



Sustaining Rural Communities

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SUSTAINING RURAL COMMUNITIES

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By

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A handwritten signature in black ink, appearing to read "D. J. [unclear]" followed by the date "05/04/2012".

Primary Thesis Advisor

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Thesis Committee Chair

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Thesis Abstract

Sustaining Rural Communities

This thesis analyzes the use of sustainable architecture to satisfy the socio-economic needs of a rural community. The research methodology used to create this project is a mixed-method, quantitative and qualitative, approach. A mixed-use development allows an opportunity to solve and satisfy more than one need in a rural community. Bowbells, North Dakota, is a good example of a community that can benefit from this type of project. Research was conducted on green development and its benefits; the needs of Bowbells, North Dakota; and current solutions to providing opportunities in rural North Dakota. In response to the research conducted and needs of Bowbells, the building includes a cooperative grocery store, business incubator, deli and coffee shop at ground level. The upper two floors contain apartment units and community room. The building is approximately 42,000 square feet and is located on the corner of Main Street and Railway Street in Bowbells, ND.

Key Words:

Sustainable architecture, rural community, mixed-use, green development, North Dakota



Statement of Intent

Problem Statement

How might sustainable architecture satisfy the socio-economic needs of a rural community?

Statement of Intent

Building Typology:

Mixed-use development

Claim:

To thrive for years to come, a rural community must develop a sustainable environment based on its socio-economic needs.

- Actor: rural community
- Action: develop
- Object: sustainable environment
- Manner of Action: based on the social and economic needs of the community

Premises:

A rural community must develop according to its socio-economic needs to avoid a large population decrease.

By responding to the socio-economic needs of the community, a rural town can focus its attention on what is needed to maintain viability.

A sustainable environment that relies not only on current utilities and architecture but employs new technologies and resources can help maintain that community's lifestyle and facilitate progress.

The rural community needs to focus on what is appropriate for the town's socio-economic needs rather than what is unrealistically desired.

Theoretical Premise/Unifying Idea:

A development that meets the socio-economic needs of a rural community and responds to the natural environment will bring people to the town for business, pleasure, and residence.

Project Justification:

Small American towns are diminishing across the nation. It is important for these towns to continue to thrive because the relationships and environment created in a rural town affect more than just the residents. By carefully designing typologies that satisfy the social and economic needs of the town, local governments and residents can greatly increase the life of the community.



Project Proposal

Narrative

I have lived in Bowbells, ND, practically my whole life. Even now, when living in Fargo, I still call Bowbells home. I grew up in this small town where everybody knew your name and family. You could walk in any business to do one thing and spend twice the amount of time there just talking to whoever was working. We were all friends. I remember walking to Winzy's Tasty Freeze and talking to the owner while she made my ice cream sundae just the way I liked it. I also remember rollerblading down Main Street after it was repaved without worrying about cars coming. Crimes in the community were limited to drunken "fun," like the one night some guys shot out the

street lights on Main Street. Within a few hours, the whole town knew who did it and still joke about it over 5 years later. People always got together for community and school events. Home games for basketball and volleyball were a major time for socializing. Everybody cheered for our team. Our town held a celebration during the harvest season called the "Harvest Hoedown" There was a barbeque, games at the pool, events like catching greased pigs, and a street dance with a live band. Most kids would run around and play tag in the dark while the adults talked and drank alcohol.

Today, it's a bit different. The

number of students in the school dropped drastically; classes of 24 are now around 4. Bowbells has to co-op with other schools for activities, including prom. With these co-ops, there are prejudices between cities and schools, and a lot of times the sports teams don't do well because of it. Crime rates



Narrative

are going up because of the oil boom, people can't walk across Main Street without waiting for an oil truck, and some people don't even want to live on Main Street anymore because of the noise of the trucks going by. Bowbells is not as welcoming as it used to be.

Even through all this bad, Bowbells is still a small and proud community. The town recently lost its swimming pool to extreme structural damage, and groups of people are raising money for a new one. People are still good at heart, but there is becoming less and less that will draw people to the town to stay.

Wanting to do something for my community, I realized how much everything added to the town has to be economical. Everything that has to be done needs money. What is added to the community must be a place city residents can use, meaning it has to be social. With the oil boom, there is a need for housing but creating single family homes doesn't benefit the whole community.

The future of design is focused on sustainable practices. This means that the future of rural communities needs to consider this notion. By using the old mixed with the new, I know the city can be greener.

Some may ask "Why bother?" but I know that the environment of a small town affects more than the people who live there. Travel has become so simple and quick that it is not hard for a person who grew up in a small town to meet someone from the big city. When you meet someone new, it leaves a mark on your memory and personality. You find something you like or have in common with that person and you're better for it. America needs small towns for variety, for learning, and for fun. Some of this might be nostalgia, but I think it plays a key role in this project as well. If we don't know or understand where we come from, we can't appreciate where we are.

Client/User Information

The primary client for this project will be the residents of Bowbells, ND. This project is to be available for use by the members of the community. This building would be a great investing opportunity. Two options of investors would be the local grain elevator, SunPrairie Grain, or a local oil company.

The building itself will be owned by one party and used by others. The largest group of users is the citizens of Bowbells. This requires a large public space and the supporting rooms for that business or recreation space. This and all spaces within the building will need to be ADA compliant.

Housing is a need in Bowbells for new residents, oil workers, and elevator workers. This need will give the opportunity for renters of apartments and owners of condos to live within the building. They will need the apartments or condos, parking, social areas, and laundry.

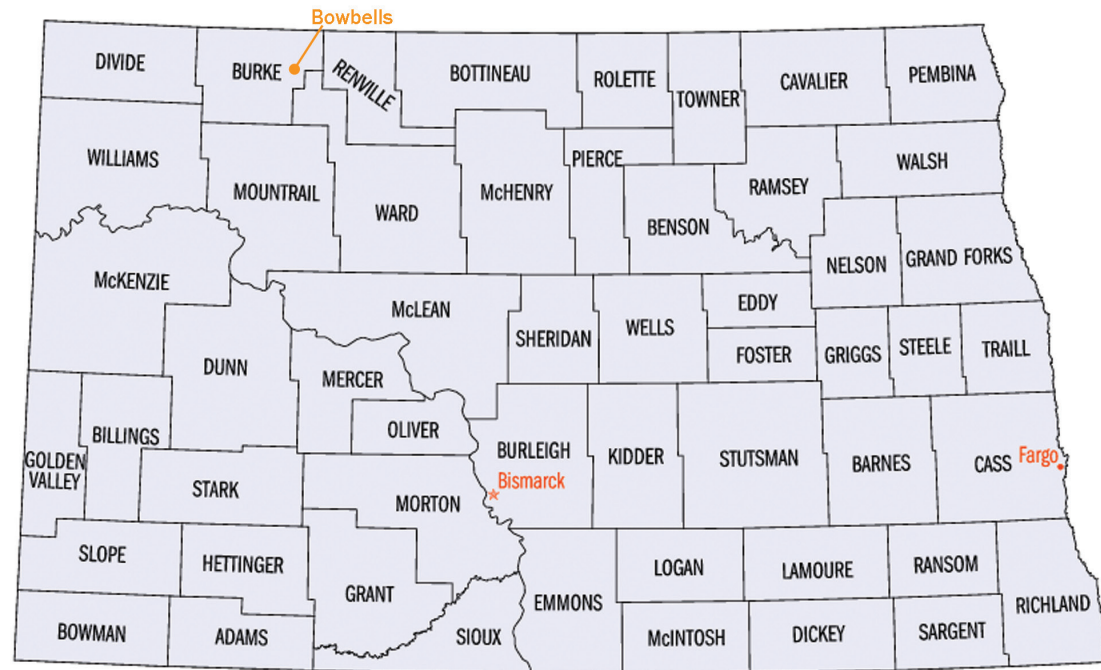
Parking for the community will be on the streets, but there will need to be a dedicated parking lot for renters and workers.

Major Project Elements

The spaces of this development must satisfy the socio-economic needs of the community:

1. Public space to be used by the community
2. Supporting rooms to the public space
3. Opportunity for housing.

Site Information

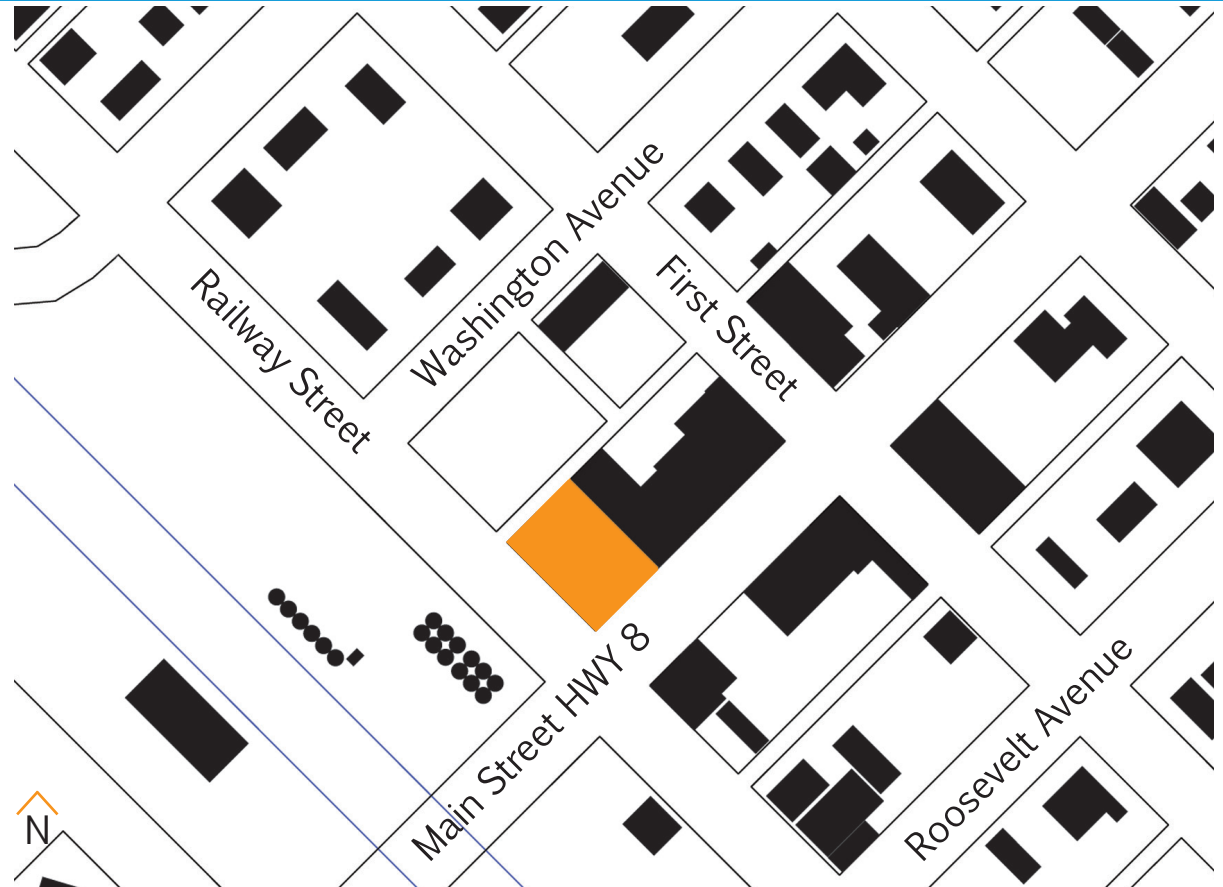


Map of North Dakota with Bowbells, Bismarck, and Fargo noted.

Bowbells is located in western North Dakota, where oil has become a major source of economic growth. The climate is continental semi-arid, allowing the city to experience cold winters, hot summers, and all four seasons. The landscape is quite flat, but valleys are typically the source of major slopes. The city of Bowbells sits on a corner of ND Hwy 5 and US Hwy 52. This major highway connects the Portal Port of Entry into Saskatchewan, Canada, to Charleston, SC, along the Atlantic Coast. Main Street is the start of ND Hwy 8, which heads down towards Stanley, ND.

Bowbells is also the county seat of Burke County, named for the 10th governor of North Dakota, John Burke.

Site Information



A map of downtown Bowbells, ND. My site is highlighted in orange.

The site I will be working with is in the downtown commercial portion of the city. It is located on the north corner of Main Street and Railway Street. This area of town has lots of pedestrian and vehicle traffic. Within walking distance of most of the major businesses in town, it is a good location for people to meet and do business. The open southern corner of the lot will allow multiple opportunities to bring in natural light. This lot allows new development and replacement of old condemned buildings. On the other side of Railway Street, sits the SunPrairie Grain elevator, office, and agronomy buildings. Dacotah Bank and the Bowbells Hotel are located across Main Street. On the same side of the block is a bar, clinic, racquetball court, and old grocery store.

Project Emphasis

This project will attempt to satisfy the socio-economic needs of Bowbells, North Dakota. It should attract the public to use it everyday.

This project will use sustainable technologies.

Plan for Proceeding

Research Direction

To ensure that my development will satisfy the socio-economic needs of Bowbells, I will research green development, socio-economics, and mixed-use typologies. I will use that research along with the history of Bowbells and a site visit to help choose the programmatic requirements for my project.

Design Methodology

The method of research I will be using is a mixed-method approach. While researching, I will gather both quantitative and qualitative data. To avoid researching on a tangent, I will focus my efforts on the theoretical premise/unifying idea.

Documentation

As I collect data and start the design process, I will begin documenting my work biweekly. Photographs, notes, and sketches will be compiled into a digital folder and backed up frequently. This work will be available through the digital commons and a hard copy will be available during the exhibit.

Plan for Proceeding

	Jan 8-14	Jan 15-21	Jan 22-28	J/F 29-4	Feb 5-11	Feb 12-18	Feb 19-25	F/M 26-3	Mar 4-10	Mar 11-17	Mar 18-24	Mar 25-31	Apl 1-7	Apl 8-14	Apl 15-21	Apl 22-27	A/M 28-5	May 6-12	
Prog. Editing	█																		
Proj. Design	█																		
Proj. Anal.	█																		
Proj. Develop		█																	
Mid-term									█										
Spring Break										█									
Design Revise											█								
Present Work											█								
Final Design															█				
Final CD															█				
Thesis Exhibit																█			
Thesis Reviews																	█		
Final Doc. Due																		█	

Plan for Proceeding

Breakdown of Plan

Program Editing

Project Design

- Project analysis
 - Context
 - Concept
 - Spatial
- Project Development
 - Floor Plan
 - Section
 - Structure
 - Envelope
 - Materials
 - Sustainable Systems
 - ECS Passive
 - ECS Active

- Midterm Reviews

- Design Revisions

- Building
- Structure
- Context
- Presentation Work
 - Presentation Drawings
 - Presentation Renderings
 - Model
 - Presentation Layout
 - Plotting

Final Design Steps

- CD
- Thesis Exhibit
- Thesis Reviews
- Final Document Due

Previous Studio Experience

- 2nd Year Fall 2008 -- Heather Fischer/Meghan Duda
 Tea House; Fargo, ND
 Rowing Club Boathouse; Minneapolis, MN
- Spring 2009 -- Mike Christenson
 Dance Academy; Fargo, ND
 Time, Material, Place; Fargo, ND
- 3rd Year Fall 2009 -- Steve Martens
 Indigenous Inuit School; Katovik, AK
 Airport Terminal; Williston, ND
- Spring 2010 -- Ron Ramsay
 Darrow & BSO Auditorium; New Lebanon, NY
 Daniel Burnham Arch. Library; Chicago, IL
- 4th Year Fall 2010 -- David Crutchfield
 High Rise; San Francisco, CA
- Spring 2011 -- Don Faulkner, Frank Kratky
 Boomtown Master Plans; Williston & Tioga, ND
- 5th Year Fall 2011 -- Cindy Urness
 MXC Center for Learning; Ottertail Co. MN



Project Program

Research Results

Green Development

Green development is a practice that integrates choices considering the environment, social impact, and financial goals. As John Knott, a developer in Charleston, South Carolina, puts it, green development is “a return to a climatically, geographically, and culturally appropriate way of architecture and building, in combination with new technologies” (Rocky Mountain Institute et al., 1998). It includes design features that provide multiple benefits to the project’s surroundings including energy performance, restoration of prairie ecosystems, and encouraging community cohesion. According

to Green Development by the Rocky Mountain Institute, green development offers many potential benefits: reduced operating costs, higher property values, reduced capital costs, and better health and higher productivity of workers.

Green developments contain a few elements that can manifest in different way and reinforce each other. One element is the development should respond to the environment. Green developments should be designed to restore and enhance the natural environment. This can be done by respecting and using what is available or natural to the area. Environmental responsiveness applies to land use

(reusing developed land, restoring degraded land, and preserving virgin land), infrastructure (using natural features for water management and road design), and buildings (using passive and active systems that use renewable resources). An effective use of these tools can minimize damage to an ecosystem and improve surroundings.

It is also important to use resources efficiently. Clustered developments reduce infrastructure needs. Pedestrian-friendly and transit-orientated planning reduces the use of automobiles and pollution. Reusing existing buildings and recycling demolished buildings and construction waste saves

Research Results

energy and reduces landfill loading. Specifying energy-efficient appliances can reduce the need of fossil fuels and electricity. These are just examples of what resource efficiency can consist of. Not only is resource efficiency good for the environment, but it is also good for our society. It can offer financial savings, reduce pollution, improve health, and enhance a building's comfort, beauty, and performance. Green developments also convey community and cultural sensitivity. They should be designed to encourage a community's sense of safety, involvement, and neighborliness. This can manifest in the land use, building layout, design, and operations. The development

can also be responsive to the local culture in vernacular designs by using local products and materials and respecting local customs and building practices.

Green development can establish and reinforce connections: people with place, people with nature, and buildings with nature. Focusing on this requires an application of ecological thinking to real estate. Each of the past elements reconnect to the integration of ecology and real estate because "nothing exists in isolation; everything is a part of a larger system" (Rocky Mountain Institute et al., 1998). By understanding and using these interconnections, developers will

become the leaders of tomorrow's real estate industry (Rocky Mountain Institute et al., 1998).

Some people believe that developing green costs more and takes more time. The reality is that a well executed design will perform extremely well financially according to the Rocky Mountain Institute et al. (1998). Green developments have reduced capital costs. For example, by using a smart energy design, the mechanical systems can be downsized or even eliminated. Other ways of lowering capital costs include the use of low-maintenance native vegetation in landscaping, re-use of abandoned buildings, and eliminating the

Research Results

perimeter heating system by designing a high-performance building envelope. Not only can developers save on capital costs, but owners can save on operating costs. With a greater emphasis on efficiently using resources, green developments have lower operating costs. Savings can be applied to the lower amount of energy used, reduced water demand, lower maintenance requirements, and reduced waste generation. For a business, these savings affect the bottom line and increase the net operating income. Monetary benefits can also include higher premiums and absorption rates.

Saving money is not the only

benefit that a green development has over the regular. By designing green, developers and owners have gained marketing benefits from the media approving of the project and promoting it. “Positive press coverage is the best kind of press” (Rocky Mountain Institute et al., 1998).

Approvals of a development can speed up if the project gains the early respect and support from the community. This, along with avoiding legal delays, is becoming an important element of green development. By responding to the environment and occupants of the development, one can reduce the risks of litigation, liability, and natural

disasters. These same decisions can also improve the health and productivity of those who work in the development. According to a study by the Rocky Mountain Institute et al., (1998) “productivity gains of 6 to 16 percent, including decreased absenteeism and improved quality of work, have been reported as resulting from energy-efficient design.” By gaining these benefits and responding to the whole environment, developers have the satisfaction of doing the right thing.

The market for green development continues to grow. Americans are more aware of the connection between the natural environment, social environment, and overall

Research Results

quality of life. They now view “lots of natural open space as essential or very important” (Rocky Mountain Institute et al., 1998). Several surveys have been taken to confirm this issue. The city of Tucson, Arizona, surveyed 300 heads-of-households when promoting a mixed-use, environmentally responsible development. About 60% found the concept of an energy-efficient community appealing.

With all the popularity, profitability, and marketability, why aren't all developments green? The Rocky Mountain Institute et al. (1998) supposes that there is a lack of awareness and understanding of the opportunities a green

development creates. There are also those who view new concepts as financially risky. There are a few more barriers that prevent or inhibit a green development, but mostly if all involved are well informed about the benefits, process, and outcomes of a green development, we will see a continued growth in the concept.

Research Results

Western North Dakota Economic Growth

In recent years, western North Dakota has seen a huge growth in economic activity due to the extraction of oil from the Bakken Oil Shale Formation. According to Bakken Oil (2011), oil was first discovered from the formation in 1951. Until recently, the extraction of that oil has been limited by technology. Recent technological advances such as horizontal drilling and hydraulic fracturing have increased the amount of oil by astonishing amounts. In 2008, USGS estimated that there were 3 to 4.3 billion barrels of technically recoverable oil in the formation.

The increase in production of about 458,000 barrels a day and the increase in technology has led some experts to conclude that the USGS estimate is quite low and a new estimate of 24 billion barrels of recoverable oil has been recorded. However, USGS and the State of North Dakota still believe the lower range is more realistic. (Bakken Oil, 2011)

The activity in this area has been beneficial and detrimental to the surrounding counties and communities. Western North Dakota has seen population and economic growth. Young people are moving to the area because of the increased job opportunities

and businesses are seeing an increase in customers. However, not everything can be good. The increased truck traffic in the area is wearing down roads not suited for the added weight. Road safety has become an issue in many parts of the region, and the infrastructure in most towns cannot support the large population growth. In response to the impacts of gas and oil development, the state of North Dakota has committed \$1.2 billion during 2011-13 to meet the region's needs. Governor Jack Dalrymple stated:

The remarkable growth in western North Dakota's oil and gas industry has created great

Research Results

benefits and opportunities for our state, but this growth brings its own challenges. Our progress is not without hardships, but we are fully committed to meeting the challenges of rapid economic growth. (More than \$885 million..., 2011).

During the first four months of this period, \$312 million went to North Dakota's oil-producing counties to help fix roads and other projects. The other \$885.3 million remains to be distributed. This funding would go towards rebuilding and repairing county, township, and state roadways; extending city streets and utilities for residential growth; addressing growing student

enrollments; expanding and upgrading municipal wastewater treatment systems; and enhancing law enforcement, other emergency services and regulatory oversight. State legislation also approved \$15 million for the state Housing Fund, \$35 million to the Energy Impact Fund, and directed an additional 13 Highway Patrol troopers to be stationed in the region. (More than \$885 million..., 2011)

To determine where the remaining \$885 million will go, state representatives held meetings with county leaders across the state. A meeting was held in January 2012 in Bowbells to discuss the impact of gas and oil development and

plans to address any problems. This meeting was also a time where county officials, area city representatives, and business representatives can voice concerns relating to the issues discussed. Kiara Crosby (2012b) from the *Burke County Tribune* reported on the discussion held that day. Transportation was a major issue discussed during this meeting. The Department of Transportation shared plans to rebuild and repair Highway 8 and Main Street in Bowbells. The project will include new asphalt, ADA ramps, and at the request of Dan Linster, mayor of Bowbells, crosswalks for students. During the meeting, it was determined that the parallel

Research Results

parking on Main Street is the safest solution for such a busy road. Other concerns with transportation dealt with road safety, including truck lights and speed limits. Another issue brought up for discussion Crosby (2012b) says was water supply. The demand on water has been greatly increased with the growth of the oil industry. Some towns have begun to sell water to companies. The concerns were about new developments and keeping a monthly report on water use. The last large issue the group discussed was the need for affordable housing. North Dakota's answer to encourage people to invest in housing is the Affordable Housing Incentive, which provides

income tax credits for those who develop affordable housing. The state also encourages multi-family housing. Two communities shared their housing developments with the group. Bowbells currently has increased sale of homes, building permits for modular homes, and FEMA trailers. Individuals are providing dormitory housing, apartments are being renovated, and the motel is housing temporary employees. Powers Lake has developed housing as well. Crosby (2012b) says other issues were brought up toward the end of the meeting and both citizens and officials benefitted from sharing best practices and concerns. This discussion and others like it held in

seven other communities will help the state determine how to distribute the remaining \$885 million during 2011-13 (Crosby, 2012b).

Research Results

Burke County

As the gas and oil development in the area continues to grow, Burke County residents are gathering together to discuss their concerns, views, and opportunities. In June 2011, Burke County hosted USDA Rural Development's Kathy Coyle for a visioning session to discuss the future of the county. The USDA Rural Development provides financing for housing, community facilities, infrastructure, and business loans and grants. It helps generate jobs, build or revitalize social amenities like infrastructure and housing. And finally, it strives to improve the quality of rural life. Monisha Shrestha (2011)

described the session as a place where citizens could voice concerns and brainstorm to solve problems. Weaknesses in the area discussed were housing, stores, water quality, demolition of old buildings, infrastructure, youth involvement, community gathering/entertainment center, Laundromat, and other business needs. Strengths mentioned were work ethic, economic boost from oil, highway location, and Portal as a major border crossing. The groups discussed opportunities for the area such as potash plants, a county-wide investment group, demolition of dilapidated buildings, community centers, housing developments, and adding new

businesses, (Shrestha, 2011).

A number of projects across the county have been started to address community needs. Powers Lake (2011), a city 34 miles southwest of Bowbells, has been prospering in the wake of the oil boom. Royalty checks and high paying jobs are allowing residents to clean up the city, paint and repair buildings, and remove older dilapidated buildings. The city took on a new major sewer and water line replacement project and now has a new well and water loading facility in response to the high water demand from oil companies. This facility is on the outer edge of town to reduce truck traffic, (Powers

Research Results

Lake, 2011). Lignite, located 22 miles west of Bowbells, had a group of investors come together to reopen their grocery store. The store, according to Crosby (2011a), now includes a deli section and bakery, fresh breads and sweets, to-go meals, chicken rotisserie, and a drinking water machine. After some renovation, new countertops, freezers, and paint, the store now serves the community five

days a week, (Crosby, 2011a). Communities are not the only places where projects to address the impacts of the oil boom are taking place. North Dakota's Department of Transportation is approaching the 2012 reconstruction of North Dakota Highway 8, which runs through Bowbells and heads south. This road is currently very narrow and has numerous turns that are sometimes unsafe. The department plans to fix this problem by widening the road to 12 foot lanes with 6 foot shoulders, realigning the curves, and repaving the urban section through Bowbells complete with gutters and ADA accessible ramps at the corners, (Crosby, 2011b)

Research Results

Future of Bowbells

Established in 1906, Bowbells has become an important community in Burke County. While other nearby communities suffered, Bowbells was able to maintain its importance because of it being the county seat and having well developed businesses. There hasn't been question of a future for Bowbells as a community but more of a question about the businesses' and the local school's futures. With larger farms, Bowbells has seen a steady decline in population. The town has also seen a decrease in younger families that directly affected the atmosphere of the school. Class sizes are quite small and some

parents chose to enroll their children in a larger school nearby. Within the past few years, Bowbells has lost some key businesses and amenities, including the local grocery store, auto repair shop, and the public pool.

Beyond the past events, the increase of oil activity in western North Dakota has been beneficial to the community. There is now an increase in younger adults in the smaller communities because of oil field employment opportunities. Most residents and workers are temporary, but Bowbells Mayor Dan Linster hopes to see this as a stepping stone into permanent housing (personal communication,

October 20, 2011). Another benefit is oil companies might be big investors in new developments, especially housing which could benefit their employees, but the oil industry in the area comes with some problems as well. Residents living on Main Street are upset with the amount of oil trucks passing by and the noise that comes along with them. Some residents are moving into houses further away from this annoyance. New residents do not have the pride and ownership of the town as older residents do, and Bowbells is losing its small, clean, and friendly atmosphere. So far, no major commercial development has been planned or constructed in town, but Linster believes it will

Research Results

follow within the next few years. The town itself has some problems for new structures and traffic as well. The lagoon is much too small for a significant amount of growth and many other kinds of infrastructure need to be improved. The city has plans for the water system to be replaced and upgraded. The city council is also looking into a bio-degradable system for sewage to resolve the lagoon problem. In 2011, the city adopted a new zoning and land use code (D. Linster, personal communication, March 17, 2012).

As Bowbells looks into the future, a few things need to be considered. Number one, people will need to step forward and help the

community by rebuilding Main Street and developing housing. There are groups stepping up for many reasons. A group of people got together a couple of years ago to start “Save Our Swimming Pool” or “SOS.” After finding a crack and closing the pool, they raised money to fix the pool. Last year, members of the Bowbells Recreation Commission found that the pool

Top Right: The Bowbells swimming pool has been reduced to a large hole. Right: A number of oil trucks crossing the railroad tracks adjacent to the project site.



Research Results

suffered from many more cracks and had to close the pool for good. Now the group is raising more money for a new pool. Estimations range close to \$300,000. Others in the community are renovating buildings along Main Street as temporary housing. A couple is renovating and restoring the bunkhouse and hotel as well. This is a good start, but the town will also need core businesses like a grocery store, a daycare, an auto repair shop, and a café. These additions to the town should attract people for the long run. Another important issue for residents to remember is that accepting new people and new ideas in the community is important for Bowbells's future. Some of the

people who have stepped up to do something good for the community have been continuously challenged with negative comments. New people will be moving into town, and it is vital that current residents welcome them. As Linster wrote in a letter to the editor, "We need people to sustain any form of retail business, be it a grocery store or some other retail business." (Linster, 2011) Bowbells, North Dakota, will have a bright future as long as new and old residents are willing to step forward to help the community and are open to new ideas. The new developments will have to support the needs of the community and the surrounding areas.

Research Summary

Rural communities in western North Dakota have an opportunity to take advantage of the impacts from the recent oil and gas development. Towns are increasing in population and more people provide more businesses and opportunities. With the growing population, school class sizes are larger, more residents are involved with the community, and more community events are taking place. Economically speaking, the state of North Dakota has committed \$1.2 billion to the area to address the negative impacts from the oil boom. From 2011 to 2013, the state will disperse the money to oil producing counties to build or improve roads, infrastructure, housing, and public safety. By

meeting with county leaders, the State representatives can choose where and how the \$885 million will be distributed. This gives the communities in the area and North Dakota the opportunity to base decisions on the socio-economic needs of the region.

Burke County residents have met to discuss what the county needs now and in the future. The area needs housing, better water quality, community gathering centers, and laundromats. It also needs to repair its infrastructure and demolish old, condemned buildings, (Crosby, 2012b). With their strong work ethic and economic boost from oil, county residents can start to

address socio-economic needs like community centers, grocery stores, retail shops, and housing developments. Many of the communities in Burke County already have projects that satisfy socio-economic needs, such as Powers Lake's new well and water facility, Lignite's grocery store, and Bowbells's temporary housing. Even North Dakota has plans for the county: the 2012 reconstruction of Highway 8.

Bowbells in particular has lost some of its key businesses over the years and will have to focus on getting them back. The city already has plans to improve the infrastructure of the town to support these new

Research Summary

projects. People need to step up and take on projects like rebuilding Main Street and providing housing. A new development will have to incorporate one or more of these community needs until all needs are satisfied.

A strategy for this new development is to be green and integrate choices considering the environment, social impact, and financial goals. This will not only satisfy the socio-economic needs of the community, but will also respond to the environment. The design and construction should restore and enhance the natural environment. This type of design will establish connections between people, places, buildings,

and nature, illustrating that “nothing exists in isolation” (Rocky Mountain Institute et al., 1998). For green development to be a part of the future in Bowbells, people will need to be educated on the financial benefits because most people believe that “green” is financially risky. In reality, a well planned green development will have reduced capital costs and operating costs. Green development is a great opportunity for rural communities to satisfy their socio-economic needs in a way that benefits the environment with a limited amount of funding.

Case Study: DC Townhouse

Bottom Left: The front view of the townhouse.
Bottom: The back entry to the townhouse
(Cadtopia, 2010).



This townhouse in Chinatown, Washington, DC, is a small-scale mixed-use project. Architect Robert M. Gurney renovated the former commercial space to include a ground floor commercial space and a two-story town house. The house's façade was kept as close to the original historical façade as possible to respect the local context. To allow more light into the space, the architect redesigned the alley façade. Despite its long, narrow footprint, the house is full on natural light due to skylights and an open floor plan, both horizontally and vertically. This house also provides an outdoor living space up on the roof. After completion in 2010, the house won an AIA National Honor Award and in 2011 received an American Architecture Award (Cadtopia, 2010).

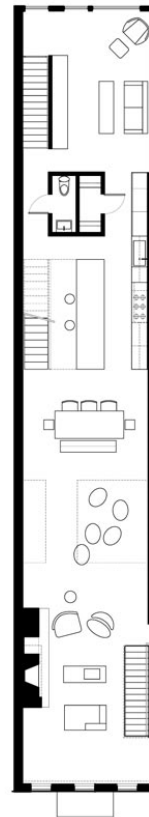
This house has a total of 5,400 square feet including the commercial space. The commercial space spans the ground floor with approximately 1,800 square feet. There are separate entrances for

Case Study: DC Townhouse

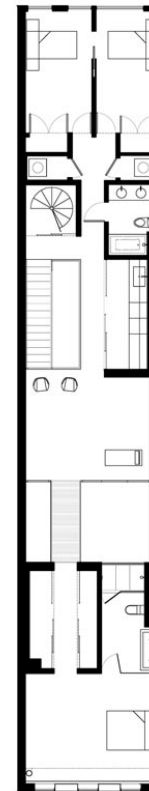
the residential space, making the commercial space a bit smaller. The upper floors are the 3 bedroom, 2 ½ bath townhome. To make the place more spacious, this area has an open floor plan. The only spaces with doors are bathrooms and bedrooms. The kitchen lines one wall while the staircase circulation is along the other wall. The circulation spaces, along with a 12-foot opening the width of the building on the third floor, are areas where natural light can reach through the spaces.



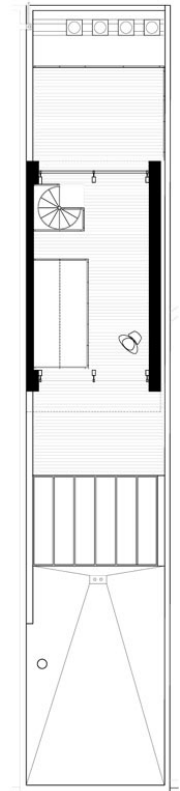
FIRST FLOOR PLAN
12 8 16



SECOND FLOOR PLAN



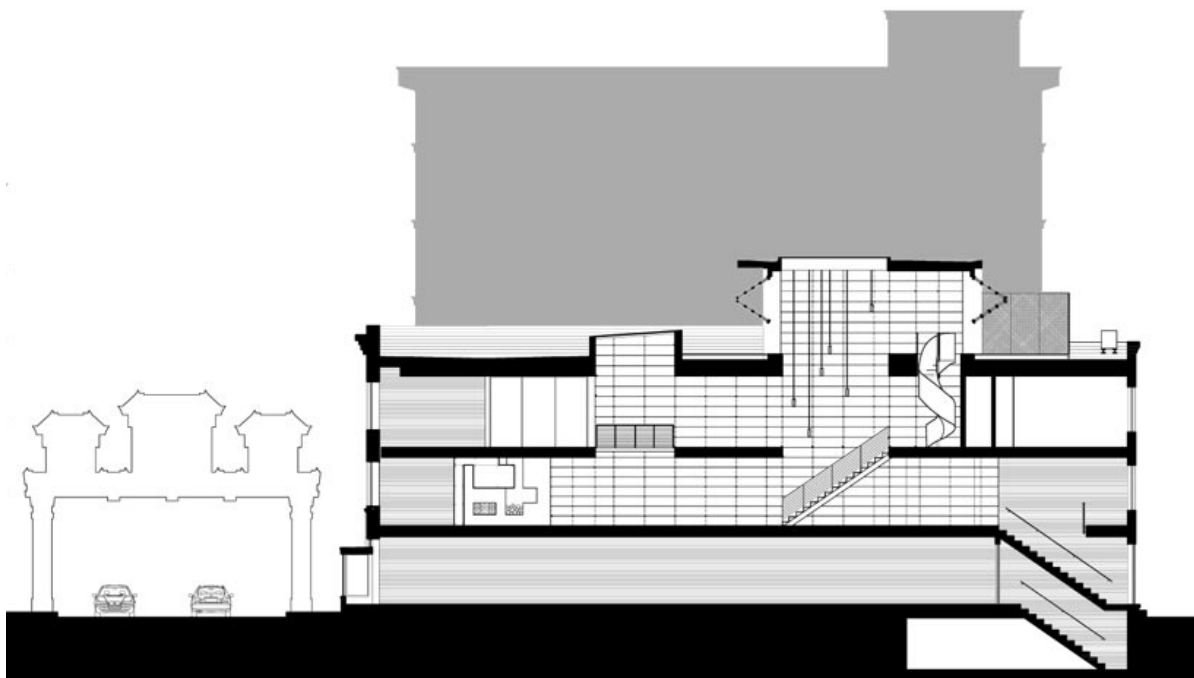
THIRD FLOOR PLAN



ROOF DECK PLAN

(Cadtopia, 2010)

Case Study: DC Townhouse



Section



Front Elevation

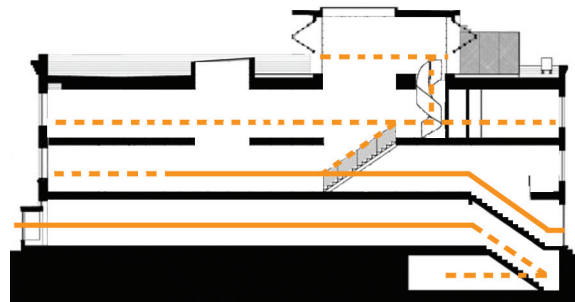
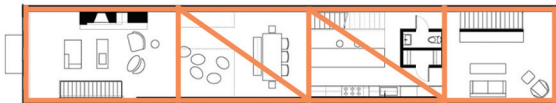


Back Elevation
(Cadtopia, 2010)

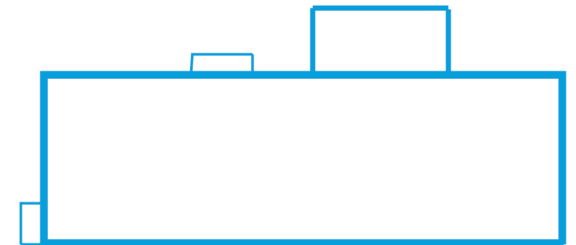
Case Study: DC Townhouse



Structure

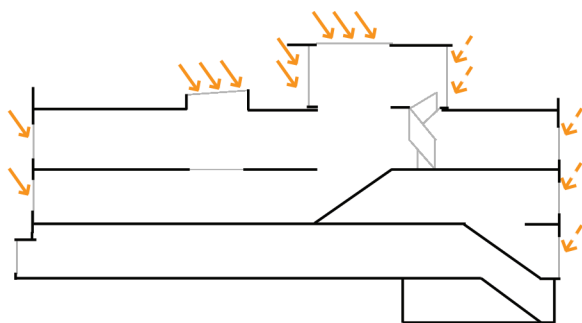


Circulation

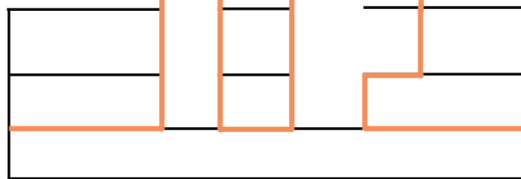


Massing

Geometry



Natural Light



Plan/Section



Hierarchy



Symmetry

Case Study: Cherokee Studios

A front view of Cherokee Studios' moving shutter (Building Green, Inc. 2011).

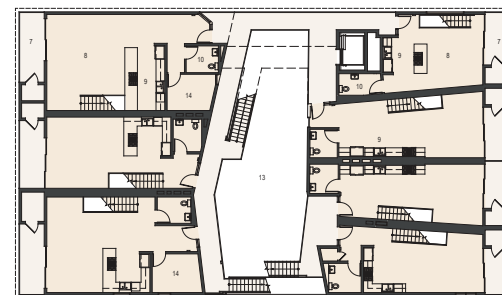
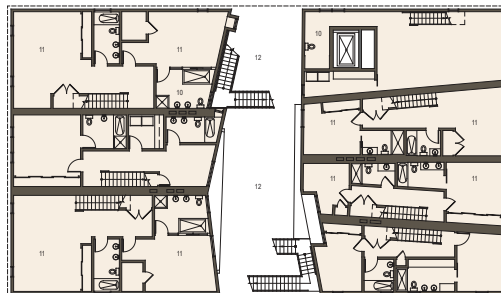
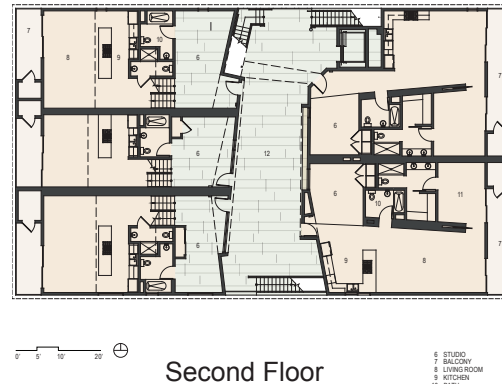
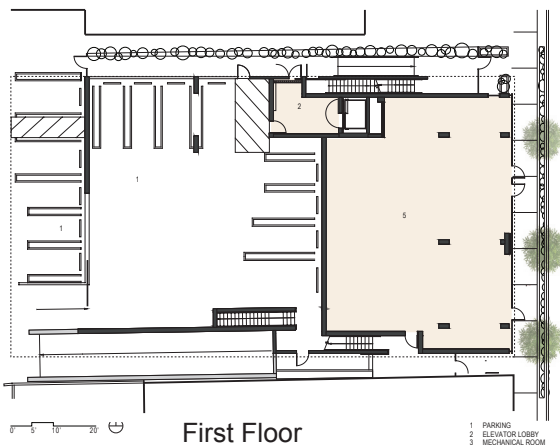


Cherokee Studios in Los Angeles, California, is an urban infill, mixed-use, market-rate housing project designed to incorporate green design. Architects of Brooks + Scarpa made a commitment to minimize the building's ecological footprint. Cherokee Studios boasts an owner-operated shading system. By opening and closing these "shutters," occupants of the building can change the façade on a whim. This screen allows privacy, views, shading, and thermal comfort (Building Green, Inc., 2011). This complex shading system is not the only strategy used to make this building "green." The design team also employed other strategies such as orientating the building to control solar cooling loads and for exposure to prevailing winds. They also designed windows to maximize day lighting and natural ventilation. The inner courtyard that cuts through the residential floors allows more natural light and natural ventilation in the apartments. As of April 2011, the building was pending LEED Platinum certification and

Case Study: Cherokee Studios

was awarded AIA/COTE Top Ten Green Projects in 2011.

The size of Cherokee Studios is approximately 32,000 square feet. At ground level and below grade, 10,600 square feet is allocated to both residential and commercial parking. This project incorporates around 2,400 square feet of retail space that faces the street. On the upper three floors, residential apartments of varying sizes take up the bulk of the superstructure. At 17,740 square feet, this area includes 12 apartment units ranging from a studio to a 3-bedroom apartment. The outdoor courtyard on the second floor not only serves as a source of ventilation and sunlight, but also serves as the main circulation between floors (Building Green, Inc., 2011).



Images made available by Brooks + Scarpa Architects, Inc.

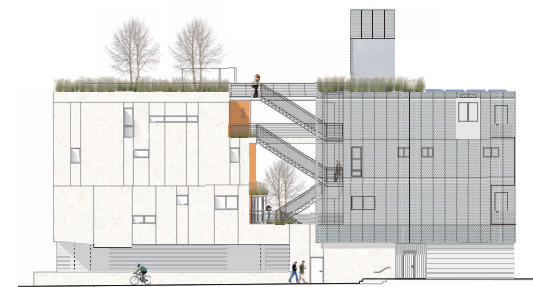
Case Study: Cherokee Studios



Section



West Elevation



South Elevation



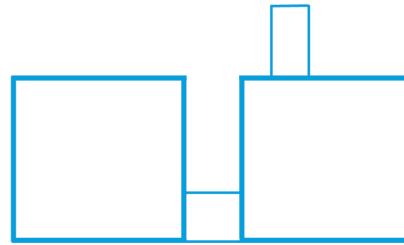
East Elevation



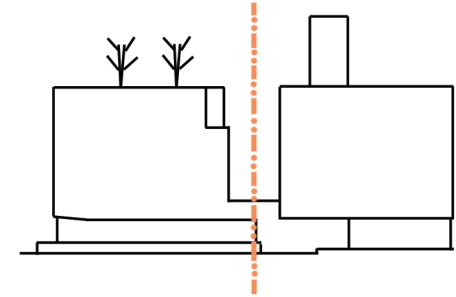
North Elevation

Images made available by Brooks + Scarpa
Architects, Inc.

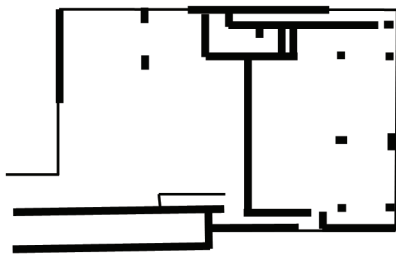
Case Study: Cherokee Studios



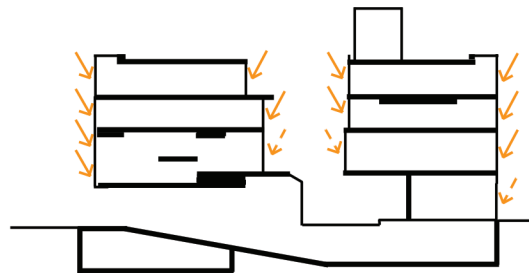
Massing



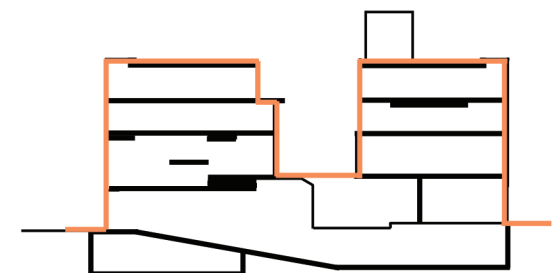
Balance



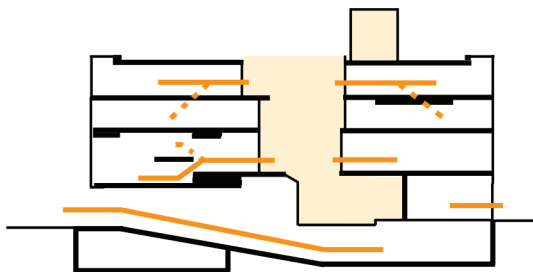
Structure



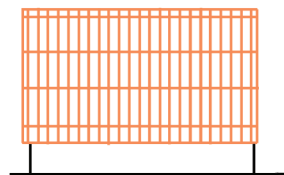
Natural Light



Plan/Section



Circulation



Geometry



Hierarchy

Case Study: Sweetbriar

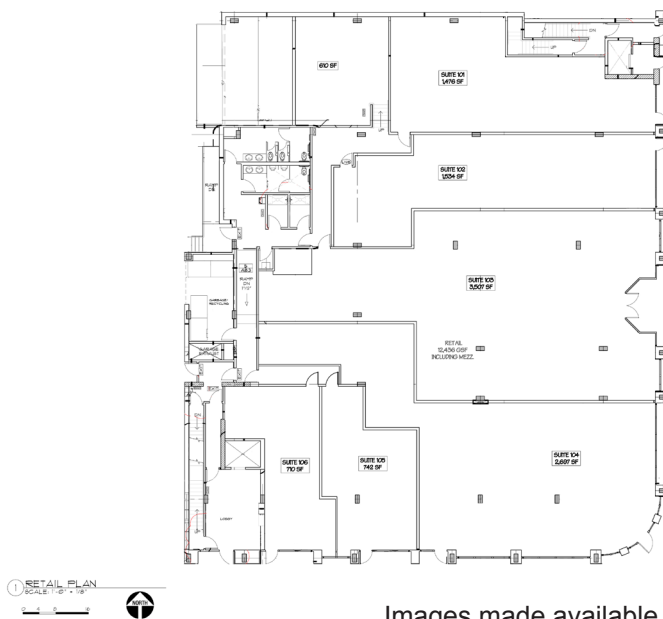
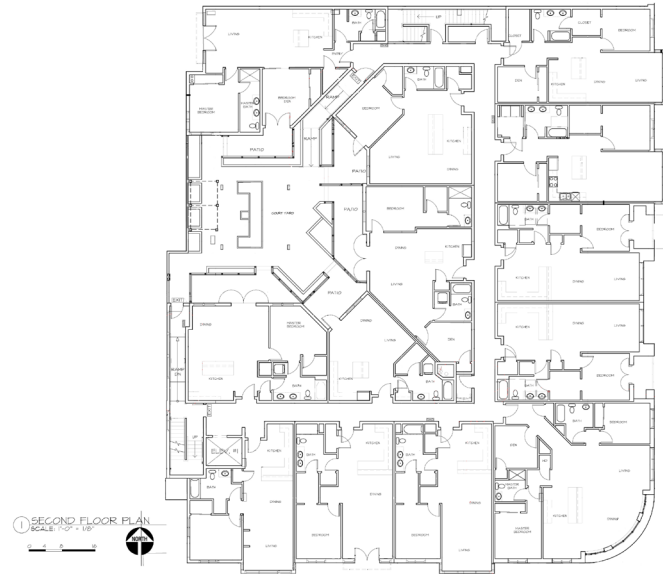
Corner view of Sweetbriar, (Tiscareno Associates, (2012).



Sweetbriar is a mixed-used development in the Queen Anne shopping district of Seattle, Washington. The architects at Tiscareno Associates designed the building to promote the pedestrian friendly atmosphere in this area. Aaron Swain (personal communication, December 1, 2011) of Tiscareno Associates said that special attention was paid to the massing of the building in order to break up the wall façade and create an image of a number of smaller buildings instead of one big building. Canopies and landscaping were focused on creating a walk able site and to add a human scale to the building. Some sustainable strategies used are double-glazed windows, recycling building materials on site, using recycled materials for the floor, and a centralized boiler to provide hot water & heat to all the units. It is a very efficient system for the Pacific Northwest climate. Originally planned to be LEED certified, Sweetbriar did not receive certification due to cost.

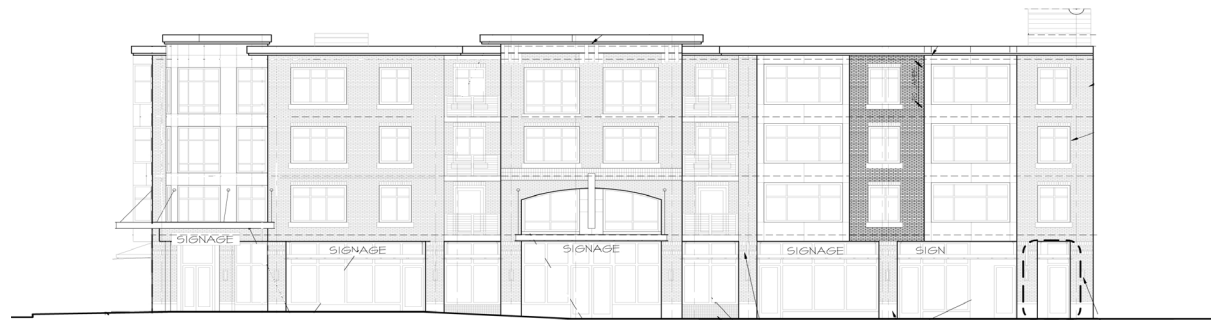
Case Study: Sweetbriar

This development includes retail spaces as well as apartments on the upper floors. Parking for both is below grade with about 80 parking stalls, half of which, Swain tells me, are still usually empty. The retail spaces are on ground level for easy pedestrian access. There are six retail suites to include a total 12,436 square feet of retail. Each floor above has thirteen units for a total of 39 apartments. They range from studios to two bedroom apartments. Total residential square footage is 35,555 square feet. The residential portion also includes an upper courtyard on the second floor to bring light into the inner apartments and gives outdoor space to residents.

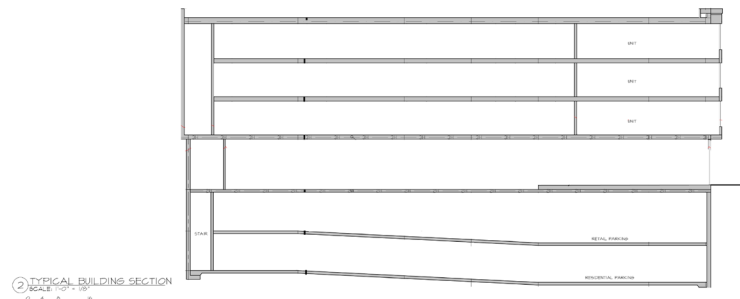


Images made available by Tiscareno Associates

Case Study: Sweetbriar

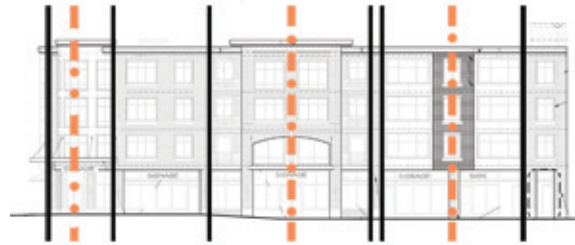


① EAST ELEVATION
SCALE: 1/8" = 1'-0"

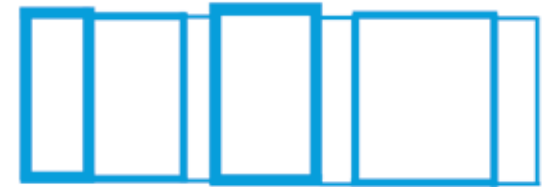


② TYPICAL BUILDING SECTION
SCALE: 1/8" = 1'-0"

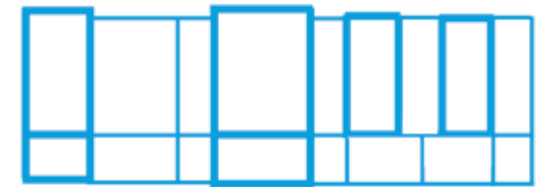
Case Study: Sweetbriar



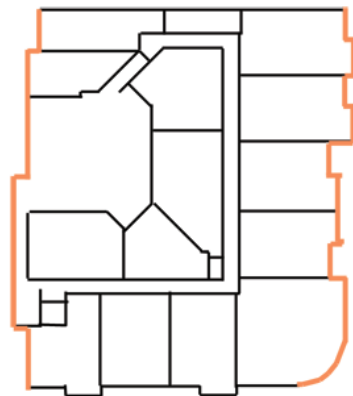
Symmetry and Balance



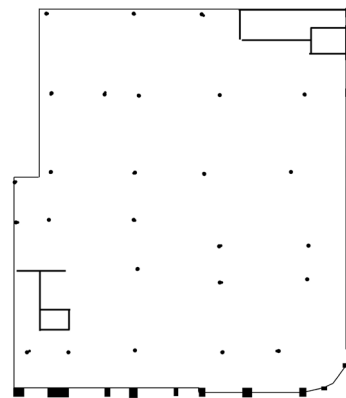
Massing



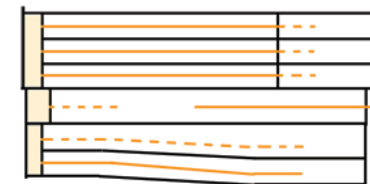
Hierarchy



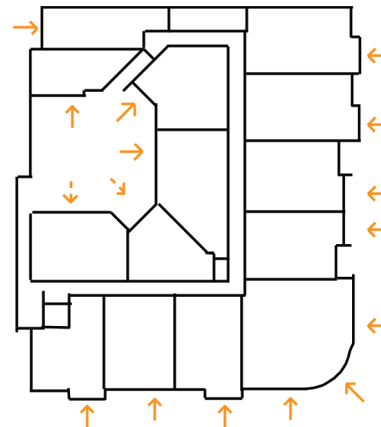
Plan/Section



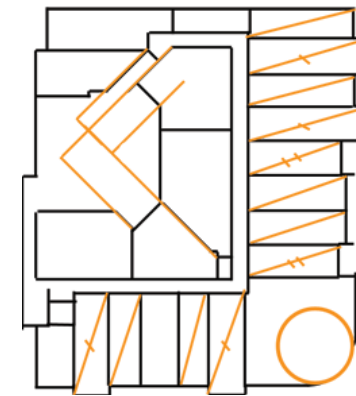
Structure



Circulation



Natural Light



Geometry

Historical Context: City



In 1893, the Soo Railway company laid tracks from what is now Bowbells to Portal and on into Canada. In 1895, Jimmie Buzzell, section foreman, erected the section house which became the first building in Bowbells. “Towns along the railroad were named by the English stock-holders in the

company.” (Clark, 1972). Bowbells is named after the Bow Bells in St. Mary-Le-Low or Bow Church in London, England. In 1896, the Federal Survey came and laid out the section lines. Immigrants came in train cars in the year 1897. Some of these cars were used as housing and stables for livestock until settlers could build their own. Later, the railway built two 100-foot by 16-foot sheds called immigrant sheds. These sheds were partitioned into 10 rooms each. Most of the houses were made of sod. Sod from a slough was plowed two to three inches thick then cut and placed like bricks. The walls were 36 inches wide at the bottom and tapered to 26 inches at the top. A wooden



Top Left: North entry vista upon entering Bowbells.
Left: The Bowbells post office located on Main Street.

Historical Context: City



framed roof was made from the sparse trees and “shingled” with slough grass and hay. In 1898, the first school house, a tarpaper shack, was built a few yards south of the railroad.

Mr. John Harry filed his homestead papers for the site, which is now



Top Left: The John Burke Memorial located in the city park with a view of the Bowbells water tower. Left: The Burke County courthouse which was completed in 1928.

Bowbells. In 1899, it was sold and surveyors were sent to layout the first eight blocks. It is an interesting story as to why surveyors chose to orientate the town diagonally.

One day, John Lesh, who lived in the section house and used his rig to take people out to look over the land before they filed on it, had a break down when crossing the tracks. He complained to the station master of there being no crossing. Mr. Irwin, depot agent, instructed Jimmie Buzzell to make a temporary crossing, which was done immediately. Jimmie split a few ties and threw some dirt up around the tracks, making

Historical Context: City

a crossing where it is today. When the surveyors arrived here they had some discussion as to where to start the survey, and with a little argument from Jimmie at was agreed to leave the crossing where it was and start the survey from this point (Clark, 1972).

The city of Bowbells was formally established in 1906. It was a prosperous city of about 500 people. The town became the seat of Burke County in 1910. The old school was used as the first courthouse until it was destroyed in a fire in 1925. The city park is now located where the courthouse perished. In 1927, the cornerstone of the new

and current courthouse was laid. The courthouse was designed by architect and engineers Toltz, King, and Day of St. Paul, MN, and constructed by Olsen & Orheim of Minot, ND. The red brick fireproof construction cost \$125,948. It is 98 feet by 57 feet and 2 stories tall with a full basement. It was completed in 1928 and dedicated on June 18, 1929, followed by a big celebration of 3,000 people from across the county.

In 1913, the Great Northern Railway came through Bowbells creating the two different rail lines sandwiching the town. Both rails operated passenger trains at the beginning of the 1900s but no

Bottom: The Memorial City Hall was built in 1951.



Historical Context: City

longer do. In 1920, electric lights were installed within the town (Zook, 1989). When the depression hit the city, most businesses had to close and farmers in the area went broke and moved away for better opportunities. The park was named “World War Memorial Park” in 1932, but residents just call it “the park.” The 1940s sparked a new life for the residents of Bowbells. The machine age brought bigger farms and fewer businesses, but the population stayed quite steady. In 1951, Memorial City Hall was built in commemoration of the Second World War. In 1952, the school got a new addition of a home economics room and music room. In 1962, the city commissioned a new pool to be

added to the park, and in 1964, the high school portion of the school was built (Zook, 1989).

The city celebrated the centennial of North Dakota in 1989 and its city centennial in 2006. Today, Bowbells is a growing city once again with opportunities arising from the nearby oil boom. Its residents and governing body are establishing a future for the community by looking into and creating new opportunities.

Historical

Context: Projects

Across the state, many residents are finding opportunities for social and economic growth. *Renewing the Countryside: North Dakota* (2003) is a collection of stories of people finding solutions to the problems their communities are facing. One such person is Jody Doe, the owner of Killdeer Pharmacy. The town of Killdeer spent nearly nine years without a pharmacy. Residents and people at the local nursing home had to travel to Dickinson, 35 miles away, for prescriptions. Doe's pharmacy remedied this inconvenience. Not only does he supply the town of Killdeer with its pharmaceutical needs, but thanks to a new law allowing remote pharmacies, he

can serve two other towns by video-link. The towns of Beach and New England are now served by Doe and the pharmacy techs located in each town. This advancement in technology and new law allowed Jody Doe to renew the life of each rural community involved (Bergan et al., 2003).

This book also includes stories of people who take advantage of what they have and make something with it. An example would be two ladies from Ray, a town a little over an hour from Bowbells, who developed a business selling gourmet foods. Their venture started out by planting vegetables to sell at a farmer's market but soon the sides like soup

and dip became more popular than the veggies themselves. The women soon turned their business into Thunderbird Ranch Gourmet Foods, selling soups, dips, rubs, and more. It is stories like these courageous people that will bring new life into rural communities across the nation. Their successes are proof that sustainable business and technological opportunities can exist in rural communities, but they are not necessarily recipes for success (Bergan et al., 2003).

Bowbells has seen an increase of building projects within the community. One project is the Bowbells Bunkhouse and Hotel. A couple originally from Spokane,

Historical

Context: Projects

Washington moved to western North Dakota because of job opportunities in the area (Crosby, 2011c). The couple started looking for houses or buildings with a bed and breakfast potential. After viewing the closed Bowbells Hotel, the couple bought the building and immediately started renovating and restoring. They first remodeled the bunkhouse in order to secure money for the hotel. They gutted it and put in fresh insulation, sheetrock, wiring, plumbing, fixtures, furniture and more. These four motel-style rooms are rented by the month and include an electric fireplace, refrigerator, Wi-Fi and TV—complete with Netflix, blue-ray, and cable. Also included is a weekly

cleaning service with laundry at an addition fee. Twenty-four hours after they were finished in August, the bunkhouse was booked until December (Crosby, 2011c).

The couple started restoring the building by removing old items from within the building and tearing out walls and flooring. Marble floors on the main level and hardwood floors upstairs were revealed when old carpets were torn out. By removing the drop ceiling, the owners found high ceilings and crown molding. The couple does not want this hotel to be oil field housing, but rather a small, upscale hotel as a getaway from the hustle and bustle of the boom. When done, it will

include three 2-bedroom suites, two 1-bedroom suites, and eight to nine bedrooms with community baths and showers. The building will be heated by a waste oil boiler to reduce waste from the building. As the restoration continues, the couple is looking for items to keep the era of the building authentic. After replacing windows, the roof, and other interior projects, the hotel will open on May 1st in honor of its first opening in 1930 and the day the couple saw the building (Crosby, 2011c).

Another project in Bowbells is called Main Street Housing. Two residents from Bowbells came together to renovate the interior of

Historical

Context: Projects

a building on Main Street formerly called “The Bow Zone.” Since October, the two men have gutted the interior and replaced windows. After demolition, the team began to rebuild the interior to have 13 dormitory-style rooms. These rooms will share seven community bathrooms and showers and a community kitchen, laundry, and, in the summer, a patio. The building will provide much needed long-term temporary housing for those working in the oil field (Crosby, 2012a).

Not only are people in the area working on projects within Bowbells, but an architect out of Washington has shown interest in working there.

James Rozanski has proposed a planned community within the city of Bowbells. The Bowbells Cottages are 20 bungalow-sized homes situated within the city. The cottages will take up less than 30% of the 3.5 acre site. They are designed and orientated to maximize the passive solar opportunities. Constructed from nontoxic, energy-efficient and low-maintenance materials, the planned community will be a green development. The firm also proposed a concept for oil field housing that resembles a barn. The purpose is to replace the man camps in a way that is more inviting. This barn for humans includes a series of loft units and one-bedroom units. The occupants will

share space in the central atrium and in the “silo,” which includes a kitchen, laundry, and multipurpose spaces. The structure is designed to be independent from the grid and other utilities. Photovoltaic panels, a gas powered generator, and a sewage incinerator are just a few qualities that will be used to accomplish this.

Historical

Context: Projects

My project will be a mixed-use building that will include a grocery store, deli café, business incubator, and housing units above. Bowbells does not have a grocery store at this time, and residents have to travel at least 16 miles to buy groceries. By having a store in town, residents will no longer have to travel so far and the downtown area of Bowbells will gain more business. The deli café will allow residents, workers, and visitors alike to meet for coffee, have soup and a sandwich for lunch, or just enjoy time in a friendly atmosphere. A business incubator will allow small business owners to have a secure place to conduct business. These units could be used as an

office or as a product booth. The housing will provide a more long-term residence for people who work either in the oil fields, at the elevator, or just in the area. The design will include sustainable strategies including rainwater harvesting, passive solar heating, and protection from the harsh cold winter winds and temperatures.

Project Goals

Academic

Besides fulfilling the requirements of the Master of Architecture degree, my hope is that my classmates, underclassmen, and professors will find this thesis to be informational and inspirational.

Professional

In the professional world, I hope this project will indicate my ability to perform research, make logical design choices, and accomplish a huge goal.

Personal

This project is really important to me. It is the first time I can really do something that I want to do with my degree and in my career: help those I love. By choosing to do this project in Bowbells, I hope to open the eyes of my family and friends, and, hopefully, by seeing what Bowbells could be like, they might strive towards something quite similar.

Qualitative Site Analysis

When approaching the site two words come to mind *tired* and *worn*. The site sits on a corner of Main Street that is busy and full of life. The site spans across four plots that create a rectangular grid set at a 45 degree angle from North. This will allow sunlight to hit each exposed wall. Since it is located on the



south corner of the block and there are no trees, most shade occurs in the alley, on the northern faces of the existing buildings, and on Main Street. Texturally, the area is rough with a grass and weed mixture of vegetation, brick, abandoned and naturally destroyed buildings, and surrounded by concrete and gravel.



The typography is quite flat and the buildings are usually one-story tall.

There are two buildings on site and both are in complete disrepair. Both are abandoned commercial buildings and will have to be removed because they are structurally unsound. The southernmost building is actually pulling away from the other, probably due to the southwest wall sinking into the soil. Beyond structure, both buildings have been exposed to the elements and are probably very unhealthy atmospheres. The brick

Far Left: This is the heavily damaged southwest wall. The brick course has bent and broken.
Left: The interior of the south building, the roof is collapsing, it is unhealthy, and beyond repair.

Qualitative Site Analysis

of the buildings might still be okay to use as something unstructured like landscaping.

Since the site is situated on the south side of the block, there is plenty of natural white light that is soft and warm during the fall through the spring or hot and vicious during

hot summer days. During the night, there are a series of street lights that surround the site. Because they are focused on the street, the lights don't completely fill the site with direct light and would cause little to no glare to future inhabitants.

It does get windy in North Dakota

and there is little that would obstruct the wind flow across the site. Only the northern winds would create an irregular flow across the site due to neighboring buildings.

In the past, people have used this site for business and sometimes recreation. Now, the site is rarely



Far Left: A close-up view of the southwest wall which is structurally unsound.

Middle Left: The south building is sinking toward the south so much someone could almost reach a hand in the gap.

Left: The north building or hardware store has seen better days, as it too has significant damage.

Qualitative Site Analysis



Top: A view of the western side of Main Street. The left most buildings are the existing building on the project site.

Left: A view of Main Street and the SunPrairie Grain elevator.

used and barely maintained. Around the site, people drive on the bordering streets and alley and walk to businesses on the north part of the block. There is street side parking that usually is only full at night when the bar next door is open. Because this site has not been maintained, nature has slowly deteriorated the existing buildings. On the micro level, a wall is sinking, a building is pulling away from the other, roofs are caving in, and the owners do not want to pay for demolition. On a macro level, some surroundings buildings are in a similar shape but some are kept in good repair and are well maintained.

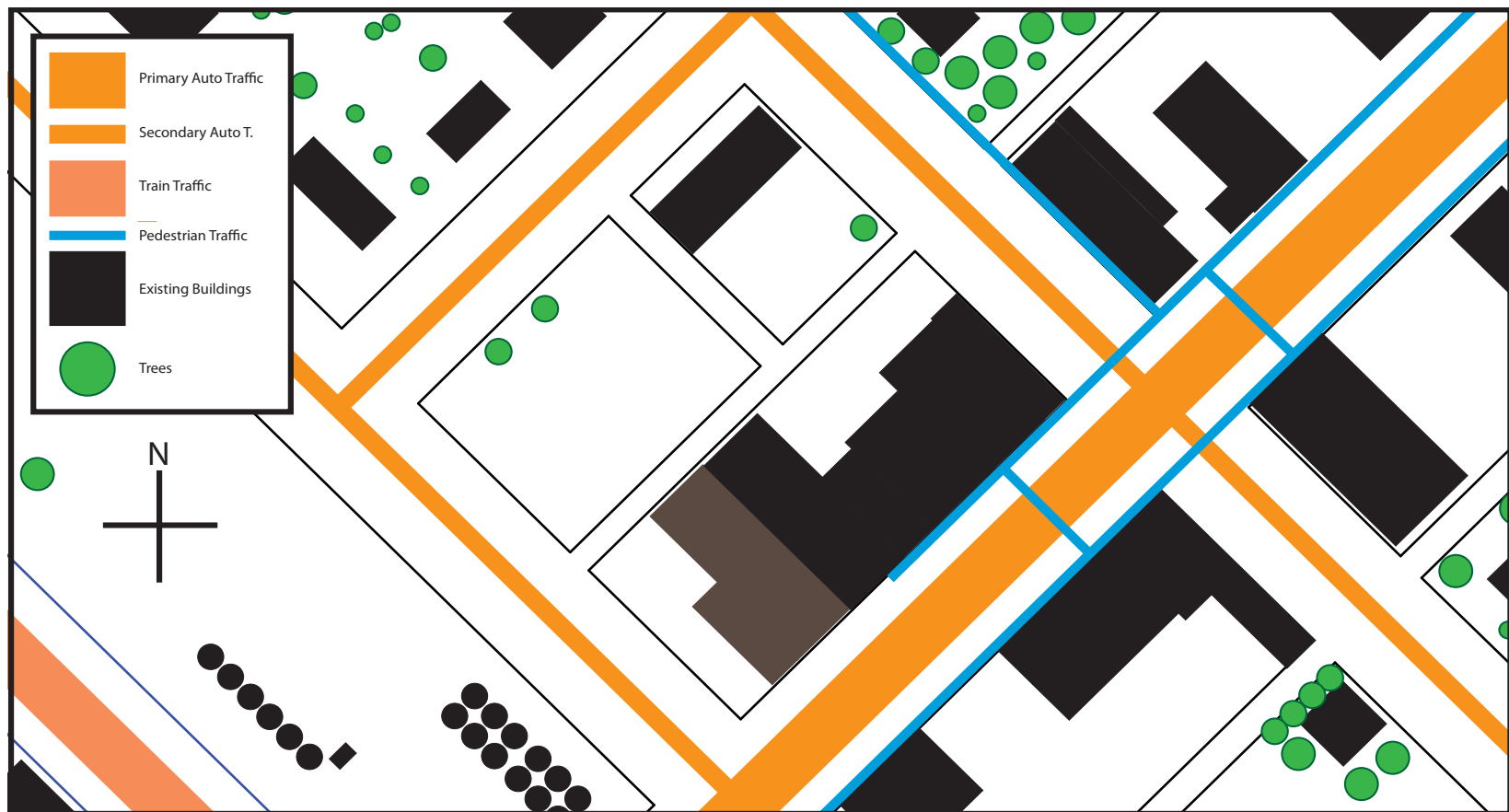
Quantitative Site Analysis: Maps



A map showing the the site's relationship to downtown Bowbells.

Quantitative Site Analysis: Maps

An analysis of the activity surrounding the site.

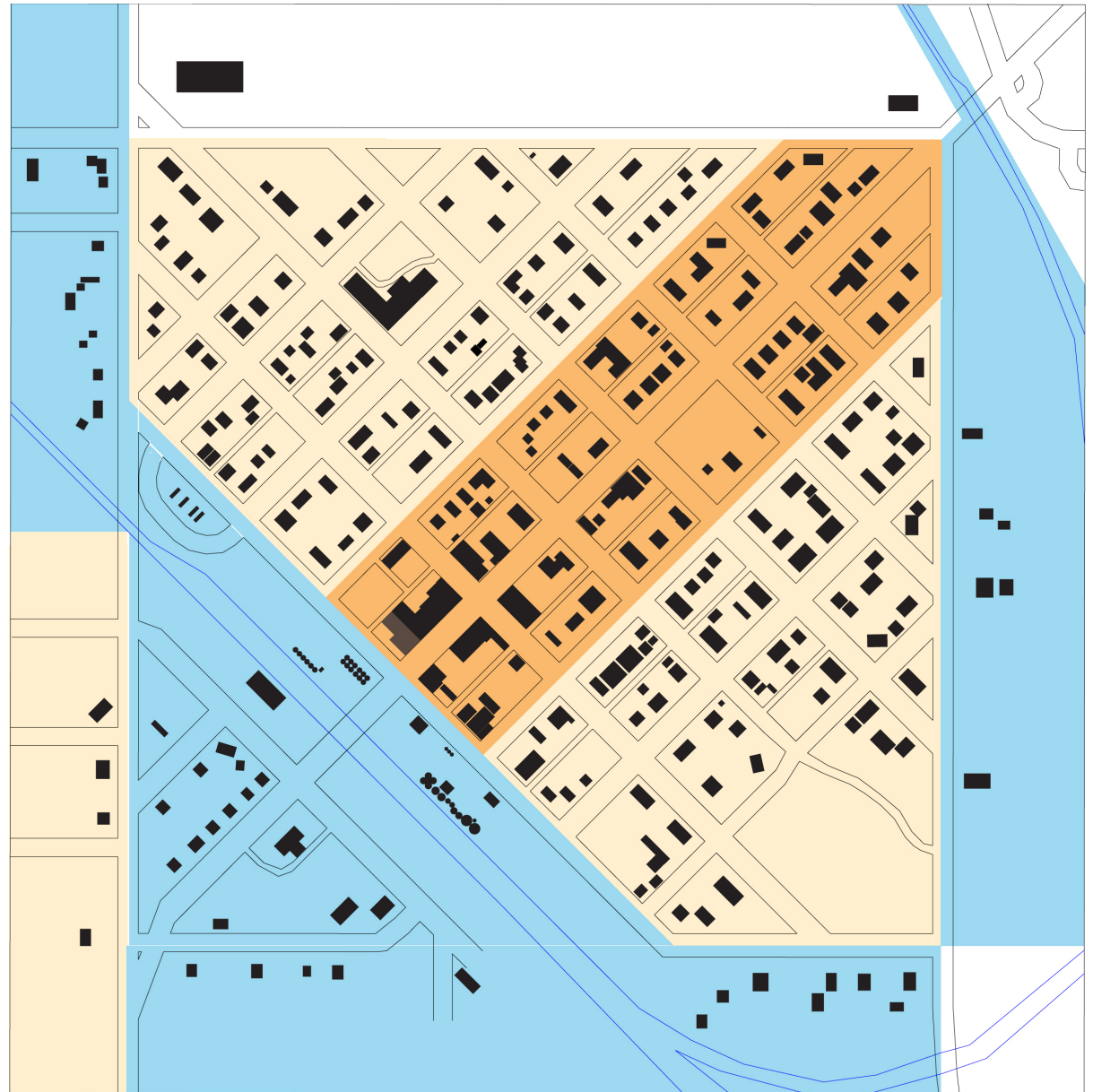


Quantitative Site Analysis: Maps



Map of Land Use and Zoning before the introduction of the new plan.

Quantitative Site Analysis: Maps



A map illustrating the new land use and zoning code developed by Kadrmas, Lee, and Jackson Engineering.

Quantitative Site Analysis: Soil

Soils

According to the Soil Survey of Burke County, North Dakota, the soil on my site is USDA Series 2023 which is a mixture of Williams-Niobell loams. It occurs on a 0 to 3% slope and has a typical profile of loam or clay loam. This soil will have some minor problems in building site development due to shrink-swell and freeze-thaw.

Water Table

The water table fluctuates throughout the year and is usually seasonal.

(SOURCE)

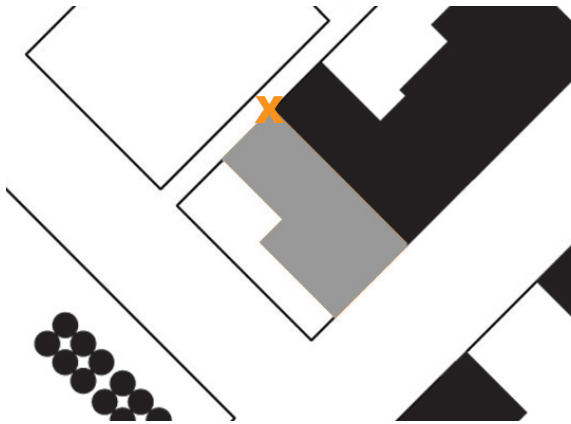
Quantitative Site Analysis: Site Reconnaissance



Left: View to North
Below: View to East



Above: View to West
Right: View to South



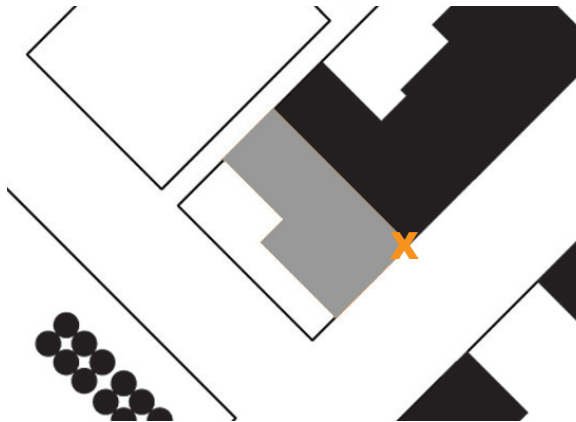
Quantitative Site Analysis: Site Reconnaissance



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Below: View to East



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Right: View to South



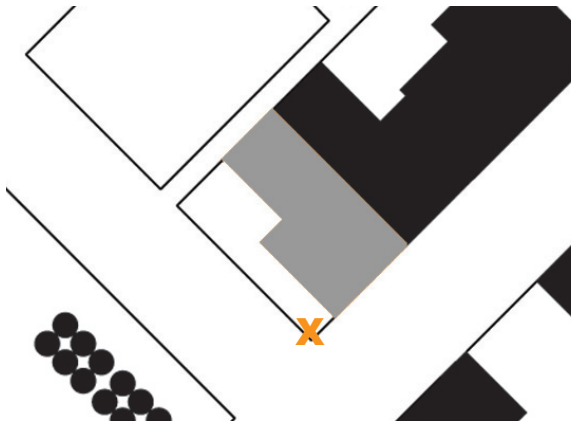
Quantitative Site Analysis: Site Reconnaissance



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Below: View to East



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Right: View to South



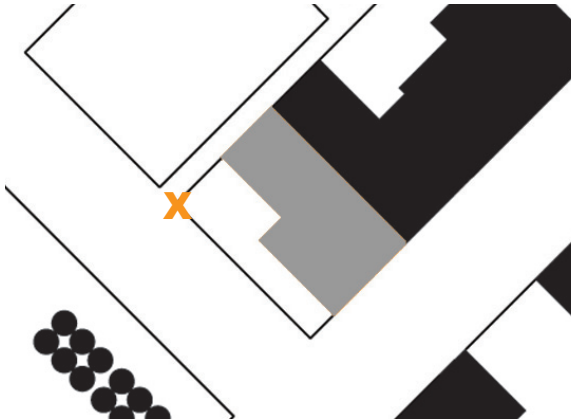
Quantitative Site Analysis: Site Reconnaissance



Left: View to North
Below: View to East



Above: View to West
Right: View to South

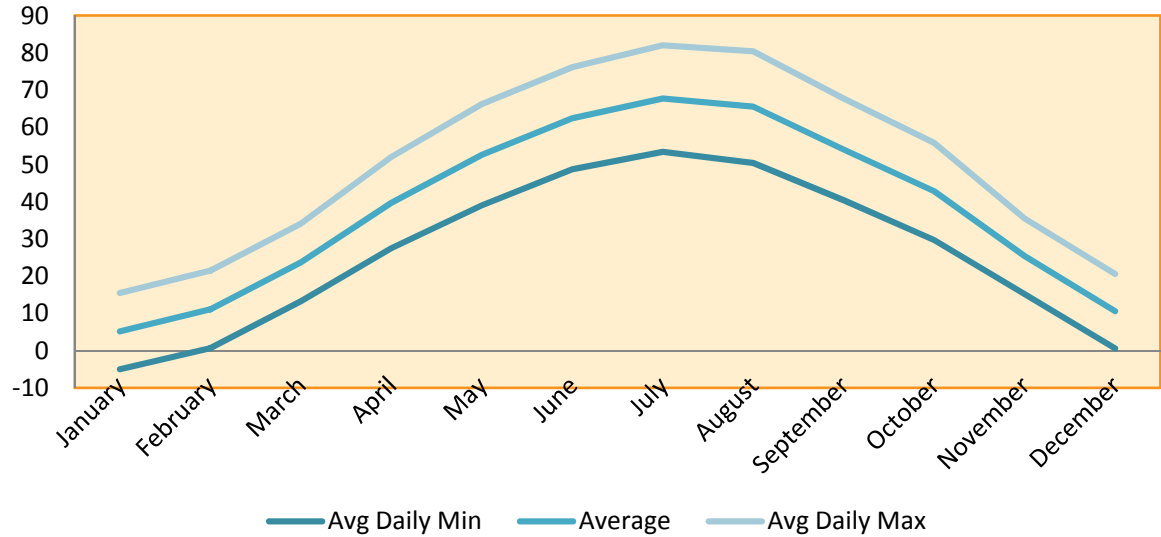


Quantitative Site Analysis: Climate

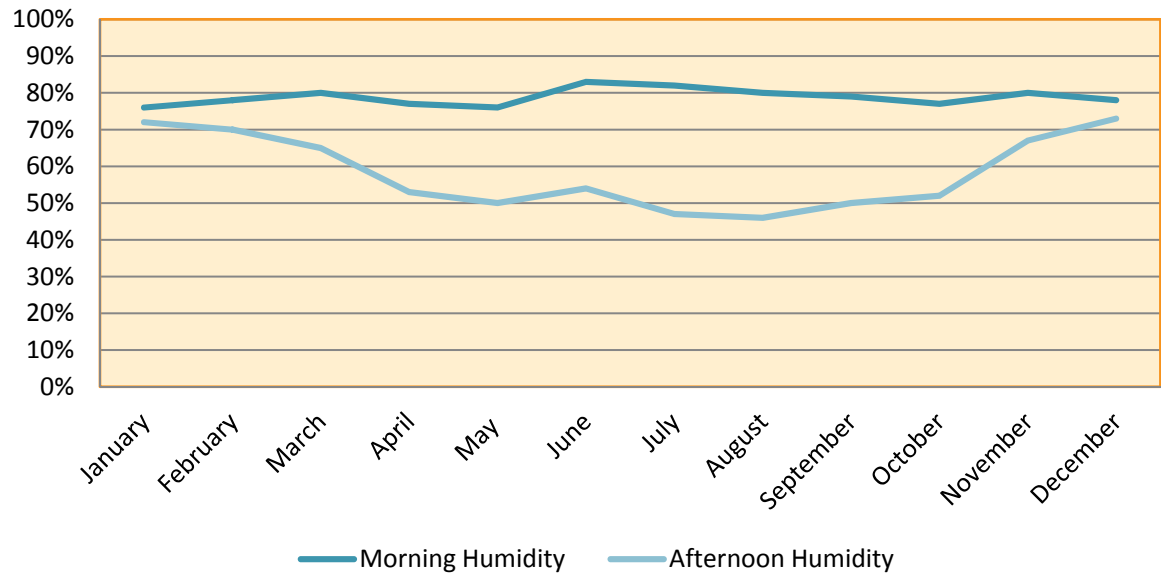
Bowbells climate has a high range of temperatures. Winters can be bitterly cold with average temperatures below zero. Snow is quite common and the winter winds can drop the wind chill to below negative 40 degrees. The summers, however, can get very hot, but summers and their hot days are very short. It is very important for a building to keep the heat inside and cold temperatures outside during the winter. Some strategies to do this include:

- Using a compact design with a minimum surface-area-to-volume ratio
- Building attached or clustered buildings
- Minimizing window area on all

Average Temperatures In Degrees Fahrenheit



Average Humidity



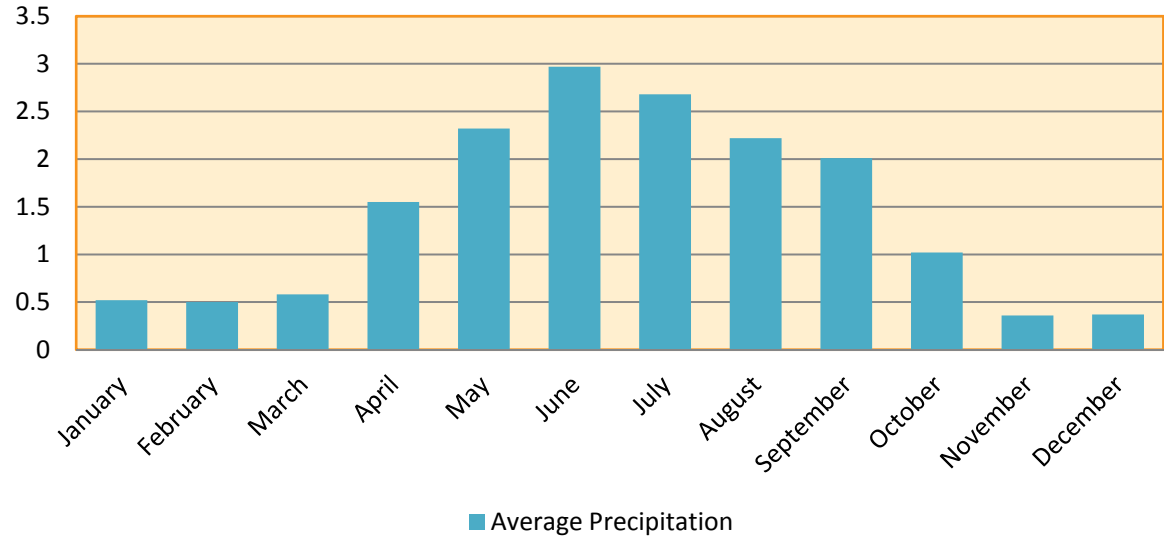
Quantitative Site Analysis: Climate

- orientations except south
 - Using double or triple glazing, low-e coatings, and movable insulation
 - Using plentiful insulation
 - Making Insulation continuous to prevent heat bridges
- (Lechner, 2009)

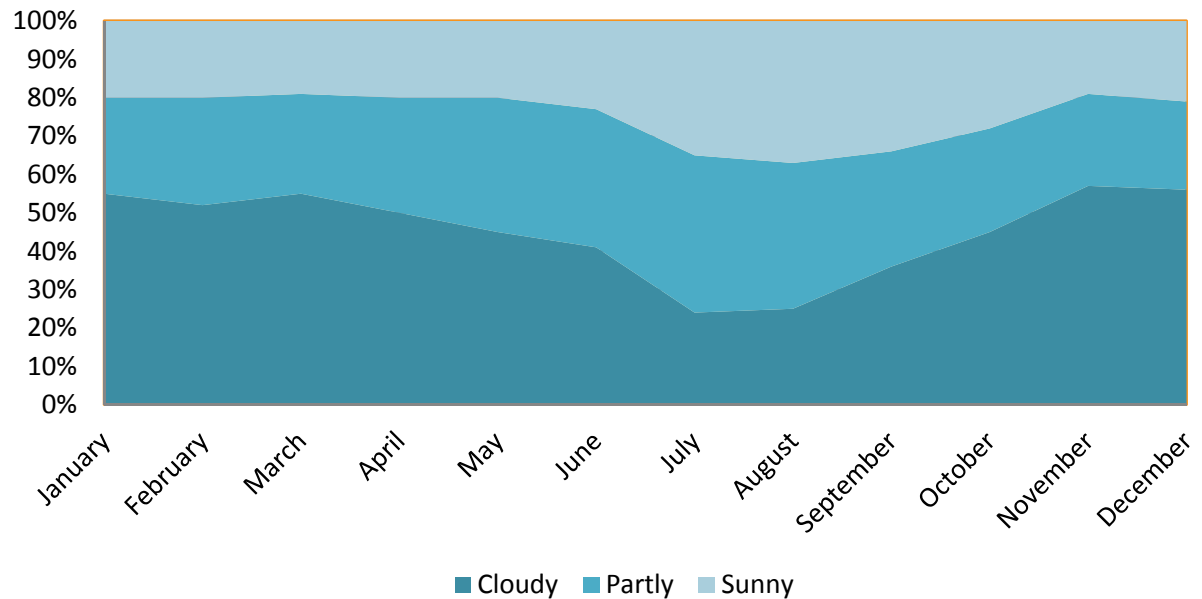
Precipitation in the Bowbells area averages about 17 inches a year. Most of this moisture occurs in the summer months. Sunshine is available about 54% of the time, which provides an opportunity to use solar heating during the winter. When it is summer, the sun can overheat a building so shading is required (Lechner, 2009).

Average Precipitation

In Inches



Days of Sunshine and Clouds

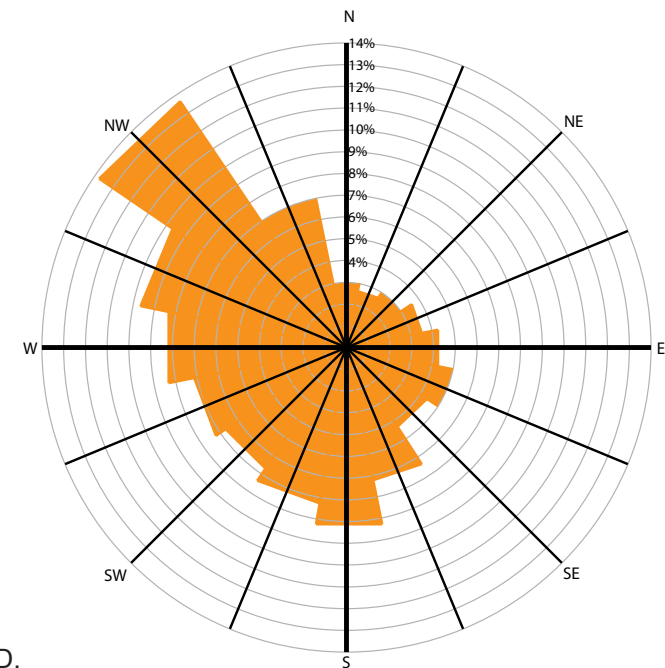
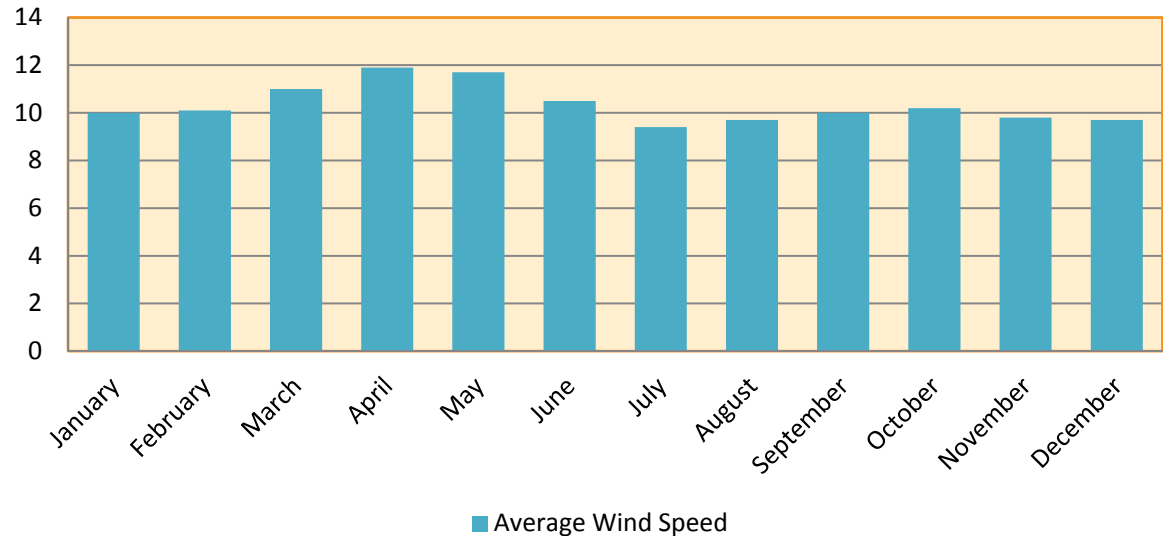


Quantitative Site Analysis: Climate

Winds in the Bowbells area generally come from the northwest. During the cold winters, the fairly high winds are a concern in this area, so it is important to protect the building and interior from these cold winds. A few ways to do this include:

- Keeping buildings close to the ground
 - Compacting designs reduces exposure to wind
 - Using streamlined shapes to deflect wind
 - Clustering buildings for wind protection
 - Placing garages and utility spaces on winter windward side
 - Using sunspaces and glazed in porches as windbreaks
 - Minimizing openings on the windward side
 - Placing main entry on the leeward side
 - Using storm windows, storm doors, vestibules and revolving doors
 - Using tight construction
- (Lechner, 2009)

Average Wind Speed In MPH

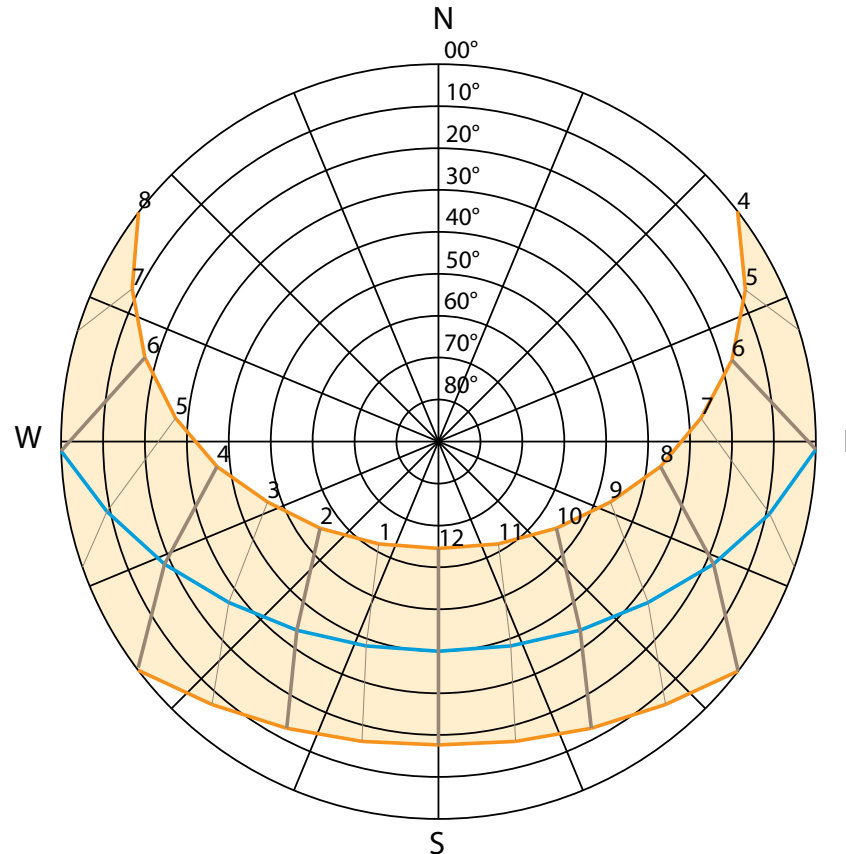


Windrose for Bowbells, ND.

Quantitative Site Analysis: Climate

Since the region has a good supply of sunlight, it is important to let in the winter sun in order to heat the building. There are numerous approaches to let in the winter sun, which include:

- Providing solar access
- Using only deciduous trees on south, east, and west sides
- Facing most windows to the south
- Using an open floor plan
- Using direct-gain, Trombe walls, and sunspaces for effective passive solar heating
- Using interior thermal mass to absorb and store solar radiation
- Using active solar collectors for domestic hot water and space heating



- Creating sunny, wind-protected outdoor spaces on the south side of building

It is also somewhat important to protect the interior from the harsh summer sun (Lechner, 2009).

A sun path diagram for Bowbells, ND.

Quantitative Site Analysis: Climate

Slope and Climate:

Because the site is small and relatively flat with a slope between 0 and 3%, there is no change in climate conditions due to slope.

Shading:

The site is located on the southern corner of the block, and across the street there is nothing that causes shadows to cross the site. The storage bins for SunPrairie Grain are not tall enough or close enough to cause shading on the site. Solar access is plentiful and will continue to serve as an opportunity for solar energy collection.

Topography and air movement:

The shallow 0-3% slope does not effect the air movement across the site. Air movement is only affected by nearby buildings. This could allow for design integration of wind energy utilities planned according to the Zoning and Land Use Code for the city.

Noise:

There is a lot of noise pollution on the site, which sits along Main Street or North Dakota Highway 8. This road is full of traffic through most of the day and is used by cars, grain trucks, and oil trucks. To the south of the site, the elevator is another source of noise pollution. Trucks, augers, and other equipment can be heard on site. The tracks used to supply the elevator are quite busy and the trains can be heard not only on site but throughout town. Careful consideration towards acoustics and sound proofing will be made to minimize effects from within the building.



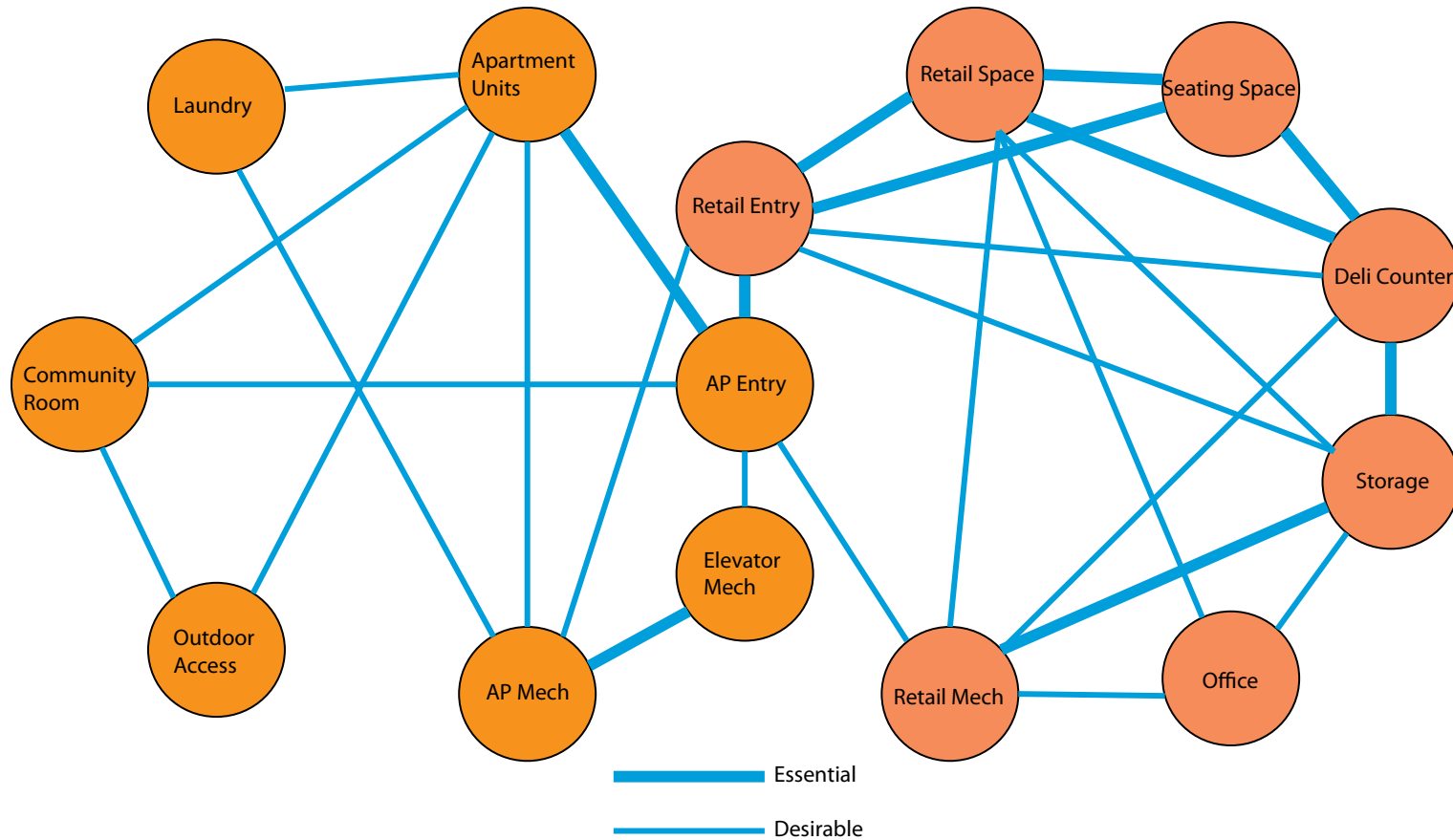
Top Left: The top of the SunPrairie Grain elevator which stands 128 feet high.
Left: Train engines from the Canadian Pacific Railway pass by the railroad crossing next to the project site.

Interaction Matrix

	AP Entry	Apartments	Laundry	Community Room	Outdoor Access	AP Mechanical	Elevator Mech.	Retail Entry	Retail Space	Seating Space	Deli Counter	Storage	Office	Retail Mechanical
Retail Mechanical						Desirable			Desirable		Desirable	Essential	Desirable	
Office									Desirable			Desirable		
Storage								Desirable	Desirable		Essential			
Deli Counter								Desirable	Essential	Desirable				
Seating Space								Essential	Essential					
Retail Space								Essential						
Retail Entry	Essential													
Elevator Mech.	Desirable					Desirable								
AP Mechanical		Desirable	Desirable											
Outdoor Access		Desirable		Desirable										
Community Room	Desirable	Desirable												
Laundry		Desirable												
Apartments	Essential													
AP Entry														

Essential	Essential
Desirable	Desirable
No Relation	No Relation

Interaction Net



Program Requirements

Lot Size: 14,000 sq ft
Lot Dimensions: 140 ft x 100 ft

Zoning

Minimum Lot Area: 10,000 sq ft
Minimum Lot Width: 80 ft
Minimum Lot Coverage: 35%

Setbacks:

- Front 10 ft
- Side Interior 10 ft
- Side Corner 10 ft
- Back 10-15 ft

** Decreasing setbacks available in Compensating Public Benefits and by review of City **

Maximum Density: 16-25 units/
gross acre

Minimum Common Open Space/
Dwelling Unit: 500 sq ft
Minimum Dwelling Unit Size: 900
sq ft
Maximum Building Height: 35 ft

Amount of Common Open Space
Required: 250 sq ft/ 1000 sq ft

Maximum Floors: 3
Maximum Sq Ft: 42,000 sq ft
(3-stories)
Minimum Sq Ft: 4900 sq ft
(1-story)

Program Based on Maximum Sq Ft:

Parking: 2000 sq ft
Retail: 12,000 sq ft
Residential: 24,000 sq ft

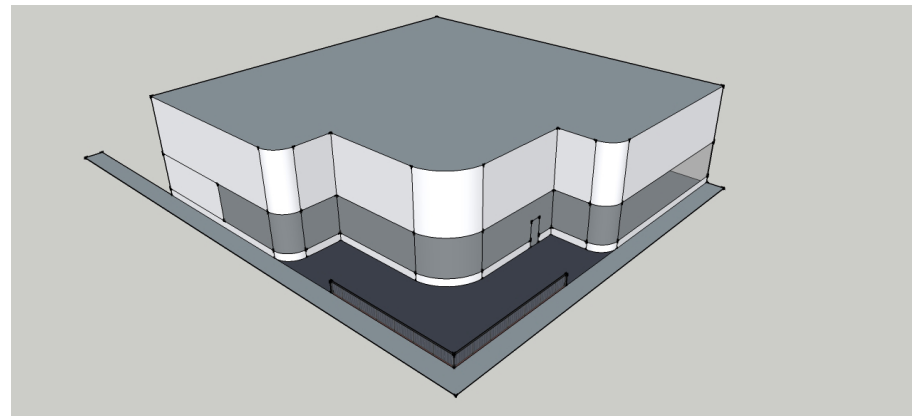
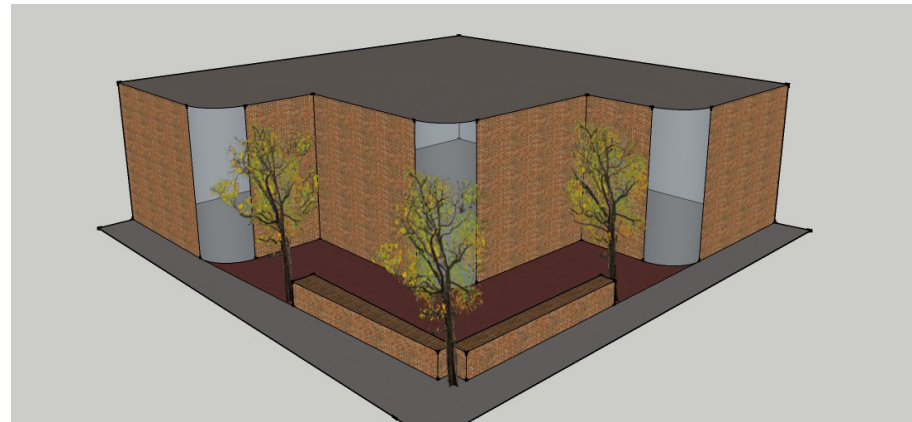


Design Process

Corner Design

When I began the design for this mixed-use building, it was very important to me how I would address the south corner of the lot. The following images are a few iterations on the design of the corner. The first I found nice because of the space for outdoor seating available. The curves were inspired by the grain storage bins across Railway street.

The second iteration applies a band of storefront windows to the shape previously explored. Still, the overall feeling of the building was very plain and formal.

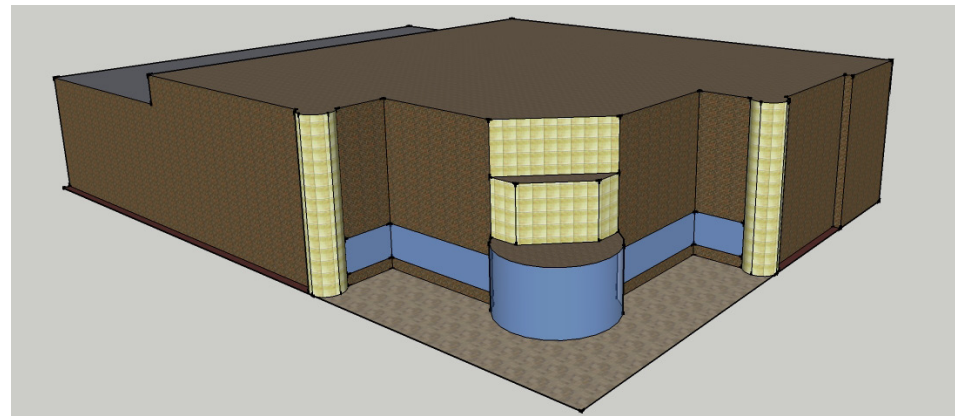
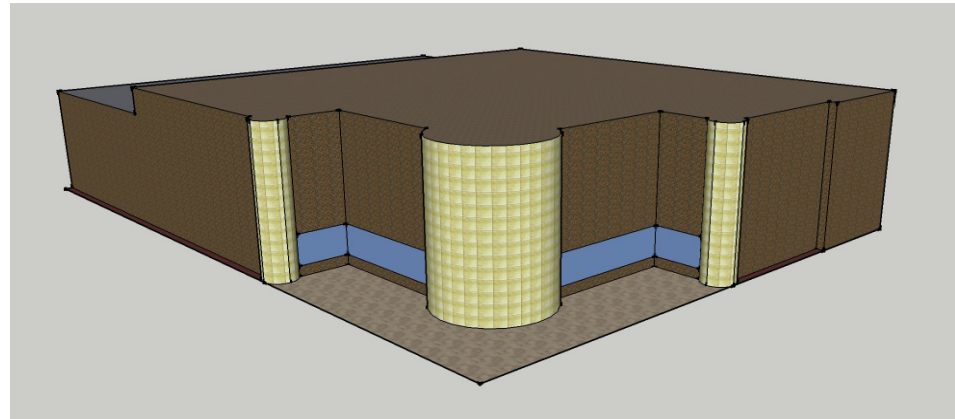


Corner Design

In the next two iterations, I pushed the curves a bit more to break up the southern facades with more geometry and mass.

The fourth iteration I broke up the largest cylinder into layers that could create outdoor balconies.

It was this concept of pushing the walls in to break up the large mass of brick that appealed to the site in Bowbells.

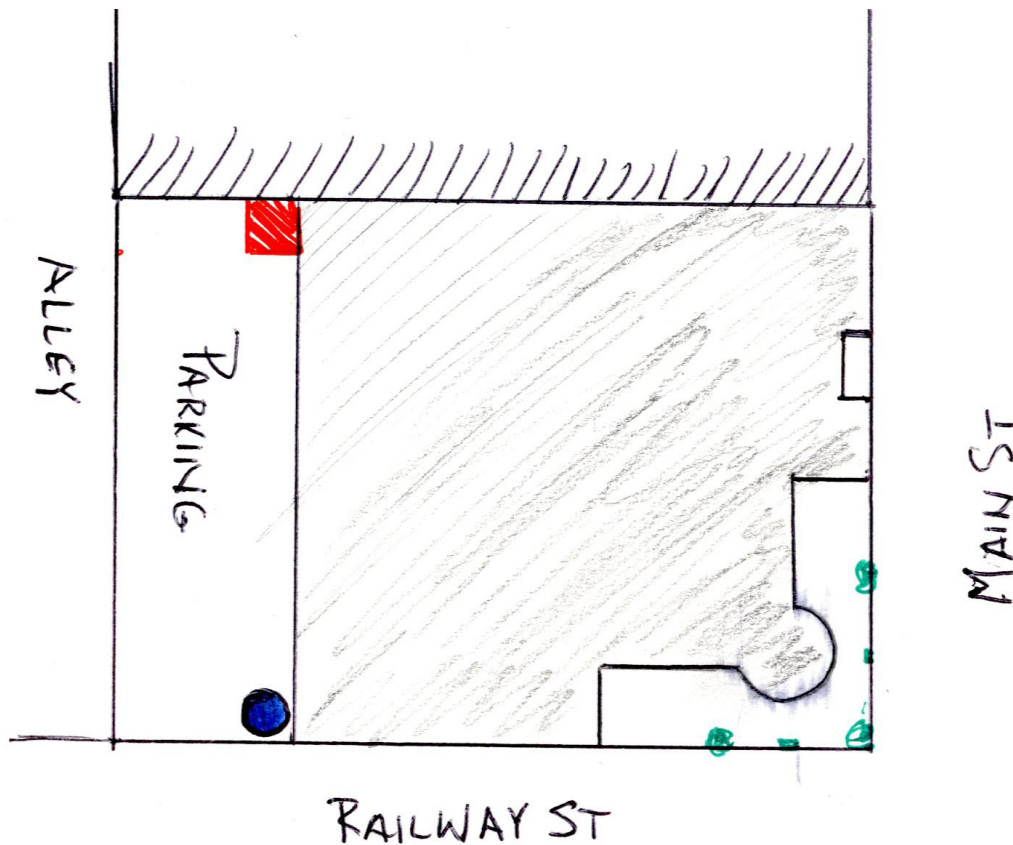


Initial Design

By paying careful attention to the mass of the building, I was able to create a number of balconies that can be used by the tenants of the apartment units. A material change in these areas further indicates this change of space.



Initial Design



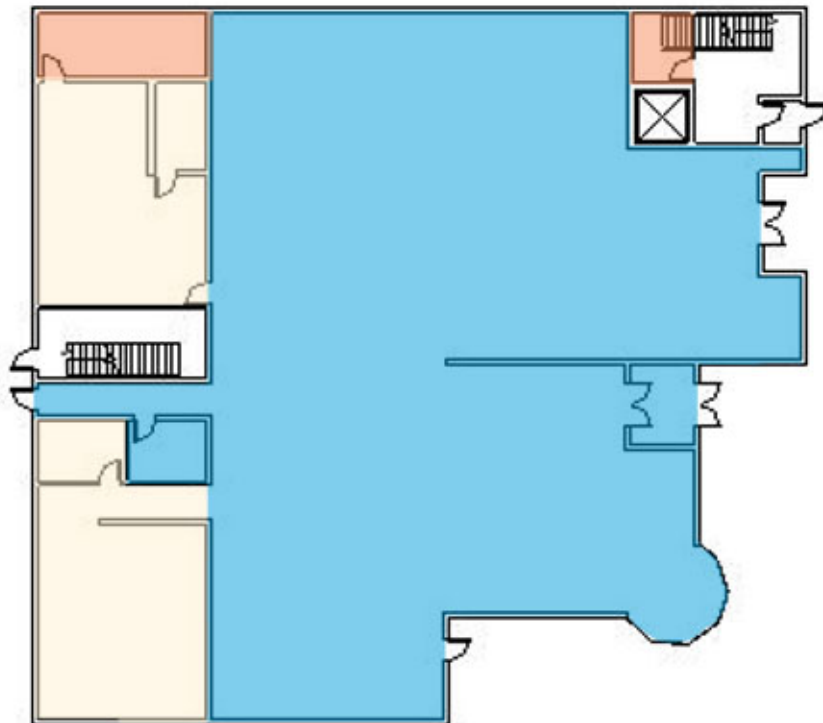
The first site plan was not quite figured out except the building footprint but here are some things you should know:

The green dots at the corner of Main and Railway are trees and landscaping to help shade summer sun and to help with noise control.

The blue circle along Railway is a cistern used to collect rainwater for use as gray water within the building... hopefully minimizing the effect on our lagoon. I'm still looking into that study.

The red square is an area for garbage and recycling. It might move but it will be in the final design.

Initial Design



The first floor will consist of a cooperative grocery store and coffee cafe. The store will provide necessary food goods as well as seasonal goods. The cafe will serve coffee, sandwiches, pastries, and soups. It will be a nice place to have coffee in the morning, meet a friend for lunch, and watch the day go by.

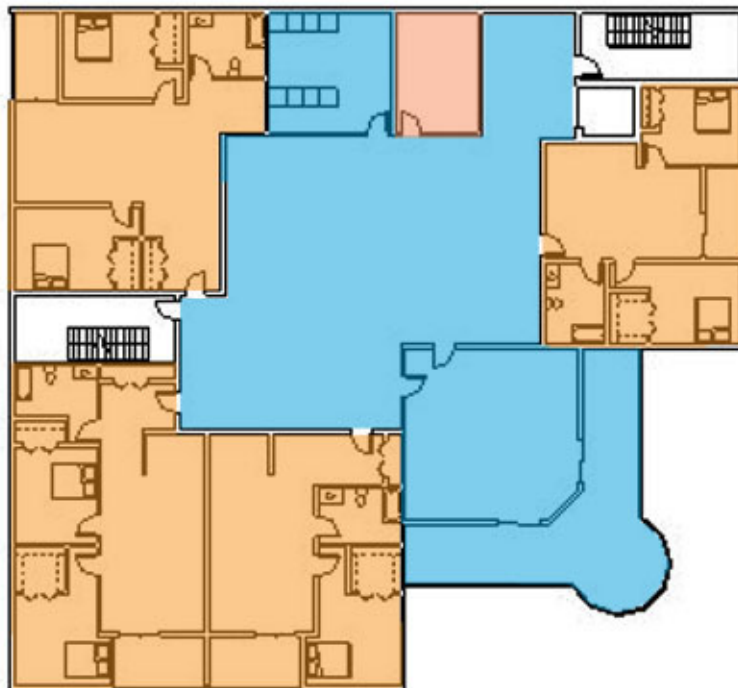
The areas in blue indicate the public part of this retail space.

The cream is for staff only, like storage and offices.

The salmon is the mechanical rooms for the retail area and the elevator.

The white areas are circulation to the upstairs apartments. These areas are secure so only residents can get upstairs.

Initial Design



The second floor consists of four apartments: 3 two-bedroom and 1 one-bedroom. Each apartment has a balcony/deck. As well as a community room with a balcony looking toward the street corner, good for parties or other gatherings. A laundry room, and mechanical room to serve that floor.

Above is open to allow light to penetrate from the cerestory on the roof. I am possibly going to apply the same balcony to this floor allowing more light into the store.

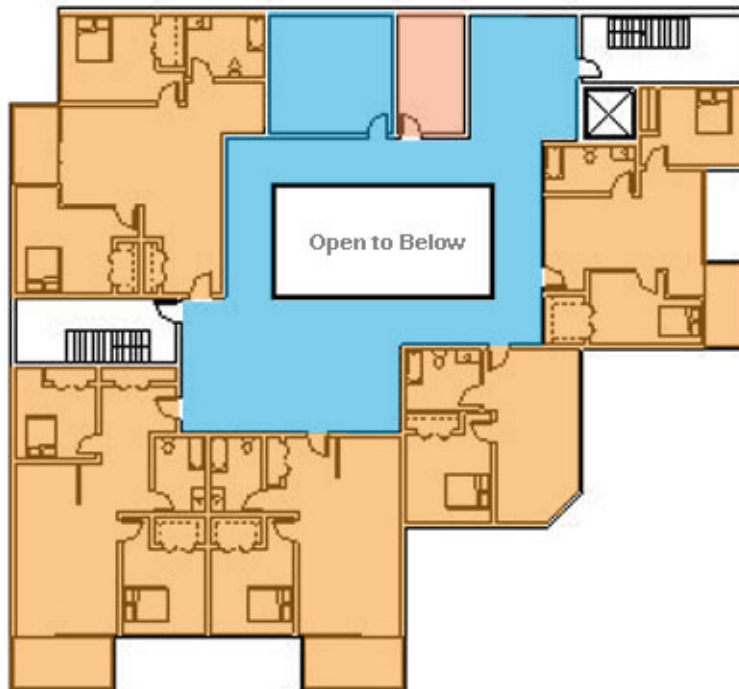
The areas in blue are open to all residents in the building. This includes the community room, lobby, and laundry room.

The areas in orange are the apartments.

The area in salmon is the mechanical room for that floor.

White spaces once again are verticle circulation.

Initial Design



The third floor consists of five apartments: 3 two-bedroom and 2 one-bedroom. Each apartment has a balcony/deck except the corner apartment which will have plenty of daylight. A cerestory above brings light to the floor and the balcony open to the second floor allows the light to filter into that floor as well. It also has a laundry room, and mechanical room to serve that floor.

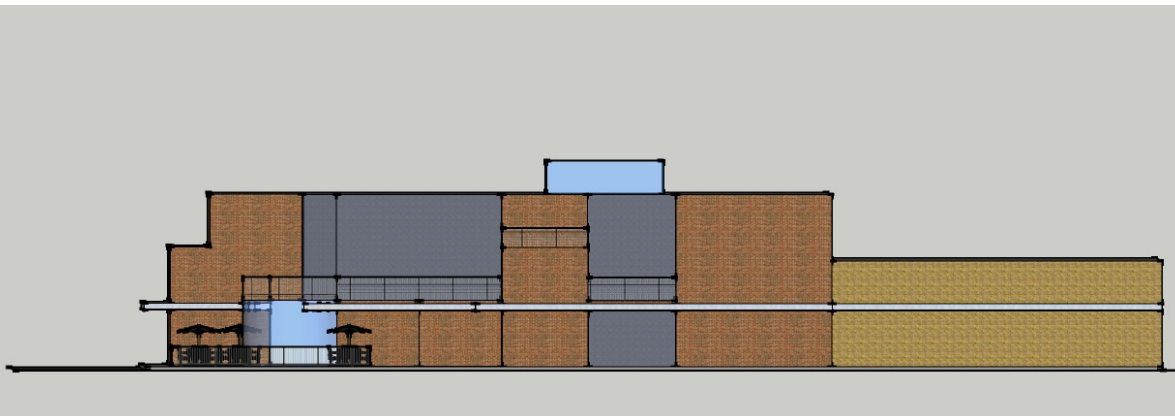
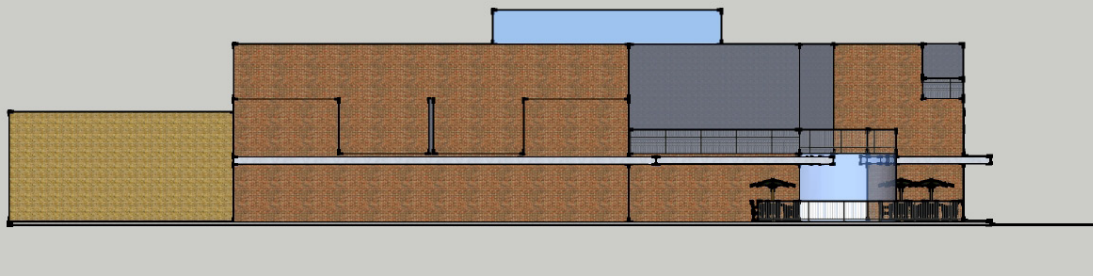
The areas in blue are open to all residents in the building. This includes the halls and laundry room.

The areas in orange are the apartments.

The area in salmon is the mechanical room for that floor.

White spaces once again are verticle circulation.

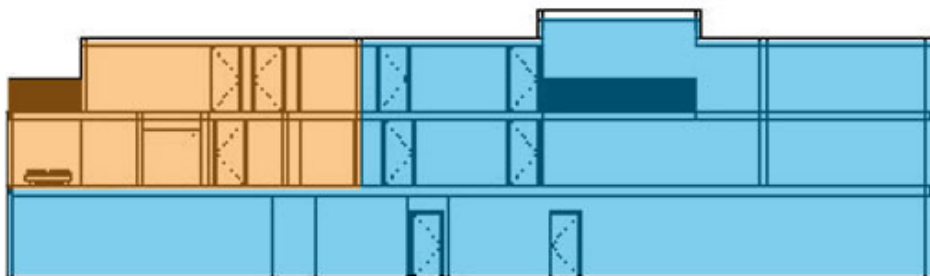
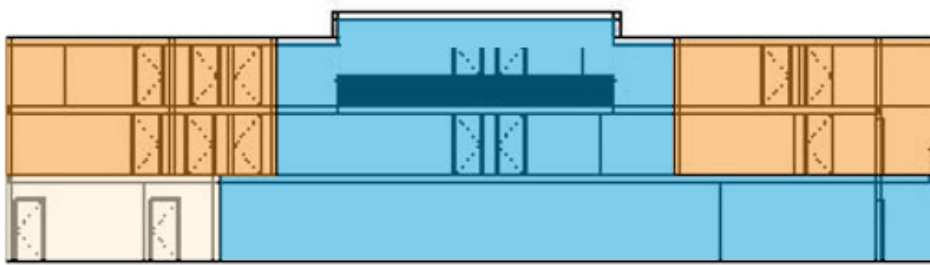
Initial Design



These elevations further illustrate the massing details of the design.

Top Left: Railway Street Elevation
Left: Main Street Elevation

Initial Design



The building sections allow you to more fully understand what is happening with the cerestory. The southern sun will come in the cerestory windows and filter through the third floor to the second. I am probably going to continue this into the first floor so daylighting will fill in the store and reduce the need for alternative lighting during sunny days.

Blue is more public areas
Orange is apartments
Cream is coop staff

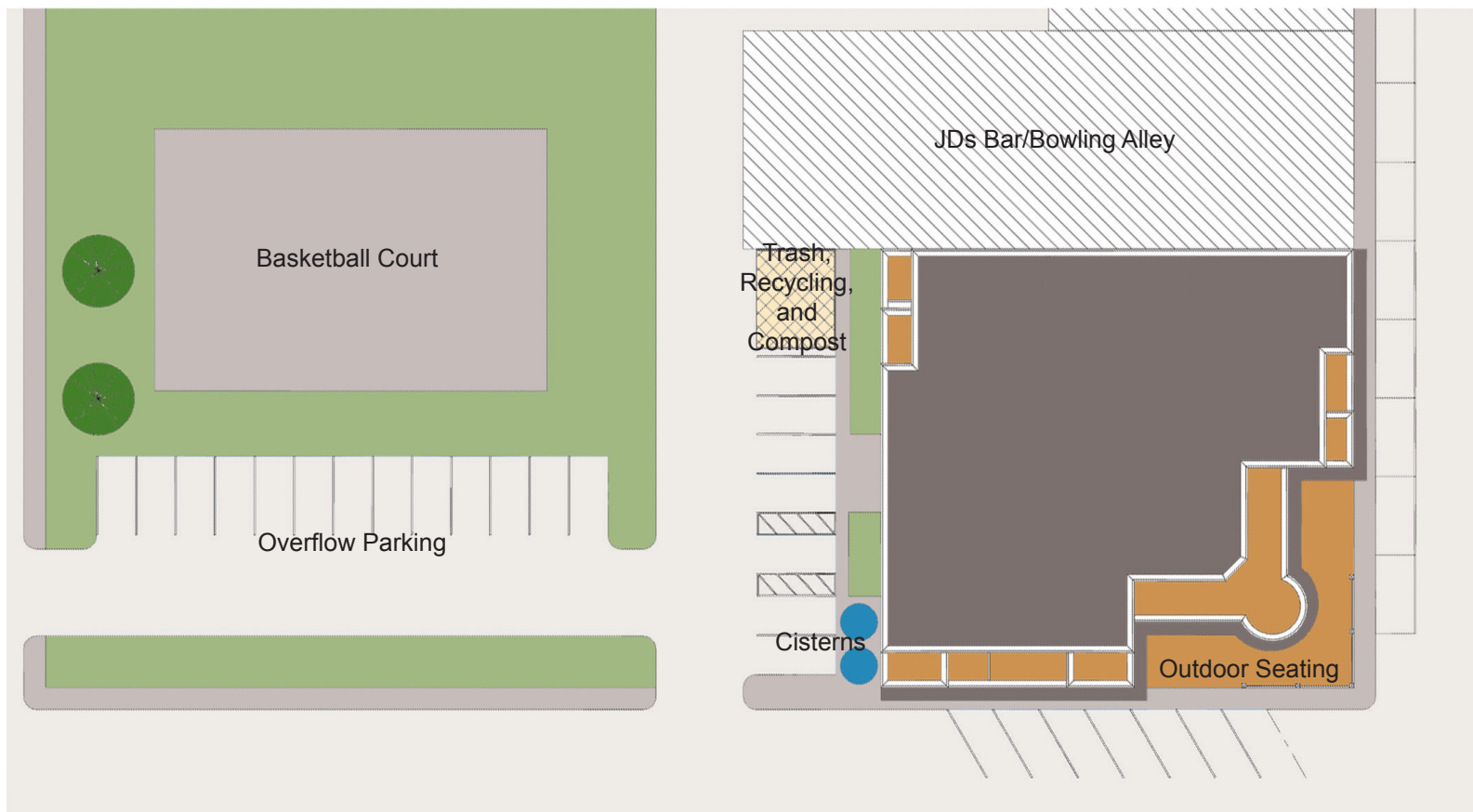


Design Solution

Design Solution: Perspective



Design Solution: Site Plan



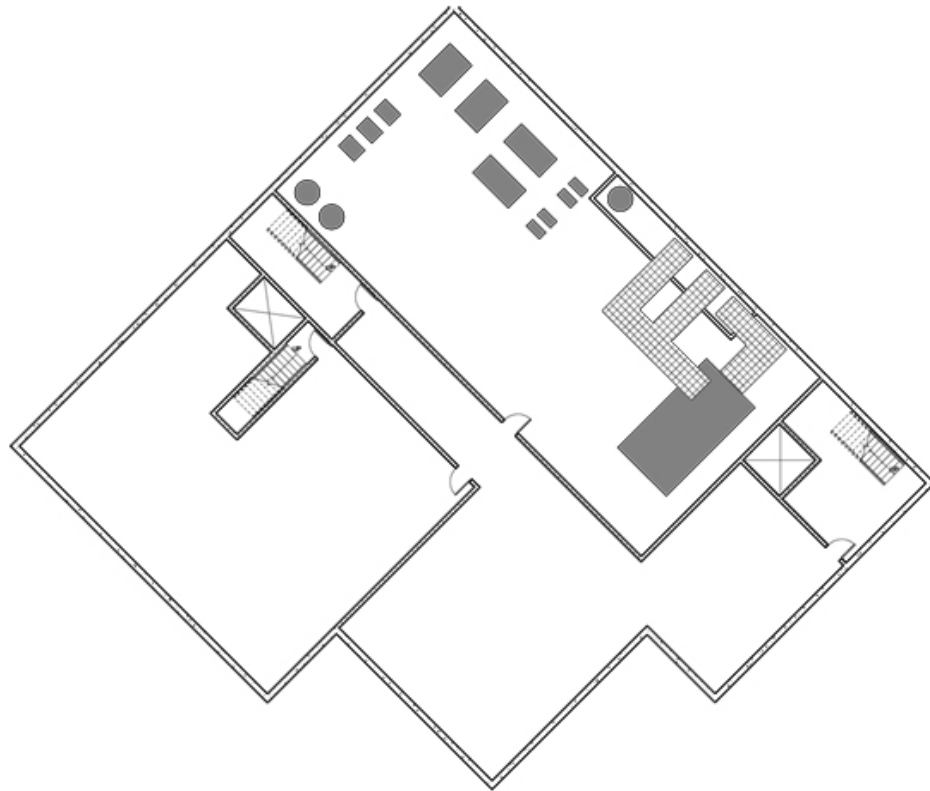
Design Solution: Basement

The basement is broken down into three different areas: store storage, resident storage, and mechanical room.

The store storage area is accessed by a private service elevator and set of stairs.

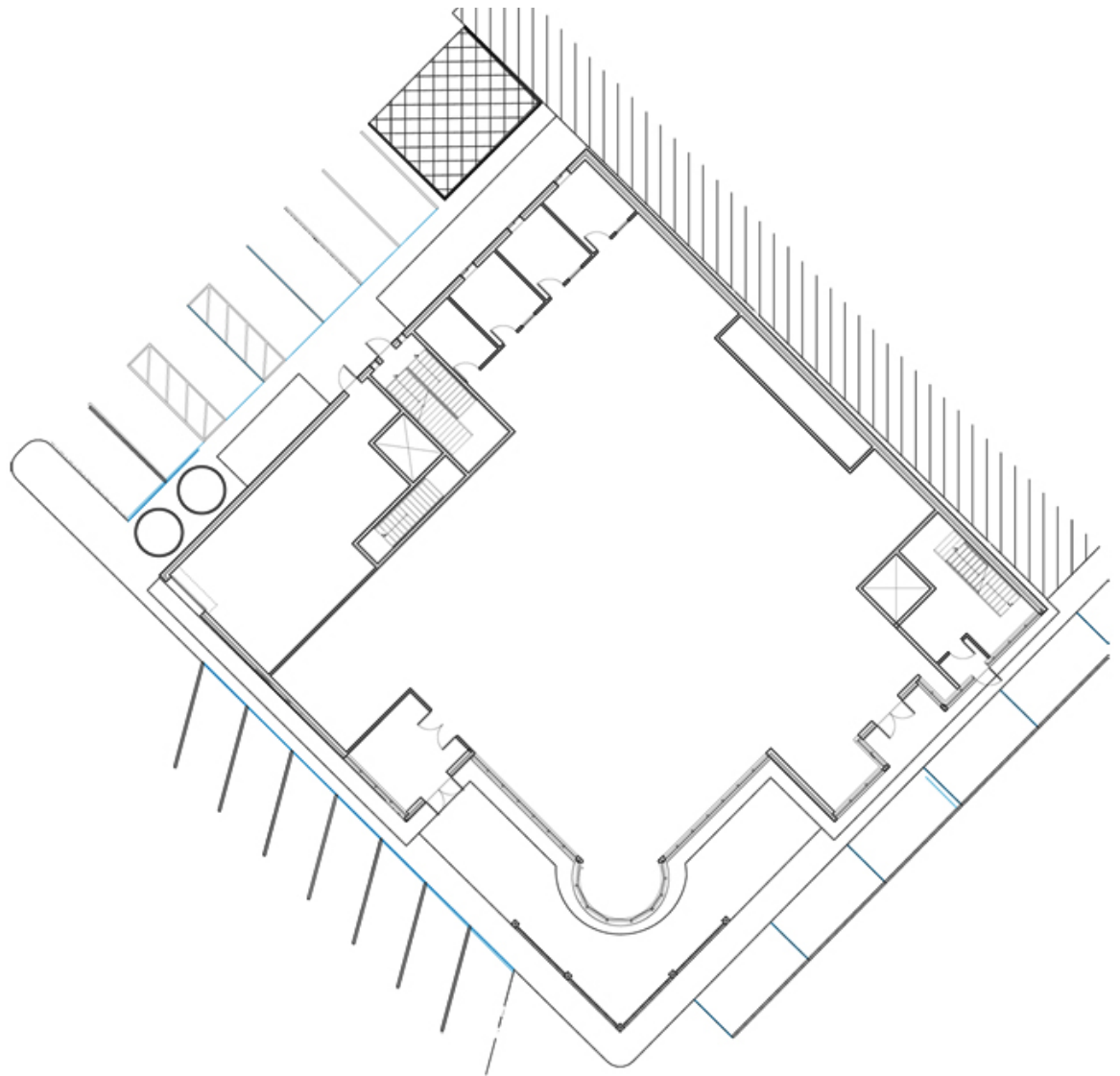
The resident storage is accessed by two sets of stairs and the elevator.

The mechanical room consists of two water heaters, two boilers, two chillers, and a fan room. These units make up the Variable Air Volume HVAC system.



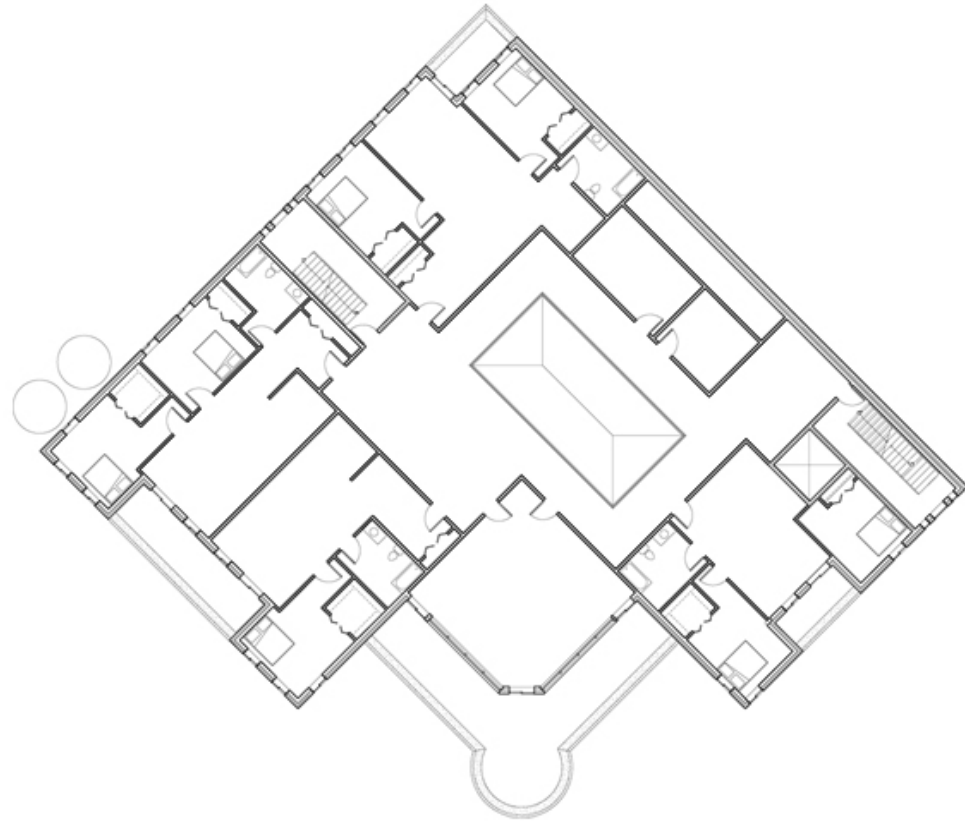
Design Solution: First Floor

The final retail floor plan consists of a large open area for the grocery store and deli cafe, a back room for store management, a loading dock, three business incubators, one public bathroom, and two entries into the apartment units above.



Design Solution: Second Floor

The final second floor plan consists of four apartment units three 3-bedroom apartments and one 1-bedroom apartment. The second floor also has a community room that has a balcony looking out towards Main Street. In the middle of the second floor lobby is a balcony looking down to the store below but is separated by a glass barrier preventing the possibility of a robbery. Above this balcony is a view to the third level and cerestory above. This space has good access to indirect sunlight.

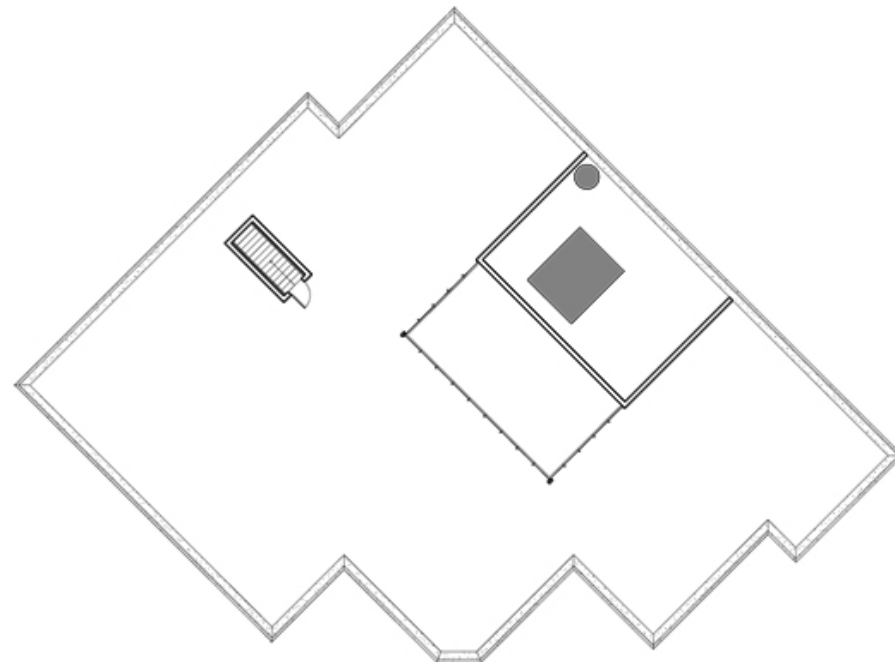


Design Solution: Third Floor



The final third floor plan consists of five apartment units: three 2-bedroom apartments and two 1-bedroom apartments. The interior balcony looks down into the levels below and has a cerestory above to provide natural light.

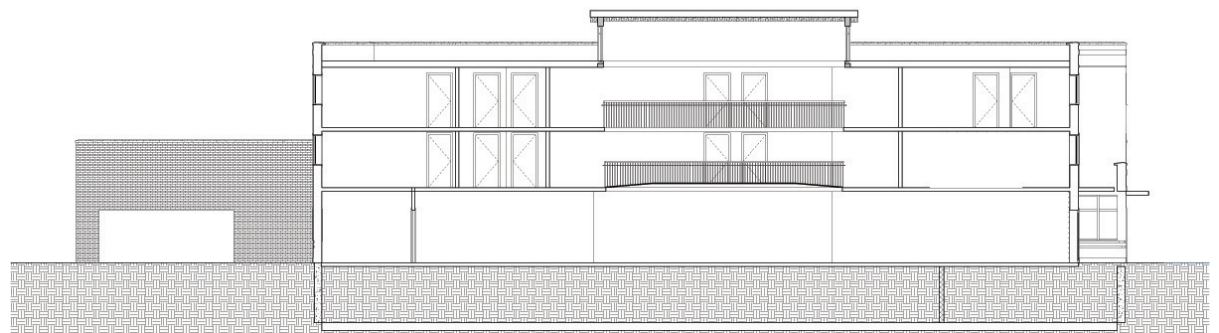
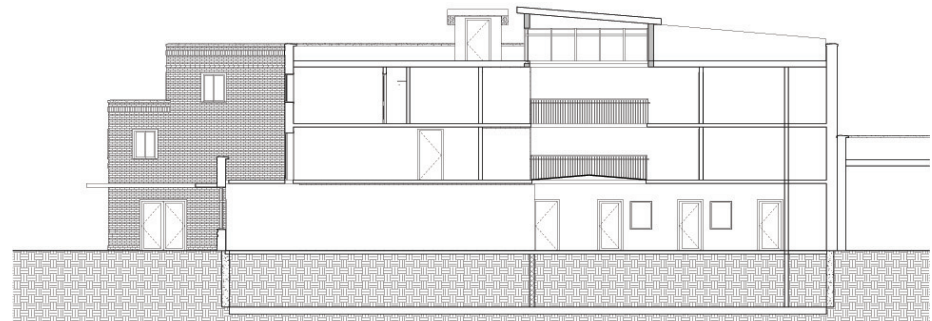
Design Solution: Roof



The roof consists of an access staircase and area for mechanical units. These units are the chimney and cooling tower. It is at this level where a series of clerestory windows allows natural light to enter the atrium within.

Design Solution: Sections

These sections present a better illustration of how the atrium and cerestory line up and provide indirect sunlight in the space. The sections also give you a sense of height between each floor and between the proposed design and the building next door.



Design Solution: Elevations



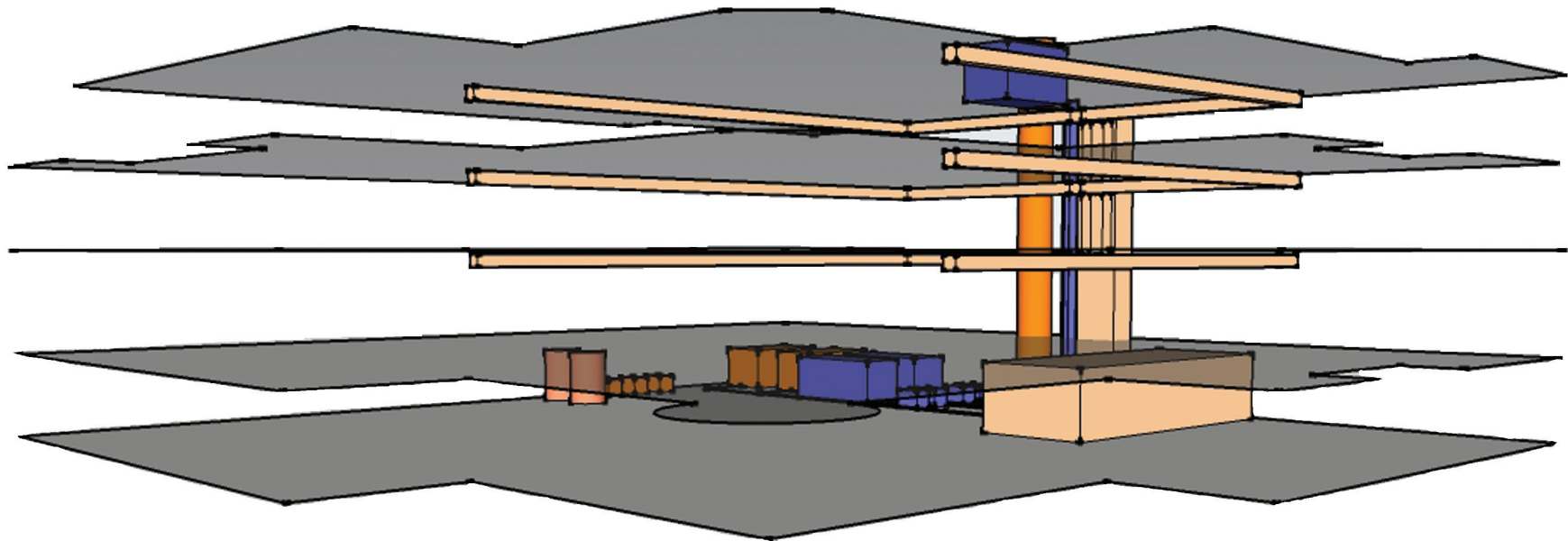
These elevations illustrate the final outcome of the attention to massing. The building begins to like a number of smaller buildings instead of one large structure.



Design Solution: Basketball Court



Design Solution: Mechanical



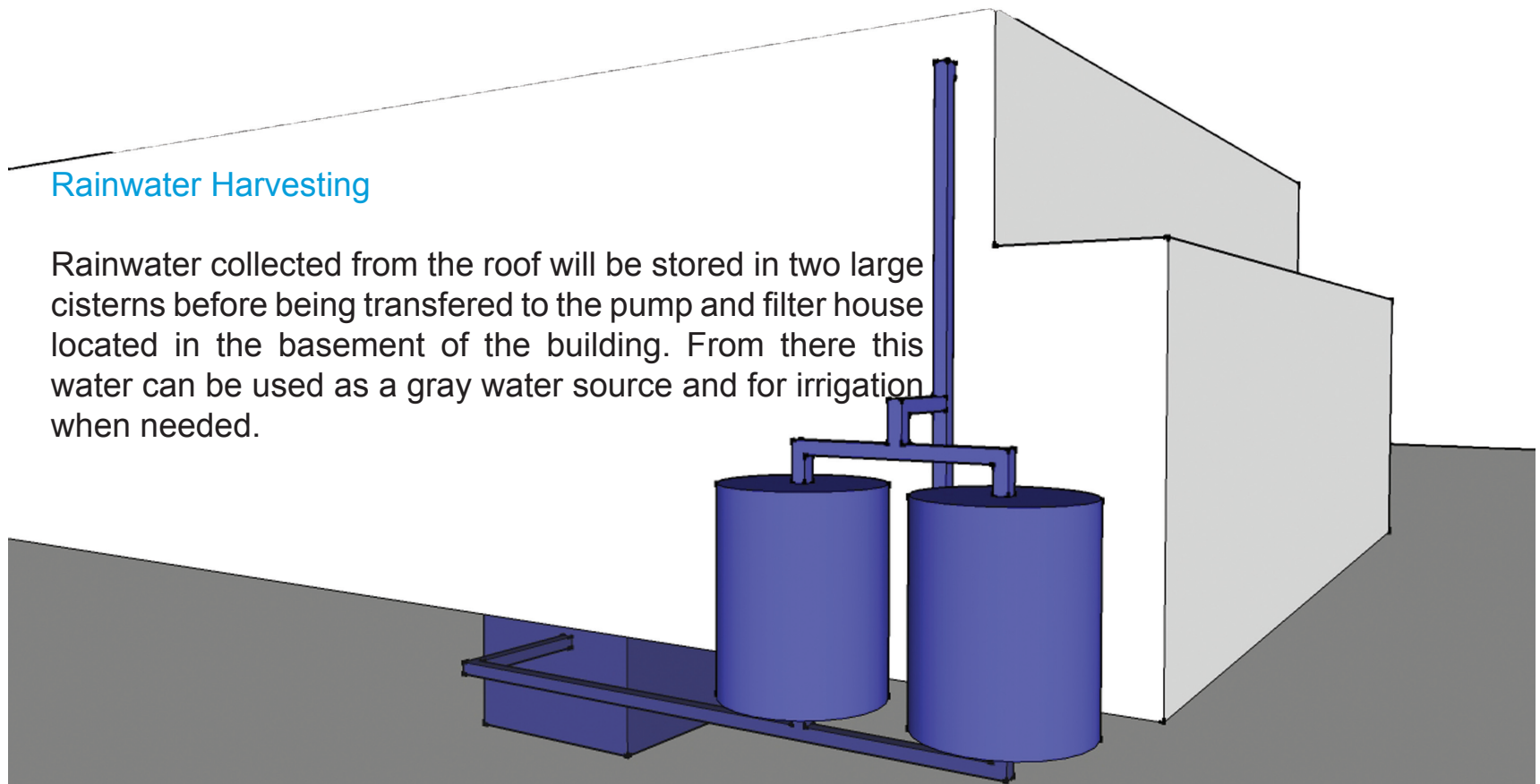
HVAC - VAV

A variable air volume system is quite versatile and is frequently used in a building of this size. The one fall back of using this system is the limited control in certain areas. This problem can be overcome with a VAV reheat system, in which a reheat coil and local thermostat is used to condition the air before entering the local ductwork.

Design Solution: Rainwater

Rainwater Harvesting

Rainwater collected from the roof will be stored in two large cisterns before being transferred to the pump and filter house located in the basement of the building. From there this water can be used as a gray water source and for irrigation when needed.



Design Solution: Needs/Solutions

Determining A Need

Bowbells' major sources of business are agriculture and oil. Having both is putting a strain on the communities infrastructure.

Before oil activity hit the area, small businesses were lost, including a grocery store and an auto repair shop.

Those essential businesses are not the only establishments the community lost. Bowbells also lost a diner and swimming pool, which gave residents a place to gather.

Now, with oil activity at the back door, the population is rising but there is little to no housing available.

Satisfying A Need

A mixed-use development such as this can satisfy more than one need.

Grocery Cooperative: Providing a sense of community and restoring a much needed supply service.

Business Incubator: Allowing small businesses and offices to be established.

Coffee Shop and Deli: Giving residents and workers a place to meet and enjoy a meal.

Apartments: Providing an opportunity for young families to establish roots in the community.

Courts: Renovating an existing amenity will provide new parking and a safe place for play.

Showcasing Sustainability

Sustainable developments can respond to the environment in a number of ways. Strategies used in this project include: recycling, composting, rainwater harvesting, and providing natural light and ventilation.

Developments such as this will establish connections by providing a community atmosphere, allowing users to interact with the environment by recycling or being outdoors, and finally designing to respond to nature as noted above.

To overcome green development's greatest fall back, a lack of understanding, this building will act as an example and provide information on designing green.

Design Solution: Model Photos

This model was built to illustrate the context of the project. Shown is six city blocks located around the site. A pamphlet was used to describe each of the buildings' use in detail.





Appendix



Appendix: Interview with Dan Linster



Parkinson: How long have you lived in Bowbells?

Linster: We have been in Bowbells for 41 years.

P: Why did you decide to become mayor?

L: I thought there were some things I could do to help Bowbells so ran for city council. I was president of the council when the mayor resigned because of health issues, so moved into the mayor position for two years and then was elected for another four year term. As a member of the city council I was appointed to the Regional Council which is responsible for allocating a number of loans and grant programs so by being on the council I was able to put Bowbells into a position to apply for some of those programs.

P: What kind of future do you see for Bowbells?

L: Bowbells should have a bright

future but it will depend on people to step forward to do some things, such as rebuilding our main street. I would expect Bowbells to gain population over the next five years and would hope that business opportunities will follow.

P: What issues will affect this future?

L: We will need to have people step forward and take on leadership roles. It will also be very dependent on the viability of the oil development in the area. We will need to add core businesses such as a grocery store.

P: How has changes in agriculture, society, and technology changed Bowbells over time?

L: With larger farms we have seen a steady decline in population, especially young families which have had a negative effect especially on our schools. We are also a more mobile society so we have a number of people commuting

Appendix:

Interview with Dan Linster

from other towns for work. As our population decreased, parents also elected to send their children to other schools. This continues to snowball and we would hope that with time we can turn this around.

P: How do you feel about the general migration of young people away from town?

L: Currently we are seeing an increase in young people in our smaller communities because of the oil field employment opportunities. I believe that the jobs will have a continued positive effect and we will see an uptick in this age group in the city and county.

P: How do you envision keeping residents here and/or bring new residents in?

L: Providing the necessities, such as a grocery store and we need to make those infrastructure improvements to show we are a viable community. Better streets, improve our water system and build a new pool. This shows that Bowbells will be around so that they will be willing to invest in new homes etc.

P: How do you think the oil industry will affect Bowbells?

L: We will see population growth. This population growth will first be

in the increase in temp employees. We are seeing some housing units being developed, these being group housing and trailer houses, but we hope that will lead to permanent housing. We are also seeing the negative effects. People moving in do not have the feeling of ownership that older residents have so we are losing some of the small, clean, friendly town atmosphere we had in the past. To date we have not seen any commercial development but some of that will follow in the next few years.

P: How would you prepare for these changes? Are there any needs or services that Bowbells will need to sustain in the future?

Appendix:

Interview with Dan Linster

L: I'm going to move and let someone else do it. Just kidding, but you may see that some long time residents will leave and hopefully community minded persons will step forward. The first things we are doing is trying improve the infrastructure, roads, water, sewer so those are ready for more people. Than we need to try to encourage people to invest in the business community to add - grocery store, cafe, day care, etc.

P: Is there adequate recreation and education?

L: I think our school is doing what it can and I believe it will attract

students in the future; we need to build the new pool to provide the entertainment for the youth and it will also show that Bowbells can do it.

P: What areas in Bowbells do you think would benefit from a new mixed-use development? What issues will regulate the development of a mixed-use building in our community?

L: Someone is working on group housing as I write. What also would be nice would be a minimal type building on main street that would be used for a multiple of businesses as I listed above, the main drawback is finding someone

with deep pockets willing to take a chance a develop such a building.

P: Are there any zoning issues I should be aware of?

L: Bowbells has just adopted a land use plan and zoning regulations, that when followed should provide a clear roadmap for development. This plan allows flexibility to the commission to make changes that are positive to the community.

P: What sustainable or 'green' technologies would you like to see in this project?

L: I think it would be great to incorporate green technologies into

Appendix:

Interview with Dan Linster

a designs, I am not familiar enough to know what those things might be other than use of materials, etc.

P: You mentioned a grocery store would be a core business for our community. What other businesses would fall into this category?

L: Other businesses that would fit in very well with the grocery store would be a good "all day restaurant", and maybe a hardware all purpose store.

P: Do you think it is possible to achieve the small, clean, friendly town atmosphere we had in the past? How?

L: As far as the small town atmosphere, as soon as some of the people that have moved in buy into "my town" this will be develop automatically. After you are a member of the community for a while you come to think of it as your hometown, thus wanting the same things us old-timers want.

P: Where in Bowbells would I go to find information on the land use plan and zoning regulations, soil classifications, information on the water table, detailed topographic maps, information on utilities, a city map with property lines, and maybe finding history of a particular property?

Most of the things you asked about would be in the city auditor's office. I will call her and let her know you may stop in. The soil types, etc you should be able to get at the NRCS office and your dad could ask Mark for help with that.

One of things I was going to mention before was the need for some outside investment, an oil company or some developer that would come in. Current residents don't seem to have the knowledge or capital to know where to begin or what development is.

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