

NEW PRODUCTIVE LANDSCAPES

DESIGNING FOR SUSTAINABLE URBAN FOOD



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New Productive Landscapes: Designing for Sustainable Urban Food

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

By
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In Partial Fulfillment of the Requirements
for the Degree of
Bachelor of Landscape Architecture


PRIMARY THESIS ADVISOR


THESIS COMMITTEE CHAIR

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abstract | **thesis intent**

As of 2008 over half of the world's population is now living in cities, and the number is expected to swell to approximately five billion in the next twenty to thirty years. As the volume of people living in cities rises, so does the amount of food that must be imported into these urban areas. These imports consume energy at a rate that is far beyond sustainable. The costliness of this transportation results in rising food prices. This in turn leads to a host of other problems and issues. Urban agriculture, though historically nothing new to cities around the world, is at the very heart of solving these issues. This work focused on the effect that landscape architecture can have on urban agriculture. It examined different solutions that could increase the viability and sustainability of farming in the city, in particular it dealt with the issue of finding space for agriculture. Using the case study method as well as assessment measures that deal with the viability in an urban environment, this work dealt with whether or not integrating urban agriculture with city parks could increase the viability and sustainability of the practice.

problem statement | **thesis intent**

What if integrating urban agriculture with public spaces could increase the viability and sustainability of productive landscapes in a city?

typology | **thesis intent**

claim Productive landscapes, in an urban setting, can be made more viable and sustainable with the integration into public spaces.

premises Productive landscapes can be an important asset to an urban environment, that currently relies on faraway land for resources. However, often there is limited space in the urban environment. This results in a lack of opportunity for productive landscapes that go beyond the individual.

theoretical premise/unifying idea City run farms can be integrated into, or designed as, public spaces which will create a more viable and sustainable urban agriculture practice.

project justification In the last twenty years the world's population demographics have undergone a dramatic shift. As of 2011 just over half of the world's population, which is estimated at seven billion, currently resides in an urban area (United Nations 2012). The total resources required to sustain the earth's urban agglomerations are drastically changing the relationships and conditions between the planet and its people. Urban environments comprise approximately three percent of earth's land surface yet consume seventy-five percent of all natural resources. This provides the strongest evidence for the necessity of urban agriculture.

It is apparent that the production of food is fundamental to life and that it upholds all other activities. However most cities are not willing to sacrifice their space to the practice of farming.

This project suggests combining public spaces with agriculture in order to better provide space in an urban environment.

narrative | **thesis proposal**

The idea of the productive landscape is an extremely vital one. Without such environments humans would not exist as we do. However, the relation between urban environments, where over half of the world reside, and productive landscapes is defunct.

It is agriculture that originally gave rise to the primitive urban settlement. Farming allowed groups people to settle in one area and still have the security of resources. However somewhere along the way the two factions became separate. Agriculture became a practice that belonged away from the public eye. Designated for the spaces inbetween cities.

However a change is necessary. It is not plausible for our productive landscapes and our public ones to remain separate. An integration of the two must occur. I feel that this is the direction in which the future of urban design is heading.

user/client description | **thesis proposal**

The city of Minneapolis and the current and future residents of the North Loop district are the primary clients. The residents of the district will be in the closest proximity, to enjoy the public space, while the whole city will be able to profit from the products of the landscape.

The neighborhood is currently without an open/green space, or really any public space of any kind. This type of flexible space is necessary in every type of environment, so as to promote outdoor activity and public interaction.

The farming of the land will be beneficial to not just the nearby residents but also to the rest of the city. The products of the landscape will be sold at the farmer's market as well as to many of the restaurants and food providers of the city.

program elements | **thesis proposal**

- + food forest
- + gardens
 - city owned (and run)
 - warm season crops
 - cold season crops
 - greenhouses
 - community
- + farmer's market/
event space
- + open/green
space
- + flexible space
- + rainwater harvesting (rooftop)
 - cisterns (above ground)
- + accessible
- + compost

site information | **thesis proposal**

sitecontext

north loop
highrise d.

population	jobs
+5000	+9500
+1000	+ 20,000

- 5 minute walk**
- + target field
 - + target center
 - + apartments
 - + restaurants
 - + occupations

site (acres)

ground	14.21
rooftop	01.81
total	16.02



1 north loop



2 highrise district

minneapolis, mn



research results and goals | **thesis proposal**

Urban Agriculture is the process of farming that occurs within the city (Viljoen, 2005). In most cases it involves high yield market gardens for fruit and vegetable growing and if economic conditions are right can include small animals. Examples of agriculture can be found on the ground, roofs, facades, fences, and boundaries (Viljoen, 2005). Though the rise in the popularity of urban agriculture is relatively newfound, historically the system is a great many centuries old. According to an article by Lewis Mumford (1956), the process of farming itself is perhaps what originated the idea of urbanization. As the process of growing food was gradually mastered humans were afforded the opportunity to give up a nomadic life in exchange for more dense permanent outposts surrounding small farms. These villages gradually grew larger as populations grew larger and eventually evolved into major cities, many still around today. As systems of transportation became more technologically advanced this allowed for agriculture to be moved out of urban areas (Mumford, 1956). This history of the rise of cities and agriculture's role is important to note. It means that at a certain point in the past the sites of the world's major cities were chosen solely because they had specific characteristics that made them good for farming. It gives heed to the notion that agriculture can indeed be successfully and sustainably grown in an urban setting.

In Andre Viljoen's 2005 book *Continuous Productive Urban Landscapes (CPULs)* he claims it is self-evident that production of food is vital to life and that it underpins all other activity on earth. Every single being on earth must eat and it is this necessity that is giving rise to the popularity of urban agriculture among other sustainability issues. Viljoen, (2005) goes on to paint a vivid picture of London in the not too distant future. This vision includes a London that has adopted and instituted the idea of the continuous productive urban landscape into its city plan. The idea behind CPULs, as the

author terms them, is to bring together the idea of continuous landscapes with the idea of productive landscapes. Continuous landscapes being "a network of planted open spaces in a city which are literally spatially continuous," and the productive landscapes being "open urban space planted and managed in such a way as to be environmentally and economically productive." (Viljoen, 2005 pg. xviii) The future of London that Viljoen projects is a city that produces an incredibly high percentage of its own food. A long planted corridor runs through the entire city and provides numerous environmental, economic, and social benefits. These include local farmer's markets, much needed public space, and improved social connections among many others. The outcome that Viljoen advocates for is fantastic, but how does a city get there? What are the steps that must be taken in order to achieve this ideal city form? The author is able to answer many questions in his book as to the benefits of such a plan and some of the obstacles but one obvious question that is overlooked is where do cities find the space to incorporate this landscape. Where is a space that can benefit everyone and be a hindrance to none? What are the qualities that a space must have for a farming system to survive?

At the turn of the century Tjeerd Deelstra and Herbert Girardet (2000) wrote a thematic paper that described the role that agriculture could play in a sustainable city. The paper discussed both the opportunities and the constraints that follow urban agriculture. There are an extraordinary amount of opportunities and benefits that the practice of urban agriculture allows for. These opportunities include things such as microclimate improvement, conservation of urban soils, waste and nutrient recycling, water management, biodiversity, and atmospheric pollution. These matters are some of the most important issues that researchers and urban designers are currently attempting to solve and they could see vast improvements with the integration of agriculture. Within urban agriculture there are

research results and goals | **thesis proposal**

several constraints. Some of them include city policies that make it difficult for agriculture to flourish as well as issues with maintenance and costs. However the main issue that urban farmers run into is the lack of space within the city limits. Particularly in the western world, very few plans have been made for the integration of agriculture into the urban fabric. This idea was left by the wayside back in the mid 1900's and it was assumed that residents of the city would simply buy all of their food without issue. There would simply be no need for people to grow it themselves (Deelstra & Girardet 2000). In recent years there have been attempts to change the unemployment rates in cities, such as Detroit, that have seen industrial decline. These cities offer large amounts of land that have been become derelict as industries go bankrupt or move away. These vacant lots create perfect opportunities for agriculture to help revitalize the communities. Not only does it provide cheaper produce for what have become lower income neighborhoods, but it also provides much needed employment opportunities, as well as aiding in the refertilization of urban soils. Though this is a fantastic way to go about restructuring planning policies for cities that have seen decline, what about cities that are yet quite stable? How can productive landscapes be incorporated into a fabric that is already established and perhaps still growing?

Across the globe there are numerous styles and types of urban farms (Nugent, 2001). They are the primary form of urban agriculture (Redwood, 2009). They tend to range in size and scope. There are three different kinds of categories these being recreational, adaptive, and traditional (CFSC 2003). Farms are classified as recreational when they sell less than ten thousand dollars annually and consist of less than one hundred acres. They are classified as traditional farms when they sell more than ten thousand dollars and range between one and two hundred acres of plotted land. Farms labeled as traditional, which sell more than ten thousand dollars

annually and are made up of more than two hundred acres, tend to be much more similar to farms found in rural sites. According to the CFSC most agriculture found in urban environments operate on fewer than 25 acres.

One of the main issues that goes hand in hand with the sustainability of an urban farm location is the cost. Because of the low rate of return financially it is very difficult for small scale urban farms to sustain themselves. It is simply not viable for farming to be a sole source of income in the urban setting. In the National Building Museum's panel discussion on urban agriculture (2010), Josh Viertel put it quite succinctly when he stated that, "farming jobs stink, financially...It is quite unreasonable and sort of silly to expect that an urban farm is going to turn a profit like a business would in that space, or like someone who is trading stock in that space would. It's simply not going to be a high return of investment financially." So maybe the urban agriculture does not provide a lot of financial return but you have to keep in mind the services that it can provide within the surrounding area. Environmental services such as holding water that would otherwise runoff as well as having the capacity to lock up carbon. There is a public health value in that people eating homegrown fresh vegetables are going to become less likely to be obese and have diabetes. There are also educational components which allow residents, in particular children, to gain a higher knowledge of healthy foods and the positive effects they can have, as well as a quality of life factor. Yet with all of these benefits local governments shy away from city owned agriculture. Is it really necessary for a farm to make money when it provides a vast list of other advantages? Are city parks ever expected to turn a profit? Similar to agriculture urban parks are crucial, for several reasons, to the economic health of our cities as well as the quality of life of the citizens (Saz Salazar, 2007). As agriculture can contribute to promotion of public health and safety by encouraging healthy food

research results and goals | **thesis proposal**

habits and knowledge so to can urban parks. City parks can encourage the promotion of public health by encouraging physical and mental health by providing an effective alternative to the stress and anxiety of urban living. Is a city owned farm perhaps one of the keys to sustainable urban agriculture? It is a unique idea to integrate agriculture within a city park, one that requires further study.

a plan for proceeding | **thesis proposal**

In order to gain a more thorough understanding of what exactly the result might be, when integrating agriculture with public parks, research had to be done. The primary goal of the research was to find out whether combining the functions of both agriculture and urban parks would in fact increase the viability of urban agriculture. The study would begin in a broad sense and gradually focus more closely on the gap in previous research. This exploration involved looking at two different fields of study and their relationships to landscape architecture. The first field of study being the practice and application of agriculture, and the second being the function and effects of urban environments. After deciding on the nature of the fields of study, it was necessary to utilize archival records in order to properly amass the data involved. The archival records took the form of case studies that exemplified the issue. After collecting the data the next step was to analyze the findings from the two separate fields of study using several common objective measures.

The first step in the research process was to take a separate look at both agricultural and urban environments as independent sectors and then collect information based on the results. While examining the two fields it became readily apparent that the relationships both categories have with the field of landscape architecture is considerably different. The first move within this step was to take a closer look at what exactly constitutes an agricultural environment. This broad look would help to gain an important perspective of the topic. It was also important to know and be able to accurately define the confines of the category. This would aid in the clarification of objective measures later on. Once the agricultural environment was clearly described the next undertaking was to delve more closely into the broad spectrum of urban environments. To know this, particularly in relation to the specifics of an agricultural environment, was useful in completing the objective measures. In order to spell out what constituted an agricultural or urban

environment it was necessary to examine several case studies that exemplified the two types. Once the surveying of the case studies was finished an in depth analysis allowed for the relationships of the two environments to be substantiated in the field of landscape architecture.

After the broad spectrum had been analyzed and the two environments had been defined, it was time to bring in the focus to a smaller field of vision. The confines of the agricultural environment were reduced to the even smaller purview of urban agriculture. The boundaries of the urban environment were refocused to solely include urban parks. These two areas of study were much closer to the gap in the previous research, the gap being the lack of new space for agriculture in an urban environment. To gain an idea of the viability of the two fields qualitative research design was utilized in this portion of the study as well. It was a non-experimental and analytical type of design that involved a descriptive study of several current examples of both agriculture and urban parks. Each case study was measured with carefully considered criteria that helped to determine the viability of each area. The measures consisted of the physical amount or value produced by the space, the intangible value produced, the amount of public uses, and the length of time that the given environment had been around.

The location of the study site was a medium sized plot of land in New Orleans, Louisiana. It was located very near the city center in a well populated area of the city. The site itself was already slated to begin construction in order to build housing developments. However for the sake of the study it was to be assumed that the decision to begin development had yet to be made. The site was chosen as a result of its perfect placement to the city center. Its placement is one that will allow for a number of persons to interact with the site daily with relative safety.

a plan for proceeding | **thesis proposal**



To go along with the chosen site location a number of case studies were selected. These studies included varying sizes of agricultural farms and urban parks. The location of the cases were spread wide across the country. This was a chose made in an attempt to allow for the most diverse findings.

goals | **thesis design**

The goal of this design solution is to create a viable and justified public space that incorporates and promotes productive landscape.

I to gain further knowledge and experience in the research and application of a full scale design solution. The insight gained into the effort and dedication it requires to develop such a project will be continually advantageous as I move further into a design career.

Finally it is my hope that this project will be an appropriate tool in demonstrating to prospective employers my skills and intentions for career advancement.

site justification | **thesis design**

a new **urban** neighborhood

The north loop district in downtown minneapolis is an integrated urban neighborhood. Although previously an undeveloped historic warehouse district, the area is enjoying a burgeoning resurgence as a neighborhood with housing, employment, entertainment, restaurants and retail. The city of minneapolis has designed a plan for the district that is currently underway.

“North loop village will be among the largest developments in minneapolis creating unprecedented opportunity to build new neighborhood around **public spaces.**”

target field

transit hub

residential

street level vitality

site justification | **thesis design**

target field

\$390 million

Home to the Minnesota Twins professional baseball team the stadium draws thousands of visitors every game.



site justifiaction | **thesis design**



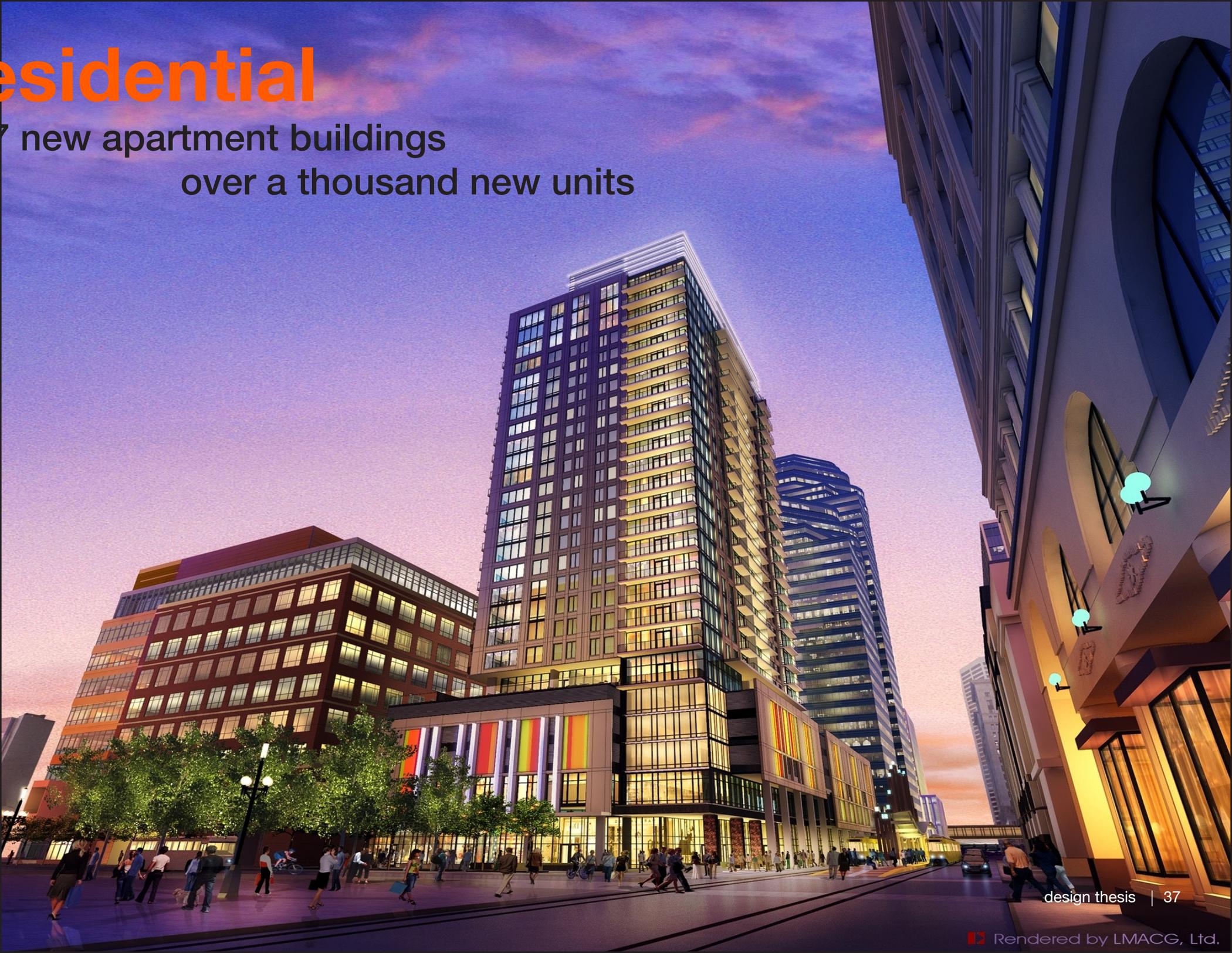
The new transit hub, the Interchange, is currently under construction and is expected to be done by 2014. Once finished it will be the biggest transit hub in Minnesota.

\$67.7 million
transit hub

site justification | **thesis design**

Residential

7 new apartment buildings
over a thousand new units



site justification | **thesis design**

street vitality



creating walkable streets that meet
the energy needs of the village

site justification | **thesis design**

north loop developments

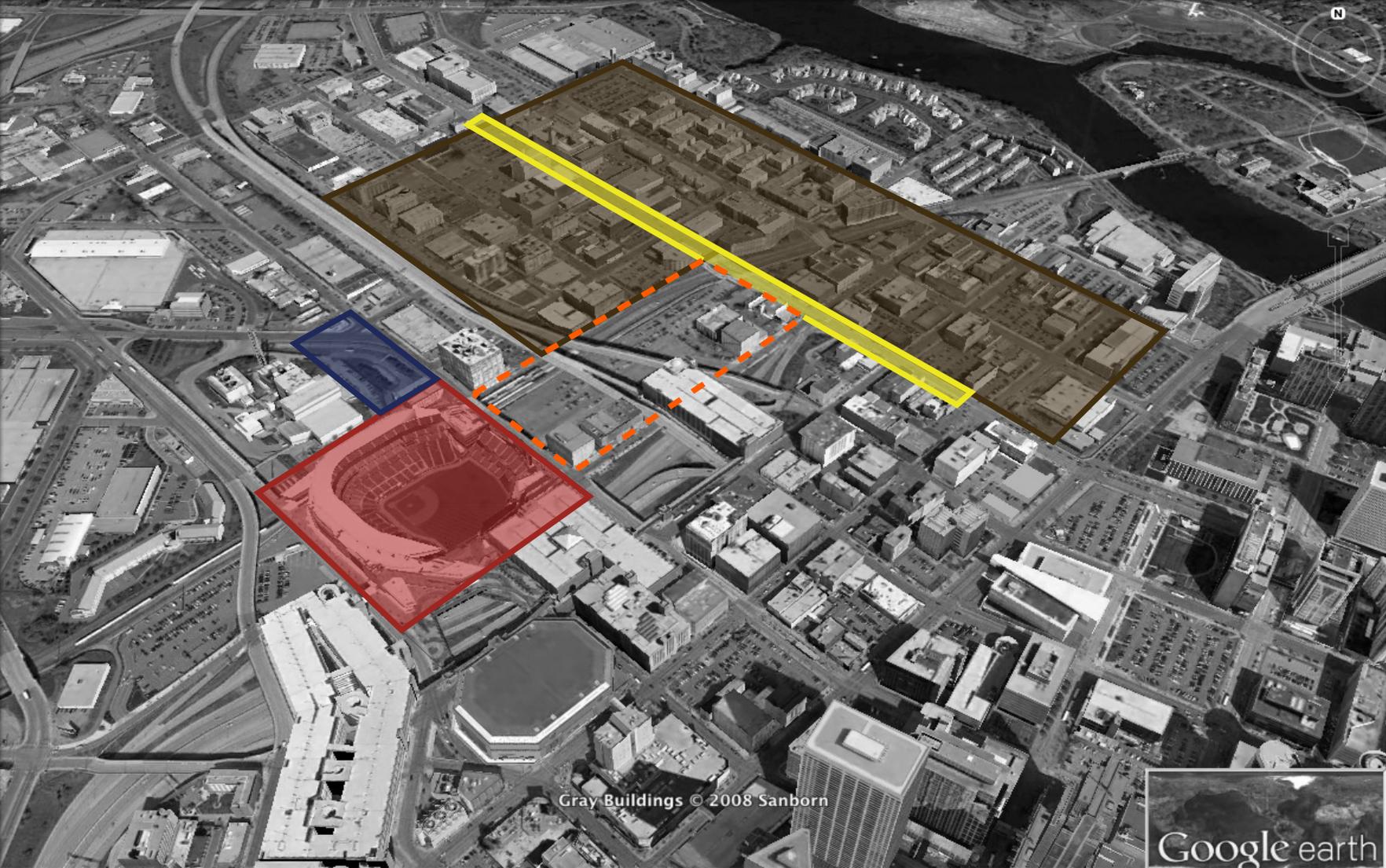
Target field

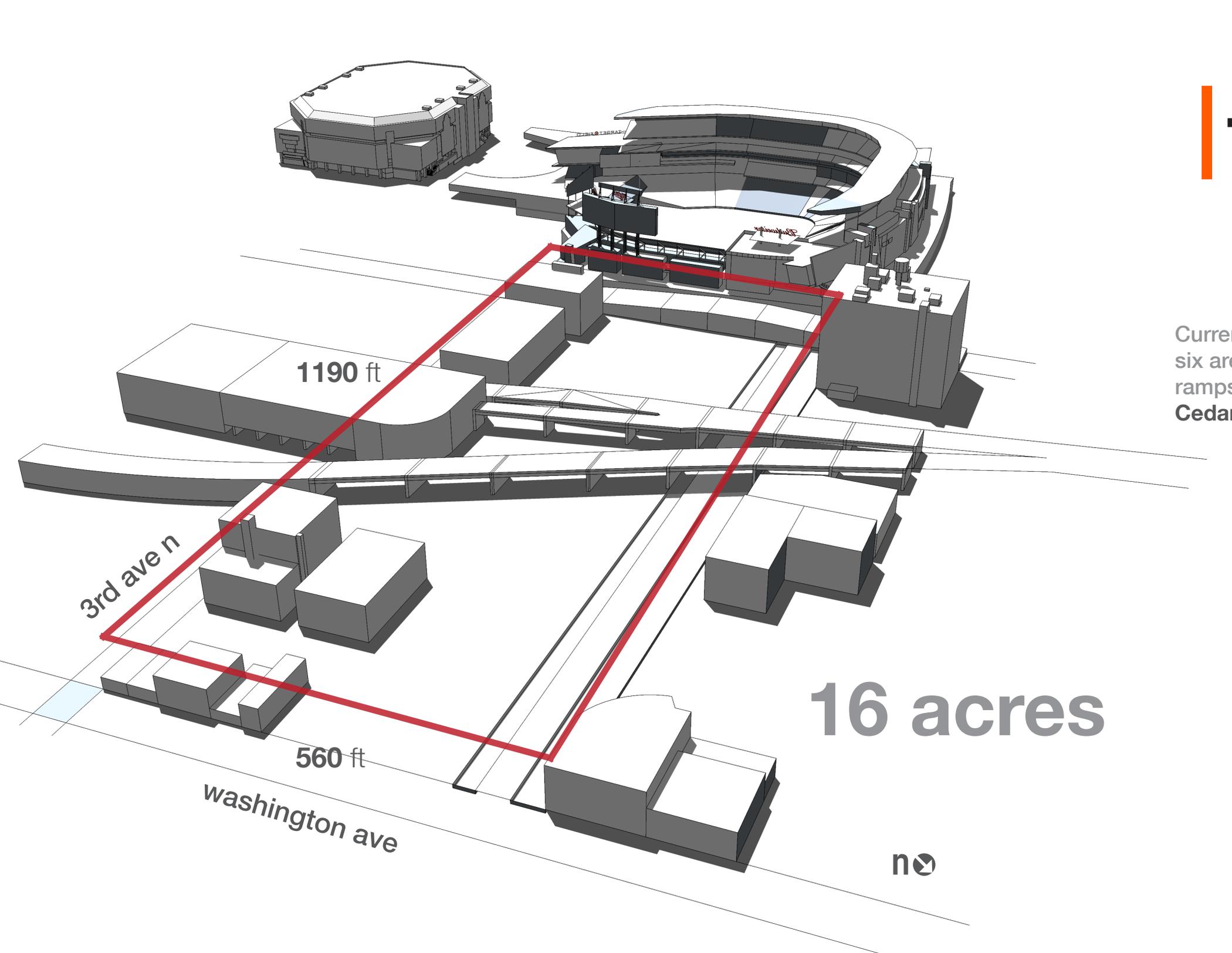
Transit hub

Residential

Street vitality

Site





1190 ft

3rd ave n

560 ft

washington ave

16 acres



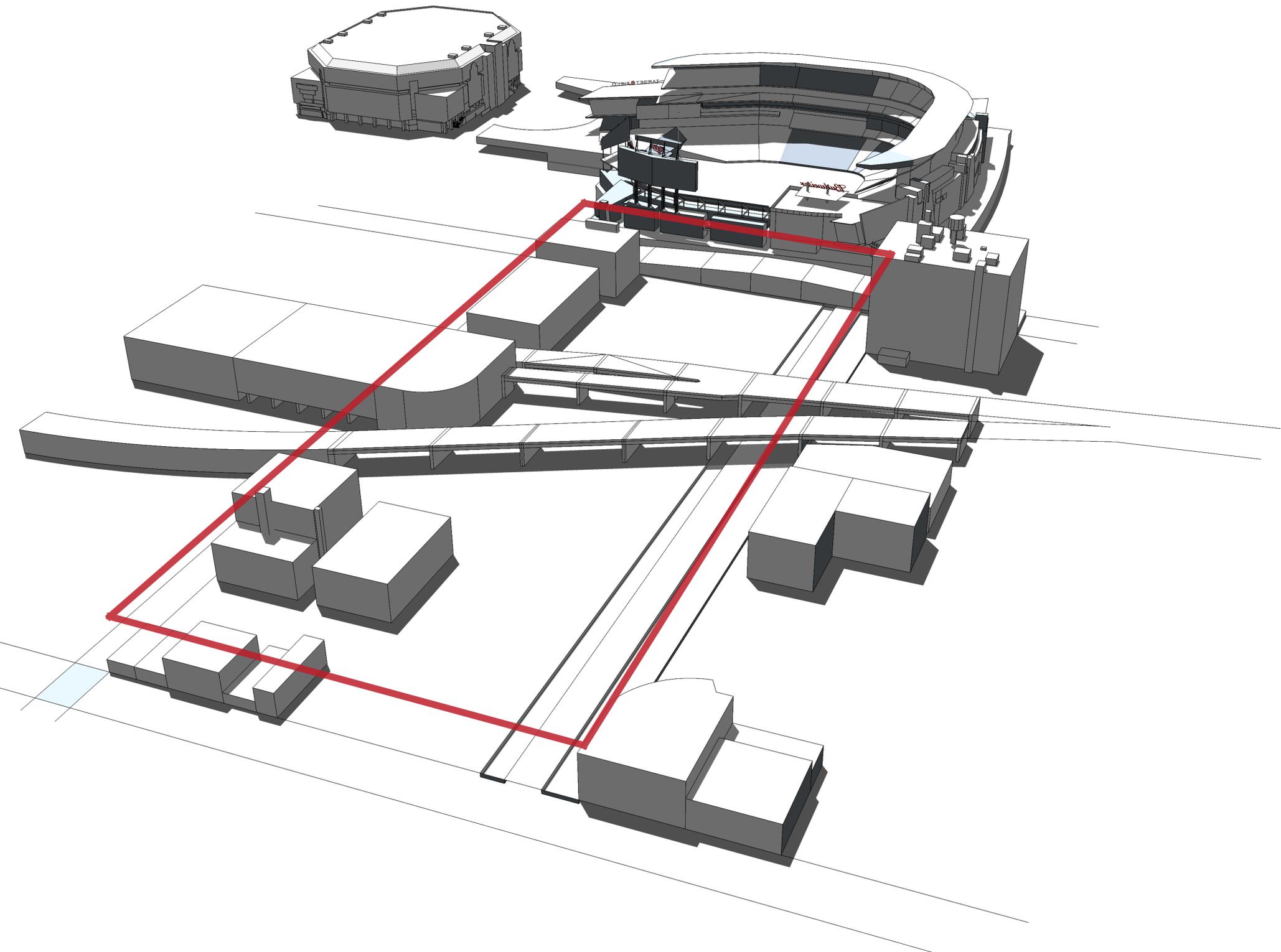
Current
six ar
ramps
Cedar

the site |

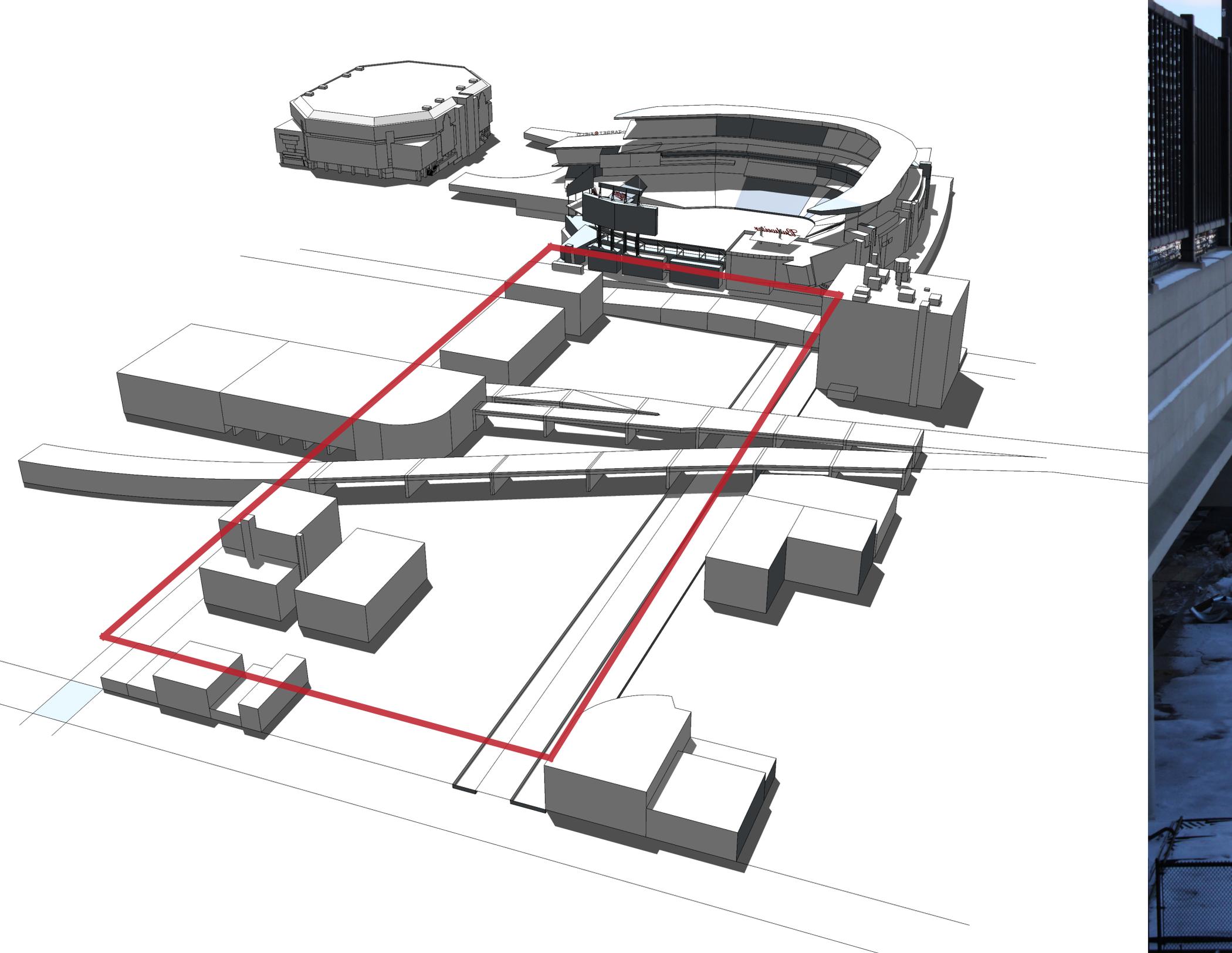
Currently a vast majority of the site is programmed as a **parking lot**. There are seven buildings on site while another is directly adjacent. The majority of the building uses are retail and office with several restaurants and 2 parking lots. At the southwest end of the site is the **Target Field Station and Rail Platform**. Running alongside that is the **Rocky Lake Bike Trail**.

issues with site

- vast amount of concrete
- poor access
- surrounded by buildings
- freeway
- drainage







1

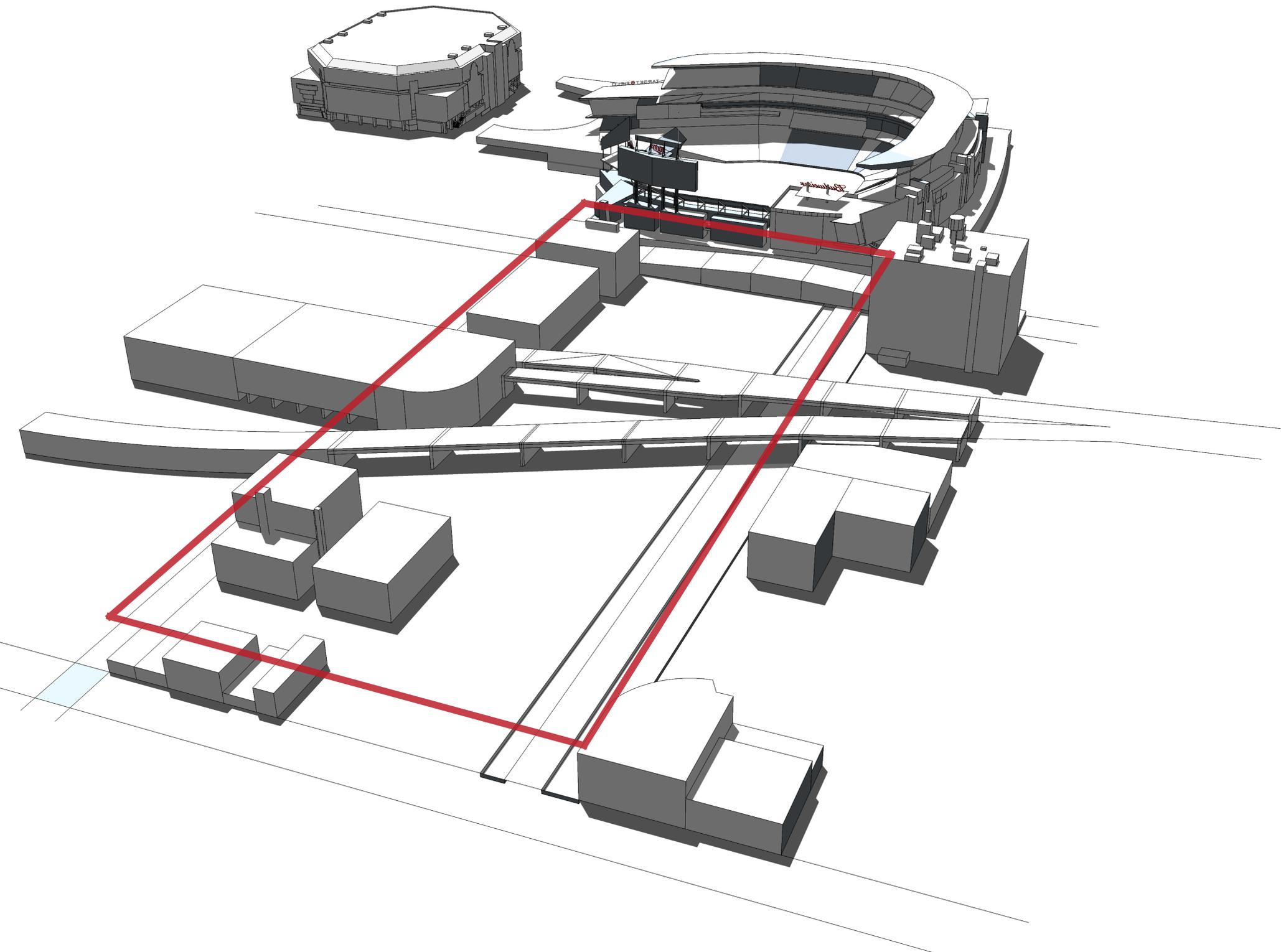
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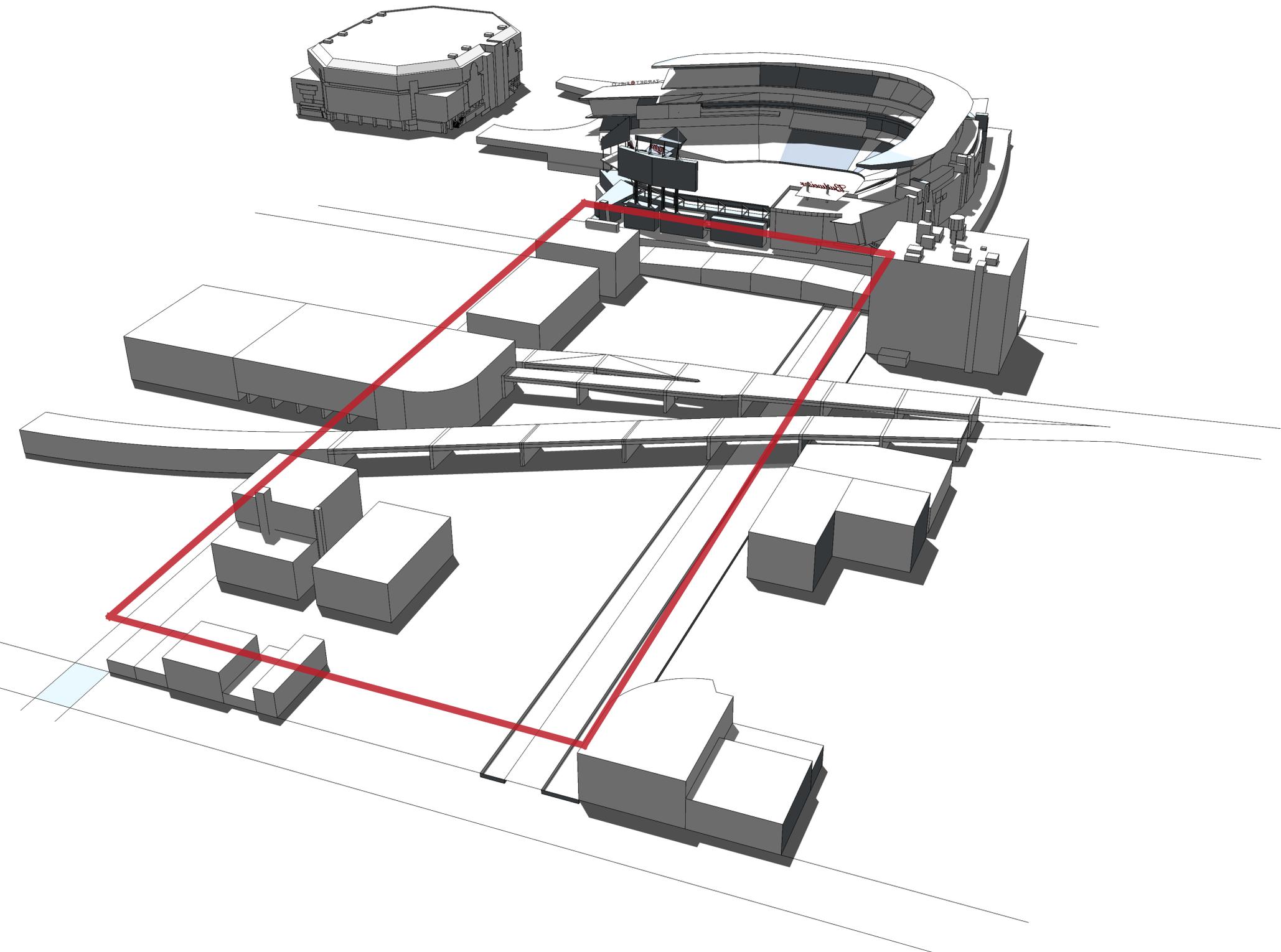
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site access

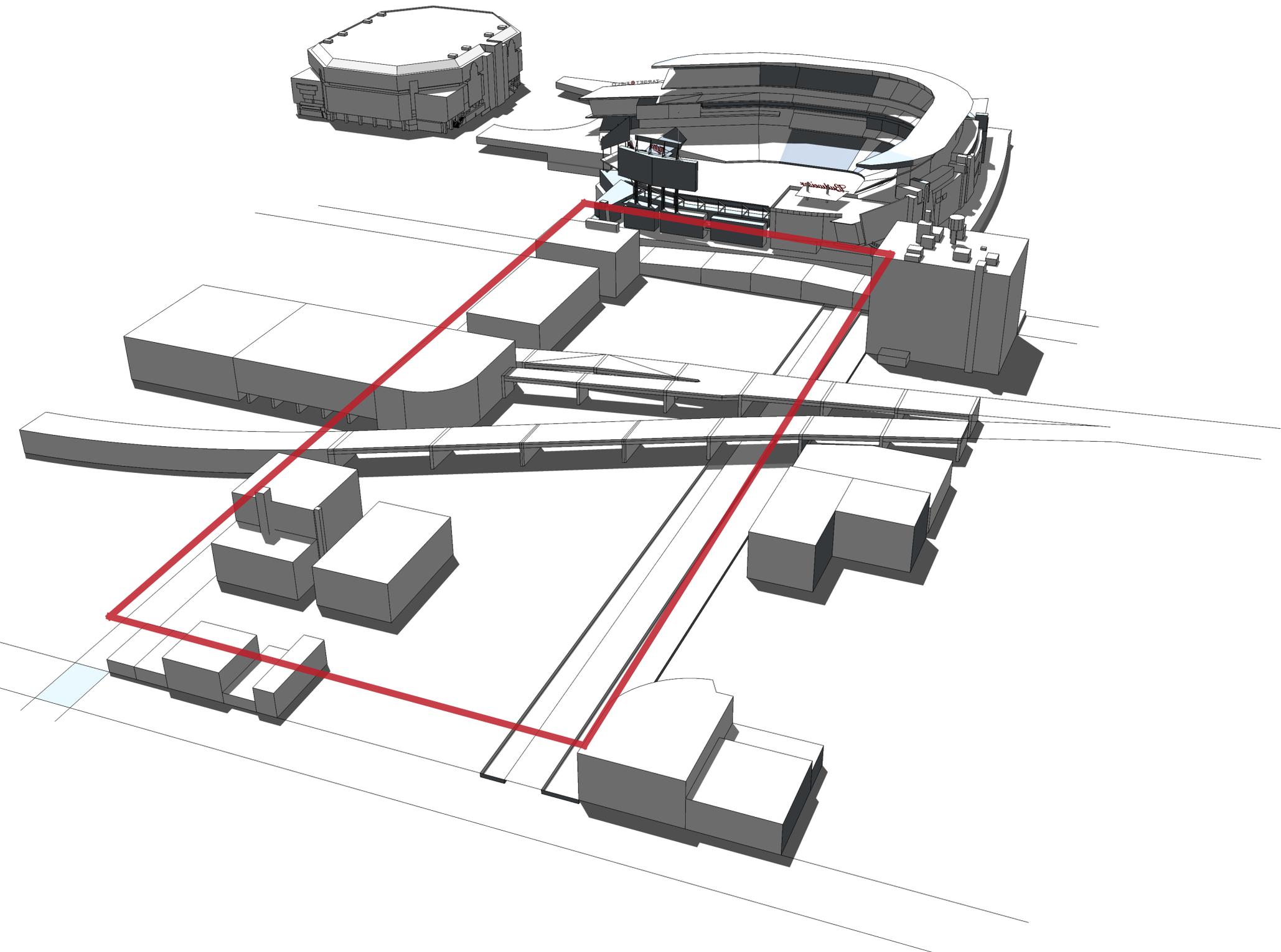








freeway overpass





drainage

site necessities

agriculture

- sun
- water
- space
- drainage
- soil

public space

- circulation
- access
- comfortable spaces

other

- service road
(target field)

9 am

10 am

11 am

12 pm

1 pm

2 pm

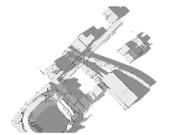
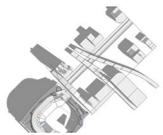
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4 pm

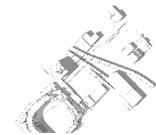
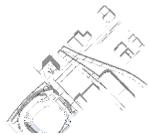
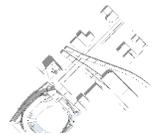
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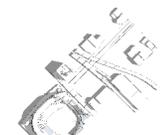
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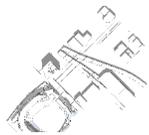
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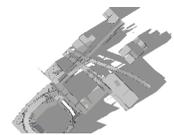
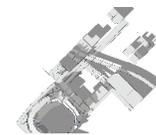
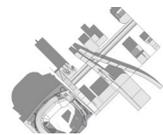
jul.



sep.



nov.

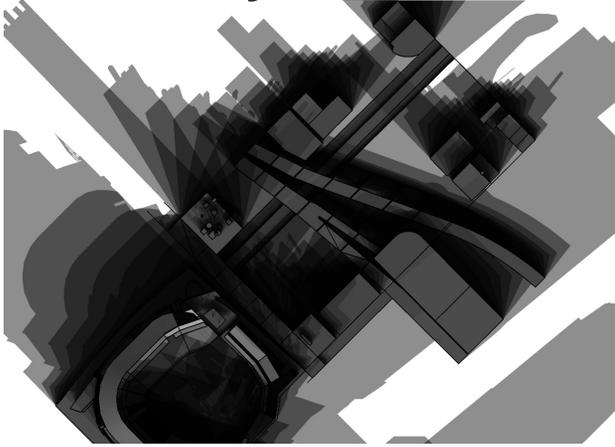


shadestudy

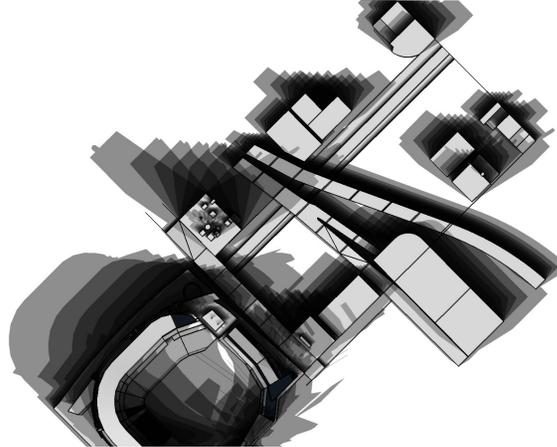
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longitude -93 20' 23.43"

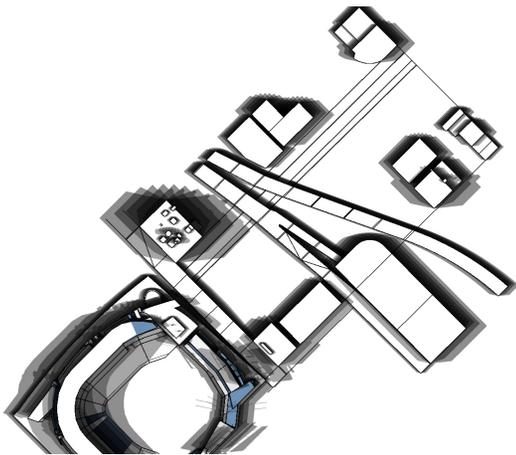
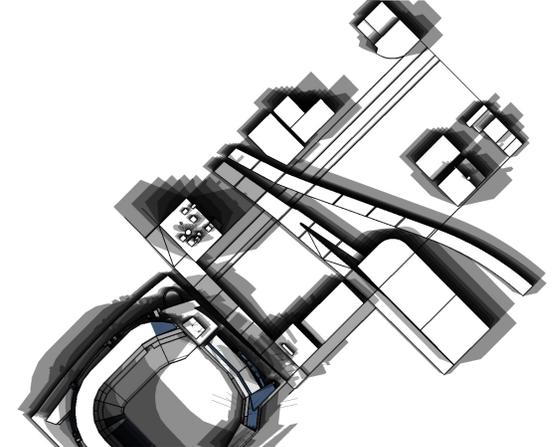
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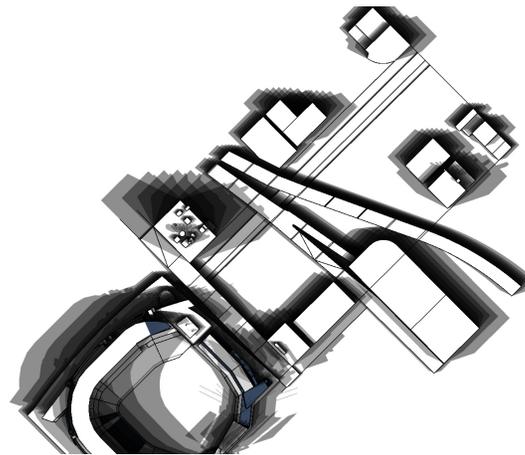
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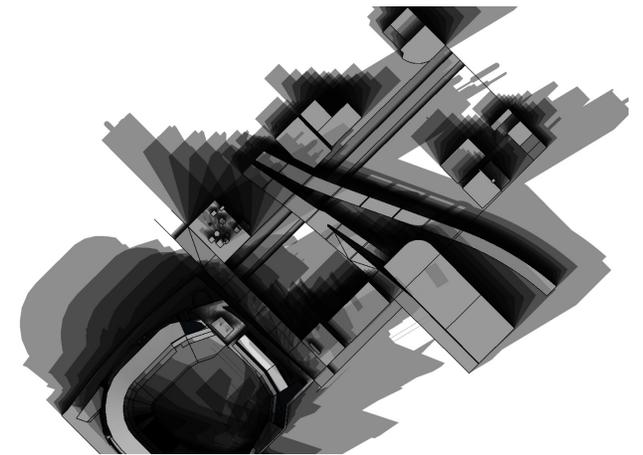
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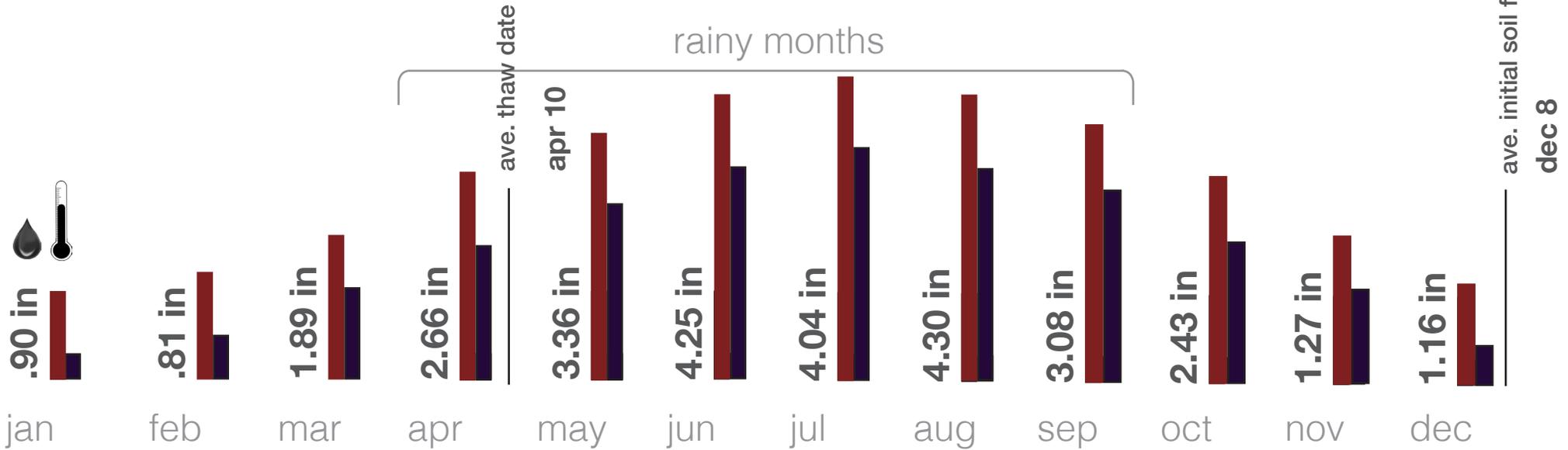
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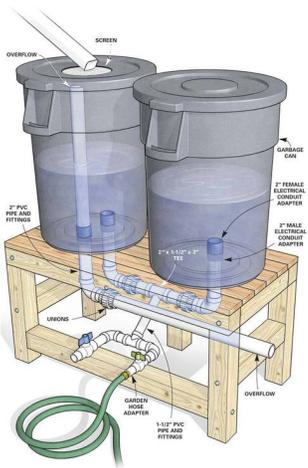
nov.

climatestudy

precipitation & temperature



rainwater harvesting potential



on site

- building 1 = 14,688 ft²
- building 2 = 11,000 ft²
- building 3 = 18,850 ft²
- building 4 = 18,700 ft²
- building 5 = 5,250 ft²
- building 6 = 4,200 ft²
- building 7 = 4,050 ft²
- building 8 = 2,000 ft²

rooftop collection

volume (v) = precipitation (p) x footprint (a) x surface efficiency (e) x conversion to gallons (k)

$$= 78,738 \text{ ft}^2$$

$$v = .335 \times 78,738 \times .8 \times (7.48/\text{ft}^3) = 947,048 \text{ gal}$$

adjacent to site

- building 9 = 11,425 ft²
- building 10 = 12,825 ft²
- building 11 = 8,000 ft²
- building 12 = 8,000 ft²
- building 13 = 29,000 ft²

$$= 69,250 \text{ ft}^2$$

$$v = .335 \times 69,250 \times .8 \times (7.48/\text{ft}^3) = 832,927 \text{ gal}$$

soilstudy

minneapolis average initial soil freeze: dec 8

average frost free period: 210 days

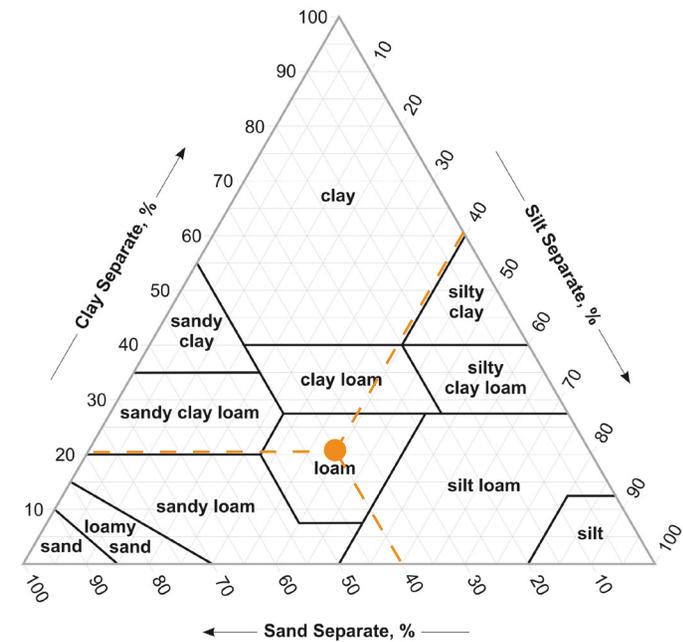
soil composition:

loamy soil: 1. a fertile soil of clay silt and sand containing humus
2. soil is considered ideal for gardening and agricultural uses

composting : 1. decayed organic matter used as plant fertilizer
2. compost is a key ingredient in organic farming

concrete: 1. 5-6 inches of concrete leaches into soil below
2. leaches into soil below

Soil Textural Triangle



parking lot (concrete)



remove certain areas (concrete)



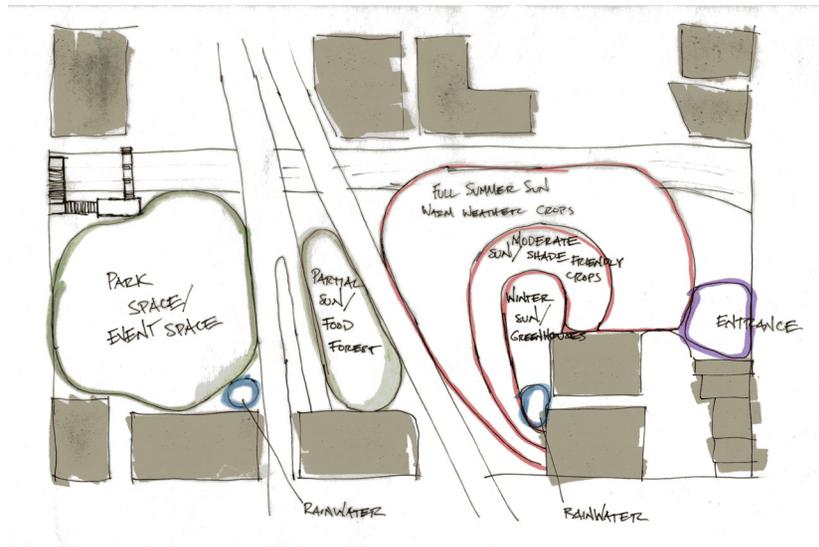
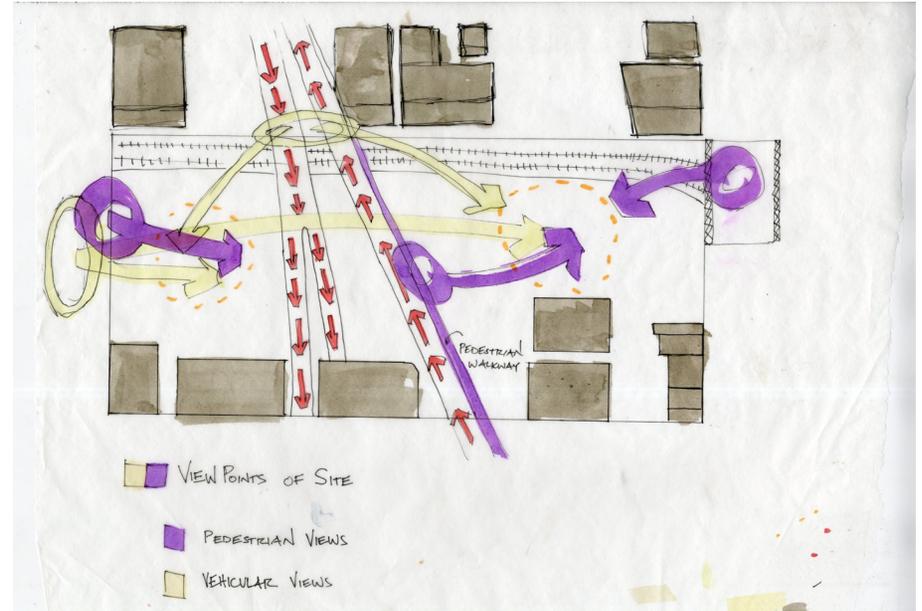
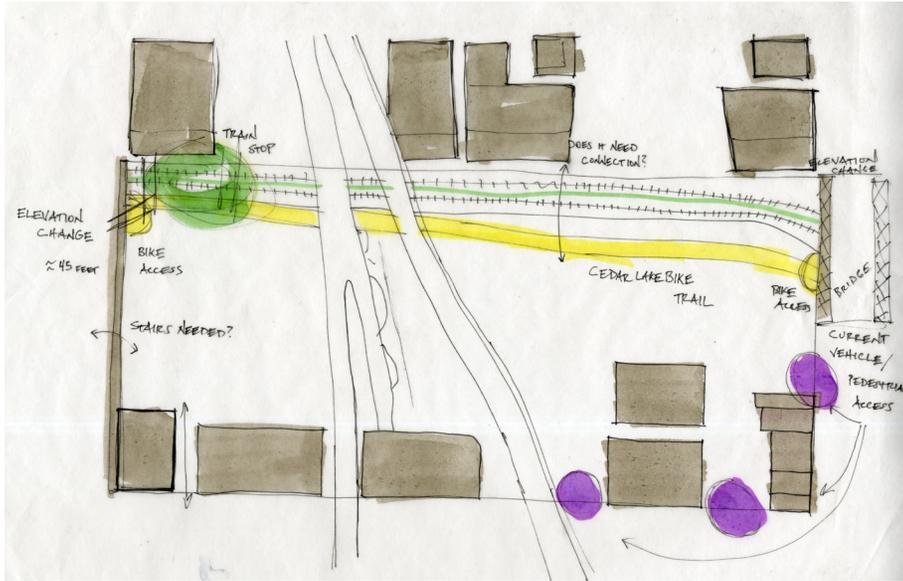
recycle on site (concrete)

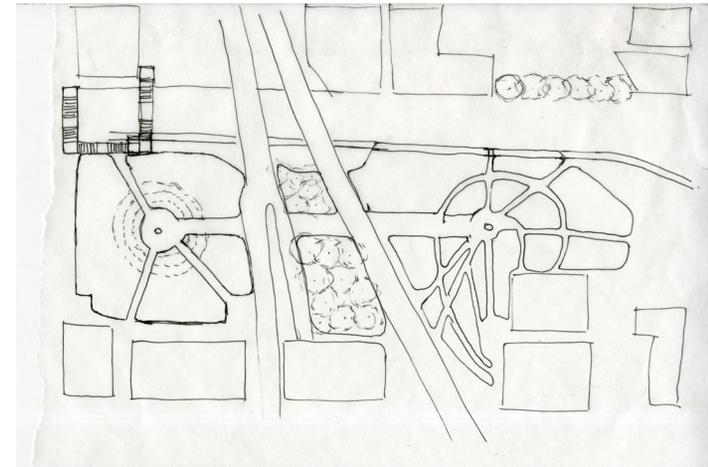
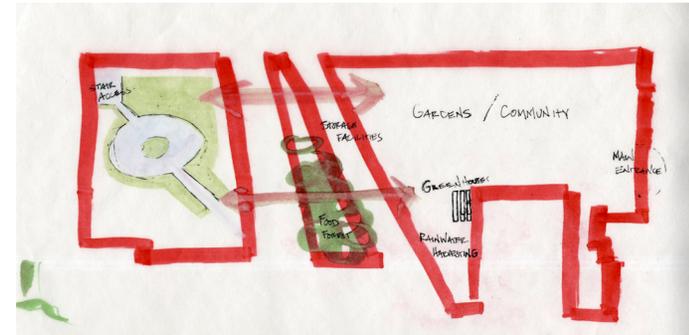
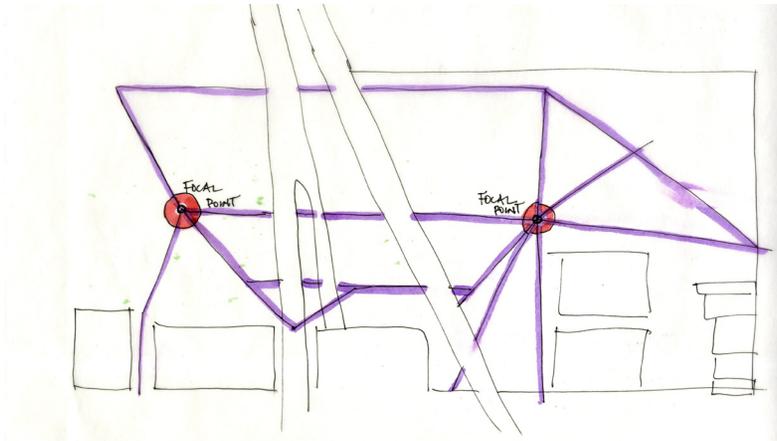


add soil and compost mix



conceptual development





- ① gardens
- ② farmer's market/event space
- ③ greenhouses
- ④ community gardens
- ⑤ storage
- ⑥ cistern
- ⑦ food forest
- ⑧ plaza/flexible space
- ⑨ open/green space
- ⑩ wooden footbridge
- ⑪ ada ramp
- ⑫ service road (target field)

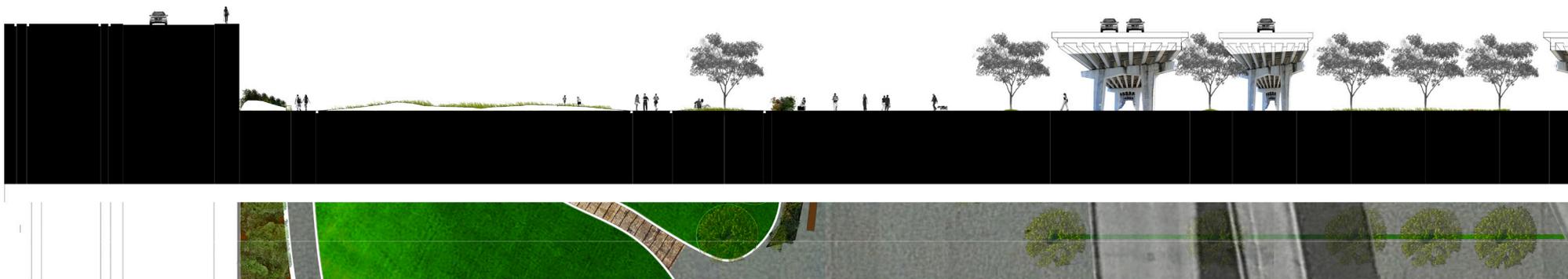
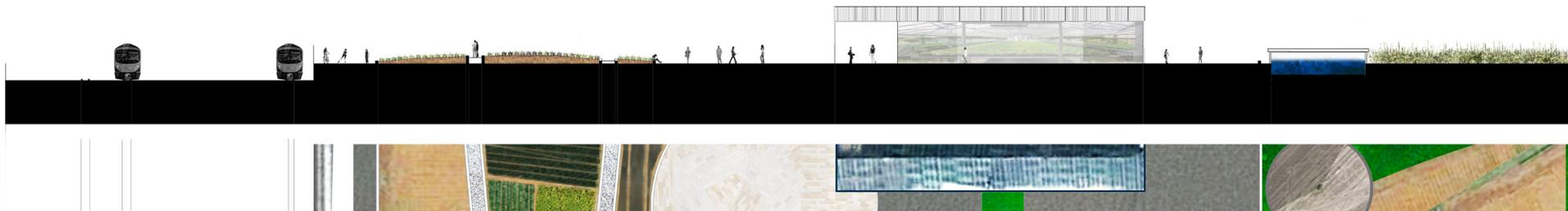
masterplan



washington ave

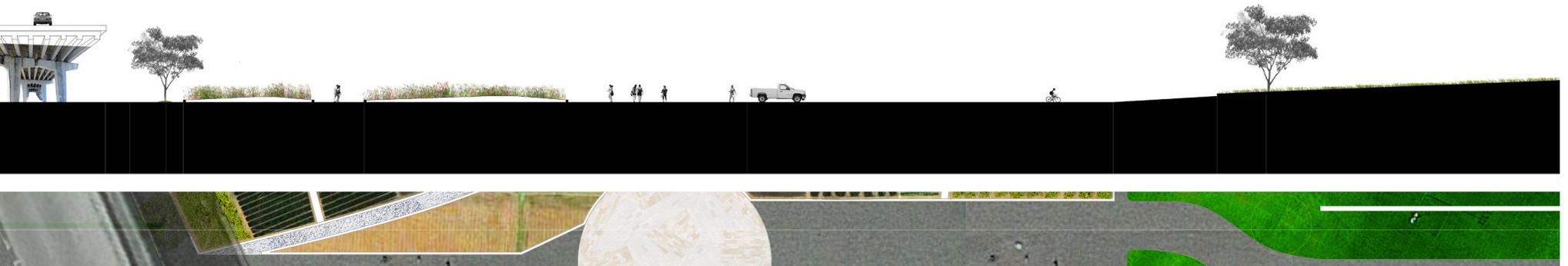
3rd ave n

0 100 200 400M

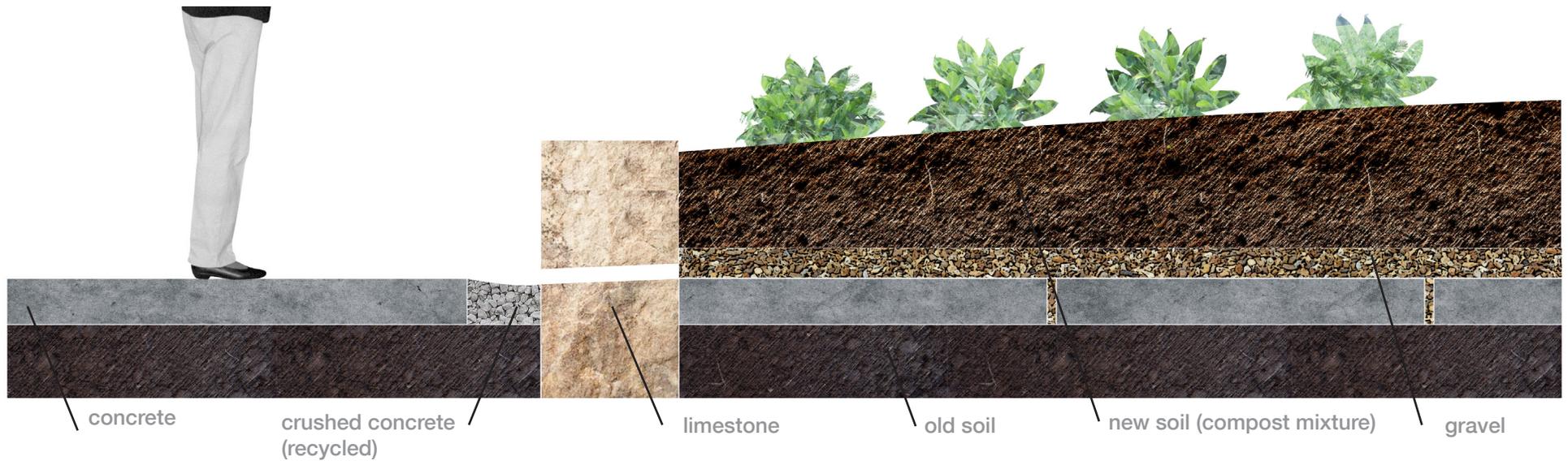


sectionstudy

These section cuts show the spatial and height relationships that have been created. It is important to note that the site is lower than most of its surroundings. This can achieve a feeling of seclusion and tranquility in some of the recreational spaces



gardens



planter benefits

soil condition

easier to manage drainage

easier to manage heavy soils

easily customize soil

can be located where light conditions are ideal

can grow crops more intensely

soil warms faster in spring



view of agriculture
facing west

fruit shrubs

raspberry **rubus strigosus**
blueberry **vaccinium boreale**
black currant **ribes nigrum**
red currant **ribes rubrum**
gooseberry **ribes uva-crispa**

fruit trees

apple **malus domestica**
plum **prunus americana**
cherry **prunus avium**
apricot **prunus armeniaca**

nut trees

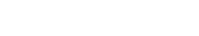
hybrid chestnut **castanea dentata**
grasses
reedgrass **calamagrostis xacutiflora**

other

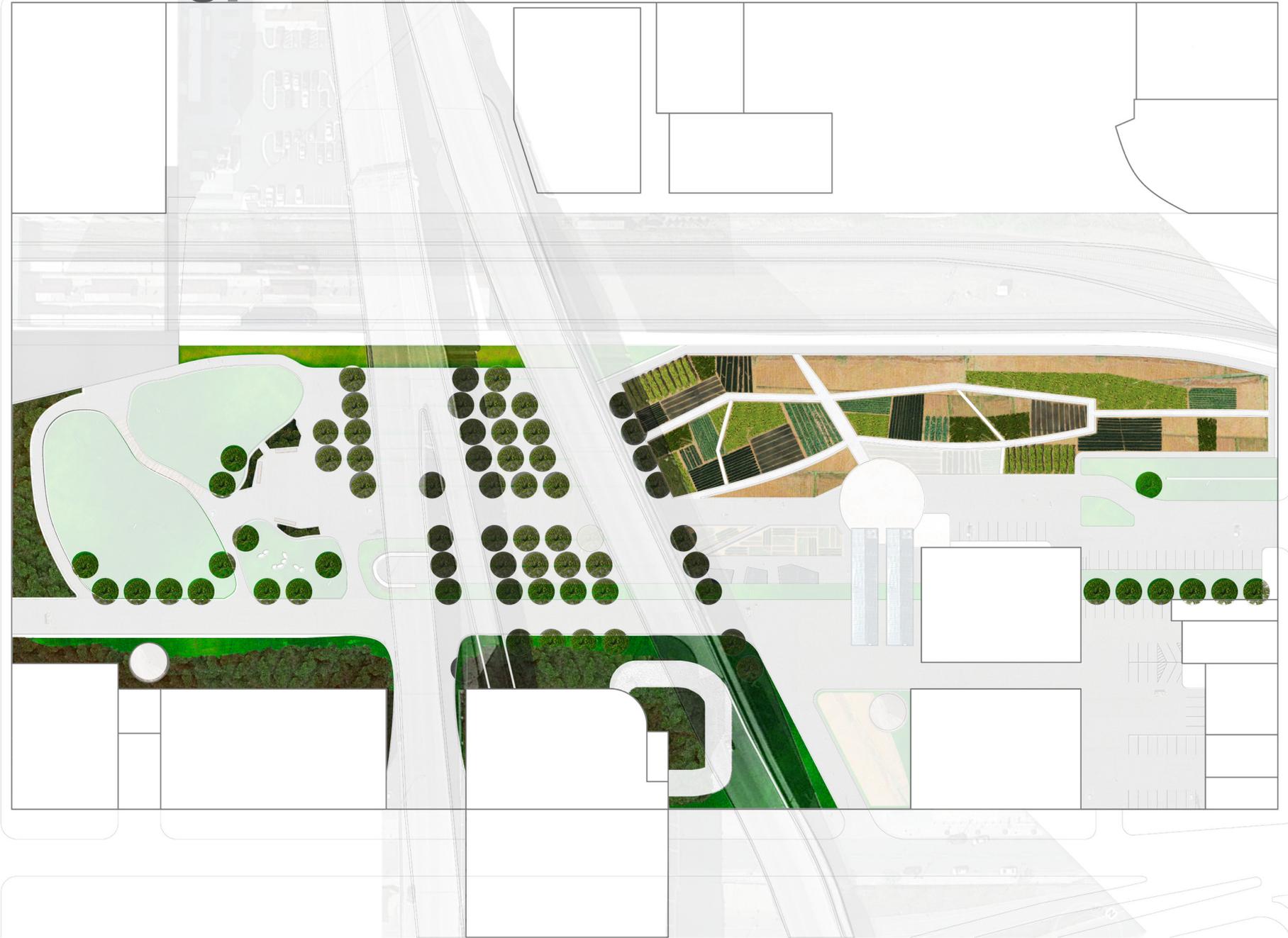
canada yew **taxus canadensis**
bush juniper **juniperus scopularum**
creeping juniper **juniperus horizontalis**
labrador tea **rhododendron tomentosum**
trailing arbutus **epigea repens**
creeping snowberry **gaultheria hspidula**
pipsissewa **chimaphila umbellata**
bog rosemary **andromeda polifolia**

garden crops

asparagus **asparagus officinalis** lettuce **lactiva sativa**
beans **phaseolus vulgaris** onions **allium cepa**
beets **beta vulgaris** parsnips **pastinica sativa**
bell pepper **caspicum annum** peas **pisum sativum**
broccoli **vaccinum myrtillus** potatoes **solanum tuberosum**
brussel sprouts **brassica oleracea** pumpkins **cucrubita pepo**
cabbage **brassica oleracea var. gemmifera** radishes **raphanus sativus -**
cantaloupe **cucumis melo var. cantalupensis** spinach **spinacis oleracea**
carrots **daucus carota** strawberries **spinacis oleracea**
celery **daucus carota** tomatoes **solanu lycoperiscum**
corn **zea mays** turnips **brassica rapa**
cucumbers **cucumin sativus** watermelon **citrillius ianatus**
eggplant **solanum melongena** winter rye **secale cereale**
garlic **allium sativum** wheat **triticum aestivum**



plantingplan



greenspace



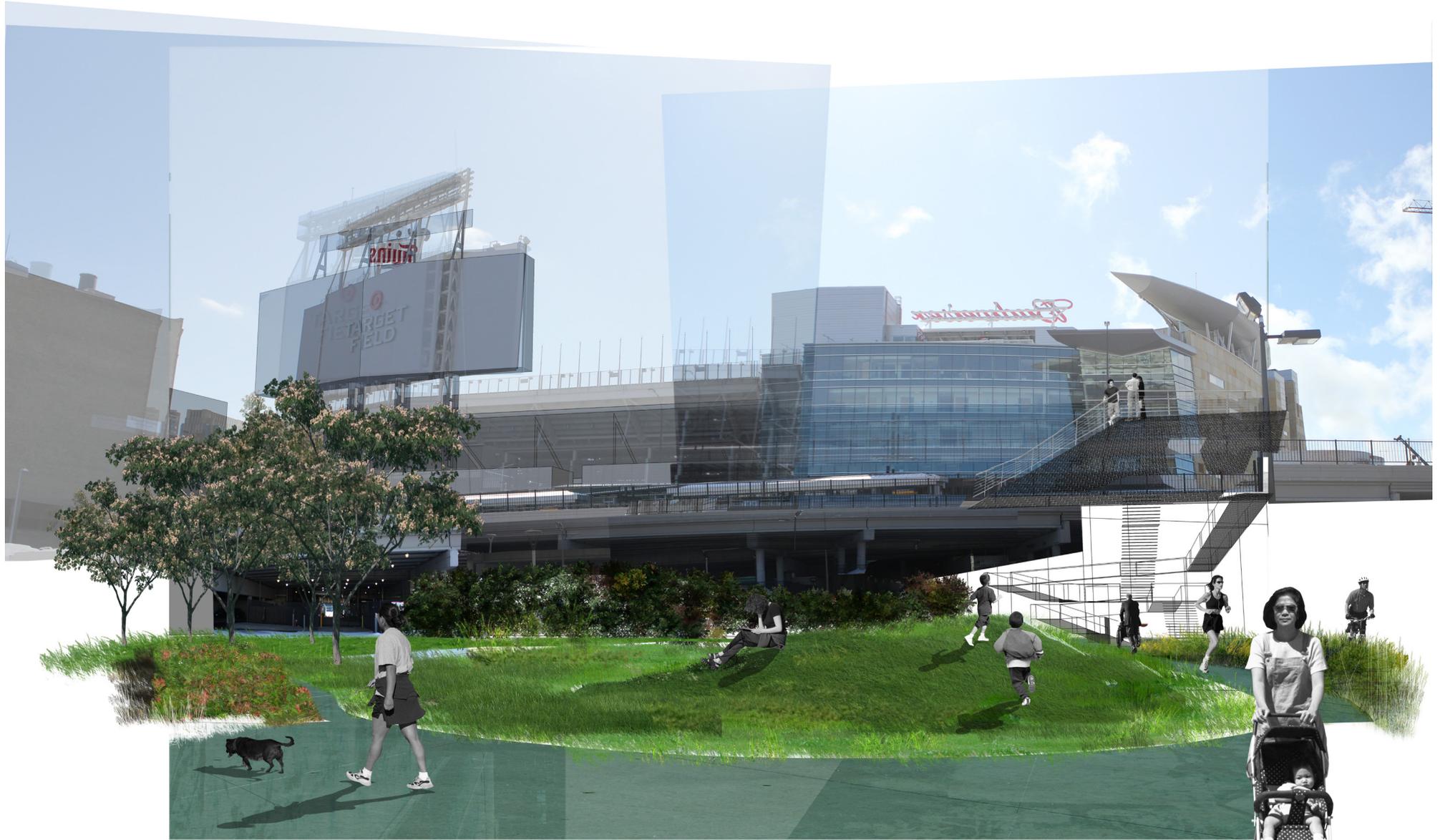
concrete

crushed concrete
(recycled)

limestone

old soil

new soil (compost mixture)



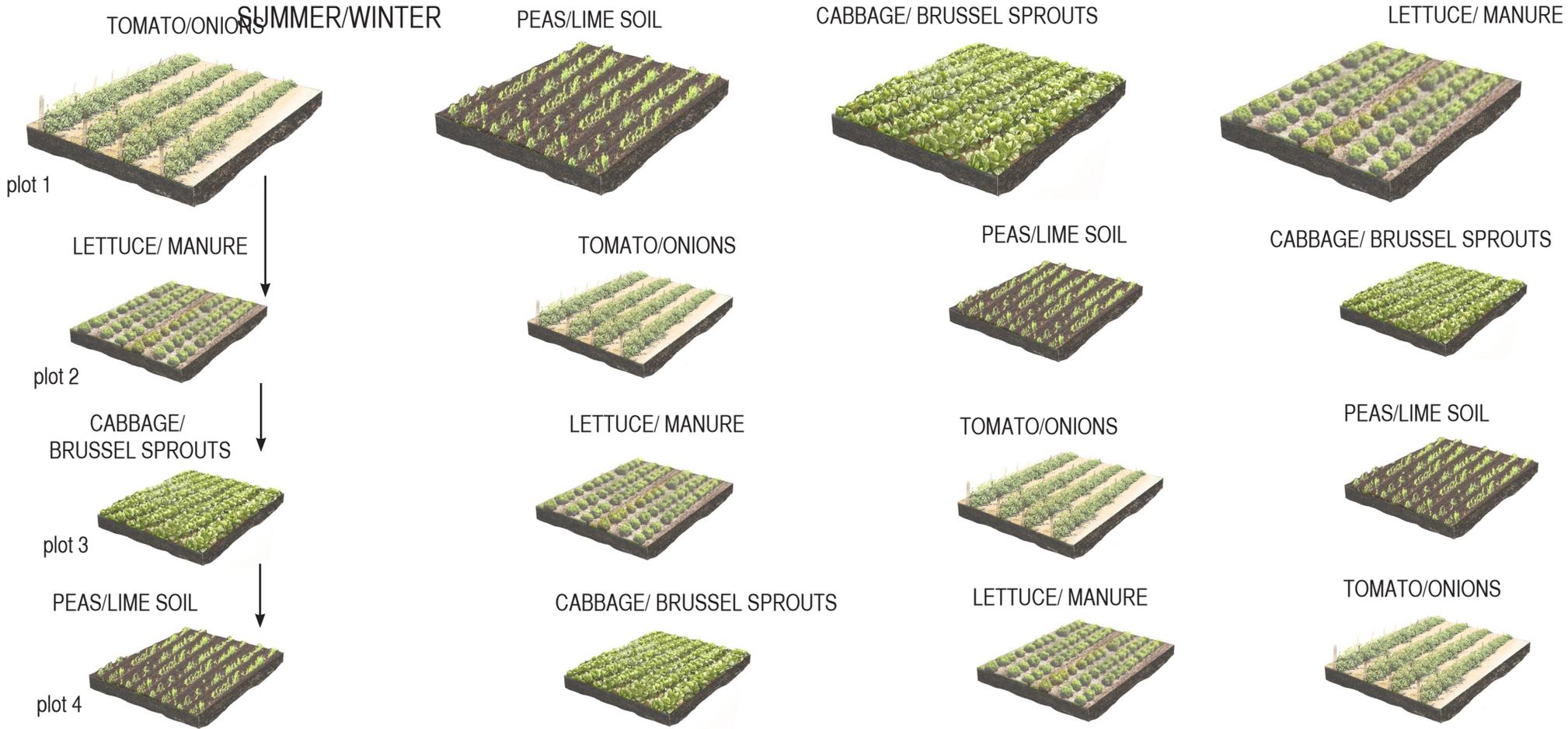
view of green space

facing southwest

The open green space is ideally located next to Target Field. It is even close enough to catch the sounds of the game. It also offers the opportunity for a public green space in an area that has none.

four bed crop rotation

Rotating crops can be a very effective method of getting the most out of a season





view of food forest

facing east

The food forest is a good example of flexible space. Like other parts of the site it can be used for a multitude of things. The large amount of flat space can be used for activities such as skateboarding, rollerblading, and running.

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