

Making Space:

Feasibility of Manufacturing Through Shared Resources

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Abstract

Making Space:
The Feasibility of Urban Manufacturing Through Shared Resources

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Urban manufacturing has adapted steadily through the years according to technological advances and market shifts, and yet the current state of this job sector is seeing more dynamic growth and transformation recently. Many urban centers are seeing population increases as well as dramatic job growth. The resulting growth is winnowing the supply of industrial spaces within the city. Industrial zoning often cannot compete with other use types such as housing or office, which in turn will pay higher prices for land and properties. Zoning restrictions preserve industrial spaces, for the most part, allowing for manufacturing jobs to remain in the city. But due to code exceptions that have large allowances for retail and office space much of urban industrial zoning is not used for manufacturing.

Manufacturing is changing. What was simply about production is finding further specialization. Advanced manufacturers – “companies that design and build products that incorporate digital manufacturing technologies and/or advanced materials” – have seen a doubling in job growth. With jobs employed mostly by engineers and designers, they are pulling from the same job pool as most high tech firms. As a compari-

son, 70% of jobs from more traditional manufacturers are held by people from lower-income households.² The growth of traditional manufacturing companies is important for a city’s economic diversity. Traditional manufacturers have difficulty paying higher rent/land prices that advanced manufacturers can pay, further decreasing the available supply of space for traditional manufacturers within the city.

Not only is there a change in demand within the industrial market there has been a large change in manufacturing processes which require both an update in zoning and in community perceptions. Manufacturing processes are lower impact and cleaner than ever before which reduces the need to isolate industrial zoning. Artisan, small-scale production relies heavily on consumer accessibility and feedback necessitating access to both peer industries and urban marketplaces.

Even though spaces for manufacturing are facing increased demand from multiple uses, it remains important for today’s manufacturers to have access to spaces within the city that allow them to produce within proximity to consumers and to other manufacturers. Space must be provided for today’s industrial

uses and market demands, re-imagining space built for historical uses.

This thesis proposes the reuse of an existing warehouse site. The building is gutted and additional structure provides upper floors to allow for a density of spaces. The building is split in the middle by a 32’ interstitial space, allowing air, light, access and an organizational hierarchy for circulation and spaces throughout the building. Internally the building is made up of multiple overlapping spaces with several communal zones allowing for collaboration and community development. The internal walls are flexible frames that create soft boundaries as a way of blurring between individual spaces and which act as a scaffolding to allow flexibility and customization tailored to each tenant’s needs. The space can expand and contract as these manufacturing companies grow. The different ways that people customize the space creates character, ownership and a richness to the space.

Further analysis of the project includes cost and revenue. The returns are further analyzed in an effort to estimate the worth and risk of a financial investment that results in taking on a unique project such as this.

Acknowledgments:

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To my love, Natalie for her unyielding support.

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The work that I produce is shaped by the community that surrounds me.

That is what this project is about.

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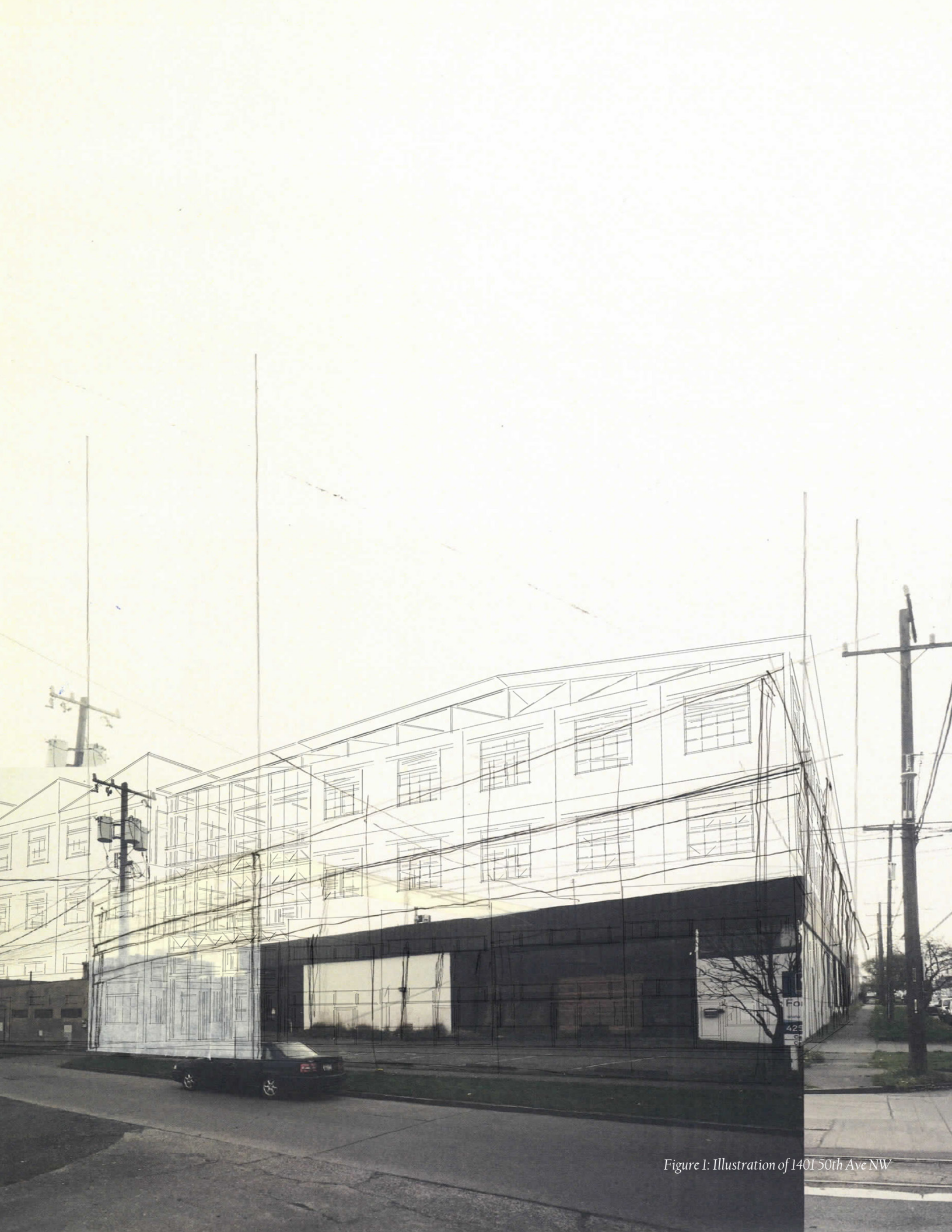


Figure 1: Illustration of 1401 50th Ave NW

MAKING SPACE: FEASIBILITY OF URBAN MANUFACTURING THROUGH SHARED RESOURCES

PROBLEM STATEMENT

Urban manufacturing has adapted steadily through the years according to technological advances and market shifts, and yet the current state of this job sector is seeing more dynamic growth and transformation recently. Many urban centers are seeing population increases as well as dramatic job growth. The resulting growth is winnowing the supply of industrial spaces within the city. Industrial zoning often cannot compete with other use types such as housing or office, which in turn will pay higher prices for land and properties. Zoning restrictions preserve industrial spaces, for the most part, allowing for manufacturing jobs to remain in the city. But due to code exceptions that have large allowances for retail and office space much of urban industrial zoning is not used for manufacturing.

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Figure 2: Seattle Cement Factory

HISTORY AND DEFINITION OF MANUFACTURING

The history of manufacturing can be traced through three separate revolutions. In 1770 the Industrial Revolution began with simple loom machines. The distinguishing aspect of this revolution was the amplification of human power. Through the aid of machines a single person was able to do the work of many. This revolution is concentrated around people/labor as the means of production. From this moment the methods of production as well as the products themselves began to advance at a rapid rate.

The second revolution, the Digital Revolution centers around the democratization of the computer. This took place in the late 1970's. Computational machines had been in existence since the early 1940's but were really just an extension of the Industrial Revolution. The moment when the computer entered into homes a drastic shift began in America. A large part of society (the middle class at that time) had access to knowledge as well as production (printing). This revolution began the massive shift from an economy based on production towards what

is now experienced as the knowledge economy.

The current revolution is the age of Digital Manufacturing. This is almost a conflation of the previous two revolutions. Digital manufacturing is not centered around robotic manufacturing nor simply automation. What makes Digital Manufacturing a real revolution and paradigm shift is that it becomes a flexible system that allows for customization and small batch production.³ The full impact of this revolution is still in play. Prior to this revolution North America was embracing an experience/knowledge based society and off-shoring the majority of it's production.

“After World War II, manufacturing jobs rose steadily, reaching a peak of nearly 19.5 M workers in the summer of 1979. By 1980, in the midst of a recession, the total was still 18.7M. By the end of 1990 it was 7% lower, at 17.4 M; by the end of 2000 it had hardly changed, at 17.2M; but a decade later it was just 11.5M (BLS 2012)⁴ The last decade saw a decrease of 33% of overall

manufacturing jobs. This was due to global economic restructuring, where in the industrial epicenters of North America and Western Europe gradually transferred the bulk of their production facilities further overseas. This is often attributed to cheaper labor and factory spaces. But access to other markets is made available through governmental trade agreements and advancements in logistics and cheap fuel prices. This off-shoring has been beneficial for many emerging economies producing goods for western markets. But this shift has had a profound impact on North American cities. Cities were often the center for industrial manufacturing and its recession has left urban centers with deep voids and strong impoverished areas. These urban vacancy, have however made space for industries of technology, design, entertainment and media and arts and culture becoming the primary drivers of economic growth. Further there has been a trend of entrepreneurial manufacturers filling in and re-purposing the affordable space left vacant by large traditional manufacturers.⁵



Figure 3: Manufacturers at work.

“WITHOUT THE PRESERVATION AND REINVIGORATION OF MANUFACTURING, THE UNITED STATES HAS LITTLE CHANCE TO... REMAIN A DYNAMIC AND INNOVATIVE SOCIETY FOR GENERATIONS TO COME.”⁶”

NECESSITY OF MANUFACTURING IN A POST-INDUSTRIAL SOCIETY

As a post-industrial society, the US economy prioritizes service industries and a more experience based economy. This is an economy based on highly differentiated experiences rather than on an exchange of goods. With this perspective, modern manufacturing becomes “a largely dispensable activity, a matter of a secondary importance that can be taken care of by simply importing whatever is needed from the cheapest foreign sources and paying for the purchases by earnings from high value-added services whose contribution now dominates GDP’s of all affluent countries.”⁷ This argument is fully seated in mutual trade agreements, low gas prices, ignorance of global warming and a myopic view of the economy. Not only do manufacturing jobs pay higher wages for middle-class employees but the experience economy continues to benefit only tech-startups allowing the founders and investors to make millions once the company goes public. This is of great benefit to only a slim percentage of the US leaving many marginalized.

A further argument towards off-shoring manufacturing is that technical innovation displaces mass, and the quantities of material inputs and manufactured products that are required to perform identical economic functions decline with time.⁸ But even with mass reductions taking place there is no aggregate decline in material demand.

Manufacturing remains a necessity, specifically for the US (a consumer society). The large question remains: Where should manufacturing take place? Certainly off-shoring will maximize profits for large companies, but much is lost when this takes place. Maintaining a strong manufacturing sector remains essential for several key reasons:

First: Manufacturing has been the principal driver of technical innovation, which has been the most important source of economic growth in modern societies.

Secondly: Despite extensive off-shoring, large labor cuts, and a deep erosion of many formerly thriving sec-

tors, US manufacturing remains very large and still growing part of the nation’s economy

Third: A relatively low intensity of manufactured exports has contributed to the country’s trade deficits, and a further retreat of the US manufacturing sector would eliminate any realistic hope for their eventual reversal.

CHALLENGES TO URBAN MANUFACTURING

In the past manufacturing was viewed as a detriment to a city; increased air pollution, noise, traffic impediments not to mention the quality of an industrial district never garnished a high walk score. This negative perception creates a challenge not only for the preservation of existing urban industrial zoning but also for the promotion of additional manufacturing. There are multiple barriers to manufacturing within an urban environment.

1. Urban industrial zoning is limited and the code use is out of date.¹²
2. Scarce availability of space. Especially due to high demand of competing uses such as high tech manufacturing.
3. Competition from overseas manufacturers.
4. Low financial incentive for property owners to retrofit and/or improve warehouse space for manufacturers.
5. Municipalities lack resources to incentivize owners to prepare sites for manufacturers
6. Perceived as inefficient land use (land could go to building luxury condos and premium office space)¹³
7. The density of an urban environment is not conducive for larger trucks and other industrial scale traffic.

IMPORTANCE OF MANUFACTURING WITHIN AN URBAN ENVIRONMENT

The Manufacturing Institute has found that every dollar of manufactured products supports \$1.33 in output (compared to the service industry which generates \$.60 per dollar of sales), a larger multiplier than any other economic sector. In other words, manufacturing creates the wealth that drives much of the economy. Without going into the details of imbalanced trade agreements and a crippling trade deficit^{9, 10} the overall loss of jobs and opportunity loss makes American manufacturing seem like an easy choice. Manufacturing provides better pay than service-industry jobs and remains integral to maintaining a middle class which is the most necessary sector of the US economy. “Manufacturing workers make approximately \$10,000 more than the average US worker. Between 2010 and 2012, the US added 400,000 new manufacturing jobs — and 98% of these are small, boutique operations.”¹¹

MANUFACTURING CONTRIBUTES TO THE ECONOMIC HEALTH AND VITALITY OF A CITY

Despite the many challenges to urban manufacturing the benefits exist not only for the individual manufacturer but also for the city and area they are situated within.

1. Small size and integration within the city means urban manufacturers are able to quickly identify and respond to changing customer trends and preferences.

2. Ability to employ a highly skilled workforce from the surrounding population and offer middle-income job opportunities that wouldn't traditionally be available. Not only does urban manufacturing support traditional jobs it also creates linkages with other industries.

3. Connections with other local industries to spur innovation, leading to new products and new businesses.

4. Re-use of older, large-scale building stock that would normally be too large or unsuitable for other tenants.



Figure 4: Shared Manufacturing Space

CITIES PROVIDE OPPORTUNITIES AND ADVANTAGES TO MANUFACTURERS

1. **Sustainability Benefits**– reduced transportation and opportunity for locally sourced materials. Current consumers are demanding more socially-responsible and sustainably sourced products. There is also a high demand for authenticity. The story of the product, how it is made, where it is sourced is equally important.

2. **Customer Adjacency**– More highly educated employees are moving to urban centers. They are attracted to quality over quantity. An urban center allows for higher visibility for their product. Much of these industrial spaces have a retail aspect to it. There is a strong desire for transparency between production and final retail product.¹⁴

3. **Available Capital**– Cities also have a higher percentage of investors whether it is an investor firm or

high net worth individuals, resulting in an increased likelihood of funding.

4. **Material Supply**– Access to local suppliers increases in relation to the density of a city as they remain the center for commerce even in this digital age.

5. **Skilled Workers**–With proximity to colleges and training centers, manufacturing companies have access to educated, highly skilled employees. Higher populations mean greater chance to fill employment requirements while also providing all the access a city provides to the employees themselves.

6. **Cultural Access**– Urban areas are the intersection of diverse local economies and global trade. Proximity to this allows an ability to adapt to surrounding demand in a rapid way.¹⁵

7. **Knowledge Sharing**–While the marginal cost of transmitting information across geographical space has fallen significantly, the marginal cost of transmitting knowledge still rises with distance. . . . Therefore, the knowledge spillover benefits of clustering in cities can be large for high-value, knowledge intensive sectors.” Proximity enables constant interaction and knowledge sharing, and the effects can be staggering¹⁶

8. **Brand Origin**– Cities are becoming part of the brand differentiator. By using these local identities manufacturers are able to give a story and relevance to their products.¹⁷

TRANSFORMATIONS IN MANUFACTURING

The Department of Labor¹⁸ separates Industry as warehousing & wholesale, transportation distribution logistics, construction, manufacturing and other. Manufacturing is further classified into the following categories:

- Aerospace
- Electronics & Components
- Food & Beverage
- Machinery & Transportation
- Metals & Fabrication
- Printing & Publishing
- Refining, Chemicals & Plastics
- Textiles, Apparels & Leather
- Wood & Paper Products
- Other Manufacturing

Urban manufacturing has changed drastically from its origin. Gone are the coal-burning, toxic producers of the past. Today's urban manufacturing companies are smaller, more adaptable.¹⁹ Capitalizing on their location they have become more artisanal, producing primarily for local consumption in a more tailored fashion. With the transition from large scale single production facilities towards smaller scale production urban manufacturing has become a niche within the broader national and international industrial activities.²⁰ Not all of the national manufacturing categories apply to this smaller scale production. Categories such as: Food & Beverage, Printing & Publishing, Electronics (small production), Textiles, Metals & Fabrication, and Wood Products seem uniquely suited to the urban environment. These broader classifications do not tell the full story of small scale production. These are often using raw materials, processed materials and products to further create their unique products. Urban manufacturing companies have evolved bringing design

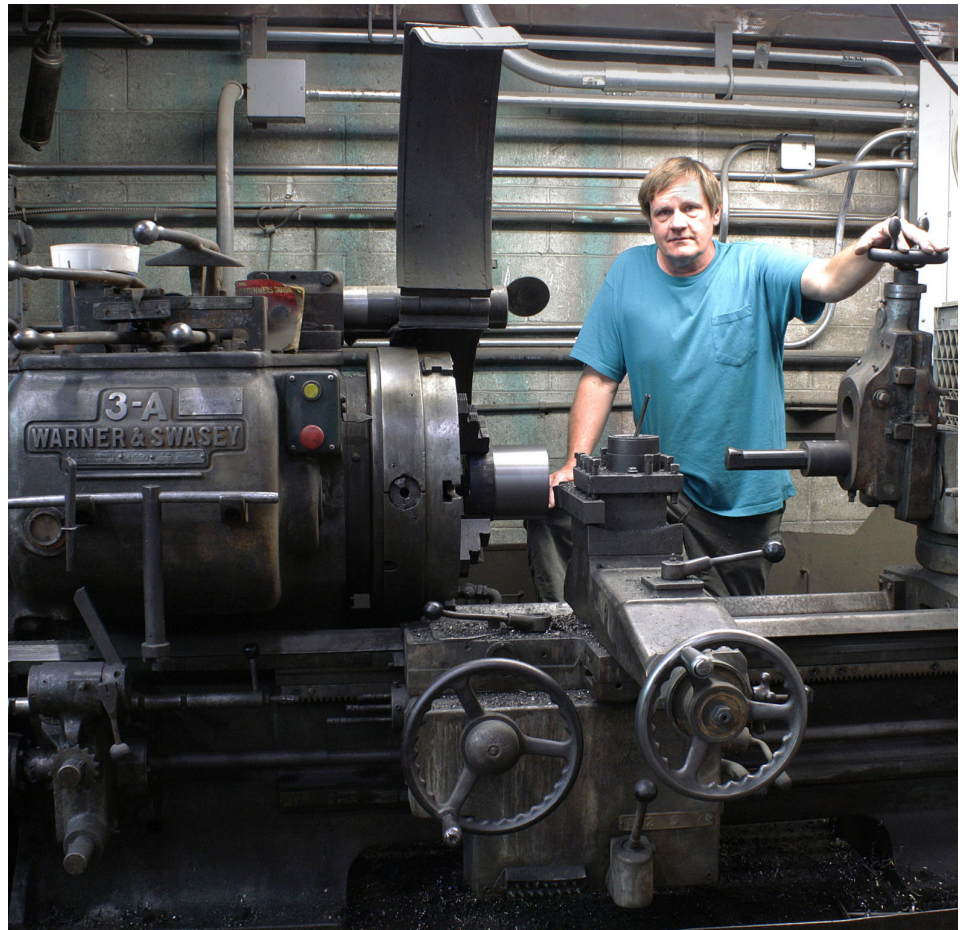


Figure 5: "Traditional Manufacturer" Denny in the FenPro BLDG.

and production support services in house.²¹

TRADITIONAL MANUFACTURING

Traditional manufacturing remains a large contingent of the industrial sector. The newer more glamorous divisions of manufacturing (discussed below) create more press but remain a smaller division of actual job creation. Traditional manufacturers are categorized as production, distribution and repair. These uses include auto repair, contractors, maritime uses (important in the Seattle region) and even specialty tools not available at typical hardware stores. As mentioned in the earlier thesis statement traditional manufacturers create well-paying middle class jobs. This sector remains one of the best ways to raise the quality of life through accessible employment. Other accessible employment opportunities such as retail provide typically 1/3 the income available in manufactur-

ing. And yet, manufacturing remains a volatile portion of the US economy constantly contending with the negative impact of outsourcing. Traditional manufacturers within the urban area are also scaling down in size requirements. Providing affordable and scalable space creates viable options for the traditional manufacturer.

NICHE MARKETS

These niche manufacturers, often labeled as craft businesses have been receiving a lot of notoriety with the resurgence of American Industry. These are small production, craftspeople focused on small run product lines. They are supplying the ever increasing demand from urbanites interested in unique products and experiences related to these products. There is an increasing emphasis being placed on not only local production but also on the use of local ingredients. With more attention to craft and limited produc-



Figure 6: Furniture Designer Andrew Moe.

tion meeting customers demand for “fresh, authentic and local products or unique anti-mass market manufactured goods.”²² Often these small niche manufactures are dismissed as a rejection of modern industrial capitalism. “But the craft approach is actually something new – a happy refinement of the excesses of our industrial era plus a return to the vision laid out by capitalism’s godfather, Adam Smith. One of his central insights in “The Wealth of Nations” is the importance of specialization. When everyone does everything each act becomes inefficient, because generalists are rarely as quick or able as specialists.”²³ It is this specialization that separates craft manufacturers from the more recent history of mass-manufacturing.

These craft manufacturers tend to be more entrepreneurial often employing fewer than ten people. These are well paid jobs and represent an important part in our economy. But as Steve Wertheim (planner in San Francisco’s Planning Department)

states it: “lots of them are, like, two guys with luthiering degrees from Vas-sar making beautiful guitars. So these outfits are not going to be the savior of our blue collar workforce. But they do provide many quality jobs, and it’s great to see people making things again.”²⁴

FOOD & BEVERAGE MANUFACTURERS

The Food & Beverage category has seen the largest demand increase. The rapid increase of breweries opening in each city seems to confirm and unquenchable thirst on the part of urban consumers. The rise of the Food & Beverage sector is the result of several cultural shifts. First, looking at the role of the local food movement, popularized through writing by Michael Pollan among others. This movement focuses on not only the quality of food but where it comes from and when it’s peak season arrives. Restaurants led the way as the general population be-

came familiar with catchy terms such as locavore and foodie. An interesting phenomenon can be found with a walk through Whole Foods. (Despite the social implication of a grocery store that sells a glass of juice for \$10). Much of their products celebrate the location not in terms of Made in the USA but rather Made in this City. Local food producers from bakers, granola makers and even tortilla purveyors distribute directly through this venue.

Perhaps the more notable and famous portion of this sector is in beverage through the explosion of local craft-breweries. Craft beer production has doubled in the past four years (up to 12.2M barrels).²⁵ Consumer spending on beer continues to increase.

One very interesting aspect is not only the public desire to consume local craft brews but also to visit those breweries themselves. Each brewery attaches a large tasting room or exterior patio that allows customers to see the brewery in action. Fermentation tanks are on display. Tasting rooms showcase not only the companies beers that they distribute but also makes available experiments and small run batches. This is not merely novelty but an embrace of the current beta culture. Ready to try those products that wouldn’t necessarily be commercially ready, consumers participate in the testing and working out of new products. Their feedback allows these companies to provide unique products suited to the desires of the local consumer community.

MAKERS MOVEMENT

Micro-manufacturers are able to deal in highly customized goods purely due to increased access to new digital fabrication techniques. Robotic arms, CNC-machines, laser cutters and 3d-Printers are becoming increasingly affordable. This creates a lower barrier to entry for manufacturing startups. These lower startup costs allow more small manufacturing companies to exist in a very entrepreneurial way.

Design and manufacturing for products is typically done separately and at a distance, due to outsourcing the designers are in a different country communicating with their manufacturers (a process that is not only difficult for precision but also leads to counterfeiting). Outsourcing is slow and inflexible. This large disconnect between designers and manufacturers results in products that are out of touch with the marketplace and require significant costs to retool.²⁶ Advanced manufacturing changes this relationship. Manufacturing takes place, through automation, on-site with easier dialogue between designers and manufacturers. And often the designer is the manufacturer. This also means that products can change as needed without heavy re-tooling costs as most digital fabrication tools are inherently flexible.

“The ability to increase domestic production and stimulate economies through 21st century innovation in manufacture is a breakthrough for wealth creation.”²⁷ As more production happens on-site companies are able to create valuable high performing goods in a rapid and affordable way.

The only caveat to advanced manufacturing is that most production is machine based. “The modern robotics and modern software to drive that robotics are phenomenal and are changing what can be done with hu-



Figure 7: Holy Mountain Brewery fermentation tanks.

man hands at a cost that can replace workers. This means much higher productivity, on the one hand, but it means a lot fewer workers, a lot more money going to capital and less to labor. A common thought is if we do not make things in America, we are not going to have a middle class in America. But in this case, if we do not make things in America with people, we have a chal-

lenge. And yet, to be competitive with the world, we are certainly going to continue adopting these new technologies.”²⁸ This is an old struggle that began with Luddite riots in 1811. As more advanced machinery comes to play older jobs are lost. And yet, the nature of advanced manufacturing is truly the creation of new jobs and new ways of making.



Figure 8: Image of a growler.

THE GROWLER AS CONCEPTUAL REPRESENTATION

The growler is a 64oz. container that has become the vehicle for tap-room distribution. It is the perfect middle ground between the keg, a reusable distribution container and the individual bottle or can. More accessible than the keg while also cheaper to distribute than bottles. Beer is purchased directly from the brewer, whatever seasonal variety offered. The customer takes their beverage home to enjoy alone, or preferably in the company of friends.

The empty growler, now owned by the customer is brought back to be refilled at the brewery. This unique product is a closed loop system. By being a direct from manufacturer to consumer product a relationship is built between customers and the brewery.



Figure 9: Kuka Robotic Arm milling aluminum.

IMPORTANCE OF SPACE AFFORDABILITY TO MANUFACTURING

Advanced manufacturing has doubled its job growth in certain cities. Most jobs are high earning, requiring higher education mostly in engineering and design. Advanced manufacturing is drawn to urban areas for much of the same reasons that other sectors of manufacturing are. Many of these digital fabrication firms have higher resources either backed by venture capital or other tech based funding. This gives them the ability to pay higher prices for property within the limited urban industrial zones. This is great for the rebirth of urban industrial areas. This allows more use for these underutilized areas. But at the same time this is also further competition for urban industrial space.

Food and Beverage manufacturers (specifically brewers) have the ability with addition of tap rooms

(retail space) to also pay higher rents allowing them to stay within urban areas mostly near commercial areas. They benefit from this adjacency. More traditional manufacturers without a retail component or V-C backing do not have the resources to pay for these higher demands.²⁹

Traditional manufacturers typically provide more middle class jobs. Is there a way to provide space for traditional manufacturers without limiting the growth of newer advanced manufacturers?



Figure 10: Rendering of Hundred Hooper.

HUNDRED HOOPER

Class A mixed-use commercial project offering over 400,000 rentable square feet located in San Francisco's SoMa District. Designed around the different uses of the project's spaces, Hundred Hooper combines the high market demands for tech office space and innovative local manufacturing.

The construction of 290,000 SF of office space gives the developer the ability to pay for an additional 100,000 SF of affordable manufacturing space.

SFMade, a non-profit dedicated to the promotion of manufacturing within San Francisco, will rent out the spaces at a range of about \$15 to \$22 per square foot — or less than \$2 per month per square foot. Other industrial spaces with the site's proximity to

downtown San Francisco are trending well above \$24 — in some cases, \$36 — per month.³⁰

This project showcases a public private partnership that not only provides affordable manufacturing space with the expectation of employment but also provides an approach for industrially zoned property in urban areas. By combining the market's highest and best use with a city's urban plan a provision is created to not only create manufacturing space but also economic diversity within the city. This could be construed as an eating away of the already minimized industrial zoned land in the city. But an alternative view see this as using market demands to leverage opportunity for the urban manufacturing sector in San Francisco. Without the additional

290k SF the initial 100k of manufacturing space would not be built.



Figure 11: Photo of American Industrial Center.

AMERICAN INDUSTRIAL CENTER

Formerly the American Can Company, its four block campus is home to over 275 small sized businesses (Designers, video production firms, breweries, and chocolatiers). The complex acts as a hub for “collaborative entrepreneurship and a breeding ground for new companies.”³¹ The four buildings make up approx 800,000 SF of space devoted to Warehouse, Light Industrial and Office & Studio Space.

These unique spaces are a telling translation of spatial transformations: The large buildings that once housed large scale manufacturers have given way to smaller and more-nimble producers focused on local consumption. The result is a multi-tenant mixed use space that can only be described as a hub. The streetface uses act as retailers but are in actuality manufacturers of beverage, food and apparel.



Figure 12 and 13: Photo of Heath Ceramic Tile Factory. Photo by Mariko Reed

HEATH CERAMICS TILE FACTORY

Heath Ceramics opened a Tile factory in a former industrial laundry building in San Francisco's Mission neighborhood. The 60,000 SF building serves as space for daily production of their coveted tile.³² The space also serves as a retail space for Heath, a small cafe and an art gallery on the main floor. The upper floors house several studio spaces (some for Heath's in house artists, some for other artists) and offices.

With several tours occurring through the week Heath is capitalizing upon the effect that the experience of seeing products made has upon customer loyalty. This allows consumers to become not only familiar with their products but also become attached to the brand of Heath. Not only do they sell their own wares but they also are providing retail space for other small manufacturers in the area. Even further the cafe as well as a small garden shop operate as a pop-up venue within the space, adding to the collaborative spirit of the place.



Figure 14 : Photo of 25th & Larimer Building.

RINO DISTRICT - SHIPPING CONTAINER BLDG (25TH & LARIMER)

A first of its kind for Denver, the new mixed use property, comprised of 8,200 sf of mixed retail and office space, located at 25th and Larimer Streets is built out of 29 recycled shipping containers.³³ The containers were sliced and welded together to create overlapping spaces. The containers were further opened up to include retail glazing.

To lease the space they used branding experts rather than brokers to cultivate a collection of tenants. These tenants range from restaurants and bars to small artist production shops. The retail and restaurant aspects of the building are on the front street. In the back of the building are several artisan production stalls. Hosting small furniture makers, artists, design shops and several apparel shops. These studio spaces open up to a courtyard space that allows for communal aspect to the building.

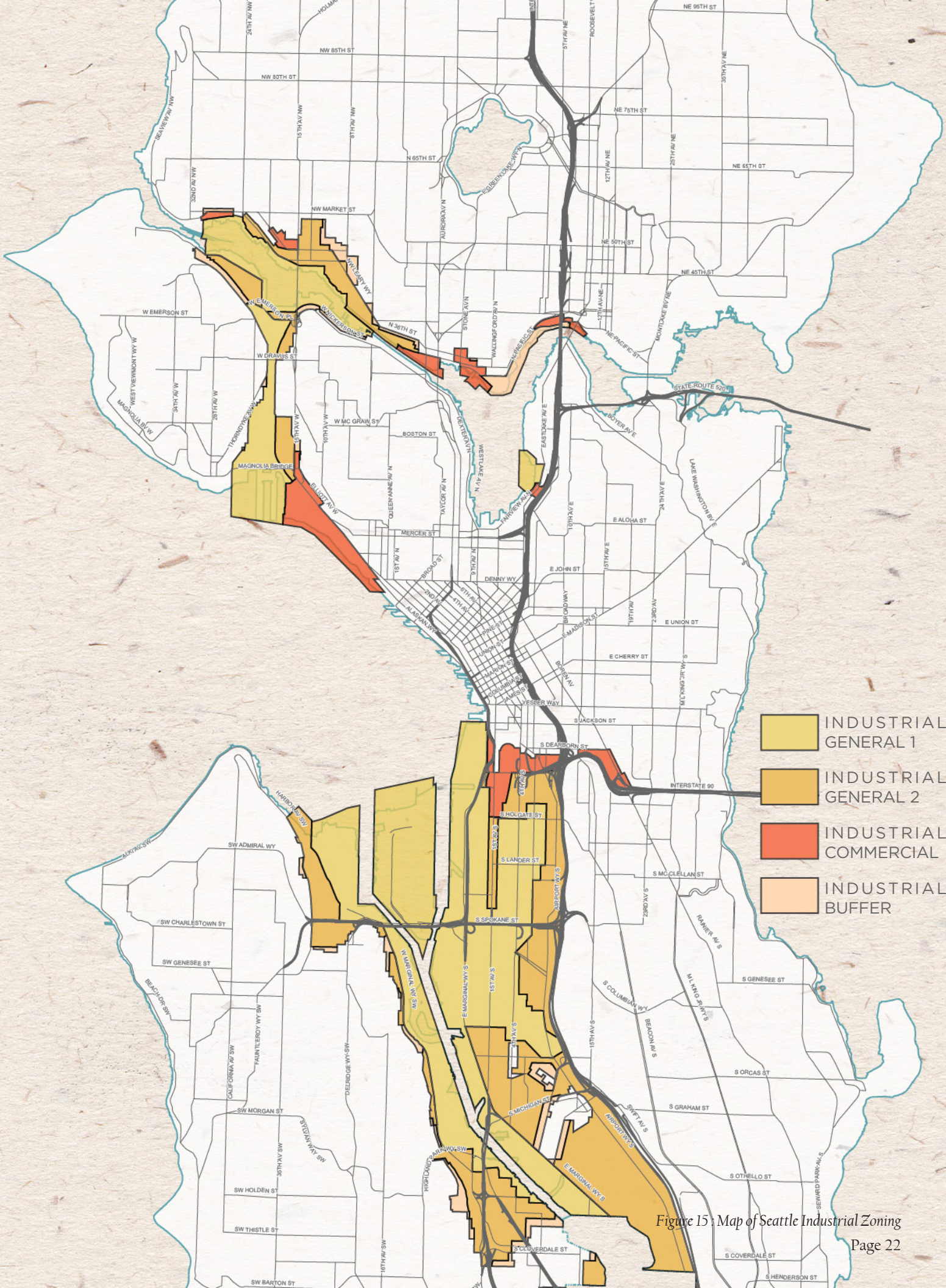


Figure 15: Map of Seattle Industrial Zoning

SITE

Seattle has several industrially zoned districts. With the southern SODO and Georgetown Districts relegated to heavy industrial neighborhoods with close access to the port. The Northern industrial district, labeled as the Ballard-Interbay Manufacturing/Industrial Center, has several waterfront access points making it ideal for maritime uses among its many other uses.

As with many urban areas industrial zones are considered an inferior use with low rise aging buildings. There tends to be a strong impulse and market push for rezoning and allow the real estate market to create the space rather than control through zoning. JoAnn Greco in Planning magazine raises this very question. Is it good practice to preserve land for industrial (specifically production/distribution/repair) uses? But as she states: "...if we're going to have any PDR uses in San Francisco, we have to protect them, otherwise they will always lose out economically.³⁴" Perhaps as some argue all manufacturing should make its way out to the suburbs. While changing the land use away from industrial uses may provide short term gain, but this "eliminates their potential for new types of urban manufacturing. Land needs to be affordable, accessible, and available to allow for 21st century urban manufacturing options.³⁵" This preservation of industrial space provides for the potential of innovation. Furthermore, it continues to allow for economic diversity and employment diversity creating a resilient city.

CREATION OF THE BALLARD INTERBAY NORTHEND MANUFACTURING INDUSTRIAL CENTER (BINMIC)

The Ballard-Interbay Manufacturing/Industrial Center (BINMIC) is located in the northwest part of the City of Seattle, and extends some 3 miles from the northwest corner of downtown Seattle to Ballard. The industrially zoned BINMIC is a thriving urban industrial center with a diverse mix of businesses. The center spans from Elliott Bay to Salmon Bay, and includes some of the city's most productive working waterfront, wharfs, shipyards, and rail yards. Salmon Bay is home to Fisherman's Terminal, one of the largest commercial fishing terminals in the northwest. The Salmon Bay area, stretching from the Ballard Locks to Fremont, also supports intense marine-related industrial and manufacturing uses.³⁶ At 16.6 activity units per acre, Ballard-Interbay is significantly more dense than the 8.1 average for manufacturing/industrial centers.

There continue to be several plans, policies and revisions therein to provide a way to maneuver this industrial zone to today's market. Many of these policies focus on promoting industrial uses and "ensuring availability of land to sustain a diverse employment base and supporting retention and expansion of existing industrial businesses and opportunities for new compatible businesses.³⁷" There are even measures placed forward to restrict Industrial Commercial Zoning as this zoning type tends to allow and is predominantly used for retail and office use.



Figure 16: Map of Ballard Industrial/Manufacturing Area

BINMIC MARKET ANALYSIS

PROPERTY MARKET DESCRIPTION

“...IF WE’RE GOING TO HAVE ANY PDR USES WE HAVE TO PROTECT THEM, OTHERWISE THEY WILL ALWAYS LOSE OUT ECONOMICALLY.²⁹”

- JOANN GRECO

The BINMIC area is a unique region undergoing tremendous growth. All areas outside of the industrial zone are being developed into either large institutional apartment blocks or townhouses. Throughout the residential area everything is being rebuilt. Even within the Industrial Commercial zoning several parcels are being developed into Bio-Tech, Tech office space, and big-box retail.³⁸ This area offers a strong example of the pressures that many urban areas are facing.

The BINMIC area is relatively well connected with several bus routes running through. The main vehicular thoroughfare, 15th Ave runs North/South and acts as a major connection between several Seattle neighborhoods as well as a way to cross over the water way that much of the industrial use is centered around.

Program ratios, Cost and Income projections are informed through looking at a market analysis of the area.

MARKET DEMAND³⁹

Population of **1,846**
Median Income of **\$64,000**

INDUSTRIES & EMPLOYMENT⁴⁰

Industrial
10,700

Non-Industrial
22,800

Size of Businesses (# of Employees):

1-4 **41%**

5-24 **41%**

25-50 **10%**

50-100 **4%**

100+ **4%**

EMPLOYMENT BY INDUSTRY⁴¹

CONSTRUCTION: **1,400**

DISTRIBUTION: **1,200**

WAREHOUSING: **1,000**

OTHER_IND: **700**

MANUFACTURING: **6,200**



Printing **1,400**



Electronics **400**



Paper & Wood **100**



Apparel **300**



Chemicals **100**



Aerospace **300**



Transportation **700**



Food & Beverage **1,900**



Fabrication **300**



Other **500**

Figure 17 : Employment by Industrial Sector in BINMIC

MARKET SUPPLY

Absorption has become steady within the past few years, alluding to a stability in the industrial market. There is still possibilities of negative absorption which can be a cause for concern when bringing new space on to the market.

BUILDING STOCK

% SHARE OF BUILDING SIZE

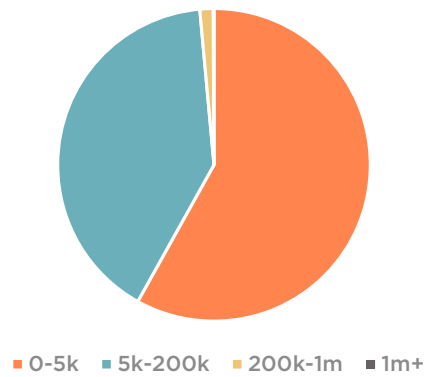


Figure 18: Building Size Pie Chart

58% of the building supply is under **5,000 SF**.⁴²

The majority of the buildings in this area were built between 1900-1950.

“THE SPRAWLING BUILDINGS THAT ONCE HOUSED LARGE-SCALE INDUSTRIAL POWERHOUSES HAVE GIVEN WAY TO SMALLER, MORE NIMBLE, AND MORE HIGH-END MANUFACTURERS.”^{43,}

Net Absorption (Square Feet)

Net Absorption

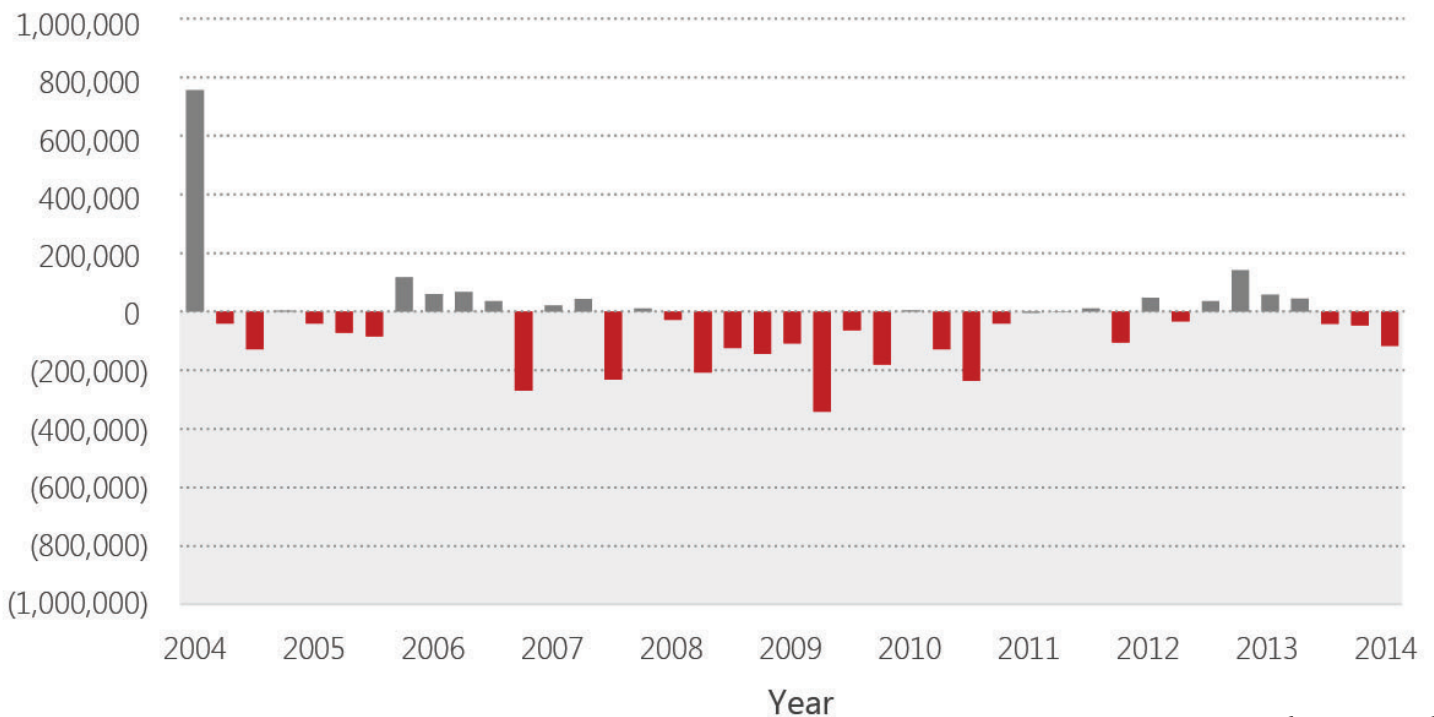


Figure 19: Net Absorption Graph



Figure 20: Substation turned artisan manufacturing space in BINMIC.

RENTAL DEMANDS

Vacancy Rates are lower than they have been in years. Dipping down to pre-2008 rates. Due to the low number of buildings available in the area these numbers will tend to act with more volatility. Nevertheless, low vacancy with an average monthly rental rate at \$1/SF confirms the story of a market with increasing pressure for manufacturers to find affordable space. Comparing buildings of similar type and quality to the site building (shown on p 27) several rent averages are able to be construed⁴⁴.

Warehouse Space - **AVG 8,123 SF**
\$1.54/SF MONTHLY ASKING

Industrial Retail- **AVG 2,450 SF**
\$2.32/SF MONTHLY ASKING⁴⁵

Industrial Office - **AVG 6,241 SF**
\$1.81/SF MONTHLY ASKING

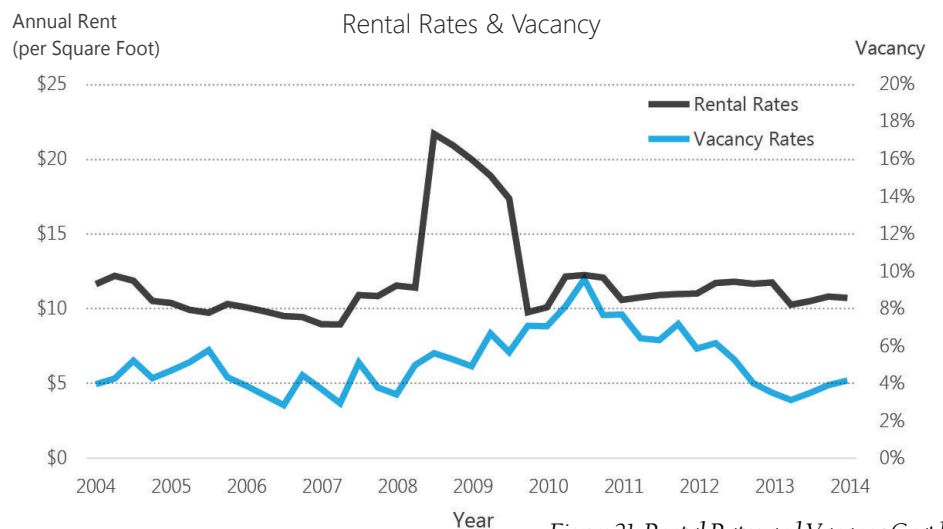


Figure 21: Rental Rates and Vacancy Graph

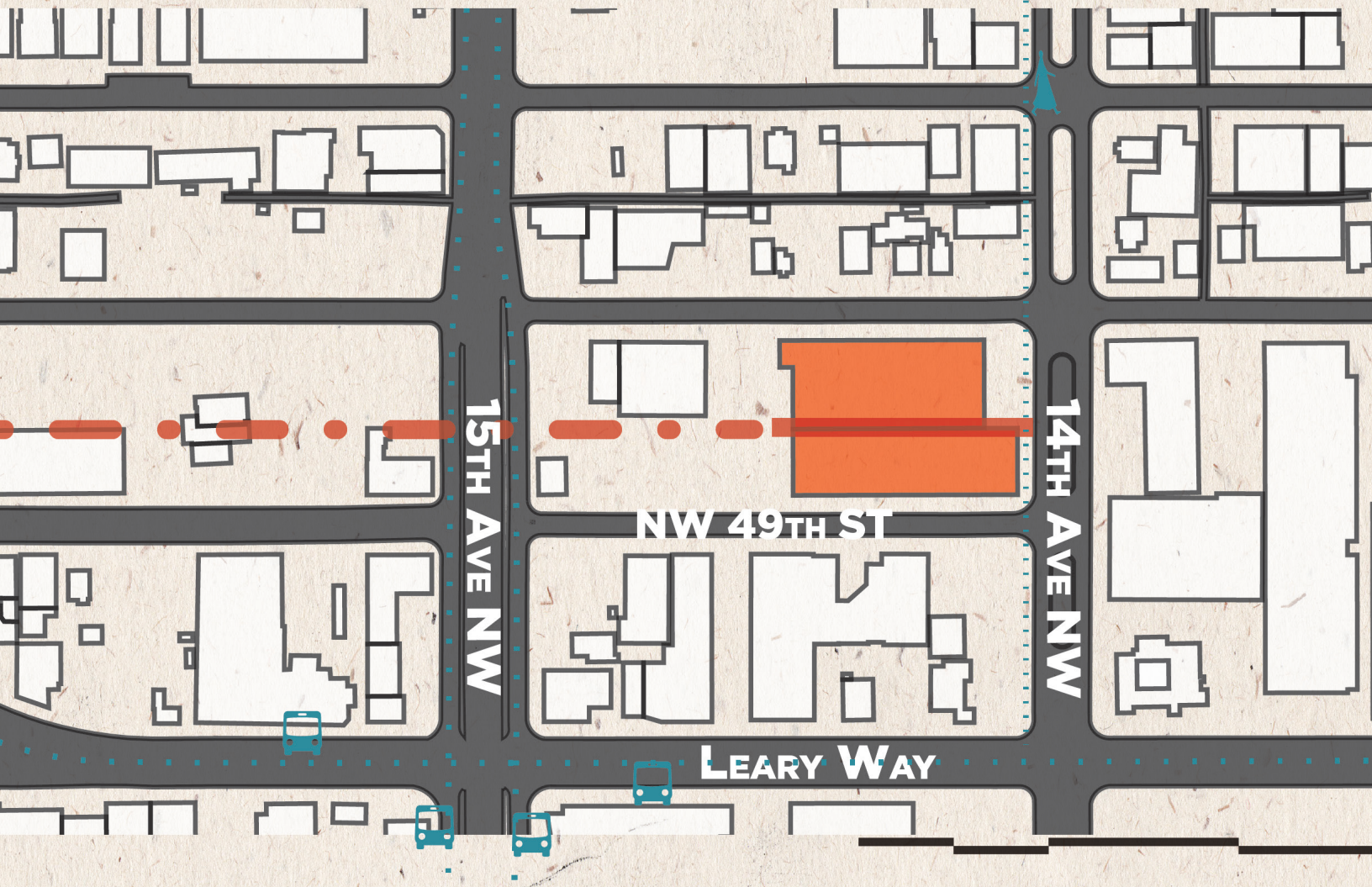


Figure 22: Site Plan

THE SITE: 1401 NW 50TH ST

This is a neighborhood with great access off of 15th Ave and Leary, both large arterials. Leary acts as the main industrial thoroughfare through the northern part of the BINMIC. There are several major bus routes providing great transit options for access. 14th Ave is a slower though heavier used street with an eccentric history of parking where the median lane would exist.

14th Ave further has heavy pedestrian traffic. This is due in part to several industrial/retail uses in the area. There is an architectural reuse center, several auto repair shops, a hardware store, and a few breweries in the area.

There is a historic archetype of alley ways through the blocks. As the neighborhood further increases in density regaining these alley cuts could allow for a sense of granularity to occur. Not only useful for simple access to buildings the alley cuts the blocks into smaller portions both amenable to smaller urban manufacturing spaces but also allows for a strong neighborhood feel. This feeling is one often attributable factor in successful neighborhoods. The alley could ostensibly act as a pedestrian connection across the auto centric 15th Ave.

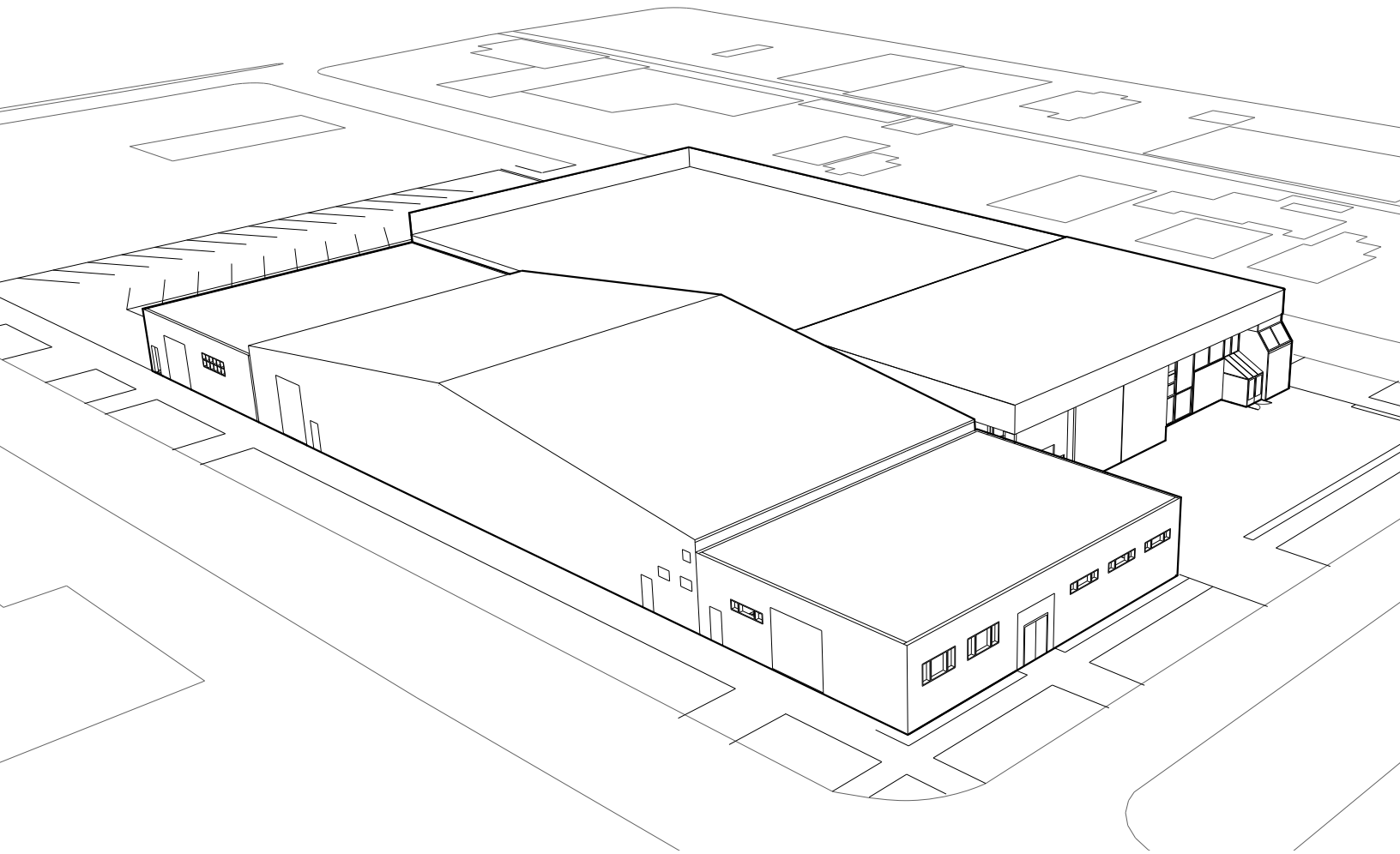


Figure 23: Axon of Existing Building

EXISTING BUILDING

1401 NW 50th Street is composed of four distinct buildings. The 20,000 SF northern building was built in 1975 of a steel structure with EIFS wall system. Most of the interior is open to the twenty foot ceiling height. The center building an 11,000 SF pre-fabricated metal structure was erected around 1968. Flanking either side of the metal warehouse are two eighteen foot tall masonry buildings both 3,750 SF each (the first built in 1923 and the second in 1968).⁴⁶ These four ubiquitous buildings are not special icons of an industrial era. Nor are the components with which they were built of valuable. What is special about them is their quotidian nature and their ability to act as a case study for the shifting of much of the urban industrial building stock.

Reusing Buildings and Preservation in Industrial Spaces

Often preservation is an act that entombs a building in an attempt to regain its glorious past. The reason this project focuses on reusing old buildings is two-fold:

1. Retain an existing building is cheap. The space is already there. Industrial spaces are so minimal that adding in reinforcement structure adds minimal cost. Furthermore, most industrial land is toxic to some extent. Digging and moving that soil to create a new foundation is cost prohibitive.
2. The history of industrial structures is of adaptation and agglomeration. When additional space is required it is tacked on as simply as possible, at times to awkward results.

DESIGN RESPONSE

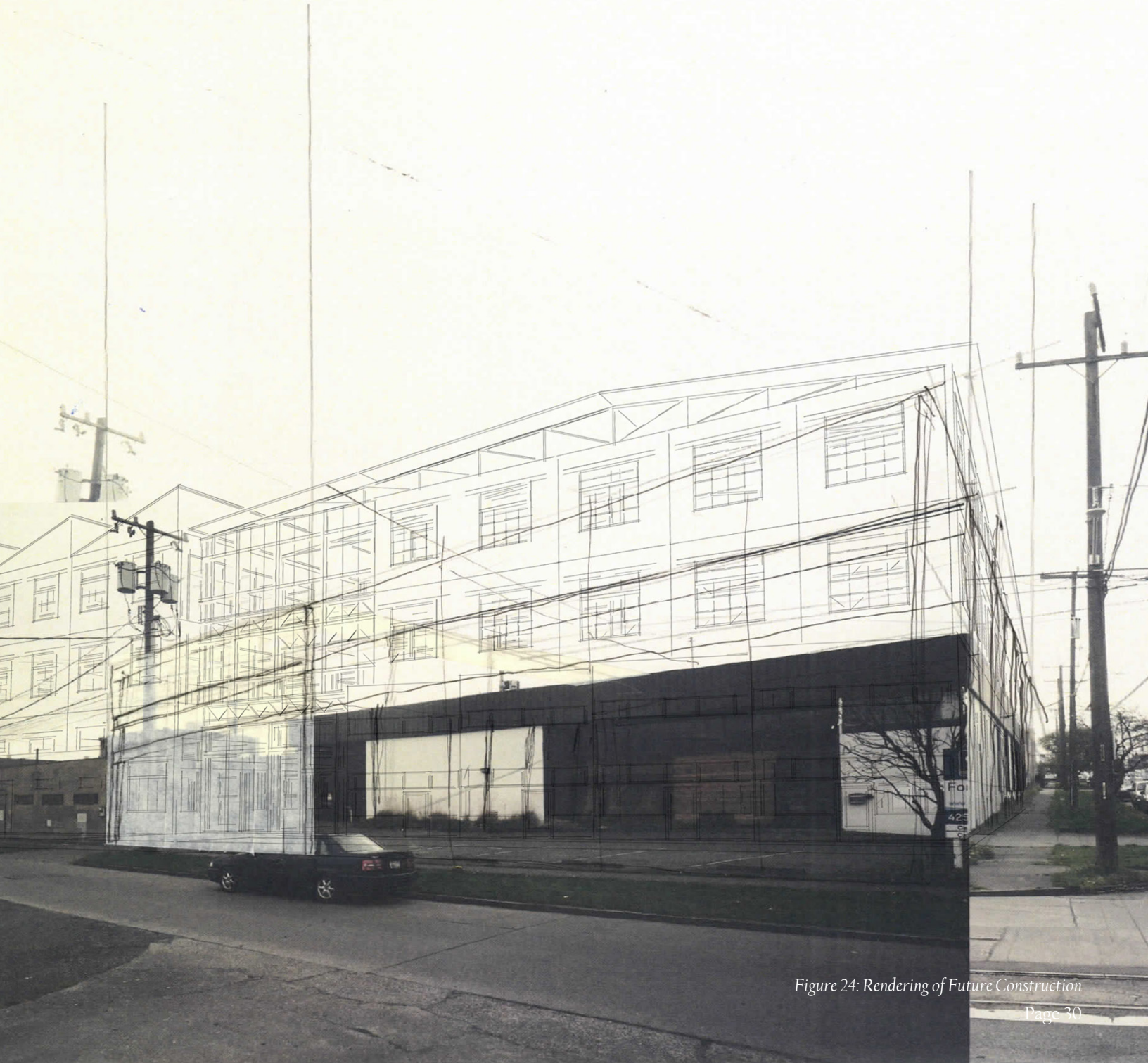


Figure 24: Rendering of Future Construction



Figure 25: Open typical warehouse.

EXTENDED USE OF AN INDUSTRIAL BUILDING

The industrial areas in most cities have been built, and rebuilt throughout hundreds of years. A short walk through any industrial neighborhood will quickly reveal buildings from very different eras built up from the best or most efficient building technologies of their time. The old unreinforced brick buildings with their classic steel sash windows next to tilt-up concrete buildings of the 1980's. Each building representing the different demands of manufacturing at that time. Though there remain these differences typologies do emerge. The structure of these spaces are typically long span allowing as much open floor space as possible. In every generation of these spaces the ceiling heights go up. In the 40's eighteen feet of vertical space was typical while more recently the shift successively moved from 24 feet to 32 feet with a growing demand in distri-

bution warehouses for 40 foot vertical spaces. Industrial spaces were in the past built to last a hundred years with unadorned masonry and large timber frames. Whereas manufacturing spaces of more recent eras are built as cheaply as possible while still remaining robust. With long span steel trusses and either tilt-up concrete walls or corrugated steel exteriors. Windows included are either high up as clerestories or translucent panels. This provides security, privacy as well as protects the windows from breakage as material is thrown around the interior space.

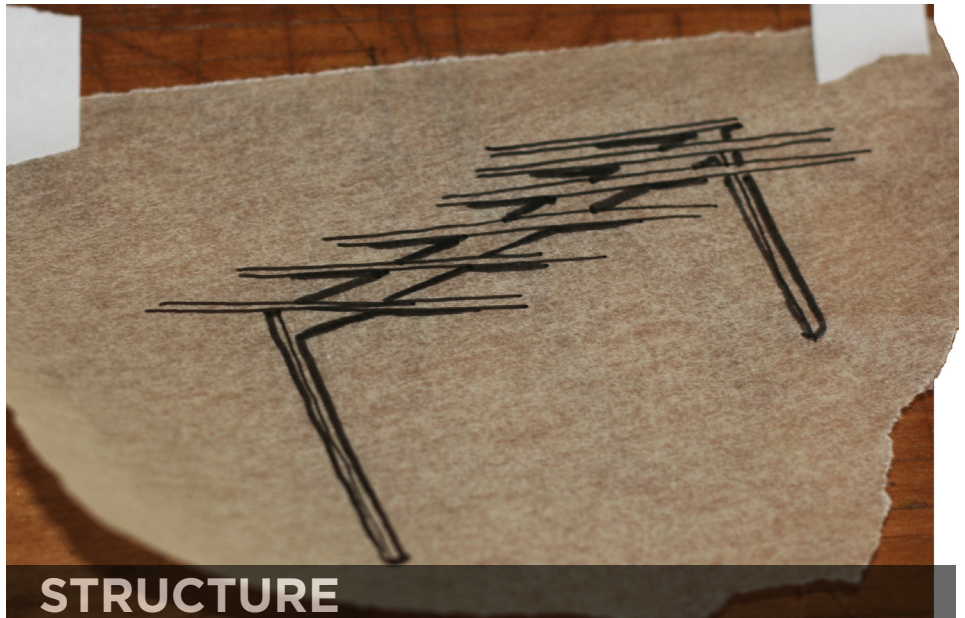
These older buildings were built for large manufacturing companies with large labor pools. Today's urban manufacturing sector looks much different. Smaller companies consisting of fewer people. The machinery has also become smaller in size to a

point. Motors are more efficient with the largest component consisting of the working surface itself (table on the table saw or sanding bed on a belt sand etc.). These smaller companies still require space but much less than was required in the past. Methods must be developed in order to retrofit older manufacturing buildings for this new model.

RETROFIT METHODS

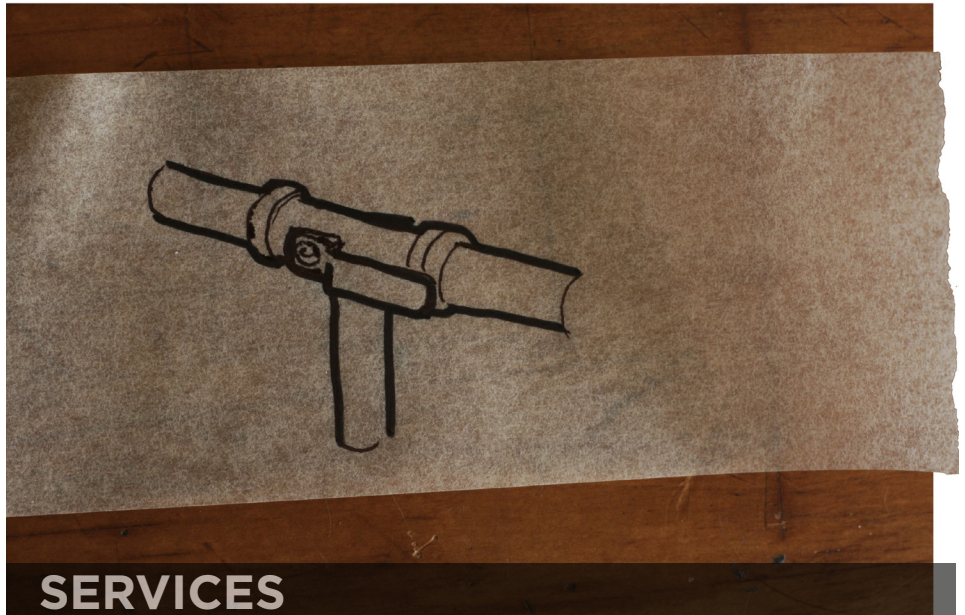
These Retrofit Methods can be broken down into five approaches.

1. Structural Additions – Seismic retrofits and wide span structural additions must be made. This allows the space to remain as flexible as possible as manufacturing changes further. This gives the additions and the building permanence throughout the many changes in the future.



STRUCTURE

2. Services – Manufacturing operations require more utilities than typically found in residential buildings; large loads of electricity, requisite water supply and pneumatic services. These should be accessible and located within the periphery or along structural walls as the interior is subject to change.



SERVICES

3. Access – Defined in two ways: Material and consumer. Manufacturers deal in production which requires material. Material conveyance becomes tricky in multi-story spaces. Each tenant needs access to loading docks and freight elevators to allow for incoming materials and outgoing products. Consumer access is particularly important in this newer economic model. People are interested in not only the end product but also in the processes therein. Manufacturers are branding themselves with instagram feeds, public events and tasting rooms/show rooms. Consumer access is about windows into the manufacturing floor, space for show rooms or even dedicated retail for the building to showcase the products both for direct retail and further jobs.



ACCESS

4. Interior Partitions – Urban manufacturing buildings are now multi-tenant spaces. As companies grow and contract it is important that the interior spaces can adapt to these changes.



PARTITION

5. Shared Resources – Small manufacturing companies operate on tight budgets. Such low overhead may not allow a designated meeting room, a fully built office or the occasional tool (an expensive piece of equipment that is used once a month). Spaces included in the building that provide these resources to all tenants furthers their economic viability. These spaces are not unlike amenity spaces found in offices and apartments. They attract and, more importantly, retain tenants with the result of both creating community and consistent cash flows.



SHARED RESOURCES

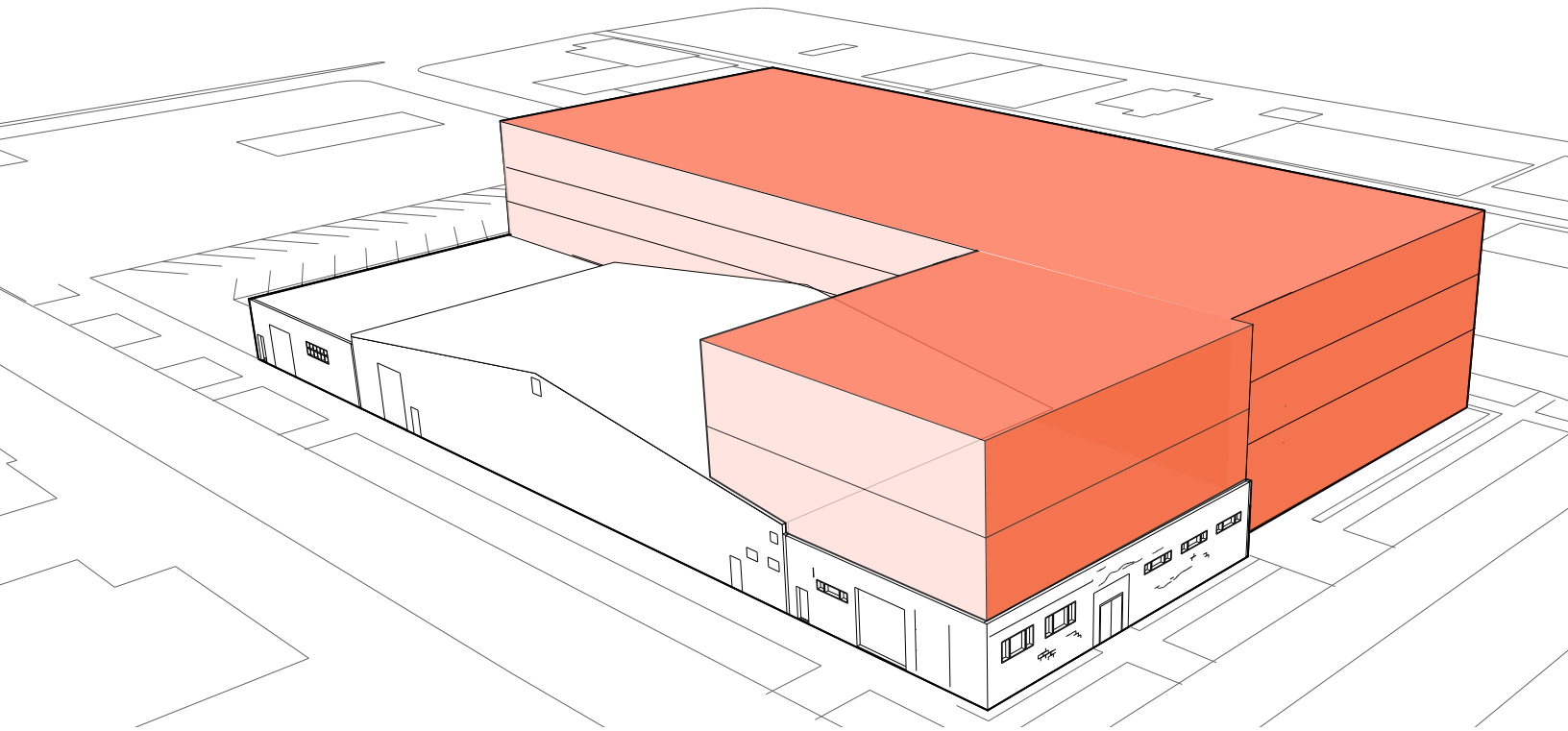


Figure 31: Diagram of Additional Floors

STRUCTURAL ADDITIONS

The additional floors will use the base structure of the steel building. Wide-Flange columns are welded or bolted on top of the original columns. These will provide points to attach open web trusses to build additional floors and the roof.

These long span steel structural members allow for flexible open spaces, utilitarian in nature they act as a staging ground to allow unimpeded movement and work to take place. These spaces have several aspects of concern: Open space to work in including all the utilities necessary to work (gas, electricity, water). Plenty of natural light, proven to increase work productivity and quality of life. Clerestories are perfect for this, allow light without additional heat, they can also help with ventilation.

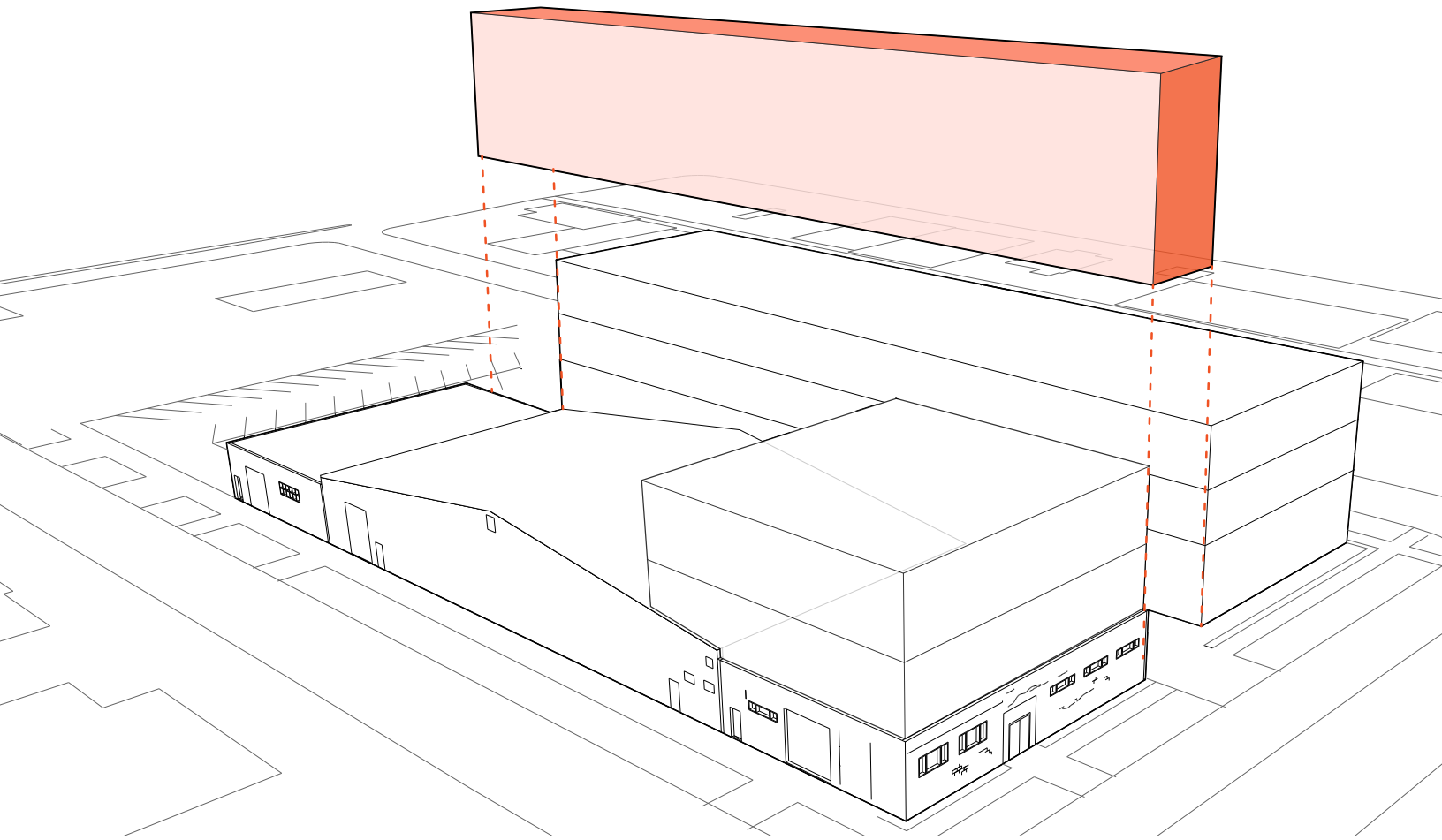


Figure 32: Diagram of Cutting through the Building

ACCESS: AN INTERSTITIAL SPACE

By cutting a 32 foot wide space clear through the middle of the building an opening is created that not only provides light and air but acts as an interstitial space. Trucks and pedestrians move through this arcade in the building. Manufacturing and retail spaces open into this space. To reinforce the interstitial space the exterior will be faced in CMU (concrete masonry units) block, a utilitarian and cost effective option that gives a mass and thickness to offset the open nature of the arcade space.

The interstitial space will further have its own structure with stair access, elevators, and bridge ways connecting the tenant spaces. The space will be wrapped in translucent panels, large sash windows and operable doors all alluding to a very open space dividing the building.

On the upper floors of this

interstitial space provide spaces for tasting rooms, patios, and event spaces. It acts as a public spillover from the more private work spaces.

The interstitial space facilitates the consumer's desire to see where and how their products are made. A spatial element that enables relationships between consumer and manufacturer.

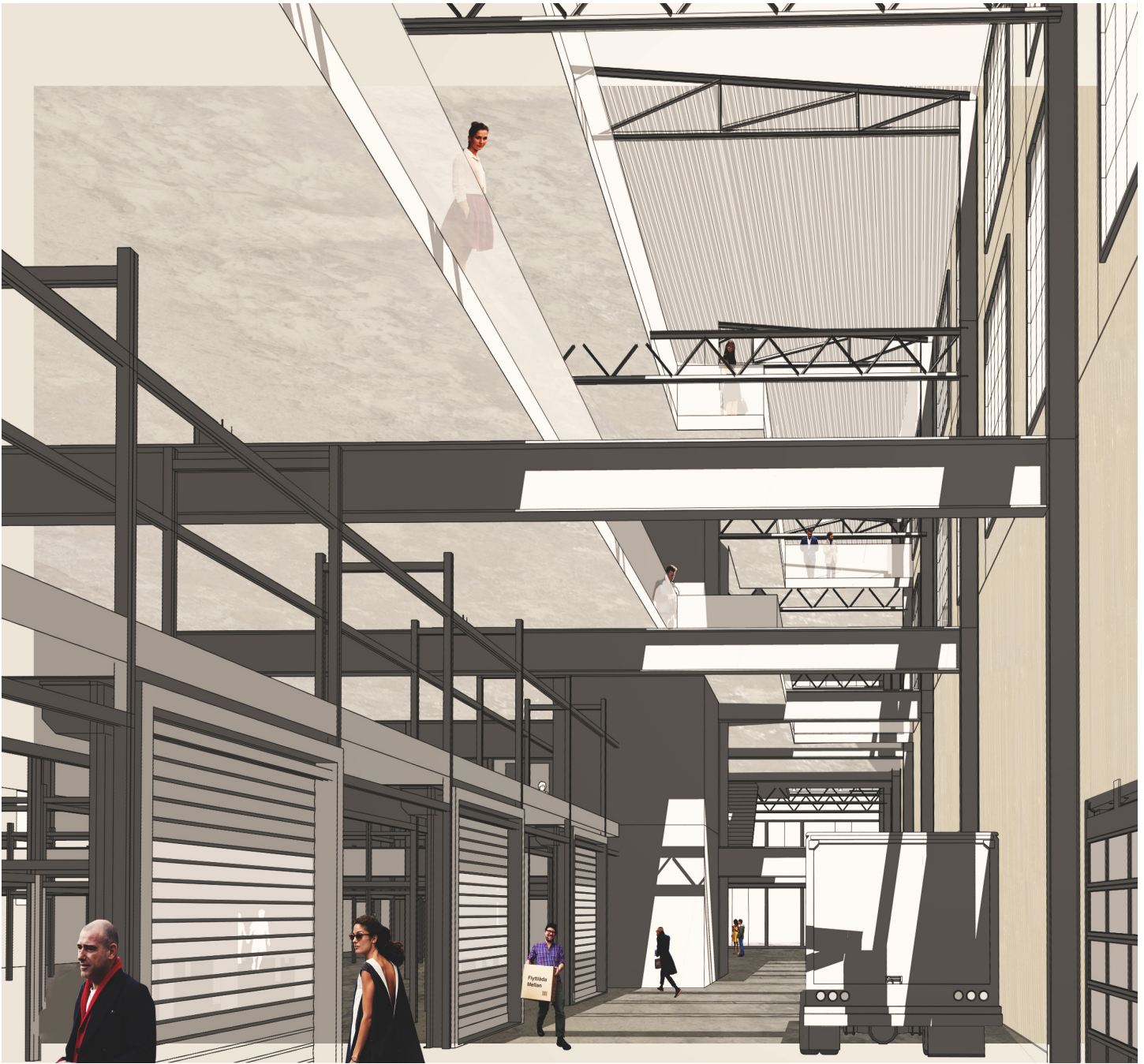


Figure 33: Rendering of Interstitial Space

THE FRAME

Taking the flexibility of the partitions and importance of shared resources to create synergy and merge them to create the combined action of the frame. The frame acts as a middle space between public and private. It is the space that bridges the two.

“TODAY’S CONSUMER DEMAND HAS SHIFTED TOWARDS MORE SOCIALLY-RESPONSIBLE PRACTICE; AUTHENTICITY (I.E., THE STORY OF WHERE AND HOW PRODUCTS ARE SOURCED, PRODUCED, OR MANUFACTURED) IS EQUALLY AS IMPORTANT.⁴⁷”

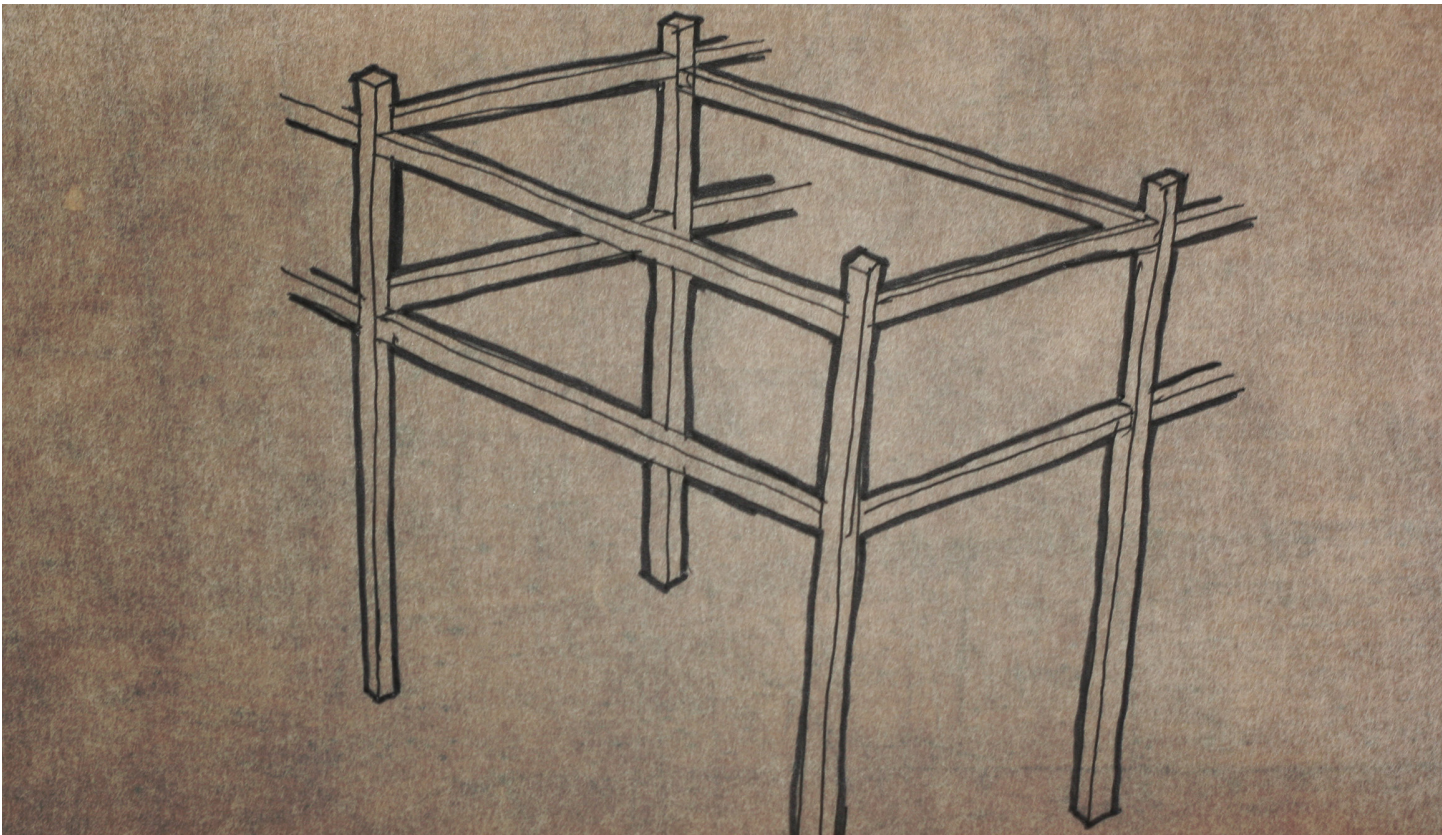
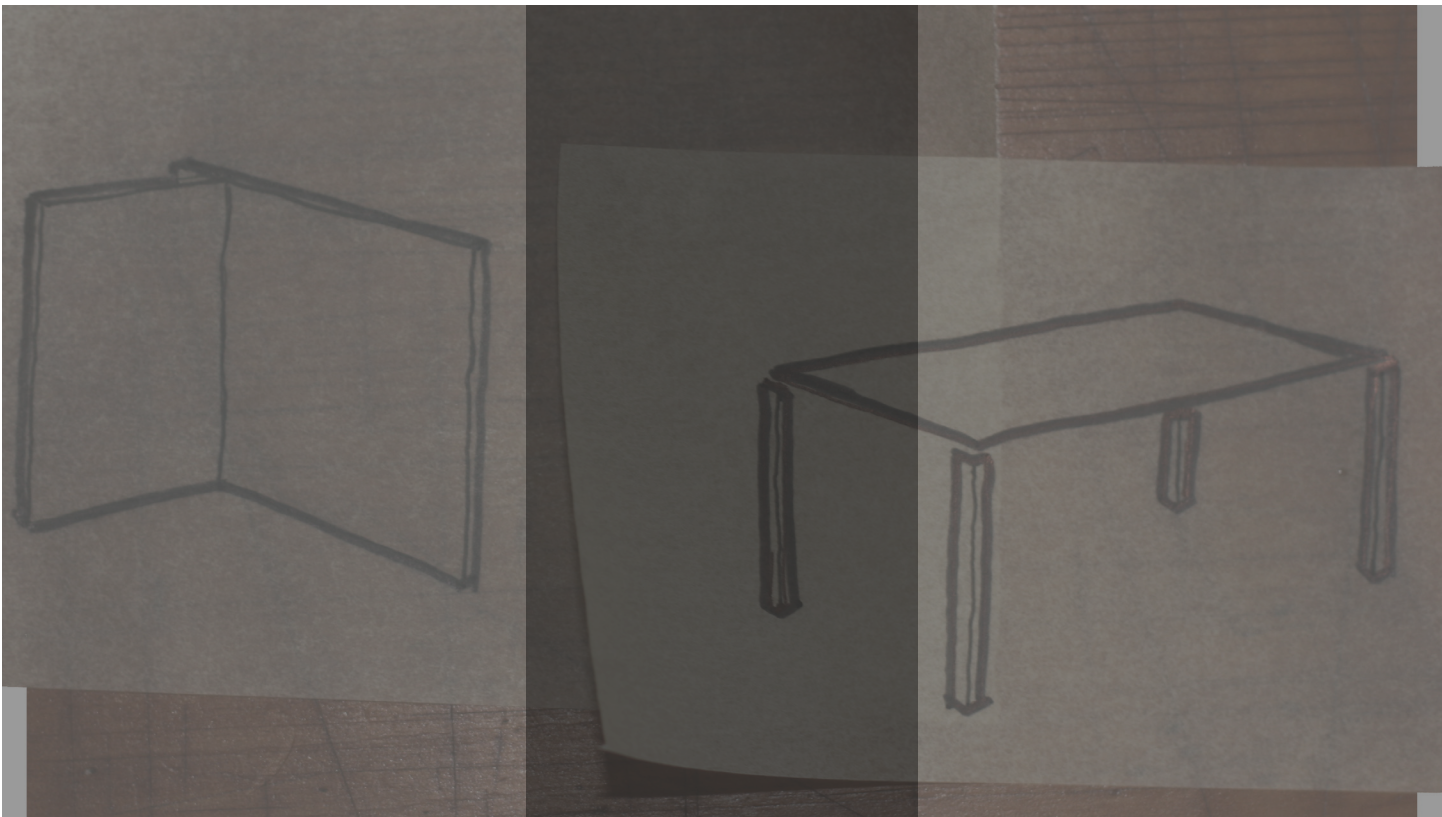


Figure 34 and 35: Diagram of Frame



Figure 36: Exploded Axonometric

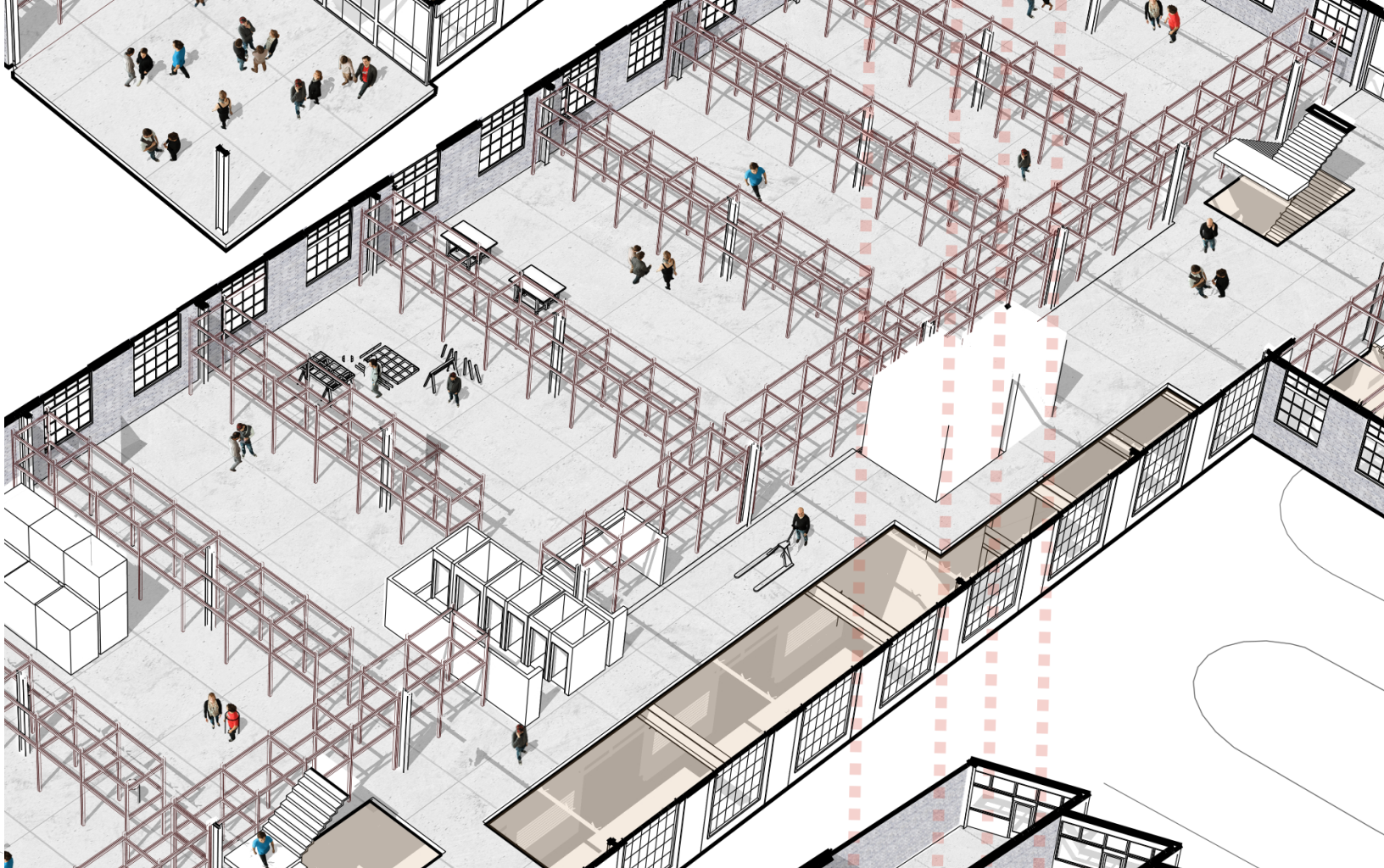


Figure 37: Detail of Manufacturing Spaces

FLEXIBLE SPACE

Manufacturing is incredibly adaptable to its physical constraints. Industrial uses tend to be located in open warehouse spaces where they are filled out. Often floor plans operate as a diagram of the assembly line or flow of processes found throughout each individual manufacturer. Like a fingerprint it is unique and tailored to each manufacturer's needs and production method. It is shaped through years of daily movement. At times machines, work surfaces, receiving and outgoing spaces are the well thought out plans of an assembly plant operating as a machine. More often than not a manufacturing space is the result of daily wear and movement like clothing use is reflected through creases. Machines are moved to take large material or for a special operation with rigged machinery becoming permanent. The ad-hoc be-

comes the permanent with little time to create finessed tools. The oven with a ducted tape handle, the saw with a vice grip welded on. In maker spaces the ugliest dirty tools create the most beautiful products.

The shop floor, be it a bakery, metal shop or apparel, is a diagram of the assembly line. Each as individual as the maker themselves.

It only makes sense to create a structure that allows for this work to take place.

The frame creates a soft boundary and a way of blurring between individual spaces and acts as a scaffolding that allows flexibility and customization tailored to each tenants needs. The different ways that people customize the space creates a character

and a richness to the space. This allows for tenants to truly identify with their location, feeling a sense of ownership.





Figure 38-41: Rendering of Studio Spaces

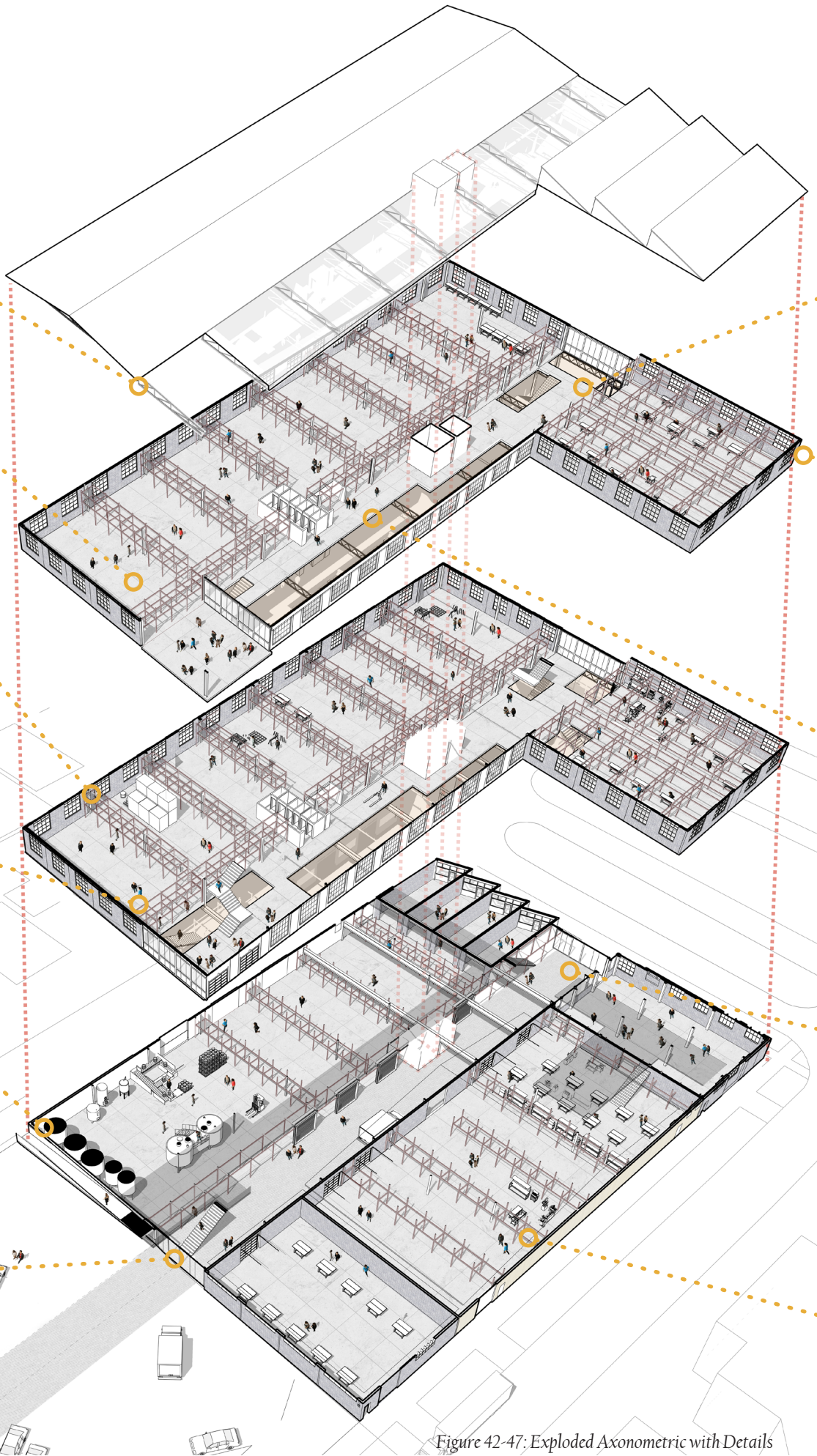
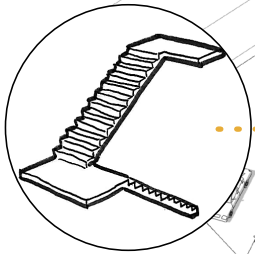
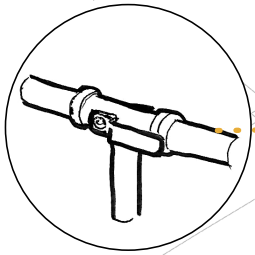
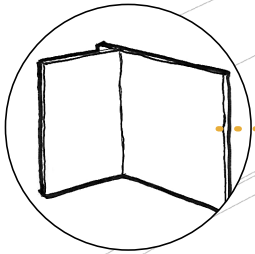
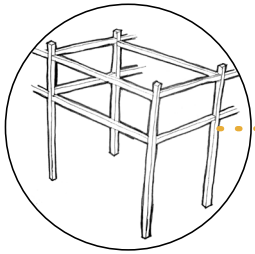
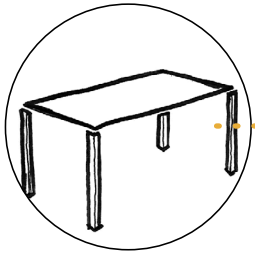
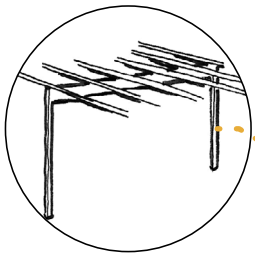
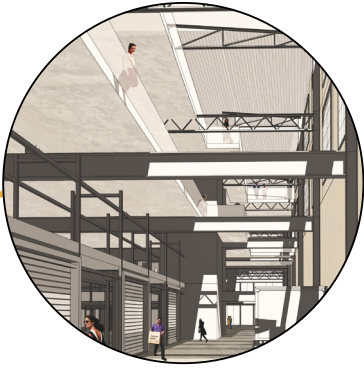


Figure 42-47: Exploded Axonometric with Details



INTERSTITIAL SPACE

TRUCK ACCESS THROUGH THE MAIN FLOOR. CIRCULATION IS ORGANIZED THROUGH THIS CENTRAL SPACE.



EXTERIOR WALLS

COMPOSED OF UTILITARIAN CMU WITH INDUSTRIAL WINDOWS CREATES A THICK MASS CONTRASTING THE OPENNESS OF THE INTERSTITIAL SPACE.



TASTING ROOM

FLOOR HAS SEVERAL OPENINGS WHICH ALLOW FOR MULTIPLE PERSPECTIVES. OUTDOOR PATIO CAN ALSO BE SEEN THROUGH THE GLASS CURTAIN WALL AT THE END.



INTERSTITIAL SPACE

THE CUT ALLOWS AN ARCADE EXPERIENCE WITH RETAIL AND MANUFACTURING SPACES ACCESSED CENTRALLY.



FRAME

THE SCAFFOLD OF THE FRAME ALLOWS CUSTOMIZATION FOR INDIVIDUAL SPACES. THE END RESULT READS MORE LIKE A TAPESTRY THAN A WALL.



3RD FLOOR EVENT SPACE
 2ND FLOOR MANUFACTURE
 1ST FLOOR BREWERY

PATIO
 BEER GARDEN
 ENTRY

MANUFACTURE BAY

TRANSVERSE SECTIONS

The first floor has 24' high ceilings which serve well for larger industrial purposes (e.g. fermentation tanks). The second and third floor are each 16' tall which allows for the ease of adding mezzanine spaces. The second floor is structured for medium sized manufacturers while the third floor is more disposed to office uses.

Sections illuminate the diversity of spaces as well as the difference between shop spaces and the more public interstitial space.



3RD FLOOR	OFFICE	-	STUDIOS
2ND FLOOR	MANUFACTURE	-	STUDIOS
1ST FLOOR	MANUFACTURE/RETAIL	-	RETAIL MARKET

“MANUFACTURING WORKERS MAKE APPROXIMATELY \$10,000 MORE THAN THE AVERAGE US WORKER. BETWEEN 2010 AND 2012, THE US ADDED 400,000 NEW MANUFACTURING JOBS – AND 98% OF THESE ARE SMALL, BOUTIQUE OPERATIONS.⁴⁸”

Figure 48-49: Transverse Sections, North to South



WALKING ALONG THE THIRD FLOOR OF THE INTERSTITIAL SPACE, WITH THE OUTDOOR PATIO VISIBLE PAST THE GLASS CURTAIN WALL. BELOW, A BEER GARDEN FILLS WITH PEOPLE AND OPENS TO SUN AND BREEZE WITH SEVERAL ROLL-UP DOORS.



Figure 50: Illustration of Interstitial Space

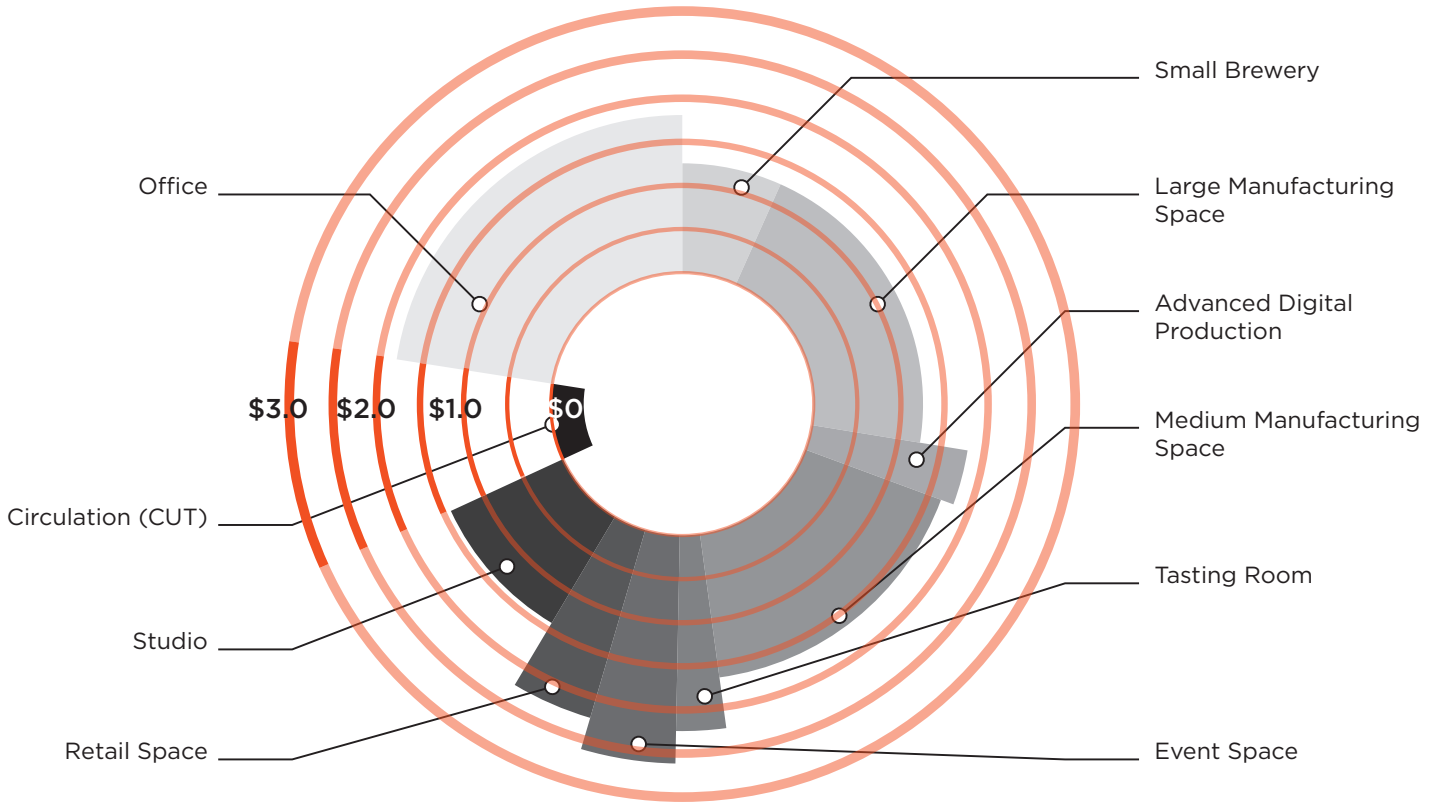


Figure 51: Coxcomb Graph of Rental Projections

PROFORMA/FINANCIAL ANALYSIS

INCOME AND RETURNS

As a mixed-use, multi-tenant space average revenue has the ability of being higher than a traditional single-use manufacturing space. This higher revenue is due to both higher paying uses and a higher density of tenants. Studio spaces at approximately 400 SF allow for more tenants paying rent that is both affordable and more per square foot.

Using rents derived from market comparisons³⁷ rental projections can be made.

Based upon the NOI and equity required for the project cost a leveraged return equates to 8%. This return is typical of industrial projects. Although there is a higher amount of risk due to the unique nature of the project the returns seem commensurate.

Industrial Spaces

48,690 NSF @ \$1.46/SF

Retail

12,360 NSF @ \$2.32/SF

Office

20,180 NSF @ \$1.81/SF

Event Space

4,000 NSF @ \$10,000/MO

NOI

\$1,055,800

NET
OPERATING
INCOME

\$1.05M

PROJECT
COSTS

\$14.6M

UNLEVERAGED
RETURN

7.2%

LEVERAGED
RETURN

8%



Figure 52: Photo of 1401 50th Ave NW Street Frontage

CONSTRUCTION COST

Building Acquisition

\$3,800,000

Renovation Costs

\$283,000

Addition Costs

\$6,480,400

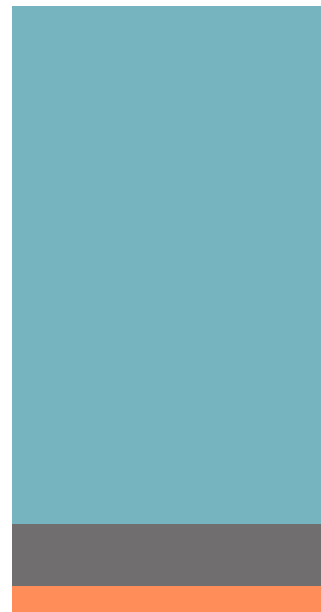
Tenant Improvement

\$325,430

Project Costs

\$14,622,883

Capital Stack



Loan Amount

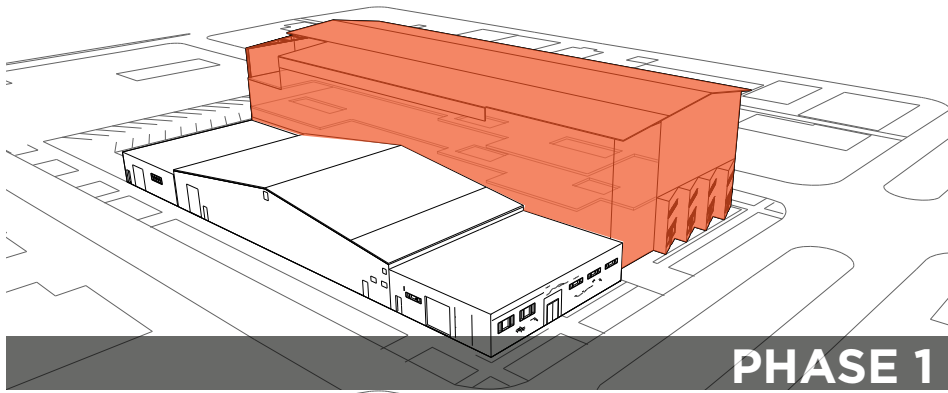
\$12,429,400

Senior Equity

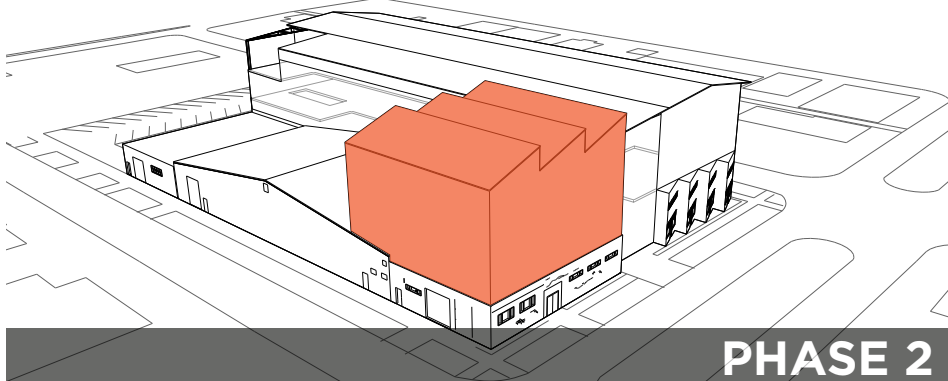
\$1,500,000

Junior Equity

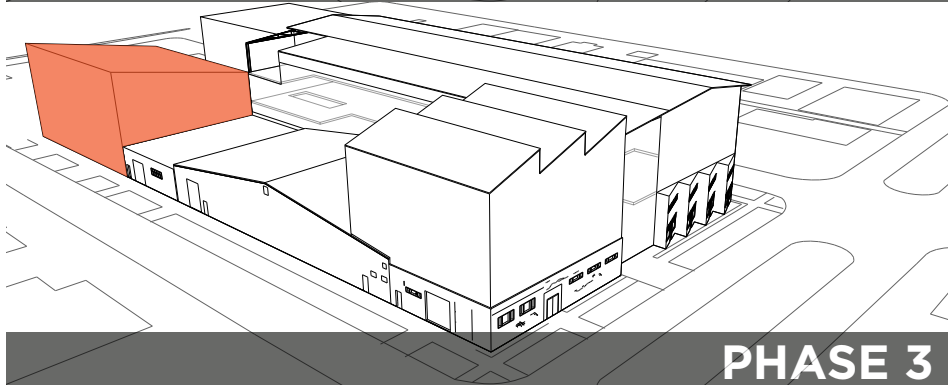
\$693,400



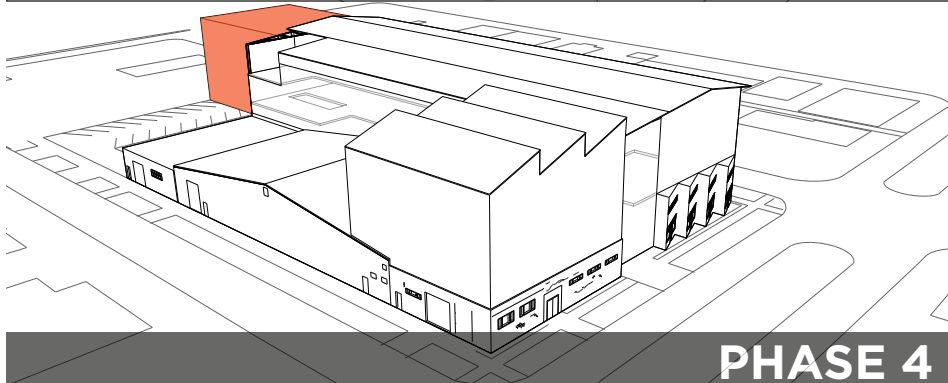
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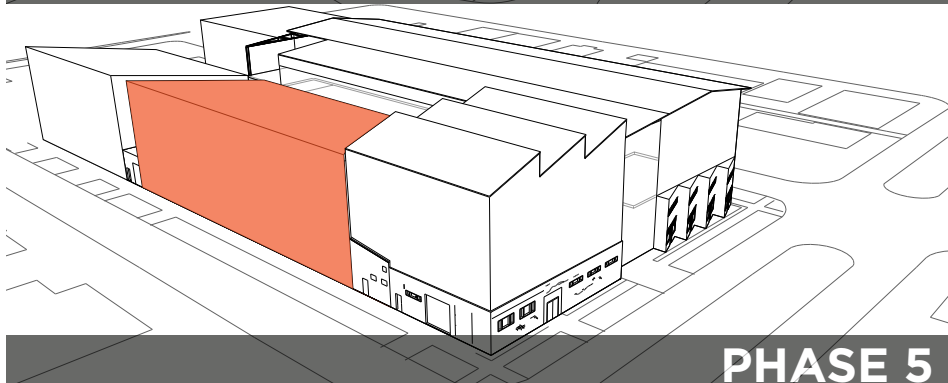
PHASE 2



PHASE 3



PHASE 4



PHASE 5

PHASES OF DEVELOPMENT

The costs are high enough that this immediately becomes a project for long-term ownership. Long-term ownership is extremely important for a project such as this. Ownership becomes tied to the strength and success of this community.

The creation of affordable space with its lower revenue changes the amount of overhaul on the site that would be cost effective. This approach means that some of the spaces are left with minimal intervention allowing for immediate use and also calling for a phased construction plan, giving returns as the project grows.

Figure 53-57: Diagram of Construction Phases

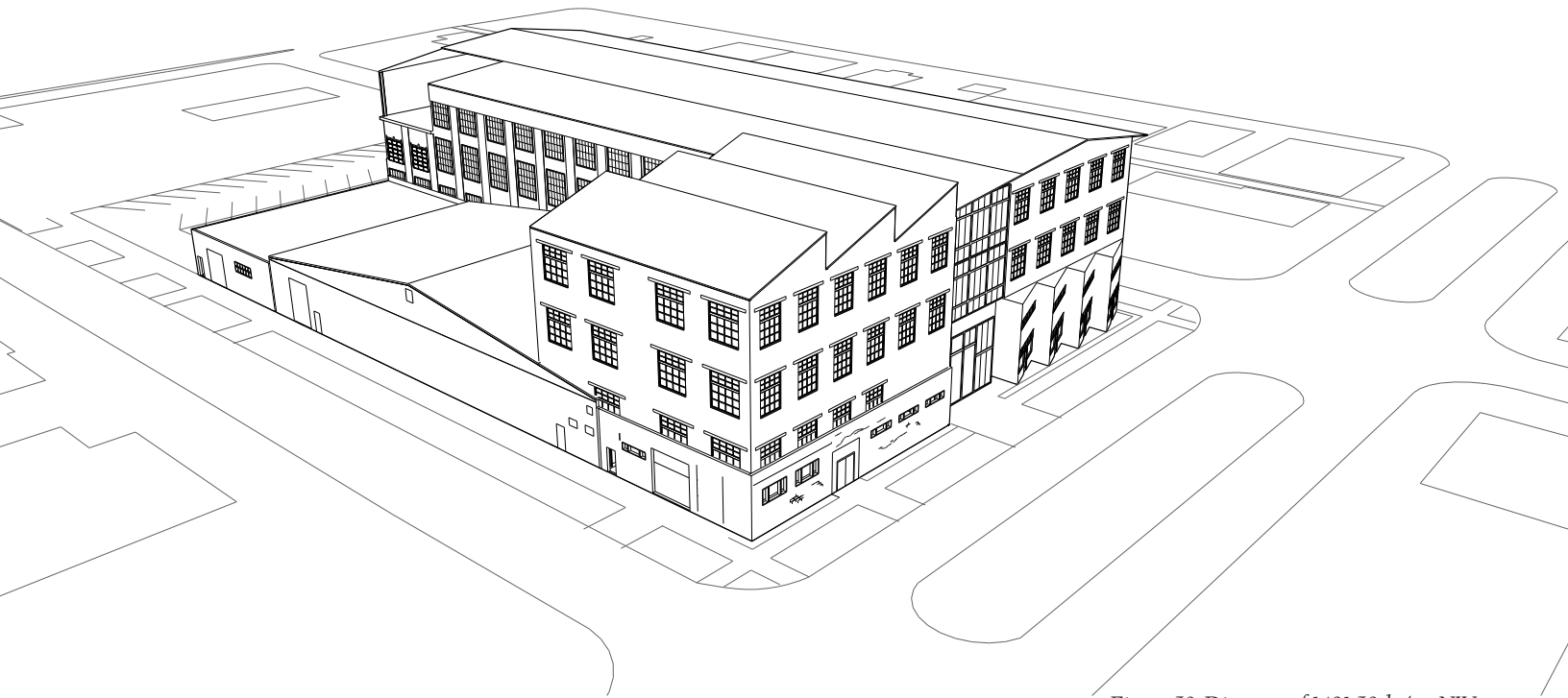


Figure 58: Diagram of 1401 50th Ave NW

CONCLUSION

In the end, building out a multi-tenant space on top of several old existing buildings and densifying a prototypical sprawl use is a risky proposition. At over 90,000 square feet of rentable space, this building not only presents a challenge to fill up occupancy but also to create a purposeful hub. The architectural elements present an atypical solution to defining and possessing space. A framework that at its premise is open creates a challenge to define space without closing it off from its surroundings.

With the reuse of the existing buildings and their structure, my focus was not in preservation but in the frugality of keeping that which already was built. That said, the results were not wholly pragmatic. With greater goals towards synergy and the creation of community the building takes on an ad-hoc approach. Part utilitarian part

trendy retail experience, this building attempts to fuse the way industrial structures are used with a purposeful goal. The old and new elements are not neatly exposed, instead new elements borrow from the old. Form and detail are aesthetically borrowed and scrapped from industrial buildings to collage a new addition. Taking concrete blocks, corrugated panels, steel sash windows and saw-tooth roofs the addition is a celebration, even imitation, of our urban industrial history.

This building looks and feels like many familiar warehouse structures (perhaps all aggregated into one collage of a building) while simultaneously structured as something completely new. This is a space that promotes synergy and flexibility in order to foster urban manufacturing within the city of Seattle.

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- 6 Smil, p. xi.
- 7 Ibid, pp. 9-10
- 8 Ibid, p. 187
- 9 Ibid, p. 141: "Defenders of unlimited imports of consumer products do not see unconstrained importing as a problem because, they claim, America's proven high-tech prowess gives the country an unassailable competitive advantage in the global market, and exports of expensive advanced manufactures can pay for import of inexpensive goods...but it is not true...these advanced manufactures, or advanced technology products (ATP), did not confer any commercial advantage during the closing decade of the twentieth century and the first decade of the twenty-first century. (2000 ATP (\$222.5B) = slight trade surplus of \$5B. 2002 the balance = negative. 2005 = annual deficit of \$43B. 2010 = \$100B (deficit). 2012 = slightly smaller)..."
- 10 Drivers of Job Creation: Hearing before the Subcommittee on Economic Policy of Committee on Banking, Housing, and Urban Affairs, Senate, 113th Cong. (2014). Pp 10-14: "The implementation of the PNTR with China. When China PNTR was passed in 2000, the U.S. exported three times as many manufactured goods as China, but within a decade China surpassed the U.S. in exports and became the world's leading manufacturer and exporter. By 2012 our share of global manufacturing activity had declined to 17 percent from 30 percent just a decade earlier even as the value of our exports had more than doubled. Now, two-thirds of our global trade deficit is with China, a rapidly growing country that engages in a variety of unfair trade practices—illegal subsidies, forced technology transfer, currency manipulation, and an appalling lack of labor rights. The Economic Policy Institute estimates that over the last decade our trade imbalance just with China has cost the U.S. nearly 3 million jobs and put downward pressure on U.S. wages. And now, just 2 years after the passage of the U.S.-Korea FTA, we have seen our exports to Korea drop and our trade deficit with that country grow with a loss of an estimated 60,000 American jobs, mostly in manufacturing."
- 11 Caruso, et. al.
- 12 Greco, JoAnn. "Making Way for Makers." Planning 1 Feb. 2014. Print. p. 22: "In the old days, you did your manufacturing in one place, your office was somewhere else, and your shop in still another location," says Laurie Feinberg, assistant director of Baltimore's Department of Planning. "Now, all three functions are blending and zoning codes aren't always up to date in acknowledging that."
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41 Puget Sound Regional Council, and Community Attributes, Inc. *Industrial Lands Analysis: For the Central Puget Sound Region*. Seattle. March 2015. PDF File. P. P-25

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APPENDIX 1

INCOME PROFORMA	Amount	Unit	Rent/Cost	Subtotals	TOTALS
Industrial	48686	NSF @	\$15.31	\$ 745,148	
Retail	12357	SF @	\$34.63	\$ 427,958	
Office	20186		\$21.67	\$ 437,471	
Parking	50	Stall @	\$240	\$ 12,000	
PGI					\$ 1,622,577
Less Vacancy/Credit Loss					\$ (52,107)
Industrial	5%	@	\$ 745,148	\$ (37,257)	
Retail	5%	@	0	\$ -	
Office	5%	@	284988	\$ (14,249)	
Parking	5%		\$ 12,000	\$ (600)	
EGI					\$ 1,570,470
Less Operating Expenses					\$ (514,667)
Utilities	89352	SF @	0.1	\$ (107,222)	
Maintenance	89352	SF @	0.1	\$ (107,222)	
Janitorial	89352	SF @	0.1	\$ (107,222)	
Management	89352	SF @	0.1	\$ (107,222)	
Taxes	89352	SF @	0.08	\$ (85,778)	
NET OPERATING INCOME					\$ 1,055,803

FINANCING

T.O. LOAN AMOUNT CALCULATION

Debt Service Check

N.O.I. \$ 1,055,803

Less Debt Service Cov \$ 1,055,803 @ 1.2 \$ 879,836

Available to Service Debt

Trial Loan Amount \$ 879,836 @ 0.0663 \$ 13,277,651

Loan To Value Check

Value \$ 1,055,803 @ 6% \$ 17,596,723

Trial Loan Amount \$ 17,596,723 @ 80% \$ 14,077,378

T.O.Loan Amount \$ 13,277,651

INTERIM LOAN AMOUNT CALCULATION

Trial Loan Amount \$ 14,622,883 @ 0.85 \$ 12,429,451

Interim Loan Amount \$ 12,429,451

Cash Flow \$ 1,055,803 \$ (879,836) \$ 175,967

Inverstor's Cash Flow \$ 150,725

Personal Cash Flow \$ 25,242

COST PROFORMA**APPENDIX 2**

Building Cost			Allow		\$3,800,000
Closing+Holding Costs	5%		Allow		\$190,000
Construction					\$ 7,088,836
Renovation	28,300	GSF	@ \$	10	\$ 283,000
Addition	59,117	NSF	@	\$110	\$ 6,480,406
Parking	\$0	SF	@	\$0	\$ -
Tenant Improvements	32,543	NSF	@	\$10	\$ 325,430
Services/Fees					\$ 1,708,032
WSST	9.60%		@	\$ 7,088,836	\$ 680,528
A/E	7%		@	\$ 7,088,836	\$ 496,218
Developers Fee	6%		@	\$ 7,088,836	\$ 425,330
Other Consultants	\$13,800		Allow		\$ 13,800
Permits	1.30%		@	\$ 7,088,836	\$ 92,155
Leasing Fees	\$0		Allow		\$0
Financing					\$ 1,127,133
Interim Fee	\$ 12,429,451		@	2%	\$ 248,589
Interim Interest	\$ 12,429,451		@	6%	\$ 745,767
Take-out Fee	\$ 13,277,651		@	1%	\$ 132,777
Contingency	\$ 7,088,836		@	10%	\$ 708,884
TOTAL PROJECT COSTS					\$ 14,622,883

SOURCES OF FUNDS

Loan Amount (Bank)				\$ 12,429,451
Equity Required	\$ 14,622,883		@ \$ 12,429,451	\$ 2,193,433
Sources of Capital	\$ 12,429,451		\$ 2,193,433	\$ 14,622,883
Uses of Capital			\$ 14,622,883	\$ 14,622,883
TOTAL FUNDS AVAILABLE				
Proforma Profit	\$ 17,596,723		@ \$ 14,622,883	\$ 2,973,839
Allowable Total Project Costs				
Investor's Equity	\$ 1,500,000			
Personal Equity	\$ 693,433			

FEASIBILITY MEASURES

Unlevered C/C	\$ 1,055,803	\$ 14,622,883	7.22%
Leverage C/C	\$ 175,967	\$ 2,193,433	8.02%
Profit	\$ 17,596,723	\$ 14,622,883	\$ 2,973,839
Profit Margin	\$ 2,973,839	\$ 14,622,883	20.34%
Investor's C/C	\$ 1,500,000	\$ 150,725	10.05%
Personal C/C	\$ 693,433	\$ 25,242	3.64%

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