BEST IF USED BY:

Duluth Recycling and Production Factory

Written by: Tyler Pritchard

Signature Page

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Duluth Recycling and Production Factory

A Design Thesis Submitted to the
Department of Architecture and
Landscape Architecture of
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By

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Primary Thesis Advisor

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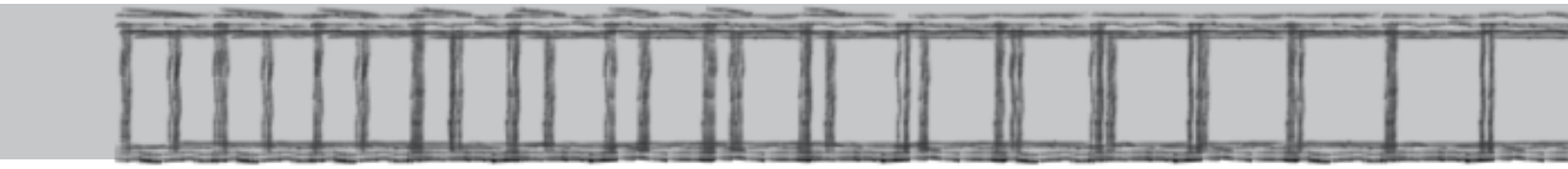

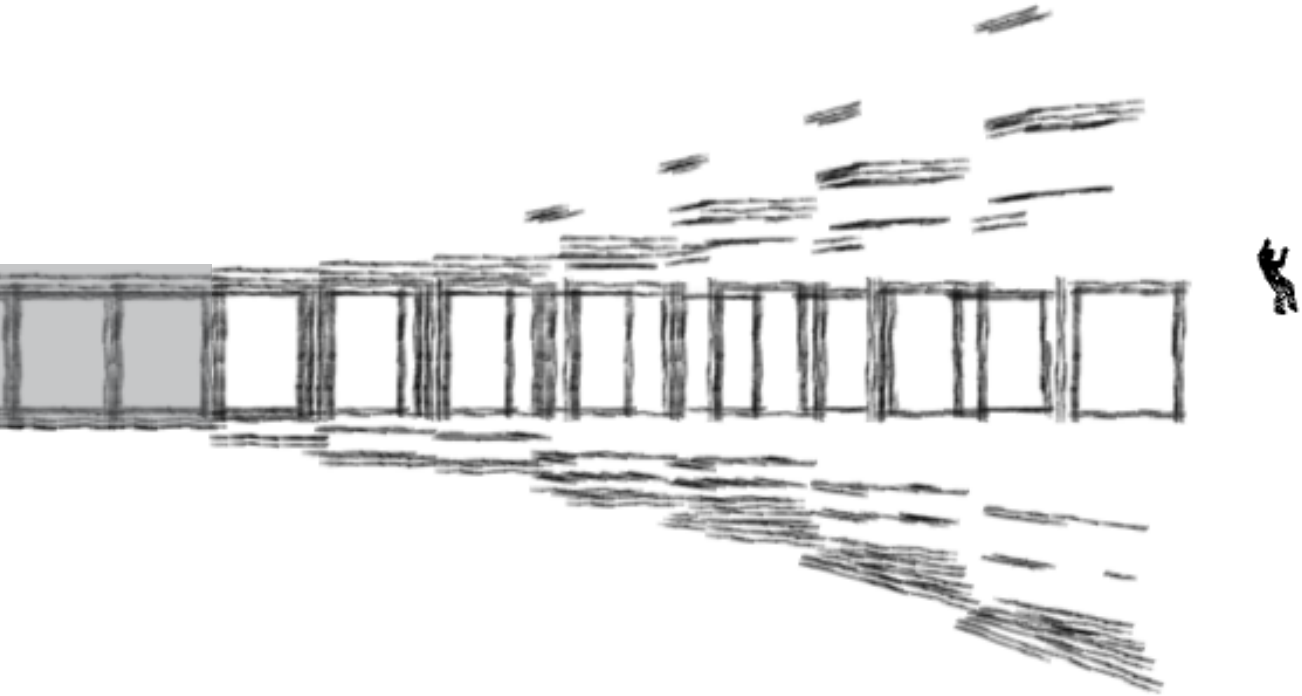

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Abstract:

This thesis work looks to explore and determine the lifetime/expiration of a structure. The longevity of a building's life is its ability to adapt to current needs. The project will use the shells of old structures in Duluth, Minnesota, which both creates and recycles components to ensure its survival through programmatic changes until its expiration. This work will display the importance of re-purposing and recycling, while creating new jobs and markets for the region. Best if Used By: Duluth Recycling and Production Factory will consist of both public interaction and factory for production spanning 70,000sqf of an old pier in the harbor.

Keywords:
Lifetime Expiration Adapt
Warehouse Duluth Components

Thesis Problem Statement

What would happen if a building had an expiration date by which to be used?

Statement of Intent

Statement of Intent

Typology

A production factory which creates and recycles the very components it is comprised of with imminent expiration in mind. The factory creates local jobs and materials for the city of Duluth.

Theoretical Premise

Claim
Develop buildings with a checkpoint or expiration date to determine the future use or need for the structure's existence.

Investigation
The factory affects both the architect and client by developing a more evident expiration date for buildings by determining when a new program is called for (checkpoint) or when the building must expire itself (expiration). The materials used and what exactly the need of the building is informs both participants in a deeper understanding of what can be expected from the structure.

Support
The lifetime of a structure is a direct reflection of the structure's ability to perform and maintain until its program is deemed insufficient, or the building itself is no longer able to meet the needs of the user and ultimately expiring. This leads to the structure's ability to be decommissioned in an appropriate way by recycling its own components. "A future which must be planned rather than a past which must be patched up"(Coates, 1934). This is not to say an abandoned building is unable to be revived but this should be part of its lifelong plan.

Justification

Buildings are designed in such a way that once they are deemed expired they are torn down with an eager structure sent to replace the void. A structure that is able to realize an expiration, adapt to the needs, and ensure a future to minimize the waste of the 'once was' is a better look into the future of how we might develop buildings.

Proposal

Narrative

What happens when a building is no longer able to meet the needs of the user? Buildings are expected to perform for a destined amount of time, and once the lifespan is exhausted the building ultimately dies. This is becoming a problem with new building technologies, where instead of repairing something broken it is disposed of, and a new component is sent to replace it. Can a structure either create or recycle its own components to ensure its survival through programmatic changes and ultimately its expiration?

Consider the shell of an old abandoned building. Can it ever be used again? These type of structures exist all around the world, yet are not torn down because of some value of labor and appreciation in time. Structures such as this will never be built in the same way as they once were simply because of the cost associated with building an old factory structure comprised of brick. The warehouse and factory typology is found desolate and cold because it may recall a time of success for a thriving city and now only serve as a 'once was' reminder.

Duluth is a 'once was' city. Its history tells the story of industrialization and manufacturing. The port city thrived while many of these structures were created. Inevitably, the factories and warehouses shut down, and shells were left behind. The Duluth Works is comprised of over 48 of these structures, barren and unused. With a production factory, the city may once again turn to industry but not like industry of the past. The city of Duluth would grow, new jobs would be created, and perhaps an entire market would be created- a market that recycles expired products and waste in order to make way for new materials, which could eventually be exported and turn this city back to the roots from where it began.

What would happen if these structures were inhabited once again by machines that recycle and produce building materials? These materials can then be used to complete a shell. The city lends itself to industry and manufacturing, so can it recycle and manufacture its own components in order to ensure the structure's longevity (Kincaid, 2002). After time, checkpoints can be instilled to make sure the programmatic needs are being met and adapt in order to fit them. Over time, the structures will no longer perform, and the shells themselves will have to be recycled. This investigation is about the lifespan/expiration of a structure, and how long it can sustain itself without becoming an empty shell once again.

User/Client Description

The City of Duluth is one of the most substantial ports on Lake Superior, lending itself to import and export materials. The city will be an inlet for recyclables, whether it is large materials or small product waste. With this inflow of raw materials, many jobs will be created from the shipping- all the way to the production of new building materials.

Users
The citizens of Duluth will be given great job opportunities and the ability to participate in the production of future structures. The jobs created from the project will bring workers to the city and improve the economy. The remnants of the old factories will no longer serve as a reminder of the past but as the future.

Owner
The factory owner will be the City of Duluth. The city is responsible for the shipping and manufacturing of products. The City of Duluth urban planning group executes building assessment and planning.

Major Project Elements

The factory is the foreground for future expansion, and as the shells populate, so must the residents. The factory will ramp up production and expand when necessary, but in order to ensure success it will also take time to determine scale. The production factory of the building materials needs to be able to both expand through production and contract by recycling unnecessary parts.

The Production Factory

Shell-
an old warehouse/factory with access to the shipping yards and waterway

Shipping Yard-
the inlet and outlet for materials

Preparation Station-
raw material preparation

Production Floor-
consisting of multiple devices for breaking down waste and producing building materials

Shop-
where the materials are finished, tested and packaged

Offices-
for the floor managers, shipping, and production department

Store-
sale of small goods and individual pieces

Restrooms

Security

Site Information

In order to understand the expiration of a building and the shells left behind by the changing of times, a city must offer up the desolate factories from a time before.

Duluth Minnesota is a city which displays the characteristics of a very hard working community that has seen change in workforce and demand. The city lends its hands to the water and thrives on import and export across Lake Superior. Over time, the factories and warehouses closed and many buildings stand idle awaiting a future.

Region: Midwest

State: Minnesota

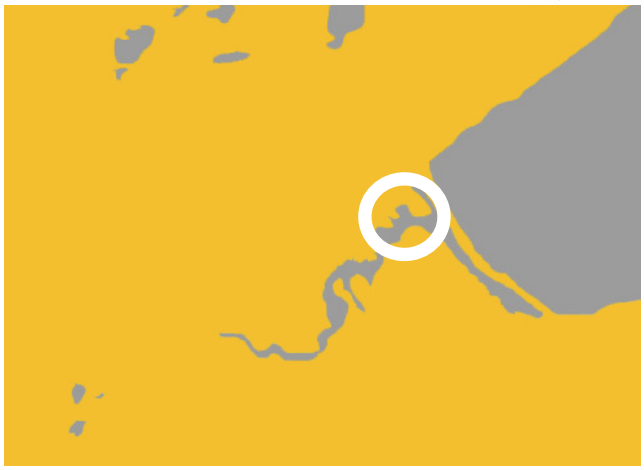
City: Duluth

Site: S 8th Ave W 55802

Site Components:
- Water Access
- Railroad Junction
- Pier
- S 8th Ave. W
- Near I-35
- South of Bayfront Festival Park
- Direct Line of sight to Duluth Areal Bridge
- 6.87 Acres

Midwest

Minnesota



Duluth

S 8th Ave W

Project Emphasis

The overall goal of this process is to discover the lifespan of a building. The search is for steps that must be taken in order to produce a beautiful structure that understands there is an expiration attached to its lifetime. Though difficult to determine, it is important to develop buildings in a responsible way, so eventually they can be disposed of properly.

This project looks to both the designer and user to be responsible for understanding the outcome of the building.

The impact of realizing the lifetime of a building will focus the public on what to expect from the shelters in which they reside. The recycling of products aims to create jobs, produce a market, and revive the shells.

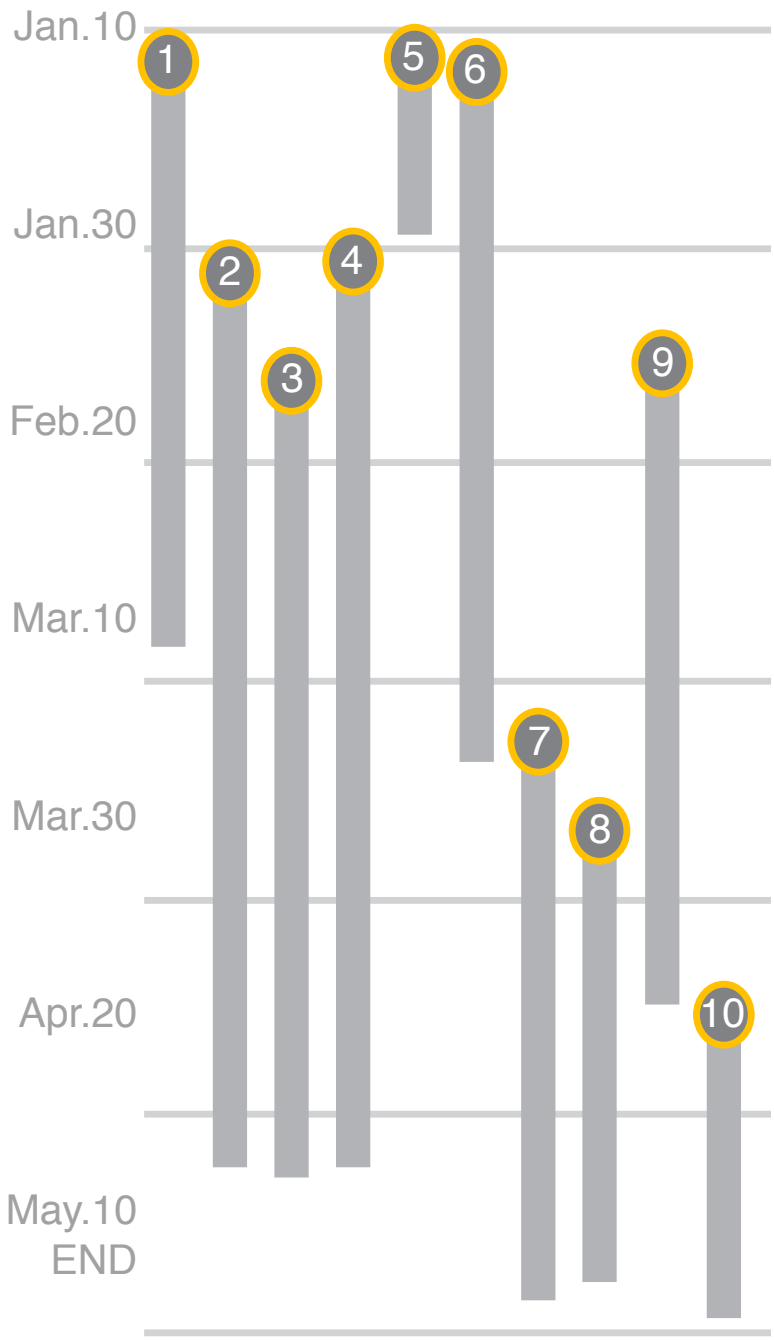
Plan for Proceeding

The Direction of the research will delve deep into the realm of old industrial buildings and why they are necessary (Stratton, 2000). The research looks at the stalled structures of a successful port city. The project looks to understand an expiration of a building and its ability to adapt to ensure future use. The research conducted will also focus on the recycling of products into new building materials. The Production Factory is to produce parts for itself and eventually manifest them into other structures, while studying the local impact.

The Method used will be the concurrent transformative strategy. Information will be gathered through quantitative/qualitative analysis, graphic and digital representation, site visits, and exploration.

The Documentation shall proceed by journal entries, whether it be through a website to follow or simply written. All documents will be scanned, compiled, and backed up via timemachine at the completion of a project component. The whole production is planned to be displayed on a website for future scholars and will also be referenced and perhaps navigated from during final presentation.

Plan for Proceeding



1) Component Design ECS 1/9-2/6
2) Modeling(floors/sections) 2/2-4/22
3) Graphics 2/15-4/23
4) Structure (redevelopment) 1/9-1/30
6) Initial Sketches/Concepts 1/9-1/20
6) Infiltrate Site 1/15-3/15
7) Production 3/16-4/28
8) Mock-ups 3/15-4/26
9) Board layouts 2/10-4/10
10) Final Boards and Models 4/10-5/7

Previous Studio Experience

Second Year

Fall 2008 - Stephen Wisher
- Tea-House - Fargo, ND
- Rowing Club - Minneapolis, MN

Spring 2009 - Meghan Duda
- Dance Academy - Fargo, ND
- Neighborhood Project - Fargo, ND

Third Year

Fall 2009 - Paul Gleye
- Center for Excellence - Fargo, ND
- Snow Sculpture Competition
- Center for Intellects - Fargo, ND

Spring 2010 - Cindy Urness
- Small Space Project - Fargo, ND
- Downtown Research Project - Fargo, ND
- Enchanted Highway Design - Regent, ND
- Transit Center - Fargo, ND
- Natatorium - Fargo, ND
- Chicago Trip

Forth Year

Fall 2010 - David Crutchfield
- San Francisco Trip
- Vertical Community - San Francisco, CA
- KKE Container Project

Spring 2011 - Malini Srivastava
- Design Build

Fifth Year

Fall 2011 - Malini Srivastava
- Design Build

The Program Document

Research Results

Building Expiration

Buildings have the potential to realize expiration through programmatic changes or structural degradation. The expiration of a building becomes important when determining new programs and needs of a structure, however, in many cases the built form may only have the ability to serve an expired program. Can a structure adhere to multiple programs, by adapting to the intangible needs of tomorrow?

A building should be designed in such way to utilize is previous shell or create a new adaptive form to ensure a longer lifespan. Brand (1994) states, "Every building is potentially immortal, but very few last half the life of a human" (Brand, 1994, p.111). Within this passage, Stewart suggests the reason for dilapidated structures is poor maintenance. The programmatic changes are what are affecting our current building strategies. Therefore, no program means no maintenance. The recent plague of wants instead of needs has upset the balance of care.

An expiration date adhered to a building is not a new concept, but it is a convoluted one. Builders and contractors are familiar with selling a structure as a product, stating it is approximately a 30-year structure. Talking with some construction companies, one might be lead to believe that this expiration is the basis for how a building is designed. If a client wants a building to house some equipment for 20-years and then be done with the structure, the construction company may develop a building cheaply and quickly to meet the needs of the client. This is an unavoidable role for buildings, but what if that building found a different use after the allotted 20 years? What happens to these temporary shells? Can these structures themselves be used or dismantled and used in a different way? The role of the client is to determine what should be done after their specific needs are fulfilled. More times than not, buildings are simply abandoned, leaving nothing but the shell of some to-be-determined structure. The expiration of these temporary buildings is reached as far as programmatic needs but how about the building's integrity. Shigeru Ban has created structures out of paper that have a longer expiration than most temporary steel buildings. Is this the maintenance and value issue held by the client? Not every building is needed, and not every building must last forever, but having a plan for a building's expiration is good design.

The structures created recently somehow disregard a future and adhere to only one program in mind. I am not saying it is a good idea to force a building to be universally adaptive, but I think they can be designed in a way that, once the expiration is reached, it has the potential to adapt to a new need or demand. Can a school become a jail? Can a library become a salon? This question is, I think, rarely asked but is a seemingly important question for buildings housing a temporary program. What about the buildings that were never designed to adapt? Many buildings are abandoned and kept standing without a program, vacant. Many of these structures were never developed to house any other program other than building cars, changing trains, and distributing cement. These structures still exist, not because of new programs and owners but because of the materials from which they were composed. Many of these buildings of industry lay desolate and would not fall unless provoked. It is amazing the mistreatment and lack of maintenance these structures have endured, yet they still stand as if they are out to prove something. These buildings were designed to last, not adapt, but can they? The very fact that they were designed to last is proof to me that they are adaptive, not necessarily adaptive to program but time. The shells of these structures stand in amazement after lifetimes of abandonment, waiting to either be provoked to fall or refilled with a needed program. These shells exist.

With an expiration looming over a building, how might people interact with it differently? What if every building had a counter on the front letting the occupants know the time left for the building? Perhaps multiple counters for maintenance, program revision, and structural repair, big red numbers fall away, as time passes, eventually counting to zero. What happens when the clock zeros out? Should the structure instantly be abandoned and recycled? This seems like bad design and a loss of money. Perhaps, the timer is there to ensure checkpoints, at which the program and building are analyzed to ensure they are being used optimally. I think the interaction with a piece of architecture may be strengthened, knowing the building has time just as its occupants do. What does this mean for design and how would this affect a building's construction? Currently, buildings are designed in such a way that an expiration date is associated with its construction. The problem is the client is seemingly oblivious to the fact that someday the building sitting before them will no longer perform, that is, only if allowed to decay, Brand would suggest. Throughout a building's life, it adapts, to some degree, for future use.

Can a building be designed to adapt better, quicker, and more resilient to the eventual expiration? What might that building look like? It might suggest the building would be comprised of traditional materials that have proved to age well. The building might look just like its neighbors. The building is cautious and conservative (Brand, 1994 p.190). In many eyes these steps are not progressive. This type of design suggests buildings and not advancing typologies, materials, or construction methods. There is value in learning that a certain type of wall construction might not perform as well in one climate as another. While it is good to design adaptively, not all buildings can adapt. Some are destined to crumble, rot, and lean, but some get to show just how long they may adapt.

Expiration can be viewed from a few perspectives. One expiration to be investigated is the amount of time the design can support itself after a building is constructed. whereas, a checkpoint may be the amount of time the program is supported. Sometimes a program lives on as the building expires and must be reworked to still provide for the existing program, while other times a program exhausts, and the structure is still able to host. The expiration does not exist on shelves like a gallon of milk placed behind one with an earlier expiration. The expiration exists in the way it is used, such as a plastic bottle versus an aluminum refillable container. The difference between a single serving purpose, or the ability to be reused is similar to the design of buildings. We need buildings that are disposable; we need buildings that will outlive us, and it is better to know the difference.

What happens when the timer hits zero? A building is deemed unsafe, uninhabitable, and dangerous. The construct is still composed of materials that have not reached an expiration. This allows a great opportunity to salvage the building, instead of traditionally being buried, as if it died. The parts which make a building are a huge range of materials and could potentially lend themselves to new construction or products entirely. Alas, the expiration ends when these materials, components, and parts are to be harvested. In a similar way to how an organ donor distributes organs, a building can lend the materials for a new building or to repair one reaching its own expiration. This is the main idea of the expiration. A time at which a previous building can be reused once again. To repair the broken, to replace the cavities, and to re-establish the ground, this is the purpose of a building with an expiration.

Industrial Remnants

The industrial revolution still exists as a layer of film on much of our landscape. With each pass of the white glove, more is revealed. The buildings that resulted during the revolution are abundant and unique to the previous use. Are they adaptable to today's needs or are these shells still standing because of esteemed value? Can these tired structures be revitalized and transformed into this so called adaptive structure, and at that point was it always adaptive? An old factory building can show us almost the entire lifespan of a building and in some cases the deconstruction. A factory might be an icon recalling a time once known but now forgotten. "Factories, the reassuring first fruits of the new age"(Le Courbusier).

These structures are spread around, desolate, awaiting a future. According to Nutt and interpreted by Kincaid (2002), "Where a building has been vacant or under-utilized for a considerable period of time, six basic options are available. Market, Vacate, Refurbish, Modify, Change, Demolish" (Kincaid, p.11). The indecisive nature and lack of commitment are the reasons these structures exist in their current state.

What can these extinguished stacks of brick provide, other than a sense of a past time and accomplishment? Many of these structures represent a time with various regrets. The time was fast paced and thriving, but little attention was paid to the effects of this progression. The factories and production lines were necessary for where the country was going and had a strong connection to the American worker. The fruits of labor were evident, yet an underlying catastrophe was forming. Little attention was paid to the level of destruction to our environment, until it was too late. The buildings from these times stand for, in many eyes, a scar on the environment. I can sympathize with this perspective, but it is not how I personally view an industrial remnant. These structures are the most iconic form of our manifest destiny. Much was taken from the Earth to construct these buildings, but much was given to the world. The world would not have transformed had the industrial revolution not happened, whether or not it would be better off it is impossible to say. This is proof to me that men and women are extremely capable of hard work and pride in labor.

These structures that once evoked fear, wonder, amazement, and passion now stand for the sake of standing. “Cleaned of detritus and grime, odorless and dust free, its working parts left as sculptural objects in the space inside and out, the Templeborough Mill has become an object almost entirely out of its context”(Darley, 2003, p.208).

We are left with shells of industry, where bombs were produced, were planes where assembled, where cars took shape, all of which now stand empty. That era has passed, and the futures of these iconic remnants are dependent on our perspective of what they represent. Is it important to keep the factories around? Whether or not they need to represent a point in history or become something entirely different, it is clear that they have four possible futures: stagnation, repair, demolish, or recycle. These structures can adapt to represent a new time. What if these remnants represent a new industry, one that learns from the mistakes made in the past? Can a factory represent a new time that accounts for the environment and still produce local materials and products? These industrial remnants can be an icon to both the past and future, representing progress itself, and how we can adapt and learn from our mistakes. It is important to not dwell on a mistake but to move on.

A new breed of factory, focused on fixing our mistakes, can begin to start a new revolution, a revolution focused on revitalization and reuse. To help these shells become a new vantage point, it is important to understand the need for them. Not all structures can become a new industry; some will remain, some will fall, but it is the point of having them and using what the structures lend to us that is important.

A New Production

The production of materials in an old industrial park is not a new idea. But, what if that industrial building was both a recycling facility and production factory? With the import and export necessary to sustain it, these building types exist near harbors and are found commonly in port cities. Can this program exist in a past factory/warehouse shell, or is it entirely a new animal? Can a building be created that is adaptive and produces its own means to adapt? A structure that utilizes both methods could possibly be a solution, and, on top of that, a program which creates building products and materials from old buildings for old/new buildings. Can a factory exist to recycle and create materials for its surroundings and eventually lead to material export?

A building is comprised of recyclables; therefore, a building can be recycled. Perhaps, the factory becomes part of an old industry park that recycles or repairs the buildings around it eventually cleaning up and creating a new mass or void. The factory can import recyclables. An old building, which may not be suitable for an adaptive reuse, is definitely suitable for disposal. The results of this can lead to deployment of machines in several areas to utilize old shells and create new ones. The factories could once again produce, turning the key to a new age of industrialism. The stacks would no-longer plume black smoke; and the rivers would remain clean because we have done this once before. The mistakes made before serve as a constant reminder of a time when care for the environment was not thought about. A time existed when great disregard for the environment existed, but the perspective of progress clouded our judgment just as much as the stacks. What was learned from this? A building is both necessary and dangerous, which determines the level of disregard. A new industry will form eventually, lending to progress instead of the current recession exposed by the changes in time.

It is no secret that buildings will never be built in the same way they once were, but those buildings scattered amongst the ruins can teach of the past. Everyday, advancements in production and means to recycle more efficiently take place. These old structures can teach the future as well (Reiner, 1979).The materials alone create many recycling opportunities, and, if it is necessary, the shell can be revitalized from its neighboring buildings. The main reason old industrial buildings are decommissioned is the structure or shell is deemed unsafe. These shells can be utilized by being recycled and turned into new building materials.

What could this new production entail? What is collected and produced? A building is a cocktail of materials and consists of many reusable and many recyclable materials. Glass is a material that is a staple for old industrial structures, usually with the glass broken out by vandals and scattered all around openings in the building's shell. This glass is very abundant in many abandoned buildings and could be recycled along with other glass recyclables. The opportunity for a window to be reused and to close-up another potential building is a concept I find rather interesting, and, along with the general recycling of glass materials, this reuse of glass could range from hundreds of different glass products. The range could be aggregate for concrete all the way to a new window. Many of these glass forms are directly recycled back into building materials, and the unusable glass for building materials can then be turned into small products, such as furniture. This direct transfer is something our generation is unfamiliar with, but, with all the recent reuse and recycle products, it is becoming more evident. What if you brought your recyclables to the same place you bought your desk lamp and chair?

This direct connection may encourage the recycling of products and create a small economy for the community. This does not go only as far as glass, because a building's composition contains much more than glass alone. Steel, wood, and masonry make up the raw percentage of a structure's composition. So how can those materials be used? Along with the glass, most of the materials are processed in the same type of line, but most of these lines require a large area and a long straight corridor for the production. The danger lies in when these lines share space and start to cross over into one another. This may be the reason a recycling center specializes in only a few products, but, with new strategies and technologies, the lines are starting to emerge because the importance of recycling is becoming more evident. New York is currently working on the Brooklyn recycling center, which shares a lot of similarity as far as the type of recycling and where the materials are coming from, though it is never mentioned the material may be coming directly from a neighboring building.

How can this new industry function, and what does it mean for the city of Duluth? The industry represents a time of change and again turning the key in the factories' locks. Duluth is still a thriving city, based on the blue-collar attitude that hard work reaps rewards. The factory infrastructure is still represented throughout the city, and the people still work hard to have a desirable community. The re-installment of the factories would create jobs and a community based on Duluth's original foundations. This time around, a model of industry is present, and we learned much from the industrial revolution. The factories will no longer plume black, but produce and recycle, representing an new revolution important to both the environment and the people.

Utilization

Create the architecture of a transformable factory that creates and recycles itself. This type of building must look back at the roots from which it may spring. The history of industrial buildings demonstrates an infatuation with the production line and the efficiency of mass production. These are key points in revitalizing the idea of recreating a new industry. Recycling is becoming a larger industry, as the resources and products are being consumed. The consumers produce a product themselves, which is raw recyclables. A new infatuation is taking place today, and these pieces are utilized for reuse. Products are starting to find a niche for green and sustainable materials. It is not uncommon to see products claiming to be made from recycled aluminum, used car tires, and plastic bottles.

Obviously, a market for these types of products exist, but most of the production happens in a small shop and are generally specialty items. What would happen if these sought after specialty products were mass-produced in a shop where the social context could interact to help create a production line for the product of yesterday? Most of these products are handmade. This makes them unaffordable in the sense that the shoes produced from recycled car tires and canvas still cost more than importing them. Take the same idea of industrialization and recycle both old buildings and materials, creating a local market and cleaning up the environment and our landfills at the same time. Society is adopting the idea of producing local materials, yet seems hesitant in light of production's dark past.

Modern production processes are paving the way for better industrialization. As work changes, so does the architecture. Industrial buildings are no longer what they once were, but this is not a problem. The buildings now are looking to ensure survival through adaptable spaces (Adam, Hausmann, Juttner, 2004). Recently, architecture is displaying that a building can be multi-storied and still okay for the environment. No building is perfect, but they are trying.

Summary

A building is essentially a shell, which is used to house a program that it was designed for. The building calls to the original intention and the past programs, and with each change, evidence of the past can be erased or emphasized. A building and program serves the owner and is developed by an architect to meet the needs of the client. It is important that the client and architect look to determine a future use of the building, once the client no longer needs the building designed, or how the current building can transform in order to serve the client longer. This underlying idea is a means of investigation. A building can determine the future use based on materials, location, and adaptability. A building can be designed by the communication between the client and architect to create a design that is adaptable to the largest component of expiration- time. As time passes, so does the future need of a structure. This expiration may come more quickly, depending on the buildings ability to adapt, but as Brand would suggest, buildings not only adapt but also learn. Learn to meet the needs of the future and to continue to provide an infrastructure for society to use. "Best if used by."

The expiration of a building is ever-changing, depending on the structure's ability to adapt, and, even as the structure degrades the implementation of a new structure extends the shell even further into the future. At some point this becomes an uneconomical adaptation. If a building was fitted to checkpoints and an expiration this information may change the way the public interacts with a building. The time spent with the building has the possibility of a longer, more engaging interaction. Knowing that the library or gas station may not be around forever. Recently a film was released based on the idea that humans themselves never die; however, they time-out. Time is the currency, and it becomes an important part of surviving. The expiration is extended through working and labor, but with each day the time falls way and is regained (Niccol, 2011). This film was of interest for its connection to an evident expiration. Some had much more time than others, and some would run out if the timers were not maintained. The constant watch and upkeep of a building is part of the overall lifetime. If a building is not maintained it will surely meet an end sooner than others.

If these adaptations to a building change too much the building runs the risk of erasing the identity from its original formation. In some cases this is not of most importance, but in cases like the Reichstag in Germany the identity and homage to the past become the most important part of preservation. What a building once stood for and what it can stand for in the sense of a monument, what about a building that is forgotten by almost all, such as an industrial structure- the remnant of a past time? These remnants surround the world and little attention is paid to the structures that at one time stood for progress and hard work; the icons of advancement. These icons exist but only as a shell hollowed out and desolate. Theses structures can once again stand as an icon and monument, if a program is to infill, but it is important to represent the past. These structures were never designed to adapt to a new program, but more and more value is being held in the old structures of a different era. Can one of these buildings represent a new era of progress? An era where reusing a material, shell, or space drives the programs. The buildings can still represent the ghosts of time, even if they are dismantled. The materials of a building can be reused to form a new structure or repair an old one. The idea of a building that can be decommissioned and distributed, like an organ donor, to others may seem like a mutilation of the building's past, but essentially it is extending a future and avoiding the probable hole in which it could rest.

The participation in both designing a future and maintaining the goal is the responsibility of both the architect and client. This relationship recently has become about a single serving building with a short lifespan. A building with a short lifespan is not a problem, but the disregard for what is to happen to the structure after the established times. This building type should be developed in such a way that the parts of the building can potentially be reused in another project. The lifetime of a building can be designed for, and the future of the shell should be investigated.

The utilization of these materials is pivotal in the future of building. A building is comprised of several parts that individually still function, but as a whole no longer perform as a building. These materials can then be recycled to building materials and other products. This brings up the next point of a new production, the idea of creating a facility set out to prove the use and longevity of materials and buildings themselves. A demonstration to society to hold value in the parts themselves, not always the entire module. The future of a component is dependent on the value held by the owner and user. A recycling factory can manage the inflow of these materials and redistribute them to be used once again. Whether a component is reused directly or processed to become a new part depends on the materials and the downgrade though the recycling process. Accounting for the future is not only an important part of design but should be the means to design in the first place. The checkpoints should be in place, as well as an expiration, which can be extended, depending on the building's ability to adapt. Some buildings will never reach this point, but some buildings can become seemingly immune to the time and the expiration that follows.

Case Studies

Project: **Lensvelt Headquarters**
Location: **Breda, Netherlands**
Architects: **Wiel Arets**

Project: **Tate Modern: Bankside Power Station**
Location: **London, England**
Architects: **Herzog & De Meuron**

Project: **TEMASA Logics Base**
Location: **Valencia, Spain**
Architects: **Jose Manuel Barrera (INAVAL)**

Adam, J. A., Hausmann, K., Jüttner, F., & Daniels, K. (2004)

Lensvelt Headquarters

Project: **Lensvelt Headquarters**
Location: **Breda, Netherlands**
Architects: **Wiel Arets**

Lensvelt Headquarters defines a new approach to a program of production. The project has approached the daunting task of creating a production facility without separate quadrants for storage offices and exhibition areas. The building is fundamentally an open floor plan with the flexibility to arrange the 'separate' spaces within an open floor plan. The building is located in Breda Netherlands and acts as the headquarters for the Dutch furniture producer Lensvelt. The building appears plain and cubic but houses an extremely complex interior layout. The floor area covers 67,000 square feet allowing the spaces to adhere to new production.

The building is as unique from its design as the function of the spaces. Essentially, the building produces furniture in-house that with each year must adapt according to the type of production moving through the building. The building houses offices, storage, production, and shipping. These spaces, unlike most, are not subdivided and separated from one another. The spaces must change and move around as new furniture/programs come through. This is a true test in the productivity. What has been found is with the offices being integrated into the rest of the production a greater understanding of the production plat is achieved. Less shipping mistakes and communication errors occur with this type of layout. The only downfall is an office may be located in a different spot than the previous month. Wiel Arets, the architect behind the adaptive floor breed, ensured Lensvelt of the type of layout. It is a unique strategy. It is proving to be the most productive use of the space.

This case is similar to other factories besides the way the adaptability is addressed. In most cases, the floor plan is somewhat stagnant, but like the others it shares materials coming in and going out. The site is addressed in such a way that it presents what seem like interior elements to the outside of the building. The interior and exterior are not exactly blended, but the architect ensured the use of natural light through the use of a translucent double skin that wraps almost the entire building. This allows natural light to filter through the green tinted glass and makes use of the sunlight during the day. The conference room is interrupted by an interior courtyard, and from that point exhibition spaces are accessed. These spaces are designed with basic materials such as timber, glass, and steel.

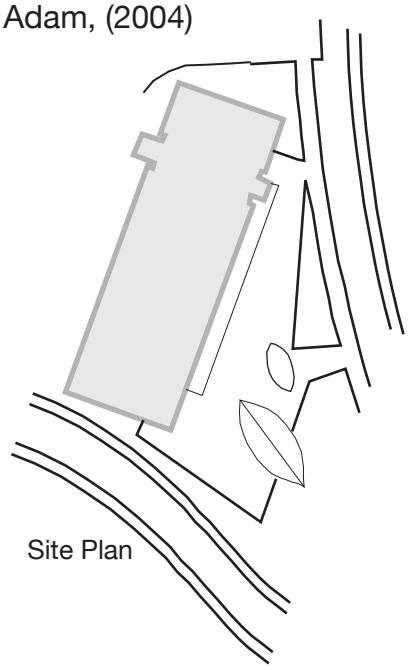
Environmentally, the headquarters addresses the site by creating green spaces and courts outside of the building. The site is composed of a few trees and much open grass around it, creating a welcoming invite for a seemingly stark building. The building welcomes visitors to enjoy the exhibition space and walk around the courtyards. It is a great stride to bring the side of production and still welcome the public. This is achieved in very few production type projects. Historically, any type of production is kept separate from the public's eye, but in this case it is welcomed so that the public sees where and how this highly desired Dutch furniture comes from.

The building plays a pivotal role in the furniture company and engages everyone from the shipper to the consumer. The building is not only a means of production but also the entire life and variety of the company making this a very successful project for Lensvelt and Wiel Arets.

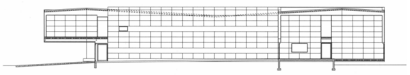
I think the project addresses some problems such as flexibility with production unlike any other company. The fact that the offices are so engaged with the production is one of the strengths in the project. I was looking for a space that could adapt in production, and the Lensvelt Headquarters has shown that production can manifest the entire spirit of a company. The public loves the space, and the workers enjoy going to work and producing for the public. This case is one of great importance in how spaces are to interact. Most parts of the system may not be the same as a furniture production plant, but the interaction between all members is something to take away from the Lensvelt Headquarters. Even the materials used in the project create a very desirable atmosphere. From the green glass to the steel wrapping it, this building was produced to please its occupants and create a whole new identity for the company. I think it is essential to my project because of that fact. How can you address the public with a program that does not lend itself to be explored? The building also addresses the site in a very supportive manner. The building does not seem to destroy the land and any type of interaction is addressed with the ground. Stones follow the buildings perimeter and trees are introduced. Even the yard and parking lot are reduced to fit the needs of the building.

The Lensvelt Headquarters demonstrates how import, shipping, and manufacturing can be encapsulated with the production, offices, and exhibition rooms. This integration allows an adaptable space that is both accessible and productive. The idea of being able to arrange the production line to account for a new furniture type is a very interesting idea.

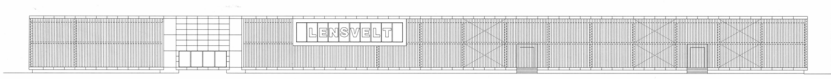
Project: **Lensvelt Headquarters**
Location: **Breda, Netherlands**
Architects: **Wiel Arets**
Completion: **1999**
Adam, (2004)



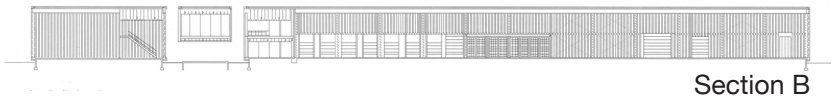
Site Plan



Section A



Elevation



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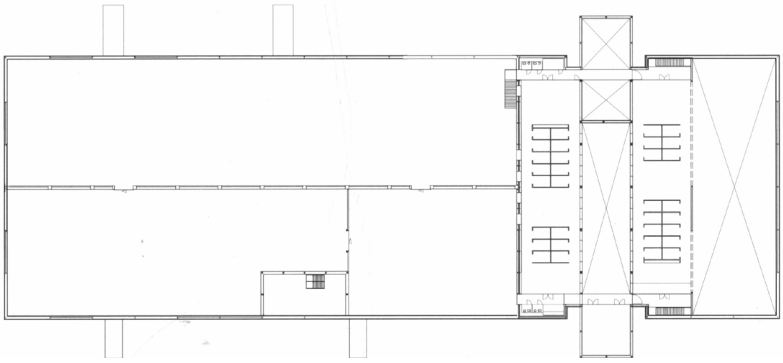
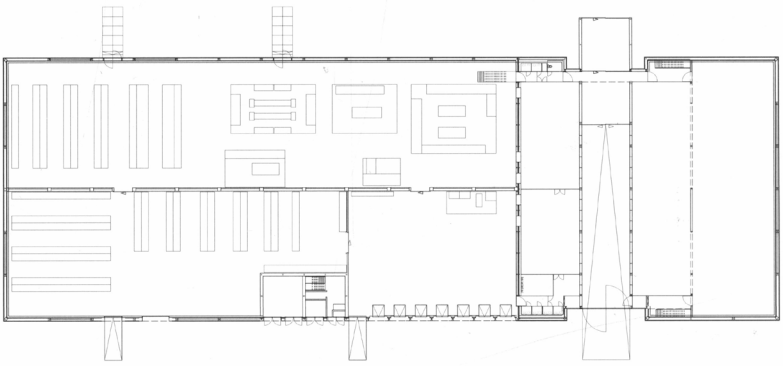


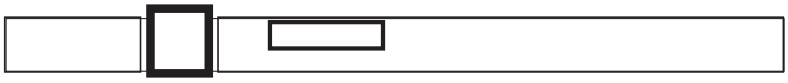
Upper Floor



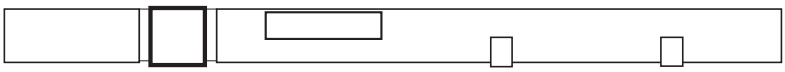
Ground Floor

0 5 20 m

Natural Light

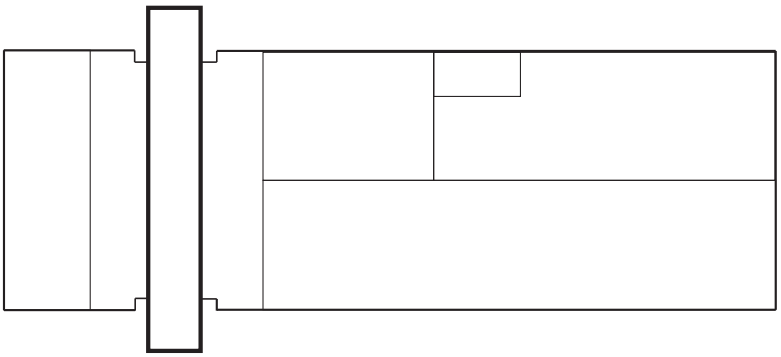


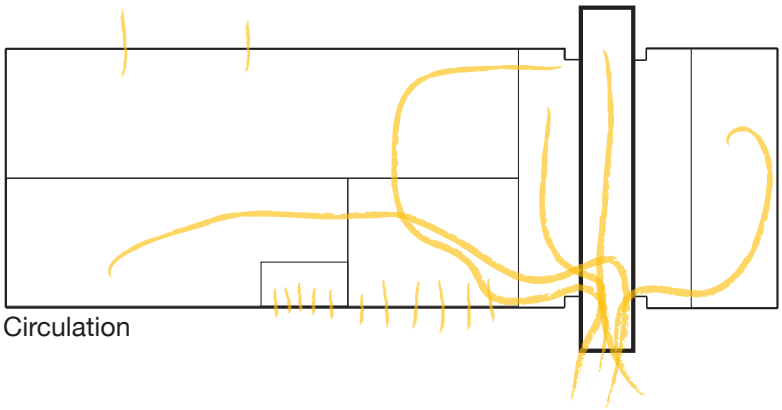
Hierarchy



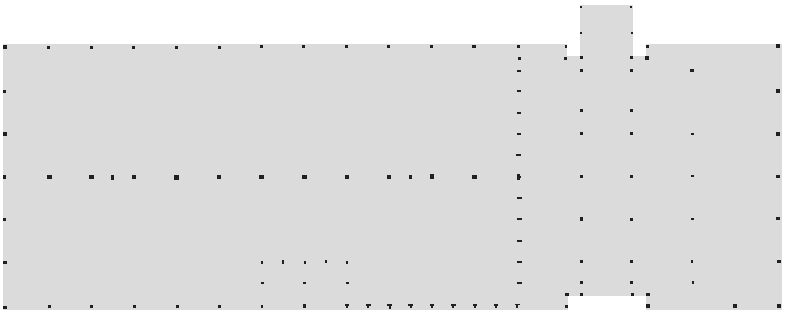
Massing

Section to Plan

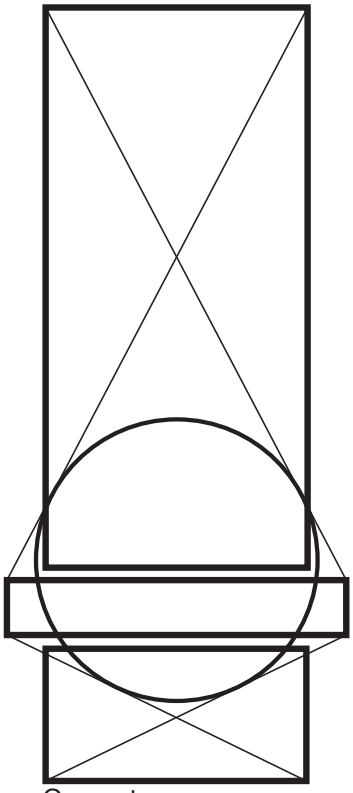




Circulation



Structure



Geometry

Futagawa, Y. (2000)

Tate Modern

Project: **Tate Modern: Bankside Power Station**
Location: **London, England**
Architects: **Herzog & De Meuron**

Tate Modern has become an icon for the city of London and has allowed the artistic culture to bleed through into the public eye. The Tate Modern was formally the Bankside Power Station, which during 1952 until 1981 powered the area via oil-fired energy production. The building is massive and is now one of the world's most visited modern art galleries. The structure stands on the Bankside area of Central London and spans over 700 feet. The central chimney was limited to just under the main spire of St. Pauls Cathedral, directly on the opposite side of the river.

This massive building was home to one of the leading power plants of its time and like most buildings of this type, represented progress for the city. The structure was comprised of three phases but with each phase a new quantity of power began. The first phase was completed and began generating power in 1952, as the other phases were constructed. Sir Gales Gilbert Scott who also designed the Battersea PowerStation and the famous red telephone box of London, designed the building. Finally, after the completion of all the structures components in 1963 the PowerStation was at full capacity. Over time, fuel prices rose, making the station an uneconomical means for producing power. The Station was closed in 1981.

With the shift of the closed station, the massive structure sought a program to once again fill the void. The station stood the risk of demolition for years, and many admired the building, however, it seemed no one could save the structure. Time passed and the building was to be demolished. Contractors had punched a hole within the wall, and at that time the public pled to save the building. The outcry was heard, and the building stood for the time battered but not broken. In 1994 Tate Gallery sought the building and held an international design competition for their new, modern art gallery. Herzog and de Meuron won the competition, and work began to transform this once PowerStation in to the new, modern art gallery it is today.

The Tate Modern is an excellent study of the struggle between developers and expired structures. Clearly, the PowerStation is a remnant of industry, and many view the old facility in a new light today. The design still pays homage to the industrial typology, which can be seen in the arrangement of the galleries, as well as the rust stains of old machinery. The study of Tate Modern relates to the other cases in how industry can be approached, even from the past. The building shares the perception of what an old building can become, and how a new program can fill the gap between the building's expiration and demise. The Tate Modern, like other cases, is advancement in the adaptable nature of industrial structures. Looking at how buildings are able to adapt and judging on the success of the new program connects to the idea of re-use.

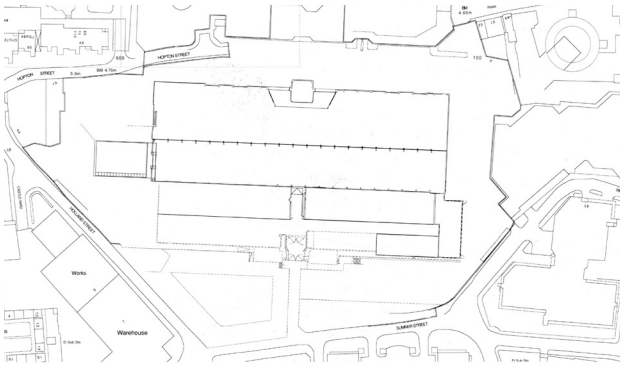
The Tate Modern, unlike the other cases, is an old structure of past industry. The other cases look at how the new industry is addressed with new structures but not the revival of an old one. This study also differs in the timing of program. Perhaps, the other cases may follow the history of Tate and regain a program, but the PowerStation successfully demonstrates old industry-new program. The other cases are not of the same type of building, however and it is interesting to view how a new industrial typology may interact with new programming.

The Tate Modern hits many points for an adaptive reuse.

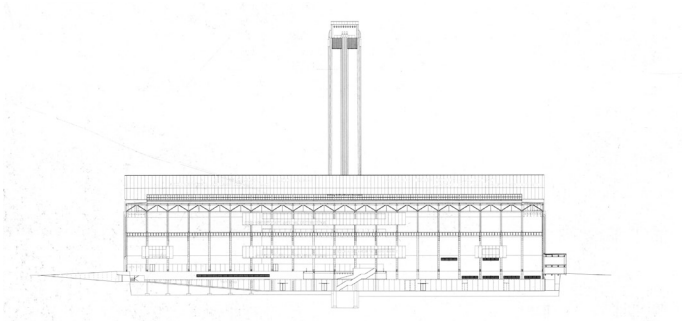
- -Engages the Public
- -Represents the artistic culture of London
- -Re-establishes an old shell
- -Addresses the past
- -Formulates a model for buildings of its kind

This case shows that a building can shift from industry to public engagement and remain successful. The new Tate Modern gallery may not have been as successful without the rise of The Bankside PowerStation. The building shows the public a new way to view old structures. Structures that lay dormant, may now have some wondering what future may wait. The building is a great example of how to represent the past without completely erasing it.

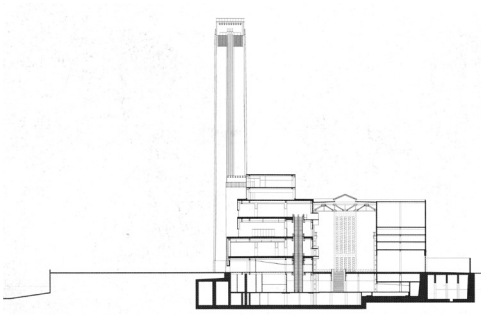
Project: **Tate Modern: Bankside Power Station**
Location: **London, England**
Architects: **Herzog & De Meuron**
Completion: **2000**
Futagawa, (2000)
Hourston, (2004)



Site Plan



Section A



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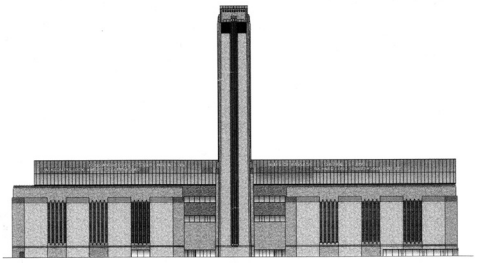
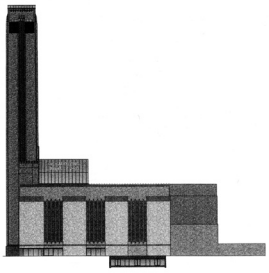
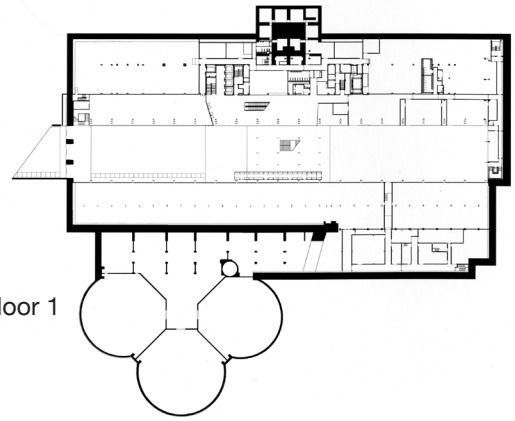


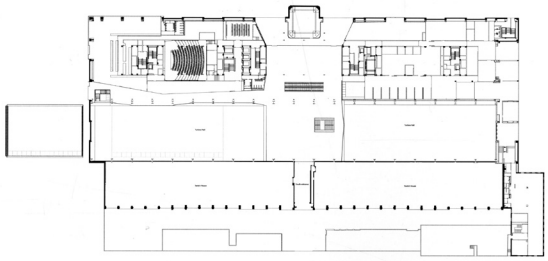
North Elevation



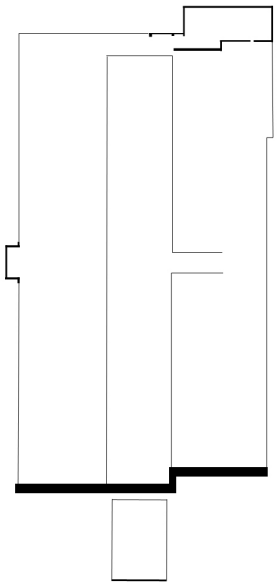
West Elevation

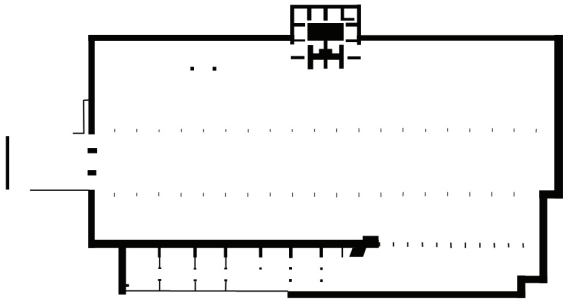


Floor 1

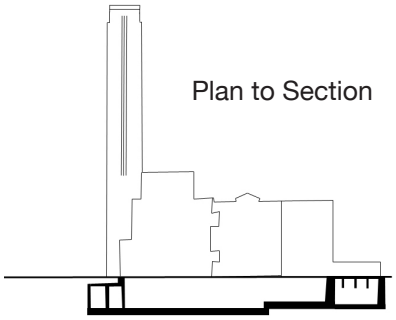


Floor 2

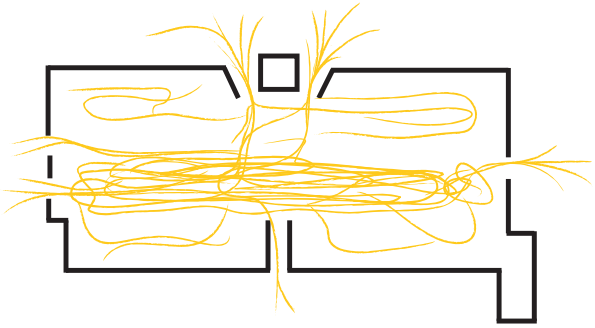




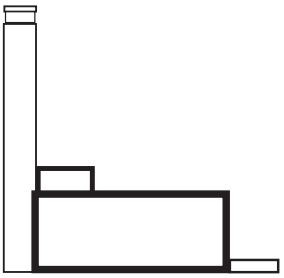
Structure



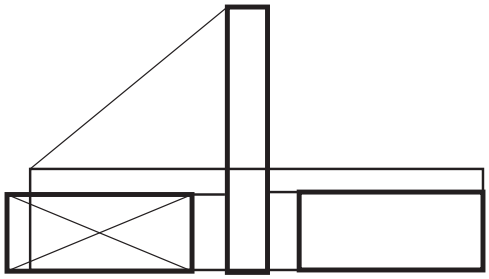
Plan to Section



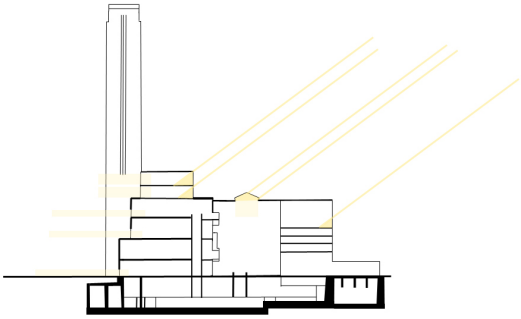
Circulation



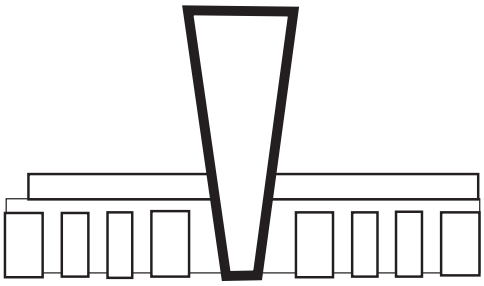
Massing



Geometry



Natural Light



Hierarchy

Mostaedi, A. (2002)

TEMASA Logics Base

Project: **TEMASA Logics Base**
Location: **Valencia, Spain**
Architects: **Jose Manuel Barrera (INAVAL)**

TEMASA Logics Base is home to the storage and distribution of optic fiber and cable laying equipment. Within the port area of Valencia, Spain a former shipyard is used to host the new warehouse and offices for TEMASA. The site is located on a pier and distributes cable to ships that lay and repair it in the Mediterranean. The building footprint takes up about 23,000 square feet within houses, cable silos, and splicing stations. The building is as unique in function as is its design. The structure operates day and night and both captures light during the day and emits light though the frosted glass at night, acting as a lighthouse or beacon for incoming ships.

The cable station was constructed entirely through dry work so that it would be easy to dismantle, modify, or change. The material qualities of the building are the distinguishing factor of this project. The Bicellular polycarbonate plastic with a concealed assembly system allows a continual duality of full-empty. Externally, with the light falling vertically during the day, its materiality appears to be a solid; internally however, it is a luminous enclosure. At night this relationship is reversed; the artificial light makes the enclosure corporeal and solid from the inside; whereas, from the outside it is a box of light (Mostaedi, 2002).

This case, like the others, is based on an industry and how a building of this typology is treated. Similarly, this building has a process and line that it follows, allowing the spaces to be somewhat linear. The cable station relates to how the import and export of a material is addressed, yet, unlike the others, it is directly addressed to the ports. The shipyard plays a very important role in how the boats are loaded and how the cable comes in. The building studies the arrangement of spaces based on light and transformability. This case shares this with the Lensvelt Headquarters in the way the interaction between light and function of space is addressed. The interior spaces do not blend between one another, but somehow they are not entirely disjointed. Unlike the other cases, the program does not welcome the public and is inaccessible for the most part. This missed interaction is of interest because of how it affects the program. The public may not be interested in the program, but the building is a point of interest, especially at night.

This case was focused on the interaction between the pier and the architecture. How the building is addressing the site, and how the site then reaches out to address the water are some of the main points of interest in this case. The cable ships are massive and the building must load these large ships in the same way that the cable is loaded into the building, giving the import and distribution of the materials a similar duality as day and night. The interaction between the ship and structure begins to reveal how the building is formed, and the odd components one might find interacting with the interior spaces.

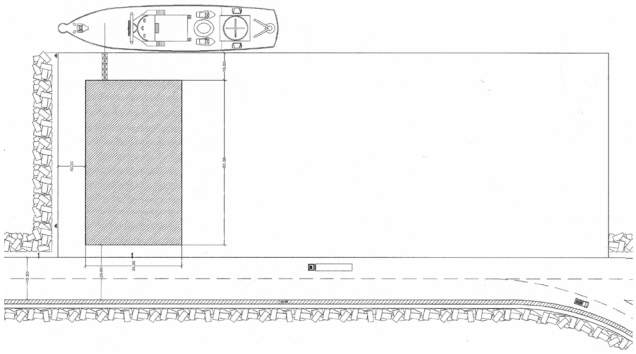
The cable building responds to the former site by addressing the use of the dock. The ships still come in but are to be loaded with cable and not broken down. The site allows for an efficient distribution of the material and organizes the space accordingly. The building may seem empty, but it is reaching its maximum capacity. The workers occupy the loft above the spools of cable crating, which is a less dangerous and more efficient work environment. The building is based on both functionality and efficiency with regards to the ships coming in, but the building also considers more than just the efficiency, by creating a desirable and safe work environment.

The TEMASA Cable Station hones in on several points for a distribution center

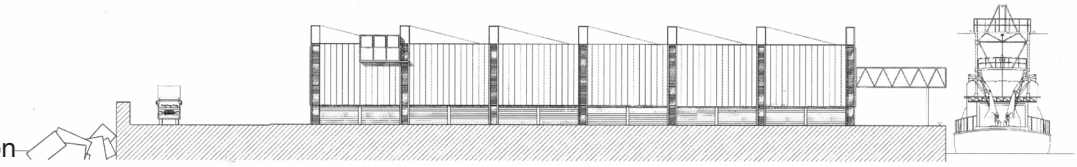
- -Creates a healthy environment for its occupants
- -Function defines the building
- -Spaces are arranged according to light
- -Addresses the site's previous use
- -Is transformable and adaptive to changes

The cable station shows that a building can serve a function efficiently but still take into consideration other important elements to design, such as light, surroundings, and simplicity. The building demonstrates the interaction between water and structure. The port is a good study for the interaction between a ship's loading and unloading of materials. The juxtaposition between public and industry is exposed by this project, showing some of the advantages and disadvantages of this interaction.

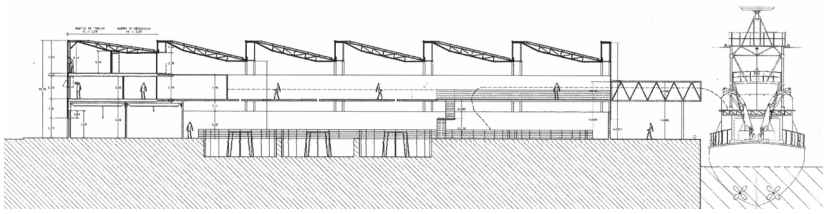
Project: **TEMASA Logics Base**
Location: **Valencia, Spain**
Architects: **Jose Manuel Barrera (INAVAL)**
Mostaedi, (2002)



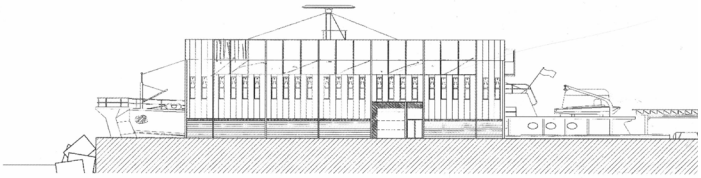
Site Plan



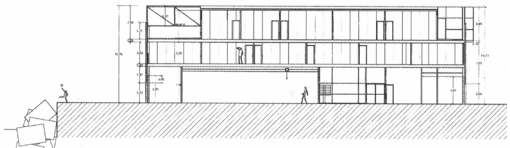
West Elevation



Section A



North Elevation



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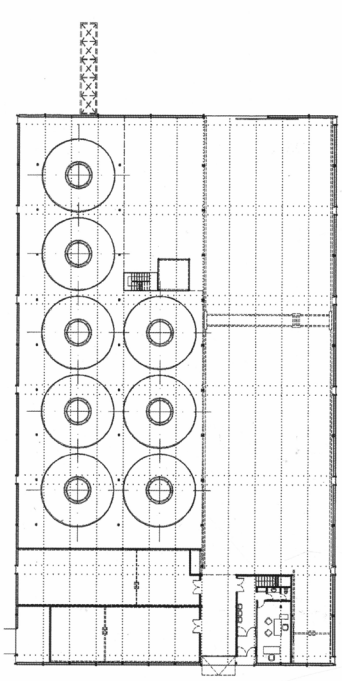
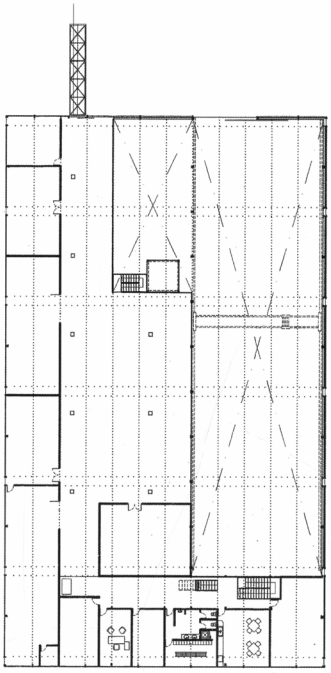
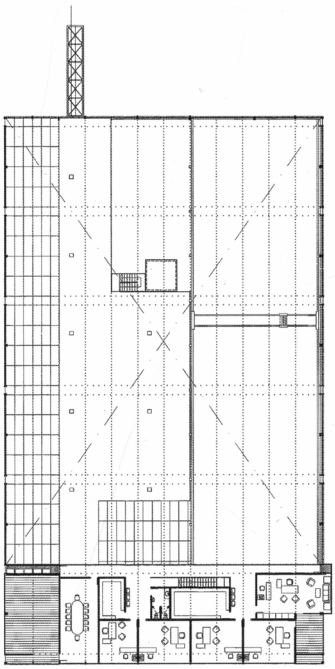


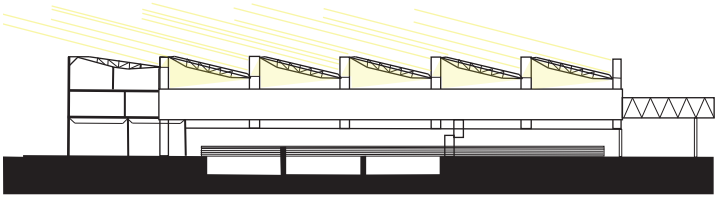
Ground



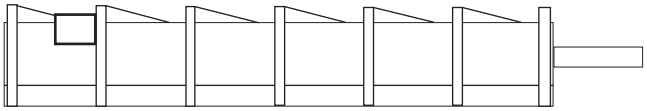
First



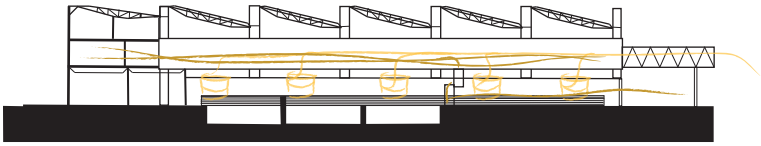
Second



Natural Light



Massing



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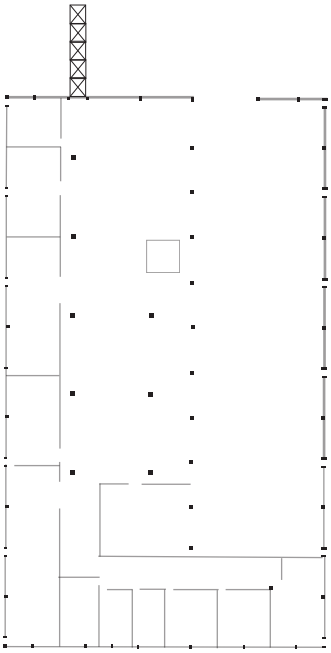

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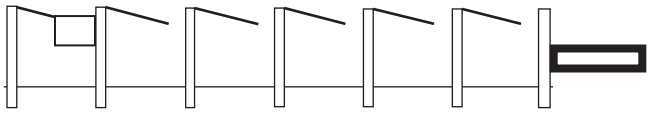
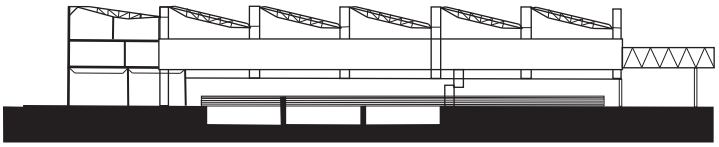
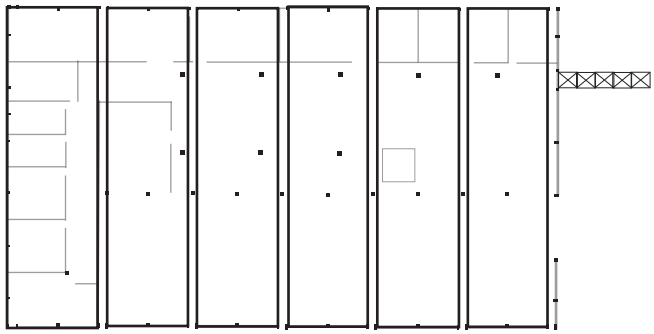
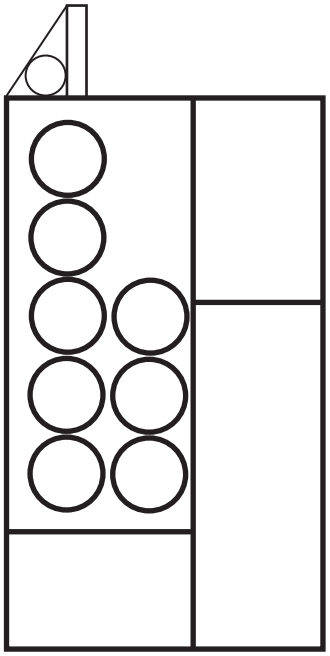


Hierarchy



Section to Plan





Geometry

Case Study Summary

With the selected cases an incorporating idea can form through the study of: Lensvelt Headquarters, Astria Waste Incineration Plant, Storage Hall A12, TEMASA Cable Station, Tate Modern, and SIMS Recycling Facility. Some of the cases explore the idea of a station that is to recycle and distribute, while others take a look at the interaction of individual components found in similar projects. The theoretical premises form much of the interaction between the projects selected. These projects justify that a building can adapt to new needs, house industrial operations, interact with the public, rise from the ashes, and interact with the past.

The projects studied helped to formulate an idea and connection between an industrial structure and the public. This type of interaction is not too common and most of the time results in walking past a construction site and being interrupted by the sound of a jackhammer. In rare cases, the public is able to interact directly with the inner workings of industry, production, and creation. This is generally an interest for most but is a sought interaction. Where does a car come from? Who makes that car? These types of questions began the formation of the unifying idea. Once those questions are addressed, it is guaranteed the individual may never look at a car the same again. Industry and production is mysterious in nature, but if the public were able to interact in some of the same ways the case studies allowed then maybe some things, such as recycling, can be demystified. The interaction can be subtle but effective. A bottle contains liquid that an individual will drink and dispose of. If the bottle is recycled, the individual drops the empty container off where it will be transported to a recycling facility. At that point the interaction is severed. Can that individual follow that bottle and witness the future of the disposable? Maybe, after that interaction it is no longer a question of if it was recycled because it becomes part of the individual's interaction with that bottle. The idea of this is true for much more than a bottle. The pursuit of understanding the interaction between the public and industrial operations has become an area of great interest, and the case studies lend much information for this interaction.

In some cases it was a matter of the time, and others it was the operation. In Tate Modern of course, the public interacts within an industrial structure because of the program and the importance that building plays on the culture of London. Whereas, in TEMASA cable station, the public were never swayed to interact, other than the beacon that shines across the harbor at night. The operations from the cable station are considerably more dangerous than walking through the corridors of the Tate, but this is an operational difference. This is why Lensvelt Headquarters was selected. The headquarters allows both an inviting public interaction and production operations. The projects were selected based on their typology, small components relating to the project, and the site.

The cases look at the types of production, as well as the past of the building. Most of the projects are new structures, rather than an old re-use; however, this is again based on the perspective of expiration and recycling itself. Some buildings themselves are destined to be dismantled, rather than a new program implemented, such as the TEMASA Cable Station, which is composed of components that can be disassembled efficiently. Whereas, others hold a far longer future, such as Tate Modern, which could possibly stand for longer than any other program. The common place between all of the case studies is that they all are, or once dealt with, an industry. That industry does vary to an extent, but each project handles each operation in a different way. The reason this common place was selected is because of what it means to be old industry and new industry. The future to past relation of industrial buildings is of great interest, when old industry is present with a new project that will house a new industry. Connection between the past and present, as well as the changes in operations form the interactions with the public, making the common characteristics relate directly to the chosen cases. The uncommon characteristics include location, operation, interaction, and time itself. This shows that, even though these crucial aspects to a project vary, an underlying idea is present.

After the considered cases, the project and the program have been drastically affected. From the case studies I can begin to draw a conclusion based on the interaction between the public and industrial, as well as the interaction between old and new. This is important when addressing the expiration date of a building or a product. The time spent with that object and then the separation from it. As asked before, can an old industrial building house a new industrial operation or are they destined to shift their operations to allow for something entirely different? A building that reaches its expiration may host a new operation or program. A new building may reach an expiration far earlier than an old one. Does that mean it is tossed away, like the bottle, or should it be refilled and reused?

A building is destined to expire much in the same way a bottle of water expires. I do not believe the water expires, but perhaps the container it is housed in does. Other products expire in the way contents, such as milk expire. Maybe this is how some buildings are viewed, the program has expired, but the building has not or vice versa. Can we refill our buildings until the shell is compromised? I believe that it is possible, and it is important to recycle the ones that cannot be refilled.

Historical Context

The project is not a new concept; the idea of the longevity and reuse of a material has been around, but it has not been established that a building is a material- only comprised of them. This idea of utilizing a building until it is absolutely uninhabitable as a shell begins to look at how materials are used. Other projects such as this explore means of recycling and how the products can be reused. Some of the past recycling projects are very successful in terms of energy expended to energy saved. One thing however is the lack of past projects addressing the public. Most of the recycling centers found throughout the world are based on a program that may not engage the public in a substantial way or for that matter in a positive way. This project relates well to how the past can be addressed with the future infrastructure in place.

Recycling has been around for most of history. During the preindustrial era, metals were being collected and reformed into new materials. Ash was being used for brick production but it was not until the industrial movement that the demand for recycled products arose; the same era when the factories began lining the shores of the United States.

This industrialization brought production to the cities and also created several new districts from the influx of people. One local example of this is Morgan Park, MN. A company town establishes a connection between the work and laborer. The establishments have been described as model towns and cities because of the unique time in which they must serve. These small cities became an opportunity for architects, planners, and engineers to experiment and try new innovative strategies for how a city was addressed. Duluth began to rise as the zenith city that at this time was the only port to both the Atlantic and Pacific oceans, allowing the city to develop and establish an industry with more than the steel ore mining but lumber as well. With this brought the arrival of the railroad. The transportation of people and products to the area began to flourish, and with this influx of people communities were being filled by occupants.

Duluth was at one point the fastest growing city in the United States and was on track to become the largest city in the Midwest, but, due to a stock market crash in 1873, the city began to disappear. Interest peaked in the 1850s after the establishment of copper mining began to be discussed. After a government land survey and a treaty with the local tribes, the iron ore mining began a land rush for the area. During this time, a new channel and lock system was established allowing large ships access. By 1857 the resources began running out and the area's economics aimed at the woods. After some timber harvesting, the city began to establish roots with other means of transportation, such as the railroad bringing small numbers to the area but allowing the area to be more deeply connected to transportation. After some time, area corporations began to look again at the potential for the once was harbor. The city would once again be given another chance.

The combination of rich natural resources and transportation moved the city forward once again. Programs were implemented to ensure that the workers and families had access to needs and were well taken care of. This was not a reward to those who worked, however, it this type of holistic city looked to attract more workers and develop even further into the model from which it was designed. Industrial corporations looked to control employees both at home and in the workplace, but with several examples of previous towns demonstrating distress and labor conflict, new model towns were adapting to the idea of 'Welfare Capitalism.' This approach established common ground between the workers and employers. Morgan Park is an example of what the middle ground looked for and its means of establishment. From the book *Morgan Park* the author Alanen(2007) addresses the history and role Morgan Park played in the industry, as well as the City of Duluth. In the plan for a middle ground, employees were provided with home-ownership programs, health care and life insurance plans, stock investment options, limited retirement benefits, workplace safety improvements, and even home economics classes for the wives and daughters of workers (Alanen, 2007).

The modern villages were developed for the workers and ensured a good lifestyle. The new developments allowed design professionals to develope an interaction based community and encompassed an environment from which the workers lived and worked. By the 1900s the model cities started to incorporate contemporary design styles as part of their identity. A new type of housing was being developed and was the original idea of suburbia. In 1907 it was announced that a steel plant was to be constructed within the city of Duluth. The residents of the town welcomed The U.S. Steel Corporation.

The U.S. Steel Corporation quickly became the world's largest industrial enterprise and was moving fast. With the introduction of U.S. Steel, the city was witness to immediate action, and the once quiet port became a thriving artery for the city. With the introduction of the steel plants, Duluth once again looked to the advancement of population and the development of its city. The Duluth works established Morgan Park and brought the model city once again back to the area.

Morgan Park was like a city unto itself, remaining somewhat independent, and a community established by the company it was serving. As mentioned previously, the area provided all of its occupants with the means to live a good life. Alanen discusses the offered opportunities provided by the corporate sponsor. The citizens partook in the opportunities offered by the area. Both adults and children found ample opportunity to join numerous community and service groups and to participate in social events. Thirty-six organizations-ranging from educational, musical, dramatic, and religious associations to scouting, athletic, fraternal, and medical and relief groups were active in the community by early 1919. "From October 1917 to 1921 residents received the Morgan Park Bulletin, a handsome weekly magazine that informed them of the programs and events offered by these organizations and provided information about: how to garden, how to take care of their furnaces, how to manage their water supply-and keeping their lawns trimmed and premises neat"(Alanen, 2007).

Many of the articles were written by physicians, teachers, nurses, pastors, and directors, who themselves lived in Morgan Park. The majority of Morgan Park's activities were centered in the school, the good Fellowship Clubhouse, the Neighborhood House, and the two churches; many occurred with either the implicit or explicit approval Minnesota Steel and the Morgan Park Company. A number of programs, whether considering the highly organized school curriculum or the multitude of offerings in the Good Fellowship Club, revealed the pervasive and paternalistic influence of a corporate sponsor (Alanen, 2007). This dependence created a positive environment such as: work, and receive a good life. Everything began to flourish and the community was successful. Even local football teams where established. This type of community had an underlying flaw, however, that became evident. The same connection that makes and formulates this strong community is also what would inevitably dismantle it. Great dependence on the corporate sponsor is dangerous. Once the depression hit, the corporate sponsor was no longer providing what it was once able to. A community based on the dependence of a corporation feels the same ups and downs as the community.

Alanen discusses the affiliations with Duluth. U.S. Steel's drastic financial losses of the early 1930s led to significant modifications, and even the elimination of many services and employee-benefits programs that the corporation offered in its steel plants and towns. Morgan Park certainly was no exception. In March 1933, less than a year after responsibilities for manufacturing operations had been transferred to the American Steel and Wire Company, the Morgan Park Company submitted a letter to the Duluth City Council requesting that it accept the deed for the model town. Although U.S. Steel would retain ownership of Morgan Park's buildings, the petition called for the transfer of all community services to the city of Duluth. The council's members reluctantly considered the proposal, even if they saw "no alternative but to accept the deed to the property from the Morgan Park Co" (Alanen, 2007).

After the acceptance and transfer, Morgan Park's city name changed, community services were transferred to the City of Duluth, and housing in Morgan Park was being rented to non-steel workers. This change affected both parties financially and changed Morgan Park's social interaction. Plans to sell the residences of Morgan Park were becoming a preliminary plan. After another rise and fall, the city was becoming dependent on when the corporations where doing well enough to provide services and were able to deal and get by when the services fell through.

The steel production showed dependence on the war, and, with WWII, the factories once again produced. The communities banned together to provide for the country. Inevitably the steel demand fell, as well as the community. The production times became favorable events and provided the community with better means of living, but the future of the steel plant was uncertain. The facilities which were once the most modern means of production were dated by their fellow factories that used newer, basic oxygen furnaces. In 1971, it was announced that U.S. Steel would shut down its Morgan Park facility. Throughout the years the corporation extinguished its manufacturing facilities, then the cement and coke production. This shutdown was not only due to demand but also pollution concerns and the expensive advancements needed to control the facilities' impact on the environment.

The community does not exist as it once had but the remnants remain from the past. The preservation of the model city has been a recent topic of discussion for the City of Duluth, and the contents of that city still include many of the original structures. These structures still exist and are still considered by its residents to be the model city. This community looks to the future and the adaptation of the buildings and area. Some buildings may now be able to be restored, while others can be repaired for others counterparts. This rich history of community looks forward for the advancement of the city they love.

This brings around the questions of what an industry is capable of and what is affected by it? Morgan Park is a community that shows the direct correlation and connection between the impacts that production can have on society. Socially, the area was affected by the ups and downs of the industry creating jobs and opportunities, as well as taking them away. The historical sense of industry is that it seems there is almost always a fall. This demonstrates community's dependences on the local economy and in the case of Morgan Park a dependence on community itself.

In recent trends, society looks once again to the importance of recycling, much like it had during wartimes. This shift is due to the change in the economy and the amount of pollution that can be created. It is not uncommon today to hear that a product is made up out of x% of recycled materials in order to sell. The idea of recycling was to save money on products, but in many cases that recycled product is more expensive than a new product. This paradox does not allow society to make decisions based on money but on the value of a product that is recycled. This can be a problem, when perhaps a product claims to be recycled, but more energy is expended in making the recycled product. With the recent trends can the restoration of the old become a logical solution for buildings and products alike? Morgan Park is filled with parts left over from the golden years, and the people of the community want to re-establish the city and allow it to represent its past. In Alanen's article "It Takes a Village," it is discussed that in the past only a resident of Morgan Park would directly involve himself or herself in the rehabilitation of the city. Ironically, however, it was the legacy of the past.

Duluth is a city of rich history and hardworking people that make up an important drive to inspire and advance. The city is still a major port and allows the import and export of materials. Whether the materials are raw building material or timbers, the port is still active today with many wood product-producing plants. The fact that the harbor still functions with the community means that the interaction is not lost, because the community looks to the water for a future, a future that could potentially repair the past while paying homage to it. A recycling center on the bay could be the means of processing the materials left over from the dismantling of U.S. Steel's Morgan Park facility. The community looks for a solution to repair the structures, and society needs to recycle disposable materials of today. The history of the roots of recycling come from industry, but rarely an industry based on recycling. Industry brought about the rise and fall of Morgan Park, and recycling with respect to the past is a way to repair the damages of time. The expiration of Morgan Park has not been reached yet, not as long as the community from which it helped foster still exists. The process of creating jobs based on the repair and recycle of a community is much the same way the corporations supported Morgan Park, but with the import and export of materials that cease to run out, perhaps a new community is along the water.

Project Goals

The goals for this thesis exist in the context of history, culture, and well being of the Earth and its inhabitants. The goal is to investigate the interactions between the past and present, and design to build a more sustainable and adaptable architecture. Buildings are some of the largest waste sites on the planet, after they are decommissioned; however, the waste can be looked to for a new resource and means to build.

Academically, the project is challenging in the study of the old and new. Many resources are found for the relations and uses. The respects paid to the past are becoming increasingly important. and with every new project a new history is to be determined. Some of the structures may never serve more than one function, but the idea of creating an adaptable structure comes up more and more each year. New building systems are being studied and tested in order to create better-suited buildings in the sense of time. The goal is to draw a connection between the benefits of a building reuse in both the recycling and refilling of buildings. The idea of creating a recycling factory forms from the complex nature of trying to decide value in materials and buildings. This thesis aims to develop information on how this is possible both physically and conceptually. Bringing together the old and new, while processing the used, is something of a drive in the discovery. The project should offer ideas about this connection and provoke academics to think about how a building's future is addressed. Many buildings are developed without an endpoint, but this project looks to address the point at which a structure must come down, and what could possibly be gained from determining an expiration. As mentioned before the expiration could potentially be extended with programmatic checkpoints in place. These checkpoints to be studied are the needs determined by society and the owner. As seen in Morgan Park, not all checkpoints are perceivable and change drastically with the introduction of demand, war, and poverty. This constant flux created a very dynamic expiration that seems now to be realized, except for those who wish to rebuild the model city. This constant moving target is a challenge academically in order to determine a valid expiration through a program that can always produce and consume at the same rate. This project is to demonstrate to others that can be an important matter if buildings are created without a future in mind. This project is to be a reference to others as research is continued and the dynamic nature of a buildings future is determined.

In the professional realm, this thesis looks to investigate the viability of these tired shells. What can be done with a building that has reached its end and is there a future other than the piles of rubble it may become? New developments are popping up all over the globe, and these developments continue without much regard to the time at which they will not perform or are no longer desired. This guide hopes to help determine a future use of the building or for that matter a container. The world is shifting to a more sustainable approach to design but even still, what happens to the two-foot thick SIP panels after they are no longer able to insulate? This is a question this thesis is looking to address and determine if the current way is the best way to design, because as the case studies prove, sometimes the extent is impossible to determine. The strategies practiced in today's world do a good job at serving the client, but if the client shifts, old developments seem more promising. A developer may only wish to put up a community and not see that the community can function. The goal is to get professionals thinking about a building's future and perhaps, change some current building strategies. The goal is to help design a building with an expiration attached to it. This expiration time can be evident or hidden, as long as designers are thinking in terms of the future use. This does not only apply to the new constructions, but how old developments may be addressed. Old structures, which have stood the test of time, could now be seen in a new light.

Personally, the goal of my project is to understand our connections and interactions with a product, if we can call a building a product. I do not view a building as a product, but it functions in much of the same way. The interaction can be short lived or savored, but the outcome is similar because at some point this interaction ends. Can another reuse the building or can its components be utilized? This is a question that is to be explored and answered as a personal goal. This determination to discover the use for future buildings drives the project. It is in my personal interest to investigate the buildings of industry and look to determine a future use for either the shell or the parts. My interest in industry becomes apparent in the investigation but the goal is to understand further what these buildings can offer to the future. Also, as recycling becomes much more of a component in the way a product is developed, it is important to investigate how a material can be shifted and reused.

Personal Goals

- -Understand the need for disposable buildings
- -Determine how materials have a future use
- -Make recycling part of our daily thinking
- -Engage the public with the past and future
- -Develop an adaptable design

Site Analysis

Duluth, Minnesota- S 8th Ave W

The Voyage

An alarm clock interrupted the morning as I crawled out of bed. The morning began at 4:01a.m. as I shifted to the car, where I was met by fellow students and preceded to the city of Duluth. Monday the 14th was brisk and the roads were wide open. The drive from Fargo to Duluth was a progressive change in scenery. The roads became winding and found themselves passing in and out of trees. The trip down the road seemed to carry on forever, and the signs to Duluth started to become more abundant. As the horizon dropped drastically the city was in sight. The massive change in landscape and introduction to unfamiliar landforms established the city. As the car moved forward toward the site, the city began to converge around. The industrial sites became the main source of focus, and soon the region felt as though it was tipping to the water. The city was filled with busy streets, as if the town were just waking up as the sun shined over the lake. The water seemed endless and the sun had a short amount of time before it met cloud cover. As the site pulled into view, many components of the city began to drop away and the flat region along the harbor offered industry and towers pluming smoke. The industrial region followed the water and the city stood above looking down to the water. The car was parked and the trek to the site began bearing the cold air coming from the water. The smell of wood and timber introduced the OSB Plant down at the harbor. As the site was approached, the old cement plant stood at the end of the pier. The site had recently been fenced off and the cement plant seemed unreachable. I walked along the fence where I was introduced to two large signs reading: NO TRESPASSING violators will be prosecuted. Disheartened, I walked up and down the fence weighing the options. The fence was nearly breached but my colleague disapproved of this breach of security. I listened and dragged my feet back to the car. This was a large disappointment.

I began talking to the neighbors of the site. I got a name, Alex Giuliani. He was now the current owner of the site and I began calling associates. This allowed time to explore the city. Just as quickly as the city woke up, it seemed to be at rest as the sun past through the clouds. We voyaged downtown and walked along the shore and to the piers. The lift bridge re-introduced the part of downtown I remembered from previous visits. After this, we explored the downtown up along the hills, and I was reminded of San Francisco as I drove up and down the brick laid roads. I parked the car at the Duluth Library where I began to study further in depth the history of the city and the cement plant that occupied the site. After hours of winding through micro-films I gathered the information and inquired on Mr. Giuliani's number. The woman at the library told me to take a look at Clyde Iron Works, a building that he owned and happened to be a restaurant. We decided to eat there and upon arrival I asked if they might have his number. The host pointed to the corner of the building. I walked over and was introduced to a man behind a desk covered in papers and drawings hung all around. I met with Alex and explained the project, he was really interested in the project and we began to discuss the cement plant on the site. He is looking to develop this old building. He told me open the gates and drive in. We ate at Clyde Iron Works and proceeded once again to the site.

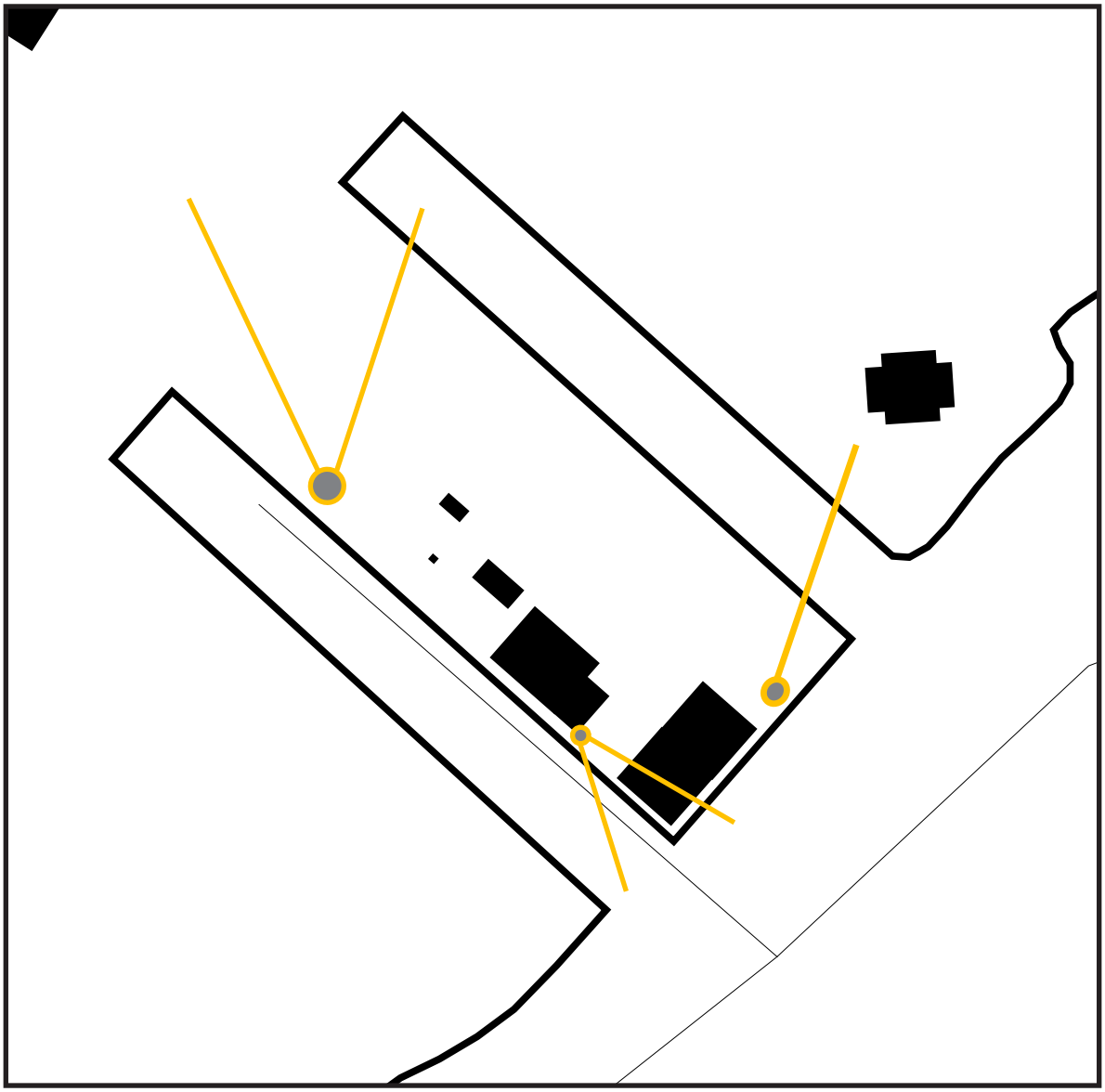
The gates swung open and I parked near a small building with the windows broken out. The site felt different now that I was granted permission to investigate. The area had a set of tracks, which held two wooden boxcars. The tracks ran all the way to the cement plant and along it various parts were scattered such as railroad ties and rebar. As I approached the cement plant, the sheer size of the building began to take form. The main building consisted of four silos and a wooden hut on top, almost as if a house landed on two of the silos. The silos were met by a concrete structure and sheet metal loading bay. The building then connected to a newer steel building by a conveyer. The sun just poked out of the clouds and the site was bathed in yellow. The blue water surrounded the end of the pier, and the cool air came off the water. A large ship was docked on the southwest by the new steel building. I walked around and photographed for a bit; the light was perfect. I set my camera down and walked the entire site. I found various objects to write from such as: **the anchor-** so rusted and pitted I was not sure if I should sit. The site and complex were very relaxing. Near the anchor was a run of sand, almost too difficult to trudge through. I could hear cars in the distance and the gravelly scrapes of the plant to the south. The wind was coming from the storm in the southwest- it was cool. The complex was odd and much bigger than I anticipated. The smell of wood chips and burnt lumber filled the air. I proceeded to the interior of the old steel building and sat amongst **the spools-** in the structure's loading bay, were the train cars where filled. It was full of spools and various objects. Up top were busted out windows and the floor was covered in pigeon feathers. I could hear them overhead. It was nice and quiet here. Other than a radio in the distance I heard nothing- echoes. As I moved to the south I sat on a large ship tie down. **The ship tie down-** I sat and looked across the water with the wind in my face. Directly to my back the large silos dwarfed the space. The area was filled with grass in-between the old and new building, the stagnant conveyer spanned overhead. I packed my things and gathered my thoughts. I got in the car and drove back to Fargo. The site seemed desolate and abandoned but peaceful. After my visit I began to think of the old cement plant more and more. I spent the entire day in Duluth and enjoyed the region filled with history and remnants of the past.

Site Views

Aerial Lift Bridge

Superior Bay

City of Duluth



Reconnaissance 1

Light

The light quality of the site is saturated, the colors are very vivid from the existing surroundings. Due to the water the light intensity tends to wash out around the edges of the pier.

Vegetation

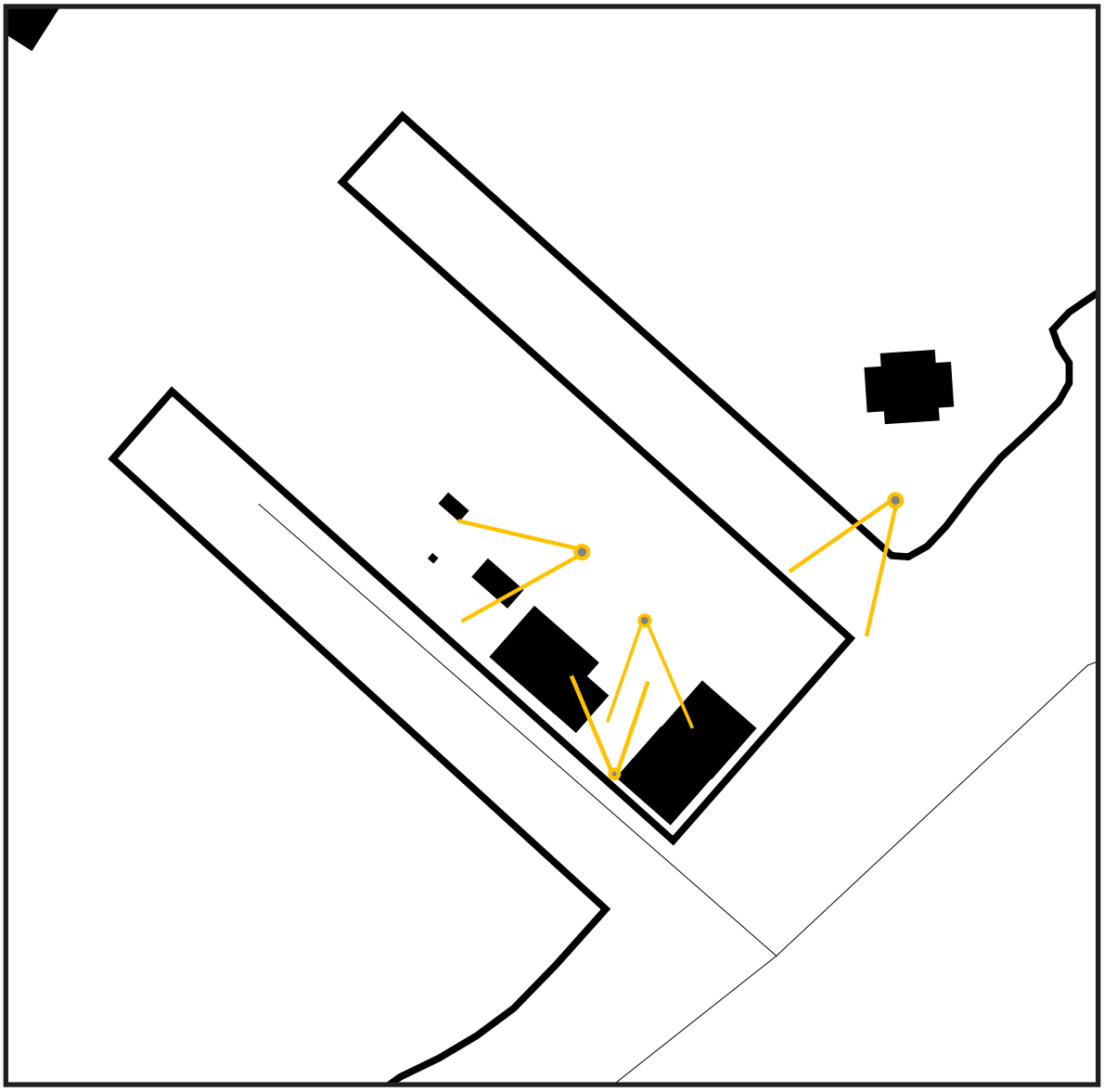
The vegetation on site is scarce and only a few trees are to be found. The grass on site grows between the buildings and railroad tracks.

Water

Since the site is located on a pier water is viewed from almost every point on the site. The water was found around six feet below the perimeter.

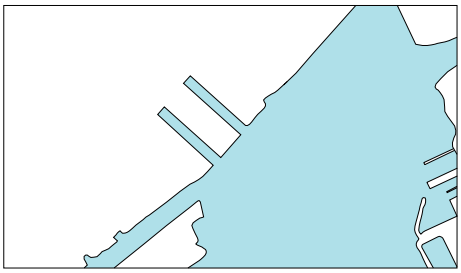
Wind

A noticeable wind tunnel is created between the new steel building and old silos. Around the perimeter of the south part of the pier a updraft off the water occurred.

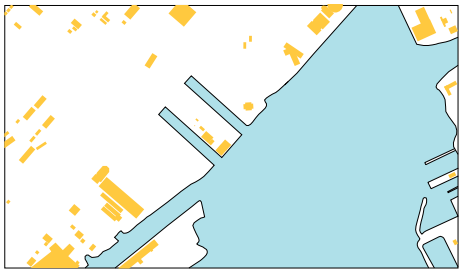


Reconnaissance 2

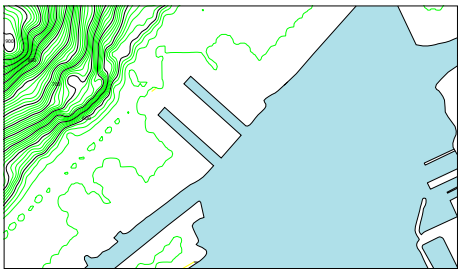
Site + Maps



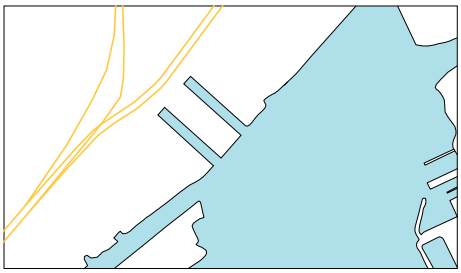
Water



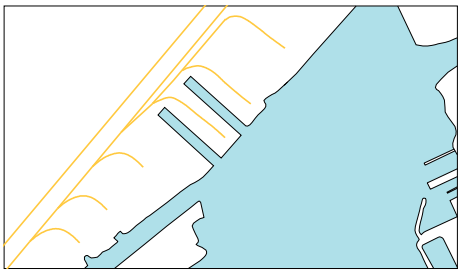
Buildings



Topography

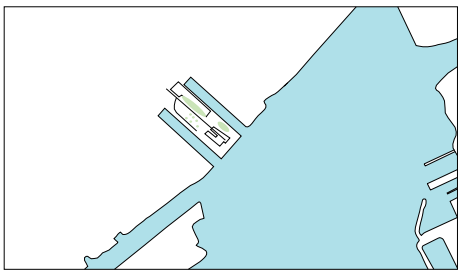


Interstate 35

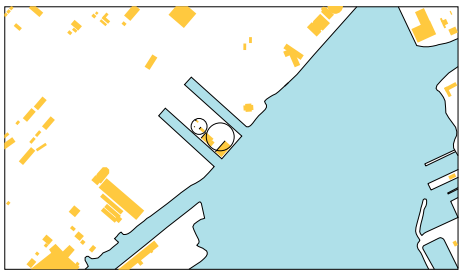


Railroad

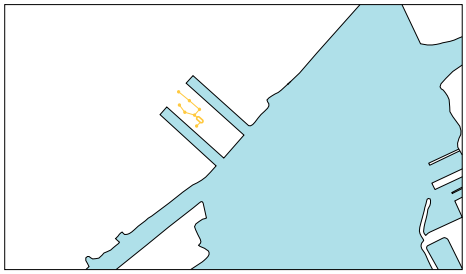
Transportation



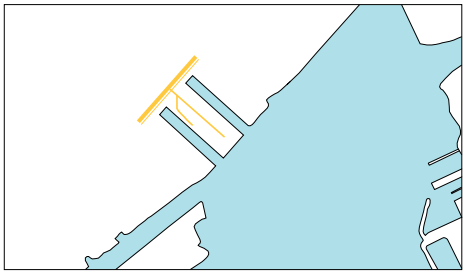
Variation



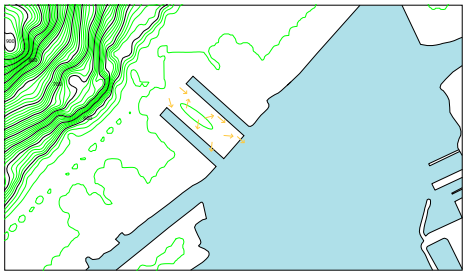
Geometry



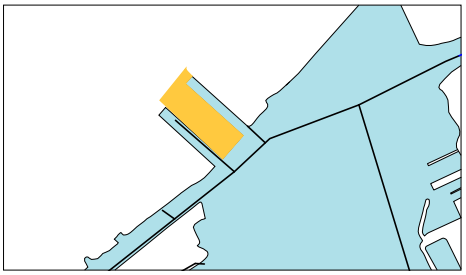
Utilities



Traffic

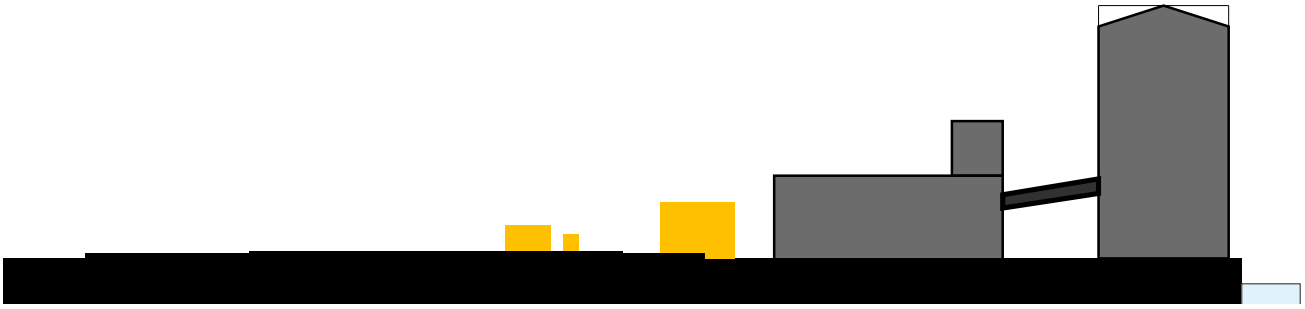


Slope

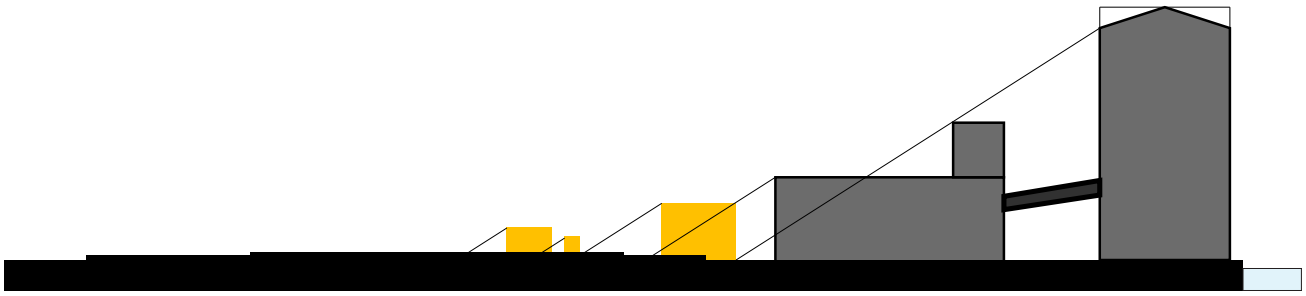


Boundaries

Site Section



Site Section



Shadow Reach

Observations

Empty wire spools line the tracks

Human Characteristics

The site is currently being cleaned up, but vacant of people

Many of the windows are broken out and the environmental wear is present on the building from the sunbaked paint to the pitted concrete.

Distress

A small shed sits vacant on the site.
Only a few trees surround this area.

The site is desolate but shows signs of maintenance

Site Character

The concrete is beginning to erode and rusty hardware leaves stains

The texture varies, and away from the facility, plant growth emerges

Textures

Around the facility, the textures vary from rust, concrete, and steel

Soils

Elevation: 490 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F Frost-free period: 100 to 140 days

Setting
Landform: Spits, shores
Parent material: Loamy alluvium, sandy beach materials and dredge materials

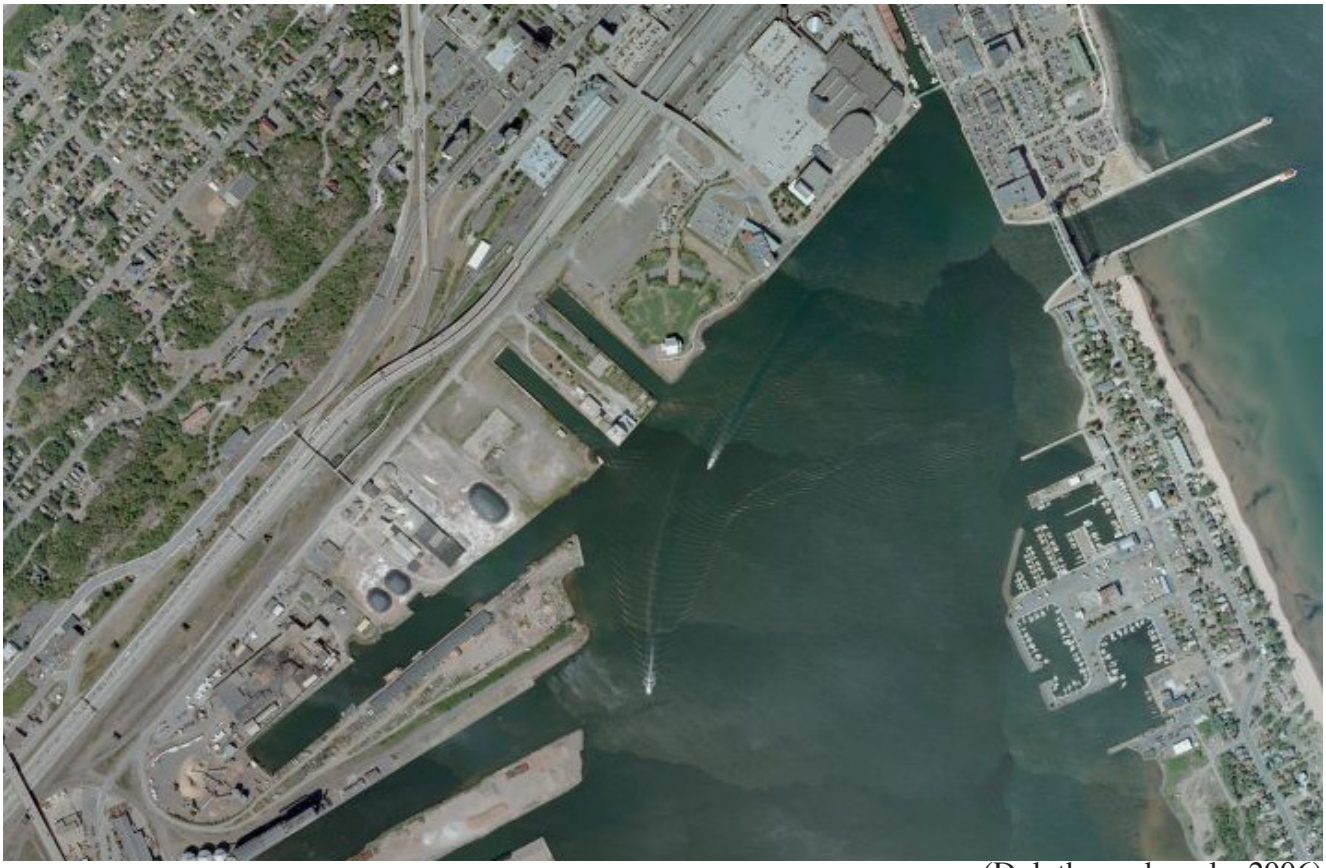
Setting
Landform: Rises on spits, rises on shores, flats on spits, flats on shores Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium, sandy beach materials and dredge materials

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches Depth to water table: More than 80 inches Frequency of flooding: None
Frequency of ponding: None

Custom Soil Resource Report
Typical profile
0 to 3 inches: Loam
3 to 80 inches: Stratified loamy coarse sand to silt loam

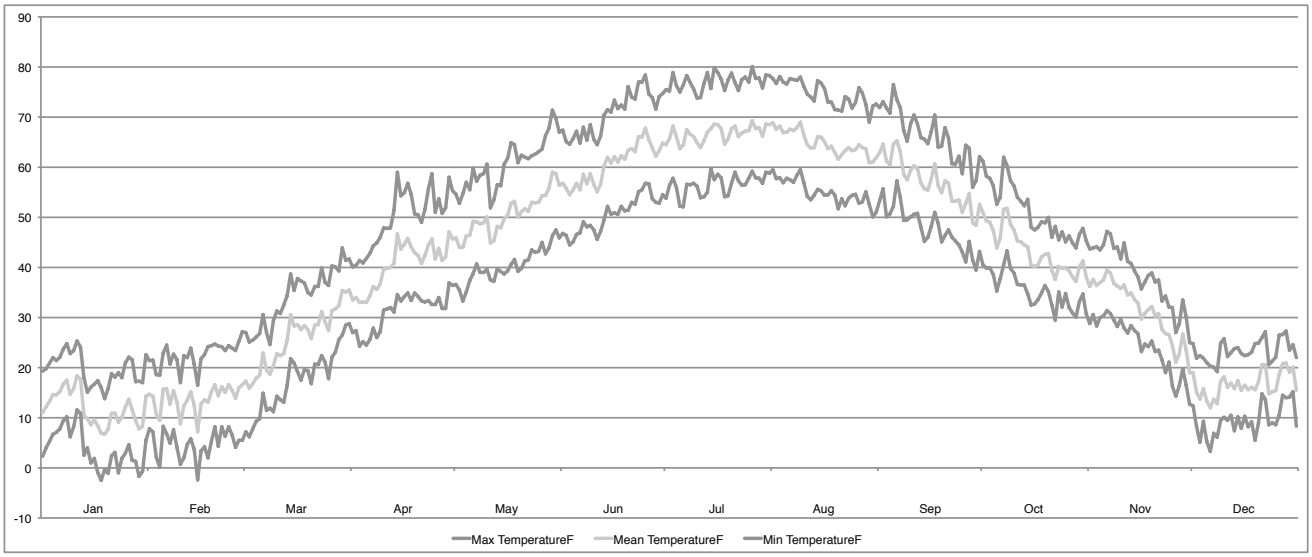
(United States Department of Agriculture, 2005)

Aerial Photo

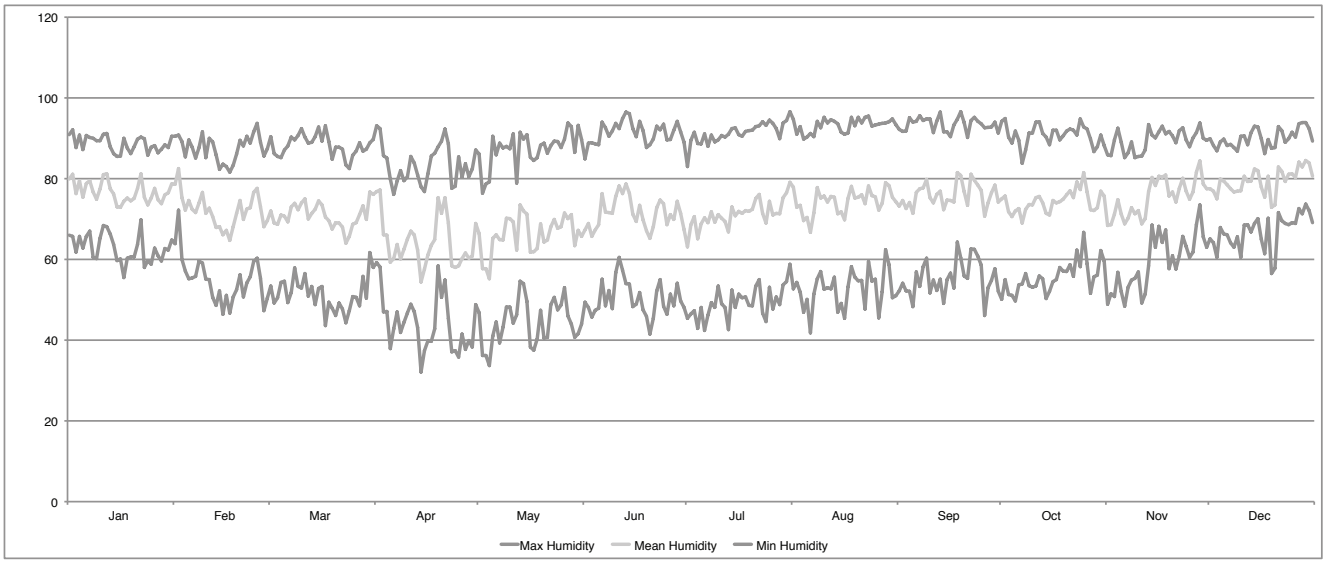


(Duluth quadrangle, 2006)

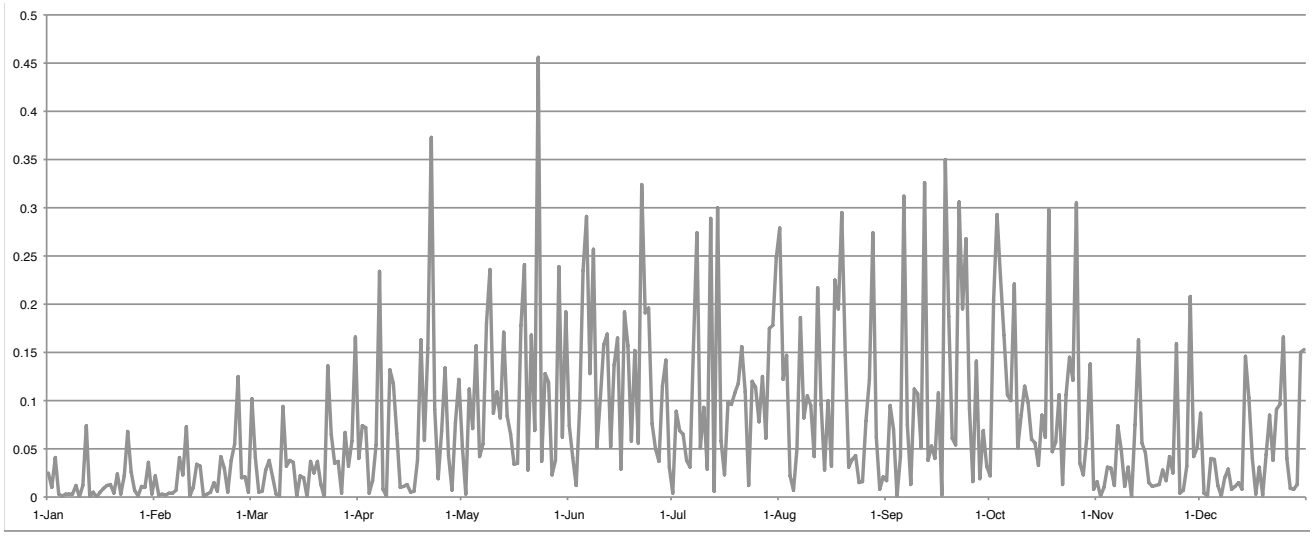
Temperature



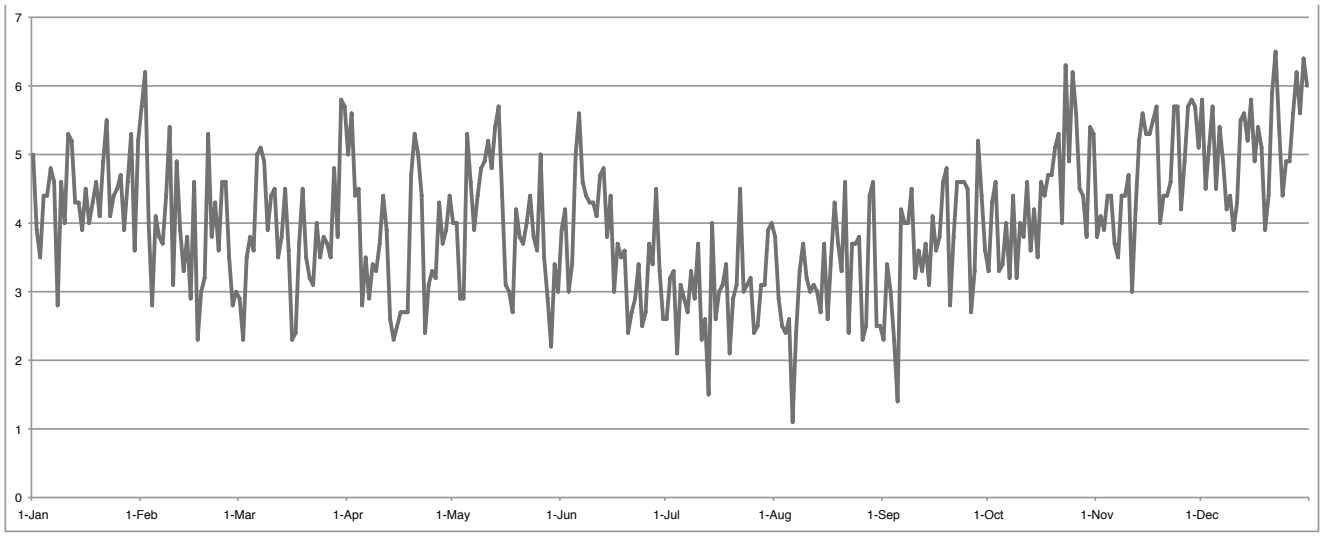
Humidity



Precipitation

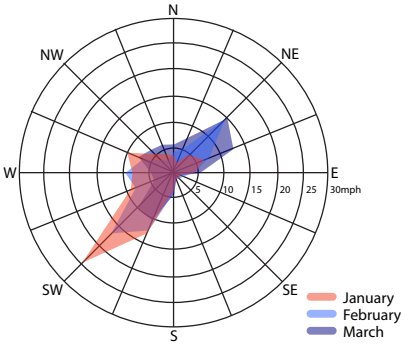


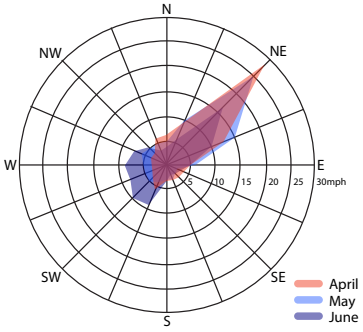
Cloud Cover

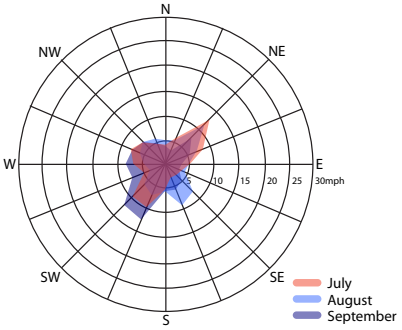


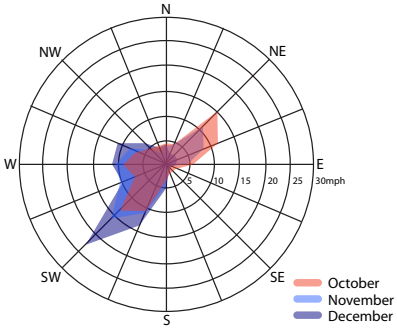
Climate Data collected from (Duluth MN KDLH, 2011)

Wind

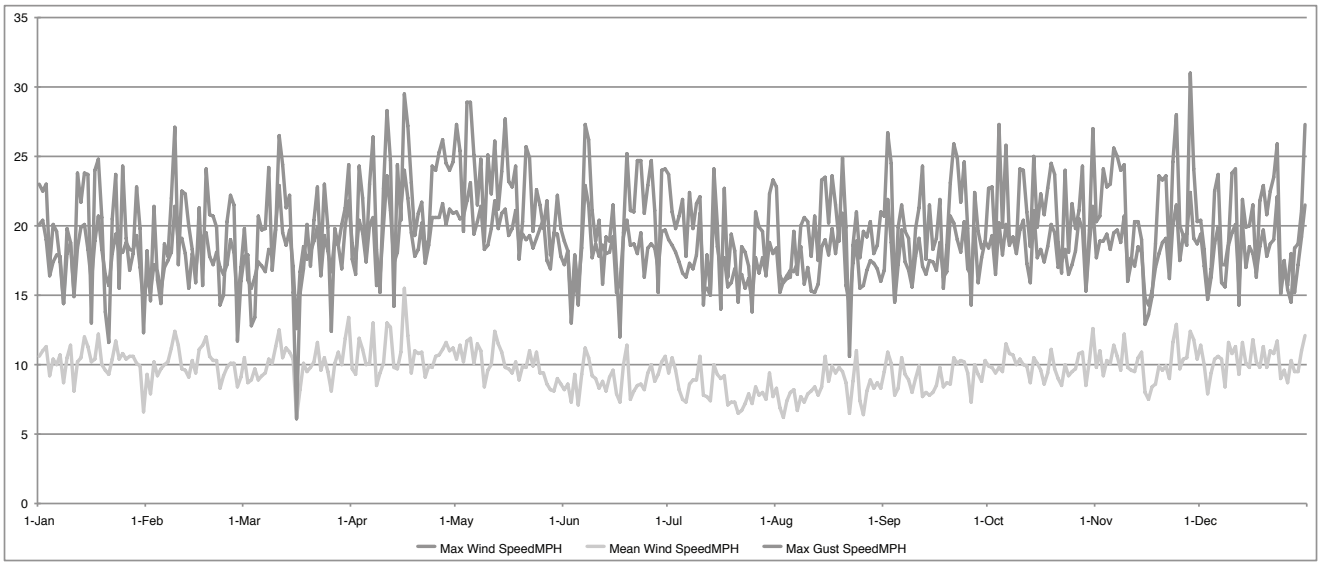




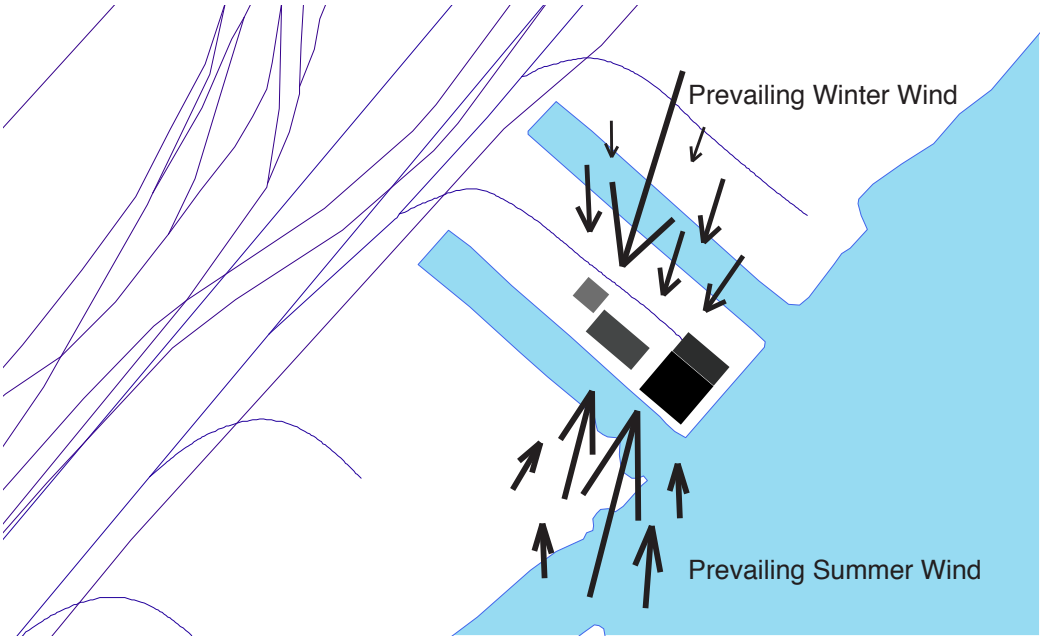




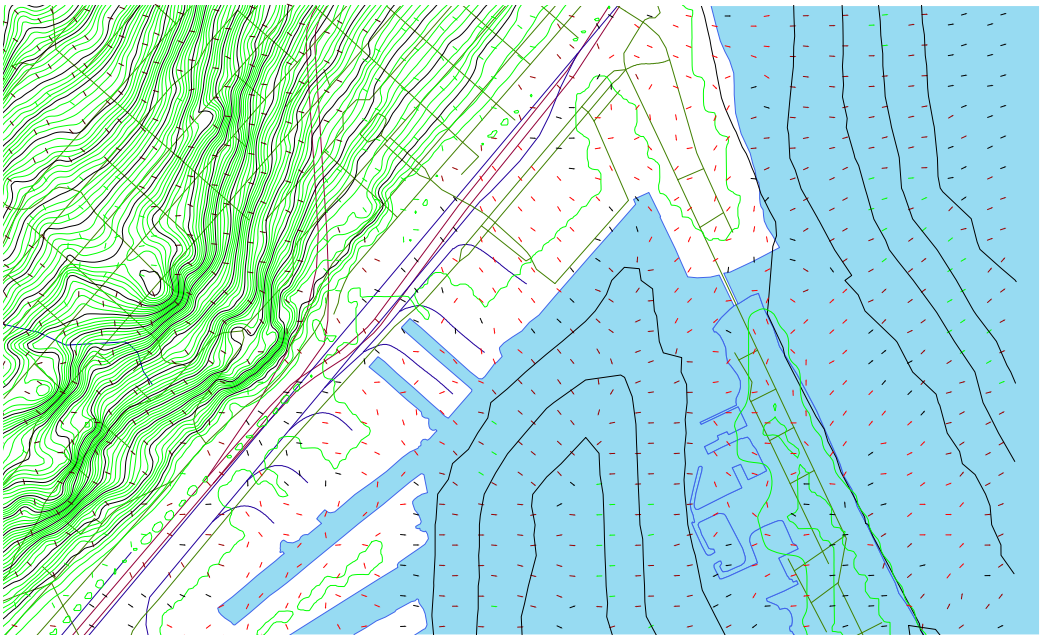
Wind Speed



Air Movement

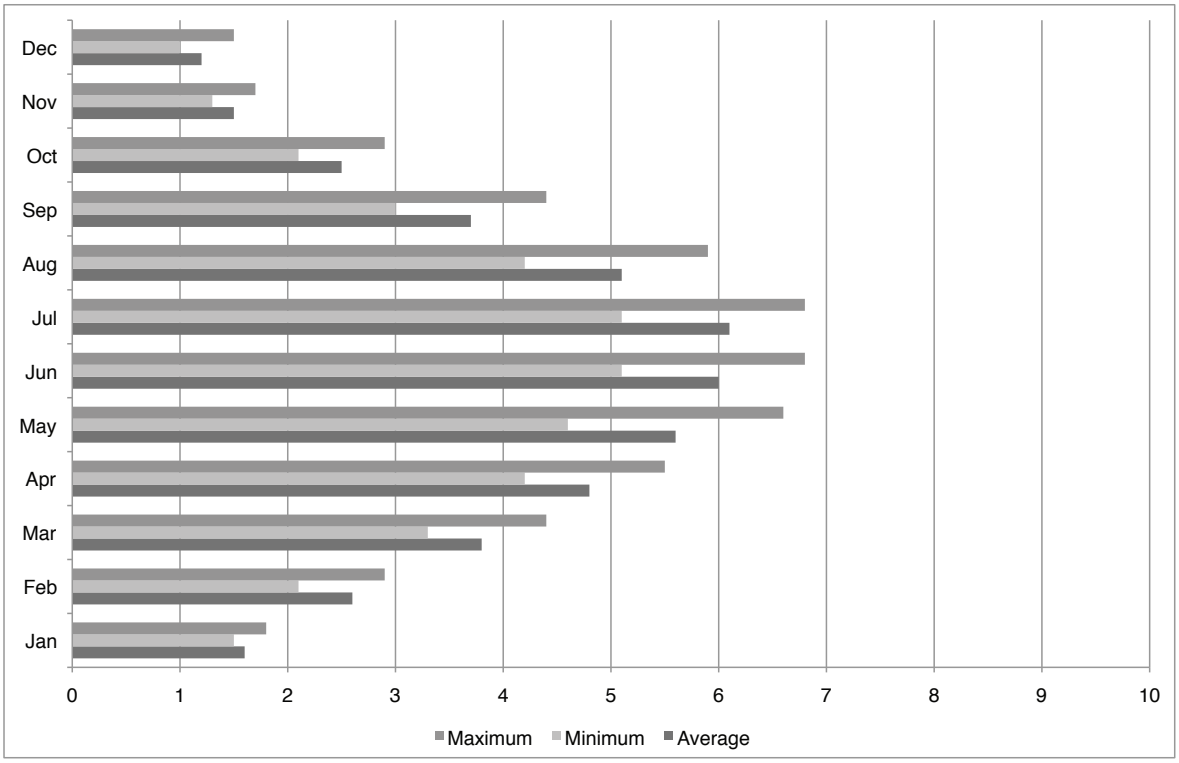


Topography + Slope

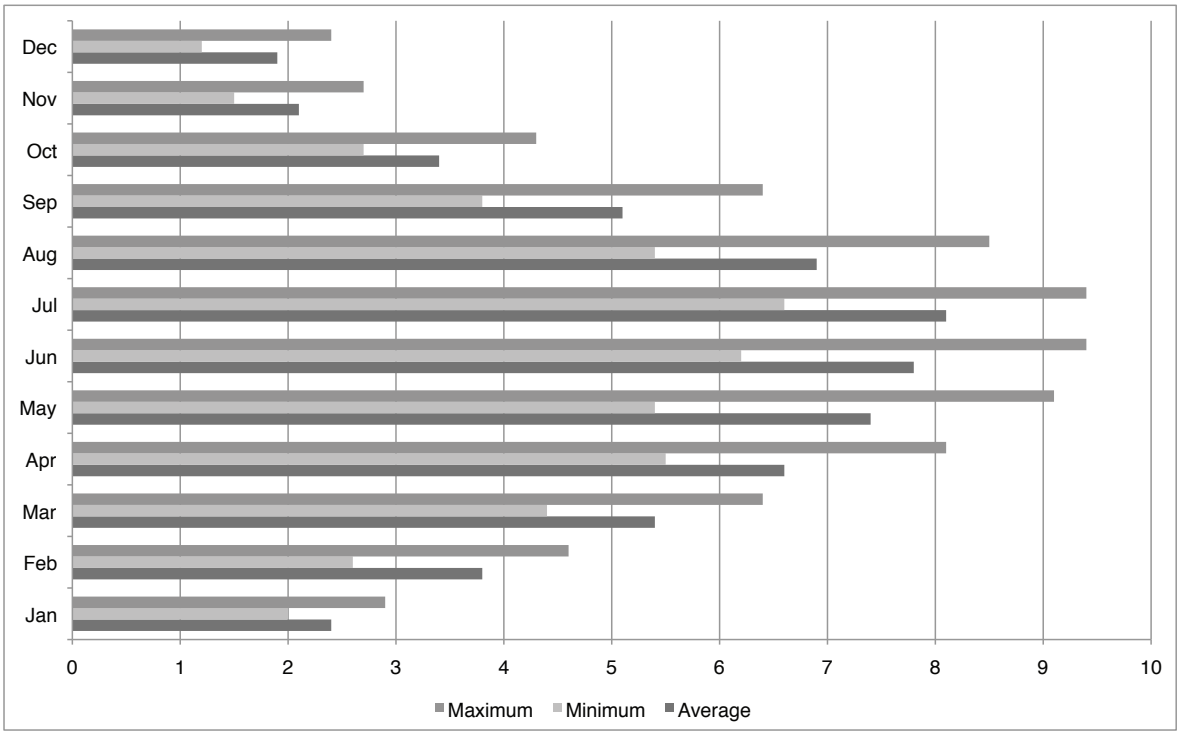


Solar Radiation

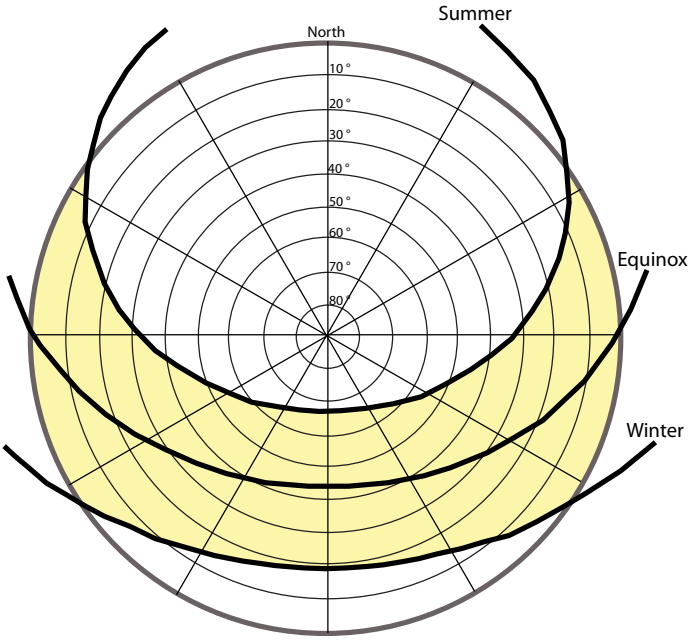
North Exposure



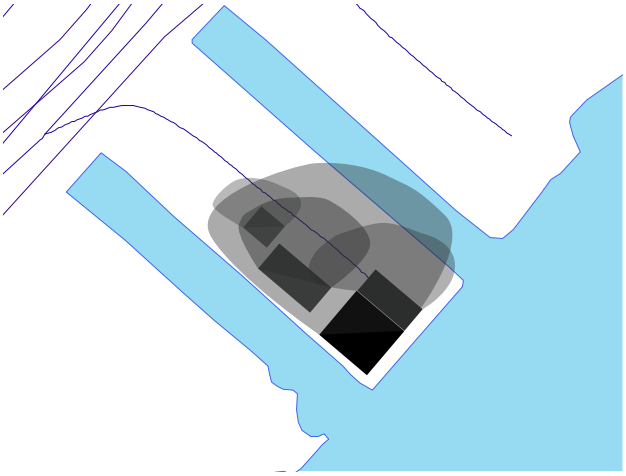
South Exposure



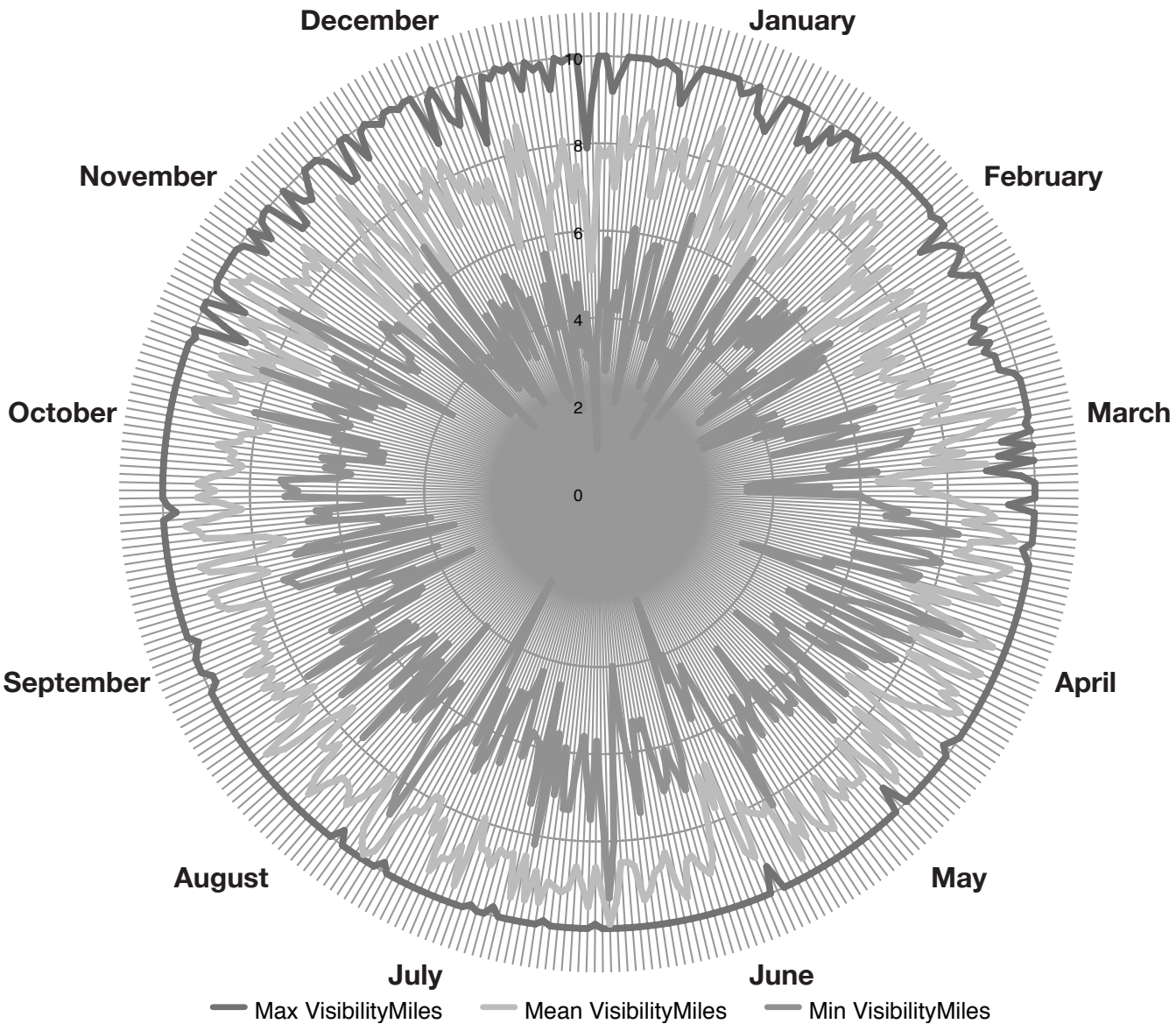
Sun Path



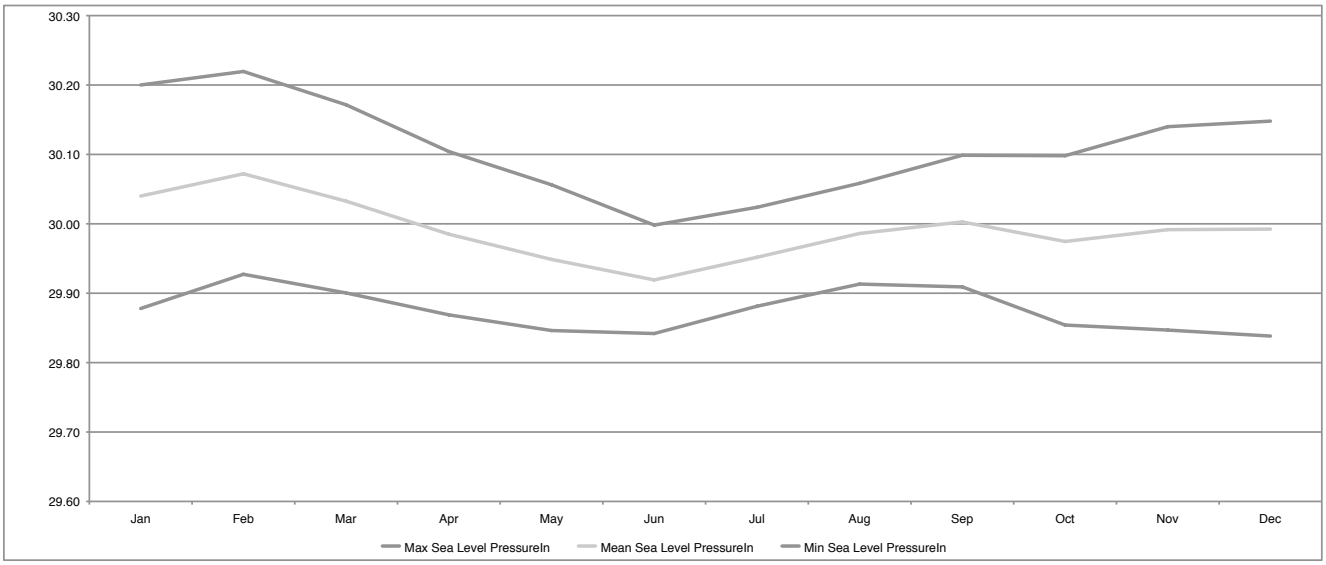
Shading



Visibility


December
January
November
February
October
March
September
April
August
May
July
June
10
8
6
4
2
0
Max VisibilityMiles
Mean VisibilityMiles
Min VisibilityMiles

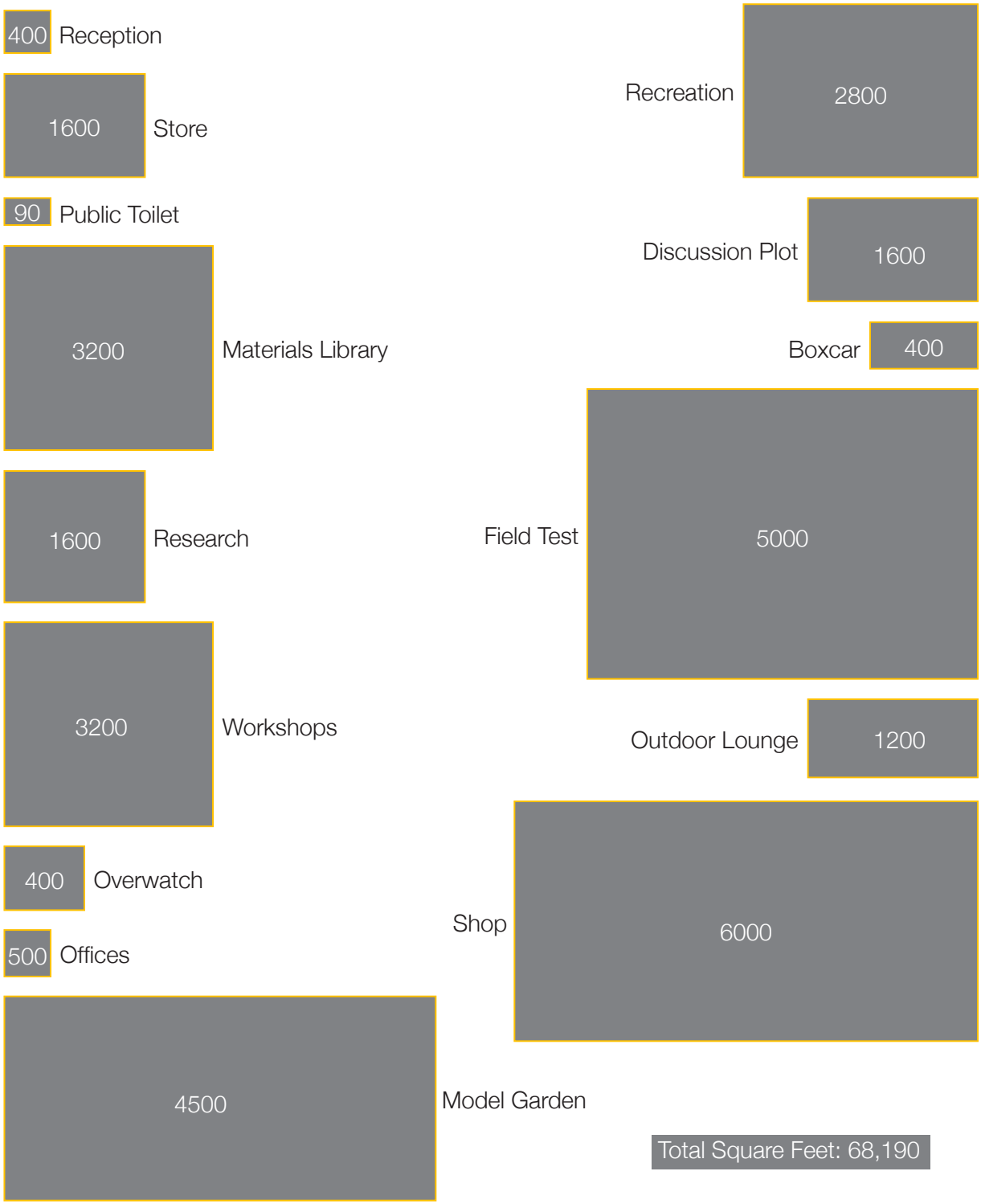
Sea Level Pressure



Noise

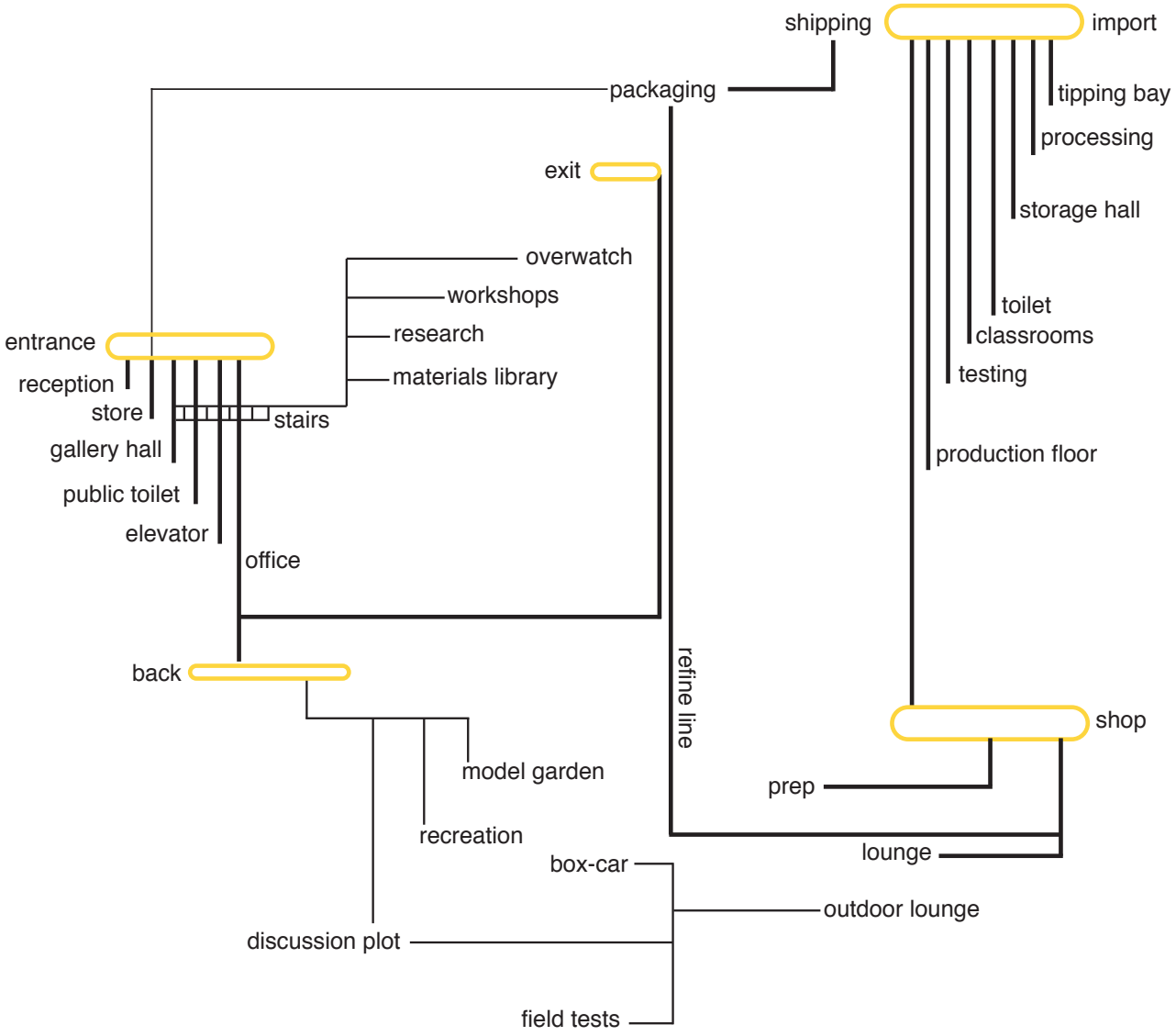
The site is surrounded by many directions of sound yet somehow seems to be desolate and peaceful. The surroundings include an industrial manufacturing plant for wood products as well as an elevated interstate. The lake brings in its own range of sounds. The sound of wind howled as I visited the site. I moved to the abandoned structure attached to the hip of the silos. I can hear the pigeons up over-head. It is nice and quiet in here, other than a radio in the distance. I hear nothing- echoes.

Programmatic Requirements

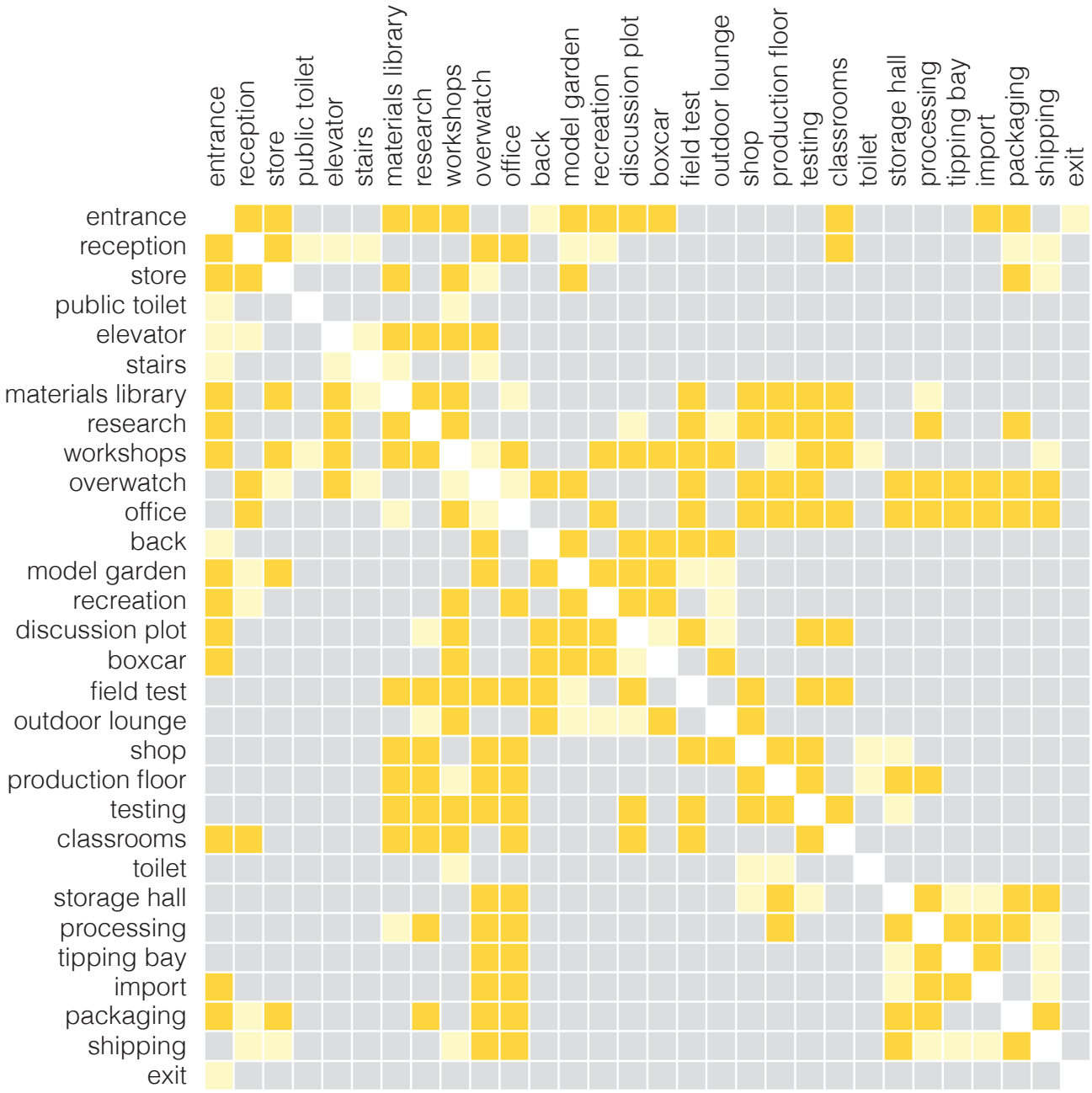

400 Reception
1600 Store
90 Public Toilet
3200 Materials Library
1600 Research
3200 Workshops
400 Overwatch
500 Offices
4500 Model Garden
Recreation 2800
Discussion Plot 1600
Boxcar 400
Field Test 5000
Outdoor Lounge 1200
Shop 6000
Total Square Feet: 68,190

Space Allocation

Interaction Net

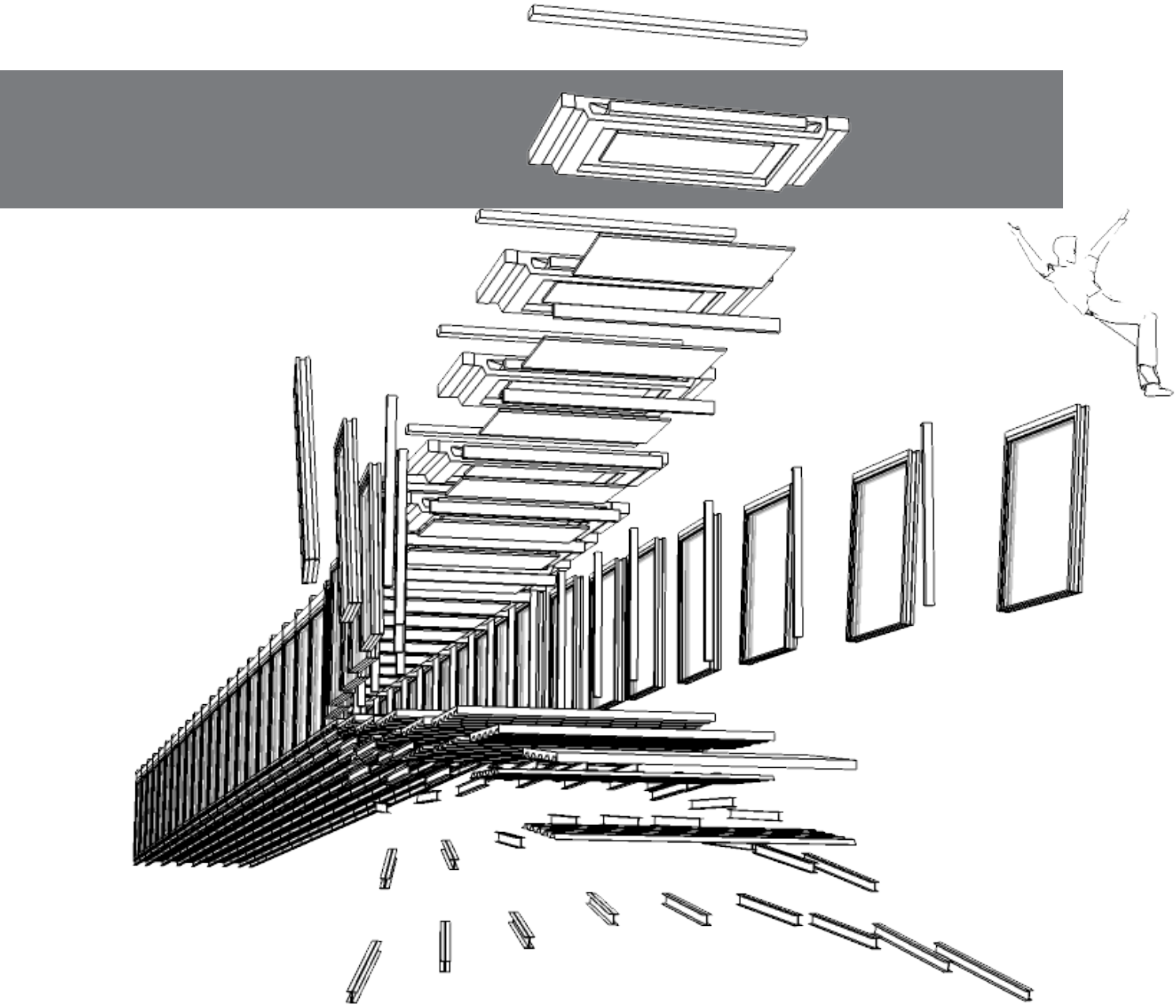


Interaction Matrix



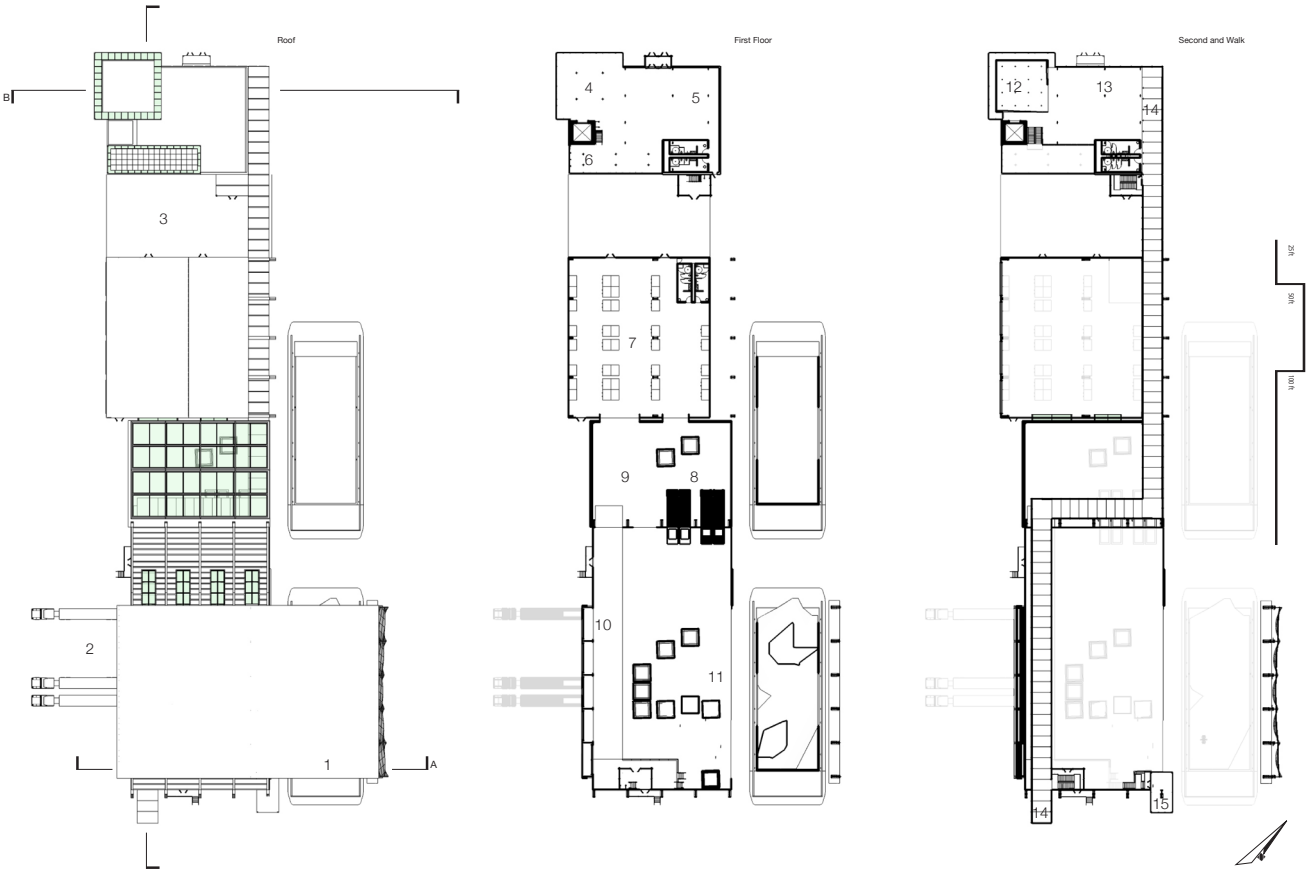
Design

"Factories, the reassuring first fruits of the new age." -Le Courbusier

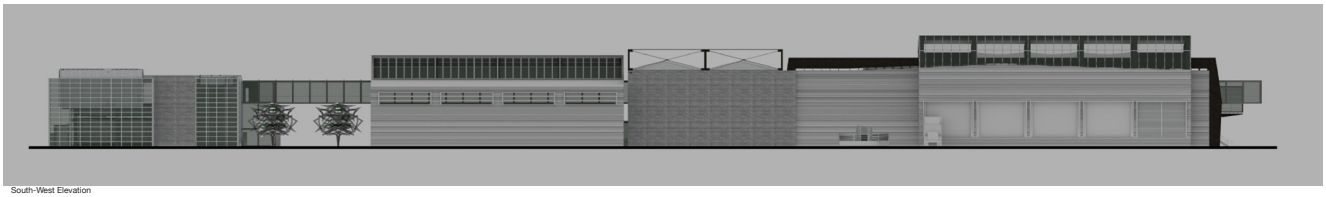


BEST IF USED BY: YEARS MONTHS DAYS

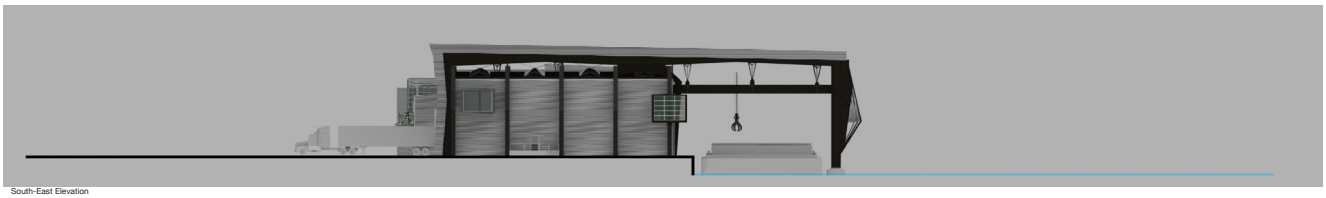
Duluth Recycling and Production Factory



[1] barge port
[2] shipping and distribution
[3] courtyard
[4] store
[5] flex office
[6] gallery
[7] process and production shop
[8] material processing and bailers
[9] material prep and storage
[10] packing and shipping
[11] claw bay
[12] conference
[13] workshops
[14] tunnel tour

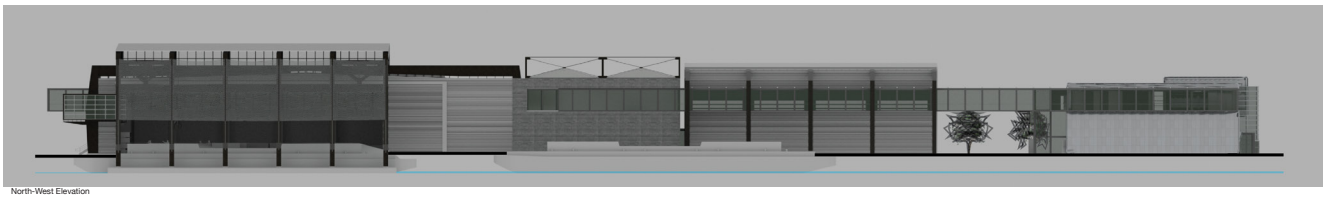


South-West Elevation

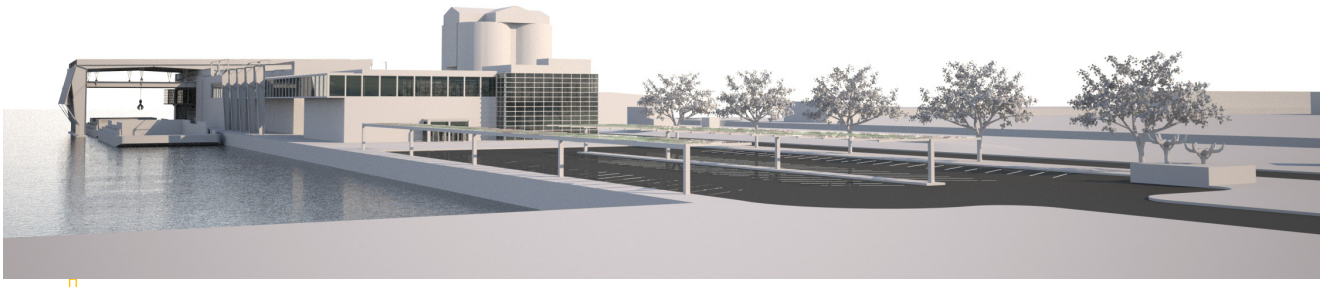


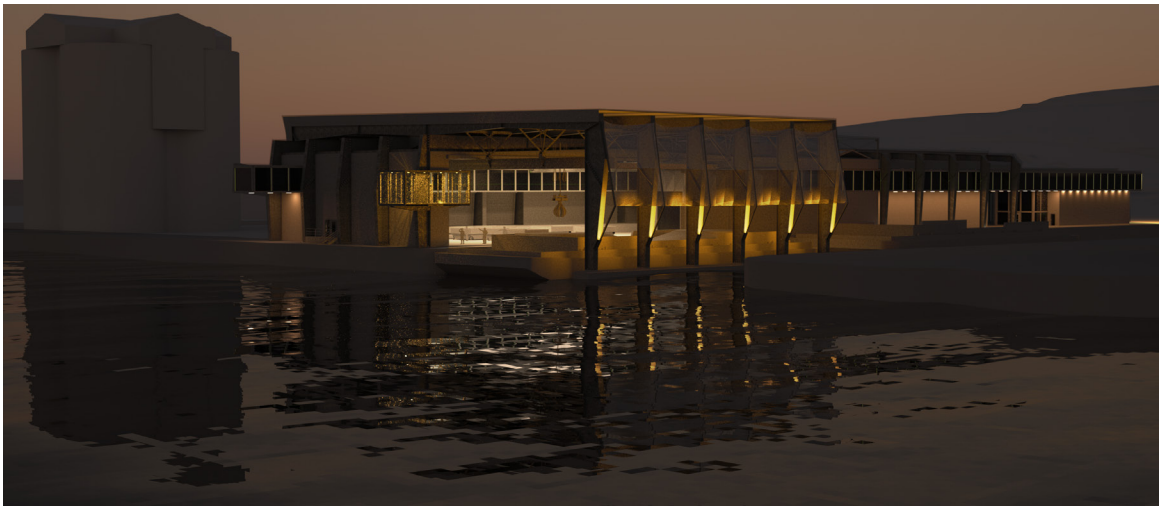
South-East Elevation

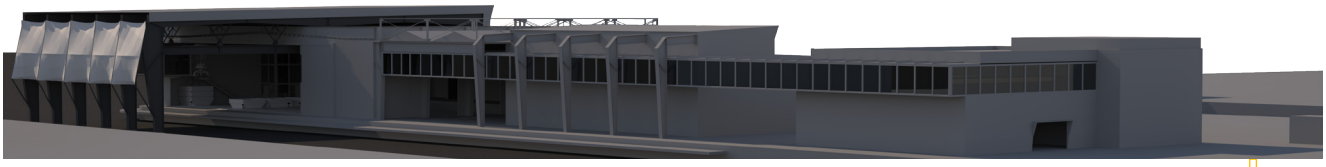
North-East Elevation

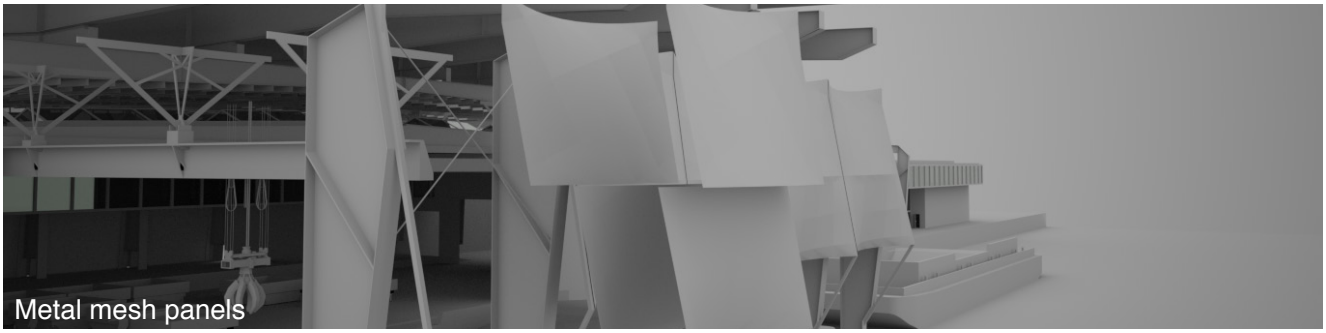


North-West Elevation



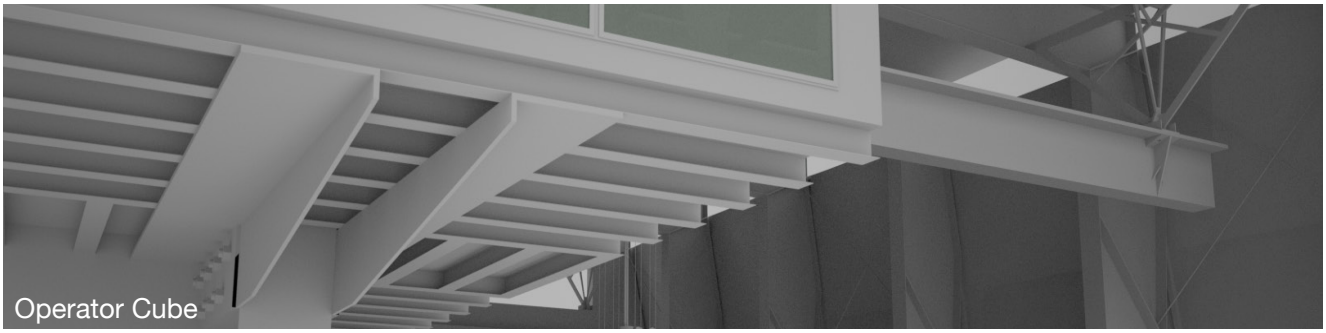




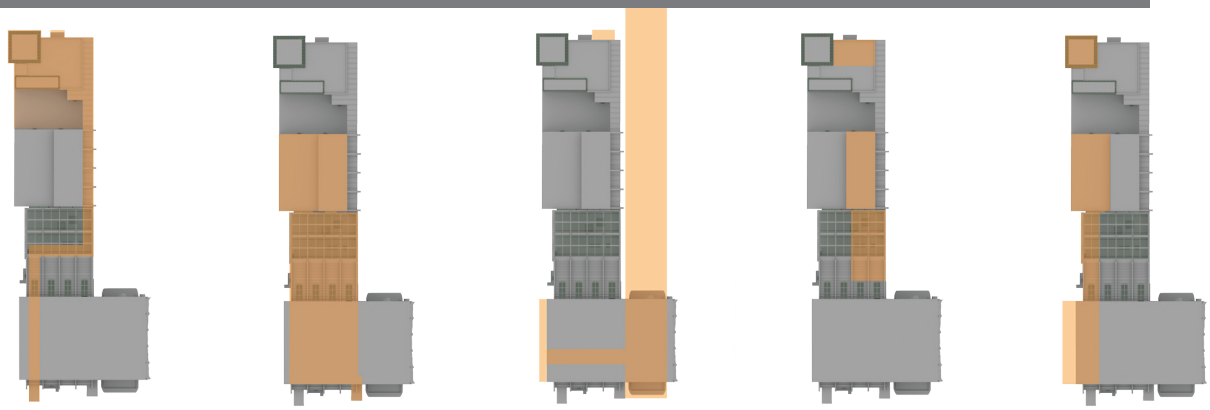


Metal mesh panels

Crane supporting steel structure

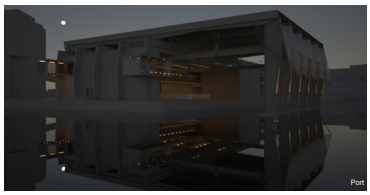


Operator Cube

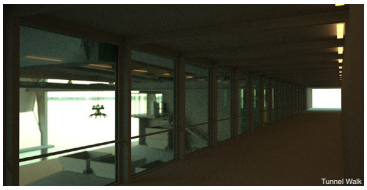


Public Factory Import Production Distribution


Store

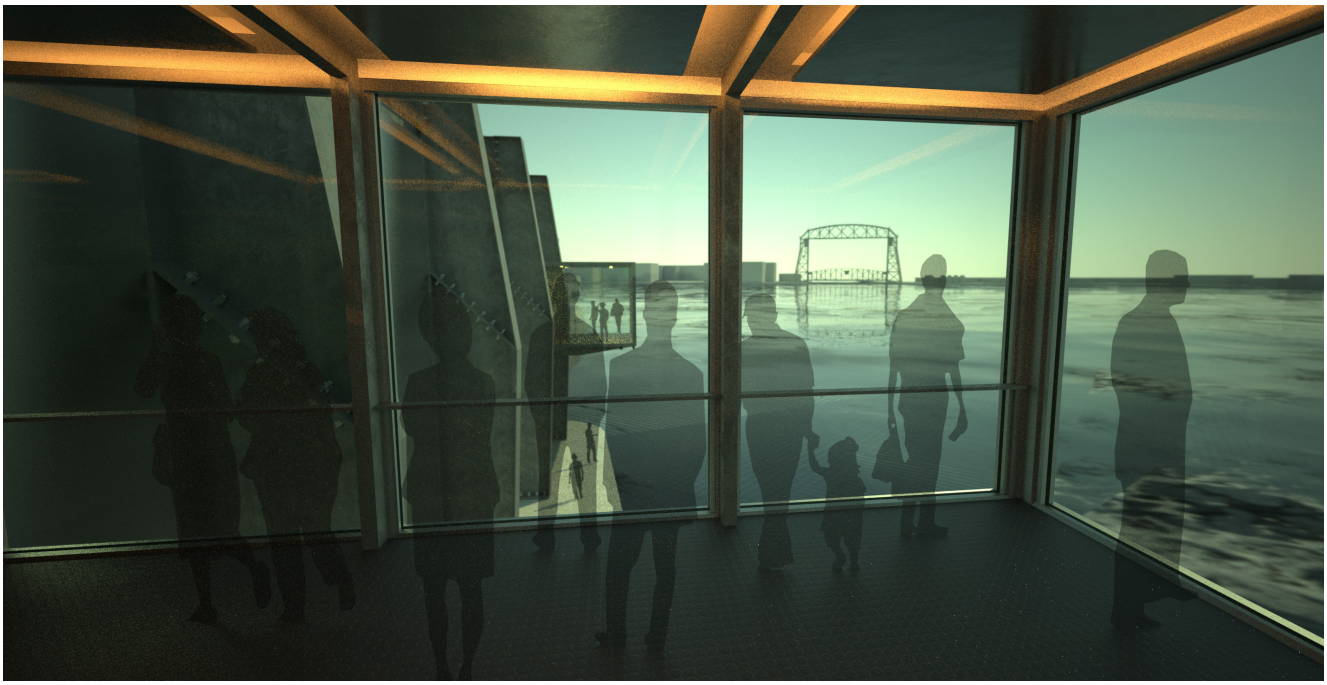

Port

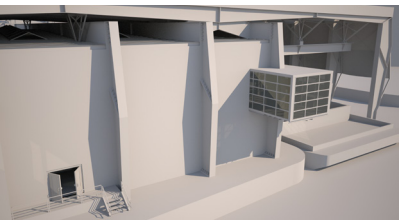
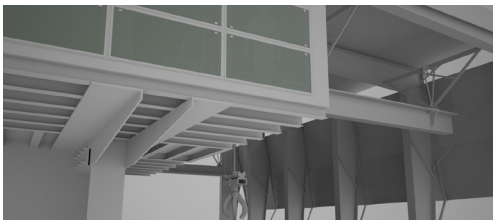

Claw Floor

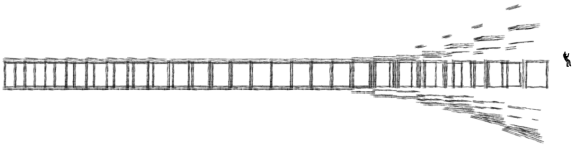
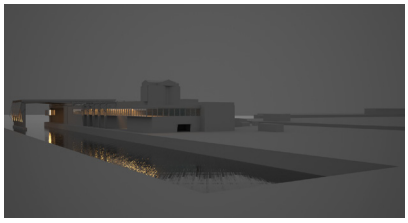
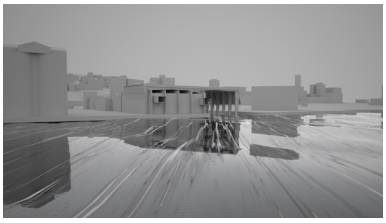

Tunnel Walk

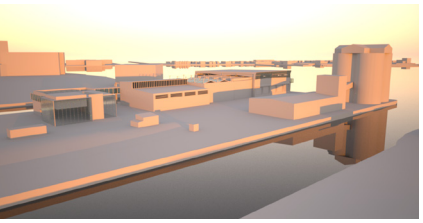
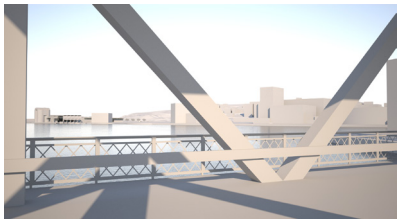
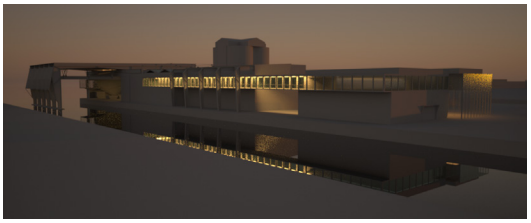
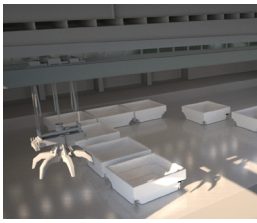

Separation

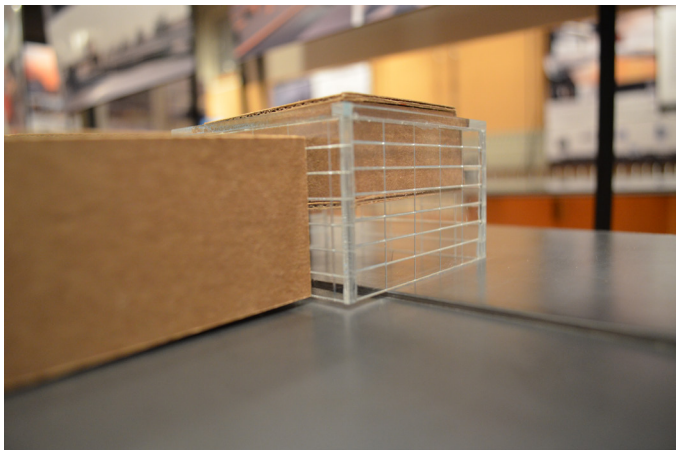

Claw Bay

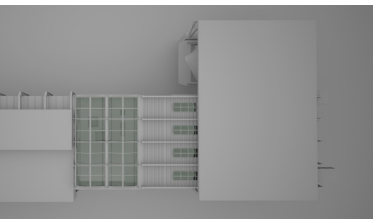
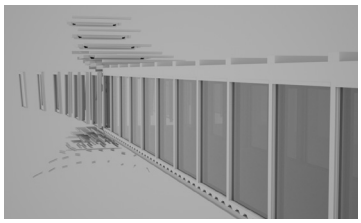
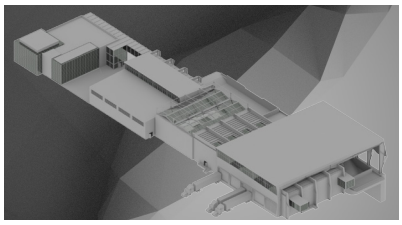
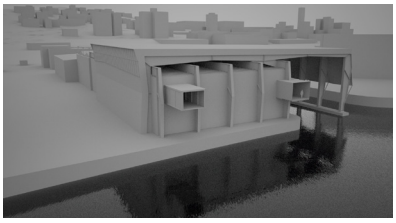
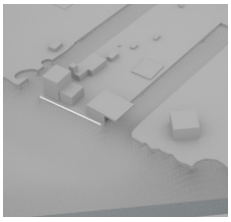
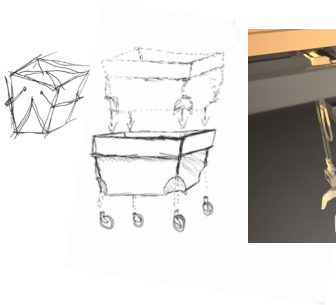
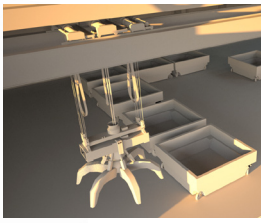
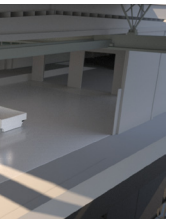
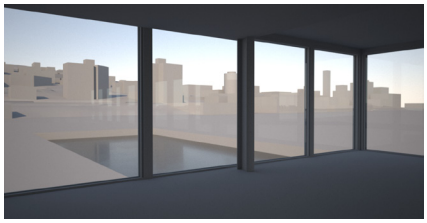
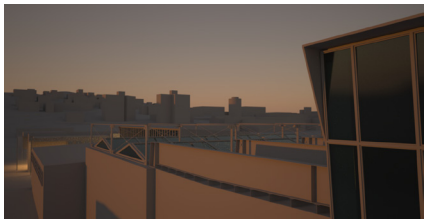


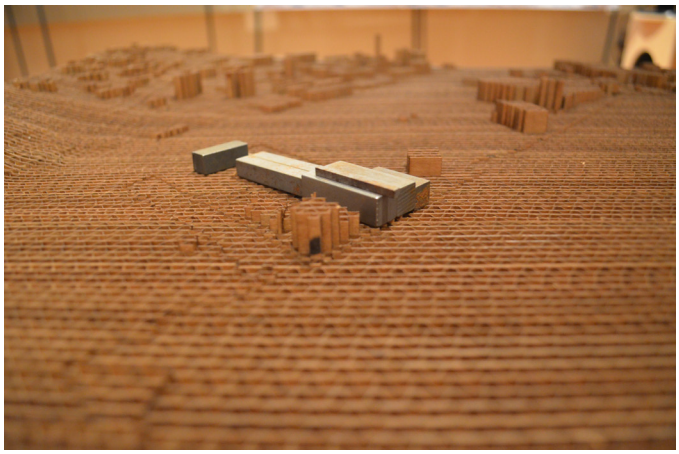
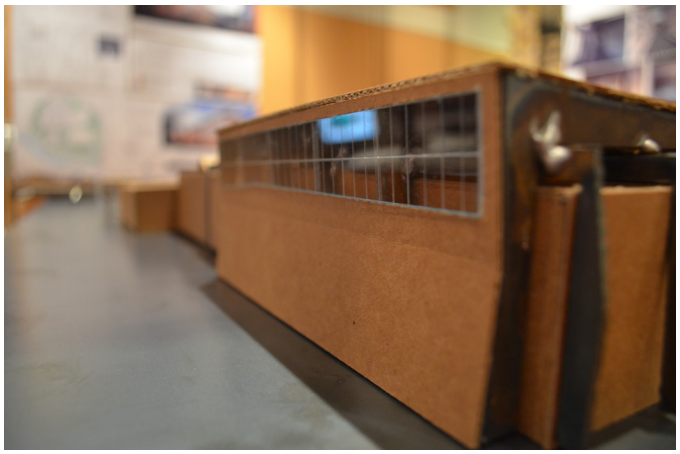



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Quote

NDSU Architecture has taught me how to be creative yet practical.