Re-Alliance

Scrap Metal Recycling Facility

Conserving the Future by Recycling the Past

Abbie Gibbs

REALLIANCE: A SCRAP METAL RECYCLING FACILITY

A Design Thesis Submitted to the
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By

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for the Degree of
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Introduction

• In the scrap metal industry there are three levels of expertise. The first is the processors who buy the scrap from a number of different sources including industrial plants, building demolition operations, and people in the community. They take this scrap and prepare it for reuse by means of a variety of techniques such as torching, cutting, baling, and shredding.**This project will include the design for the first level, the processor.**

•The second level is the brokers who are the intermediaries between the processors and the industrial consumers or users of scrap. They help the processors by locating markets for their prepared scrap and help industrial consumers by finding the supply of scrap metal they need to run their operations.

•The third level is the industrial consumers. They are the mills and foundries that buy and re-melt processed scrap. Then they manufacture new steel products from it and return the steel to the marketplace.

The typical picture of a scrap metal recycling facility consists of a dirty, polluted yard with buildings on it that look much like the scrap metal piles nearby them. The materials that come into a scrap yard are often toxic. Most scrap yards haven't dealt with the environmental issues, such as oil dripping off machinery onto the ground. The reason that scrap recycling facilities look how they do is a consequence of the processes that go on there. Heavy machinery is used to move large pieces of metal. Often times this machinery, or metal, comes in contact with the walls of the building. The current aesthetic of most scrap yards is a direct result of the industry they maintain.

The theoretical premise for this project is based on the concept of recycling. The design goals that follow define this concept further:

Design Goals

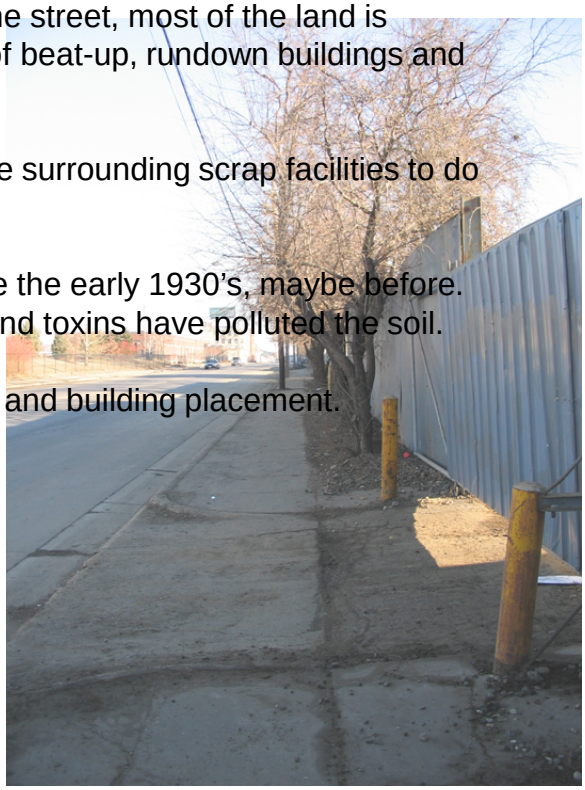
1. Renewing an urban neighborhood

2. Reinventing the recycling process through the design of a conscious facility

3. Using recycling as a concept throughout the project

1. Urban renewal

▪ The site is located in Hennipen County, just north of downtown Minneapolis. Driving down second street, one notices that the two sides of the street look very different. On west side of second street most of the companies who own the land have taken time to clean up their sites, build new buildings, and build fences to cover existing structures. On the east side of the street, most of the land is currently owned by scrap yards. They consist of beat-up, rundown buildings and old makeshift sheet metal fences.



▪ Cleaning up this site would hopefully influence surrounding scrap facilities to do the same.

▪ This site has been used as a scrap yard since the early 1930's, maybe before. The land needs to be cleaned, as years of oil and toxins have polluted the soil.

▪ Traffic congestion – eliminated by site design and building placement.

2. Reinvention of the recycling process

- Maintaining a functional, working facility is important. In order to do this, a designer must know what specific functions they are designing for.
- Through research I have found that the recycling process is a linear process. The scrap enters the site, is processed, and is shipped out.
- Site design and space planning play an important role in creating a fully functional scrap recycling facility.
- Designing a site and building specifically for a scrap metal recycling facility will generate the ability to contain and manage a dirty business.
- While recycling scrap metal is beneficial to the environment, some of the processes involved are not. Part of this project will be implementing new ideas as part of the recycling process. I will design specific facilities to house new innovations to the process of scrap metal recycling.

3. Recycling as a concept

- On the site there are currently three large steel structures. In this project I am proposing to reuse this steel as the structure for the new building.

- Other parts of this building will be made of concrete, as this is a durable, strong material. I am proposing the use of fly ash concrete, which is a concrete product made from recycled materials. There are plants in the Minneapolis area that produce fly ash concrete, so it is readily available.

With a concern for our environment on the rise, more people than ever are recycling. The scrap industry has been in effect for some time now, but the market has never looked so good for scrap dealers, or the people who sell scrap to them. In Minneapolis a single person can get at least six hundred dollars a day, for a pickup truck full of scrap. As an industry, scrap dealers do well in a city like Minneapolis, both in an economic sense for themselves and also for the local people who deal scrap.

The location of most scrap yards in Minneapolis is a four-block stretch between the railroad and the interstate, near downtown. They are easy to find and easy to get to. This area is zoned as industrial, and is therefore a good location for these businesses. They also have the advantage of not having to worry about being clean, or looking nice.

Hennepin County has been making an effort to clean up the land in their county. They can't force the scrap businesses along this four-block strip to move or clean up their property because of leases signed and contracts written that give ownership of this land for at least ten more years. This project will further the county's efforts by cleaning up one of the worst areas in the county.

The benefits of this scrap metal recycling facility would profit more than just Re-Alliance itself. The community surrounding this building would benefit in that the environment would be clean and safe, while they are still provided with jobs or a place to bring their scrap. The scrap metal industry would benefit because they will have an example to follow in designing scrap recycling facilities. The clients of the scrap dealers would benefit because they would no longer have to worry that they might be fined for selling their scrap. This entire project is proves to have a good conclusion for everyone involved.

Why Recycle Scrap Iron and Steel?

The are many benefits that come from the reuse of iron and steel. The following are seven benefits identified by the Environmental Protection Agency of why it is better to reuse iron and steel,than virgin ore, to make new steel:

- 74% Savings in energy
- 90% Savings in virgin materials use
- 86% Reduction in air pollution
- 40% Reduction in water use
- 76% Reduction in water pollution
- 97% Reduction in mining wastes
- 105% Reduction in consumer waste generated

The energy savings alone, that result from recycling steel, have a major impact on the environment. It takes four times as much energy to make steel from virgin iron ore as it takes to make the same steel from scrap. The steel made from scrap is chemically and metallurgically equivalent to the steel manufactured from virgin iron ore. Steel products can be recycled repeatedly without losing any quality. More than half of all steel manufactured in the United States is made of recycled material.

Recycling steel, as with recycling most materials, helps in controlling our volume of waste. Because we recycle steel, as of right now in the United States more than 2 billion dollars is saved in the waste disposal cost of sending used steel to the landfill. The landfill space that would be filled by scrap is conserved for materials that can not be recycled.

At full capability the United States scrap industry can process up to 140 million tons of iron and steel materials annually. By recycling scrap metal we are conserving the earth's nonrenewable supply of iron ore and coal.

Social Goals

1. Increased Employment Opportunities

▪ Part of the scrap recycling industry results from walk in trade with local people. For some people this is their only job. They bring in pickup trucks full of scrap. With a facility that is bigger and more accommodating, the company would be able to handle more walk in trades.

2. Economic Value to City

▪ Keeps cost of scrap disposal low
▪Scrap purchases are kept local, transportation cost is minimal, the money stays within the city
▪Increased property value
▪Purchasing products from other local companies: fuel/oil, utilities, property taxes

3. Environmental Standards

▪ Historically scrap yards have not been designed, rather the company has bought land and developed it without concern for the environment. This project will take a scrap yard and design the site according to environmental standards.
▪ Having a site that is big enough to adequately house the building and proceedings of the scrap business will allow the clean up of scrap materials on site. This alleviates the difficulty of cleaning up materials and environmental issues faced by scrap dealers as a result of not having enough space.

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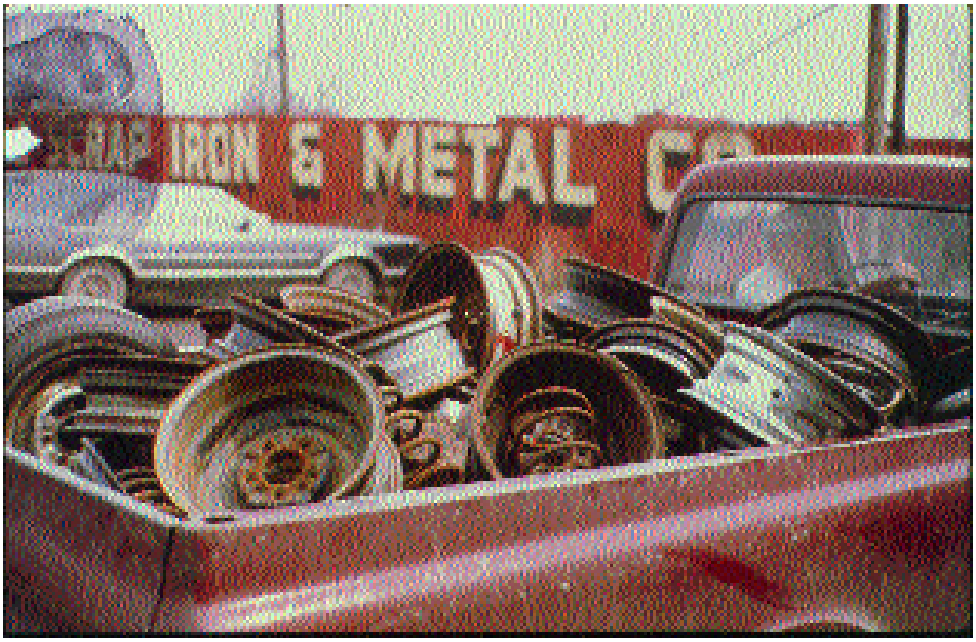
Project Elements

There will be two clients for this project. The first will be the owners of the business, Re-Alliance. Re-Alliance is a new scrap metal recycling company, created by the merging of Residual Materials Incorporated of Grand Forks and Alliance Steel of Minneapolis. As the new business in a town with old scrap dealers, they would like to get an upper edge. Designing a new building would do this for them, but they are also concerned with the practices of the scrap metal industry in general. Since they have this unique opportunity to build new, they would like to employ the latest in environmental technology to enhance their process of recycling metal. As this is an urban design project, the second client will include Hennepin County and the City of Minneapolis.

The users of this facility will include Re-Alliance's international client base, local businesses, and local people who bring in scrap daily. Spaces in this building will be used by a large range of people including business CEOs to local transients and need to accommodate everyday scrap yard procedures while maintaining a professional office feel.



Project Elements

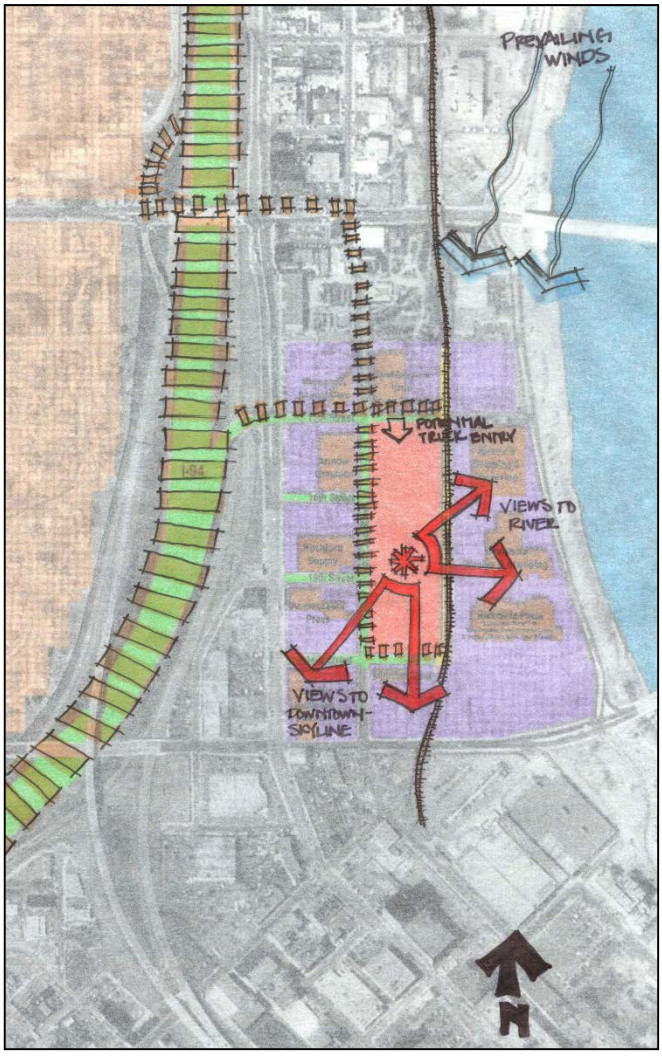
- Offices
- Reception Area (Secretary, Public, Clients)
- Storage
- Meeting Areas
- Kitchenette
- Employee Break Room
- Bathrooms
- Mechanical / Electrical
- Circulation
- Warehouse
- Bailing Area
- Shop / Turnings Building
- City Scale
- Truck Docking Area
- Scrap Yard
- Parking

The site for this project is located in the warehouse district near downtown Minneapolis on Second Street. The location of this site is ideal for this project for a number of reasons. The context of the surrounding area is made up of light industrial buildings and other scrap metal recycling facilities. The scrap metal business for Minneapolis has been located here since its start. One of the primary clients of the scrap yards is the city of Minneapolis. Also local people bring in scrap daily. This is a prime location because it provides ease for both the city and the local people in delivering their scrap metal to be sold.

The site is right next to the interstate. Any trucks coming in, hauling scrap metal, are easily able to access the site, without disturbing any residential or commercial areas. The site is also located along the railroad tracks. As of right now the railroad is unwilling to sell this land to Hennepin County in fear that the county would put a light industrial building there that wouldn't use the rails. The railroad must remain there though, in order to service the Minneapolis Tribune. The railroad has agreed to sell the land to the existing scrap businesses around it. A common method for removing scrap from the yard is by loading it onto rail cars. By providing another customer for the railroad, this placement of the site will benefit both the railroad and its users.

Because of its proximity to downtown Minneapolis this site will provide inspiration in the design of the building. Looking south one has a perfect view of the Minneapolis skyline. The current buildings around it are either dilapidated or designed for convenience, rather than aesthetics. The location of this site allows for the opportunity to renew a run down neighborhood.

This site is a prime location for a scrap yard with a number of advantages and few disadvantages. The first opportunity that arises is site access and circulation. As many of the customers are commercial manufacturers, the scrap they bring in is transported by semi-truck. The proximity to the interstate allows easy access both to and from the site for truck drivers. The trucks will not need to drive through any part of town, avoiding both residential neighborhoods and also commuting routes used by the people who live here.



Some of the business is brought in by individual people who live in north Minneapolis. This site is also easy for them to access. It is a site they know well because this area is the place where they have always brought their scrap metal. The individual people bring their scrap to the facility a number of ways. Some bring it in the back of a pickup truck, some transport it by trailer, and others bring it in shopping carts. By keeping the facility in this area commonly known as a scrap dealing area the city will avoid increasing interstate traffic. If the facility was moved to a site outside of town, people would be driving their pickup trucks full of scrap, which are often times very old and run down, on the interstate, risking breaking down or losing pieces of scrap metal.

The other side of site access occurs in the shipping of the sorted scrap from the site. Again, some of the business is done by trucking. A scrap dealer loads trucks with the sorted scrap to be brought to other recycling facilities. These trucks will have easy access to the interstate. Another way that scrap dealers ship their product is by railroad. The railroad borders the east side of the site and is currently used by the scrap yards in this area. The only other company to use the railroad in downtown Minneapolis is the Star Tribune, which is half a mile to the south of this site. This facility would use the proximity to the railroad to their advantage as a fast, efficient way to ship the scrap metal.

One issue that the city has with scrap metal recycling facilities is their look. Scrap yards are dirty places with piles of metal everywhere. This is where the second advantage of this site comes into play. Hennepin County is in the process of trying to cleanup this neighborhood. The west side of second street, on this four block stretch, has been recently refurbished. The sites have been cleaned and new buildings have been built. The east side of second street consists of scrap yards which haven't been touched. As you drive down this street and look at the east side you see rundown buildings, piles of metal and dirt, and fences made of all different materials including sheet metal, chain-link, and broken concrete block. There are a number of ways to layout and design this site which will allow the scrap yard to be totally shielded from second street. The east side can be completely shielded and the west side of the scrap yard will border the railroad.

Urban Renewal – As the site is located near downtown Minneapolis, this will be a project of urban renewal. Hennepin County has commissioned people to clean up their property and have provided government funding in order to do this. In their effort have also bought land and cleaned it up themselves. The urban neighborhood that this site is located in is in dire need of restoration.

Environmental Issues – The character of the materials that enter a scrap yard are most often dirty and covered with different pollutants. As the designer of the facility that handles these materials, I will be researching methods of toxic waste disposal as well as other site issues, such as drainage.

Scrap Metal Recycling – Scrap metal recycling is a business that many have heard of, but don't really know about. This project will give me the ability to research the processes involved in the recycling of scrap metal. Through this research I will be designing the most innovative scrap metal facility yet, to be imitated by other facilities.

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Plan For Proceeding

In recent years, with the improvement of the economy, the scrap dealing business has been on the rise. The cleaning up of our environment has also been a growing concern. The two do not go hand in hand, but rather, clash. The idea of recycling is good and is a way of taking a positive step towards a cleaner environment, but the way in which scrap recycling is done is not. Does it make any sense to recycle if the process of recycling is more harmful to the environment than just throwing the product away? As a traditionally unclean business, the scrap industry needs to take an active role in cleaning up their process.

The design of a site and building for a scrap metal facility will influence the recycling processes, while at the same time this recycling process will influence the design. This will be a project of updating an old process and bringing the scrap metal industry into the age of environmental concern. Researching the newest practices and maybe even inventing better recycling processes will achieve this.

The first step in this design process will be to conduct a thorough site analysis and to research the scrap recycling process. I will take what I learn through this research and apply it to the rest of the project. From that point I will start laying out spaces and decide what the architecture that encloses them looks like. I will then refine my project and learn, through the researching of building construction details, how this building can be built.

2nd Year

- Fall (Yergens)

  -Additive/Subtractive Cubes, A Study of Space
  -Dwelling Wall
  -Downtown Bistro

- Spring (Hatlen)

  -Fargo Pocket Park / Coffeehouse
  -NDSU School of Business
  -Prairie Green Sustainable Home

  -Pedestrian Bridge

3rd Year

- Fall (Prafke)

  -Ronald McDonald House
  -Implement Dealership

- Spring (Martins)

  -Fluid Motion Dance Studio / Fitness Center
  -NDSU Memorial Union (Masonry Competition)

4th Year

- Fall (Barnhouse, Urness, Walters)

  -Urban Design

- Spring (Kratkey, Booker)

  -Low-Income Housing Development (Marvin Windows Competition)
  -High-Rise (Flad Competition)
  -Kite Design

5th Year

- Fall (Waronker)

  -Olympic Gallery
  -United States Supreme Court

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Research Results

Alliance Steel Service Company

115 31st Avenue North, Minneapolis, MN

History:

Alliance Steel was started by Henry Davis and Fred Schwartz in 1957. In 1976 Harold Goldfine and Charles Schwartz joined the company. Soon after they joined the company moved into a new modern building that provided an increase in operation. In 1985 Harold Goldfine and Charles Schwartz bought the company. Charles retired in 1995 and today the company is managed by Harold. Alliance Steel services over 200 industrial accounts and provides needed scrap to over 25 consumers.

Customer Base for Recycled Materials:

Industrial Manufacturing Companies
- Custom Fabrication and Machine Shops
- Commercial Printers
- Reputable Scrap Brokers

Alliance Steel purchases, sorts, packages, and transports:

Steel-Aluminum-Copper-Stainless Steel-Brass

Services:

- Scrap metal recycling for mill-direct shipping within a 24-hour period
- Collection site for coolant disposal from steel/cast iron borings
- Prompt and safe material handling
- National and international brokering capabilities

Environmental Compliances:

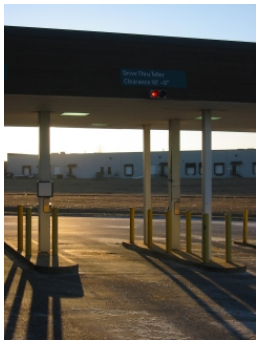
- Storm water permit requirements
- Storm water Pollution Prevention Plans
- Collection and disposal of stockpile runoff

Paying the customers is a vital part of everyday business in the scrap industry. Currently customers are paid in two different ways. The public customers enter into the offices and get paid by the secretary at the desk. The commercial customers must drive their trucks onto a scale to be weighed before and after they drop off a load of scrap. A scale ticket is then given to them, which they take back to the company. The way the commercial customers get their scale ticket is either by parking and entering the building to get it from the secretaries, or they get it through a pay window. These two methods create a few issues. The first is parking. If every commercial customer had to find a place to park their truck so they could come into the building, on site parking would be an issue and the site would need to be much larger. If a commercial customer uses the pay window site circulation becomes an issue. In the event that they are using a pay window they need to be able to drive up next to the building on the driver's side of the truck. This also creates site issues in having room to turn around. In this option trucks are also driving very close to the building, which is undesirable.

Odessa Credit Union

One way to alleviate this problem with trucks might be to look at ways other buildings deal with circulation. Banks use tellers and drive-thru windows. This might be an option, as the trucks wouldn't have to drive up next to the building, and the place they pick up their scale ticket could be located anywhere on the site.

Banks use tellers and a drive-thru system to allow customers to complete transactions without leaving their vehicle.



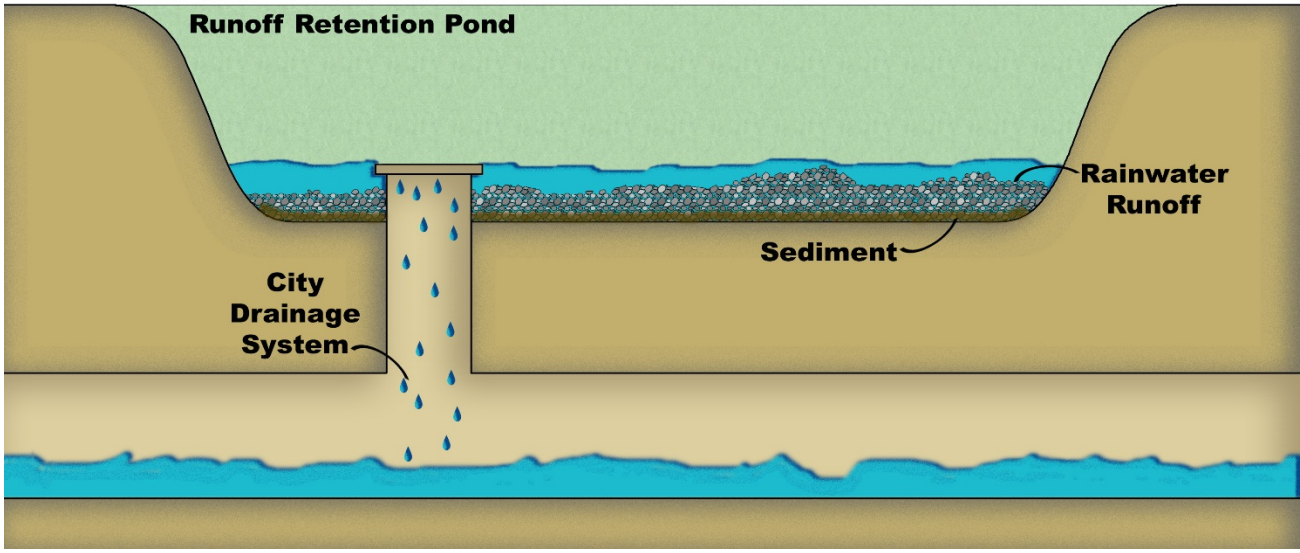
A scrap dealer could employ the same technology that banks use for payment. This would allow for the payment ticket to be administered anywhere on the site alleviating circulation problems.

On the site of a scrap dealing facility drainage is an issue. Often times scrap metal is dirty with dust and mud. When it rains the water runs off the scrap, taking the dirt with it. There are two ways to deal with this issue. One way is to let the water run off the site into the city drainage system.

The other choice is to build a runoff retention pond. In this option the water is stored in a pond with a drain in it. If the water rises above the drain it runs down into the city drainage system, if not it stays in the pond and evaporates. In this system the sediments gather in the bottom of the pond, instead of going into the city pipes. This option is desirable on a scrap metal recycling facility site. With a retention pond, the sediments collected would be tested for contaminates. This would decrease the chance of polluting the environment.

Using a runoff retention pond on the site of a scrap recycling facility is important in maintaining an environmentally friendly facility. By using ponds like this I would be able to maintain my goal of designing a facility that adds to the already environmental practice of recycling.

A&M Business Interiors: Rainwater Retention Pond



High Volume Fly Ash Concrete

Concrete is a very versatile, strong, and durable building material that is used worldwide. It is made of gravel, sand, water, and cement. Although concrete is a good building material, there are problems with the manufacture of the cement part. Six to seven percent of the total carbon dioxide in the world is produced during the manufacture of cement. This fact makes concrete sound as though it is not as desirable of a building material as one would think.

Fortunately, cement is easily replaced by a waste product called fly ash concrete. Fly ash, made of silica, alumina, and iron, is a non-combusted by product of coal fired power plants. By using large volumes of fly ash in concrete, a stronger, more durable product is produced, and the environment benefits from it too. The use of fly ash provides other benefits too. Because of the composition of fly ash concrete it is able to fill small voids, creating denser concrete and also decreasing the need for water in making it. By using less water, the chance for the concrete to crack is reduced.

Fly ash concrete is also less costly than conventional concrete. The only added cost would be if the product needed to be shipped. This would not be a factor, since fly ash is found locally in the Minneapolis area.

Product Comparisons

Fly Ash Concrete	Conventional Concrete
Less energy intensive manufacture	Energy intensive manufacture
Higher ultimate strength	Weaker ultimate strength
More durable	Less durable
Requires less water	Requires more water
Uses a waster by-product	Uses virgin materials only

www.greenresourcecenter.org

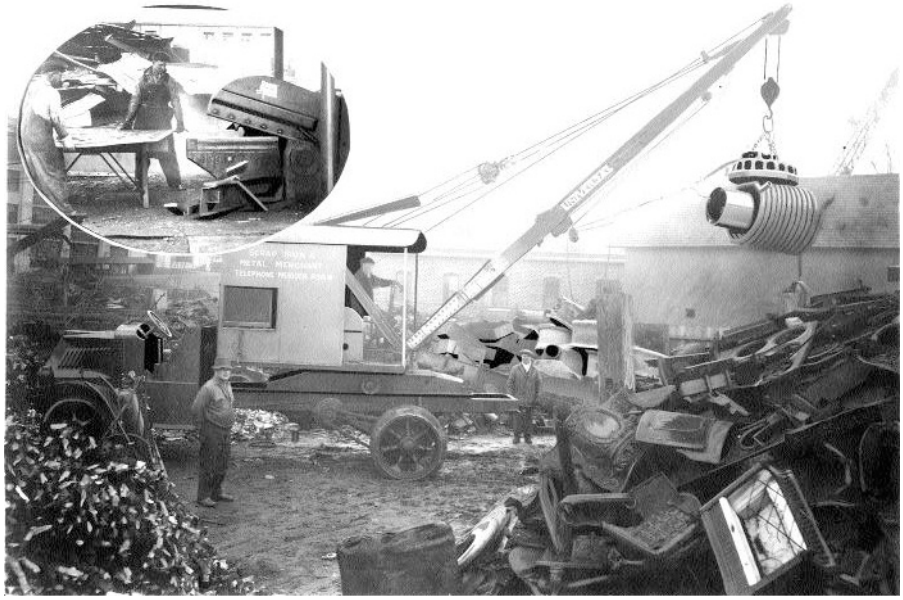
History of scrap dealing

Scrap recycling has been around as long as iron making. When the first metal product was manufactured, the first opportunity to recycle metal was born. There have been few times in history when there wasn't a market for scrap metal but in the United States scrap use was historically greatest during wartime. George Washington knew the value of scrap metal and encouraged the recycling and reuse of it.

Metal collecting for reuse dates back to the American Revolution. Colonial women would donate their iron kettles and pots to be melted down to make weapons. The civil war also brought about an increase in collecting scrap metal. During World War II scrap played a vital role in preparing America for war and sustaining the wartime production. Everyone was involved from collecting scrap to processing it for manufacture into weapons.

In the 19th century the United States has changed its methods of production as a response to the Industrial Revolution. The iron and steel industry grew, along with a growing demand for quality products. This forced manufacturers to become more sophisticated and it created changes in mechanization, collection, transportation, and processing, which caused rapid industrial growth. This created an increased demand for scrap, making it economically feasible for scrap dealers to provide recycled metal to mills and foundries. There was an increase in supply and demand for the scrap industry. With this increase came the expansion of the peddler trade. The early American entrepreneurs began by traveling through towns and rural areas with backpacks and horse drawn carts, in search of worn-out implements and anything they could resell to the mills and foundries. These people were the first scrap dealers. It was during this period that collectors and dealers started buying scrap from metal making fabricators which they processed and made into prepared scrap.

Different methods for making steel were introduced, causing changes in the scrap dealing business. During the Industrial Revolution the open hearth furnace for steel making was invented. It used much more scrap in the steel making process than the previous method, producing an increase in scrap demand.

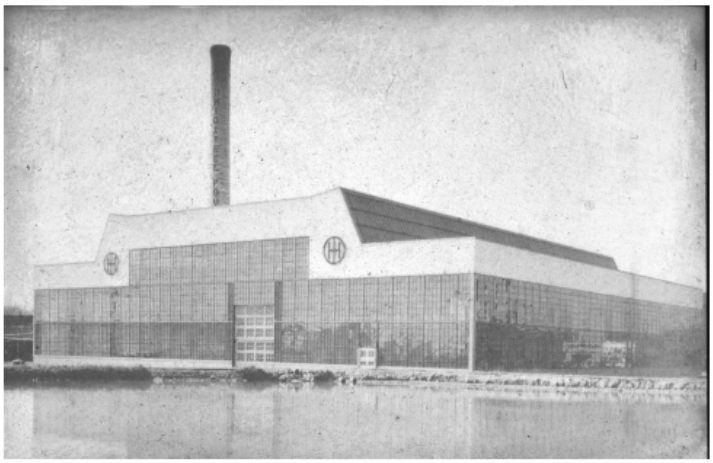


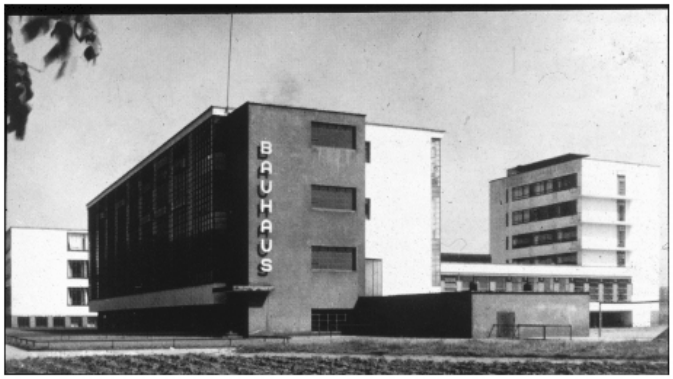
Early scrap processors faced many challenges and having the job of handling scrap was demanding, undesirable, and was a low profit business. They did not have machinery to aid them in their grueling task of handling scrap. They used chisels and sledge hammers to break apart large metal objects. Sometimes they even used the weather to their advantage by taking almost frozen water and pouring it into the cracks of cast iron and steel and waiting for it to freeze and expand, breaking the metal apart. By the 20th century innovative methods for handling scrap were being developed including shears, balers, torches, and crushers. These improvements in scrap handling helped to modernize the industry into what it is today.

In the 1950's a new method of steel making was introduced, the oxygen furnace. Unlike its predecessor, the open hearth furnace, it used only a small percentage of scrap metal in the production of new steel. This caused a decrease in the demand for scrap metal. Although the demand for scrap metal was down, a new need for scrap processors was born. The numbers of abandoned automobiles on the streets and and roads was increasing rapidly. Everyone was becoming concerned with the scenic and environmental degradation caused by these abandoned automobiles. The scrap industry responded by introducing shredders that were able to turn these autos into fragments in seconds.

Today's scrap industry has emerged from its roots of peddlers with backpacks and horse drawn carts into a vital, service-oriented, competitive business.

Industrial Buildings: Linear Look

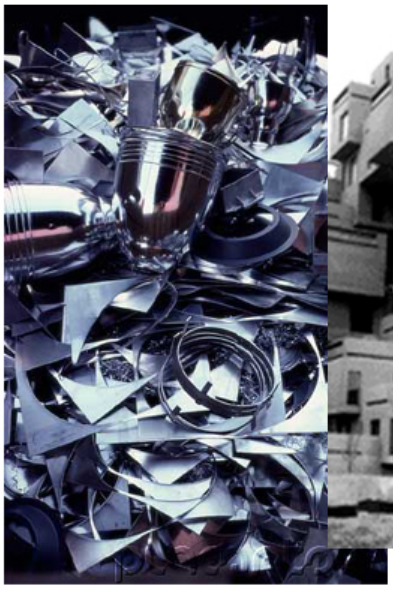




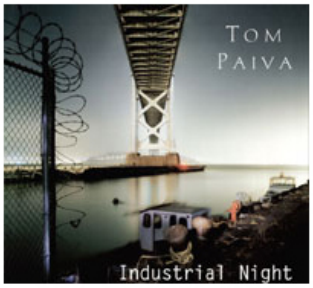
Industrial Buildings: Repetitive Forms

Industrial Buildings: Massive Structures

Scrap Metal as it relates to built features

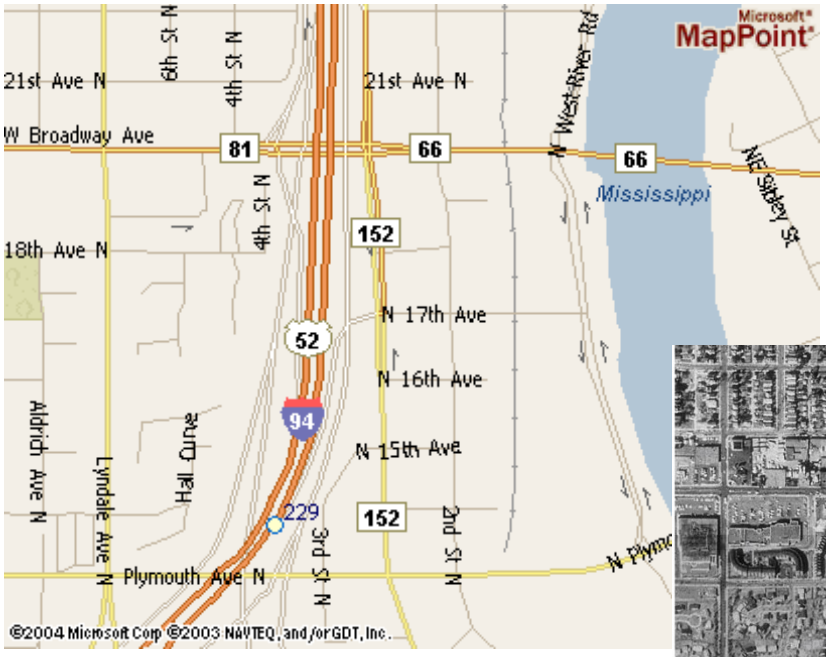


Steel Structures



Site Location

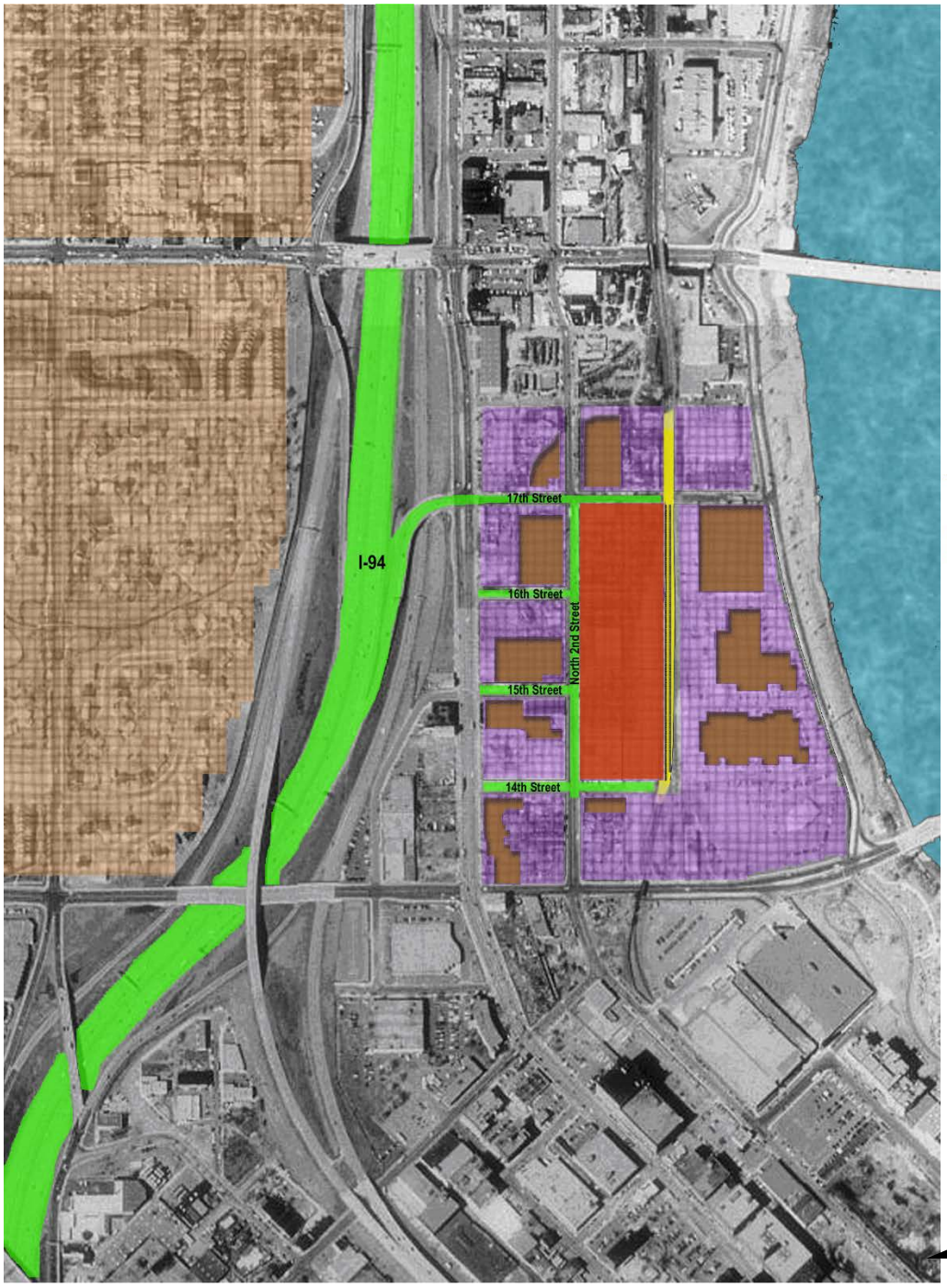
The site is located in Hennepin County on second street north between sixteenth avenue and fourteenth avenue. Two blocks to the east is the river and two blocks to the west is interstate 94. One side of this site borders the railroad. Two miles to the south of this site is the heart of downtown Minneapolis. This area is the old part of Minneapolis, where the city started with the flour mill. This part of Minneapolis has historically been used as an area for scrap metal recycling and continues to be today. Neighboring buildings include a number of industrial manufacturing facilities as well as other scrap salvage yards. The area is zoned as both light industrial and medium industrial.



Average temperatures for Minneapolis range between 20 – 70 degrees. Average precipitation in a year is around 30 in. The average wind speed is 10.6 mph and the prevailing wind direction is from the northeast to the southwest.

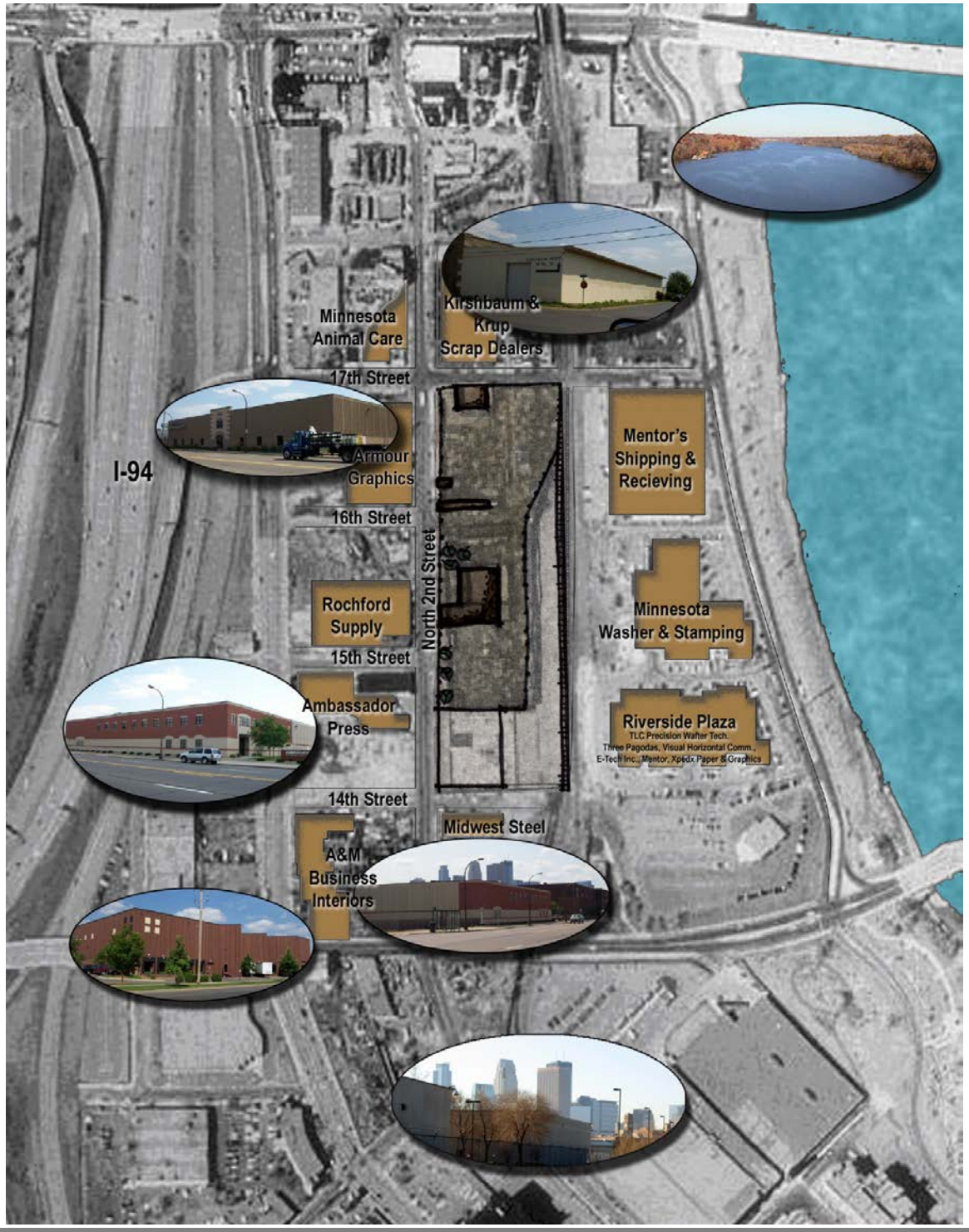
Zoning

The zoning for this area of Minneapolis includes light to heavy industrial



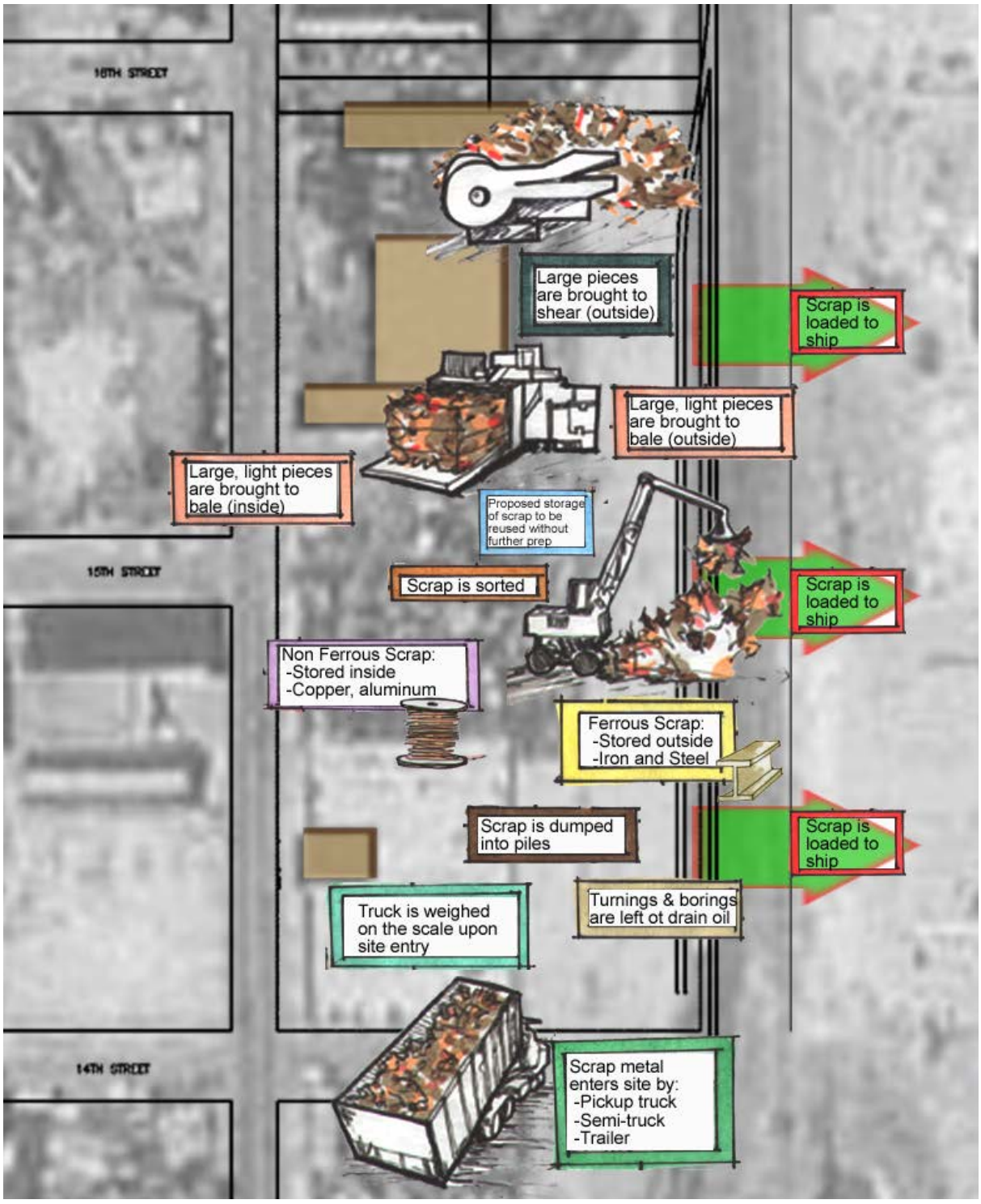
Context

The site is surrounded by manufacturing companies and other scrap recycling facilities.

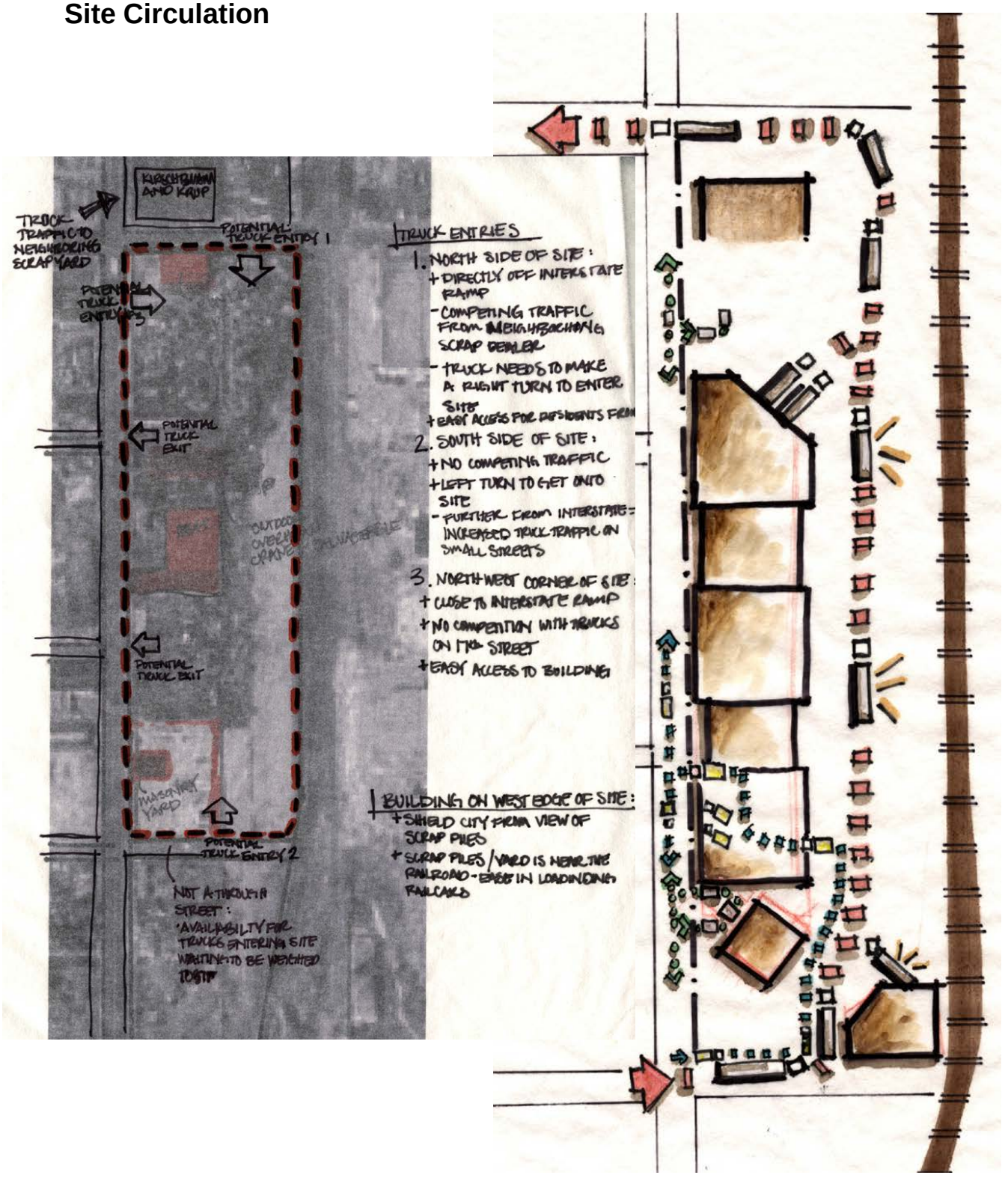


Recycling Process on the Site

I took my research of the recycling process and laid it out on the site in order to determine circulation patterns,



Site Circulation



Types, Sizes, and Requirements of Spaces:

1. Office Space: (1,500 sq.ft.)

The office space includes five offices total with space for meeting. The five offices consist of two executive offices, a facility manager, and two offices for sales people. The offices will be used mainly during the day from 7:00am to 6:00pm. The offices should be near to the reception area. The office environment should be professional, as this is the place where the business dealings take place.

2. Secretary/Reception: (1,500 sq.ft.)

The secretary/reception area will be an open office with desks for three secretaries. This area will have a small kitchenette. This area needs to include a pay station for transactions with public customers. In this space there will also be a lobby or waiting area. Both the public customers and the commercial customers will be using this area during regular work hours from 7:00am to 6:00pm. This space will be a high traffic area and must be easily accessible. Proximity to the scrap yard and the warehouse is essential.

3. Break room: (200 sq. ft.)

There will be a separate break room for employees. This area will need to be easily accessible to employees who work in both the yard and in the warehouse. The break room should have seating, a table, a kitchenette, and vending machines. The space will be open to the employees throughout the workday, for their use during break times or lunch. The employees and their line of work must be considered when picking materials for the design of the break room. It should be a comfortable, relaxing space made of materials that are easy to clean.

4. Warehouse: (35,000 sq. ft.)

- 10,000 sq. ft. for public customers. This area will include parking for pickup trucks and drop off.

- 15,000 sq. ft. for commercial customers. This is the largest part of the warehouse with room for shipping, receiving housing, and processing scrap. The loading dock for semi-trucks will be connected to this part of the building. The loading dock must be 4'-6" above grade to allow for semi-trucks to dock.

- 10,000 sq.ft. for bailing. This area must accommodate space for a baler. A baler ranges in length from 200'-0" to 250'-0", in width from 59'-0" to 65"-0", and in height from 35'-0" to 50'-0".This part of the warehouse should be accessible to both the public customers and also the commercial customers.

The warehouse is a place for storage and for working with the scrap. Trucks, cars, and pickups are driven in and near this part of the building. Scrap is moved around by forklifts and piled against walls, therefore the materials used in this part of the building will need to be durable and strong. Low windows are not necessarily desirable in this space because they are will get dirty easily and be hard to keep clean. Generally the warehouse space is not heated as it is an indoor/outdoor space. The fact that this space is not heated should be taken into consideration when deciding on materials for construction of this space. The use of natural heating and cooling techniques would be ideal.

5. Turnings/Borings and shop building: (9,000 sq. ft.)

Because of the nature of the material, turnings and borings will need a separate area to be processed. This building will be located near the railroad and allow for railcars to enter it. The turnings and borings will then be loaded into the railcars here. This building will also include a shop area for general mechanical work. This building will be designed with a drainage basin in it to allow for the oil to drain off the turnings and borings.

6. Scrap Yard: (150,000 sq. ft.)

The scrap yard is where the steel piles are kept. Three materials handlers are kept in the yard. The yard will also include a loading dock connected to the warehouse. There will be a scale to weigh trucks as the enter and exit the yard. The yard should include room for storage bins waiting to be shipped.

7. Parking: (35 spaces)

On site parking should include space for thirty-five cars, both customers and employees. There will be two indoor parking spaces for executives.

8. Bathrooms: (3 at 50 sq. ft. ea.)

In this building there will be different bathrooms, according to the spaces. The office area will have a bathroom and the shop employees will have a separate bathroom with shower-rooms.

9. Mechanical: (300 sq. ft.)

The mechanical room will be used to service the office area and should be located in close proximity to it.

10. Circulation: (1000 sq. ft.)

This circulation is for the office space only.

Office Space

2 Executive Offices		200 SQ FT (ea)
1 Facility Manager		180 SQ FT
2 Sales Directors Offices	150 SQ FT (ea)	
Meeting Space (3 areas)	620 SQ FT (total)	
Total:		**1500 SQ FT**

Reception/Secretary

Space for 3 Receptionists (Modular desks)
Pay Station
Lobby/Waiting Area
Total: **1500 SQ FT**

Break Room

Seating Area
Kitchenette
Table
Vending Machines
Total: **200 SQ FT**

Bathrooms

One Bathroom Per Area (three total)	50 SQ FT (ea)	
Total:		**150 SQ Ft**

Mechanical

Office space mechanical **300 SQ FT**

Circulation **1000 SQ FT**

Total Building Square Footage: **52,350 SQ FT**

Warehouse

Area One: 10,000 SQ FT
- Public Customer drop off
- Parking for pickup trucks (12)

Area Two: 15,000 SQ FT
- Commercial Customers
- Storage/Sorting area
- Loading dock connected (4 Semi-Trucks)

Area Three: 10,000 SQ FT
- Bailing area – Bailing machine needs to be here
- This area should connect to both area one and two

Total warehouse square footage: 35,000 SQ FT

Turnings/Borings and Shop

Turning and borings processing 5250 SQ FT
Proximity to railroad is important
Ability to drive a rail car into this building, drainage basin
Shop space for general mechanical work 3750 SQ FT
Total: **9000 SQ FT**

Scrap Yard

3 Steel piles with a diameter of 50 feet and a height of 30 feet
Crane (3)
Loading Dock
2 scales to weigh trucks (underground) 12ft x 80ft
Total: **150,000 SQ FT**

Parking

Parking Spaces for 35 cars
Total: **180 SQ FT**

General Notes:

▪ The pay station in the reception area will be used by the public customers. A separate automatic pay station will be located near the exit scale for the commercial customers.

▪The public customers consist of people in the community. Often times these customers are transients or of a rougher crowd. These customers transport their scrap by pickup, shopping carts, and crates.

▪The commercial customers consist of large scale companies and other scrap dealers. They transport the scrap using semi-trucks.

▪All building materials used in this project will be innovative, strong, durable, and aesthetically appealing.

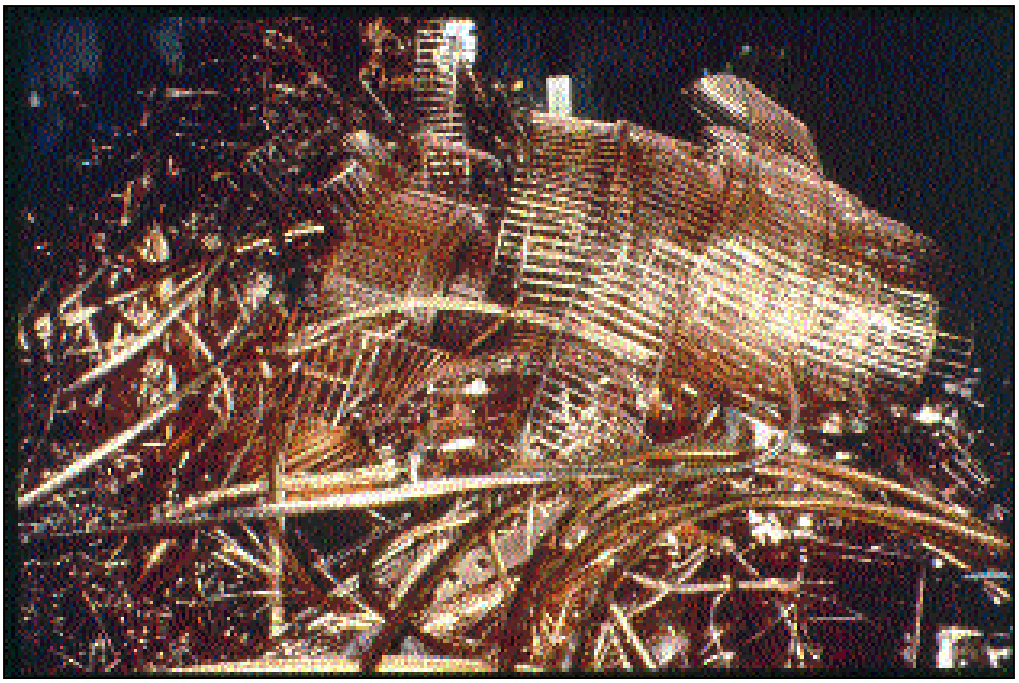
Definition of Terms

-Turnings and Borings are the scraps produced when metal forms are made. They are small shavings that result when metal is cut with a lathe or a grinder. When they cut the metal they spray it continually with oil. These turnings and borings that come to the scrap yard are covered with this oil and therefore need to be processed separately.

-Steel pile: A steel pile can range from fifty to sixty feet in diameter and be up to thirty feet high.

-Ferrous scrap: Old or obsolete iron and steel resulting from items such as automobiles, household appliances, farm, office and industrial equipment, buildings, and bridges that have been torn down which is processed and re-melted repeatedly for the manufacture of new objects.

-Industrial scrap: New scrap that is generated in manufacturer's plants including stampings leftover when a metal piece of an appliance, automobile, etc.is made. Turnings and borings are industrial scrap.



Equipment Descriptions

-Crane (material handlers): The crane is the equipment that is used in the scrap yard to lift and separate scrap into piles. There are two types of cranes, one being the cable model and the other being a hydraulic crane. Both of which are available on a crawler, truck, pedestal, gantry, rail or overhead mountings. An electromagnet is attached to the crane ranging from thirty to one hundred inches in diameter and weighing up to twelve tons. A sixty-nine inch magnet, the size most commonly used by scrap dealers, can lift more than 4,000 pounds of steel scrap.

-Bailer: A bailer is used to compress metals that require greater density before melting. A bailer is a large machine, the largest having 600 horsepower. This size machine can take three flattened automobiles, without engines, and in less that two minutes produce a 5,400 pound bale that is 36 inches by 24 inches by 60 inches. This machine can process 40 tons of scrap per hour.

-Shear: The shear is a cutting machine varying in size from 300 tons to more than 2,000 tons of head force. The shear knife is made of chrome-nickel-molybdenum alloy steel and has cutting edges on four sides which are rotated as the blade gets dull. The shear slices heavy pieces of steel including I-beams, ship plate, pipe, and sheet metal.

-Shredder: The shredder is the largest piece of machinery. It is made up of large heavy hammers which pound automobiles, household appliances, and sheet metal to pieces. A shredder can turn an old automobile into a fist-sized piece of scrap in less than a minute.

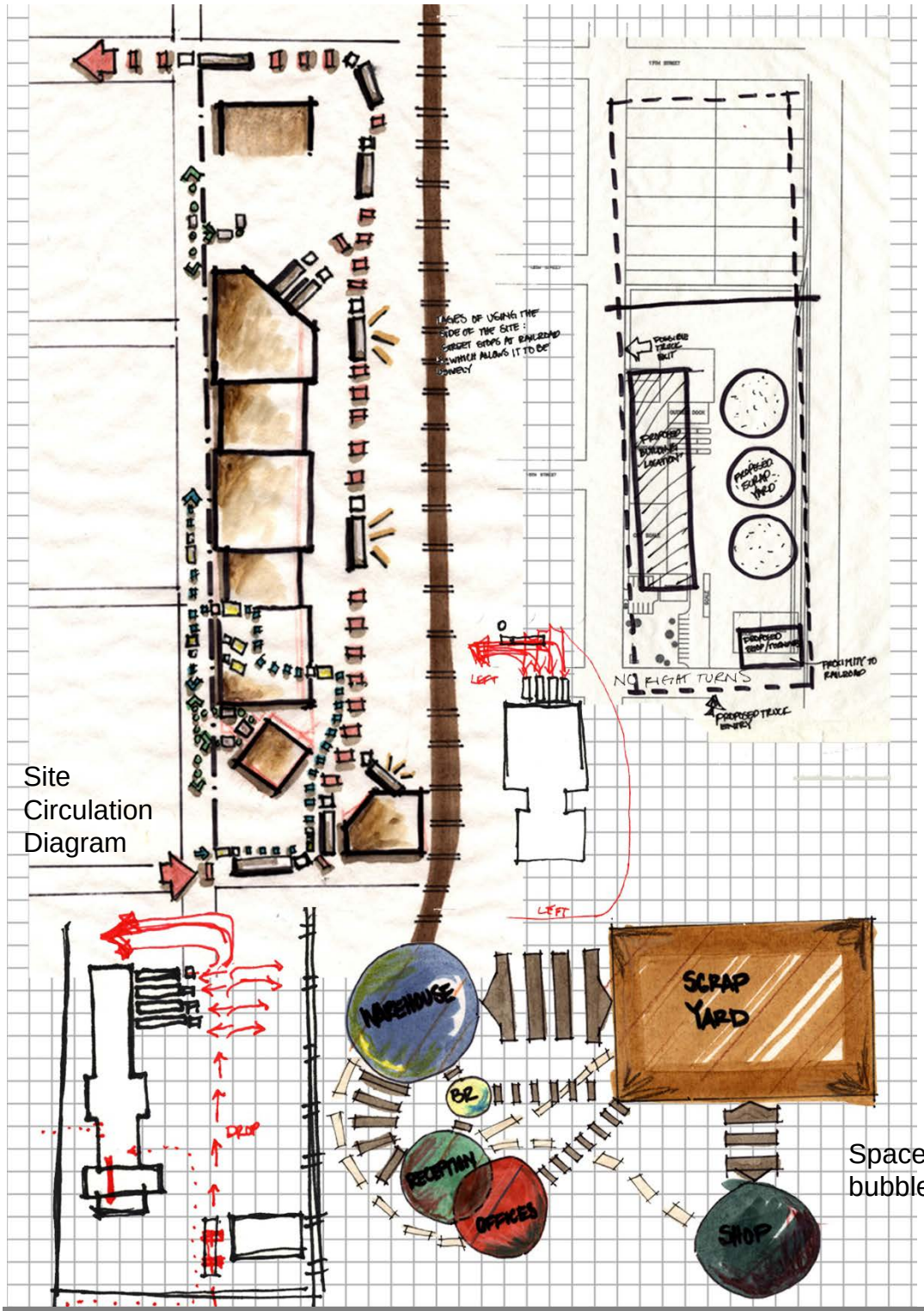
Re-Alliance

Scrap Metal Recycling Facility

Conserving the Future By Recycling the Past

Design Process and Solution

Site Design – I started out my site design by laying out the process of recycling on the site. I was then able to determine circulation patterns. Next I drew bubble diagrams in order to determine how the building space fit into this circulation pattern.

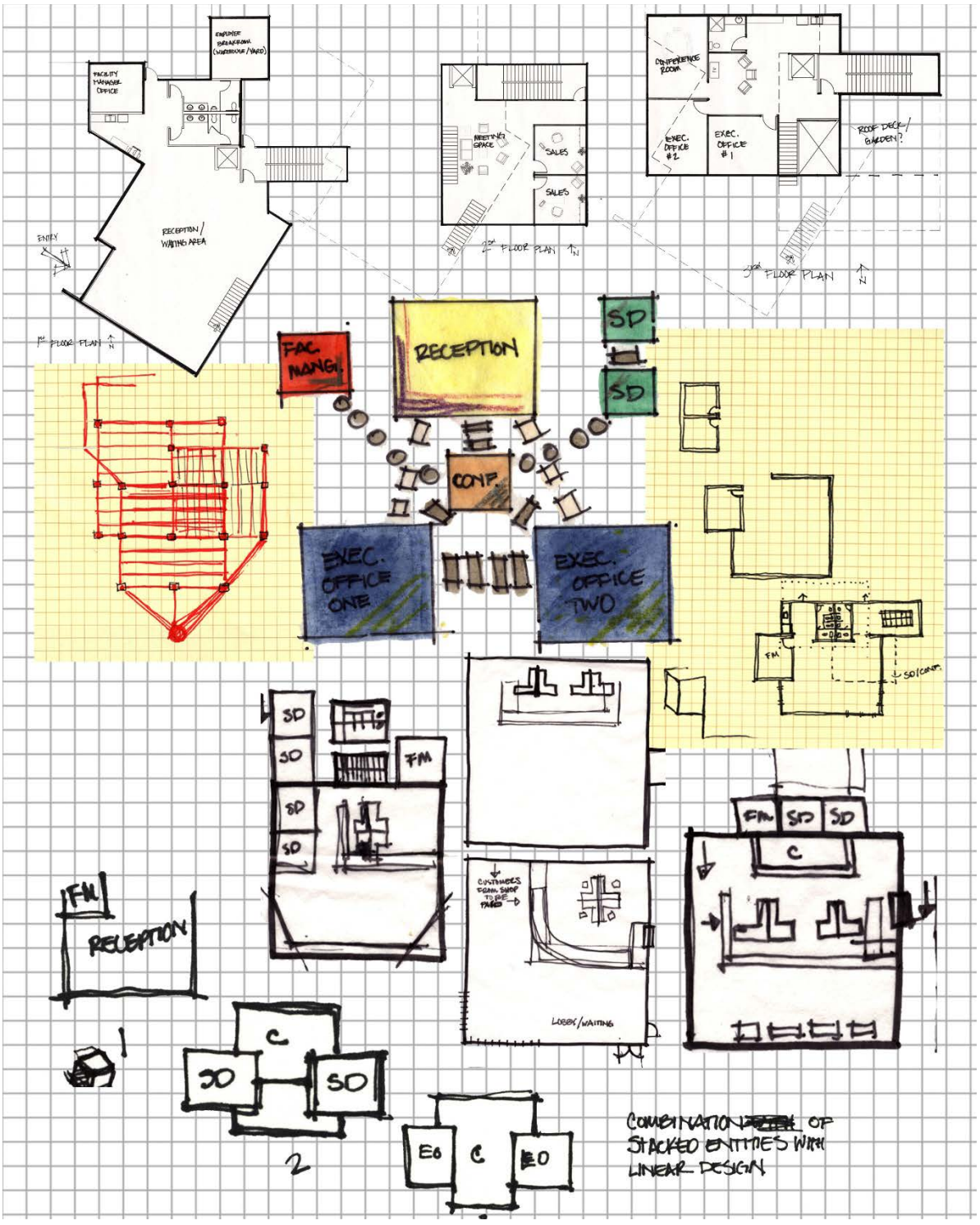


Site Circulation Diagram

Space planning bubble diagram

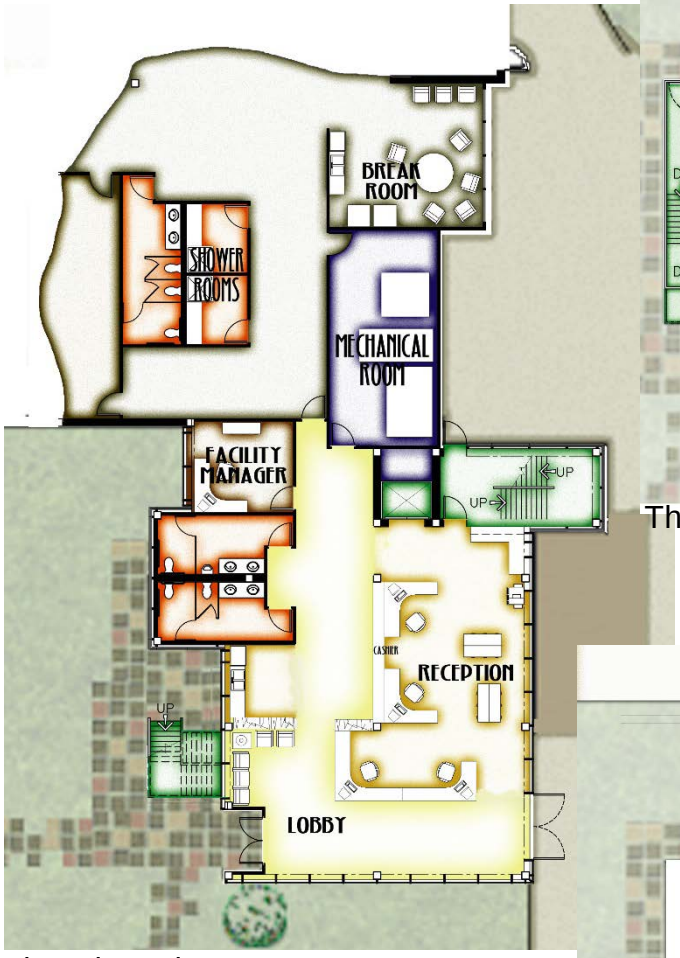
Site Plan Solution

Office Layout – I used bubble diagrams in order to layout the spaces within the office area of this building. While I was laying out the spaces I kept in mind the recycling process and site circulation and how aspects of them related to the offices.

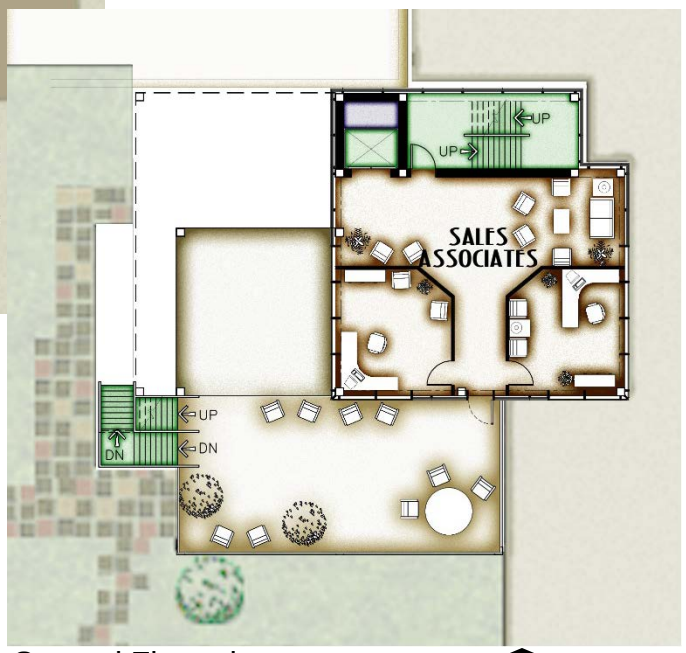


Office Floor plan Solution

Third Floor plan



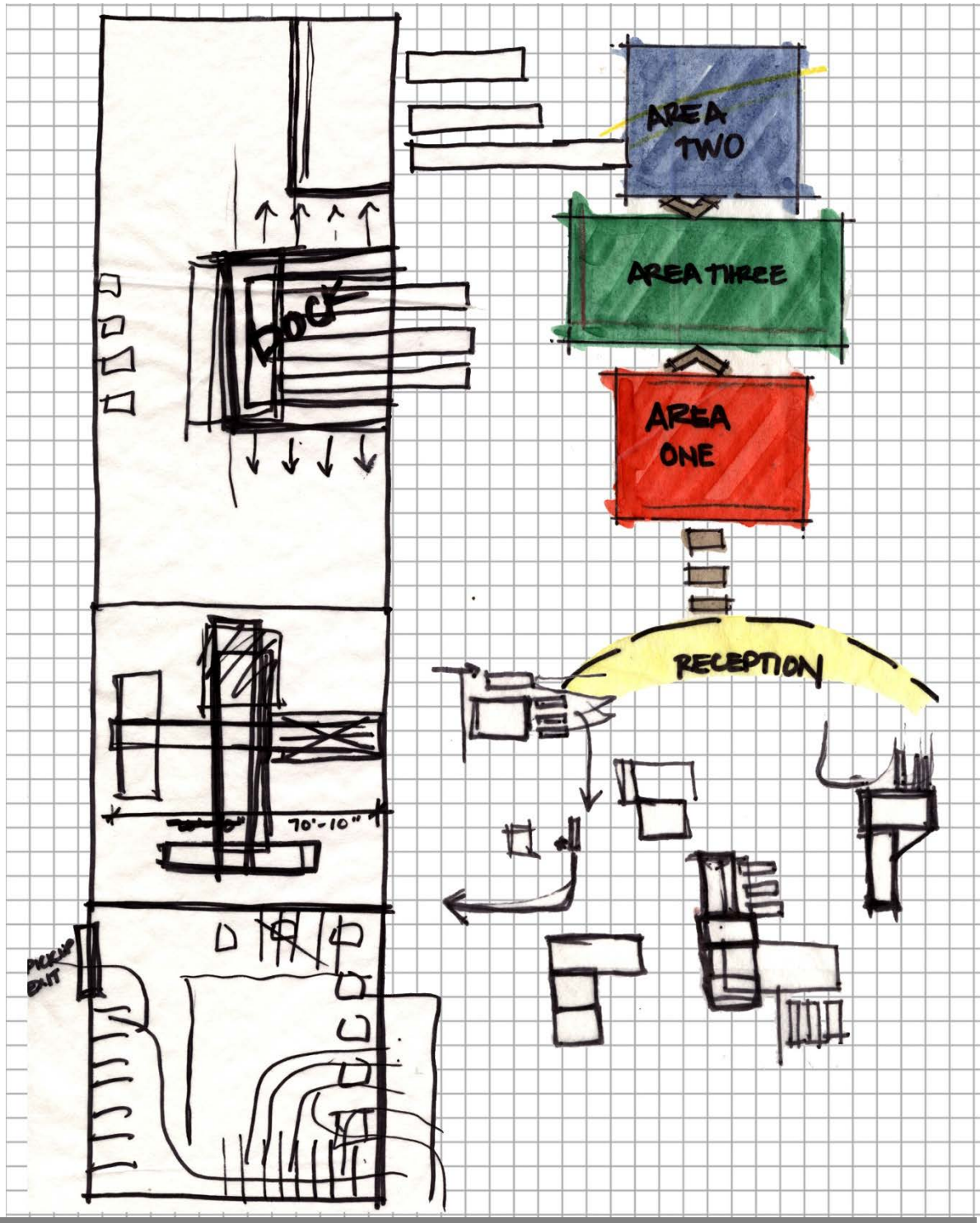
First Floor plan



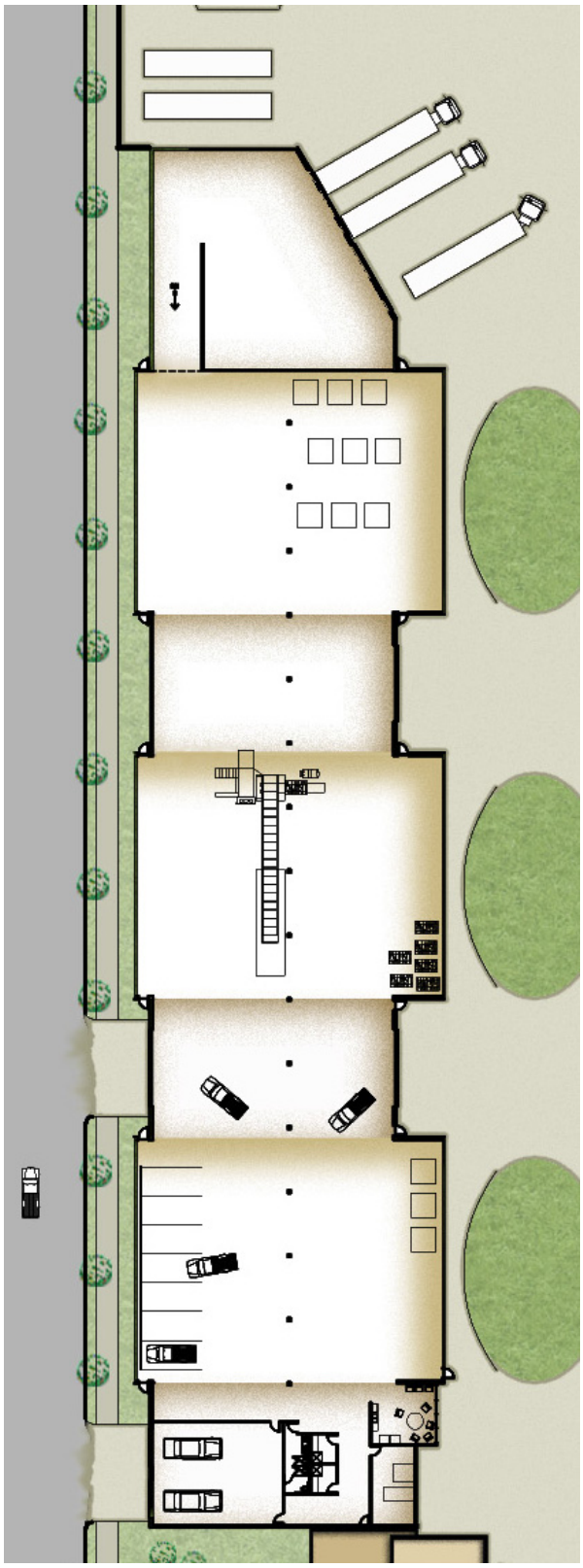
Second Floor plan

North

Warehouse planning – Once again I used bubble diagrams in the planning of the warehouse space. This area needed to be very functional and had a direct relation to the recycling process. The linear form is a response to the recycling process that happens within and also to the controlling dimensions made by the machinery used.

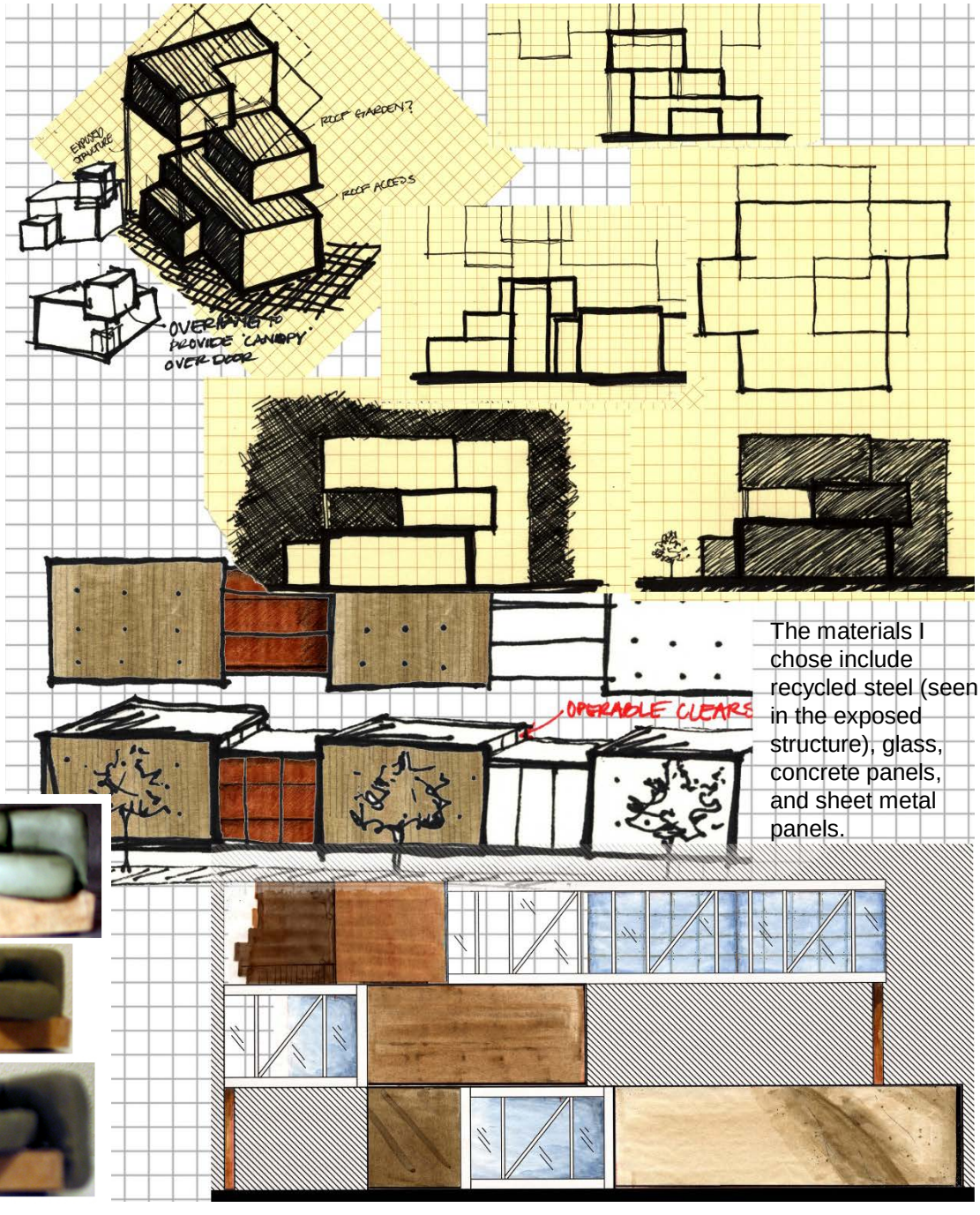


Warehouse Solution



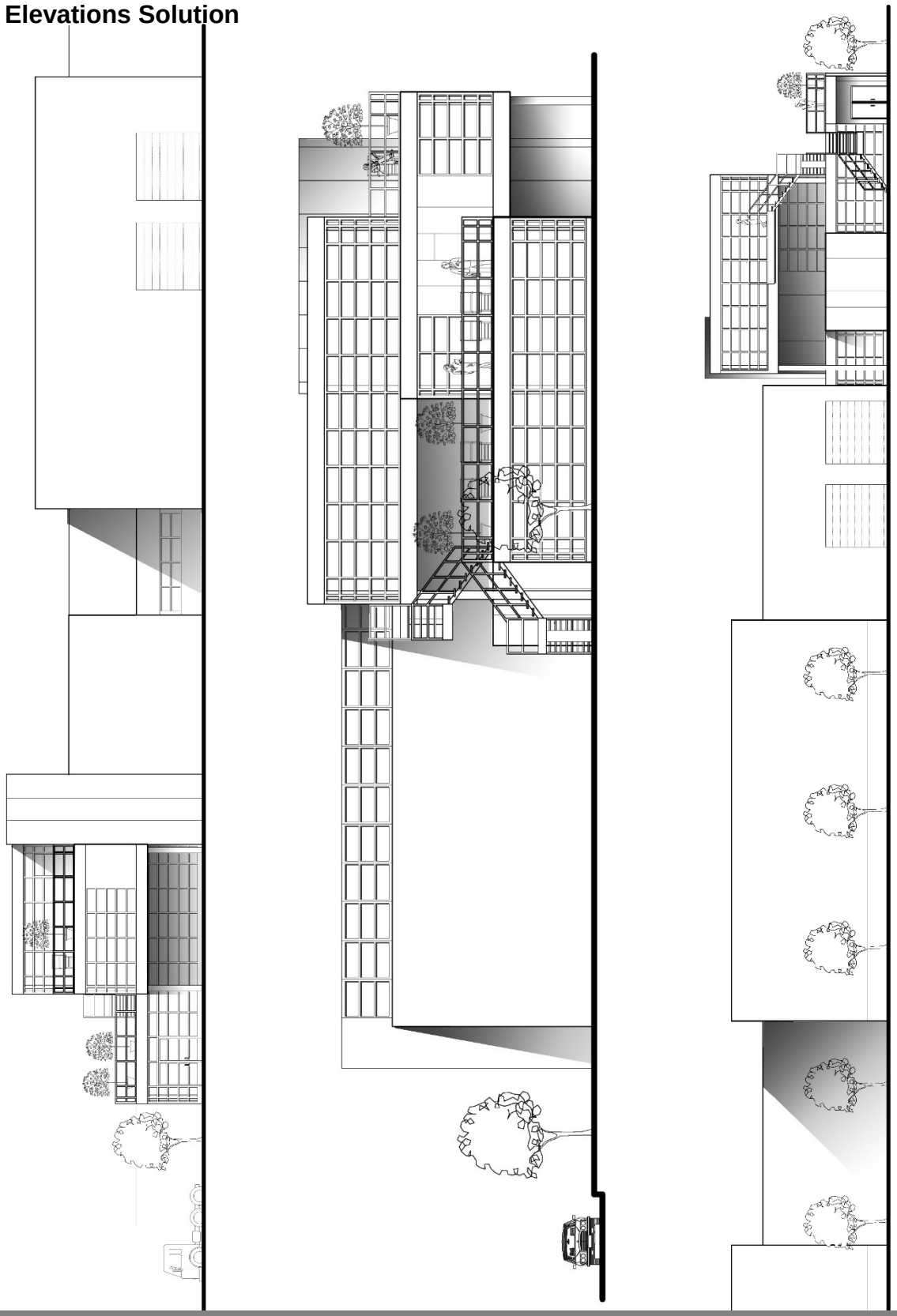
North

Elevation Studies – In order to determine how I wanted this building to look I considered elements of the recycling process. The long lines and repetitive forms of the warehouse relate directly to the linear character of the recycling process. At the end of the warehouse is the office building which is modular and stacked. I stacked the different entities of the office space, like scrap is mounded into piles. This allowed for outdoor roof access for the second and third floor offices.



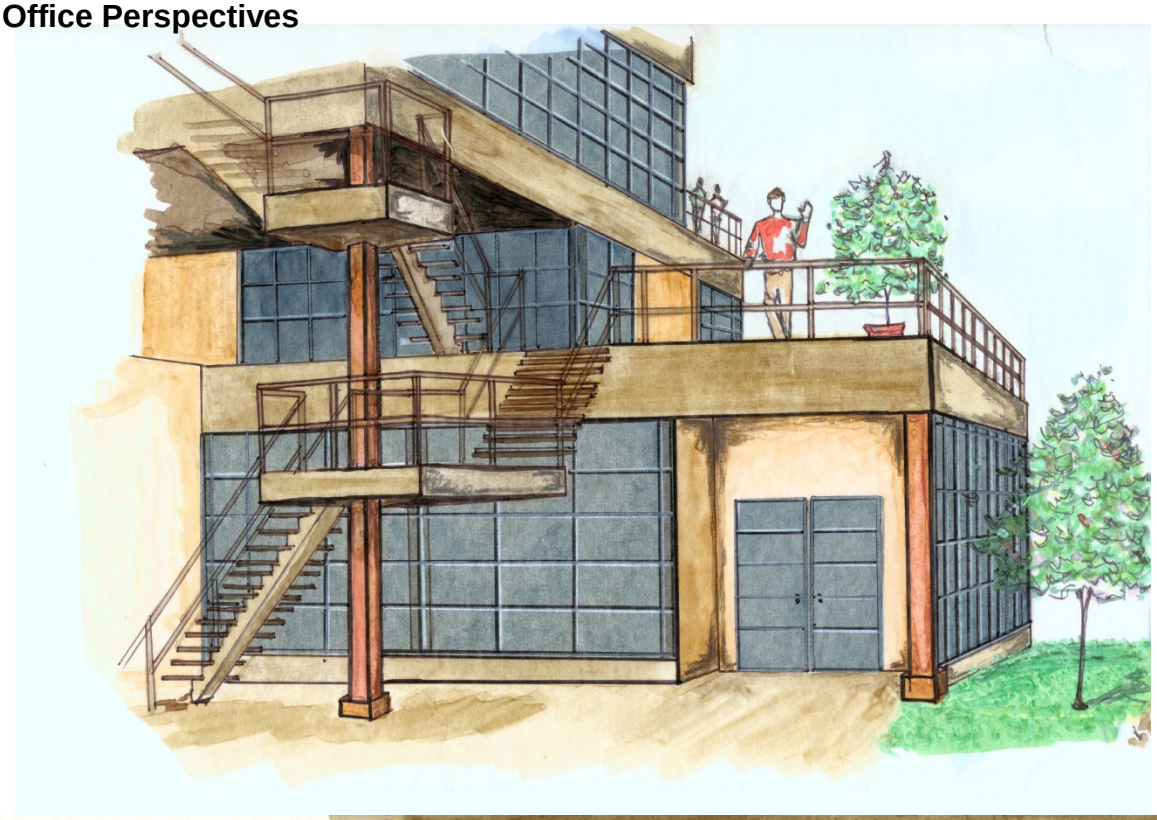
The materials I chose include recycled steel (seen in the exposed structure), glass, concrete panels, and sheet metal panels.

Elevations Solution

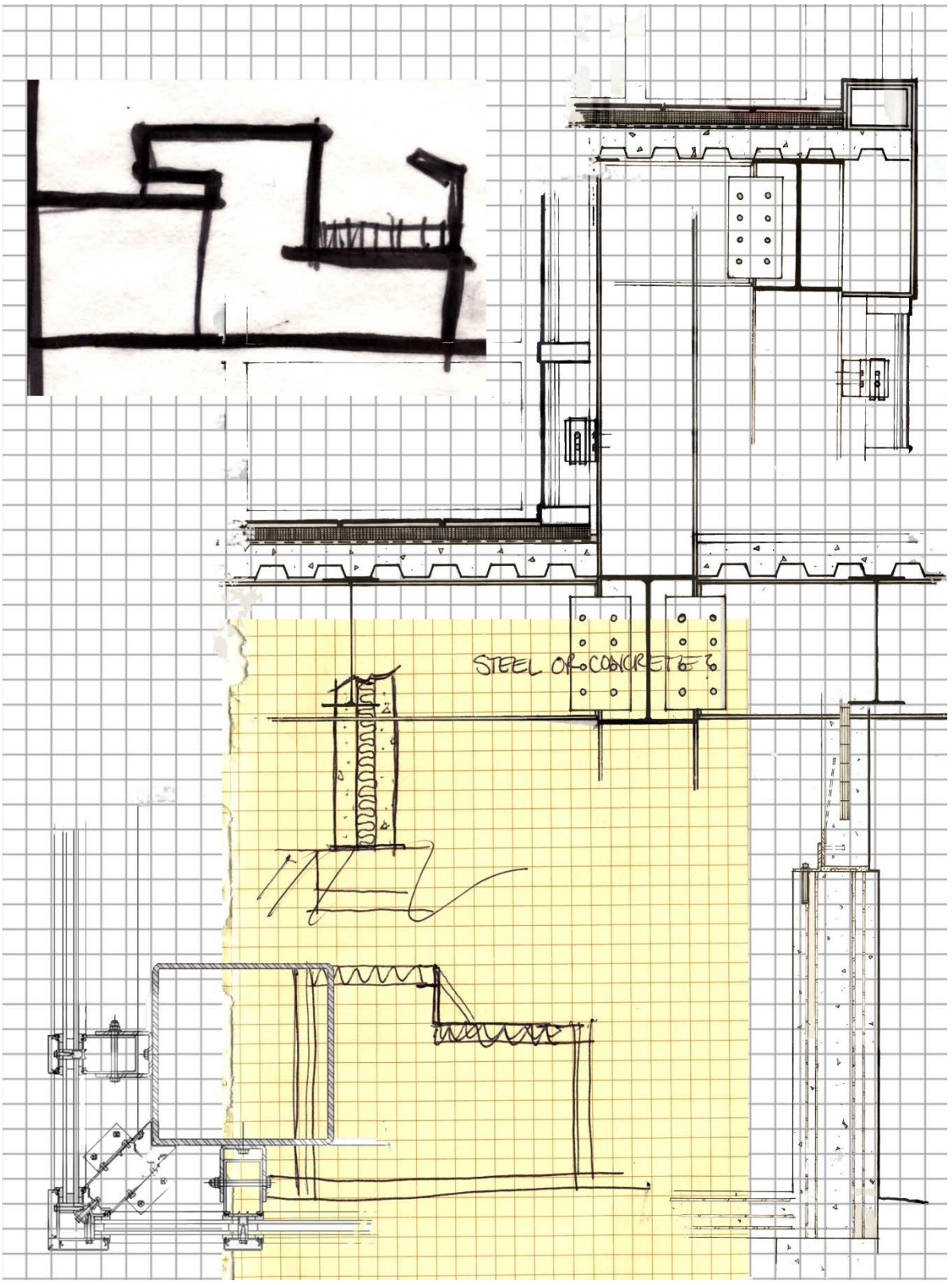


Office Perspectives

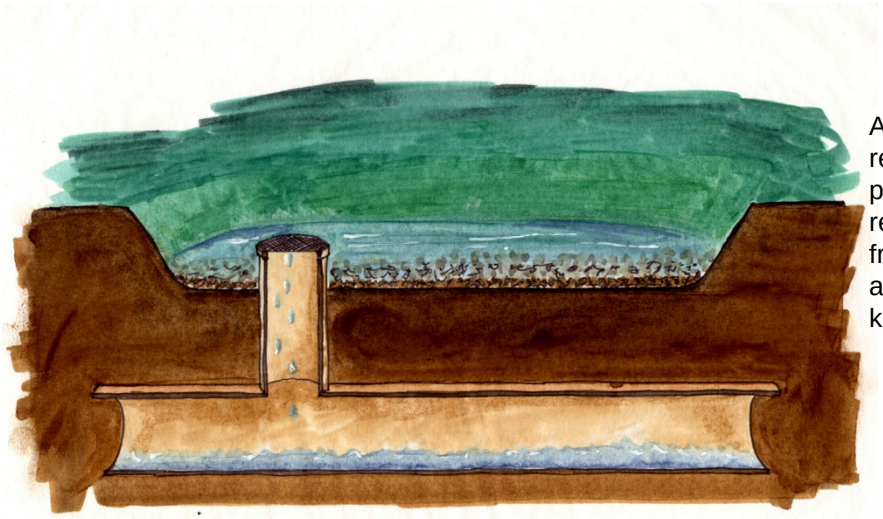
Office Perspectives



Construction Details

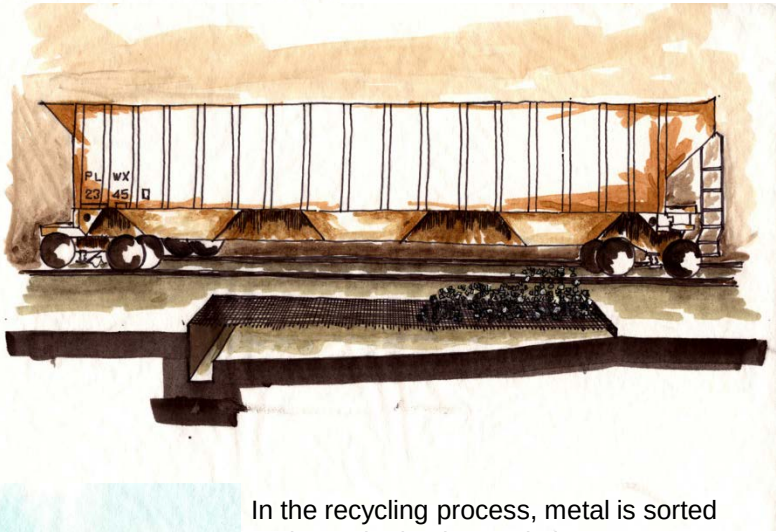


Process Proposals



As the process of scrap metal recycling can be very dirty, I am proposing the use of water retention ponds to catch the runoff from the site. These ponds would allow for the dust and dirt to settle, keeping it out of the city sewers.

Turnings and borings are a special kind of scrap created by the punching and trimming of metal plates. This scrap comes into the yard covered in the oil used in the cutting process. I am proposing a separate facility to house the turnings and borings, where the scrap will sit on a screen to drain, which allows for the recycling of the oil.

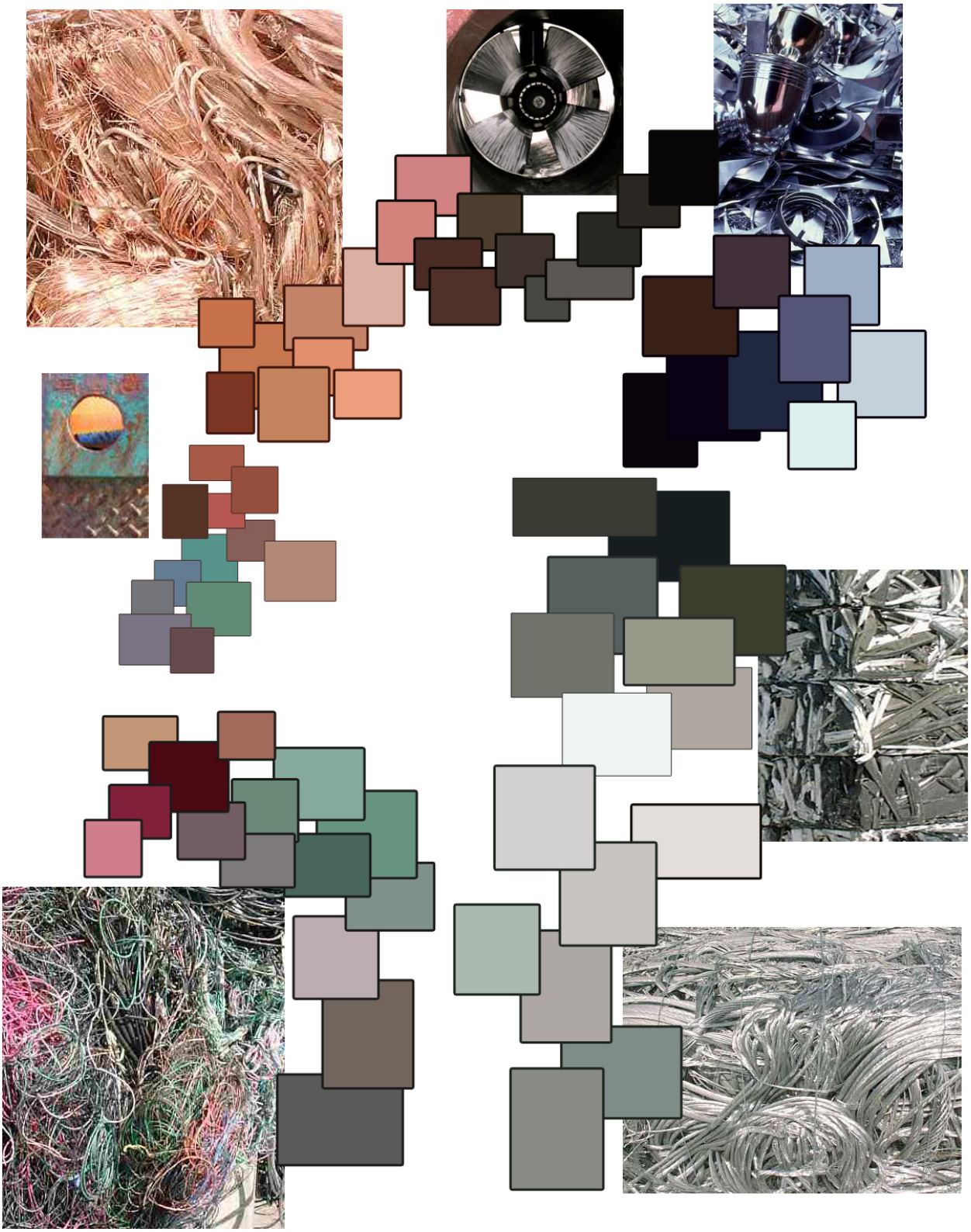


The railcar would enter directly into the building. The turnings and borings would then be loaded directly after draining the oil.

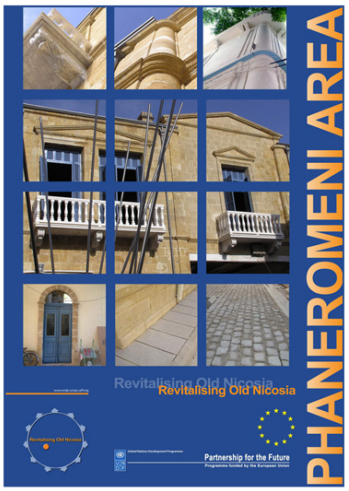
In the recycling process, metal is sorted and remelted to be made into new products. In this project I proposed the the process be taken a step farther by saving and reusing steel or other metals without the need for additional processing.

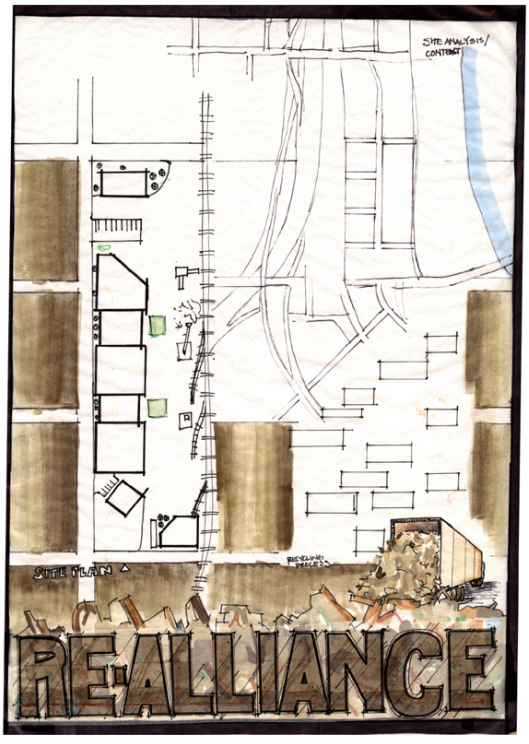
In this project I also proposed to using building materials that were recycled. Currently, there are three steel structures on the site, all of which would be reused in the new building. The concrete used would be fly ash concrete which is easily obtained from plants in the Minneapolis area.

The many colors of scrap metal recycling……

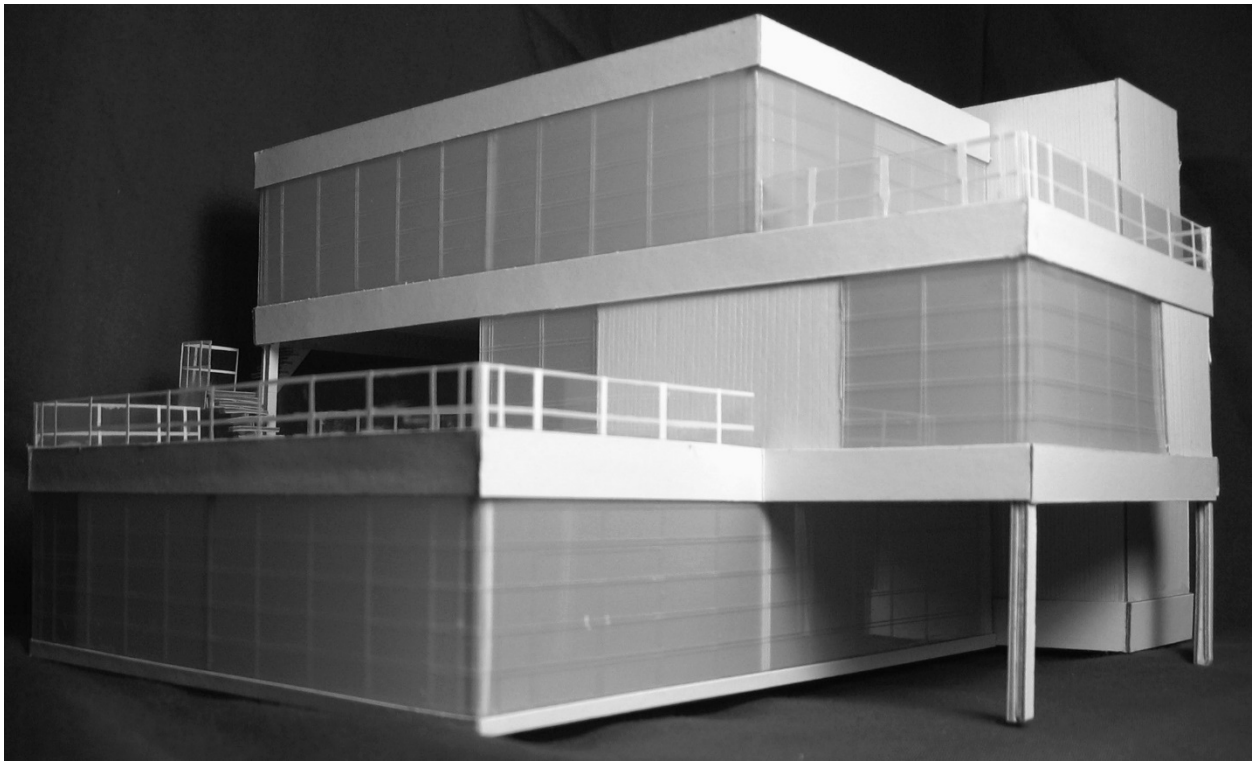


Inspiration for final board design – I wanted the design layout of my final boards to relate back to the history of scrap metal recycling. My final boards are meant to imitate the posters from war times that encouraged scrap metal recycling.

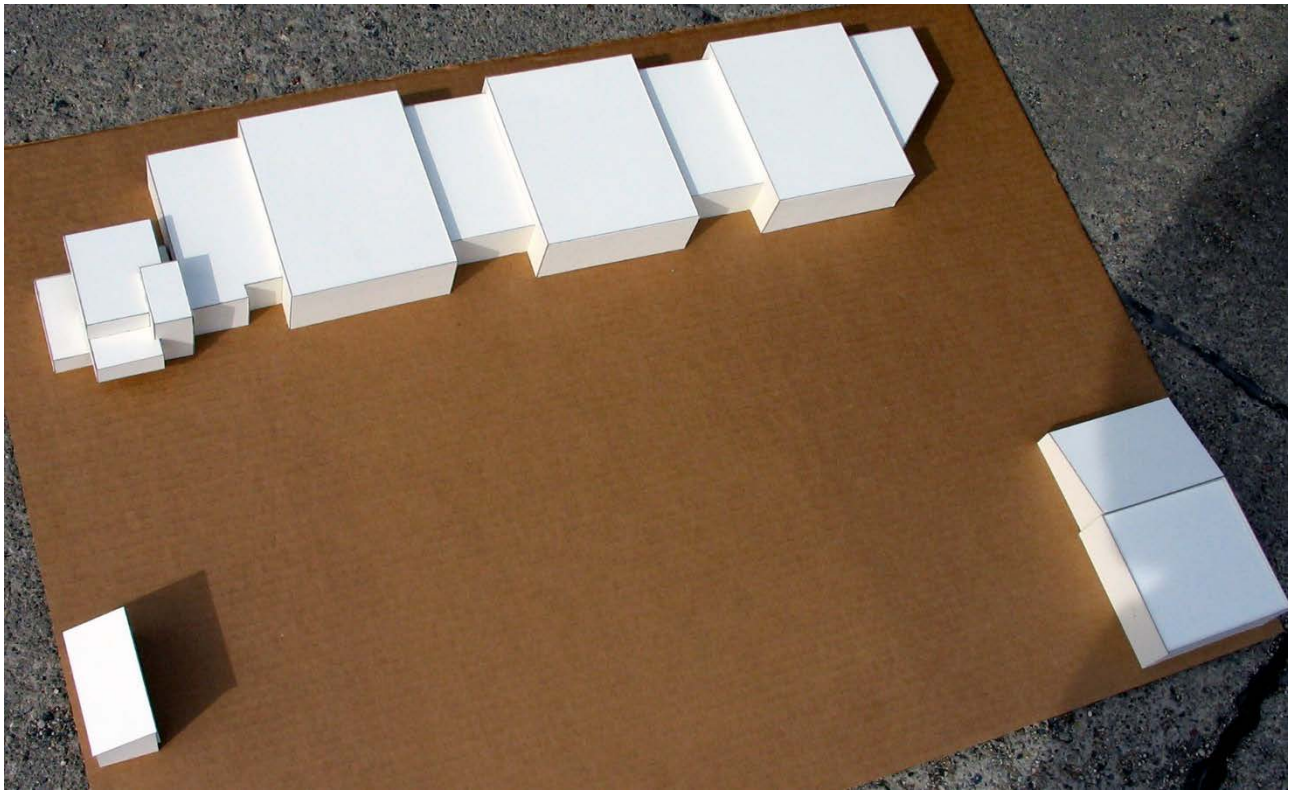


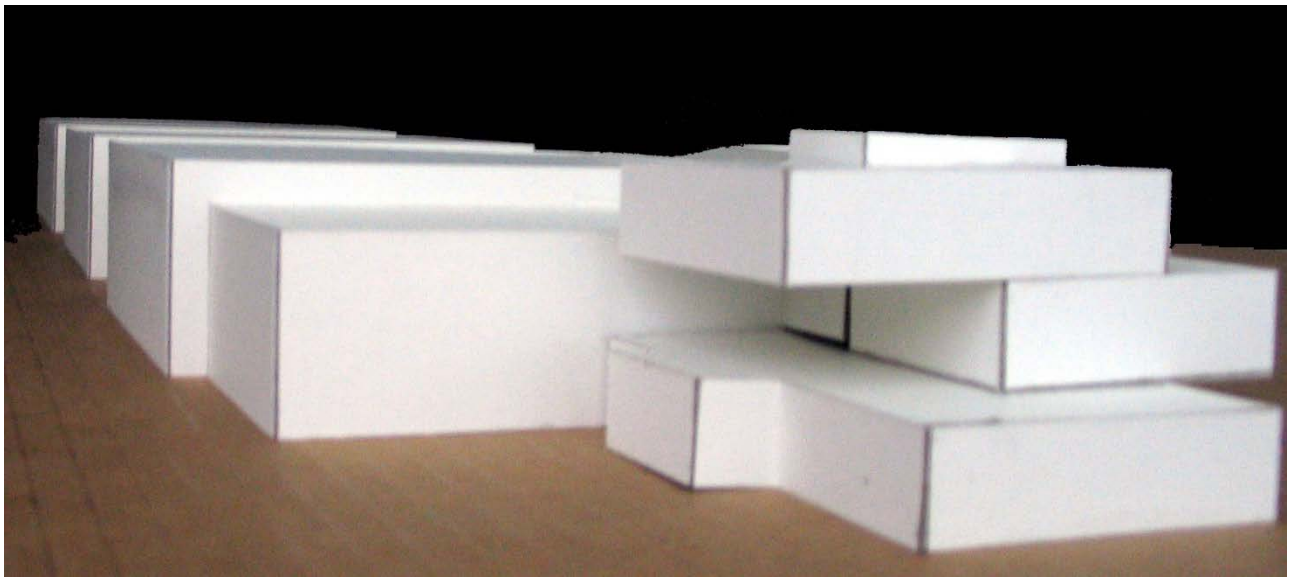


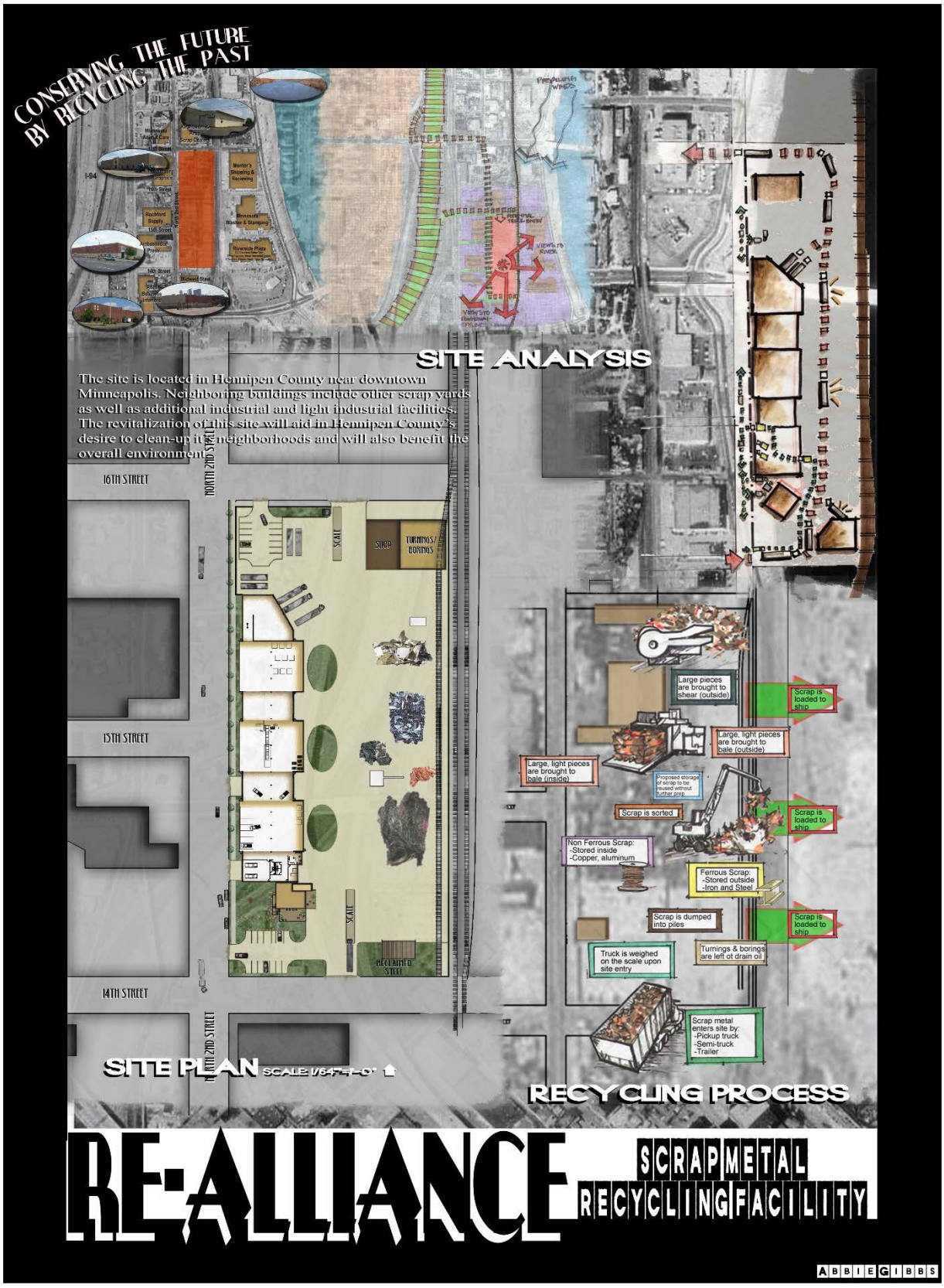
Model of Office Building



Massing model



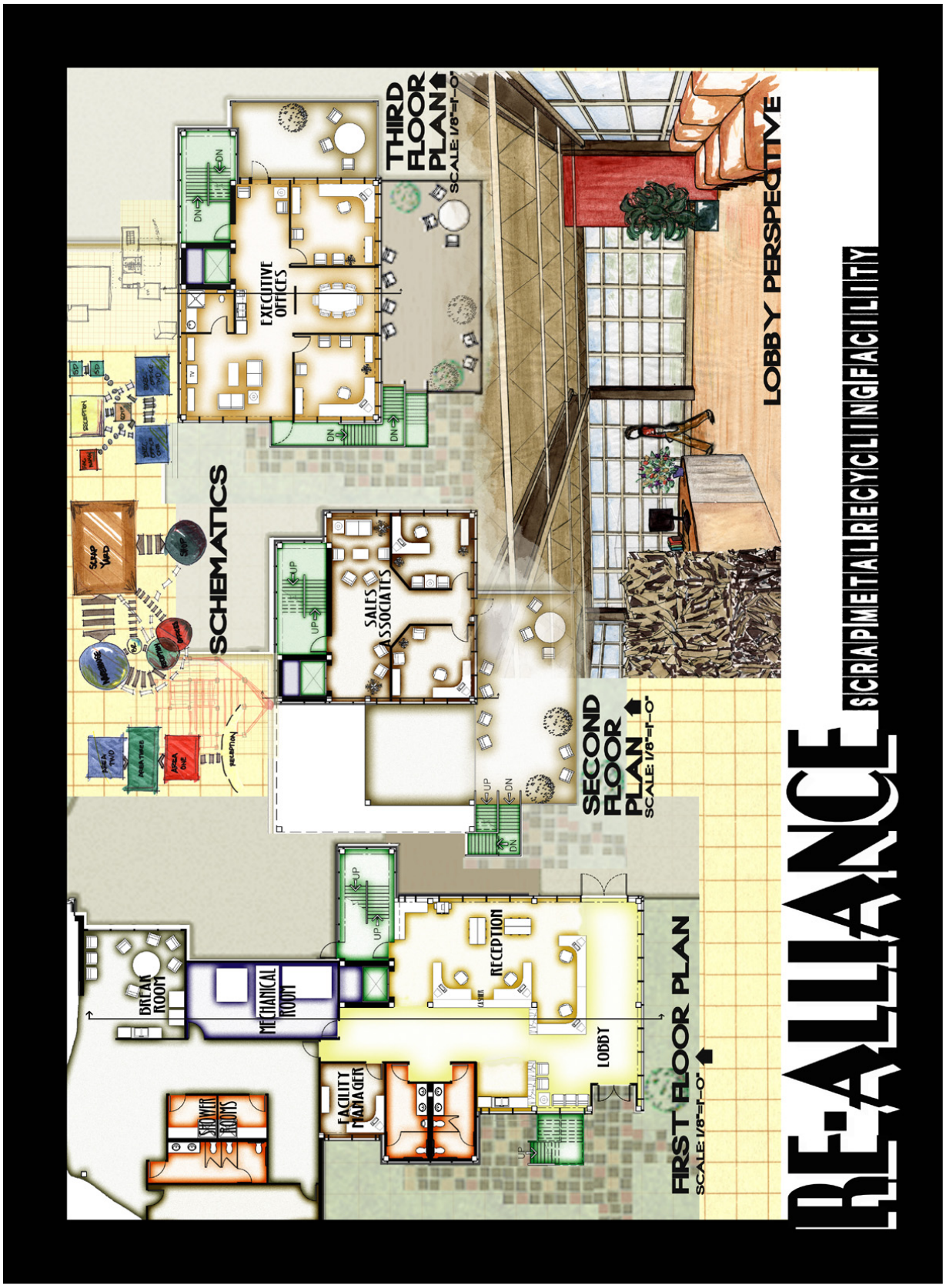


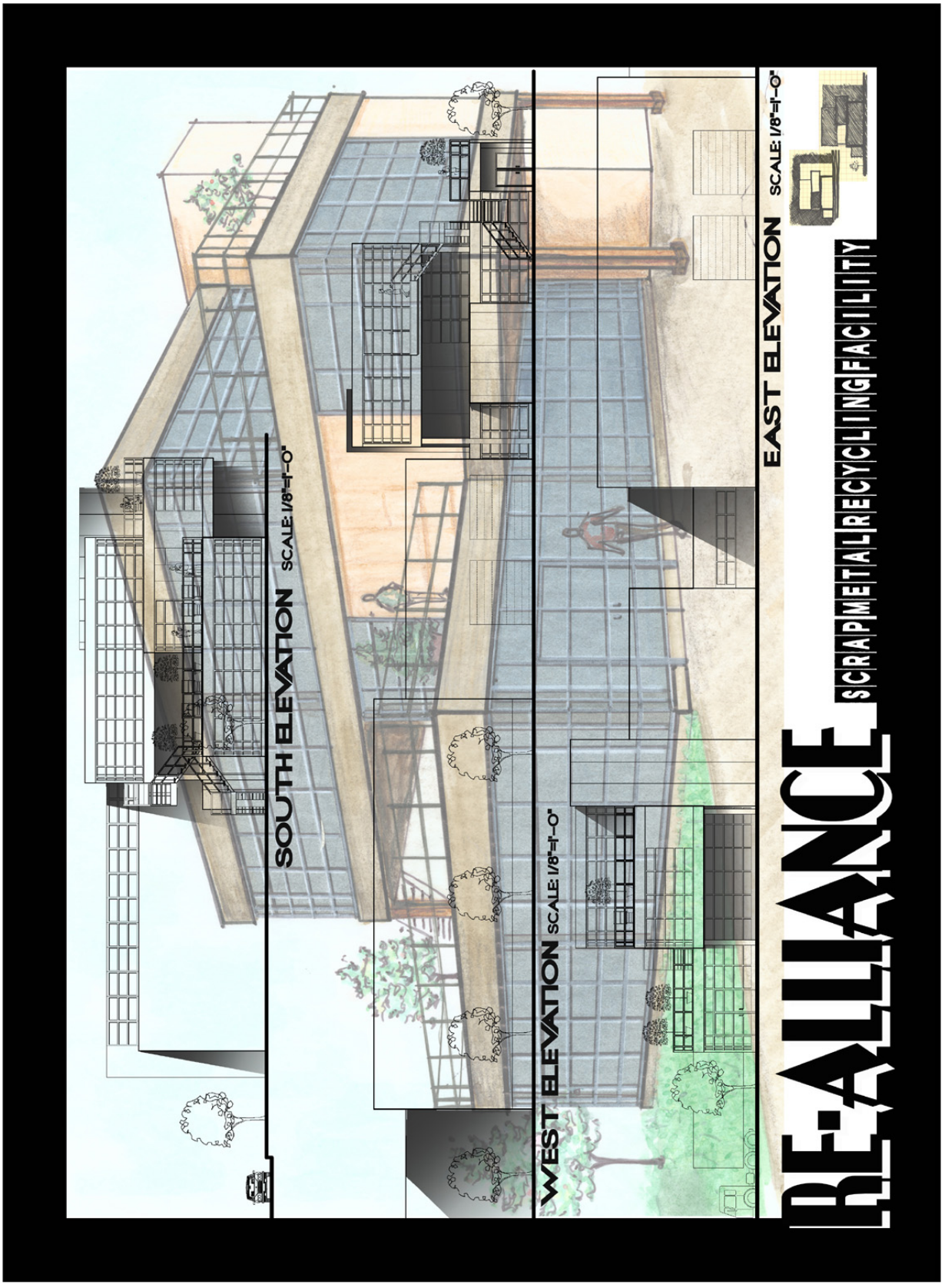

CONSERVING THE FUTURE BY RECYCLING THE PAST
SITE ANALYSIS
The site is located in Hennipen County near downtown Minneapolis. Neighboring buildings include other scrap yards as well as additional industrial and light industrial facilities. The revitalization of this site will aid in Hennipen County's desire to clean-up it's neighborhoods and will also benefit the overall environment.
16TH STREET
15TH STREET
14TH STREET
NORTH 2ND STREET
SCALE
SHOP
TURNINGS/ BORINGS
RECLAIMED STEEL
SITE PLAN SCALE: 1/64"=1'-0"
RECYCLING PROCESS
Large pieces are brought to shear (outside)
Scrap is loaded to ship
Large, light pieces are brought to bale (outside)
Large, light pieces are brought to bale (inside)
Proposed storage of scrap to be reused without further prep
Scrap is sorted
Scrap is loaded to ship
Non Ferrous Scrap: -Stored inside -Copper, aluminum
Ferrous Scrap: -Stored outside -Iron and Steel
Scrap is dumped into piles
Scrap is loaded to ship
Truck is weighed on the scale upon site entry
Turnings & borings are left ot drain oil
Scrap metal enters site by: -Pickup truck -Semi-truck -Trailer
RE-ALLIANCE
SCRAP METAL RECYCLING FACILITY
ABBIE GIBBS

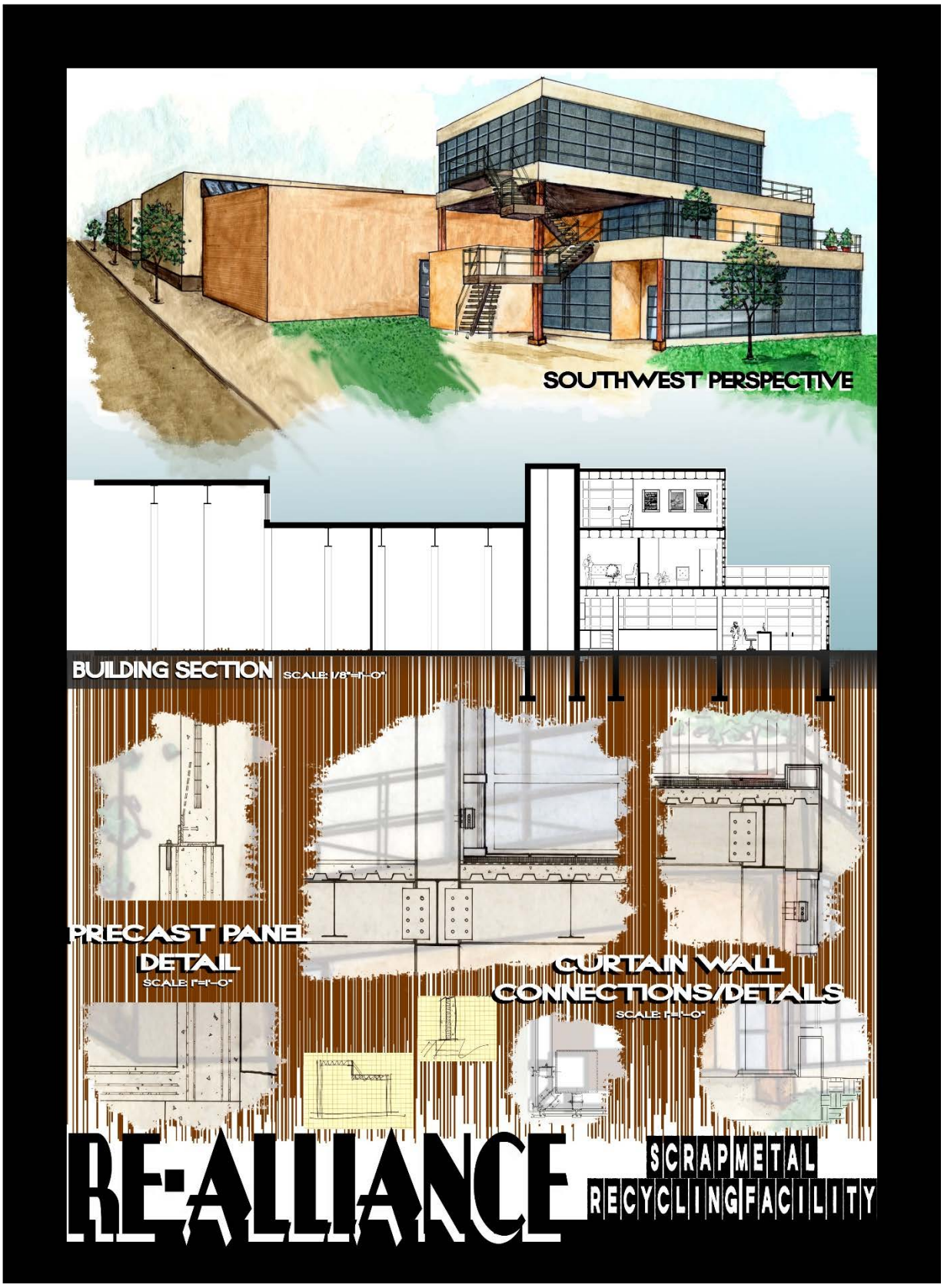
Re-Alliance

Scrap Metal Recycling Facility

Conserving the Future By Recycling the Past




SOUTH ELEVATION SCALE: 1/8"=1'-0"
WEST ELEVATION SCALE: 1/8"=1'-0"
EAST ELEVATION SCALE: 1/8"=1'-0"
RE-ALLIANCE
SCRAP METAL RECYCLING FACILITY


SOUTHWEST PERSPECTIVE
BUILDING SECTION SCALE: 1/8"=1'-0"
PRECAST PANEL DETAIL
SCALE 1"=1'-0"
CURTAIN WALL CONNECTIONS/DETAILS
SCALE 1"=1'-0"
RE-ALLIANCE
SCRAP METAL RECYCLING FACILITY


Runoff Retention Pond
City Drainage System
Sediment
Rainwater Runoff
As the process of scrap metal recycling can be very dirty, I am proposing the use of water retention ponds to catch the runoff from the site. These ponds would allow for the dust and dirt to settle, keeping it out of the city sewers.
In the recycling process, metal is sorted and remelted to be made into new products. In this project I proposed the the process be taken a step farther by saving and reusing steel or other metals without the need for additional processing.
In this project I also proposed to using building materials that were recycled. Currently, there are three steel structures on the site, all of which would be reused in the new building. The concrete used would be fly ash concrete which is easily obtained from plants in the Minneapolis area.
Turnings and borings are a special kind of scrap created by the punching and trimming of metal plates. This scrap comes into the yard covered in the oil used in the cutting process. I am proposing a separate facility to house the turnings and borings, where the scrap will sit on a screen to drain, which allows for the recycling of the oil.
OIL DRAIN
The railcar would enter directly into the building. The turnings and borings would then be loaded directly after draining the oil.
RE-ALLIANCE
SCRAP METAL RECYCLING FACILITY

Re-Alliance

Scrap Metal Recycling Facility

Conserving the Future By Recycling the Past

Appendix

Me

Abbie Gibbs
Hometown:

My family was there to support and encourage me,

My teachers were there to guide me,

My friends were there to keep me sane……Thank you all!

Individuals

Dusty Gibbs
Mitch Gibbs
Michael Zwigbaum

Websites

www.alliancesteelco.com
www.co.hennepin.mn.us
www.epa.gov
www.recycle-steel.org/
www.smorgonsteel.com
www.steel.org/environment
www.shawnk.com
www.greenresourcecenter.org
www.macfab.com

Inspirational Pictures:

www.roland-collection.com
www.metallo.com
www.hankstruckpictures.com
www.aluminumscrap.com
www.scrap-metal.info
www.brcscrapmetals.com
www.universalwrecking.com
www.brucemooney.com
www.greatlakesrecycling.com
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(2005, March/April). MSW Management.

(2003, January). Recycling Today.

Abbie Gibbs
Statement of Intent
Re-Alliance Scrap Metal Recycling Facility

With the growing concern for our environment, recycling has become an issue for everyone, from recycling aluminum cans to reusing building materials. Scrap metal facilities have become more prevalent in recent years and play a role not only in preserving landfill space, but also in conserving our natural resources.

The typical picture of a scrap metal facility consists of a dirty, polluted yard with buildings on it that look much like the scrap metal piles nearby them. It is not enough anymore that we are just recycling the metals. The way in which it is done should also be monitored. The materials that come into a scrap yard are often toxic. Most scrap yards haven't dealt with the environmental issues, such as oil dripping off machinery onto the ground. The people selling the scrap to these yards have a certain liability and are becoming more aware of the practices of the facilities they are dealing with. I propose the design of a state-of-the-art scrap metal facility that will set the standard for all other scrap yards not only architecturally but also environmentally.

A prime challenge of this project will be receiving and disposing of toxic materials inside of an exceptionally designed public building. Also, this project is intended to assist revitalization, since the site is located just a few blocks north of the center of downtown Minneapolis. This warehouse district is composed of run-down buildings and scrap yards. In an effort to clean up this area, Hennepin County has been buying land and reselling it for light industrial use. Most of the land is owned by scrap yards, such as American Iron, Alliance Steel, and most recently added Re-Alliance. Re-Alliance is looking to expand their property and building. As the new competitor in the market, it would benefit Re-Alliance to have a technologically advanced facility. By designing and placing a new scrap metal facility for Re-Alliance on this site, the nearby scrap yards will be forced to clean up their sites in order to stay in business. The placement and design of this scrap metal facility is intended to create a domino effect in the effort to cleanup downtown Minneapolis and also modernize the practices of the scrap metal industry.

The primary basis of this project is that the very process of recycling materials can inform the design of architecture in which the recycling is done. Recycling materials in a state-of-the-art facility serves to protect the public from the negative effects of leaching toxins and wasting resources while at the same time achieving the positive effects of creating a clean neighborhood and an architecturally interesting building design.

A User / Client Description

There will be two clients for this project. The first will be the owners of the business, Re-Alliance. They are a scrap dealing business that recently formed by the merging of Residual Materials, Inc. of Grand Forks and Alliance Steel of Minneapolis. As this is an urban design project, the second client will include Hennepin County and the City of Minneapolis.

The users of this facility will include Re-Alliance's international client base, local businesses, and local people who bring in scrap daily. Spaces in this building will need to accommodate all ranges of people from big business people to local vagabonds and need to accommodate everyday scrap yard procedures while maintaining a professional office feel.

B Major Project Elements

- Offices
- Reception Area (Secretary, Public, Clients)
- Storage
- Meeting Areas
- Lunchroom/Kitchen
- Employee Break Room
- Bathrooms
- Mechanical / Electrical
- Circulation
- Warehouse
- Bailing Area
- Shop / Turnings Building
- City Scale
- Truck Docking Area
- Scrap Yard
- Parking

C Site Information

The site for this project is located in the warehouse district near downtown Minneapolis on Second Street. The location of this site is ideal for this project for a number of reasons. The context of the surrounding area is made up of light industrial buildings and other scrap metal recycling facilities. The scrap metal business for Minneapolis has been located here since its start. One of the primary clients of the scrap yards is the city of Minneapolis. Also local people bring in scrap daily. This location is ideal in that it provides ease for both the city and the local people in delivering their scrap metal to be sold.

This site is right next to the interstate. Any trucks coming in, hauling scrap metal, are easily able to access this site, without disturbing any residential or commercial areas. Also this site is located along the railroad tracks. As of right now the railroad is unwilling to sell this land to Hennepin County in fear that the county would put a light industrial building there that wouldn't use the rails. The railroad must remain there though, in order to service the Minneapolis Tribune. The railroad has agreed to sell the land to the existing scrap businesses around it. A common method for removing scrap from the yard is by loading it onto rail cars. By providing another customer for the railroad, this placement of the site will benefit both the railroad and its users.

Because of its proximity to downtown Minneapolis this site will provide inspiration in the design of the building. The Minneapolis skyline is in perfect view looking south from the site. The current buildings around it are either dilapidated or designed for convenience, rather than aesthetics. The location of this site allows for the opportunity to renew a run down neighborhood.

D Project Emphasis

Urban Renewal – As the site is located near downtown Minneapolis, this will be a project of urban renewal. Hennepin County has commissioned people to clean up their property and in their effort have bought land to clean up themselves. The urban neighborhood that this site is located in is in dire need of restoration.

Environmental Issues – The character of the materials that enter a scrap yard are most often dirty and covered with different pollutants. As the designer of the facility that handles these materials, I will be researching methods of toxic waste disposal as well as other site issues, such as drainage.

Scrap Metal Recycling – Scrap metal recycling is a business that many have heard of, but don't really know about. This project will give me the ability to research the processes involved in the recycling of scrap metal. Through this research I will be designing the most innovative scrap metal facility yet, to be imitated by other facilities.

Design Methodology

In recent years, with the improvement of the economy, the scrap dealing business has been on the rise. The cleaning up of our environment has also been a growing concern. The two do not go hand in hand, but rather, clash. The idea of recycling is good and is a way of taking a positive step towards a cleaner environment, but the way in which scrap recycling is done is not. Does it make any sense to recycle if the process of recycling is more harmful to the environment than just throwing the product away? As a traditionally unclean business, the scrap industry needs to take an active role in cleaning up their process.

The design of a site and building for a scrap metal facility will influence the recycling processes, while at the same time this recycling process will influence the design. This will be a project of updating an old process and bringing the scrap metal industry into the age of environmental concern. Researching the newest practices and maybe even inventing better recycling processes will achieve this.

Documentation of the Design Process

The design process for this project will be documented using sketches, research notes, case studies, models, drawings, and computer drawings. Research notes, case studies, drawings, and computer drawings will be kept in a binder. Sketches will be done in a separate sketchbook. Models will either be stored to keep, or a digital picture will be taken to document the progress.

Fall Semester 2004

October

Research
Define the Program

7 Thesis Proposal Due
14 Student and Faculty return preference slips to main of
21 Primary and Secondary Critics announced

November

Research
Draft Program

11 Veterans' Day Holiday
19 Last day of Design Studio presentations
24 Thesis program draft due to Primary Critic
26 Thanksgiving Holiday

December

Research

9 Thesis program final draft due to Primary Critic
10 Last day of regular classes
16 Program grade due to Mark Barnhouse
13-17 Finals week

Spring Semester 2005

January

Begin Schematic and Conceptual Design Work
Start With Weekly Reviews with Primary Critic

11 Classes begin
17 Martin Luther King Jr. Holiday

February

Design Development

20 President's Day Holiday

March

7-11 **Mid-semester Thesis reviews**

Presentation Drawings

14-18 Spring Break
25-28 Easter Holiday

April

25 **Thesis projects due at 4:30pm in the Memorial Union Ballroom**
26-27 Annual Thesis exhibit in the Memorial Union Ballroom
28 Final Thesis reviews begin
29 Draft of Thesis document due to Primary critic

May

5 Last day of final thesis reviews
6 Last day of classes
9-13 Finals week
11 **Final Thesis document Due** at 4:30 in the department office
13 Commencement at 4:00pm in the Fargodome

Previous Studio Experience

2nd Year

Fall (Yergens)

Additive/Subtractive Cubes, A Study of Space
Dwelling Wall
Downtown Bistro

Spring (Hatlen)

Fargo Pocket Park / Coffeehouse
NDSU School of Business
Prairie Green Sustainable Home

Pedestrian Bridge

3rd Year

Fall (Prafke)

Ronald McDonald House
Implement Dealership

Spring (Martins)

Fluid Motion Dance Studio / Fitness Center
NDSU Memorial Union (Masonry Competition)

4th Year

Fall (Barnhouse, Urness, Walters)

Urban Design

Spring (Kratkey, Booker)

Low-Income Housing Development (Marvin Windows Competition)
High-Rise (Flad Competition)
Kite Design

5th Year

Fall (Waronker)

Olympic Gallery
United States Supreme Court Building

Reference List:

(This list will be updated and added to throughout the thesis process.)

Individuals

Mitch Gibbs
Dusty Gibbs

Websites

www.recycle-steel.org/
www.steel.org/environment
www.smorgonsteel.com
www.epa.gov
www.co.hennepin.mn.us

Articles

Fenton, M.D. Iron and Steel Recycling in the United States in 1998. U.S. Geological Survey

Books

Atwater, Isaac. History of The City of Minneapolis, Minnesota. New York: Munsell & Company.