



Blake Webber

Urban Rehabilitation

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By
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Orrin Blake Webber IV



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THESIS

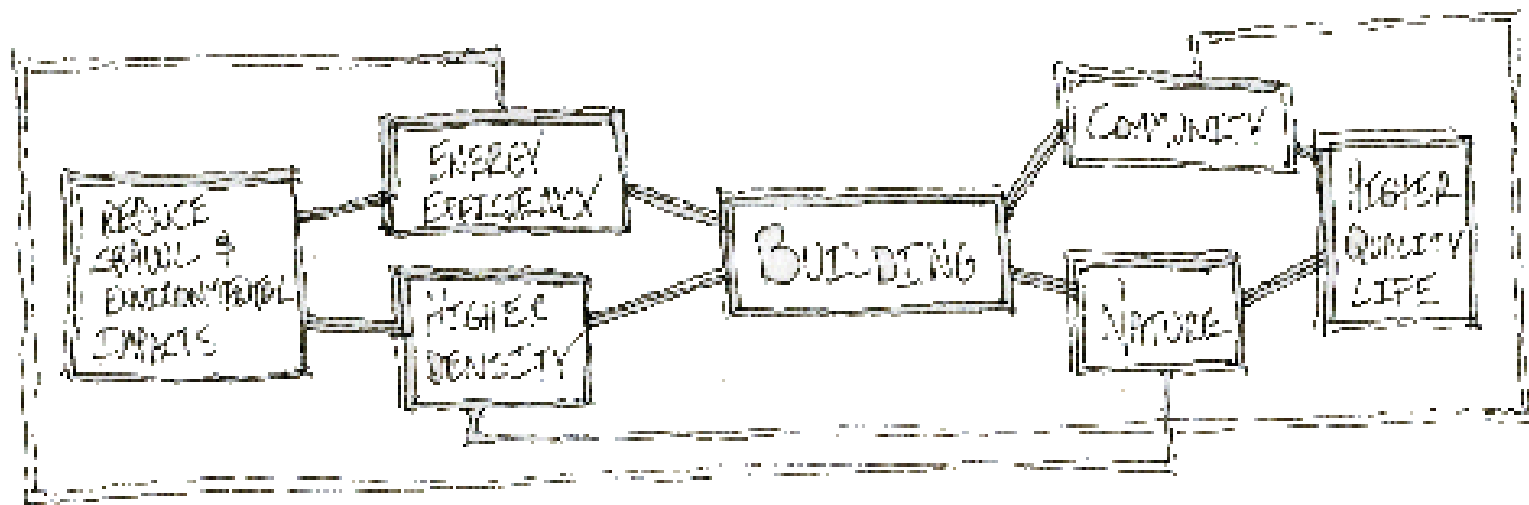
In order to maintain a high quality of life for the residents of growing rural communities a more efficient, sustainable, and pragmatic architectural solution must be devised. The current mentality concerning rural development and lifestyle must be reshaped in order to adapt to an increasingly environmentally conscience world. Within the built environment is the opportunity to provide direction for this positive change. Through extensive research and study, I intend to create an **architectural solution that begins to shape its inhabitant's mentality, behavior and lifestyle by utilizing, teaching, and promoting the importance of nature and its cycles. Thus minimizing environmental impacts and**

conserving energy while improving the health, happiness, and quality of life of the building's occupants.

Considering most of a persons life is spent immersed in architecture, the built environment determines a large portion of its inhabitants impact on the environment. This can be significantly minimized if the buildings, required as a necessity in peoples lives, have less impact on the environment. The future project's location should minimize its residents and visitors need for private vehicular transportation by providing an appealing environment for daily economic, recreational and social activities to take place simultaneously. It is my goal to continuously unite nature and man with-

in the building and its surroundings forming awareness and appreciation for the natural world and its cycles by providing gardens through which residents can each begin to personally establish a relationship with nature. Most importantly, the project should be immersed as close to a natural recreational and wildlife area as possible. Through the resident's interaction with gardening environments, the surrounding natural landscape, and the building's use of natural energies and systems, an intimate relationship and sense of dependency on nature will become ingrained in the people living in and experiencing the building. Community and public spaces will be integrated within the development in order to encourage

social and economical relationships while further immersing the architecture into the existing community. Ultimately this solution would encourage and promote positive interaction and relationships between the residents, the Bozeman community, and nature. The final result would be **an architectural solution that provides a more energy and spatially efficient alternative to lateral development while embracing, improving, and interacting with the local environment, the central core of the city, and the existing community.**



PREFACE

Throughout the four years I have spent studying architecture at Montana State, I have tried to constantly observe and contemplate the built environment that I am immersed in. As I grow to know and understand the costs on the environment caused by the building industry the importance of minimizing this impact is continuously made clear both globally and locally.

Born in Kalispell, Montana I grew up in a location that has experienced large growth in a small period of time. I could see the effects of rapid growth changing the area. At the time, I had no idea of the true environmental, economical, and cultural repercussions associated with the development. **I, like many other residents and city officials, did not begin to understand the long and short term impacts of the rapid building going on around me.** As a result, little effort or support was initially put into creating efficient

solutions for future planning or control.

Kalispell, like Bozeman, attracts people because of the unique environment and atmosphere of the rural towns and many wish to create a lifestyle filled with more connection with nature and individualism. This phenomena was not limited to this locality. For the last three decades many other rural towns throughout the state and country have gone through similar uncontrolled rapid growth phases. Having the experience of growing up watching first hand the destruction of local culture, open space, natural ecosystems, and essential farmland that urban sprawl I have developed motivation, through a personal connection, to contemplate a better solution to accommodate rural growth and development.

I have realized it is inevitable that people will continue to move to these beautiful areas and each person has an equal right at this type of living environment. In no way can I be hypocritical and attempt to blame migrating individuals for pursuing a lifestyle I have personally enjoyed.

Instead, the solution to controlling the rapid growth lies in alternative building and living options. In reality, the choice of where an individual decides to live is entirely their own. If provocative living options were designed to save energy and minimize environmental impacts in these communities it is my feeling that many individuals would elect a more sustainable lifestyle if it was economical and enhanced their health and quality of life. On the contrary, the current mentality on building, planning, and lifestyle will continue to degrade and destroy unique rural communities and their resident's quality of life. I have personally witnessed these effects throughout my life in Kalispell and Bozeman and Gallatin County.

PROBLEM

The idea of a western American rural lifestyle is attractive to many people throughout the country and world. Many come in search of a more personal and consistent connection with nature. Some seek a lifestyle with more privacy and individualism while others are looking to immerse themselves in a more local and intimate community and social scene. As society evolves the preference for urban or rural living environments constantly fluctuates and changes. There have been periods where a large majority of people preferred the city life and benefits of urban communities such as the 1960s and 1970s.¹ Other times the majority were seeking a less urbanized lifestyle. As individuals relocated from the city to the countryside it can be difficult for small rural government and infrastructure to accommodate the growth. In many cases, small rural communities are consumed by rapid

population growth as existing fragile environments and communities are quickly developed. The local **cities and communities are usually unprepared for such migration and adequate planning for the development is not performed.** This type of growth causes very serious problems for the local community, ecosystems, and civil infrastructure. Gradually, the cities image, significance, and identity begins to fade away as development sprawls away from the core and into the rural countryside. Bozeman, and the surrounding Gallatin Valley, has grown considerably in a short amount of time. Throughout the city, especially the southern and north-eastern edges, there are significant signs of sprawl



Sprawl

General Definition

Sprawl is the term used commonly to describe rapid and seemingly uncontrolled growth. The dictionary defines the word, “to be spread out in an unnatural or ungraceful manner.”² In its architectural sense a more specific meaning can be derived. “The term sprawl is generally used to denote the low density outward expansion of metropolitan areas often characterized by leapfrog development”³ is the definition used by Jon Teaford author of “The American Suburb.” For the intent of this research, sprawl, as its usually used to describe architectural planning and development, must be defined as inefficient and poorly controlled lateral development of the built environment extending away from a central city core and existing infrastructure.

Urban sprawl has many negative effects environmentally, culturally, and financially on the cities and rural areas it envelopes and there is evidence

of a rising preference to alternative, more sustainable options of development. The concept is not a new phenomena and its collateral damage is becoming far more realized. “...During the last fifty years a increasing number of observers have trumpeted the planning failures of suburbia, portraying it as a zone of uncontrolled growth blighting the countryside, the product of rampant and unthinkable greed. And in the early twenty-first century complaints about ugly strip malls and soulless subdivisions appear to be mounting. A growing number of Americans seem to be demanding something better.”⁴ The following research was done in an attempt to better understand the causes and effects of sprawl in order begin to create a more universally appreciated solution that has less impact on the environment.

Bozeman provides an appealing environment for such alternatives because it consists of a community that has shown a large support for new more energy efficient ideas embracing local attempts such as the library and community co-op. This is important because the only way to begin to combat sprawl is to begin to provide solutions that appeal to future builders, buyers, and renters. Only if there is a market for the design and a community that believes in it can any solution, especially a high density living environment, have the potential of being embraced and having a significant impact controlling growth. In the simplest respect, sprawl can only begin to be challenged by providing provocative alternatives that the individuals themselves elect to use.



Sprawl Primary Causes: Financial Gain

Sprawl is caused and accelerated by three primary factors; the automobile, human psychology, and financial gain. Financial profit is what drives the motive for urban sprawl. As John Palen states in his book *The Suburbs*, "...urban patterns are deliberately shaped for profit by elite businesses and government."⁵ Land used for agriculture or preserved as open space is worth only a fraction, on average about a tenth to a quarter, of what can be made by selling to private owners or investors who then develop or subdivide it. This provides a prominent motive for individuals to develop and sell large portions of rural land for profit without much concern of the hazardous repercussions to the existing environment. In many cases, the private financial gain is then largely subsidized by the city as it pays for new infrastructure to accommodate the growth. The private

parties are required to pay only a small percentage of the true cost of the services needed to maintain their development. Many private individuals have reaped tremendous personal gains in the construction industry and usually at the cost of the environment and the local municipalities.

What accelerates the process is an abundance of accessible undeveloped land surrounding the city that is readily available at a reasonable price. This gives competing developers justification for quickly developing in hopes of a large profit. This process is driven entirely by the quantity and monetary value of the land.

On average, when an individual looks to either develop, own, or rent a property

they're really looking for an investment. Previously, sprawling into the surrounding countryside has proved the easiest way to make profit but, when designed successfully, equal or even larger revenues can be made through increasing densities on developed or undeveloped land closer to existing infrastructure and previous development. By housing more people per acre the building can offer a unique and energy efficient environment at a reasonable cost for owners and renters while producing a far larger profit for the developer than traditional single family detached housing. Maximizing the potential revenue the land can produce per acre substantially increases its value providing financial justification for high density solutions even on lands with a high initial cost.



Sprawl Primary Causes: Automobile

The introduction of the automobile accelerated sprawl incredibly. It redefined the growth of the built environment across the world and in America especially. Instantly it allowed immense opportunity for rapid lateral growth of the urban environment. Entire new building types such as strip malls, motels, and fast food chains were created strictly to accommodate vehicular transportation. The automobile's effect on development and lifestyle is most obvious in America.

In the United States much of the country was still undeveloped and cities quickly embraced the automobile as their primary and sometimes only mode of transportation within and between themselves. This was contrary to many areas across the world

that had developed sophisticated modes of pedestrian or public transportation prior to the invention of the automobile. It allowed almost limitless growth throughout the continent regardless of the terrain. Cities were no longer dependent upon rivers and oceans for industry and transportation and they were instead dictated by the routes and intersections of interstates and highways. Individuals no longer had to live close to their workplace or amenities and could commute great distances on a daily basis. The automobile did not merely change the American lifestyle it revolutionized it. With it came massive costs to the environment and essentially the largest catalyst of modern rural and urban sprawl.

Transportation accounts for almost a third of the average person's environmental

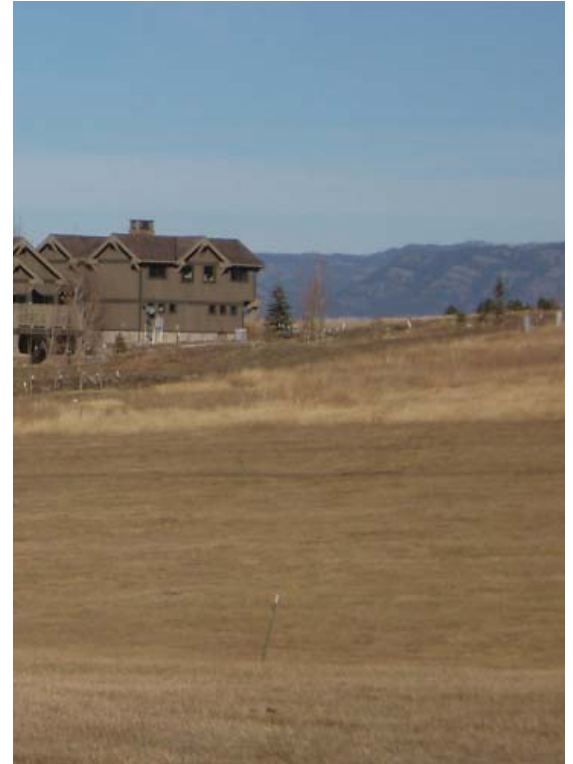
impact and energy consumption.⁶ By locating the building in an area that is within close proximity to the residents daily needs and activities the need for private vehicular transportation is significantly reduced. Instead people can conveniently choose alternative modes of travel such as walking or biking that reduce their environmental impact while improving their health and connection with nature. This allows the architecture to have an even greater effect in minimizing the environmental and financial impact of its residents rather than limiting energy and money savings to just the structure itself. As emphasized, "Savings in traffic and infrastructure are usually much greater than any energy saving achieved by the buildings themselves."⁷



Sprawl **Primary Causes: Psychology**

Psychological factors compromise the last major cause of sprawl. Individuals move to rural areas in search of a more private lifestyle. They want to have a large secluded yard and a secure environment for which to raise a family. American cities have always had the ability to expand laterally because of the large availability of undeveloped land. “What held Americans together was their ability to live apart. Society depended upon segmentation. From this elementary principal emerged a pattern of beliefs and behavior which was recognizably American”⁸ In many European countries the limited quantity of land has dictated the need for vertical expansion as a necessity. In America the value of the land usually dictates its development density. The large quantity of open space drives the price of the land down to a rate

that allows very low density development to create a profit. This has created a mentality that it’s acceptable for people to live at densities as low as five or more acres per dwelling unit. Requiring this much land for an individual to live is not a mentality that can be realistically maintained into the future as populations expand. Instead, it is important to think of the primary factors people are searching for and begin to provide those experiences in higher density solutions. A sense of privacy, a connection with nature, and a sense of security are some of the most desirable qualities people are searching for and these can be established through intuitive and creative design solutions.



Sprawl Environmental Impact

Sprawl is extremely destructive on the natural environment and wildlife. As people move in search of more private lifestyles and environments more land is needed per resident to create the experience for each arriving individual. Large amounts of undeveloped land is used to accommodate small densities of people. This is done to provide personal privacy by the strategy of simply locating people farther apart. Instead, other design strategies can be used to provide a heightened sense of privacy for residents in a higher density living situation that does not consume as much land.

This is an important psychological factor to consider because its success is a determining factor in the marketability of the project. Accelerating the problem is the fact that rural communities usually have a large avail-

ability of undeveloped land at low prices and low density lateral growth provides an easy solution in response to the problem because it can immediately create a sense of privacy at the cost of the land and environment. The local land values make it hard to justify the time and financial investments required to instill effective high density building solutions. This response becomes very obvious when looking at areas that have been effected by sprawl, such as Bozeman, where large areas of outlying land are zoned as low density single use districts. In order to accommodate the rapid growth in areas zoned at this type of density, large amounts of valuable farmland and open space must be consumed. In America, "We are losing one million acres of productive farmland each year"⁹ to development. As residents move farther

from the city center, unnecessary traffic increases and creates a hazardous impact on the environment that could be minimized or avoided. Fragile ecosystems and natural resources that are crucial to the survival of humanity are consumed by the development and the existing natural wildlife has a very hard and sometimes impossible time coexisting. Rather than judge the land value according to its financial value, its importance to the environment and mankind must be ultimately considered. These factors alone should allow justification for higher density mixed use solutions as a means to preserve open space and valuable farmland. If nothing else, existing undeveloped natural environments must be preserved for their importance to wildlife and the environment. In the case where buildings are required, they must be integrated with nature and promote awareness of its importance instead of destroying it.

Sprawl Financial Impact

Financially speaking, sprawling development creates far higher costs for the city as expensive infrastructure and services must be extended and maintained to accommodate the lateral growth. Amenities in the central areas of the city are used less and therefore become less efficient and beneficial to the community. As mentioned earlier, the new developments are primarily zoned single-family residents use so the resident's houses and lifestyles are separated from their daily needs and work places and they are forced to drive regularly throughout the day. This creates large increases in private vehicular transportation creating complicated and expensive traffic problems for the city. Nationally, "A 2000 report on the cost of sprawl estimates, that non sprawling controlled growth would

reap a savings of \$12.6 billion in water and sewer infrastructure expenditures over the period of 2000 to 2025, and a total of \$109,7 billion savings in road costs."¹⁰

The city of Bozeman has had to burden the large costs of new development. A simple and obvious example is the addition of new streetlights. Areas such as South 19th Ave that have developed to the point that they require numerous new lights to accommodate the increased traffic. The new lights and construction cost hundreds of thousands of dollars to the city and the developer pays little of the true cost caused by the collateral damage directly related to the subdivisions they profited from. A higher density living environment does not entirely solve the financial problems associated with growth but if done correctly it can significantly min-

imize them. By locating the structure on a site with existing infrastructure capable of accommodating the density, the city does not need to expand what it can currently service saving a considerable amount of money and energy. Other municipality departments can minimize their costs and need for expansion by accommodating higher densities of people in smaller areas. In a meeting with deputy chief of Bozeman fire department Jason Shrauger, he explained how higher density living environments would benefit local fire departments because "When you go out there's more of a need for physical facilities. When you go up you only need more staffing and equipment."¹¹ Instead of spending money on more buildings, funding can be put into maximizing existing facilities with better engines, tools, and training. This theory can be generally applied to the need for other services such as law enforcement and education.

Sprawl Cultural Impact

Sprawl also drastically affects a city's cultural integrity. The defining aspects of a community, usually formed by unique and local businesses, restaurants, and activities, are lost as buildings become grouped into large areas with generic purposes and appearances due to relaxed zoning. Instead of allowing creative solutions to be formed by locals, large franchises arrive providing generic building typologies and environments for individuals to acquire their basic needs.

In Bozeman these examples can be seen on the north ends of Seventh Ave and especially Nineteenth Ave. Because sprawl continuously pushes residential and commercial development farther from the city core it becomes more convenient for residents to travel to outlying areas for needs and

the central downtown districts of the city become frequented less. Some of the oldest and culturally rich areas that once created the identity of the city through unique and traditional local architecture and activities are lost because they no longer generate adequate revenue in competition with the new development. They are quickly replaced by generic and monotonous strip malls, shopping malls, and fast food chains. The unique business, restaurants, and activities are lost and the inhabitants' awareness and connection to a strong central city core is destroyed. Instead random parking lots and franchises compromise the shopping environment experienced by the individual. This creates a generic daily experience and limits the potential for people to live an interesting and exciting life. The primary reason they have come here.

Currently, Bozeman's downtown district continues to thrive despite constant commercial growth in outlying regions. It is important to realize that this will inevitably change if growth continues to be pushed to peripheral land. In order to maintain the customer base required to support these businesses residential environments must continue to be integrated within the downtown area. In a meeting with Chris Saunders a member of the Bozeman planning department he explained to me that "The best way to engage the community with downtown was through a relationship to residential districts."¹² He justified it under the reasoning that if people live closer to downtown then they, and the people that come to visit them, will utilize the local resources downtown because it becomes far more convenient. Thus stimulating the downtown economy and increasing its strength and integrity



Architecture and Human Behavior

As mentioned, the built environment consumes over half of the world's resources. Re-thinking the way buildings are designed and powered can begin to drastically minimize this impact. What must be remembered is that in reality this means that even the most energy efficient architecture can only reduce half of a person's impact on the earth. The other half is then dictated by the choices and lifestyle of the individual. Therefore, in order for a building to truly begin to obtain a sense of sustainability its strategies must not be limited to the physical form. Along with being as energy efficient as possible the buildings design, location, and integration with nature and the local community must be considered in order to positively shape its inhabitant's decisions and lifestyle.

Architecture is continuously influencing human behavior. "Our behavior can be conceptualized as

a dynamic sequence of adjustments and readjustments to our physical and social environment."¹³ People spend most of their lives in built environments and each affects people in a variety of ways such as how they feel, act, eat, socialize, and travel. Human behavior in a particular environment can be predicted because it is characteristically dependent on or relative to the space the individual is experiencing.

I feel that architecture can most significantly influence its inhabitants through three different psychological characteristics. The first is based on an individual's personal preferences and interest. Architecture has a tremendous effect in creating and manipulating relationships between individuals of a community. The buildings and spaces people experience dictate

specific human activities to take place in specific architectural environments. A large and diverse demographic of people that share sometimes just a single idea, mentality, or activity are united through architecture designed to accommodate this meeting. For example, conventional building typologies such as churches, sports stadiums, or grocery stores create the opportunity for people to form very powerful relationships based on a similar preference for religious worship, entertainment, or food. These environments form a vessel for the interaction of a large and diverse demographic of individuals to unite through a common belief, activity, or need. In many cases, this is the architecture that becomes the most significant and representative of the area because it is continuously experienced by the community and becomes ingrained in and essential to the lo-



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cal lifestyle. The architecture accelerates the individual's relationships with themselves and others while strengthening the power of their cause by providing an ideal environment for it to take place. Using this theory and designing and marketing the building as a place that promotes a more energy efficient lifestyle for residents, an idea shared by a diverse demographic of people. In turn, the opportunity is created for strong relationships to be forged between the residents based on their shared preference in reducing their impact on the environment. The building itself can then strengthen their cause and further minimizing their impact on the earth by providing an ideal environment. This maximizes the building's ability to shape a more sustainable future and the sense of purpose and community created by the residents further motivates their choices. This begins

Architecture and Human Behavior

to separate the building as a unique and appealing residential community that people want to be a part of. The result is a more enjoyable life for the residents and a more marketable investment for the developers and owners

Architecture's affect can also be observed at a more individually level. It can be seen in the way architecture shapes a persons choices by providing their needs in the most convenient manner. "The physical environment necessarily limits the range of behavioral options available and helps define human experience."¹⁴ Some obvious examples can be seen in a design's affect on the individual's route or means of travel. A paved sidewalk or path that provides a clear route through a grassy field is almost always taken as the preferred passage across the area because it is most convenient. In larger buildings such as airports escalators and moving walkways dictate many individual's

courses because they are the most convenient means of travel. In reality, each person decides how often they drive privately or take public transit, whether they minimize their unnecessary waste or just throw trash into the landfill, and what kind of food they buy and consume. In some cases people are very aware of their actions and the environmental repercussions associated. Still, there is a large majority of people who have very little understanding or concern of the true impact of their lifestyle and decisions. They usually continue living in an unsustainable manner simply because they don't know or it is inconvenient and unnecessary to change. Currently, environmentally conscience alternatives such as minimizing waste or using public transit create more work, time, and responsibility for the individuals partaking in them. To some, this is a

necessary and well-justified cost in order to limit their impact on the earth. For others it is too much of a burden on their time, energy, or finances and, because it is not necessary, they do not integrate these ideas into their lifestyle. In this case, architecture itself has the ability to make these choices more convenient. Thus encouraging far more people to minimize their individual impact on the earth. For example, if the site is chosen in order to allow individuals to live within a close distance to their workplace, services, and recreation then it is far more likely they might choose to walk or bike to those activities rather than drive because the short distance makes it a more efficient and realistic option. Another example would be waste disposal. If the trash receptacles are designed with multiple bins to allow

for refuse to be immediately organized and recyclables are picked up at the residence in a manner similar to traditional refuse then it makes recycling far more convenient and viable.

The last major factor in how architecture can effect a persons behavior is far more subconscious. It concerns how a particular space has the ability to effect a persons mood, productivity, or health. This is probably the most significant factor to consider because it can provide the individual with motive to do something because it makes them feel better and enhances their quality of life. The first two factors were dependent on the individual making a choice because of personal preference or because it was the easiest option. In this case, providing an experience that benefits the individual creates the motivation

that can cause someone to make a decision that may not be the easiest solution but is worth the personal experience. By integrating nature into the building and its inhabitants lives, a great awareness and appreciation can be formed. On average, people who have not had a personal connection to nature cannot begin to fully appreciate its significance and therefore have no motivation to sustain it. Through the use of features such as community gardens, continuous external views, and utilization of natural energy within the building, its inhabitants will have numerous connections with the natural world throughout their day. This experience should enhance their quality of life to the point where they not only live more sustainably by necessity but also because they enjoy the lifestyle and its personal and communal benefits.

Architecture and Human Behavior

“The architectural environments in which we live circumscribe our behavior and, to some extent, determines our behavior. These settings mediate the effects of other variables and are, at the same time, mutually influenced in that architectural impact is a function of social and psychological processes.”¹⁵ In essence, architecture has a tremendous effect on human behavior and provides an opportunity to both consciously and subconsciously benefit how a person lives and their quality of life while simultaneously benefiting the environment.

We have reached an era where the environmental impacts of human kind on the planet are beginning to be understood and minimized. Many people have made improvements or changes in order to minimize their personal impact on the environment. Others, have not adapted a more sustainable

lifestyle. Regardless of a person’s belief on global warming or other environmental problems it is important to support and offer alternatives in order to further develop current residential solutions. By providing potential sustainable developments, the built realization can help identify the success and failure inherent both in the buildings themselves and in the public spaces they generate. Only by creating realistic built examples can architects begin to understand how these types of developments and buildings affect the environment and how they influence their inhabitant’s impact on the environment.

The greatest environmental impact created by people on an individual level is caused by where they live and how they travel, deal with waste, and buy their food. These

are all choices which are rarely regulated or controlled. Instead, they are made entirely by the individual based on their personal experience, preference, and environment. National and local governments, along with other private entities, have formed many beneficial programs and in some cases provided incentives in order to help promote environmentally conscience alternatives but these programs are still entirely dependent on the individual electing to use them.

The construction and maintenance of the structures required to house an individual’s daily needs and activities represents a large portion of the individuals impact on the earth but efficient buildings can only begin to effectively minimize people’s impact on the earth. Specific architectural elements and

environments can then be created with the intention of promoting more sustainable behavior. For example, when individuals live and work in buildings that are designed with active and passive energy saving strategies then their basic needs of comfortable temperature and light control are provided in a more efficient manner. These systems usually require little extra work from the residents and through the control and constant observation of how the systems work a stronger relationship and appreciation for nature is established for the residents. Architectural elements have the opportunity to significantly dictate the individual's behavior and it can become subconsciously ingrained in their lives. Over time, architecture then becomes a four dimensional lesson and expression of human behavior and lifestyle.

Type-ology

In order to provide a high quality of life while consuming the minimal amount of open space it is obvious that a more dense growth mentality must be adapted. In order to do this while still providing an appealing and marketable solution a balance needs to be created between vertical and horizontal growth. The development must adhere by the basic principals of smart growth; the creation of compact, dense, walk able , mixed use communities; preservation of open space and farmland; promotion of public transit with a resulting decline in the use of the automobile, and the provision of a range of housing options including affordable units.¹⁶

A vertical structure allows for the maximum utilization of the sites full potential. Large amounts of people can share an ideal environment for living and a location in close

proximity to their needs. In the publication “Buildings and Society,” author John Hancock explains the concept by saying, “...Its(multi-story apartment buildings) appearance in the latter nineteenth century heralded a major new structure for housing people densely near their jobs and amenities. The multi-story apartment building, like the skyscraper, the steel span bridge and the electric elevator, symbolized ingenious technological solutions to growth problems requiring rearrangement of limited and valuable surfaces. In economic and political terms, apartment houses, though often risky investments before the 1930s, added more profit to the builders and property taxes to the municipality than did single homes. Socially, the apartment house reinforced rather than broke with the traditional manner in which

Americans organized to live among one another.”¹⁷ These examples explain how, when properly designed, higher density residential environments can benefit the local community in a variety of ways that cannot be achieved with subdivisions.

On the contrary horizontal growth gives residents more personal space and preserves natural skylines and view planes. As explained earlier, many people tend to prefer this type of development psychologically because it gives them a high quality of life through privacy and individualism and they are usually unaware of the environmental, cultural, or financial impacts their lifestyle causes on the local community.

Regardless of the verticality of the de-

velopment, commercial and community spaces will be incorporated in the solution. This will be done to further diversify the building increasing its financial value and its importance to the community.

Locally, it is important to address the issue of land value. Traditionally, the availability of open land in rural communities creates relatively low land values throughout the area and developers have a hard time justifying vertical expansion strictly because it is not a necessity. In reality, high density buildings have the opportunity to provide lucrative financial gains for their investors and the city itself. In order for this to be realized, these types of solutions must be designed and marketed in a manner that helps people understand the potential of the building as a long term investment both

environmentally and economically. Whether the built environment continues to grow horizontally or vertically, the mentality must be challenged that a piece of land's value is dictated strictly by financial terms rather than its environmental significance.

Regional Case Studies Sweetbrier Apartments

Located in downtown Seattle, Washington Sweetbrier is a mixed use building consisting of three residential floors above one ground level commercial floor. The building was of interest to me because it was “designed with the intent to blend a combination of quaint neighborhood and big city living.”¹⁸

The building’s success is in its ability to unite diverse groups of individuals through an architectural setting. The architect’s primary technique was to integrate the building within the community through its ground floor. This is done effectively through the regular farmers market that is held directly outside the building. The event brings local farmers and salesman together with the residents of the Queen Ann neighborhood. The building provides an ideal environment for the event because of its location and the local demographics.

In an attempt to further integrate the building with

the site the exterior materials are a blend of brick, corrugated steel, and stucco in order to blend the aesthetics of the building with the surrounding architecture which it does with limited success.

The development has flaws in its design. Especially the fact that it was designed and marketed specifically to a demographic of residents that are luxury class. Regardless, The Sweetbrier Apartment complex is located in an area with a far greater population density than Bozeman and it has still managed to integrate local farmers and residents by providing a community space and promoting activities conducive to this relationship. This in turn lengthens the buildings life and increases its value as it becomes an important architectural feature of the local community.

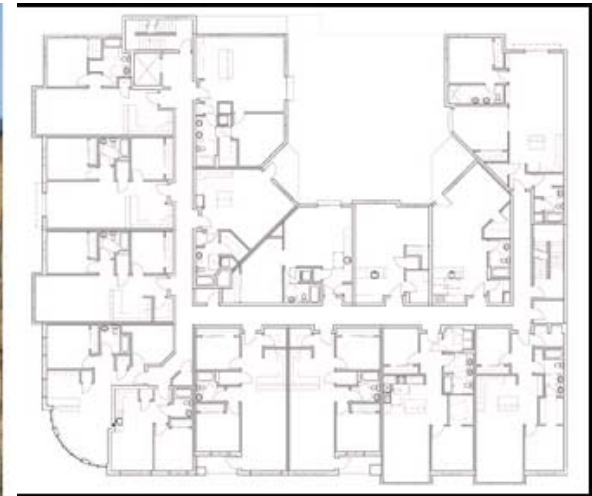


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Materials such as brick and corrugated steel were used to integrate with the surrounding architecture



A central courtyard provides an environment for residents and the local community to interact



Regional Case Studies BedZED

The BedZED project designed by Bill Dunster Architects and BioRegional Development Group is a mixed-use development in South London. It consists of 82 homes and 2,500 square meters of commercial space in a 3.5 acre site.¹⁹ Created with the idea of a thriving community in which ordinary people **could enjoy a high quality of life, while living within their fair share of the earth's resources.** The project is focused on providing an environmentally conscious alternative lifestyle to the residents. A variety of local programs were created to help lower each individual's environmental footprint. Some of the programs are large scale options such as The Green Transport Plan which aims to reduce car use and ownership by offering alternatives to private cars, promoting public transport, and reducing resident's need to travel. Others feature convenient ways to lower impact on an individual scale

such as receptacles that come segregated so waste can easily be recognized, sorted, and recycled. By providing convenient alternatives the BedZED community was able to shape resident's lifestyles. People move to BedZED **with typical lifestyles, and over the years the residents change their behavior significantly.**

Bedzed is located in an area in London that can support very high density housing. Bozeman does not have near the same population densities and because of this an identical development most likely would not have the same success. Regardless, it is a great example of how a development can provide more than just a built environment but also an appealing alternative lifestyle. It is very relevant to my thesis because

one of my most important goals is centered around the idea of creating a strong community. This will be done by designing and marketing a lifestyle centered around minimizing resident's impact on the earth rather than just trying to design energy efficient buildings. By providing residents a higher quality of life through constant interaction with each other and nature BedZED has created a unique environment that makes people want to minimize their environmental impact not just because it is necessary but because they are rewarded with a healthier and happier life.

Large vents on the roof structure are used to cool and ventilate the building using only natural energy



Open space is preserved throughout the development to encourage outdoor community interaction



Receptacles that are designed to help residents sort and minimize waste as efficiently as possible



www.bioregional.com

Local Case Studies Gold Dust

Gold Dust is a mixed use development in Missoula, Montana. It consists of eighteen affordable housing units and one thousand square feet of community space.²⁰ I chose to discuss this development because it is a high density residential solution, at forty units per acre, that rests in a site sharing many similarities to my own. The north side of Missoula shares many things in common with Bozeman's north side. Because the project's site shares relative similarities, it provides a unique opportunity to critique this response. Both were districts dominated by light industrial and rail areas that began to slowly degrade as commercial activity and transportation changed in their respective areas leaving many of the lots degraded or vacant. As expressed in an article about the development, Missoula's "...North side was in dire need of attention and revitalization. The Gold Dust is recognized as a cornerstone to this revitalization effort and is easily seen by people as they enter

Missoula from the highway."²¹ The city of Bozeman has already shown interest in redeveloping and revitalizing the area east of Rouse and north of Main Street continuing to the interstate. My project will be designed in hopes to continue to promote this idea. The Gold Dust buildings use metal siding and architectural aesthetics similar to the surrounding building's context in order to integrate the building with the site.

The project utilizes a variety of energy saving systems such as cross ventilation using operable windows and passive solar strategies with shading devices to protect from the summer sun, and southern orientated solar panels. Roof gardens top the structure minimizing runoff and purifying the water before returning it to the aquifer. The building's site also lies within walking and biking distance

to Missoula's downtown and public transit.

One aspect the project lacks is its ability to connect the occupants with natural environments. The roof gardens provide a great opportunity for residents to interact with artificial landscaping but I feel that the opportunity to experience natural and artificial landscapes simultaneously provides a far more intimate connection with nature. The development's site has limited options for this connection due to its local surroundings. It lies in an area that has been developed extensively and this has left little open space or preserved natural landscape. However, the site I have chosen provides an excellent opportunity address this concern by integrate artificial and natural landscapes together simultaneously in an extensive natural corridor through east Bozeman.

DEVELOPMENT TYPE:

New construction rental apartments

DENSITY: 40 units per acre

DEVELOPMENT PROFILE Type #/Units Size (sf)

Rent

Studio 1 330 \$240

Contextual materials such as corrugated steel where used to integrate the building with its surroundings



2 BR 14 700 \$360 - \$624
 3 BR 3 850 \$525 - \$809
 Total 18
 Laundry: Common Laundry
 Courtyard/play: Roof garden
 Parking: 18 spaces
 Total site area: 19,500sf (.45 acres)
 CONSTRUCTION TYPE

The project revitalized the area and surrounding buildings where renovated as their value increased



Three storey wood frame clad with metal siding.
 DEVELOPMENT COSTS:
 Land cost: \$141,427; Constr. costs: \$1,960,611; Other costs: \$311,520; Total development costs: \$2,413,558 (\$134,087/unit); Completed in February 2003.²¹

Parking spaces are intentionally limited and two of the units actually have no reserved parking at all



www.designadvisor.org

Local Case Studies Village Downtown

The Village Downtown designed by architect Thomas Bitnar is a high density residential development on the northeast corner of Bozeman. It is important to address this piece of architecture because it is an attempt to provide a living situation similar to my idea in the Bozeman area. However it fails to address many important issues concerning this type of density.

The development was intended to appeal to “those looking for the convenience of city life married with the beauty of Bozeman’s ever present great outdoors.”²² It fails at this substantially because it does not create any type of relationship between its occupants and the natural world. The development is centered around the idea of provide housing at far more efficient density than single family houses. Theoretically it succeeds at providing the opportunity but it fails because it is designed to accommodate only a very small

demographic of wealthy individuals, many of whom do not actually live in the area but visit for small periods of time. The result is a solution that actually wastes tremendous amounts of resources because, although it is intended for high densities, in reality there are very few people actually living in the structure. The building was designed, “...to offer a mix of privacy safeguards, reserved parking, state of the art sound insulation, and social opportunities.”²³ All of which become totally irrelevant because of the extremely narrow demographic the building was marketed for. In order to be truly sustainable high density environments must appeal to a large range of individuals in order to make the building more marketable and create far more diverse social communities. This will in turn

raise the value of the building to the community and investors. If a building becomes invaluable or replaceable then it will eventually be torn down no matter how sustainable its construction.

Aesthetically the building also fails to relate with any of the surrounding buildings or contextual elements unique to the site. The exterior is dominated by a literal interpretation of Bozeman’s historical facades using brick and white trim throughout the building and windows. The idea focuses too much on the historical replication rather than a more contemporary solution derived through connections to the site and local context. The result is a series of buildings that drastically contrast their site and do not integrate themselves within the local environment or the Bozeman community. Instead of enhanc-

The building's facade is a far to literal representation of historic Bozeman architecture for the site.



The building's facade sharply contrasts the natural landscape with no integration or sense of place.

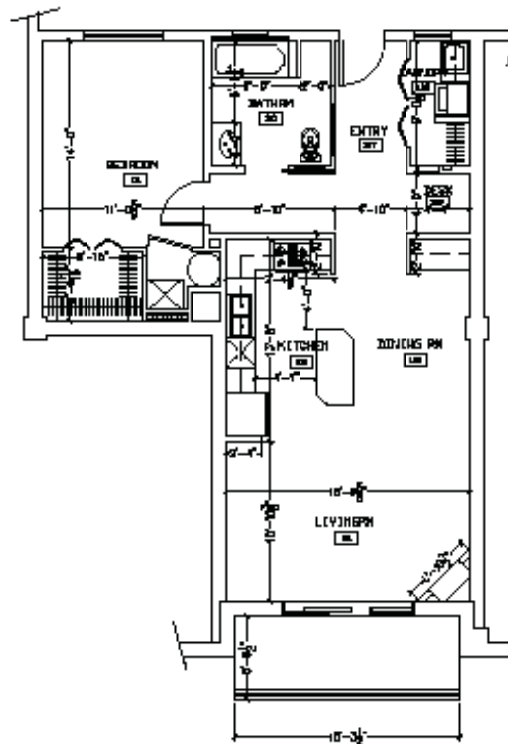


The entire development relies on artificial landscapes rather than utilizing the site's natural environment.

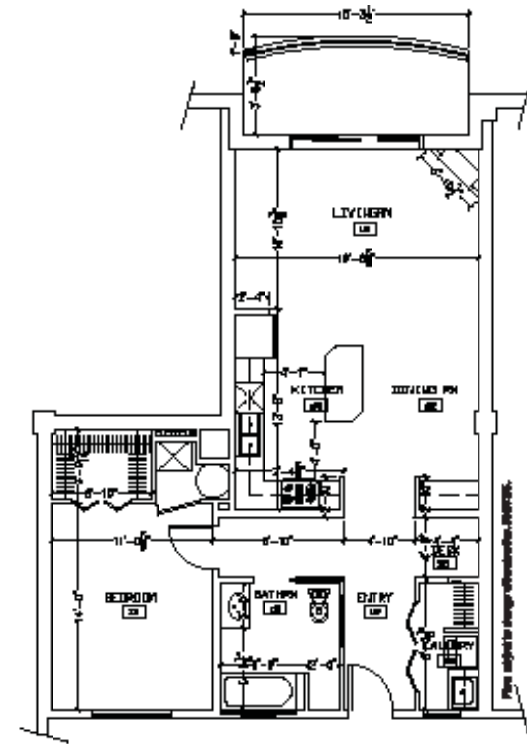


ing the local area the buildings waste tremendous amounts of resources and create an eyesore for the community

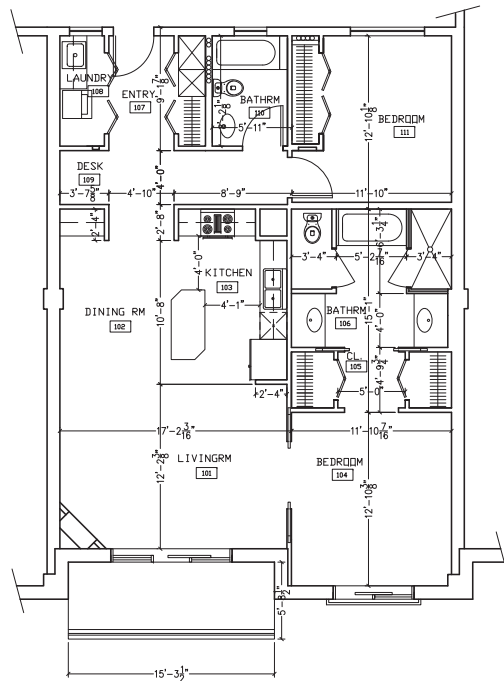
The floor plans can be looked at in order to get an idea of square footage requirements for one and two bedroom apartments while developing a program later in this research.



DOWNTOWN VIEW
LOFT UNIT 2D, 3D, 4D
167 SQ FT INTERIOR
76 SQ FT BALCONY
943 SQ FT TOTAL
SCALE: NTS
BITNAR ARCHITECTS

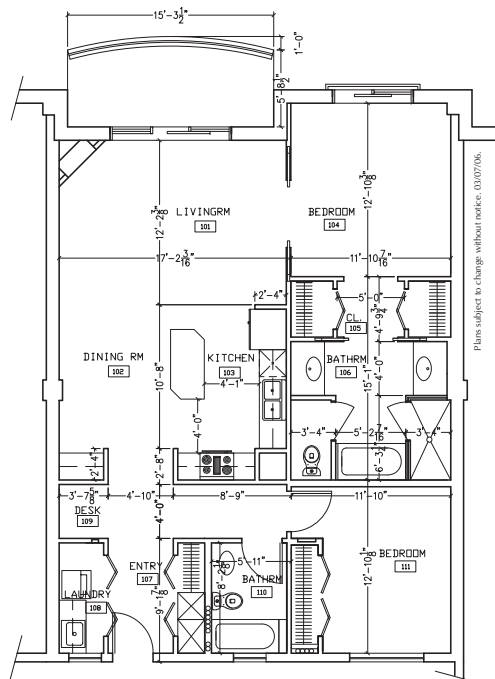


MOUNTAIN VIEW
LOFT UNIT 2G, 3G, 4G
167 SQ FT INTERIOR
87 SQ FT BALCONY
954 SQ FT TOTAL
SCALE: NTS
BITNAR ARCHITECTS



DOWNTOWN VIEW

LOFT UNIT 2B, 3B, 4B
 1,138 SQ FT INTERIOR
 76 SQ FT BALCONY
 1,214 SQ FT TOTAL
 SCALE: NTS
 © BITNAR ARCHITECTS



MOUNTAIN VIEW

LOFT UNIT 2I, 3I, 4I
 1,138 SQ FT INTERIOR
 87 SQ FT BALCONY
 1,225 SQ FT TOTAL
 SCALE: NTS
 © BITNAR ARCHITECTS

Local Case Studies Baxter Meadows

It might seem quite contradictory to include a case study on a subdivision in a thesis trying to control urban sprawl. In my opinion, it is very important to look at a financially successful local subdivision to look at specific examples of what attracts people to this type of living environment in Bozeman. By understanding an environment that has attracted residents moving to Bozeman, similar strategies can then be utilized in my project to make the development more marketable to incoming buyer's interests.

Baxter Meadows lies on Bozeman's northwest edge about seven miles from downtown. It provides a unique example of a far denser solution than a conventional residential subdivision. This makes it very relevant for review in my thesis. In reality, the developers were faced with the same problem that I am trying to solve; how to create a higher quality of life through denser living

environments. Their solution was different than many developments in the area and a lot of information can be gained by studying what the developers tried to provide to people in order to attract them to live in this type of environment.

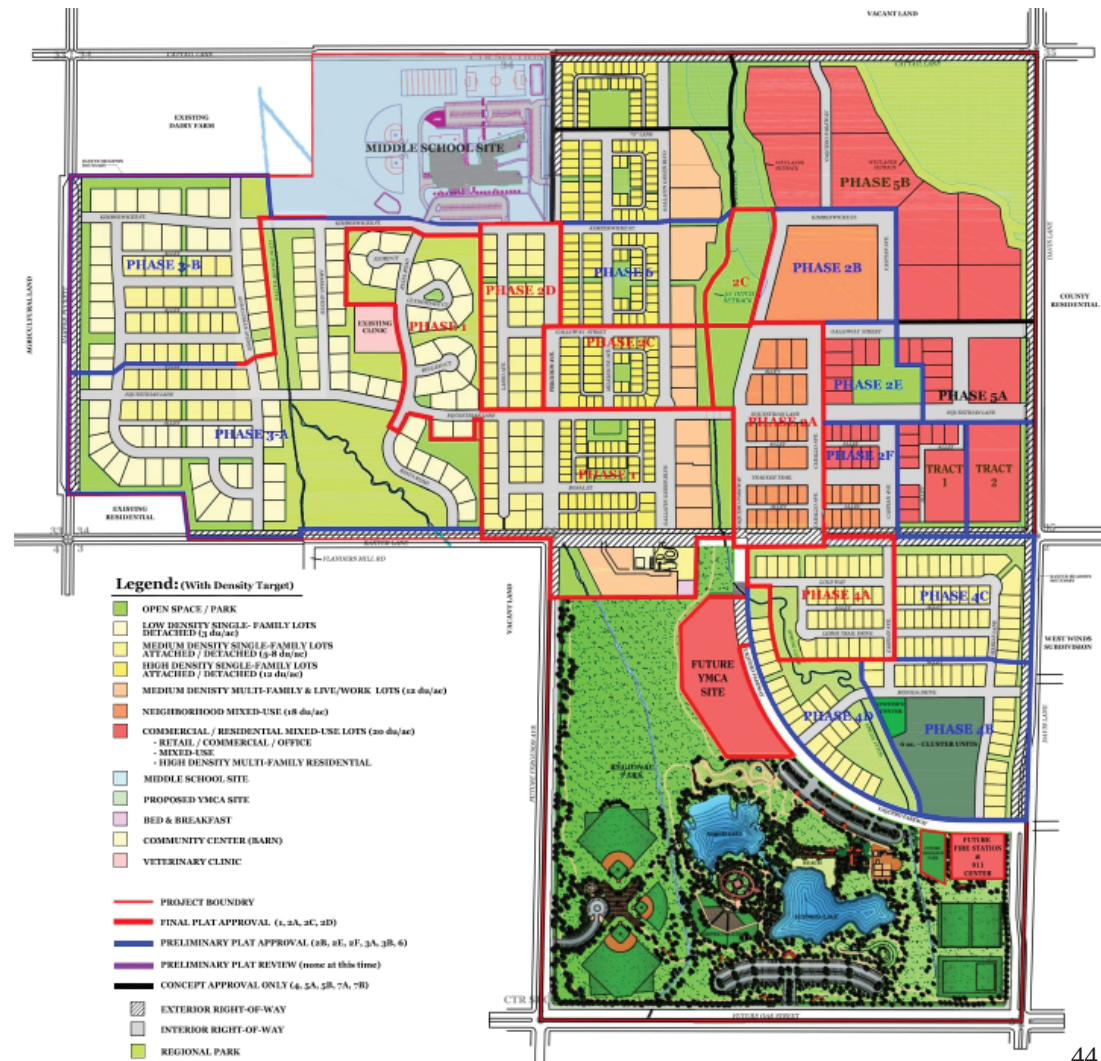
The most important factor to the development's success is its effectiveness in providing options for a wide range of demographics. Six different house types are available creating appealing living situations for people of different economical backgrounds and family size. This is an important factor to consider with new development in Bozeman right now because there are so many vacant homes and undeveloped lots for buyers to choose between. Baxter Meadows increases its feasibility by its ability to attract people of varying buy-

ing power. This ensures the development's value and stability through future value fluctuations in the housing market.

In order to maintain a sense of privacy and a connection with nature the development was laid out with a ratio of equal built space to open space. An arrangement of parks and open spaces begin to break the redundancy of the development while providing areas for community interaction. Garage doors face alleyways instead of the street to create fluid and interesting site planes between residences.

The biggest flaw of the development is in its location. Future plans show more commercial development will be integrated nearby but right now there is little in the area and the residents are forced to drive regularly in order to fulfill their daily needs and employment. This creates considerable environmental and financial impacts for the area due to excessive private transportation.

Garages face interior alleys keeping the street facades interesting while maintaining a clean site line.



Open spaces and courtyards are integrated within the development in order to provide more privacy and open space.



Conventional large single family detached homes represent the least dense living situation provided.



Single-family detached homes surround courtyards and are affordable options for new homeowners.



Two story detached homes provide an intermediary option balancing afford ability and space concerns.



Duplexes bordering a running trail and linear park create a more dense solution in the ideal location.

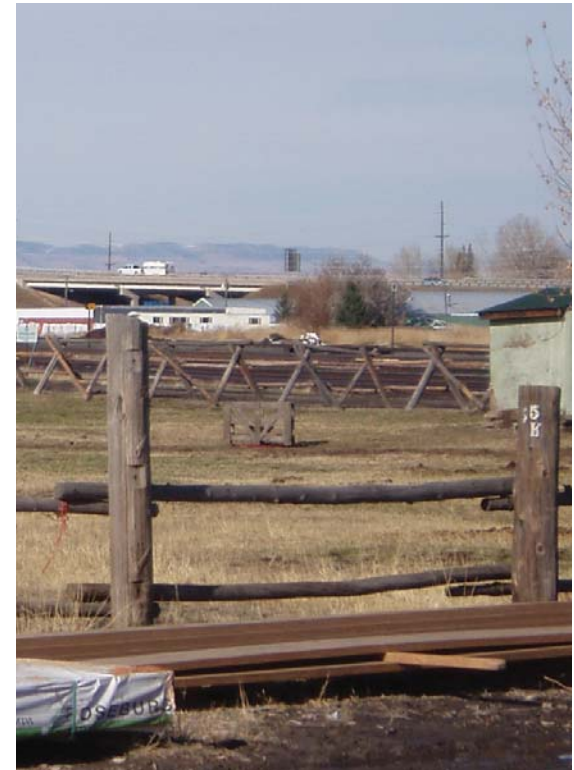


The densest options are fourplexes on the south edge of the site. These also border a park and trail system.



Site

North Broadway Bozeman, Montana





Looking northeast from the north corner of the site



Northeast corner of Bozeman Downtown Area

Scale 1" - 1220'
N

Site North Broadway Bozeman, Montana

Local Population - 27,509

Latitude - 45.67

Longitude - -111.04

Site Dimensions - 1140 ft x 1200 ft x 1600 ft x 317 ft

Site Area - 840,000 ft² 15.5 Acres

Existing Use -
Light Manufacturing
Material Storage
Brewery
Vacant Retail

Existing Zoning - M - 1



Scale 1" = 500'

Site Climate

At 4,869 feet Bozeman, Montana lies just east of the continental divide in the southwest corner of the state. The area is known as the Rocky Mountain Region. The local weather varies significantly with the seasons and average temperatures and conditions fluctuate considerably throughout the year. Even in this climate, cooling usually compromises one of the highest maintenance costs in buildings so it is important to first consider the amount of cooling required during the summer months. June, July, and August are the hottest months with average temperatures ranging from 55 to 75 degrees. Maximum temperatures can reach into the high nineties and low hundreds but on average, the temperatures are conducive to natural cooling. If designed correctly, buildings should not require artificial cooling in this region. The area’s low humidity levels also help make natural cooling more feasible. In this climate, utilizing cross ventilation and efficiently controlling solar heat

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Avg.
Avg Max Temperature	33.5	40.3	54.5	57.3	69.4	77.8	92.3	84.5	72.7	59.5	45.3	33.5	60.0
Avg Min Temperature	10.8	17.3	27.3	31.3	39.8	46.4	57.0	50.0	41.9	33.4	22.5	15.6	32.8
Avg Avg Temperature	22.2	28.8	40.9	44.3	54.6	62.1	74.6	67.3	57.3	46.4	33.9	24.6	46.4
Extreme Max Temperature(lowest)	50	58	70	78	84	94	100	93	92	78	63	50	
Extreme Min Temperature(lowest)	39	37	41	48	57	55	69	61	62	43	41	42	
Extreme Avg Temperature(lowest)	43.5	44.5	52.0	62.5	69.0	74.5	82.5	75.5	76.0	57.0	49.0	46.0	
Extreme Max Temperature(highest)	2	21	33	41	51	55	84	73	50	40	22	13	
Extreme Min Temperature(highest)	-23	-13	1	19	30	32	48	40	28	21	-4	-3	
Extreme Avg Temperature(highest)	-10.5	5.5	20.0	31.5	41.0	46.0	66.0	58.0	42.0	35.5	9.0	8.5	

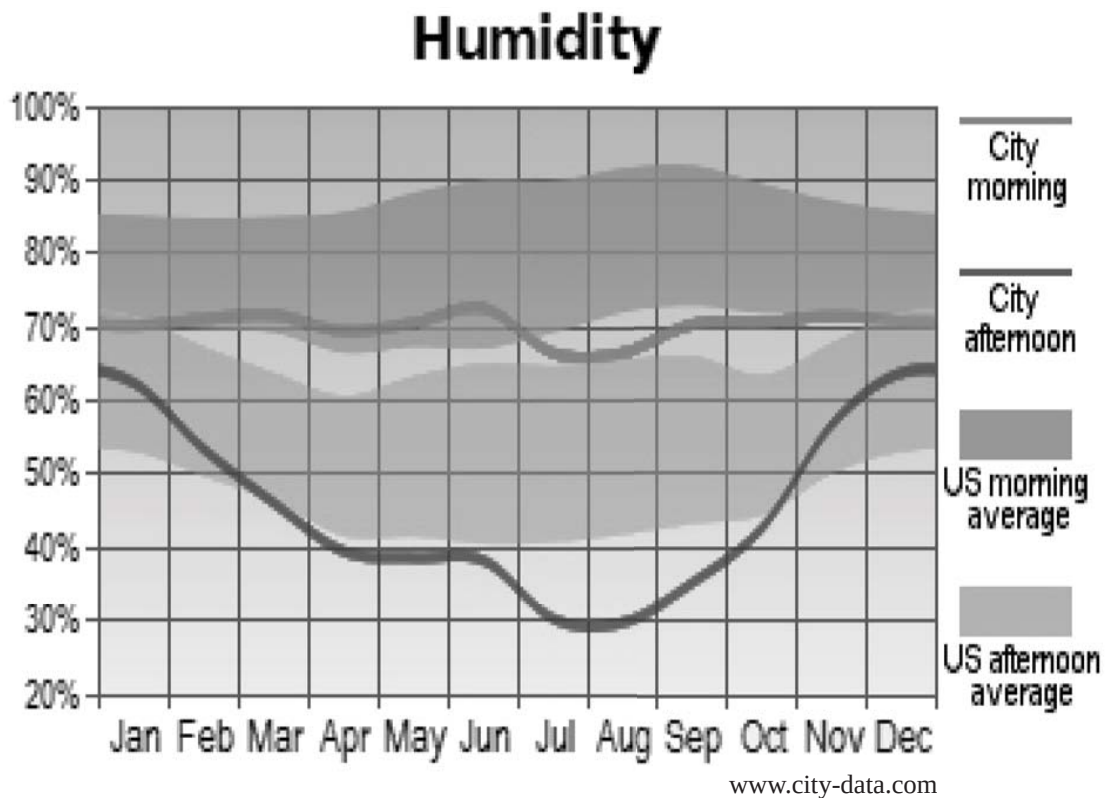


	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Avg.
Avg Precipitation	0.72	1.88	1.06	2.95	5.49	3.07	0.65	0.96	1.69	3.42	1.19	0.93	24.01
Extreme Precipitation (lowest)	0.17	0.28	0.35	0.72	1.00	1.07	0.47	0.52	0.45	0.82	0.45	0.22	
Avg Snowfall	0.0	0.0	0.0	8.6	14.0	13.0	25.7	7.8	11.3	28.4	7.7	0.9	117.4
Extreme Snowfall (lowest)	0.0	0.0	0.0	8.0	4.5	4.4	6.6	3.0	1.9	6.8	3.7	0.9	
Avg Snow Depth	0.0	0.0	0.0	0.1	2.0	3.5	6.7	7.7	1.8	0.8	0.0	0.0	1.9
Extreme Snow Depth (lowest)	0	0	0	3	6	7	14	12	5	5	0	0	
Extreme Snow Depth (highest)	0	0	0	0	0	0	2	3	0	0	0	0	

www.noaa.gov

gains should be able to accommodate residents comfort level during summer months by natural means. The three coldest months are December, January, and February with average temperatures fluctuating between 22 and 28 degrees. The average minimum temperatures can reach well below twenty degrees for these three months and extremes drop into the negatives. This heating load can be drastically minimized by proper wall construction, efficient glazing, and passive solar heating but the extreme low temperatures are too severe to rely entirely on natural energy for heating. Efficient mechanical systems will be required to maintain comfortable temperatures at times when solar energy cannot meet the demands.

The area receives an average of about 24 inches of annual precipitation. Most of

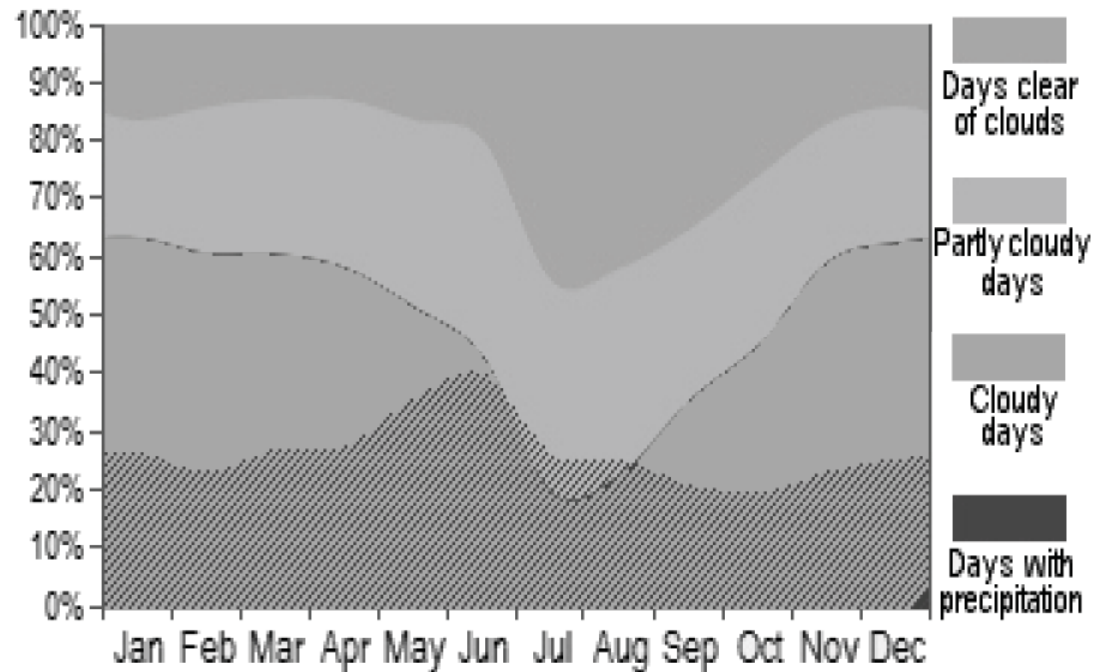


Site Climate

which comes in the months of May, June, and October. This is a considerable amount of water that can be collected and used within the building and surrounding landscape. Limiting impervious surfaces on the site will also allow the water that is not collected to efficiently return to the aquifer.

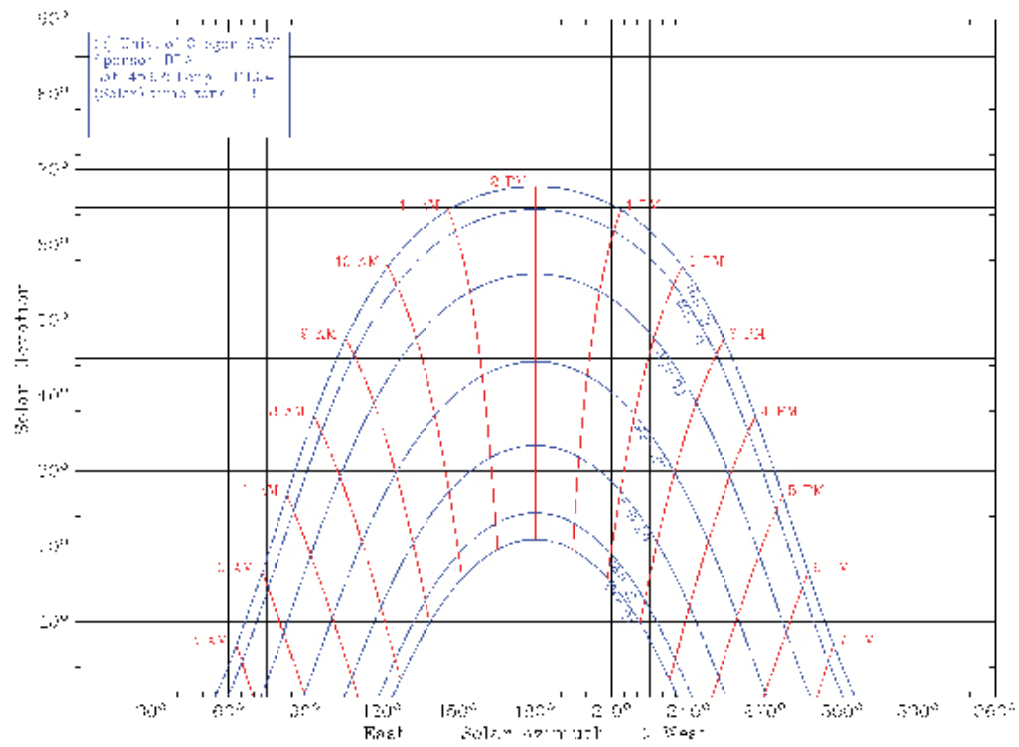
The most significant climatic factor is the amount of sun the site receives. Throughout the year more than half of the days are either clear or partly cloudy and in the summer, it increases to almost eighty percent. The large amount of sun the site receives makes it very conducive to energy savings and creation by using natural means. Passive solar heating and natural lighting can significantly minimize artificial energy requirements. Through proper building orientation the site provides tremendous opportunity for these strategies. Also, It is enough sun for solar panels to become effective and financially justified allowing the build-

Cloudy Days



www.city-data.com

Site Climate



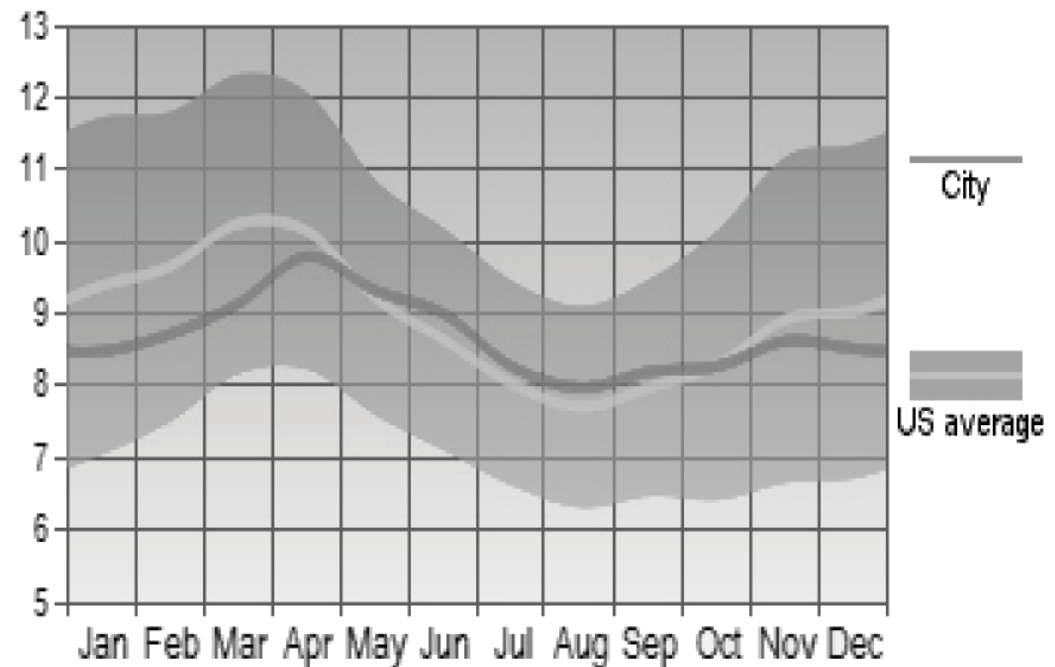
solardat.uoregon.edu

Site Climate

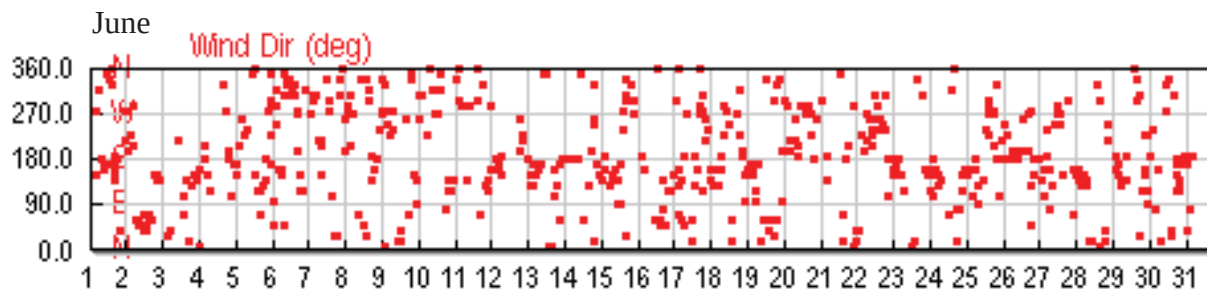
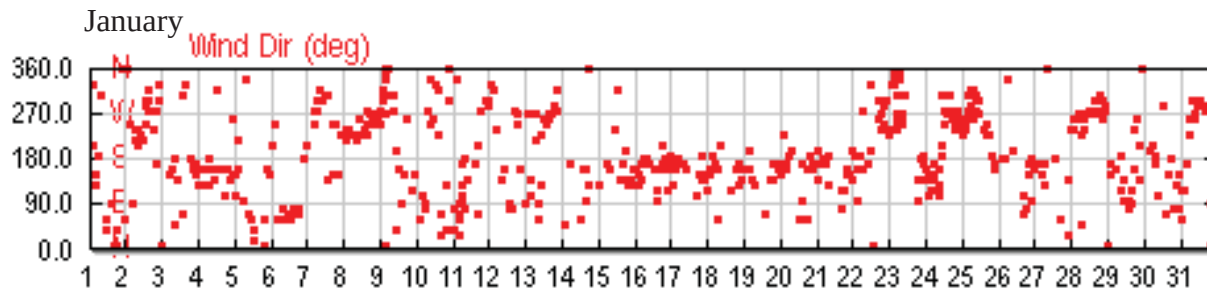
ing to create a large portion of its required power. Aside from building technologies, the considerable sunshine allows plants to flourish and community gardens, both indoor and outdoor, should be able to grow very successfully. The amount of winter sun can also allow extensive indoor planting to be naturally sustained year round.

Wind speeds on the site vary between 8 to 10 mph throughout the year. This is enough to be conducive to natural ventilation and will accelerate the buildings ability to provide comfortable summer temperatures. However, it is not enough to justify using wind for the creation of electricity. Nearby areas such as Livingston, Montana are able to utilize wind power because of funneling effects but this site does not receive the wind velocity to efficiently generate power and therefore wind will be primarily utilized for horizontal and vertical natural ventilation.

Wind Speed (mph)



www.city-data.com



www.wunderground.com

As shown by the charts, the predominant winter winds are usually from the south. Weather screens or barriers can be designed in order to minimize the impact these winds have on winter heating loads. In the summer, the wind is more variable. Southern winds are still the most frequent on the site but the direction changes more frequently than winter months. As long as the building is oriented on an east to west axis then either north or south winds should be conducive to natural ventilation and cooling.

Site Selection

Originally I was torn between locating the project in Kalispell versus Bozeman. Though I grew up in the Flathead Valley I have called Bozeman my home for the last four years. It has provided an interesting experience in my life to transition between two communities that have been faced with the problem of accommodating large scale growth in recent decades. For the concern of the project, I felt Bozeman was the most viable choice as a site. By selecting an area that I did not grow up in I feel I'm further removed from sentimental value or personal attachment and opinion. This allows me to more accurately and clearly document the site and local concerns with less personal bias as to what the cause of the problem is. Most importantly, Bozeman as a community has shown more support and enthusiasm toward new approaches to urban planning and more energy efficient architecture. According to the Gallatin County Growth Policy, in 2006 a survey was done that asked local

residents a variety of questions concerning the future development of the region. The answers were overwhelmingly in favor of higher density living solutions as an alternative to sprawl. Sixty four percent strongly supported the idea of clustering residential development to preserve open space. Forty percent also supported limiting the number of homes in rural areas and steering the growth to developed areas where infrastructure and services already exist. Therefore making it a region with a demographic that would find my solution more appealing and marketable.

Having established the general region, the selection of a proper sight within Gallatin County becomes one of the most important design issues concerning the success of this project. The connection to the environment

and community based lifestyle I intend to create are directly related to the project's location. Regardless of how successful the physical building and its systems become, environmental impacts can be minimized most significantly by the selection of the most appropriate site. "Even the most energy efficient workplace, if sited miles beyond access by public transport, would do nothing to ameliorate pollution and global warming..."

I began my process of site selection by meeting with Chris Saunders of the Bozeman planning department. The main intention of this meeting was to determine sites that had enough space required for the development while remaining in proximity to essential resources and utilizing existing city infrastructure. After explaining

my intentions with this project, he recommended sites that provided the necessary services to support this type of density on existing city infrastructure. After careful analysis of the recommended sites, and the unique opportunities they each had to offer, the Simkin Hallins lumberyard on North Broadway Ave. Became the most obvious choice for a variety of reasons.

The initial requirement in my analysis was based on site size and proximity to resources. Many of the other sites I considered are located in areas with convenient access to resources but they do not contain the buildable area required for my project to make a significant difference in the community. The Simkin Hallins sight satisfies my initial requirement concerning proximity to resources while also containing enough

undeveloped space to allow for unhindered expansion of my idea throughout the research process. It allows me the ability to continuously contemplate the scale of my solution and the balance between nature and the built environment. The existing developments in the area create a conducive environment for social and economic interaction. This is due to the large variety of zoning consisting of previously integrated residential areas, Bozeman's downtown commercial district, and the light industrial regions within these districts. In order to minimize transportation impacts, the sites location is within walking or biking distance to a large density of resources and employment with convenient access to the Streamline bus service, Bozeman's only form of public transportation.

The next important criteria for my analysis was the sites possibility to provide residents with a strong connection to nature and a sense of integration in the environment. The site is in an ideal location to act as a gateway between the growing urban community and the natural undeveloped landscape north and south of town. There is an opportunity to connect and continue one of the longest green corridors in Bozeman city limits. Pete's Hill and Lindley park create an unbroken sequence of open space that runs from Kagy and terminates at main street. Redeveloping this site with open space would continue the corridor for people and wildlife from the South edge of Bozeman all the way north to the Bridger Mountain range. Energy efficient buildings can then be poetically blended throughout the environment creating constant interaction between

Site Green Corridor

- Existing Trail
- Existing Park
- Proposed Trail
- Site
- Proposed Park



Scale 1" = 1220'
N

the occupants and nature. By existing in this natural corridor, residents would feel as if they were part of nature and a sense of personal belonging to the site would be created. The solution would allow humans to exist while preserving and benefiting the natural environment instead of destroying it. Successfully, the built aspects of the environment could act as a gateway or threshold within the corridor as it meets the rail tracks. The location provides an excellent opportunity for an architectural solution that connects and benefits the residents, the natural environment, and the community.

The last major site requirement concerned the existing environmental value of each site's land and the potential to actually improve and benefit the area through the

built environment. Early in my research I imagined a site that would be far more rural and undeveloped. As my knowledge grew, I began to realize that by developing a previously undeveloped site the building is already creating a large impact on the environment, regardless of its construction and efficiency. Instead, in order to have the largest positive impact on the local environment, the building should be located on a site where the previous use had left it environmentally and economically degraded. This allows the built environment to have the opportunity to actually benefit the site and surrounding properties by enhancing the areas aesthetic and social qualities. The site has been used as a lumber yard for decades. Trash and scrap materials clutter the entire area and impervious pavement blankets the ground accelerating and polluting runoff. The surrounding land has lost value because few want to live or work near the operation and aesthetically the area creates an eyesore for those experiencing it.

Trash from packaging and scrap material litter the site and pavement covers most developed areas



Site Zoning

The site is currently zoned M-1. A variance would have to be requested in order to change the zoning to a residential district which would most likely be R-2 or R-4. This should be a very realistic possibility as Bozeman's population continues to grow and land values raise to levels that no longer justify using such a valuable site for material storage. As mentioned earlier, the area contains a diverse mix of zoning districts and ten different types are within one mile of the site. This provides residents the opportunity to find a large variety of employment and service options very close to their home minimizing vehicular transportation and the impacts associated.



Site Land Use



Scale 1" = 875'

Site Local Context

As shown by the diagram to the right and in smaller scale on the previous page the western edge of the site consists of primarily single family detached residential buildings (yellow). Currently the site's described use is commercial (red) and light manufacturing (grey) which also compromises the northwestern boundaries across North Broadway Ave. A large majority of the commercial space is vacant and for sale but one local bar called the Brewery remains successful at the north edge of the site in the mixed use (brown) area. If possible this establishment should be incorporated into the final solution because it is beneficial to the area stimulating social and economic activity. The light manufacturing and the retail portion of the site are currently occupied by Simkin Hallins lumber company for construction material storage and sales. Moving this business to another site could be beneficial for both the local area and the business. Relocation of this industry would revitalize the



area aesthetically with more intimate architecture and natural open space and it would significantly reduce local noise, litter, and truck traffic. The business could benefit because much of the growth in Bozeman is going west now and currently Simkin Hallins is on the other side of town from the construction. By relocating, they can be more competitive with an easier accessed location and minimize the distance trucks need to travel to sites reducing financial and environmental costs. This can be realistically justified by considering that Kenyon Noble, a local competitor, just relocated its main building from downtown to Oak Street in order to be in a more convenient location.

The northeast side of Bozeman contains some of the most unique and diverse architecture in the city. It's residents have

Traditional single family detached houses are the predominant building type in the surrounding area.



Interesting solutions explain to observers the unique character of the buildings inhabitants and lifestyle.



Site Local Context

formed a strong community amongst themselves and this bond can be seen readily in each individual's design and construction of their home. There is a large variety in the architecture of the residences in the area. The majority of the lots contain traditional single family detached housing with wood siding and shingled roofs. These houses were built around the forties and fifties. Although some are beginning to degrade, most are very well kept and have unique personal touches made most likely by the people or local craftsman who live there. These residences form the primary architectural character for the area and their proximity to industrial surroundings has inspired more contemporary solutions.

Local and regional architects have created a variety of contemporary solutions in the surrounding area. Most are obviously inspired by local agricultural and industrial forms utilizing materials associated

Weathered steel, wood, and glass are the primary contemporary building materials in the area.



Agricultural inspiration can be seen in the tall slender forms used for many contemporary residences.



with those industries. Corrugated steel, brick, and wood siding are by far the most heavily used and the buildings that incorporate them successfully blend well with the existing industrial buildings in the area such as the grain silos and the old Brewery. In the last five years contemporary architecture influenced by agriculture has become very popular in the city of Bozeman and it can be seen most predominantly on the northern edge. In some cases it is unrefined, incorporated in an almost “tacked on” manner in order to follow local trends. When done successfully, it plays a large factor in defining the area creating a unique and almost eclectic identity. It is very important that any architectural solution intended for the site I have chosen utilizes or considers these ideas in order for it to have the possibility of integrating itself in the local community and strengthening its unique identity.

This four unit mixed use complex is one of the most dense solutions aside from the Village Downtown.



Traditional commercial buildings such as the old flour mill headquarters remain but are now used for different purposes.



The Brewery is the most provocative business on the site and should be incorporated in the solution.



Contemporary commercial solutions use form and material choices similar to residential interpretations



Site Local Context

Originally, the area was dominated by light industrial businesses because of its close proximity to the railroad. Over time, as transportation and shipping methods changed, many of these establishments could not survive and the vacant remnants of a once booming industrial complex are all that survives. These structures constantly remind those who see them of the importance agriculture has to the city of Bozeman. The area was founded through the agricultural industry and its significance should not be forgotten. It is of utmost importance to look to these buildings for inspiration on how to form new and original contemporary solutions and interpretations rather than just looking to the ideas already formulated by other architects and designers.

Vacant old grain and flour mills still remain and they explain the agricultural significance to the area



Much of the contemporary architecture surrounding the site is derived from these forms and materials



Site Local Context: Railroad

The northern edge of the site is defined by the railroad tracks running east and west. Currently these tracks create a barrier to the existing recreation corridor and it is my intention to bridge the tracks and allow easy and safe pedestrian access between the open space to the north and the linear park running along the eastern edge of my site. I would like this part of the development to be a public community space that not only allows passage over the tracks but also recognizes the significance of the railroad in its architecture. Should it become applicable, there is an opportunity to use the existing brick structure in the design. This space is very important to my concept because it will be the primary point of interaction between the residents and the local community and the design should create an opportunity for relationships to be formed between the two.

Railroad Tracks



Existing Brick Building



Proposed Pedestrian Trail and Bridge



Scale 1" = 500'

The northern edge of the site is defined by the rail-road intersection that once brought trains downtown.



Looking north from the site over the tracks is one of the most enjoyable views in the area.



Graffiti on the sides of rail cars can provide contextual inspiration.



Site Analysis: Natural Ecosystem Preservation

One of my most important goals with this project was to attempt to preserve as much of the existing natural environment as possible on the site. After thoroughly walking the site I was able to diagram the portions that were already developed (yellow) compared to those that were undeveloped (green) and remained as natural environments. These undeveloped areas are very important to preserve. The process of rehabilitating the developed site and creating a truly natural environment will take time and preserving the nearby ecosystems that already exist will help to accelerate the recovery exponentially.

Developed Site



Undeveloped Site



Scale 1" = 400'

Aside from the railroad track, a very intact natural corridor runs along the eastern edge of the site.



Much of the site has been developed and degraded but natural environments can be restored over time.



Site Analysis: Existing Vegetation

Trees are a very important aspect to be considered in order to preserve the natural ecosystems. The existing trees can also immediately benefit the built environment. Mature trees can block winds and unwanted views while providing shade for cooling buildings or outdoor spaces. The south edge of the site has a barrier of existing trees that separate the small residential district and block views. On the eastern edge a intermittent barrier of trees blocks out the Village Downtown and could provide a barrier for the trail system to provide more privacy for the residents. The vegetation on the site consists of three primary types of species. Aspen groves compromise the two patches on the north eastern edge of the site and they are the tallest areas of existing vegetation. These two patches could provide an effective wind and sun barrier for built elements positioned northwest of the groves. Small cottonwoods are numerous throughout the eastern corridor and provide a good site barrier between the village downtown. Thick underbrush areas, consisting mostly of dogwood, provide a safe and secluded natural trail for wildlife to move throughout the eastern edge of the site into the wetlands and open space to the northeast.

Brush and Shrubs



Trees



Scale 1" = 400'

Aspen groves are the tallest vegetation on the site and they are found in the two northeastern patches.



Cottonwoods grow throughout the corridor and provide wildlife habit, shade, and site barriers.



The natural ground cover consists of mostly Dogwood and creates a secluded animal trail system.



Site Analysis: Wetlands

As shown by the diagram, the entire eastern edge of the site is a designated wetland area. The south-eastern corridor is considered a riparian area. What is important to note is that the riparian area stops abruptly when it hits the existing Simkin Hallins yard. The development did not design around the water feature and has totally stopped the creek and ruined an important aquatic corridor that once ran through the site and into the eastern wetland. In the redevelopment of the site it will be an important priority to restore this water shed and allow it to once again flow through the site. This will allow for a pleasing natural water feature that residents and public can enjoy while allowing more water to reach the wetland and insure its survival through long summer droughts.



Scale 1" - 875'

Site Analysis: Natural and Artificial Landscapes



This diagram explains the site's eastern edge and bordering environments. After realizing what the city considered a wetland, shown on the previous page, I felt it was important to personally describe the difference between generic open space (blue) and a unique natural environment (green). It is clear that the nearby Village Downtown development did not preserve natural landscapes and instead created large areas of artificial grasses and landscaping. Open space was created but at the cost of any natural ecosystems that existed there previously. What remains is in an important natural corridor that covers the entire eastern edge of the site and will be preserved at all costs.

- Undeveloped Open Space
- Natural Landscape
- Artificial Landscape

Scale 1" = 400'

Site Analysis: Drainage

Because there is a wetland directly east of the site drainage is an important design factor to consider. The entire site drains to the eastern edge into the natural creek. Currently more than half of the site consists of impervious material and during rains excessive amounts of water pour off the site into the creek carrying debris and chemicals into the water system and causing flooding problems. In redesigning the site it is important that as much pervious surface is created as possible and buildings are not oriented north-south causing damming and flooding. The water that falls upon the site must be carefully returned back into the aquifer as naturally as possible because it is the life blood to the wetland ecosystem east of the site.

Impervious Surface



Pervious Surface



Scale 1" = 400'

Site Analysis: Built Forms



This diagram documents the existing structures that lie within the sites extents and those surrounding the immediate perimeter. The structures on the site would most likely be removed aside from the brewery on the north western edge and the old brick structure, the northernmost building on the site. The residential buildings to the west are primarily one story structures and do not have much affect on the site. However, the two high density buildings east of the site in the Village Downtown block views of a large portion of the eastern skyline and can also prohibit sun from reaching eastern areas of the site. These two features should be a large concern when designing areas in their site or shadow plane.



Existing Structures Surrounding Site



Existing Structures On Site

Scale 1" - 400'

Site Analysis: Circulation

Currently North Broadway is the primary vehicular artery (red) to the site. I observed on site that much of this traffic was related to the Simkin Hallins lumberyard and after the relocation of the business this may change. Regardless, Broadway still provides the most convenient access from the north or south from Main Street. Lamme and Fridley are the two most important secondary arteries (orange) and they are the usual routes for vehicles traveling to the site from the west. During my site visits, I observed very little pedestrian circulation. This is most likely caused by the fact that the area has a relatively low density and there are no parks or businesses to attract people to walk to. The proposed pedestrian routes (yellow) are the paths that I imagine people will take in the future and I plan on designing the environment around making the areas within the site conducive and enjoyable pedestrian walking corridors in order to stimulate walking and biking as daily modes of transportation.

Proposed Pedestrian Routes



Secondary Vehicular Artery



Primary Vehicular Artery



Scale 1" = 400'

Site Analysis: Noise



Currently the most noise experienced on the site is caused by traffic on North Broadway Ave. and trains running along the railroad tracks. Trees, small natural berms, or low walls and vegetation will most likely be adequate to minimize or block the vehicular noise but the train tracks will take more consideration. Sound dampening walls and windows will reduce the noise but this factor will have to be strongly considered in the program layout and spaces will have to be arranged according the level of noise acceptable for their uses. In-coming air traffic contributes noise to the site also but there is really no solution to this problem other than noise dampening wall and window constructions

 Primary Noise Contribution

Scale 1" = 400'

Site Analysis: Views

One of the most important design issues in providing a high quality of life for the residents is their connection to nature through views. It was very important to document the site's most enjoyable views and also those that were obstructed by natural or artificial objects on or surrounding the site. The northern views to the Bridger Mountain Range are the most exciting on the site. They are relatively unobstructed and it will be important to position the building in order to maximize resident's northern views. The western edge of the site is dominated by single level structures and views are obstructed to about thirty feet but any four or five story space would easily see over them. The Village Downtown and a natural twenty foot embankment obstruct most of the west and southwest views all the way to about a fourth or fifth floor site plane (about 60'). This will cause a limitation to the type of programmatic elements that can be positioned west of the development. Commercial or public space will be more conducive to these areas because occupants are quickly passing through rather than residences in which occupants would have to experience the views constantly throughout the day.

Obstructed Views



Unobstructed Views



Scale 1" = 400'

The views on the western edge are blocked at ground level by housing but higher structure could get views.



1



2



3

The Village Downtown blocks most of the eastern views from the southern half of the site.

Northern views of the mountains from the southern perimeter of the site.



4

The site’s northern views of the Bridger Range are some of the most unobstructed in the entire city.



5

The northeast corner of the site overlooks extensive wetlands providing views of intact natural land.



6

The views from the center of the site overlook the foothills of the Bridgers rolling out into the valley.



7

Looking southwest from the northwest corner of the site is an unbroken view of the Gallatin Valley.



8

Western views from the center of the site consist of mostly older single family residential.



9

Environmentally Conscience Design

After culminating my research and analysis of the site, my last goal was to make sure that the aspects of the built environment I developed would be as energy efficient as possible.

Today the world faces some of the most difficult environmental challenges in the history of mankind. Resources are being consumed at a rate far greater than they are produced or renewed. The United States accounts for the largest percentage of this consumption worldwide. It is known "...that 5% of the world's population, namely the current population of the United States, consumes some 20% of the world's resources."²⁴ The American building industry alone accounts for half of that consumption and another thirty is contributed to transportation. The built environment in the United States therefore accounts for the consumption of approximately ten percent of the entire world's resources. This reflects an obvious flaw in

our mentality concerning building design. A large amount of the consumption is due to inefficiently designed buildings that require large amounts of energy to maintain. For example, "...artificial illumination represents the biggest consumption of energy in built form, followed by air conditioning as a close second."²⁵ Adequate light and comfortable temperatures are some of the most basic requirements of any architecture. Through creative and intuitive design strategies they can be provided primarily by natural means, considerably reducing the energy consumption. Previously architects have relied heavily on artificial, energy intensive, systems to maintain comfort in buildings. Instead, the built environment needs to be revolutionized in this country. By simply redeveloping the way buildings are designed, built, and maintained we can begin to significantly decrease our countries impact on the world's resources. As an effort to begin to understand new ideas

on a more sustainable approach to architecture I was interested in the book "Ten Shades of Green." Author Peter Buchanan explains ten primary elements which he considers the most important factors to sustainable design. They range from very analytical aspects to the importance of humanistic qualities in design. His ideas provide a good general standard to be considered when designing any type of architecture and many of the ideas will be used as significant guidelines throughout this project.

The first "shade of green " concerns the importance of designing buildings that use as little artificial energy as possible to achieve a high

quality of comfort and performance. He states that “The single most effective way of achieving this is to ensure that buildings consume only a fraction of the fossil fuel derived energy they use presently.”²⁶ Currently, this accounts for a large majority of the environmental impact caused by the built environment and it is a problem that can be minimized considerably through the utilization of more sustainable energy sources. Generic solutions such as increasing a building’s insulation can be incorporated into any design but the greatest savings can be achieved through site specific consideration of how the building is organized, controlled, and what type of energies it uses. The orientation, envelope and form of the building are the largest determining factors for how efficiently the effects of natural lighting, heating,

cooling, and ventilation can be used and controlled. Proper consideration of these factors can maximize the use of natural energy sources and greatly reduce the requirement for energy intensive artificial systems. The research I compiled concerning elements and conditions on the site can be used to formulate the most efficient form and orientation for the future structures.

Some of the greatest savings in energy use can be created through the proper use and control of natural light. Although artificial light is obviously required at night, it can be more efficiently controlled during these times with occupancy sensors that significantly reduce unnecessary use. Most importantly the amount of energy needed for day time lighting can be greatly re-

Environmentally Conscience Design

duced, if not eliminated, through the use of natural light. The most efficient orientation for a building in Bozeman to utilize natural light is on an east to west axis with a shallow plan. The windows should be large and deep in order to allow light to reach a space but properly controlling the light levels that enter a space is extremely important. A space that has too much light or glare can be just as ineffective as one that has too little. Vertical and horizontal sun shades can help to control varying light levels throughout the day and season. Large overhangs can protect a window from high summer sun angles while utilizing the lower winter sun for light and warmth. A shallow plan is not only conducive to natural lighting but it is also the most efficient way to utilize natural ventilation throughout the building. Heating and cooling loads account for large amounts of the energy a building uses within its life. By properly designing the form of the building and efficiently orga-

nizing the program within, natural ventilation in combination with strategies such as night flushing, thermal masses, and direct heat gain control can greatly reduce the size, cost, and need for artificial systems. Heating and cooling requirements can be cut substantially and the need for air-conditioning can ideally be eliminated. Ultimately, the occupants of the building determine its heating and cooling energy requirements. The occupants must be made aware of their individual energy consumption by locating meters that show how much electricity, water, and natural gas the building is requiring. Many people use more of these resources than they need simply because they do not understand the impact of each deci-

sion they make such as leaving unused lights on or using excessive amounts of water for tasks. By creating a frequent awareness of the building's energy consumption it will ideally encourage occupants to minimize their energy need and promote the use of the natural energy systems incorporated within the building.

In Bozeman, there is tremendous opportunity to use sunlight for power, heat, and light. Through careful analysis, orientation, and control the sun's energy can be used to cut non renewable energy consumption and economic and environmental costs substantially. Although wind levels are not strong enough for power generation it is adequate to naturally ventilate most building forms and provide natural cooling during the summer months.

Environmentally Conscience Design

In nature, there is no true waste, instead each organisms's "waste" is consumed as food by something else. Far contrary to nature, the built environment consumes natural resources with little regard to their quantity or renewability and instead of returning beneficial "food" back to the system it is continuously returning its waste of destructive toxic pollution. The previous mentality seemed to be one centered on conquering nature rather than understanding and utilizing it in a harmonious relationship. Architects must intuitively look for opportunities for waste to be reduced or recycled within the building.

Buildings consume and pollute vast amounts of freshwater, one of the most valuable resources on earth. New concepts

such as low volume toilets and sinks can reduce a building's requirement for water. Then, the water that is used must be recycled as many times as possible throughout the building before it is exhausted. This can be done by distinguishing gray and potable water within the system and reusing grey water for all the needs it can accommodate. This reduces the need for more potable water in the system while minimizing the amount of polluted water that is returned. This concept can be applied to a variety of systems which have been designed to reuse heated air or water multiple times before exhausting it in order to reduce the energy needed in warming it. In taller higher density buildings these concepts become even more applicable because the vertical form of the building is conducive to allowing air

and water to be circulated naturally through gravity and convection. This can ideally reduce or eliminate the dependence on artificial systems such as fans or pumps.

Next, is the building's sense of permanence. In essence truly sustainable architecture must be able to constantly evolve and adapt to different uses and occupancies throughout its life. The zoning, local preference, and demographics of a particular area can change drastically over time and if a building can no longer accommodate a service relative to its site then it will inevitably be torn down in way for a better solution. Thus wasting unnecessary resources and energy. It can be very hard to predict exactly what a building may be used for fifty to a hundred years after its construction and therefore the building and the program must be designed with

idea of maximum flexibility and versatility while still providing a dignifying framework for a generic range of activities. Buildings that can successfully achieve this last long enough to reap the maximum return from the embodied energy needed to create them and they provide far more lucrative returns on the initial investment of the building. Additionally, buildings that last a long period of time begin to embed themselves in the community. Over time, they slowly become a defining part of the cities' identity. In order to create a design that will stand the test of time, architects must, "transcend the utilitarian and the fashionable to consider how to make the buildings that will always be cherished, that people will identify with and always wish to reuse and conserve."²⁷

In order to create a residential solution for

Bozeman that will be able to adapt and maintain value through fluctuations in societies' preference and the housing market, a variety of living options must be designed. This will be done in order to appeal to a diverse demographic of buyers and renters. The Baxter Meadows case study showed how this concept has already been utilized successfully in the area as the houses there maintained their value and attracted tenants even through slow periods in the housing market.

One of the most important aspects in the success of this project is the building's ability to embed itself in a place. The design must feel as if it has "...grown in place in intimate interaction with its surroundings and often also with deep roots in the accumulated wisdom of the local

Environmentally Conscience Design

culture and its vernacular buildings.”²⁸ There is no simple or generic solution to this problem and that is why I analyzed the site extensively in order to begin to understand its unique sense of place and community and its local materials and building traditions. The research that I did in the local context section of the site analysis led me to understand how unique the site and the surrounding architecture were. I now understand that I must create a solution that integrates itself poetically within the natural eastern corridor while also remaining aesthetically consistent with the unique local architecture of Bozeman’s north side. Only by balancing this criteria can a solution be created that does not impose on its local environment or community but rather benefits and strengthens the integrity and identity of both. Technological solutions alone cannot create a sense of permanence or place and the architect must attend to all local site conditions

covered in the analysis including the local setting, climate, topography, vegetation and traditions.

In order to minimize the transportation needs of the occupants, convenient access to the building and an understanding of its urban context are crucial. As mentioned earlier transportation is the next largest consumer of energy after the built environment. The location of specific buildings and their relation and proximity to each other essentially controls how much people must travel. In order to truly minimize a building’s footprint on our planet the mentality must go beyond the architecture itself. The building must promote a sustainable lifestyle for its residents and occupants. One of the most appealing factors about the North Broadway Ave. site was its proximity to downtown local services. In a high density living environment selection of a site that lies within close proximity to the residents’ amenities allows

large amounts of people to walk or bike far more frequently and conveniently. In achieving this, the solution can begin to significantly minimize the impacts caused by unnecessary transportation along with those caused by the built environment. “A building’s location in terms of its access ability and proximity to a range of other functions is thus critical in determining how green that building can be.”²⁹

Much of the concern so far has focused on minimizing unnecessary hazardous environmental impacts caused by inefficiently designed buildings. It is important not to forget the significance of a building’s ability to affect the health and happiness of its occupants. One of my most important goals in this project

is to create a higher density living solution that provides a quality of life that is comparable or better than that experienced in traditional subdivisions. The majority of people's lives are spent in buildings and these environments have a large effect on the physical and psychological health of their occupants. The most positive built environments are those that allow the occupants views, fresh air, natural daylight, and personal control of their individual environments. The analysis concerning the views found on the site will be used to orient the residences in order to maximize the opportunity for northern views. Continuous visual awareness of the surrounding mountains and the ever changing sky will make the residents more aware and connected with their natural surroundings. Ideally this would increase their quality of life. Build-

ings that can successfully create a feeling of happiness and enjoyment for their occupants can in turn provide tremendous economical benefits for their owners, renters, or investors. By creating an enjoyable environment, the productivity of the residents is accelerated, existing owners and renters want to stay, and new buyers and renters are continuously attracted. "The creation of green architecture, then, is much more than a merely technical issue: it is essentially concerned with delivering a much enhanced quality of life, to be enjoyed now and capable of continuing into the future."³⁰

Architects must not stop at merely understanding and utilizing nature to aid building performance they must also provide a connection between nature and the occupants. "If green architecture is to help bring about

a sustainable culture, it must regenerate a sense of community and connection to, even communion with, the natural world."³¹ In order to bring about a sense of connection with the natural world it is important that occupants have a continuous realization of the changing weather and seasons.

Using public and private gardens and other spaces, the solution's design and location should promote the opportunity for individuals to meet and form communities. This can be done while interacting in an environment that heightens the occupant's awareness and appreciation for the natural world.

Program Qualitative

After culminating my research concerning the problem of rural sprawl and then selecting and thoroughly analyzing the North Broadway Ave. site, I can begin to develop a program. It is centered around the most important points of my thesis; creating a marketable high density mixed use solution that enhances the local community and embraces the local environment. The precedents that were reviewed earlier in this document have also been used as realistic examples of how these goals can be achieved. Each precedent's respective program can help to guide decisions in order to provide spaces in which the size and use are appropriate and conducive to promoting these ideals.

This first stage of programmatic development was to create a marketable high density residential environment that could provide a high quality of life for a variety of buyer and renter demographics.

To do this I felt it was appropriate to have five different living environments within the solution. Four distinct apartment layouts will be designed specifically to appeal to four different wealth classes in a high density vertically oriented environment. Additionally, a series of row houses will be devised to attract those looking for a lower density, more conventional rural living solution. In order to create an appealing environment that enhances the occupants awareness of nature, each residence will be designed to maximize the residents northern views when possible. Apartment types C and D will utilize a skip stop overlapping system in order to provide both north and south view opportunities and accelerate cross ventilation and natural cooling.

The high density building's will also have

a variety of community spaces such as a lobby and an interior courtyard in order to promote interaction between the residents and strengthen their social relationships.

With current technological advances in communication many people are able to conduct a large majority of their business at home. In order to promote and enhance the residents ability to work from home a community business area will be included with private office spaces, a reception area and a conference room. To those applicable, this will allow the ability to run a professional business right from their home saving them tremendous financial overhead costs associated with other facilities while significantly lowering the environmental impact of their business.

Program Quantitative

Residential High Density (40 Dwellings/ Acre)

Apartment A Affordable Housing	Sq Ft
- Bedroom	400
- Bathroom	50
- Storage	100
- Kitchen and Living Area	500

Apartment B Lower Middle Class Housing	
- Two Bedrooms	800
- Bathroom	50
- Storage	150
- Kitchen and Living Area	600

Apartment C Middle Class Housing	
- Two Bedrooms	1000
- One and One Half Bathrooms	100
- Study	200
- Storage	200
- Kitchen	400
- Living Room	400

Apartment D Upper Middle Class Housing	
- Two Bedrooms	1100
- Two Bathrooms	200
- Study	200
- Dining Area	150
- Kitchen	500
- Living Room	500
- Storage	200

Residential High Density

Communal Spaces	Sq Ft
- Garden	800
- Entry	100
- Lobby	1000
- Conference	800
- Reception	500
- Independent Offices	600
- Roof plaza	2000
- Garage	10000
- Interior Courtyard	2000
- Resident Storage	2000

Building Requirements

- Mechanical	1500
- Janitor Storage	200
- Generic Storage	1000
- Circulation	1000

Residential Medium Density (20 Dwellings/ Acre)

Row Housing Upper Middle Class	
- Three Bedrooms	1500
- Two Bathrooms	200
- Personal Office	200
- Dining Area	150
- Kitchen	500
- Living Room	500
- Garage	1500
- Storage	200
- Mechanical	200

Program Qualitative

In continuation with formulating a program for the residential requirements it is then important to devise programmatic elements that would help integrate the residences with the local north Bozeman community and the natural environment.

In my opinion, based on my research and site analysis, the most provocative way to integrate the development into the community was by designing a pedestrian gateway that brought recreators through the site and over the existing rail road tracks allowing utilization of the natural open space north of the site. This feature would continue one of the largest recreational corridors in the city that currently culminates on the site. The privacy of the residents is of utmost importance and the public and private spaces must be organized in order to maintain the resident's control of their personal environment. "If architectural designs provide physical structures or promote social structuring that

reinforces an individual's ability to regulate social experience, stressful experiences are less likely to occur. Although architectural environments should support a wide range of behavior, they should facilitate social interaction under positive conditions, permitting people to get to know one another while maintaining a comfortable level of social control."³²

I felt that the railroads significance to the site must be respected in the design and the solution would not only provide a threshold over the tracks but also pay homage to them. This would create a public space that formally and aesthetically expresses the essence of the railroad. The existing brick building on the north edge of the site could be carefully redeveloped and utilized as the core of this building.

My foremost concern with the exterior program elements was to preserve and enhance the existing natural landscapes. The portions of the site that have been previously developed will be rehabilitated and used to create exterior spaces where residents and public recreators will interact with each other and the natural environment. A trail system will follow the creek and natural corridor to the east of the site with secluded and private points for reflection and meditation. Private and public community gardens will be designed in order to help strengthen the individuals relationship with nature and teach the importance of its integrity. Finally a playground and picnic area will also be included to encourage outside social gatherings and family activities for the residents and local community.

Program Quantitative

Public Community

Pedestrian Gateway

- Pedestrian Bridge
- Conference Room
- Rail Road History Room
- Bathroom
- Storage
- Janitor
- Mechanical
- Parking

Sq Ft

2000
500
200
300
100
600

Natural Environment

Exterior Spaces

- Gardens Public/Private
- Creek Trail System
- Reflection Points
- Activities Area
- Playground
- Picnic Area
- Preserved Natural Landscape

Code Analysis

International Building Code 2009

Ch 3 - Occupancy Group Classification

- R - 2 Apartment
- A - 3 Community Center

Ch 5 - Building Heights And Areas (Table 503)

- R - 2
- Type 1 - B Construction: 11 Stories, Unlimited Area
- A - 3
- Type 3 - A Construction: 3 Stories, 14,000 sq ft

Section 504.2 Height Modification

 If building is fire sprinklered, increase height value specified in Table 503 by 20’

Section 506.3 Area Modification

 If building is fire sprinklered , increase area value specified in Table 503 by 200% for multistory buildings

Ch 6 - Types of Construction (Table 601)

Fire Resistance Rating Requirements		(Hours)
R - 2	Structural Frame	2
	Bearing Walls	2
	Floor Construction	2
	Roof Construction	1

A - 3	Structural Frame	1
	Bearing Walls	2
	Floor Construction	1
	Roof Construction	1

Ch 10 - Means of Egress (Table 1004)

Table 1018.1 Corridor Fire Resistance Rating (Hours)

	Occupant Load Served By Corridor	W/O Sprinkler	With Sprinkler
R - 2	Greater than 10	Not Permitted	0.5
A - 3	Greater than 30	1	0

Section 1009.3 Stair Treads and Risers

Stair heights shall be 7 inches maximum and 4 inches minimum. Stair tread depths shall be 11 inches minimum.

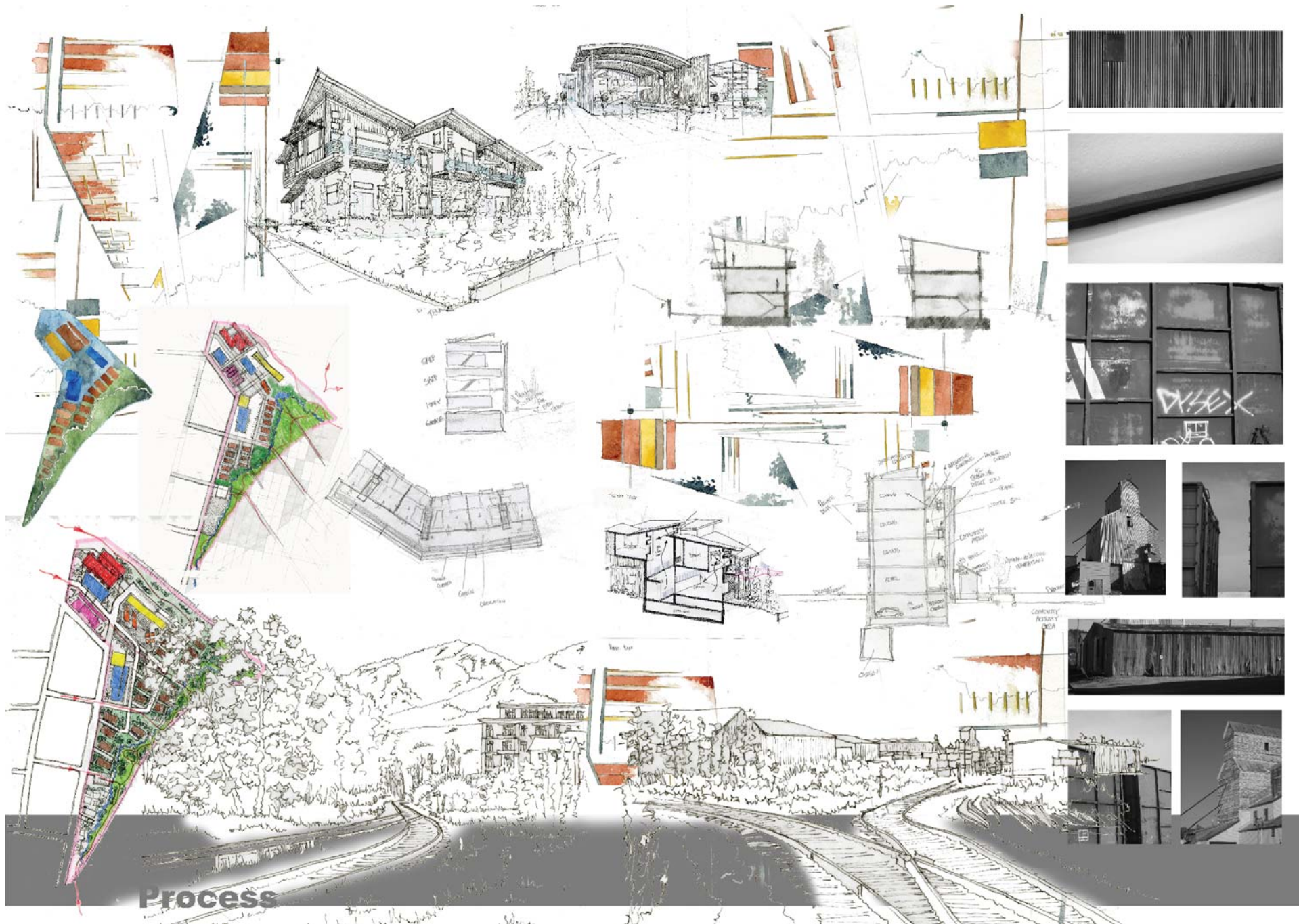
Section 1017.2 Corridor Width

Minimum corridor width can be no less than 44 inches.

Ch 29 - Plumbing Systems

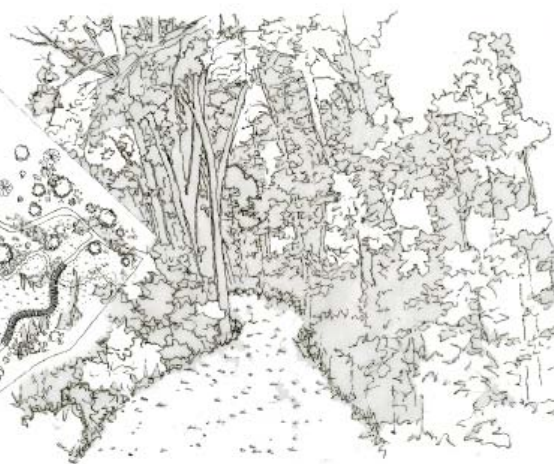
Table 2909.1 Minimum number of fixtures.

	Lavatories	Bathtub/Shower	Other
R - 2 Apartment House	1	1	1 Kitchen Sink per dwelling Unit
A - 3 Community Center	1/200		1 Service Sink





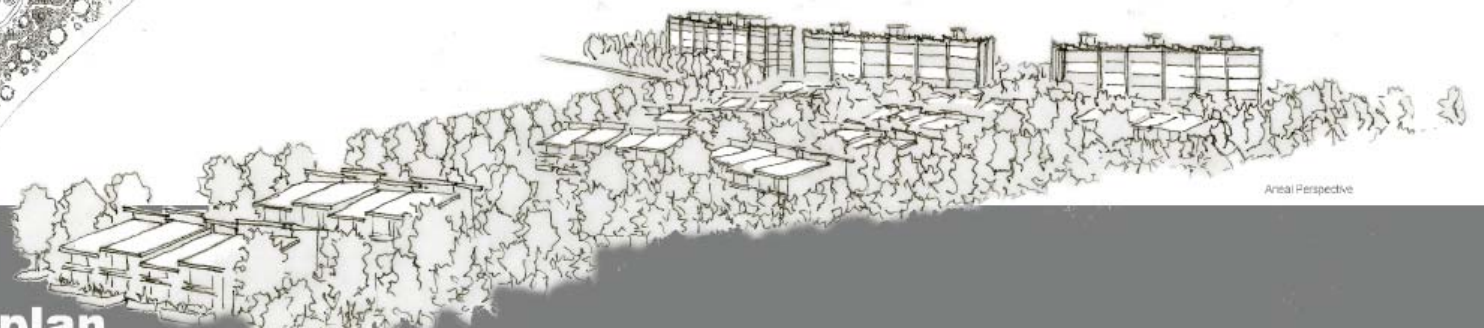
Northern Views From Site



Recreational Trails



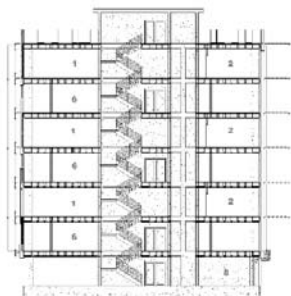
Rehabilitated Stream Corridor



Aerial Perspective

Site - Masterplan



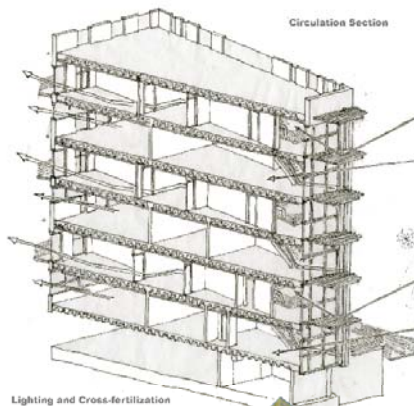


- 1 - Bedroom
- 2 - Masterbedroom
- 3 - Bathroom
- 4 - Living
- 5 - Kitchen
- 6 - Studio
- 7 - Storage
- 8 - Mechanical
- 9 - Elevator
- 10 - Mail & Facilities

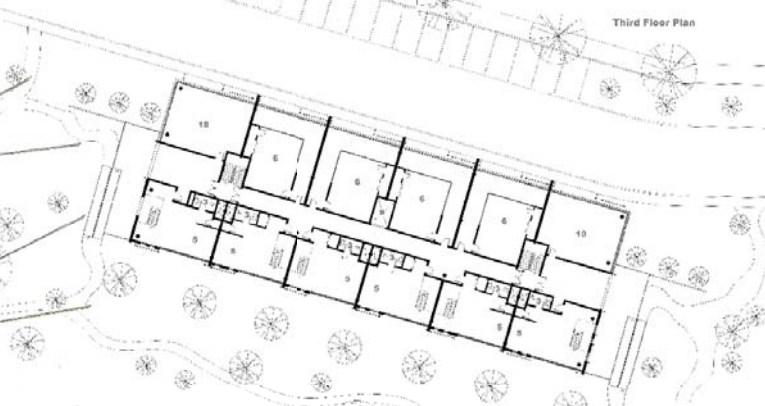
Circulation Section



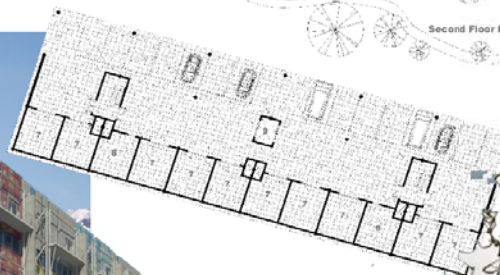
Third Floor Plan



Lighting and Cross-fertilization



Second Floor Plan



First Floor Plan



Apartment Second Floor



Apartment First Floor



Mid Rise



South Facade

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