedestrian friendly areas. This may include discussion on how successful large sidewalks are to a specific site or how beneficial it was to limit the amount of parking in the area. Many case studies will not have all the elements discussed in this section; however, each case study has included at least one idea to promote walkability.

In order to understand what makes each of these elements successful, it is necessary to study existing environments where successful transit oriented developments were built and how livable the neighborhoods are. The case studies that will be analyzed in this study will be projects that focus on transit oriented developments and street networks. The studies will be from different cities across the nation to give different perspectives on overall design elements. Some case studies will focus more on connections to transportation and some will make better connections on streetscape elements for walkability.

1. Fruitvale Transit Village Project – California
2. Clear Creek Transit Village Project – Colorado
3. South Grand Great Streets – Missouri

Fruitvale Transit Village Project
As mentioned earlier, the Bay Area Rapid Transit (BART) is a sustainable transportation practice in the highly populated Oakland and San Francisco metro area.
Fruitvale Transit Village is a project that is located in the Fruitvale neighborhood of Oakland, California. Within this neighborhood is a transit rail stop for the Bay Area Transit Rapid system (BART). BART is a very large transit system that connects the inner city of Oakland the surrounding metro area. The transit stop in the Fruitvale neighborhood was a basic rail stop, and devoted to the stop was a large 9 acre parking lot. The Transit Village project came alive due to BART and the city proposing to increase the amount of parking on site by constructing a multi story parking garage. This caught the attention of local residents and let to the redesign of the area into a transit village. Previously this area was dominated by vehicles, creating an unsafe environment for pedestrians; however, after a new transit village, the area transformed into a pedestrian destination along the BART system.

Assessment Measures:
Zoning/building/land use:
In order to transform the existing parking lot of the BART system to a new village, there was a lot of policy and zoning work that needed to be accomplished. This involved working heavily with many different groups of people, such as the city government officials, local residents and local businesses. In order for the parking lot to be removed, the city wanted to create as many new parking spots as they would remove. This case study found that parking encourages vehicle use; if there are large parking lots, there will be higher vehicle traffic. Therefore, the city changed some zoning regulations for parking, allowing the new village to have a lower amount of parking, which leaves room for more business and residents.

Building use was another very beneficial element in the development of this project. In general, the buildings are mixed use and have a fairly high density, 35 units per acre, compared to the surrounding neighborhood. Having a large amount of mixed use buildings in the area provided residents with a vast range of different business for everyday needs. These mixed use buildings help create interactive spaces between the buildings and the streets, enhancing the walkability and pedestrian interaction in the area.
Public Transportation:

The Fruitvale Transit Village does a very good job on emphasizing the need for alternative travel other than automobiles. As mentioned, this project connects directly with the BART rail system, which provides residents with more sustainable travel options.

Not only is this rail system directly connected to the village, but it provides a very reliable mode of transportation for daily travel. The BART system is very fast and convenient for both local resident travel and residents trying to commute to the inner city. Without a very reliable mode of transportation, transit villages such as Fruitvale, risk being less dependent on the automobile.

Other than having a direct connection to BART, the Fruitvale plan does not mention having more connections with other modes of public transit or bicycle lanes. Ideally, there would be other modes of transportation offered in this TOD to provide multiple transit option for residents besides automobile, walking, or the heavy rail. For this reason, this village may not be as successful as it looks on paper or in the plans. However, there may be different transit options, such as bus routes, in close proximity but there is no mention of this in the case study.

Street Composition:
As a whole, Fruitvale Transit Village is very pedestrian oriented, increasing the successfulness of the area. There are many different elements Fruitvale included to provide a pedestrian oriented design. Pedestrians feel like a priority when walking in this area. The streets are narrow, usually one lane each direction with parking lane, providing for a low amount of vehicle traffic, increasing the safety for pedestrians. Along with narrow streets for vehicles are a number of pedestrian streets. The pedestrian streets create interesting spaces within Fruitvale, such as plazas and small parks. These streets and pedestrian friendly corridors create a very high interaction for pedestrians in the village, adding to the successfulness.
The streets also have another added safety measure, vegetation buffers. Throughout the village are street trees and open grass areas, which benefit the village in many ways. The trees help give pedestrians an added safety feeling by having something separating the sidewalks from the streets. The trees also help the pedestrian corridors by creating a sense of enclosure, providing for a better pedestrian experience.

Clear Creek Transit Village:
The Clear Creek Transit Village is located in Adams County, Colorado, about 3.5 miles away from Union Station in Denver, Colorado. This case study focuses on the vision plan for Clear Creek, rather than how it was implemented. Clear Creek's vision plan is follows many guidelines to provide a successful Transit Oriented Development. This plan is a future development that is looking to provide connections to the proposed Gold Rail line, which will connect residents to many destinations in the area including the main transportation hub, Union Station. Even though this case study has not been constructed, it provides many design considerations and development guidelines; these guidelines provide useful information for other cities to apply to their new developments.

"The vision for the Clear Creek at Federal Station is to create a new, vibrant, transit-oriented community amenity within walking distance of the transit station. New retail, employment, entertainment and living opportunities within the new Village Center will serve the needs of the existing community, and maintain the area as an employment center for Adams County" (Clear Creek Transit Village Vision Plan).

Many of goals that are in this vision plan are goals that were used in other successful TOD's in Denver, CO. The goals of the Clear Creek Transit Village are as follows:

- Maximizing access to the RTD rail station
- Creating a critical mass of residents, employees, and shoppers to have a thriving retail environment and well-used public spaces
- Building Class A office space with a focus on creative and sustainable industries
- Maximizing opportunities for people to access nature without getting in a car
- Creating a substantially smaller carbon footprint as compared to conventional development though sustainable transport patterns and building design and use
- Creating LEED rated buildings
- Establishing car sharing and bicycle sharing to reduce the need for vehicle ownership
- Encouraging festivals, music, and other cultural activity on-site

This project has a very high potential to be constructed for many different reasons. This area has a great connection to natural features in the area. The proposed transit village is within a five minute walk of different natural amenities, such as natural parks and creeks. This site location is also in close walking distance to a proposed transit rail stop, providing a more sustainable mode of transportation and lowering the dependence on automobiles.

Assessment Measures:
Zoning/ building/land use:
Since this project has not been built, and is based on a vision plan for a new transit oriented development, this study provides good information on the type design guidelines. However, this case study has developed closer to a form-based code guideline, rather than zoning. As mentioned in the vision plan, this area seeks to become a mixed use development that occupies a wide range of uses and people. This idea has been notices in almost all TOD's, however, it is very important to the success for the area. The vision plan mentions specific densities in order for future developers and designers to meet the goals of the plan. Clear Creek Transit Village is looking for a density of 25 – 75 units per acre with a maximum building height of 95 feet. Setting up specific guidelines for future developments works very well; without specific guidelines, there are opportunities for new construction that does not fit into the vision plan.
Parking is also emphasized in the vision plan. Parking only creates problems for developments that are trying to focus on pedestrians and alternatives modes of travel besides automobiles. This plan has parking areas in place to accompany the needs for residents and people commuting on the rail. However, it was made clear in the plan that parking should be reduced if possible. The plan states the following:

- 1 parking space per bedroom unit for residential
- 2 spaces per 1000 s.f. of office space
- 3 spaces per 1000 s.f. for retail

Having these parking requirements in place limits the amount of parking a developer can do with their new business in the area. This promotes alternative travel and creating a destination for pedestrians.

Public Transportation:
Creating a connection from Clear Creek to Downtown Denver would be a very reliable mode of transportation for residents. It could serve as highly desirable place to live or visit. However, the construction of the Gold Rail Line to this area is going to be critical to the development of Clear Creak Village. If the Gold Rail Line is not constructed, there is no other mention of public transportation options available for the development. At this point, the public transportation details in this place primary focus on making connections to the rail system. Once the area becomes developed, it leaves area for additional public transit options, such as buses.

South Grande Great Streets
The South Grande Great Streets was a project done in the heart of St. Louis, Missouri. The project focuses on a streetscape redevelopment plan to create a better community and pedestrian friendly area. South Grande Boulevard is a pilot project done by local Landscape Architects with intense community involvement for the design of the area. Initially South Grande Boulevard was a vehicle dependent corridor with 6 lanes of vehicle traffic (4 traffic, 2 parking). The speed limit of the area is posted at 25 mph, however the average speed is closer to 42 mph. The primary programmatic elements in the design intervention are as follows: reduction of vehicle speeds, pedestrian accessibility, reduction of urban heat island effect, increasing pervious surfaces, and overall noise and air quality.
Overall this project is a great reference in the redesign of urban streetscapes. It did a good job of incorporating the public in the design to find out exactly what residents wanted, while still greatly improving the site.
One idea that was focused on in this project but was not discussed earlier in the assessment measures was designing for storm water management. This project included different successful design elements to help reduce downstream water pollution of the local river system. Their design focuses on incorporating as many pervious surfaces as possible, primarily on sidewalks and parking lots. They also included street vegetation areas, such as rain gardens, to capture small amounts of rainfall in the area. These are small elements that alone would not add up to much storm water reduced, but applying these strategies in a neighborhood or in an entire urban area would be very beneficial.

Assessment measures:
Although this case study did improve the streetscape greatly, it does not specifically address two of the assessment measures for this study. It does not address public transportation or zoning/building/land uses in the design. However, public transit is implied for the case study. As shown in the master plans for the site, the designers did include areas for buses stops. Parking was eliminated in the bus drop off zones to ensure buses could drop riders off at the curb, which adds safety for the people riding.

Street composition:
Since this study focuses solely on redesigning a complete streetscape, it will work as a leading case study for assessing street composition measures. As mentioned above, one of the main goals of this project was to reduce street noise along with traffic levels and speeds, providing for a better pedestrian environment. The graphs below show the data for the before and after effects of the design on noise and traffic. It is clear that this design was able to reduce speeds and noise by successfully adding elements such as street trees and buffer zones. The average traffic rates were lowered by 13 miles per hour. The design also reduced the active roadway by 25 percent, by eliminating one traffic lane, allowing for more space to create better sidewalks.

Pedestrian accessibility was another major portion of this project. In order to provide a better experience for pedestrians, this project included many new programmatic elements. Some of the elements include: wider sidewalks (36% increase) to provide more space for pedestrians and outdoor dining, expanded outdoor seating, street intersection bump-outs, and enhanced handicap accessibility.

Thesis Proposal

Research Results and Goals

Transportation has shaped the cities we live in and the way we live our lives. Up until the mass production and affordability of automobiles cities were dense and took up a much smaller amount of land (Filion, 2003). However, once vehicles became the most popular way of getting around, cities started to change shape and size. Through the twentieth century, cities continued to grow in population and land mass, being designed around how to accommodate automobiles. This has directly contributed to city sprawl and the majority of American cities becoming dependent on vehicles for everyday travel (Filion, 2003). Our dependence on vehicles has contributed to our cities being developed for transportation in personal vehicles; resulting in a vehicle friendly environments and not a people friendly environment.

For most Americans the automobile is the main mode of daily transportation (Filion, 2010). The automobile is used to travel to work, shop, and play, no matter what the distance. This has become the norm for the majority of people that live in cities developed after the invention of the automobile. But this is not the case for all cities around the world. Cities that were developed before the automobile was introduced are not as easy to get around in with an automobile; examples of these cities include New York City, Chicago, and many European cities (Filion, 2010). This is because they were not designed initially for vehicles; they were designed for the most efficient mode of transportation at that time period, whether that was horses, trains, subways, or walking.

With our cities continuing to grow outward and getting less dense, we are putting more reliance on automobiles. This continues to create a less sustainable environment by increasing the use of fossil fuels and increasing pollution. This leads to the question, while utilizing existing infrastructure, how can cities transform from being automobile dependent to prioritizing multi-modal transportation systems? According to Filtion, people will choose the most efficient type of transportation available. If multi-modal transportation systems within a city are prioritized, such as public transit, pedestrian use, and biking, the dependence on the automobile will decrease.

Recently, there has been a trend called Smart Growth for cities. The goal of smart growth is to create a more sustainable city by limiting outward expansion, increase densities, and promote public transit and walk-able neighborhoods (Filion, 2003). The idea of Smart Growth is not a new concept; however, it has rarely been applied city wide for different reasons; one of the main reasons being the difficulty of rezoning a large area and the complications along with new zoning regulations. Smart Growth is a plan that needs to apply at a regional level to provide the greatest benefits. For example, if a suburb adopts the smart growth idea, and only allows infill for the city, developers wanting to create a residential neighborhood outside city limits are going to look into a different city to develop (Filion, 2003). For this reason, cities reliant on automobiles need new travel solutions for more sustainable transportation.

Research Results and Goals

It is hard to find a credible source that does not agree with the need to find more sustainable transportation options for people within cities. However, there is not a 'one solution fits all' cities approach to adopt. Many people might insist that adding public transportation, such as additional buses, would help remove vehicles off the road. But, typically is not the case, because it is usually still more efficient and convenient for people to take their personal vehicles for travel (Filion, 2010).

Instead of developing more roads with the maximum amount of driving lanes and vehicle capacity, cities need to consider designing streets and neighborhoods based on prioritizing alternative travel. Alternative travel options could consist of more bus routes, more bike lanes, better pedestrian connections, or train options. However, none of these options will be successful without reduced dependence on automobiles. One type of development that has been successful in certain communities is transit-oriented developments (Renne, 2009). The concept refers to a development within a 10-min walk, or half-mile radius, around a major transit station, while incorporating a station-area precinct that is compact, mixed-use, and facilitates transit connectivity through urban design (Renne, 2009). The concept behind these developments is to utilize an existing or new transit system and create high density developments around the different precincts. This type of development is a great way to utilize a different type of travel besides the automobile. The high density development around the different transit stops also emphasizes pedestrian scale design to increase pedestrian traffic and reduce automobile traffic (Renne, 2009). An area that was successful in creating transit-oriented developments was the San Francisco Bay Area. The Bay Area was encountering typical effects of a sprawling city. The density of the urban centers was decreasing and the amount of space for vehicle transportation in the city was increasing.

"Cities and regions all over the USA, including the Bay Area, are rethinking the expansion of highways, as they often lead to induced travel demand for driving due to expanded low-density sprawl. To a certain extent, rail systems also induce new land development, although with the proper policies in place, these developments could be designed as TODs (Transit Oriented Developments), which may lead to fewer vehicle trips, reduced emissions, and more sustainable outcomes compared with the conventional low-density sprawl model." (Renne, 2009, p. 4)

The Bay Area was able in implement a series of rail connections that tied together destinations in the area. This allowed residents to save time and money compared to commuting with their vehicle every day. A trip that would usually take over an hour and a half to commute would now take half the time and cost dramatically less money. Due to the efficiency of the rail system over traveling with an automobile in the Bay Area, it has become very desirable to live near a transit rail stop (Renne, 2009).

Research Results and Goals

The Bay Area Rapid Transit system shows how dependence on the automobile was decreased once there was a more efficient mode of transportation available. This type of transportation development could be used in many of our cities across the county. However, this development could be hard to create in cities that do not have an existing train or rail systems already in place. It could be difficult and expensive to implement a new rail system within the existing infrastructure of a city. But the idea of creating high density, pedestrian based developments around transit precincts is a great idea worth exploring for future design.

Another design that has transformed urban environments is greenways. Greenways have provided many different cities across the United States with a new way of circulating the city. "Vehicular access and movement have become the predominant factors in determining the form of development, affecting the sense of place and contributing a major threat and nuisance to its residents. Greenways could thus be considered lines of opportunity; environmental corridors for the purpose of stitching together fragmented sites while providing for environment, ecology, education, and recreation." (Zakaria, 2006, p. 2)

Adding a connected greenway system through an urban environment would provide many benefits for a city. It would connect different portions of a city with a pedestrian and bicyclist friendly atmosphere; allowing the area directly around the greenway to have decreased dependence on the automobile, if designed correctly (Zakaria, 2006). A city that has successfully incorporated a greenway system is St. Louis, Missouri. St. Louis has many of the same characteristics of larger cities in the United States. It has a decreasing population density and there is a large amount of infrastructure existing. St. Louis also has become one of the most sprawled out metropolitan areas in the nation (Krummenacher, 2008). However, this city was able to create an urban greenway to help reconnect the city. The greenway system connected to the natural environments surrounding the city, the Missouri River corridor, and connected the system through the city with parks and open spaces. The greenway allowed people to travel through the city with an alternative form of transportation. Along with adding addition transportation options for residents, the greenway also helped with many different environmental issues. The greenway helped reduce the amount of storm water runoff that goes into the Missouri River, reducing water pollution downstream (Krummenacher, 2008). Although, a greenway doesn't solve the entire problem of our dependence on automobiles, it can be considered part the solution. However, as mentioned before, if a design doesn't consider decreasing the dependence on vehicles, a greenway might not be as successful as intended.

Overall, cities need to create alternative travel options that do not feel secondary to automobiles. Many cities try to incorporate alternative means of transportation such as addition bike lanes or sidewalks. However, they tend to be unsuccessful unless they are prioritized over the automobile. People will choose the most efficient type of transportation possible (Filion, 2010). When the vehicle becomes less efficient to travel in a city, people will look for alternatives. This study intends to continue to search for the best type of alternative transportation development available for the study area. This will include research on how to prioritize alternative travel within cities. For example, at what point does a pedestrian feel safe to cross a busy street, or when does a bicyclist lane become successful?

Research Results and Goals

This study hypothesizes that redesigning core urban neighborhoods around public transportation networks will reinforce sustainable livable communities. Based on the literature reviewed thus far, one of the most effective ways to reduce the dependence on vehicles is to create neighborhoods developed around public transit, Transit Oriented Development (TOD) (Graf, 2012). However, there are many different elements that go into designing and developing a livable, transit oriented development. Transit oriented developments need to incorporate all the following components: reliable efficient transit, complete streets, public areas such as parks, goods and services, and a mix of housing options (Graf, 2012).

Thesis Proposal

Thesis Goals

Research ways to prioritize public transportation

Learn new techniques to better graphically represent illustrations

Practice time management skills

Spend more time working through the process of a design

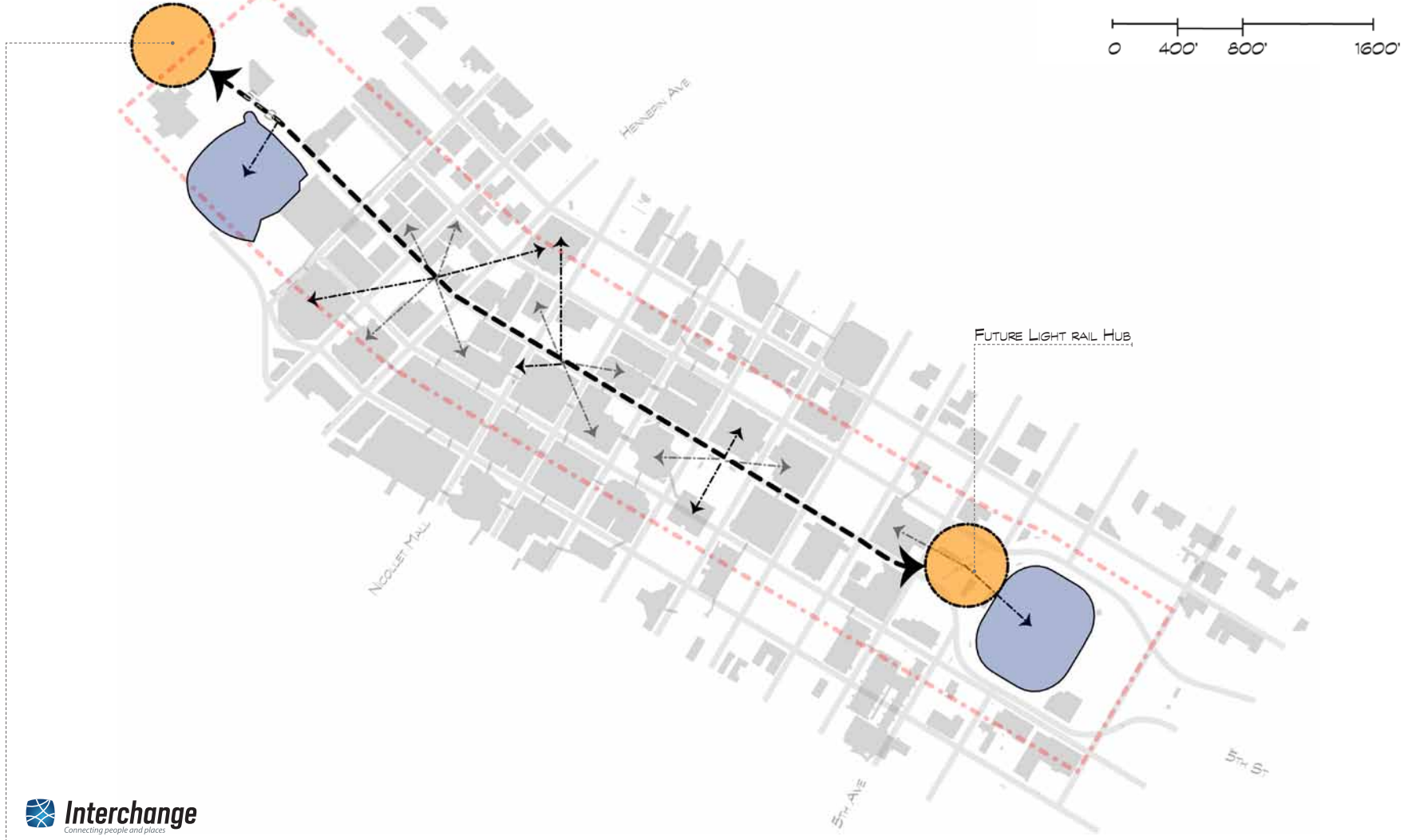
Expand knowledge on a computer program

SITE INVENTORY & ANALYSIS

SITE INVENTORY & ANALYSIS

Thesis Proposal

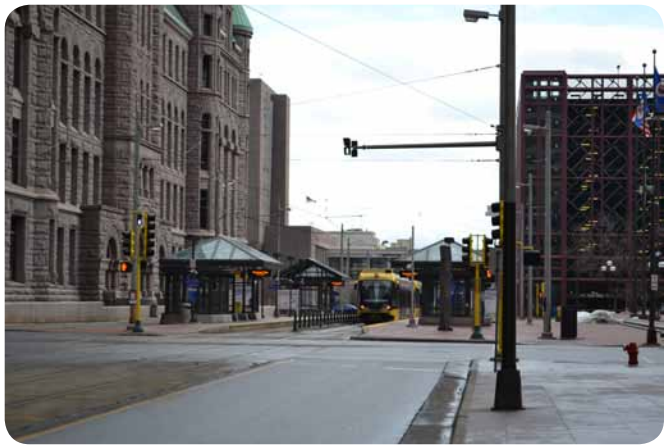
Site Inventory & Analysis



Interchange
Connecting people and places

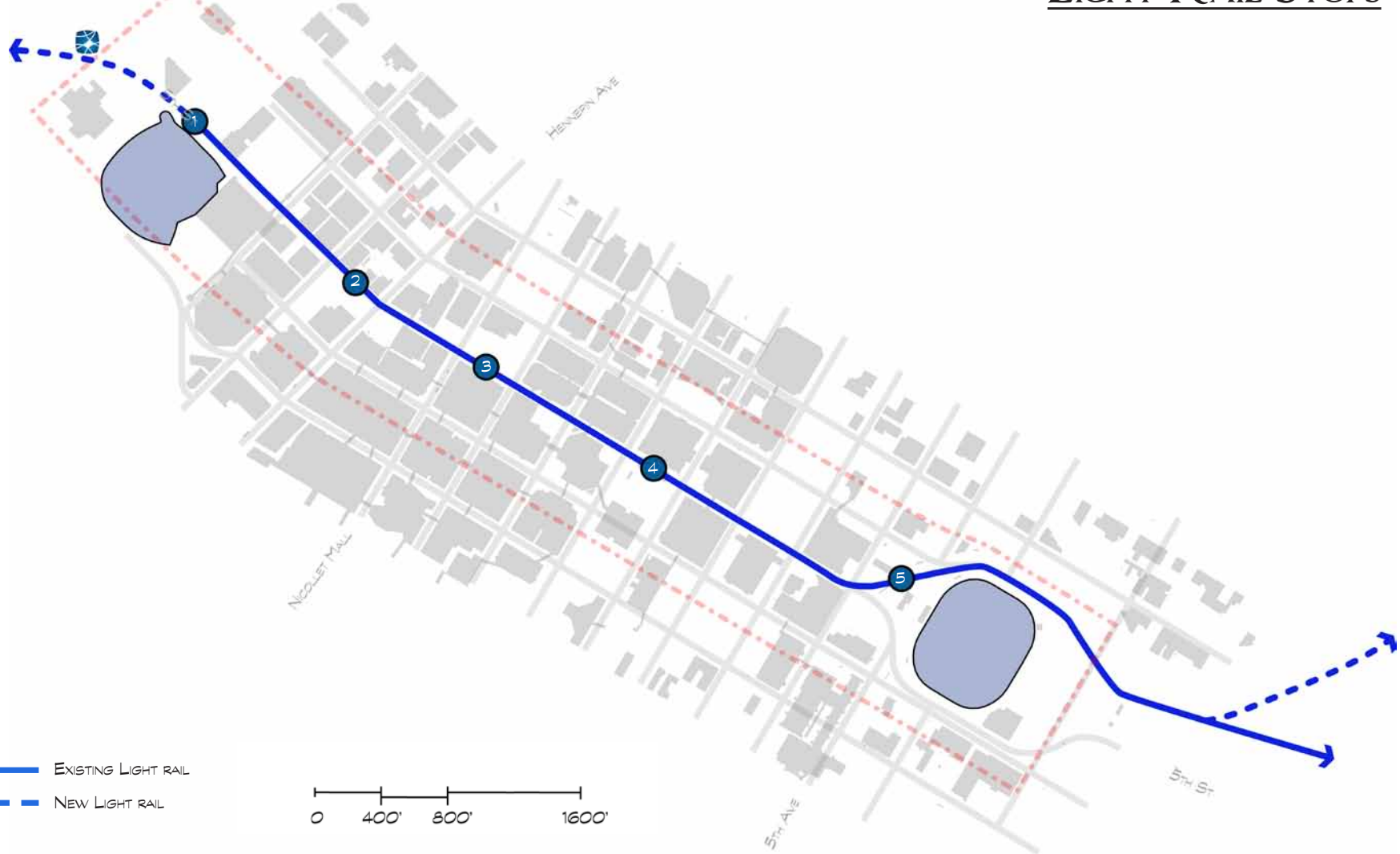
The Interchange | Multi-modal Transportation Hub

SITE INVENTORY & ANALYSIS



Site Inventory & Analysis

Light Rail Stops




Target Field 1


Warehouse District 2

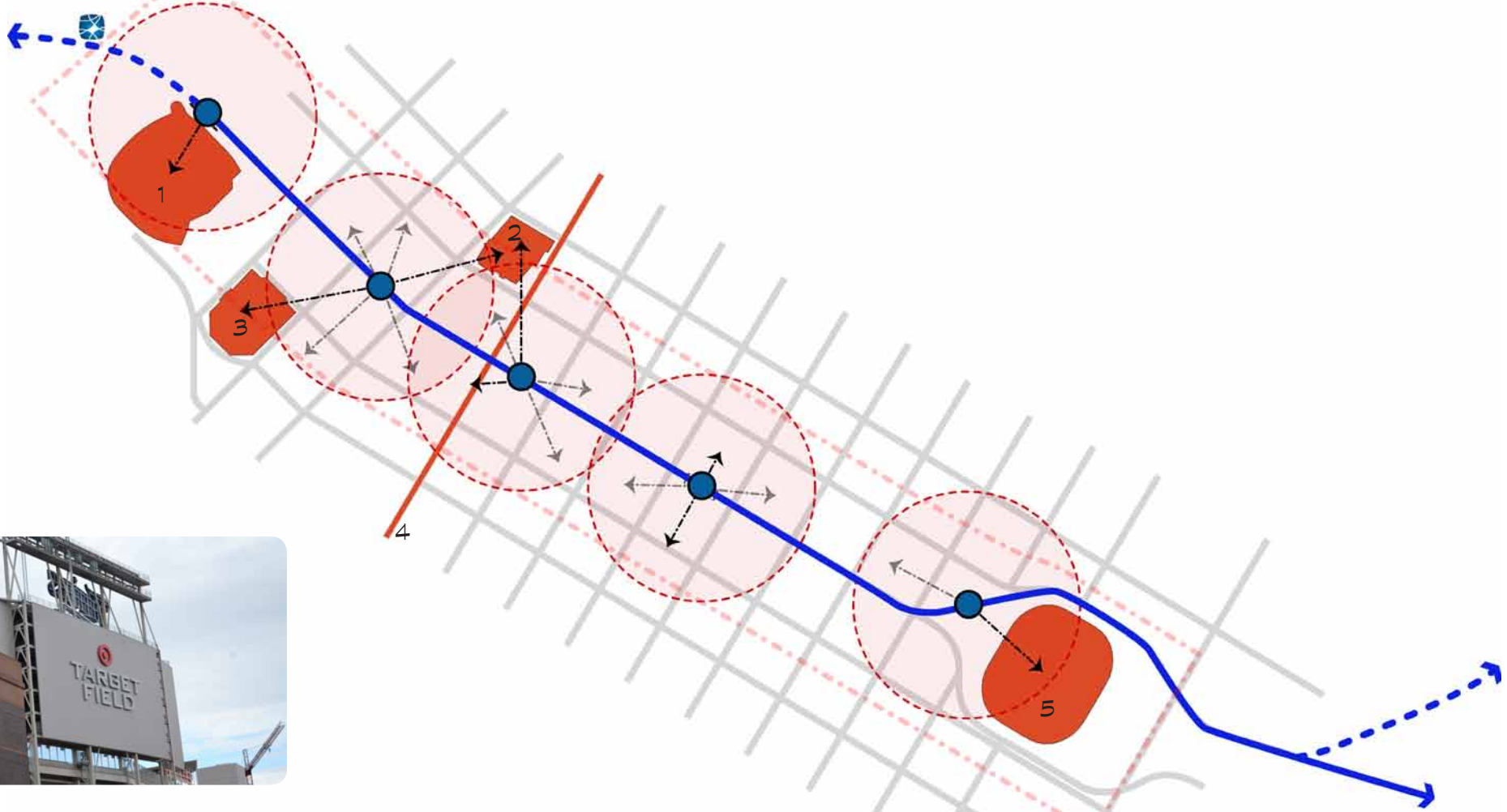

Nicollet Mall 3


Government Plaza 4


Metrodome 5

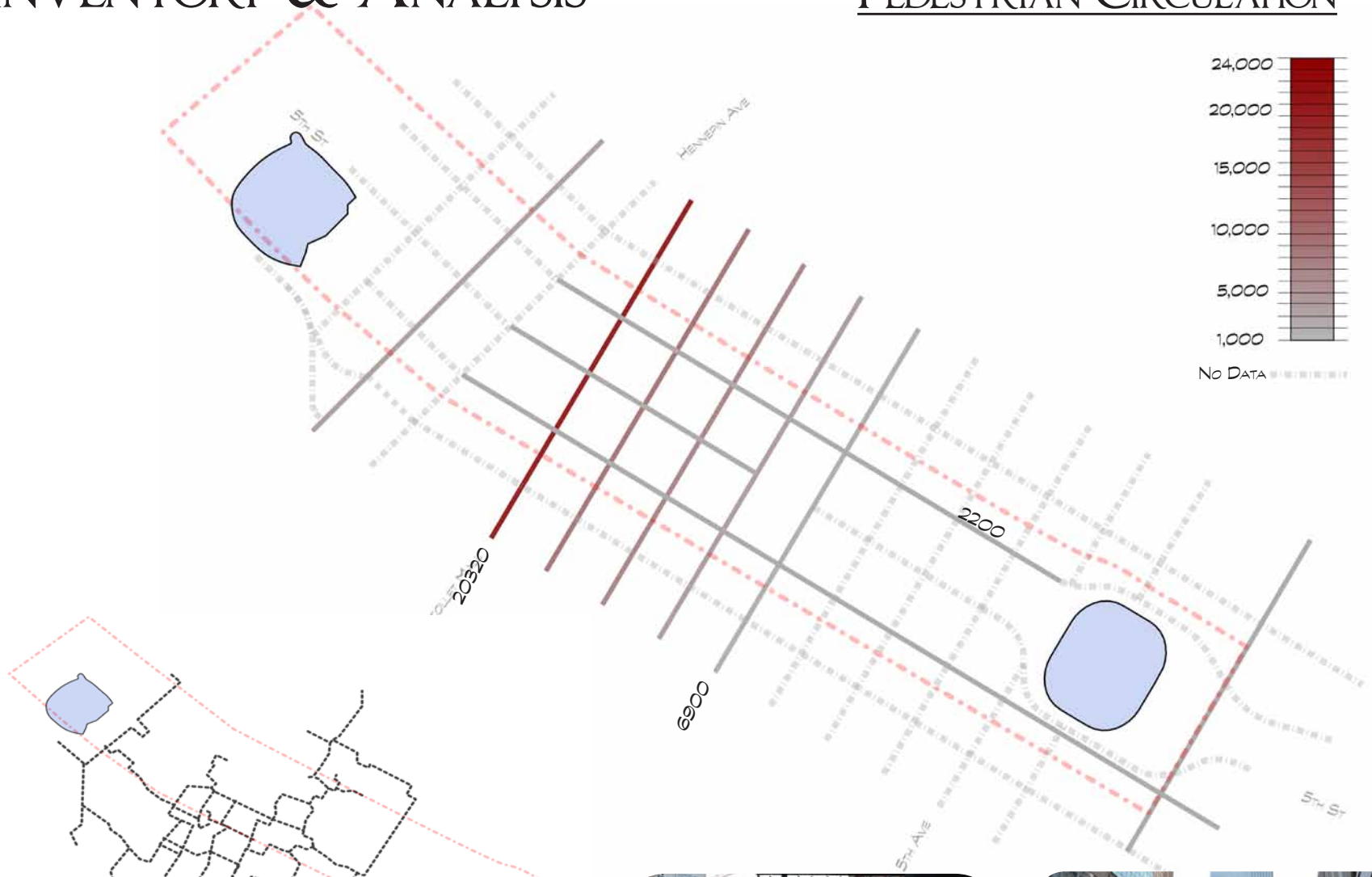
SITE INVENTORY & ANALYSIS

DESTINATION CONNECTIONS



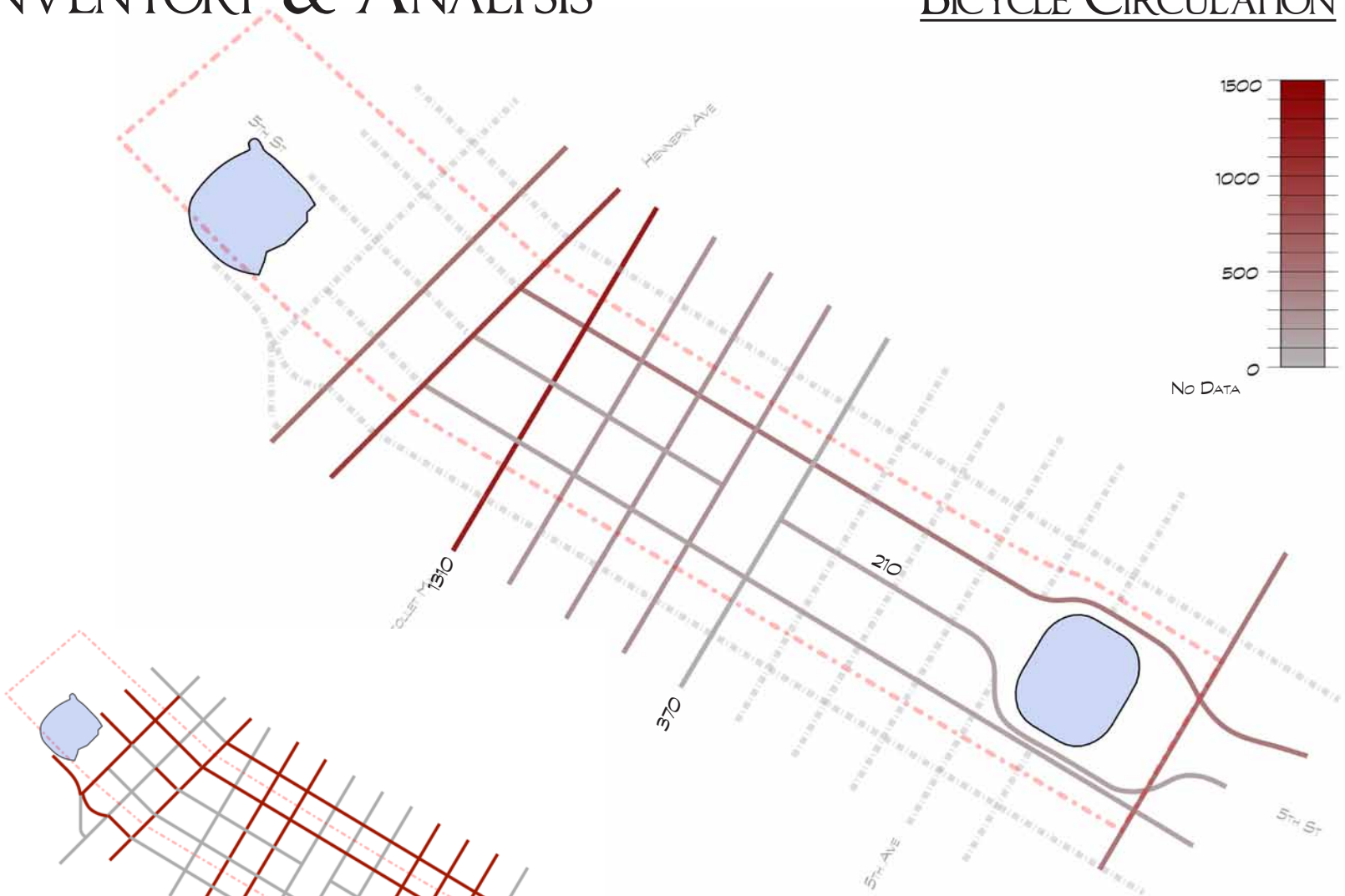
Site Inventory & Analysis

Pedestrian Circulation



Site Inventory & Analysis

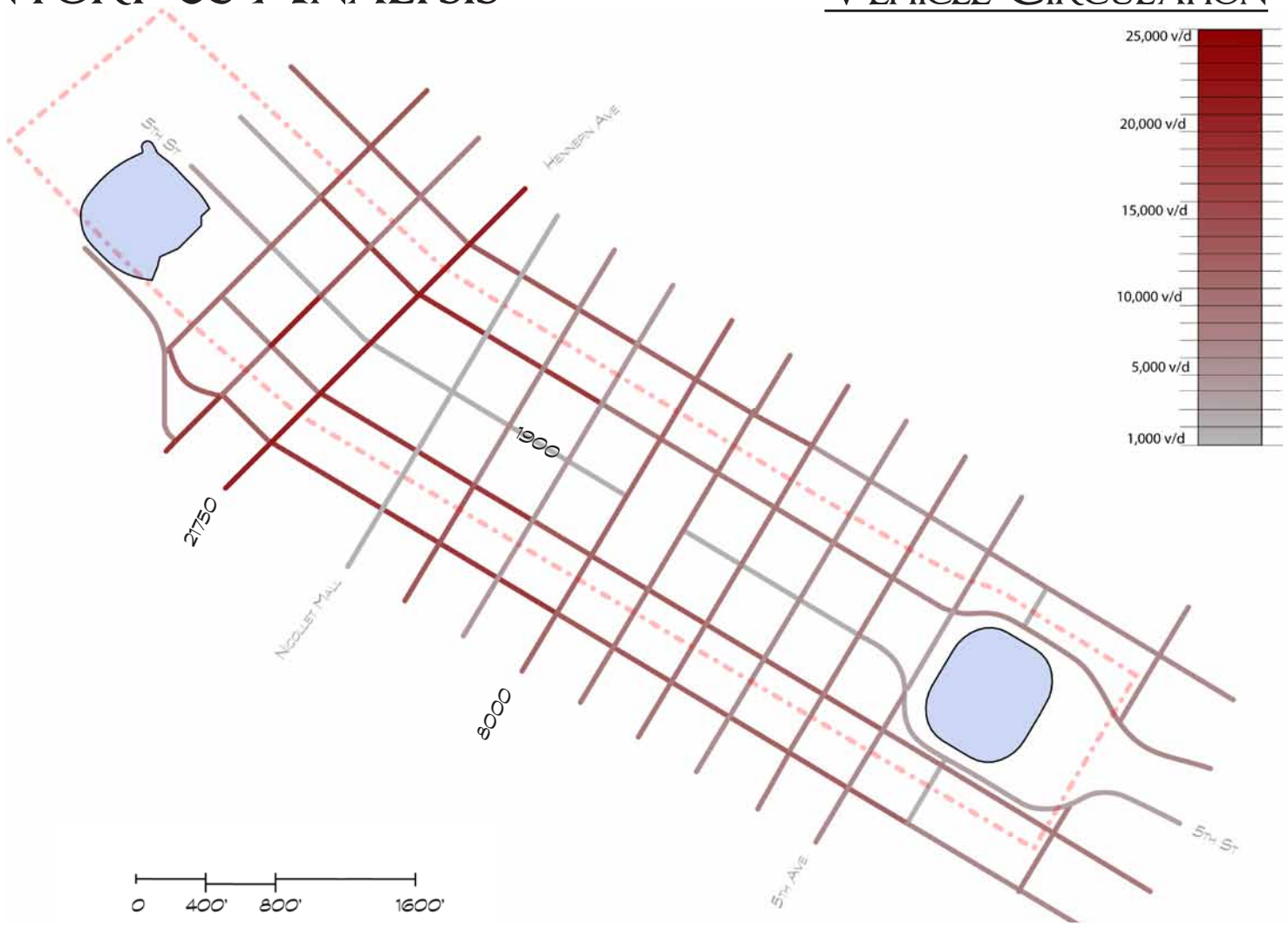
Bicycle Circulation



Streets with designated Bicycle lanes

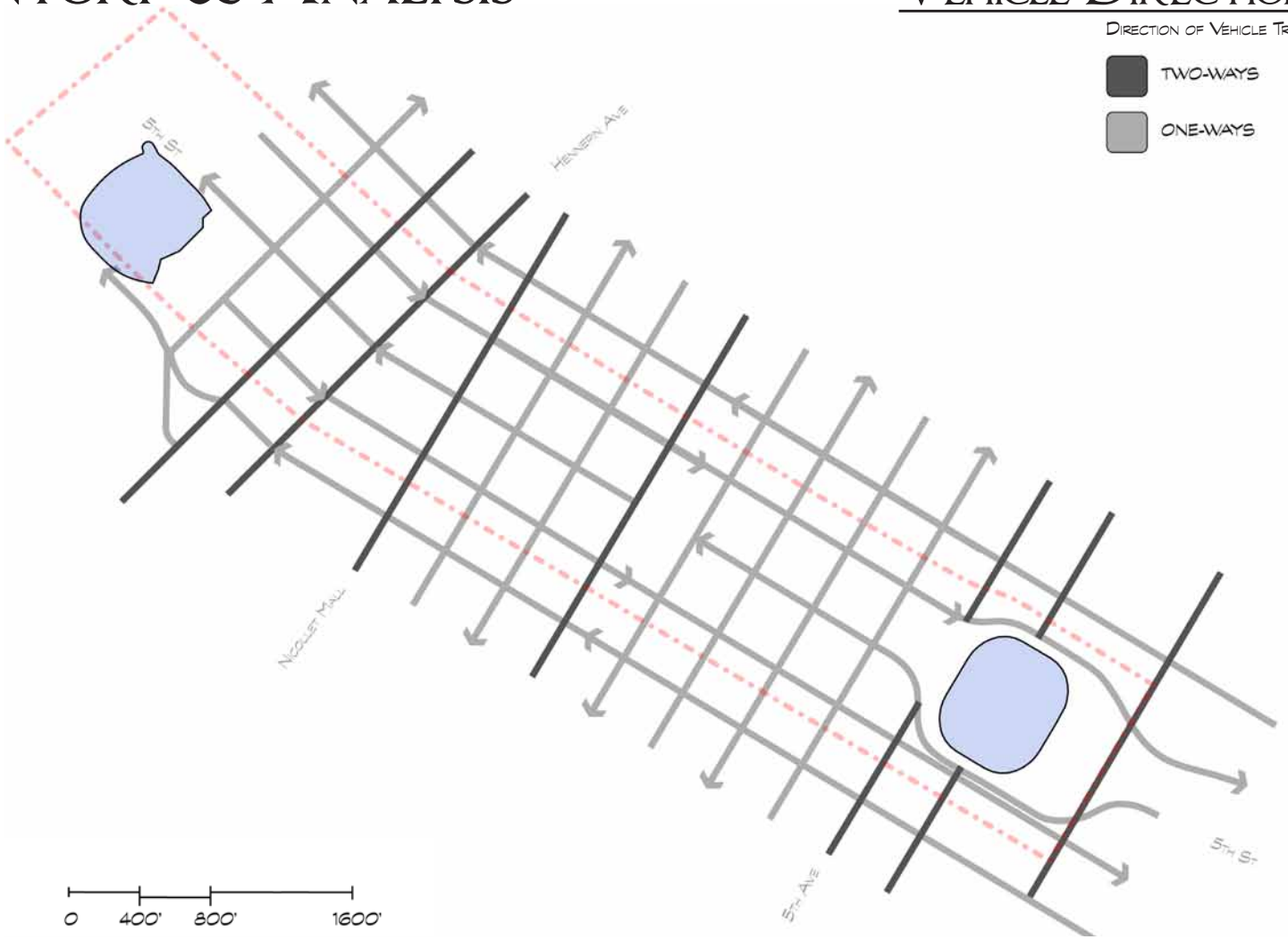
SITE INVENTORY & ANALYSIS

VEHICLE CIRCULATION



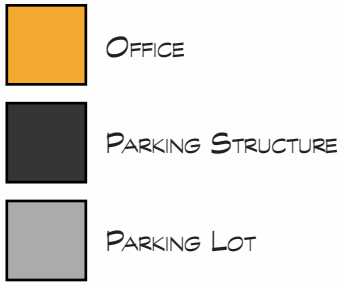
SITE INVENTORY & ANALYSIS

VEHICLE DIRECTIONS



Site Inventory & Analysis

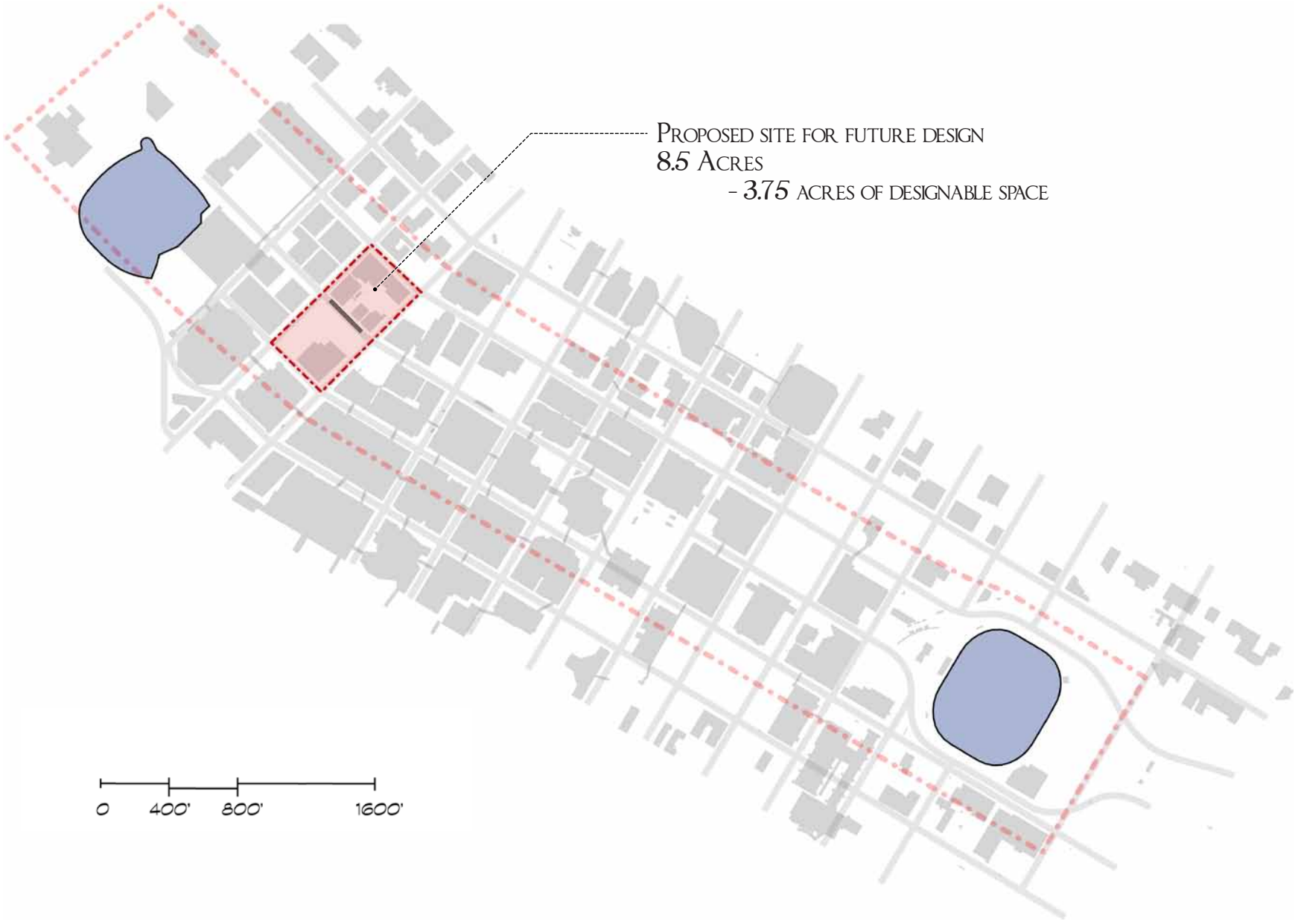
Building Uses



Site Inventory & Analysis

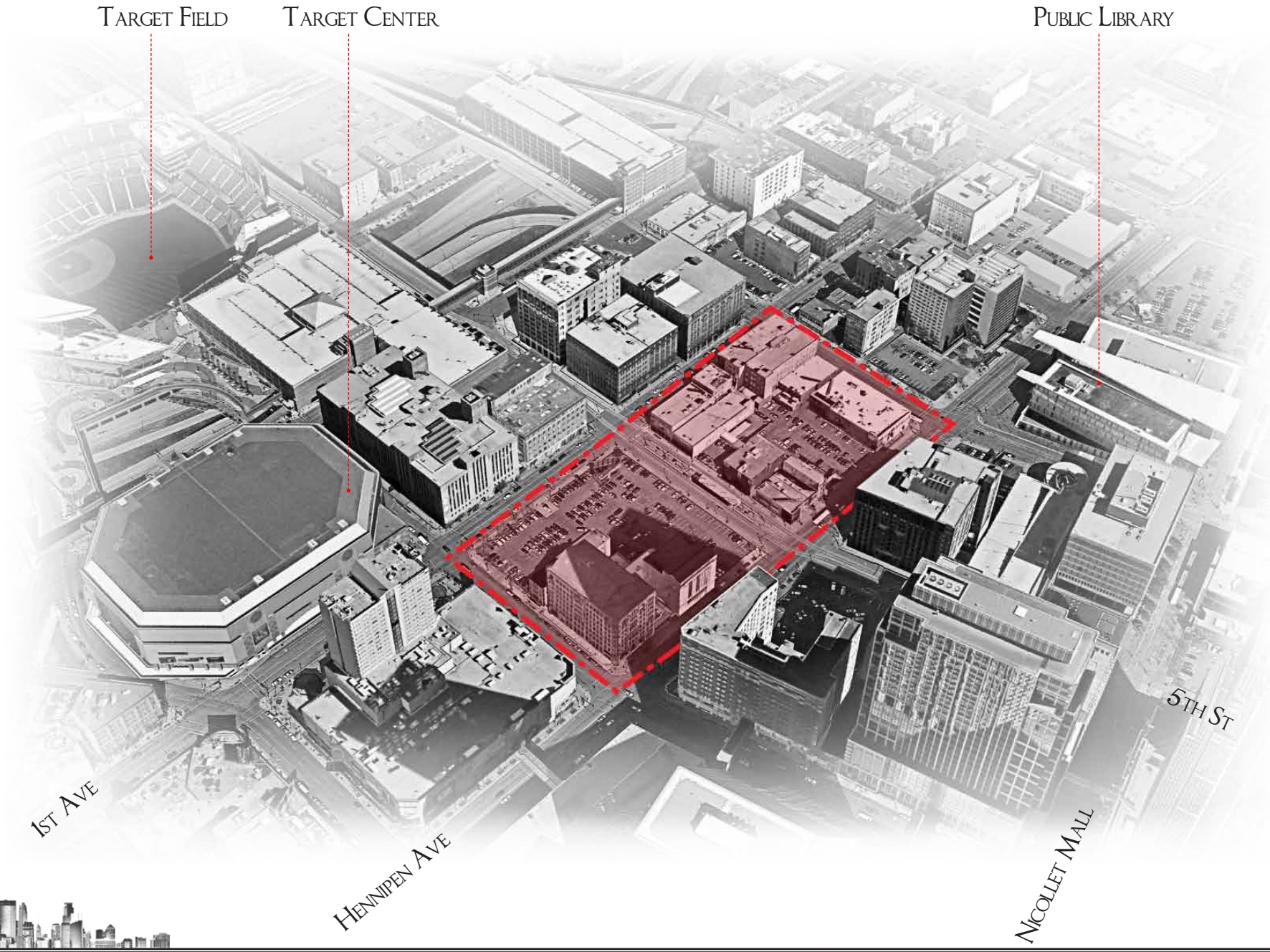
Residential Density

Site Inventory & Analysis



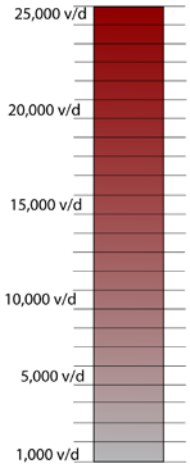
Site Inventory & Analysis

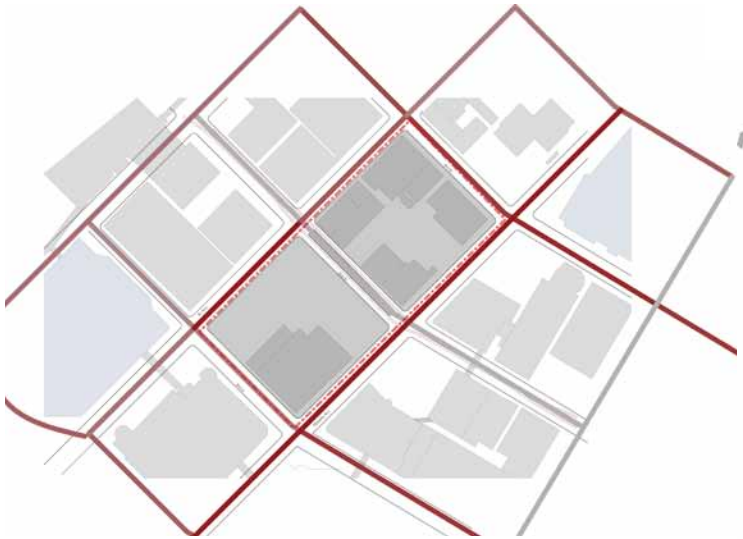
Selecting a Smaller Site



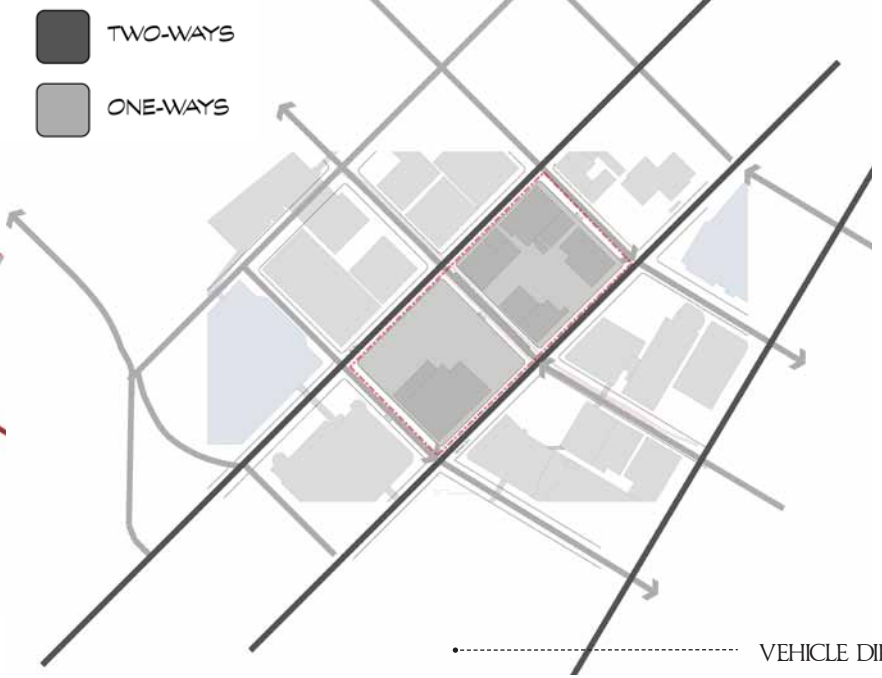
SITE INVENTORY & ANALYSIS

SMALL SCALE ANALYSIS



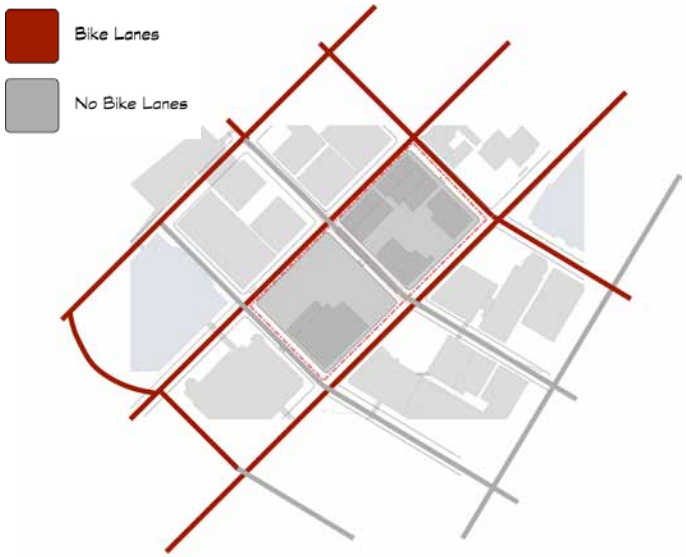


VEHICLE INTENSITY



VEHICLE DIRECTIONS

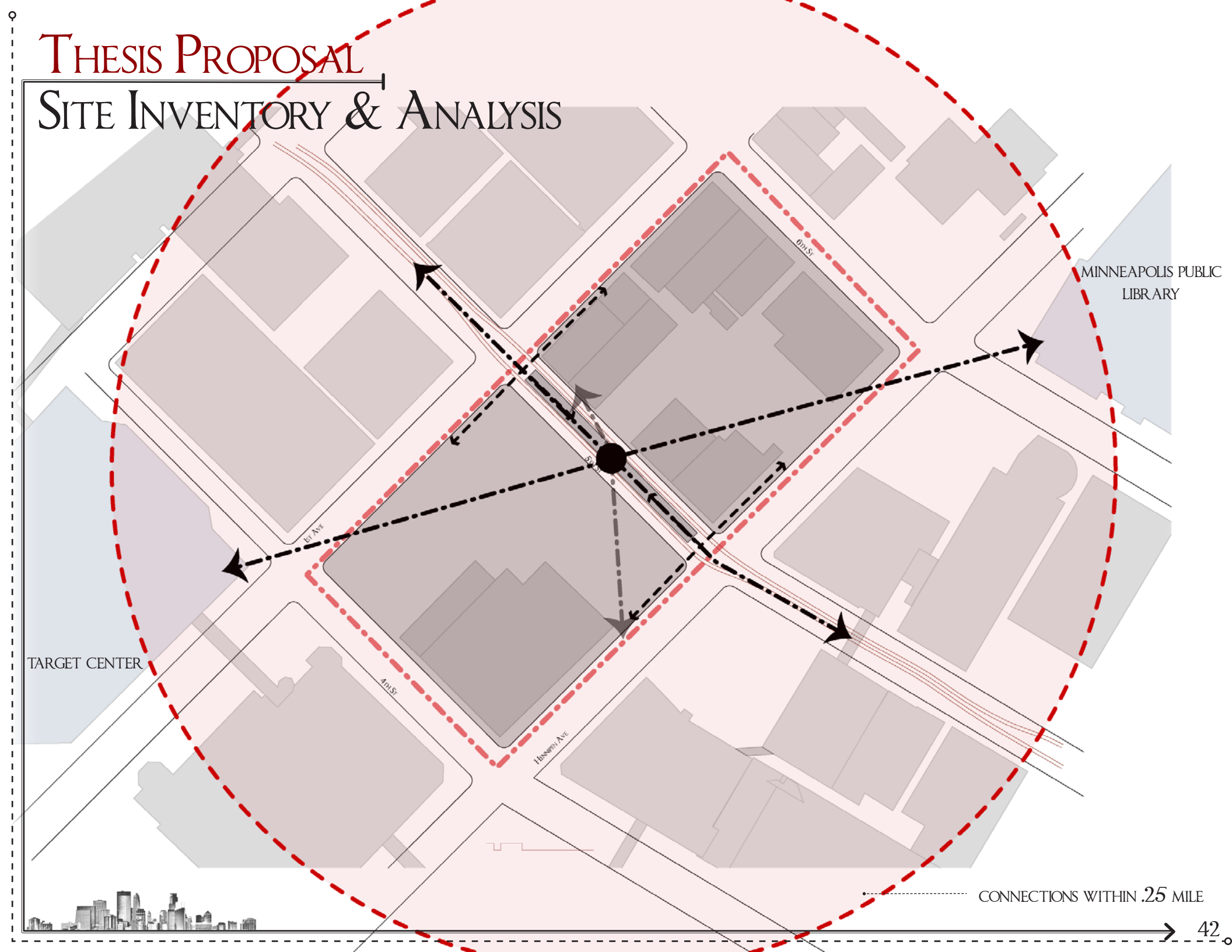
BUILDING INTERACTIONS



BIKE LANES

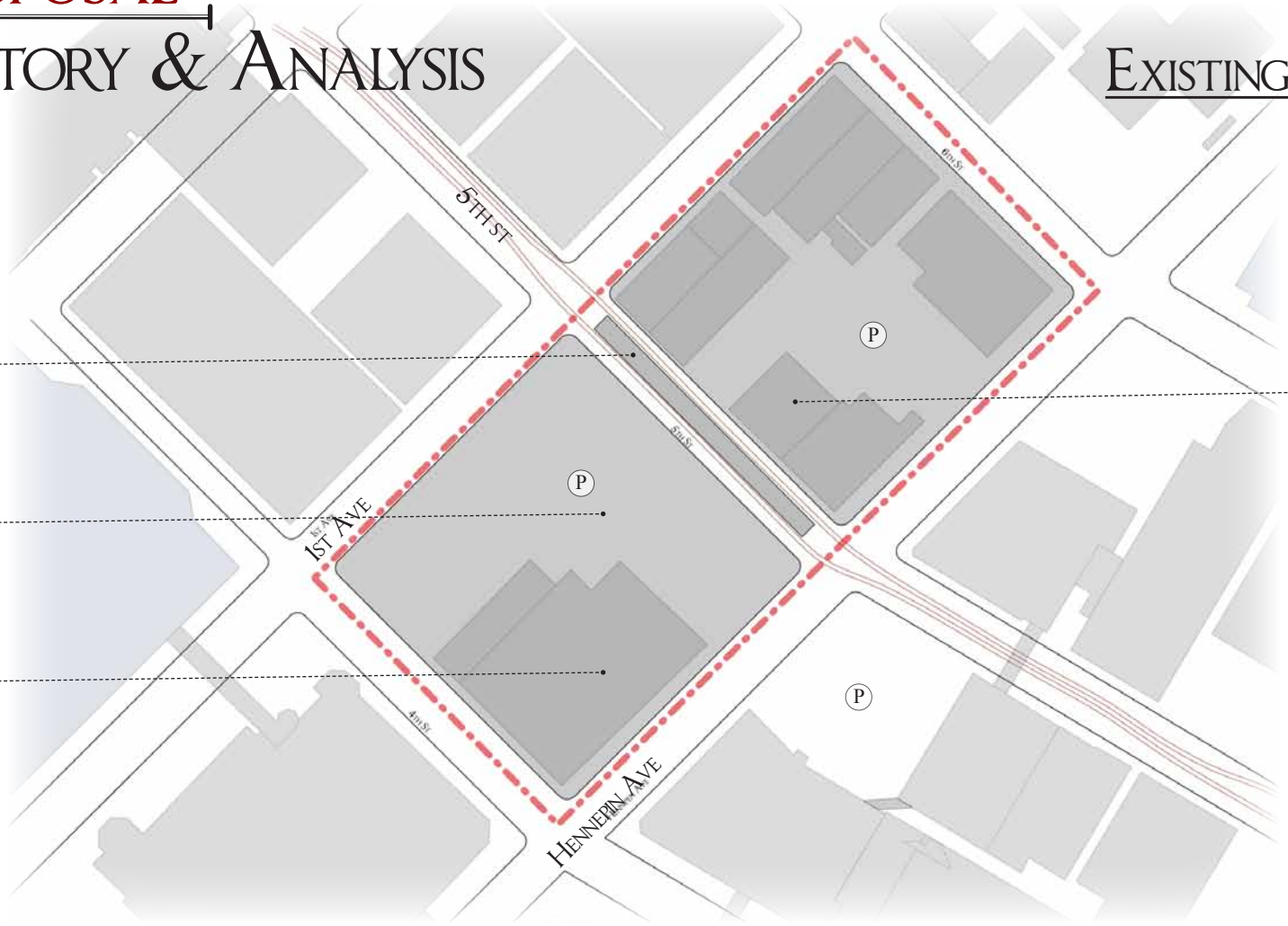
Thesis Proposal

Site Inventory & Analysis



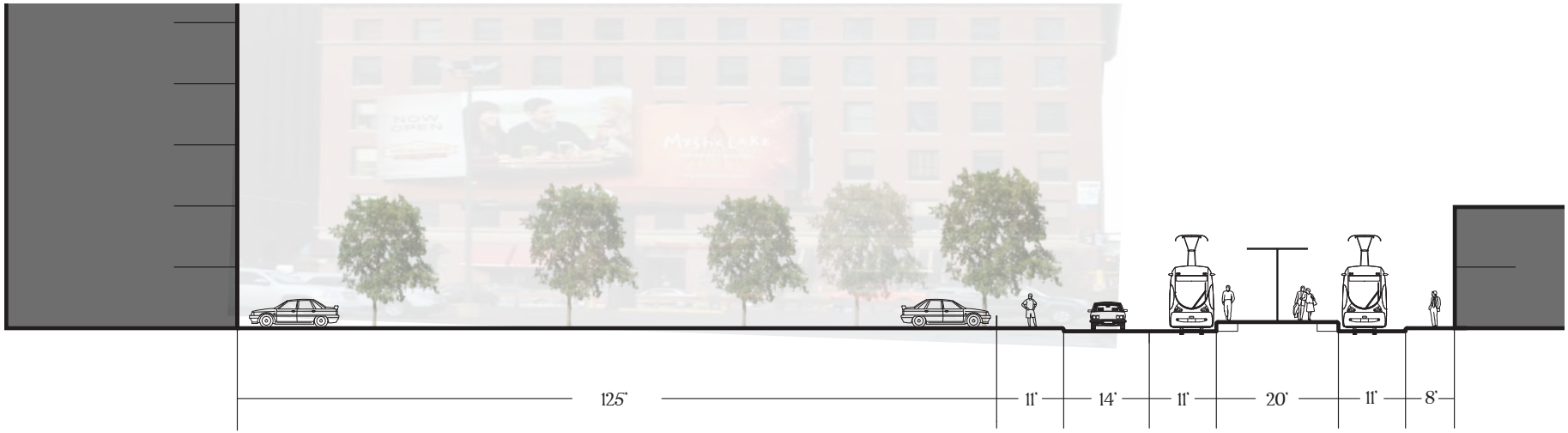
SITE INVENTORY & ANALYSIS

EXISTING SITE

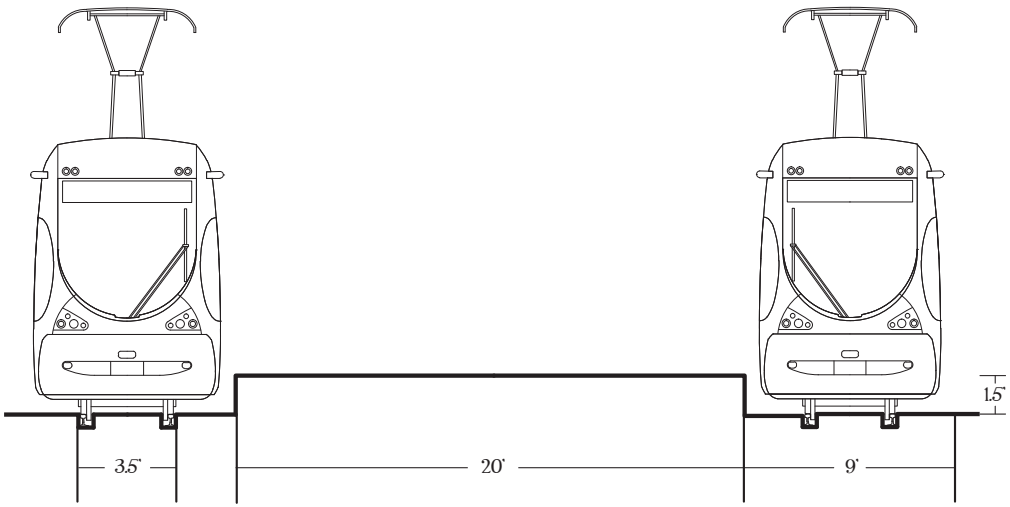


SITE INVENTORY & ANALYSIS

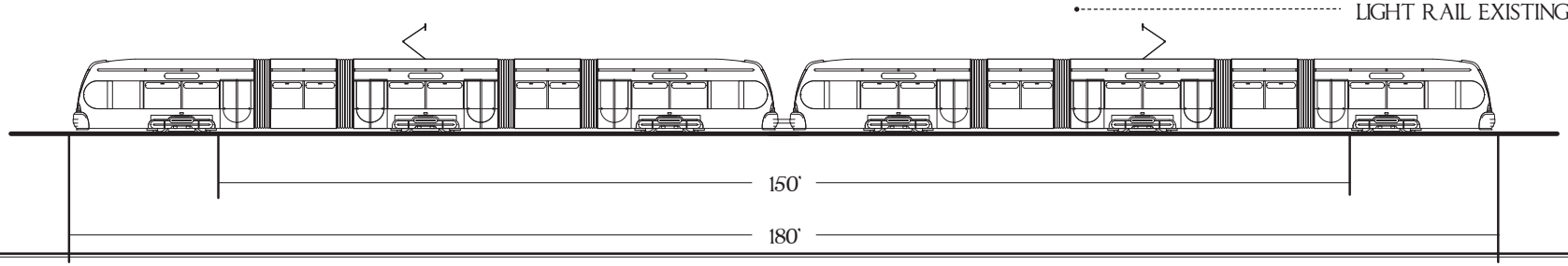
EXISTING SITE CONDITIONS



EXISTING SECTION FACING NORTH



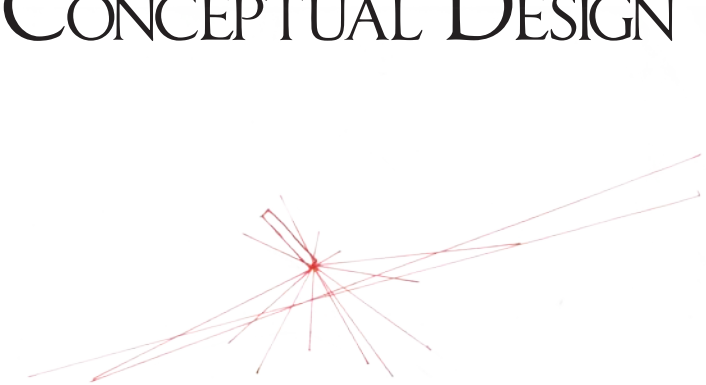
LIGHT RAIL EXISTING DIMENSIONS

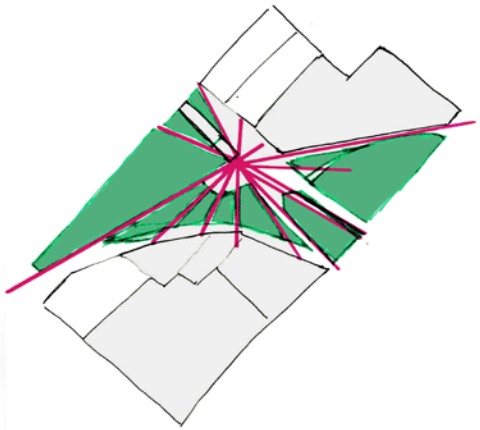


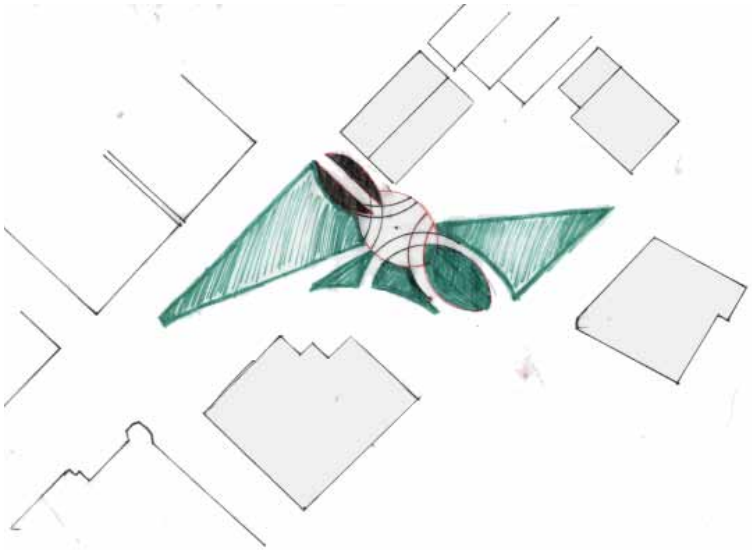
CONCEPTUAL DESIGN

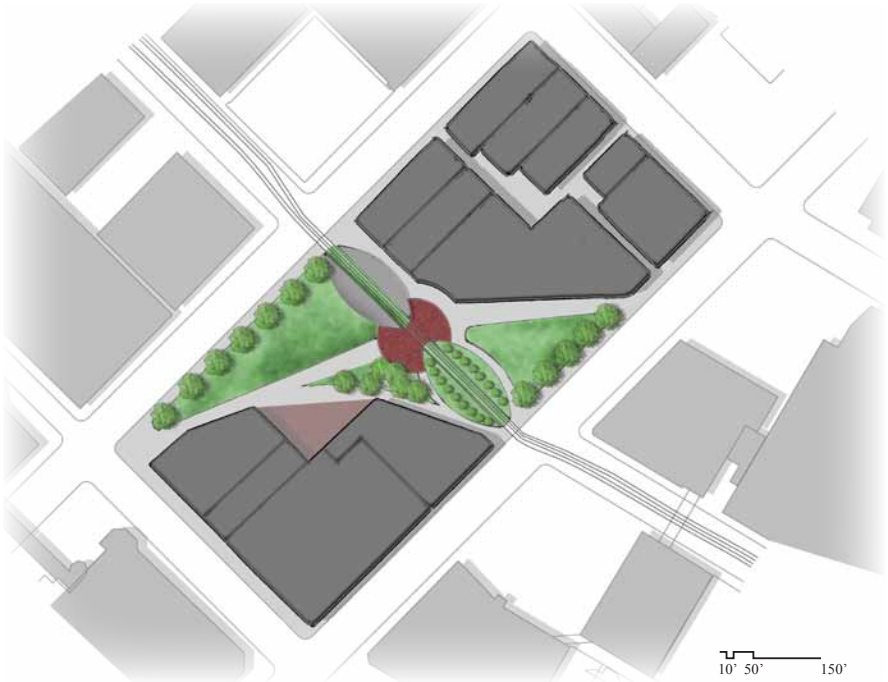
Thesis Proposal

Conceptual Design

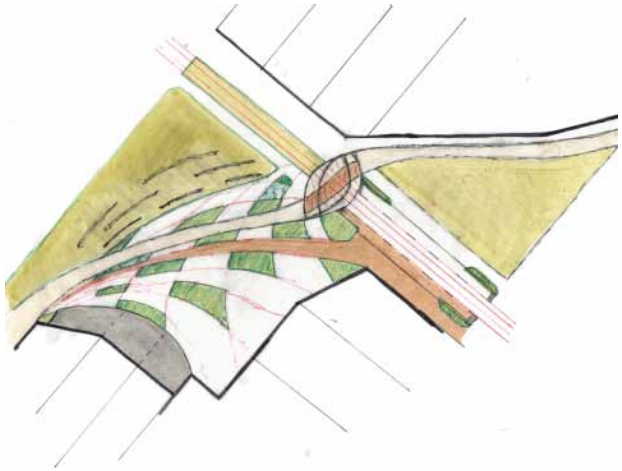


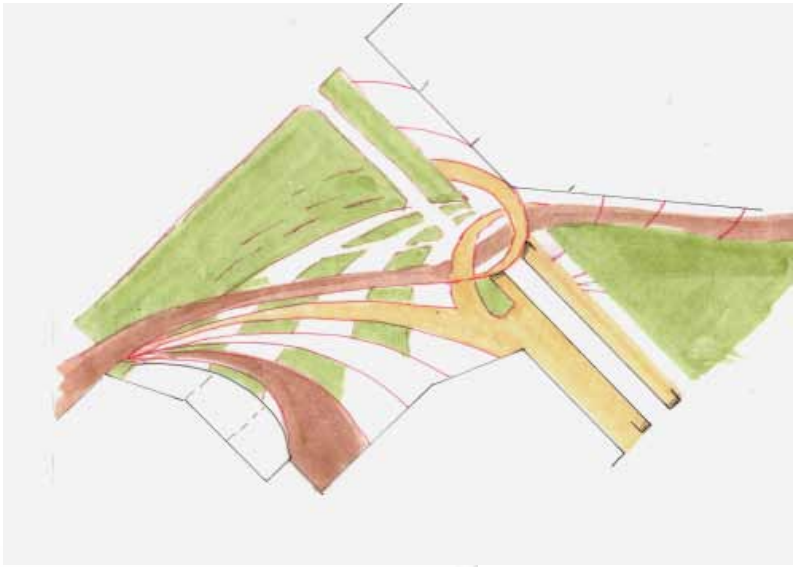


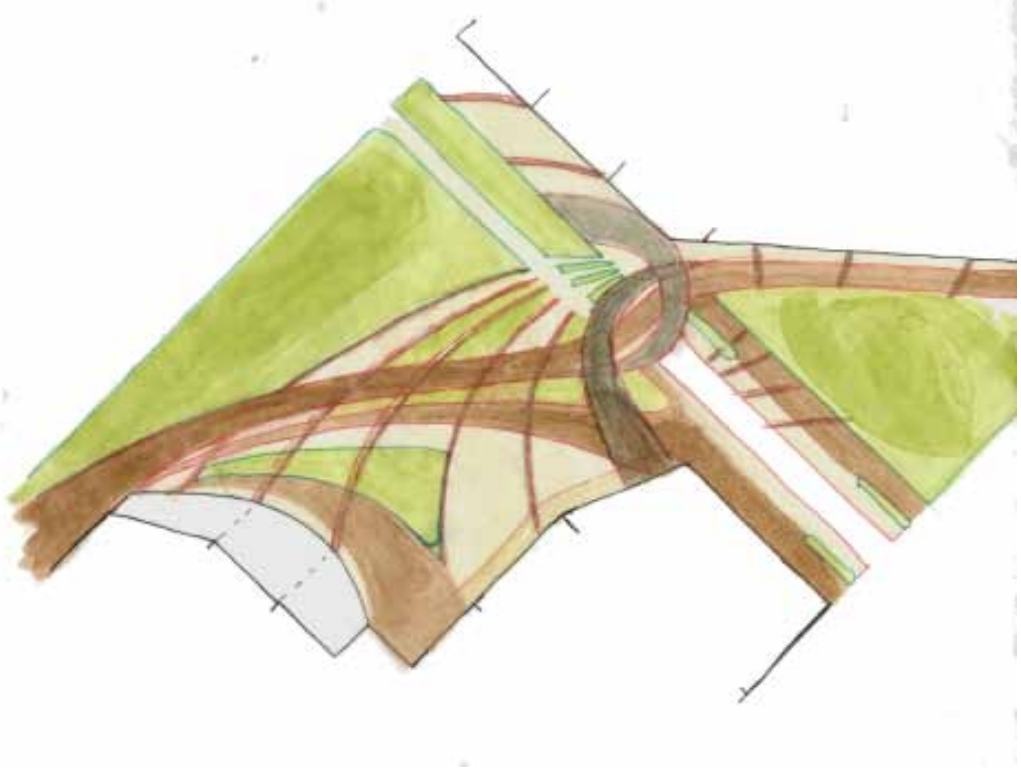




CONCEPTUAL DESIGN



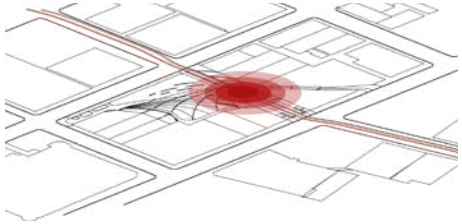




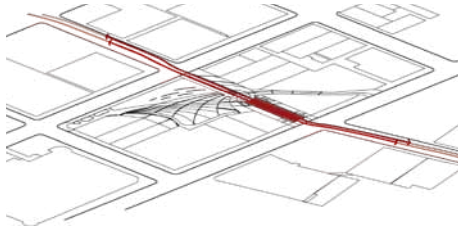
FINAL DESIGN WORK

Thesis Proposal
Final Design Work

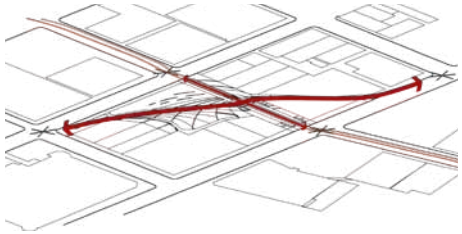
Design Elements



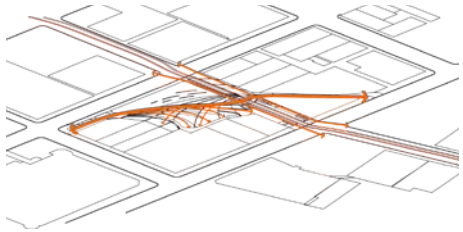
Centralized Focus



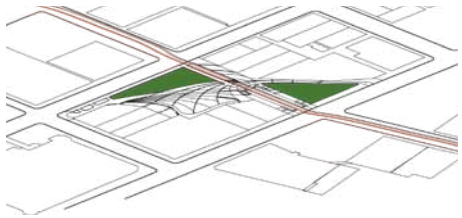
Prioritize Light Rail



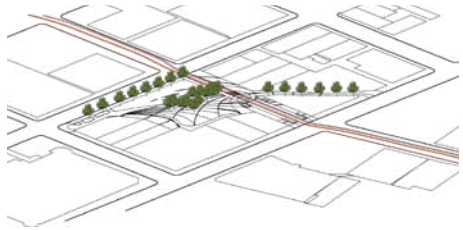
Surrounding Connections



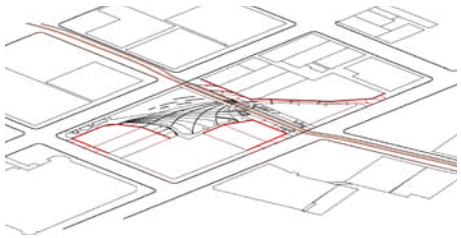
Pedestrian Connections



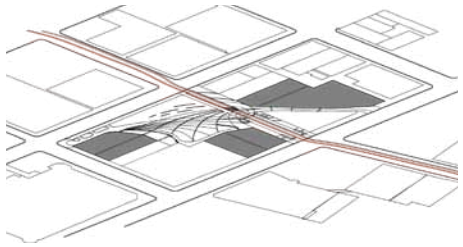
Green Space



Overhead Canopy



Store Front Interaction



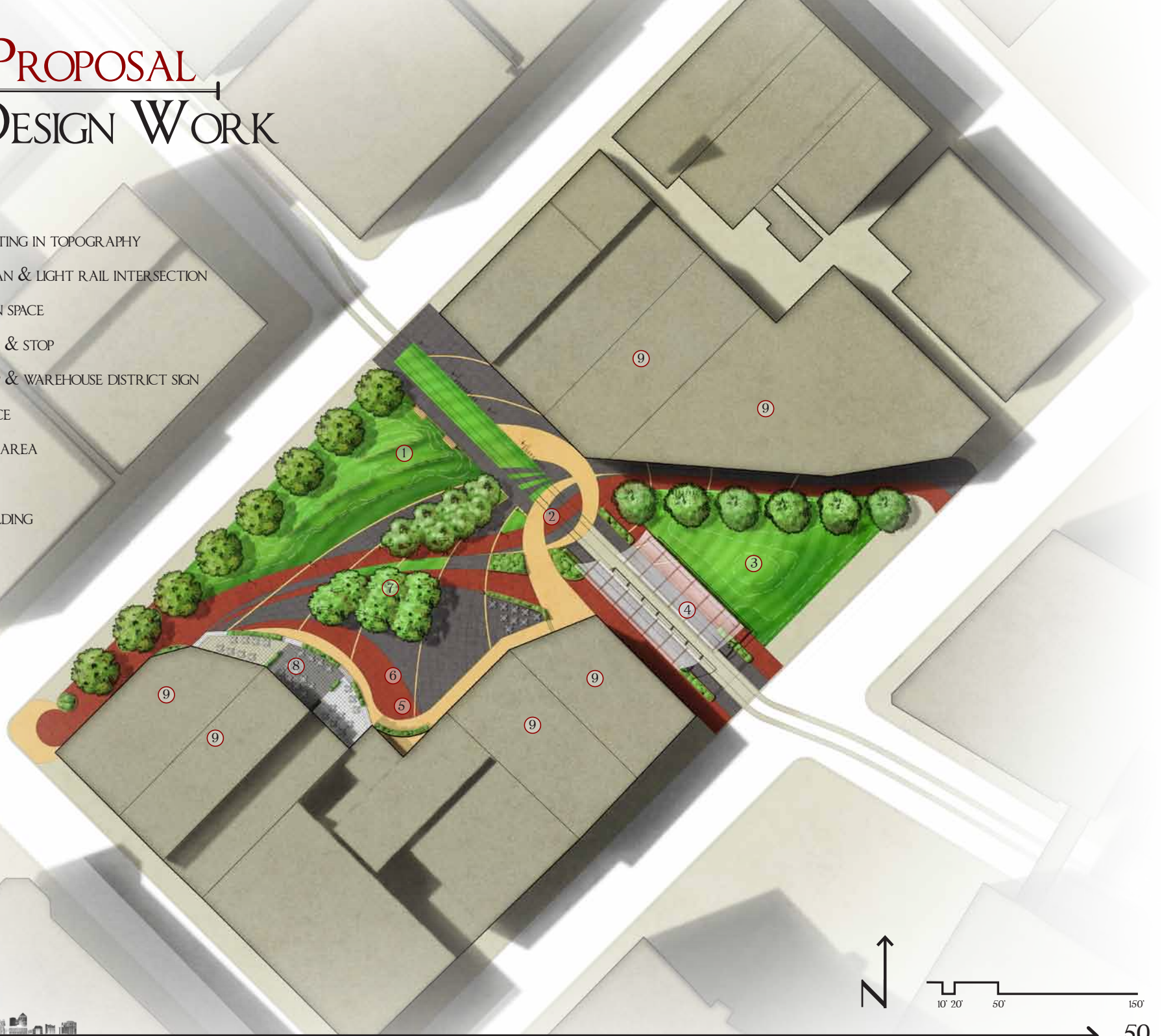
Create Density

Thesis Proposal

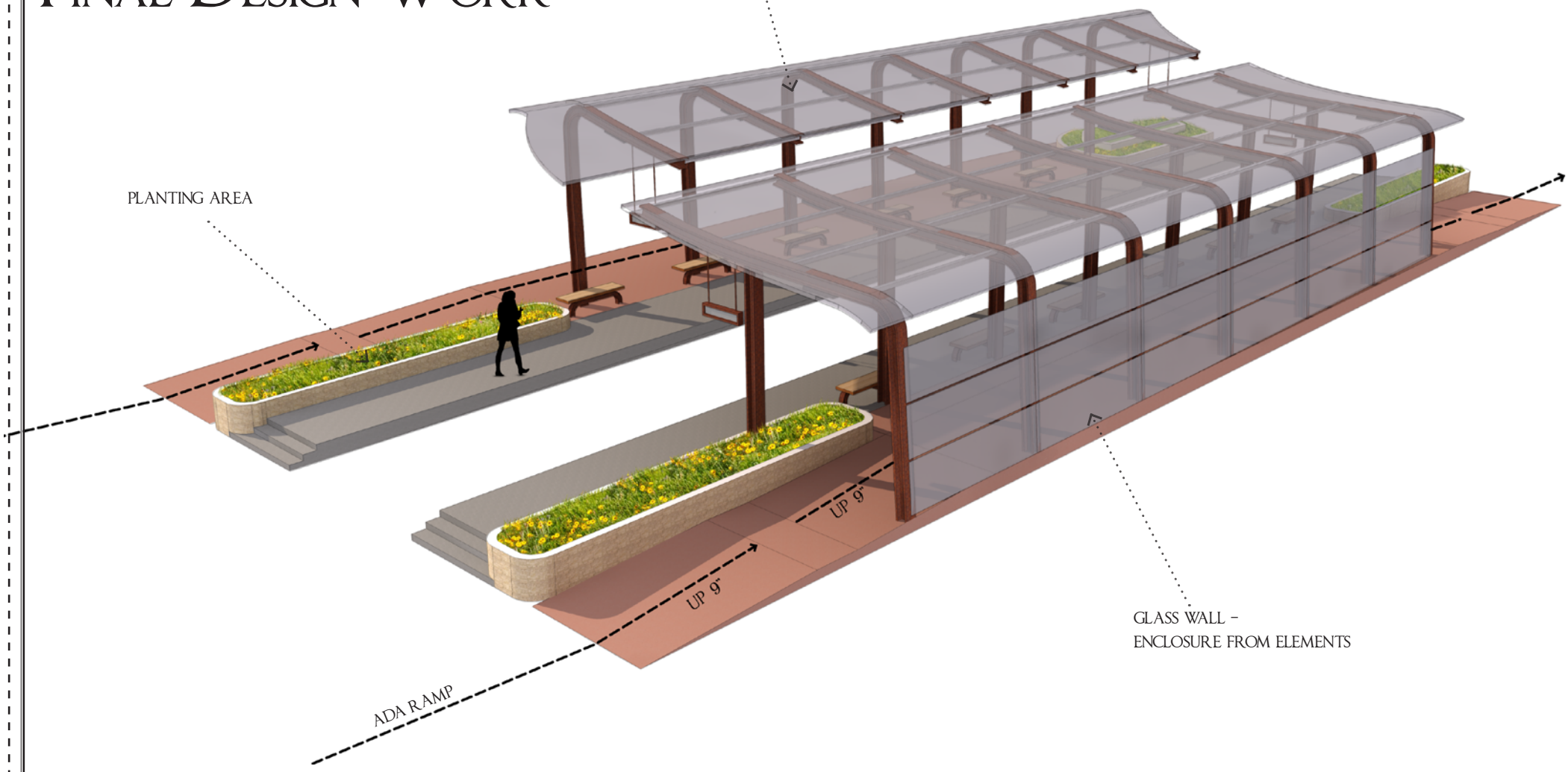
Final Design Work

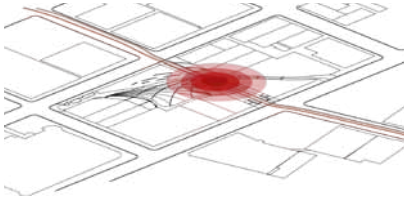
Legend:

1. Amphitheater seating in topography
2. Primary pedestrian & light rail intersection
3. Passive open green space
4. Light rail shelter & stop
5. Skyline back drop & warehouse district sign
6. Performance space
7. Informal seating area
8. Patio space
9. Proposed new building
10. Green rails

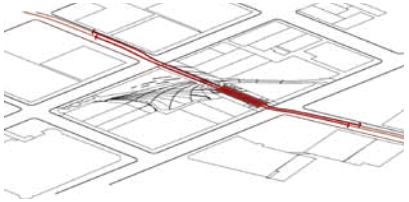


FINAL DESIGN WORK





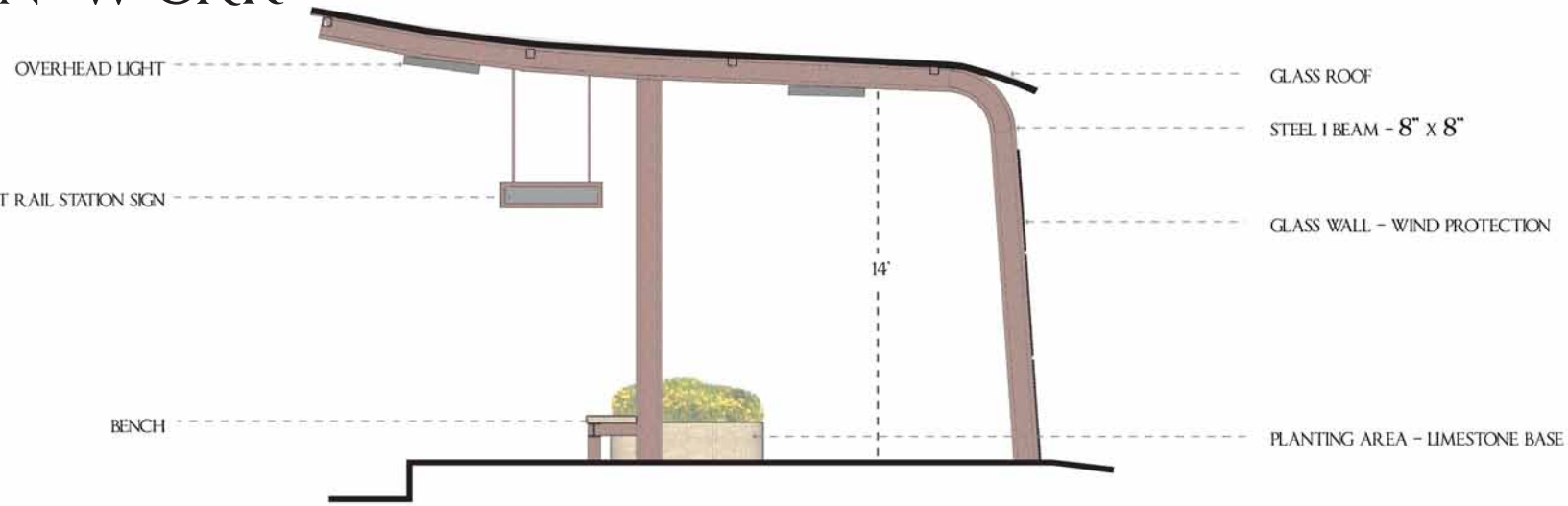
CENTRALIZED FOCUS

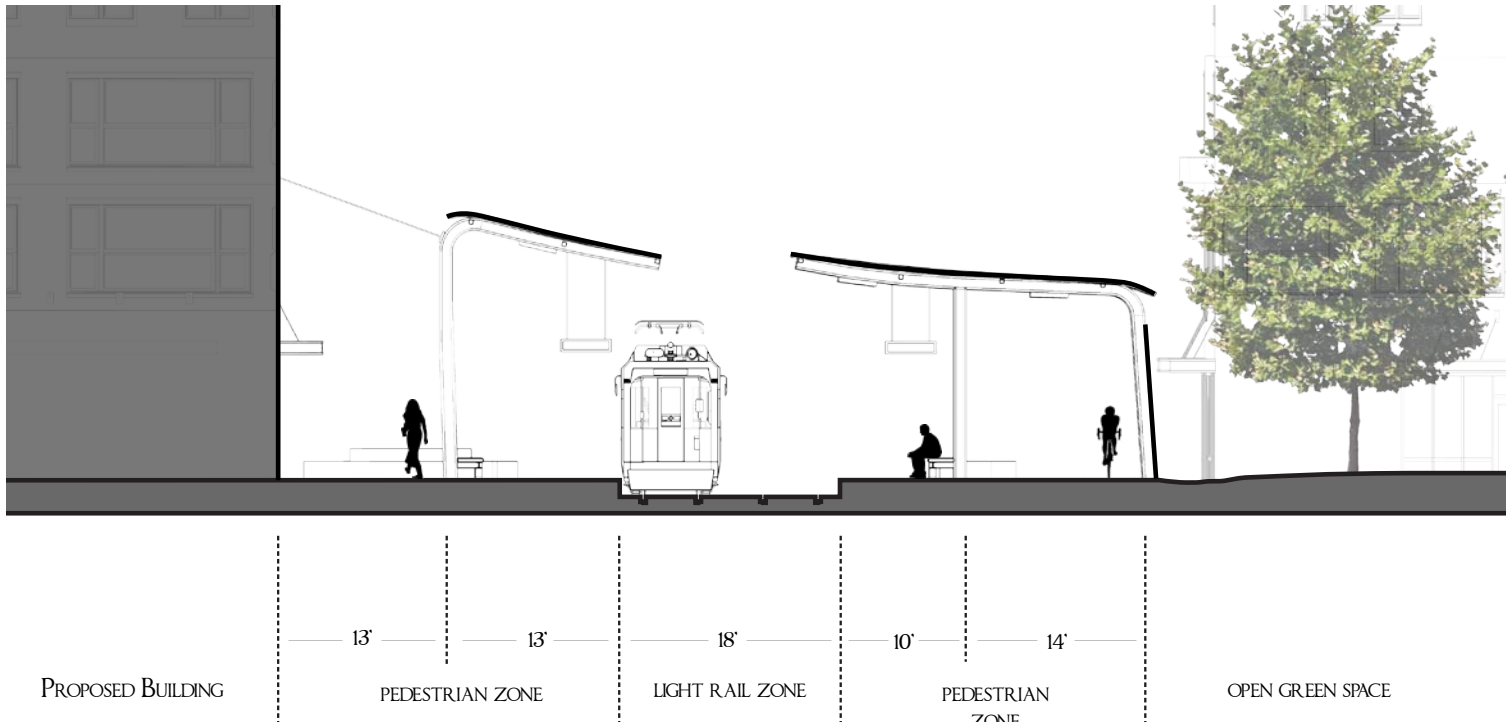


PRIORITIZE LIGHT RAIL

Thesis Proposal

Final Design Work





Final Design Work

Light Rail Shelter

View of proposed light rail shelter at night:
perspective facing north

Thesis Proposal

Final Design Work

Limestone bricks

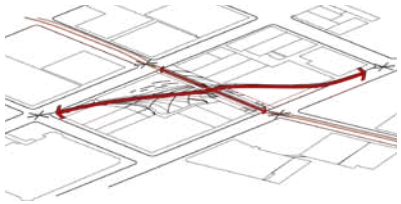
Planting area

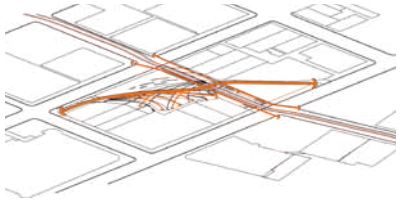
Hidden up lighting - changing colors

Soil base

Metal mesh

2" by 2" metal supports for mesh to mount on



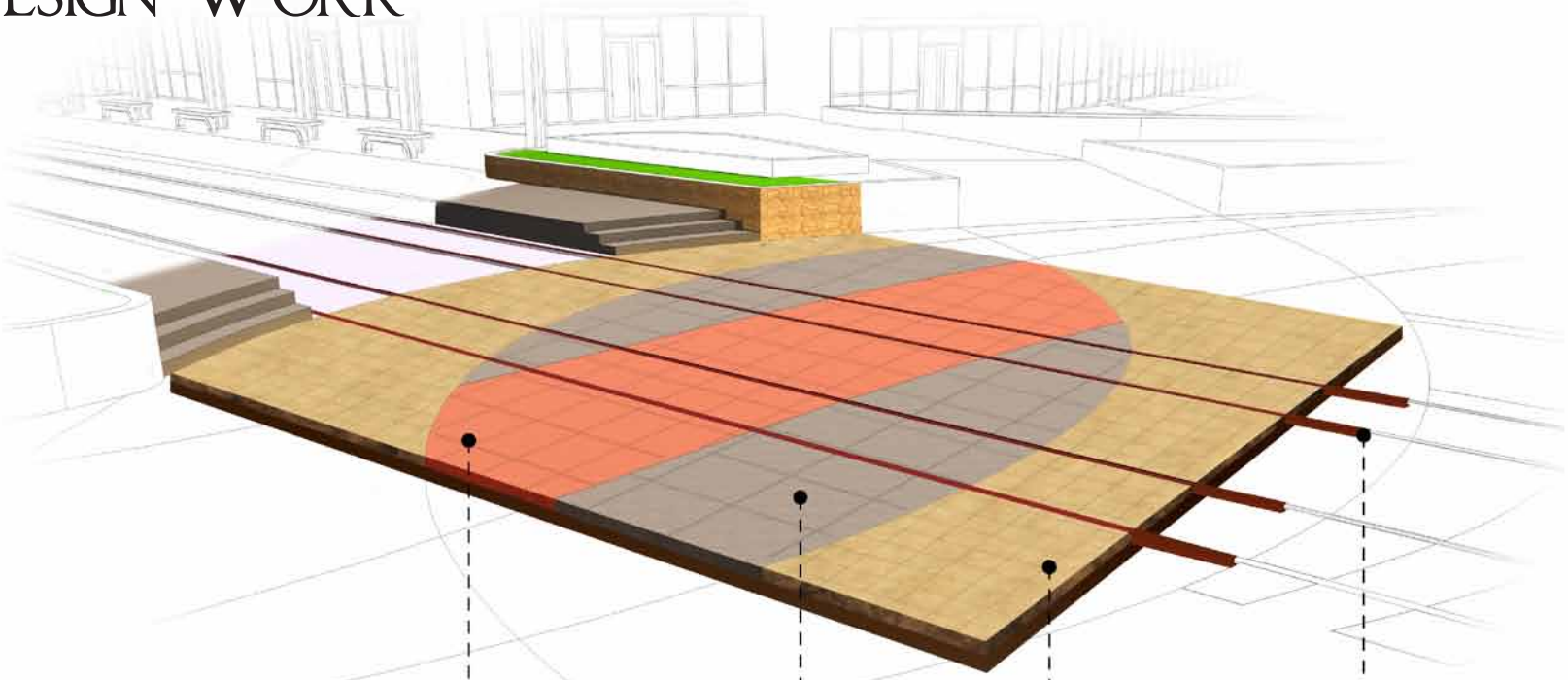


Final Design Work

Performance Space

View of performance space with skyline back drop:
perspective facing west

FINAL DESIGN WORK

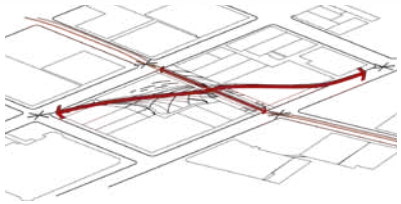


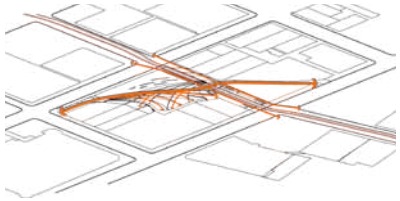
COLORED CONCRETE:
DARK RED

COLORED CONCRETE:
DARK GREY

LIMESTONE

RAIL TRACKS



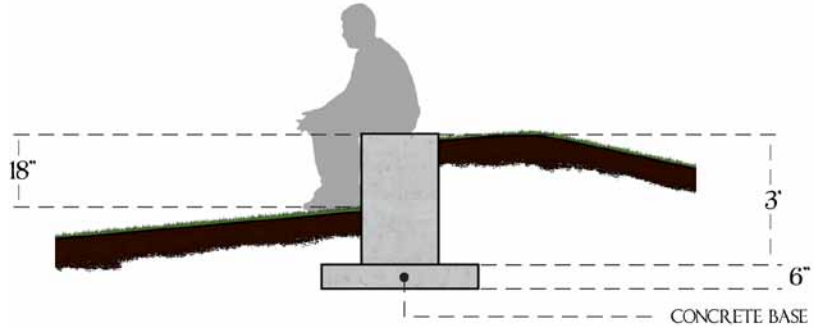


Evening Glow

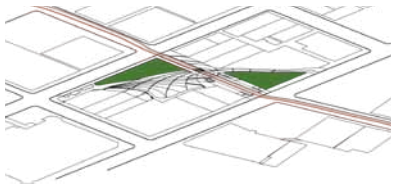
View of proposed lighting in the pedestrian circulation areas:
perspective facing east

Thesis Proposal

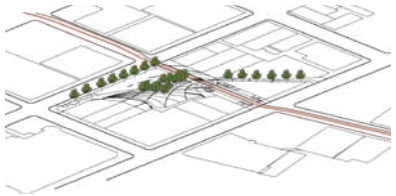
Final Design Work



Proposed Building | pedestrian zone | ramp | planter | pedestrian zone | green space built in seating | sidewalk



Green Space



Overhead Canopy

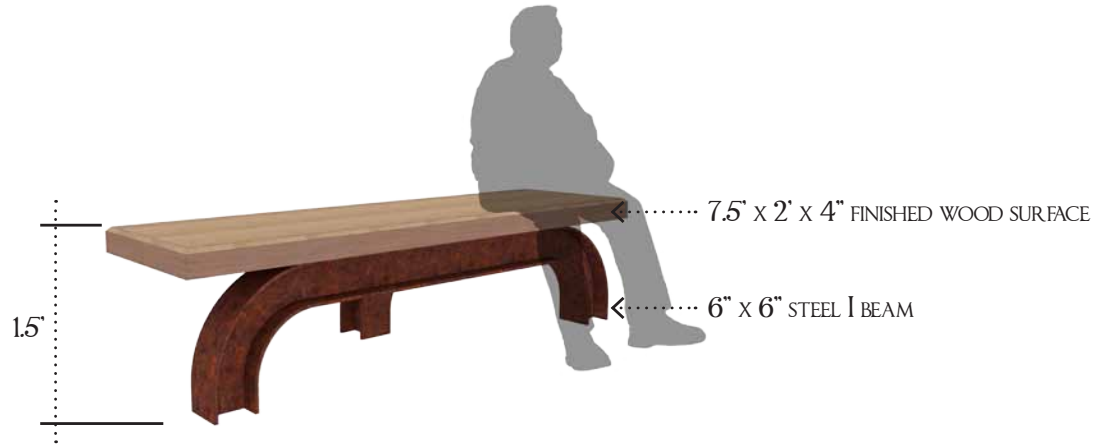
Final Design Work

Green Space Seating

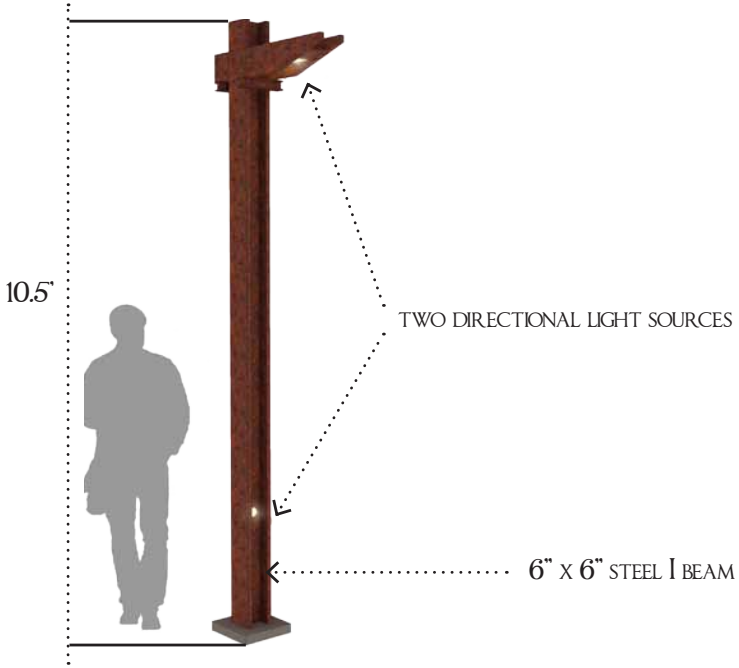
View of built in green space seating:
perspective facing west

Thesis Proposal

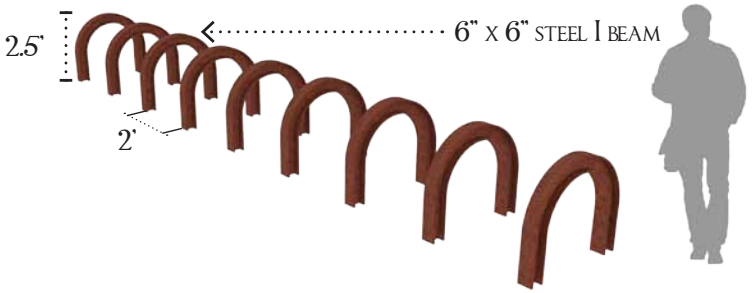
Final Design Work



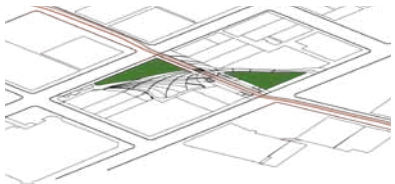
Typical Bench



Typical Path Lighting



Typical Bicycle Racks



Green Space

Overhead Canopy

Final Design Work

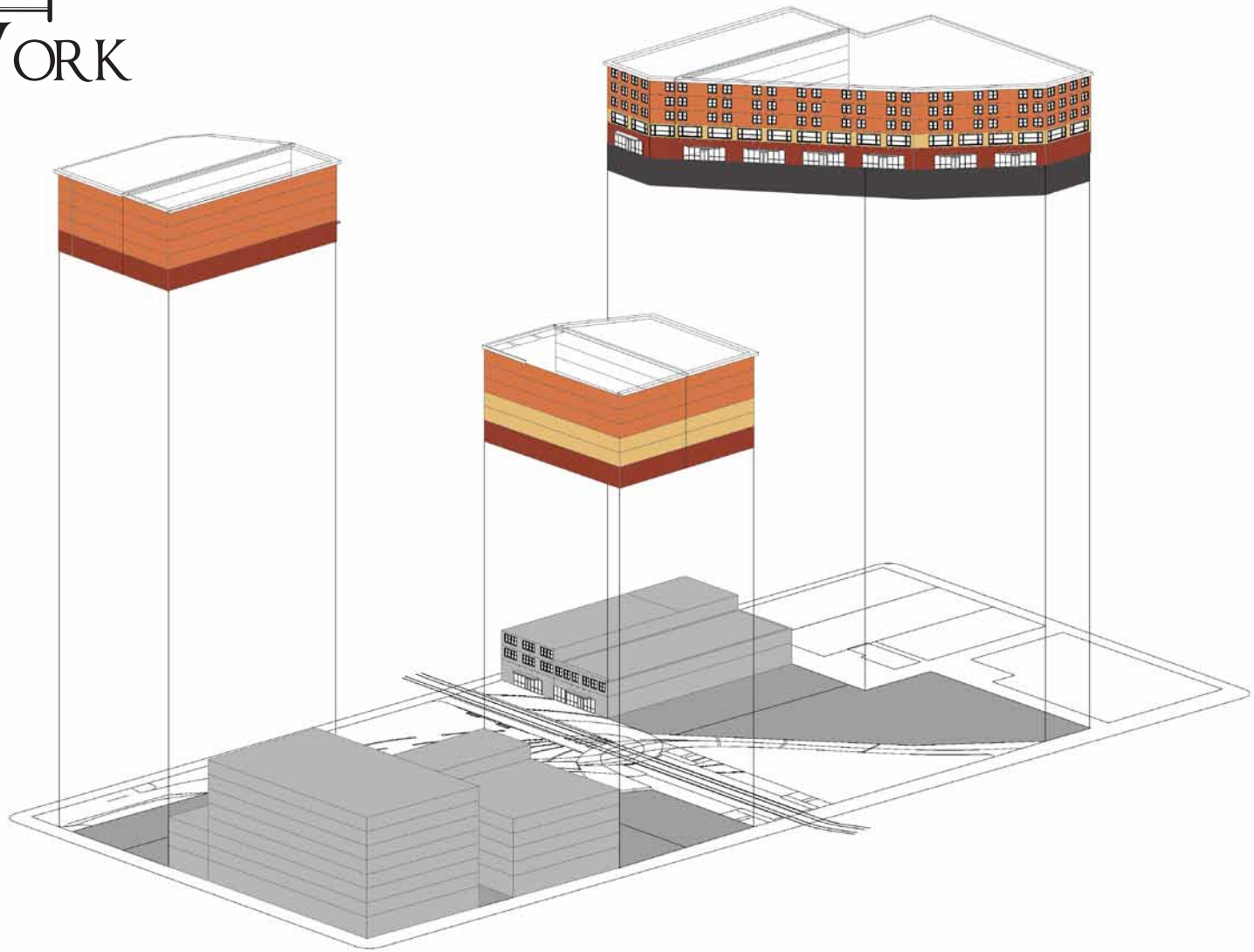
Green Rails

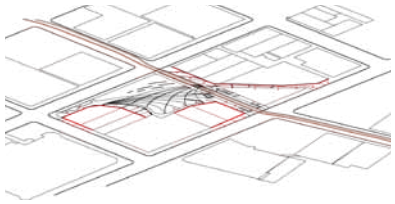
View of green rails and light rail shelter:
perspective facing south

Thesis Proposal

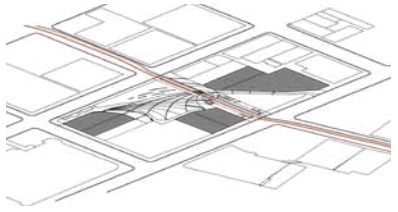
Final Design Work

- RESIDENTIAL
- OFFICE
- RETAIL
- UNDERGROUND PARKING
- EXISTING BUILDINGS





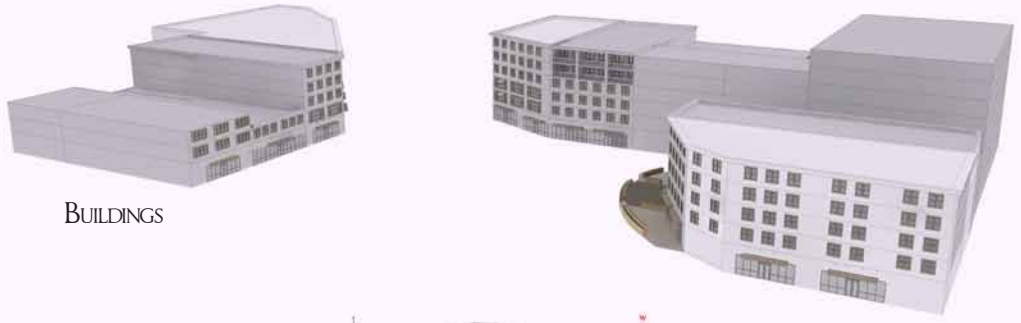
Store Front Interaction



Create Density

Thesis Proposal

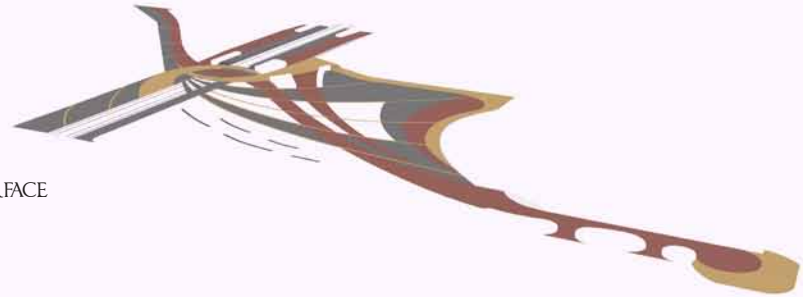
Final Design Work



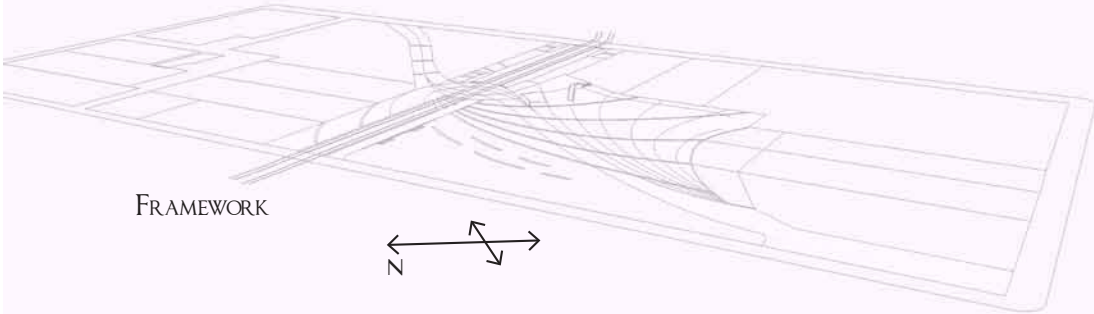
Buildings

Site Furnishings

Vegetative Spaces



Paving Surface



Framework

DISCUSSION & LIMITATIONS

After reviewing different case studies, it is evident that the site selected in Minneapolis is very relevant for a related design intervention. The two transportation oriented development case studies have very applicable design elements that can directly tie into a design in Minneapolis. Minneapolis is a large enough city to implement a transit oriented development. The TOD case studies were in larger cities, with a much more developed public transportation systems. This benefits the design implementations for this studies site in Minneapolis. It allows this study to recognize the successful transit oriented developments, and replicate them as applicable to the site of study.

Since Minneapolis is heavily reliant on automobile transportation compared to cities such as Portland or Seattle, it was important to choose a site that was within the core urban area for best results. Public transit will only be successful if there is a large enough population to rely on it; this was the main reason the site was chosen within the heart of downtown Minneapolis. This site will provide the best connections to the existing urban environment and public transportation; along with making the connection between emphasizing public transit and a pedestrian friendly urban environment.

The case studies assessed in this study have provided a good base for future design implementations in downtown Minneapolis. As an overall concept, transit oriented developments are useful resources for a future design in urban cores. TOD's core values are creating more sustainable communities while making better connections to public transit and pedestrian oriented designs. These are values any city can incorporate to development a better urban core. Looking deeper than the concept of a transit oriented development, these case studies have provided important connection between zoning, public transportation, and the street composition. They have proven to create a successful transit oriented development there needs to be a cohesive design that addresses each of those elements; if one of those elements are ignored, the successfulness of a project could be compromised. It was helpful to look into details of each of those elements, and see what made them successful. Many of the case studies that were looked at did not have a large amount of hard data that could be replicated into a design, they mainly incorporated design guidelines for the project. This was helpful to create an overall program for a future design implementation. However, it also hinders this study, due to many case studies not having exact number for their project. One case study that was most helpful for pedestrian connections and accessibility was the St. Louis Streets study. This case study proved that any urban street can be improved to provide a better experience for users. It showed how to create a better environment for pedestrians, along with implementing ideas to reduce vehicle travel on busy, unsafe roads.

This study originated from the ongoing concern of cities in America sprawling and becoming less dense. Looking into the future of cities in America, it is important to be proactive in their development and expansion. This study, along with other transportation oriented development studies, can provide ideas for cities to implement in order to have "smart growth". Transit oriented developments are only one option for cities to implement, but they have been proven to increase densities of cities along with creating a more sustainable livable environment.

Thesis Proposal

Discussion & Limitations

Due to time restrictions and access to the site of study, there are going to be different limitations to this study. Since this study will only be able to visit the site less than four times over the next five months, the amount of observations conducted in person are going to be limited. This means that data collected through observation of the city might not reflect typical use or circulation for many different reasons. Observations conducted on different days of the week are going to have an impact, along with the time of year the observations are taken. However, the data that can be collected through GIS and the city archive, such as zoning and infrastructure, will be very accurate and reliable. Combining the concrete GIS and city data along with observations will be consolidated to form a design that best fits the city. All of this information has to be taken into account when coming up with an analysis. The solutions for this study might have to consider taking a smaller portion of the city and creating a smaller design intervention. The idea of the solution for transit oriented developments could be implemented city-wide, however, the design will be detailed at a neighborhood scale.

Through a design intervention, this study expects to find solutions for successful alternative forms of transportation and developments that promote alternative transit. This may result in creating an urban greenway that connects many parts of the city or creating transit-oriented developments to prioritize transit other than the automobile. Within an intervention prioritizing other modes of transportation besides the vehicle, the city will become much more people friendly, and a more desirable place to live, work and shop. This will result in a more sustainable, safer city to live in.

Thesis Resources

Thesis Resources

Previous Design Studio Experience

2nd Year

Fall 2009 — Introduction to Landscape Architecture Studio – Kathleen Pepple
- Tea house, Fine Arts Club

Spring 2010 — Parks and Open Spaces Studio – Matt Chambers and Dominic Fischer
- Woodlawn Park, 1st and N.P. One Way Conversion

3rd Year

Fall 2010 — Environmental Art and Site Design Studio – Stevie Famulari
- Defining Space, Snow Symposium, Library Installation

Spring 2011 — Community Design Studio – Kathleen Pepple
- Fort Yates Equestrian Center, Chicago Neighborhoods

4th Year

Fall 2011 — Urban Design Studio – Jay Kost
- Denver Urban Infill

Spring 2012 — Environmental Remediation and Plant Design Studio – Tyler Kirchner and Dominic Fischer
- Reclaiming a Lost Wetland, Woodland Park

5th Year

Fall 2012 — Environmental Planning Studio – Mehran Madani
- Fargo Civic Center Redevelopment

Spring 2013 — Design Thesis Studio – Jay Kost
- Urban Transitions

Thesis Resources

Reference List

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Ziegler, E. (2008). The case for megapolitan growth management in the twenty-first century. Retrieved from www.emeradinsight.com

Thesis Resources

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