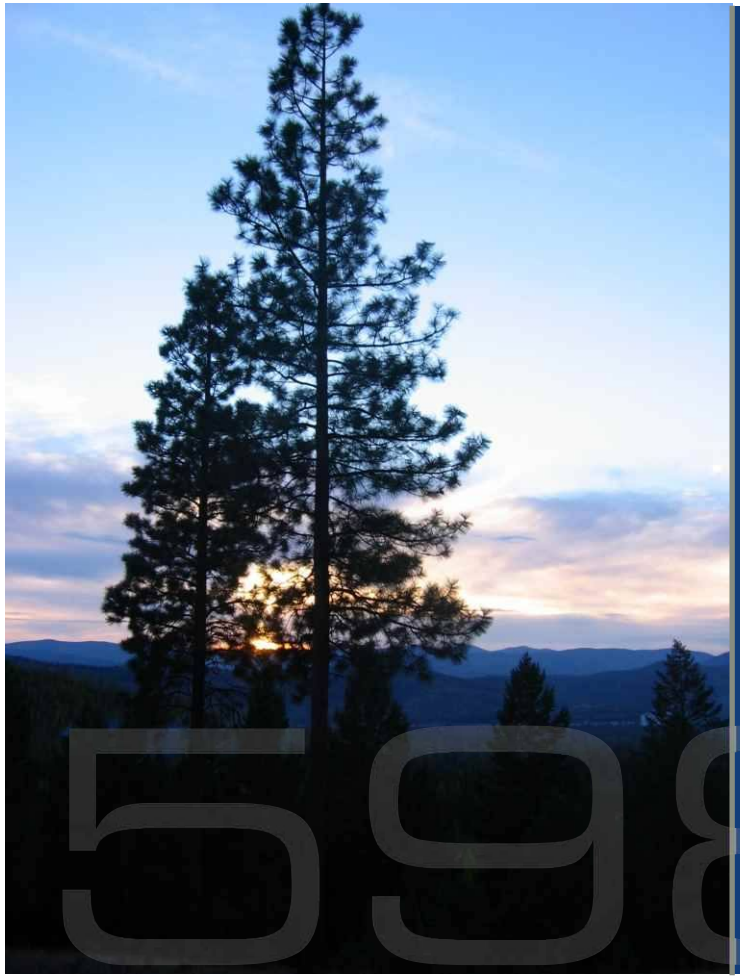


Seeley Lake, Montana

Developing a Sustainable Community within a Grid-Dependent Town

59868

Justin Jones

Seeley Lake, Montana. Developing a Sustainable Community within a Grid-Dependent Town

by Justin Balog Jones

A thesis submitted in partial satisfaction
of the requirements for the degree of

Master of Architecture

in the Graduate Program of

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APPROVAL
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Justin Balog Jones

This thesis has been read by each member of the thesis committee and has been found to be in satisfactory completion regarding content, language, format, style and consistency, and is prepared for submission to the Division of Graduate Education of Montana State University.

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Eighteen years of school, nine moves, two continents, three brothers--all of which I have despised at one time or another. However I wouldn't be who I am, or where I am today without each's invaluable impact on my life. Thank you.

To my Family, Grandparents, my Mom, Dad, Patrick, Jeffrey, and Kevin, thank you for all of your love, care and support.

Mom, thank you.
What we call the beginning is often the end. And to make an end is to make a beginning. The end is where we start from. -T.S. Elliot

My brothers, don't ever, ever give up.

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To my friends, and professors at the University of Kentucky and Montana State, thank you for the laughs, the lessons, the journeys, the advice, the motivation, and the opportunity to know you all.

The success of this thesis would not be possible without the support and guidance of you all.

Seeley Lake, Montana. Developing a Sustainable Community within a Grid-Dependent Town

Within ten years, Seeley Lake will be modernized and receive public services such as sewer, full water treatment plants, and cable television. When these developments are implemented in Seeley, the town will grow quickly and without regard for the existing physical environment. The economics of place will change as well; property values and taxes will be inflated to unseen levels. This thesis proposes that a central portion of the small town be redeveloped as an off-grid community catering to the existing

and future working class of Seeley Lake. Focusing on ten existing blocks in the center of Seeley Lake, the restructuring of the current arrangement of homes and the utilities will help in the redevelopment of central Seeley Lake into a community. (Fig 1.) By selectively abstaining from the public infrastructure, the newly revived community would be able to achieve lower utility and monthly costs as well as affordable property values while benefiting from the increased business and economic growth of the town. Within this community, the proposed architectural language would allow for future growth and change. These adaptable units may be enlarged or altered through a flexible growth system which may allow an addition of bedrooms, family rooms, and at a larger scale, even a garage. This language would be implemented to support the working families and individual economic situations. With this typology the working class could remain within the evolving town, taking advantage of the growth, while not feeling repressed or alienated. These expandable homes would be designed to cater not only to working individuals but also to small families and the elderly.

The planning within the redeveloped community would respect existing property lines and take into account local businesses, the schools, and roadways. By respecting

property lines and existing block development, the high efficiency, low cost replacement homes may occur incrementally. Incremental replacement affords each household the freedom to choose the most economically feasible time to improve. An incremental replacement strategy would also favor the construction demand on the valley, as the construction would be staggered. With the great development potential of Seeley Lake and the expected rapid population boom, the character and attitude of Seeley Lake will change from a small close-knit town to a city which may overlook the needs of its current residents. The end product of this community (the design intervention) will be an identity for Seeley Lake—a heart of the city which young and old will be able to recognize what Seeley really is and what it means to those who have lived there for decades.

This thesis contends that a community may undergo extreme change, yet retain intrinsic characteristics through the institution of a central, self-sustaining development. Great potential for growth lies in the Clearwater Valley, centering on Seeley Lake. With the development of the central portion of the town, the community may only grow stronger.

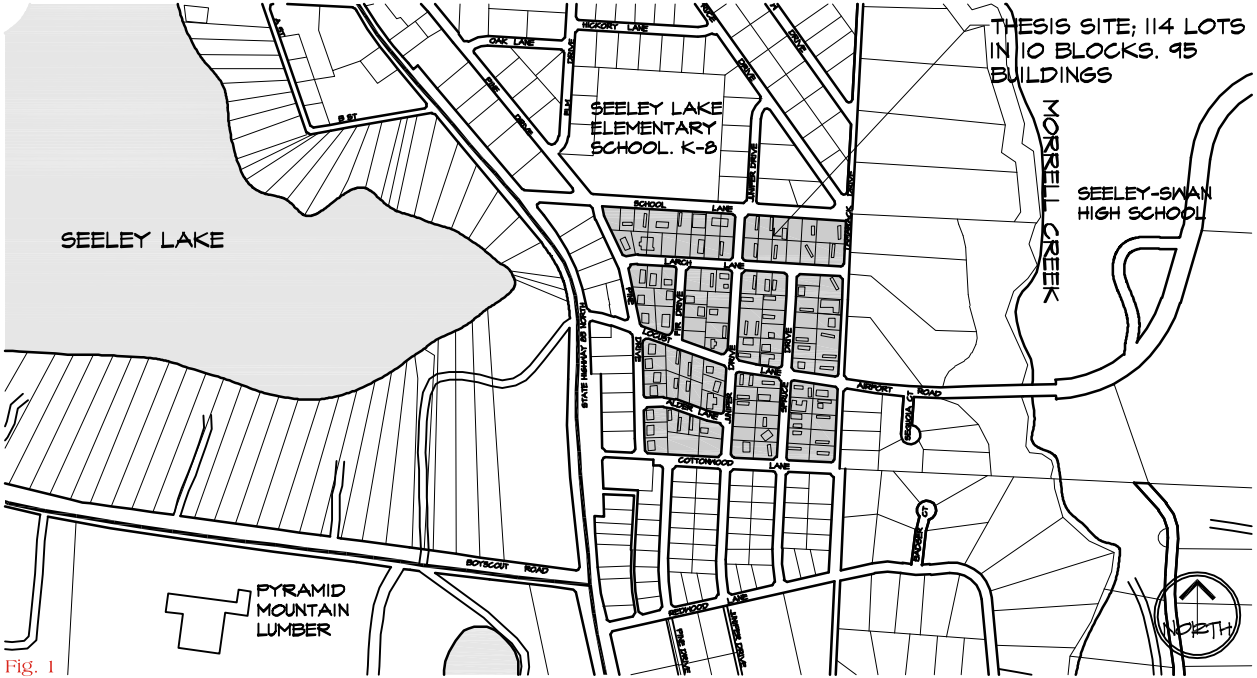


Fig. 1

SITE PLAN

SCALE: 1"=1,000'

In the midst of a chain of lakes in Western Montana, the town of Seeley Lake lies between Missoula and Kalispell, on State Highway, 83 North. Seeley Lake was originally founded as a logging community in the late 1880's, which continues to drive the town's economy today. The majority of the local population works at the local saw mill or is employed in the timber industry. The current population of Seeley Lake is around 2,000 residents. Within the past 15 years, however, the town has begun to grow. In the early nineties, the Double Arrow Golf Resort built a golf course that began a tourism boom in Seeley Lake. With the allure of a challenging local golf course, people began to move into

the region, mainly on the Double Arrow Ranch. While people had been slowly moving to the town for retirement, the coming of the golf course was the largest factor in the town's growth. The majority of the parcels range from five to twelve acres and all are heavily wooded. With the increased interest in the town and large number of trailheads, lakes and outdoor related activities, the allure has grown to own a piece of land, build a home and settle in the valley. The economy of Seeley Lake is supported by tourists in the winter coming to snowmobile, or stopping for gas and food on their way north. In the summer, the economy is supported by tourists coming for golf, water-sports, hiking, family reunions and weddings at the local resorts. The draw of Glacier National Park to the north and Yellowstone Park to the south also gains Seeley Lake the “passing through” tourist trade. During the summer tourism season, the population easily doubles in the small community. With the tourist community bringing economic support to the town, increased business interest has developed. Within the past five years, recreational rental companies have grown from one to at least four today.

There are a few major complications with future growth in Seeley Lake. The primary rationale for the lack of high intensity urbanization



Fig. 2. Public Water Service Area

SITE PLAN

SCALE: 1"=1,000'

in Seeley Lake is the lack of a sewer system, everything now is private septic system and other local infrastructure. Seeley Lake has electric and telephone services as well as public water for most “in town” residents. (Fig 2.) All others are on private wells. Many of the residents of Seeley Lake, working the local industries, live close to their places of work. Large portions of this working class live in trailers or very small, low cost “prefab” homes. Those on the affluent Double Arrow Ranch have a major influence with the direction the town is going; they will not accept the status quo. This attitude presents itself because the homeowners on the Double Arrow are here for their second or third homes. Due to this fact, their standard of living is higher than the long term residents. However, numerous Double Arrow Ranch residents are only in Seeley for parts of the year. Because there are an increasing number of part time residents, the problem arises as many of these part-time residents want to have a say in the town's direction but are not as eager to contribute to the town financially. Another problem is that Seeley Lake is in Missoula County, and public services are handled by Missoula officials. While Seeley is part of Missoula County, it is apparent that the growth and direction of Seeley Lake is not overseen or guided properly. The fact that Seeley Lake is

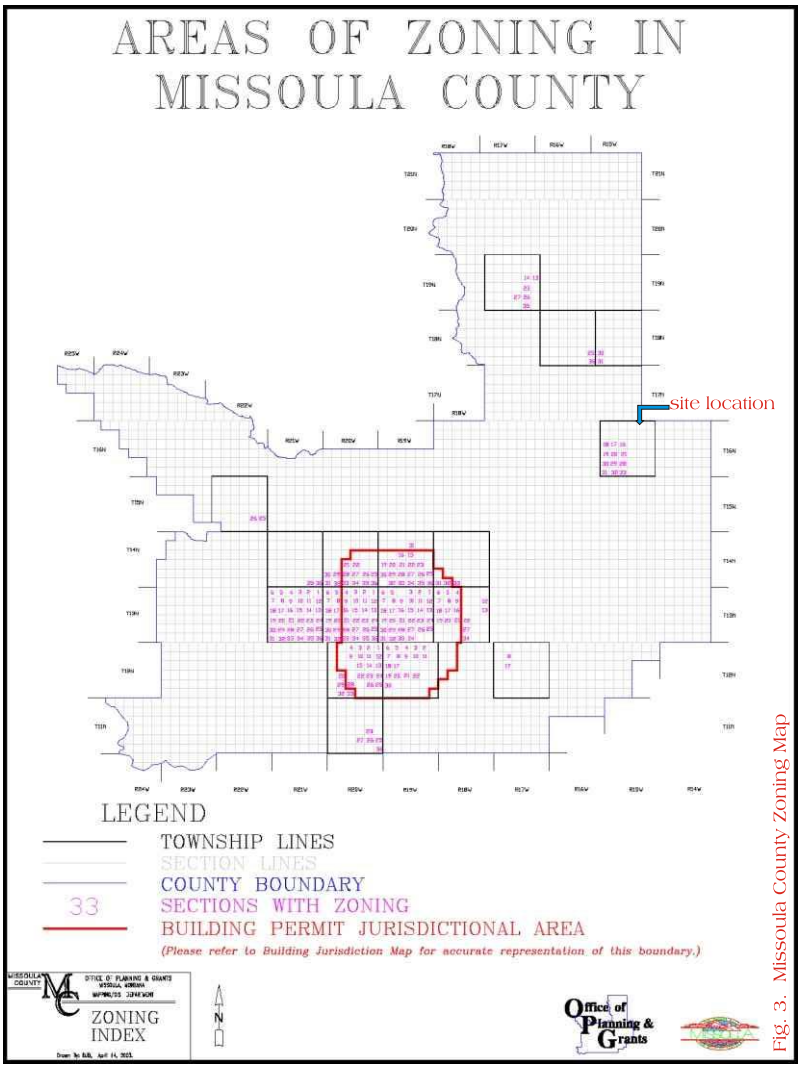


Fig. 3. Missoula County Zoning Map

growing without guidance from Missoula is supported by the Department of Planning and Grant's lack of jurisdiction over building and development in Seeley Lake.[1] (Fig 3.) Seeley has made some progress towards becoming independent however with a local school district, not under complete control of Missoula County Schools. As recent as June 2005, Seeley Lake also proposed to Missoula County that it should secede to become a new county.[2] Seeley Lake proposed these changes to the county so that the town may govern itself and produce its own boundary conditions. This way it may more easily follow state guidelines concerning building and development. These efforts illustrate the eagerness and ability of the town to grow, and the county's failing ability to adequately support Seeley Lake.

Within the past year, the potential for growth in Seeley has experienced a great increase. Not only has the potential increased, but the town itself is growing. Much of this growth is residential growth, but lately some commercial interest has developed. Missoula County is contemplating the introduction of public sewer to the region. This news excites and worries many of the local residents of Seeley Lake. The latest public hearings concerning the Seeley Lake sewer assessment occurred on September 26, 2005. This public

hearing discussed the potential costs involved and community opinion on the matter. In this hearing, the overwhelming majority of the Seeley Lake residents opposed the introduction of a public sewer due to the costs that would be charged.[3] The news of the possible sewer system has spurred a wealth of conversation of large scale housing developments and big box stores economically suffocating the private businesses. While the valley in which the town lies is very small, the lack of zoning in the region makes Seeley Lake extremely vulnerable to unguided suburban sprawl and skyrocketing property values. The lacking conformance to Seeley Lake's ten year growth plan and few building regulations is also evident in the current composition of the towns housing structure mainly in central Seeley with the majority of the housing still being trailer homes. Just recently a group was created to produce an in depth analysis of the Clearwater Valley. The results of this study are focused on the potential for growth in Seeley Lake. The team, the Clearwater Resource Council, has recently completed their work and will be reporting their findings on April 18, 2006. The depth of this analysis ranges from environmental conditions to large view corridors throughout the valley.

While having a tourist economy is not bad, caution must be taken to

ensure that economic, and physical growth are monitored as not to create a community that is dependent upon a singular activity to support the community as a whole. An example of expanding tourist trade in the valley is the increase in snowmobile rentals. Seeley Lake is home to nearly 400 miles of prime snowmobile territory and draws interest nation-wide. However, if the snow is low for a year, the industry is hit hard. Many family owned shops rely on the successful rental season, and if there is a lull, it can be hard, if not impossible for a small business to stay monetarily afloat. With an unguided plan for the growth of a community, whether it is in Seeley Lake or elsewhere across the nation, the resulting growth can be crippling to the existing society.

On the most basic level, communities may fail because of the consequences inherent to public infrastructure. As The Rocky Mountain Institute discusses in an article concerning rapid growth in communities, "Few understand that public service costs—for schools, emergency services and infrastructure— created by sprawling growth are usually greater, often far greater than the tax revenues generated."[4] The cost increases are both overwhelming for lower income families and businesses to sustain; only those individuals and businesses with the cash reserves to survive the initial shock of increased living expenses and operating costs will

survive. Today's communities are not developed for the user; the developments of today are purely profit gaining ventures fit into the existing "…hierarchical…tree-like structure, never a network."[5] Community development always has some notion of creating profit, however, the development of a community should be one where the needs and desire of the residents are met, and profit making is only a byproduct of the growth. While providing an infrastructure can greatly stimulate an economy, it carries with it negative aspects. Infrastructure is change and infrastructure does not preserve in every circumstance. The citizens of Seeley Lake want the economy to grow, however, they want the character and simple way of life preserved.

In 2000, Seeley Lake, MT, 59868 was listed for the first time as a "census designated place." With this label came the first official recording of Seeley Lake as a recognized town. Per the 2000 census, there were roughly 1,800 permanent residents in the town, living in roughly 940 homes. An average family consisted of 2.89 people, and from the data recorded by the government, there were 411 families and 589 households. Of the 589 households, 29.2 per cent have children under the age of 18. The median age of a resident of Seeley Lake is 41 years old. A further

breakdown of the residents, by age may be seen in Figure 4. The median family income in Seeley Lake is $38,188 per year. While this number may seem reasonable, it is not the median income that is used when compared to similar communities nation-wide. The per capita income is the measuring stick from which comparisons are drawn. In Seeley Lake, the per capita income is $18,825 per year. 10.6% of the working population (ages 15-65) is below Federal Poverty guidelines. 7% of the families (29 families) in Seeley Lake are below the poverty guidelines.[6] This data provides a general analysis of the economic and social wellbeing of the current residents of Seeley Lake.

The largest employer in the valley is Pyramid Mountain Lumber. Pyramid employs 145 people full time and has been in continuous operation since 1949.[7,8] Prior to the start of business at Pyramid, logging and mill work have been the primary occupation of residents in the valley with the first settlers from the late 1880's. Most likely if a resident doesn't work at the lumber mill, they are related to the occupation in some way, whether it be logging, a trucker hauling the logs, or in saw maintenance. The land in the valley is primarily a very rocky terrain that is unsuitable for planting and harvesting, and the land isn't much more suitable for livestock either- as referenced by the 1878

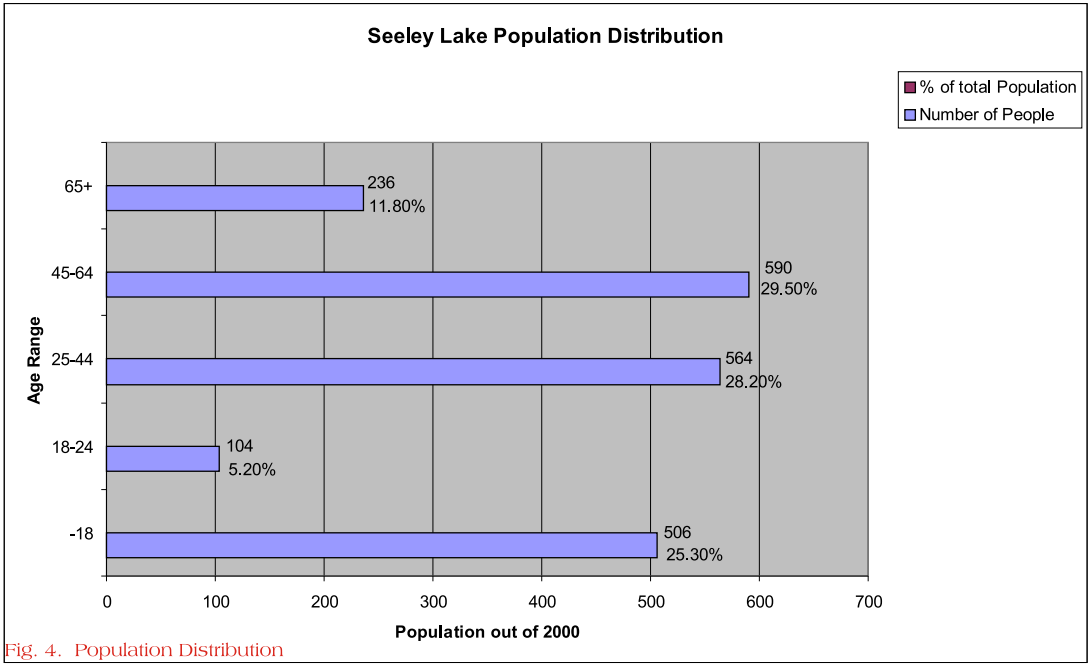


Fig. 4. Population Distribution

Timber and Stone Act allowing people to purchase nearly 160 acres at a cost of $2.50 if the property is unfit for agricultural use.[9] In the 1800's Montana was only a territory, which allowed the government to distribute the land in large parcels and low cost to homesteader's venturing westward. Generally, the settlers of the new lands were coming to experience the environment and work together to survive and grow. Substantial wildlife was, and still is present in the valley, primarily including deer, elk, moose, mountain lion, black bear, grizzly bear, and mountain goat. In addition to these animals, there are extensive fish in the lakes, streams and rivers in the valley.

The lifestyle of Seeley Lake's residents is relatively simple. They have lived and fallen in love with the landscape and have no desire to move from their birth place, or they have moved to Seeley to get away from the bustle and clamor of larger towns. Life seemingly moves at a slower pace in Seeley Lake as the current residents and people moving to the area come here for solitude and relaxation. Residents come to get away from the attractions and distractions native to larger communities such as traffic noises and general congestion. The important factors present in this thesis do not concern catering to a certain lifestyle, as for a town to progress, change is inevitable. Thus this thesis

intends to preserve the character of the town and the current residents' way of life, and enhance the quality of life while Seeley Lake inevitably changes and expands.

Seeley Lake has mainly three primary housing typologies. There exists the “central” typology, (Figs 5-6.) the Double Arrow Ranch typology, (Figs 7-8.) and the seceded Double Arrow Ranch typology (Figs 9-10.). Each of these typologies produces a small glimpse into the history of Seeley Lake. The oldest housing typology in Seeley Lake is the central area directly off State Highway 83N going westward towards the high school. This typology is developed largely of old mobile homes on fifth-acre, to upwards of one acre, many of which have been modified, expanded upon over the years. The central population represents the industrial working class of Seeley Lake. Many of the residents



Fig. 5 Trailer Homes



Fig. 6 Trailer Home



Fig. 7 Double Arrow Home



Fig. 8 Double Arrow Home



Fig. 9 Seceeded Home

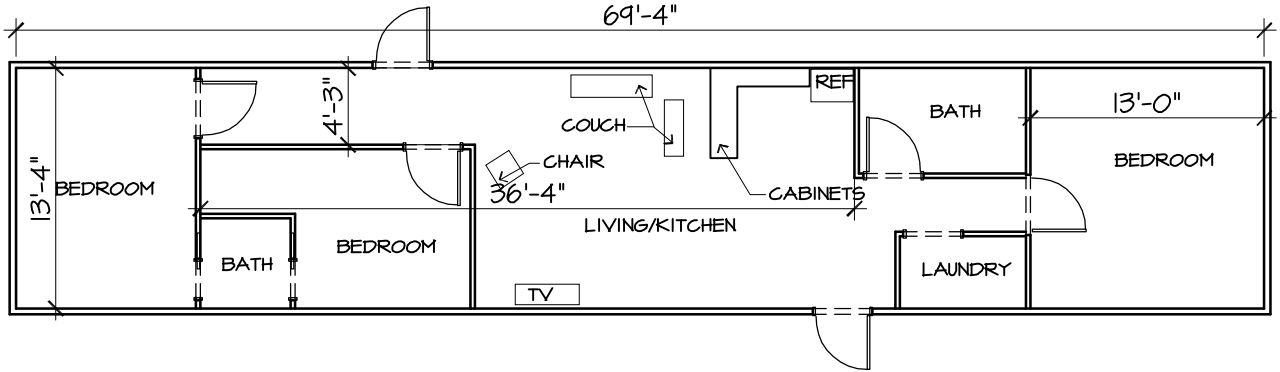


Fig. 10 Seceeded Home

in this area of the town work in the timber industry. The second typology is the Double Arrow Ranch. The Double Arrow represents the wealthier population of Seeley Lake. From the mid to late 1980's, Seeley Lake has become more and more a tourist destination. The plots on the Double Arrow range from smaller 3 acre lots to 20 acre lots. The majority however, are roughly 6 acres. The homes built on the Double Arrow are usually large custom-built homes overlooking the valley and mountain ranges, with a handful of smaller homes settled in the solitude of the forest. These homes are often only extensions of wealth and are exaggerated in size in relation to user needs. The homes on the Double Arrow are built with numerous ordinances including no fencing, no livestock and permits required to down timber. The ordinances seen on the Double Arrow were instituted to keep the land and right of passage free for all in the valley. The last typology is the seceded Double Arrow phase. The lower phase of the Double Arrow Ranch seceded approximately 10 years ago. While many of the homes were built under Double Arrow land ordinances, the newer homes are free from such restrictions and present a hybrid of the individualism of central Seeley Lake combined with the guidelines of the Double Arrow. While the housing in this area most closely resembles that of which may be seen

on the Double Arrow, the property and landscape are changed dramatically. Each resident in this typology has freedom to build as they please and cut down trees on their land.

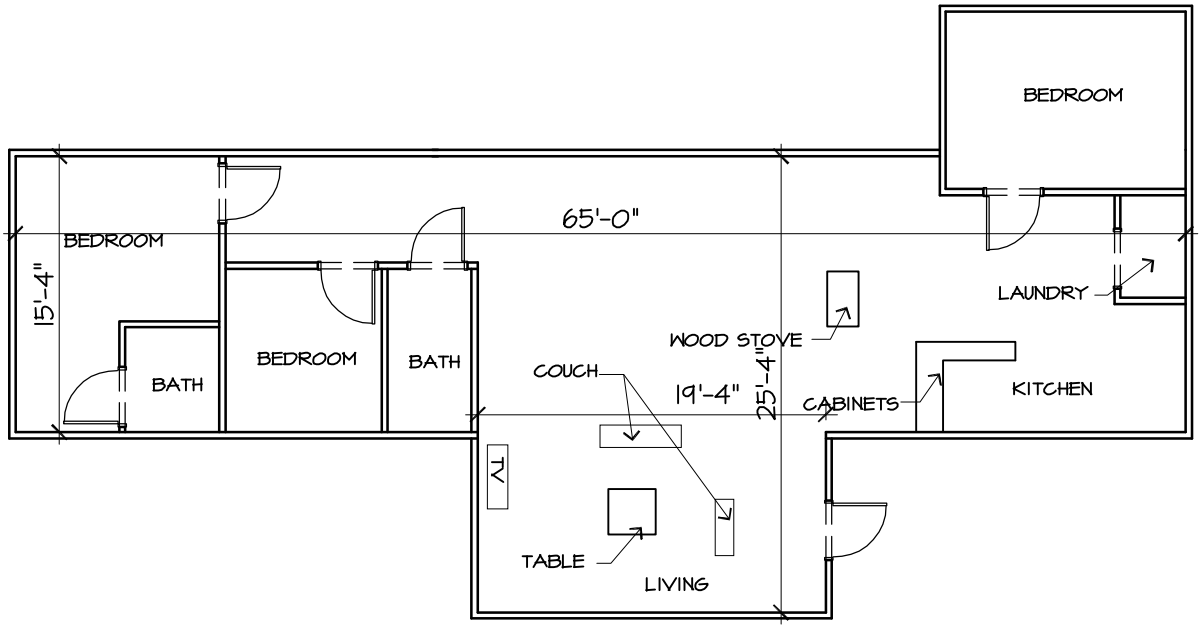
The central housing is the focus of this thesis (Fig 11.). The residents of this area of town reflect the census data almost perfectly. They aspire to have a nice, comfortable home in which they can live and grow, however, to change to a larger trailer is really their only option - to build a real home is too expensive. The average trailer in Seeley is a two to three bedroom, roughly 1000 sf. total. Maintenance costs of the trailer every month can be as expensive as the rent, especially in the winter due to high heating costs- keeping the exposed pipes from freezing in most cases and resulting in roughly $300/month to maintain the trailer. This is commensurate with heating costs for the more affluent homes on the Double Arrow. As they dream to have a real home, there is no motivation to do so due to the lack of a community voice and lack of knowledge of financial options available; it is easier to remain with the status quo. From the data herein one can develop a rough estimate as to what the average family can afford in regard to sustainable technologies, design finishes, and overall home size. To help provide a cost basis that can be employed in the design phase,



TRAILER PLAN #1

Fig. 11 Case Study Home 1

SCALE: 3/32"=1'-0"



TRAILER PLAN #2

Fig. 11 Case Study Home 2

SCALE: 3/32"=1'-0"

there are two case studies of residents within the development site. The first study is a single mother, with two children. Her current monthly cost for rent and utilities is $500. A further breakdown of the monthly finance for the families can be seen in the table below:[11,12]

	Lot	Trailer	Water	Electric	Wood	Gas	Insurance
Family One (3 People)	$150	$120	$30	$150	$30	State Paid	$20
Family Two (Four People)	Currently own, Pay $200 on Loan		$50 Winter, $90 Summer	$150 Winter, $100 Summer	N/A	$200	N/A

As seen in the first housing case study in Fig. 11, the housing situation is very tight. The home is 980 sf. (14'x70'), three bedroom, two bath. The organization of spaces leaves hardly any definition for circulation, storage, or personal space. Per this homeowner's arrangement, if she were to have a new home for her and her two young children, she would like to see some separation of spaces, a dining room separate from the kitchen, a dining room table, chairs, and other small furniture items. Through this plan, one can also see the lack of organization in the arrangement of the predetermined rooms, and the inefficiency created.[13]

The second study is a family of four; Mother, Father, and two young children. Their budget is much higher, and represents a dual income family. The father works in construction during

the summer, and takes unemployment in the winter. The mother works year-round at the Double Arrow in housekeeping. Their monthly budget is as follows: Winter monthly income total: $1200 (Nov- Feb), Summer income $3000 minimum, depending on construction workload. Their yearly income is usually around $30,000 or more. Their home is roughly 1,350 sf, three bedroom, two bath. This family has built two additions to their stock, 16'x65' mobile home. Through these additions some space has been gained, but the quality and maintenance of their home is a major problem in their eyes. If they had a new home, they would like to have the same number of spaces, with higher quality and would like a garage for two cars.[14]

While no one in the town expects the mill to run forever and the lumber to be ever-present, the town of Seeley Lake will survive. Why will Seeley Lake survive? Seeley is currently supported by the mill, which pays over $4 million dollars in income yearly.[15] The economy of Seeley is also boosted by the recreational services provided, real estate transactions and lastly from a hidden economy- the expenditures of the retired, and the overtly wealthy who have built a second, third or fourth home in the valley for vacationing. Economically, Seeley will sustain its growth and flourish.

This thesis proposes to expand the mill's production capability, working

to both further the economy and the community—similar to a value added commerce. The mill would add manufacturing capability to build the low cost, pre-fabricated high efficiency wood paneling being used in the homes replacing the trailers in central Seeley Lake. With the available workforce in Seeley Lake, an abundance of currently owned land for the mill expansion, the mill manufacturing process is viable. The validity of this proposal is also supported by the current industries which produce the raw materials needed for the panels such as steel, insulation, and other finish materials which may all be located in Missoula. Seeley Lake would be a prime location for the production and distribution of these panels due to its central location with growing communities such as Missoula and Polson to the southwest, and Big Fork, Whitefish regions to the north. This scheme will strengthen the town as a whole and invite more people to the valley, while also strengthening the core community of Seeley Lake.

The issues of affordable housing, sustainable architecture and urban planning are not new topics in architecture. As these topics have been discussed time and again, the theories supporting or refuting are as equally numerous. To design housing, the architect has to have an understanding of what the end user

expects, needs and wants. In a prefabricated, flexible housing situation, the architect may only be able to provide a core design which may be altered upon in the future. For a successful home to be constructed, the end users involvement is imperative.[16] In the development of a central community in Seeley Lake, this user involvement is available, willing and will generate remarkable results. The benefits of harvesting and processing local materials at a local mill, employed by locals, and eventually constructed by locals are imperative to the wellbeing of the town. As Lucien Kroll suggests, with the individualistic approach to the new housing, individual creativity will spur non-conformity and diversity, breaking the industrialized nature of current developments which may be seen as dull.[17] With this diversity comes a place with life, and interest—aspects which Seeley may thrive upon.

In the most negative scenario, assuming the mill's closure in the future, one may suggest that the economic support from the tourist economy and the real estate market will keep Seeley Lake afloat financially (Fig 12.). In the past four years, the cost of a single lot has doubled, and the market doesn't seem to be slowing.[18] While this is the most negative result the town may foresee, it is possible to survive. In Kremmling, Colorado, a similar scenario took

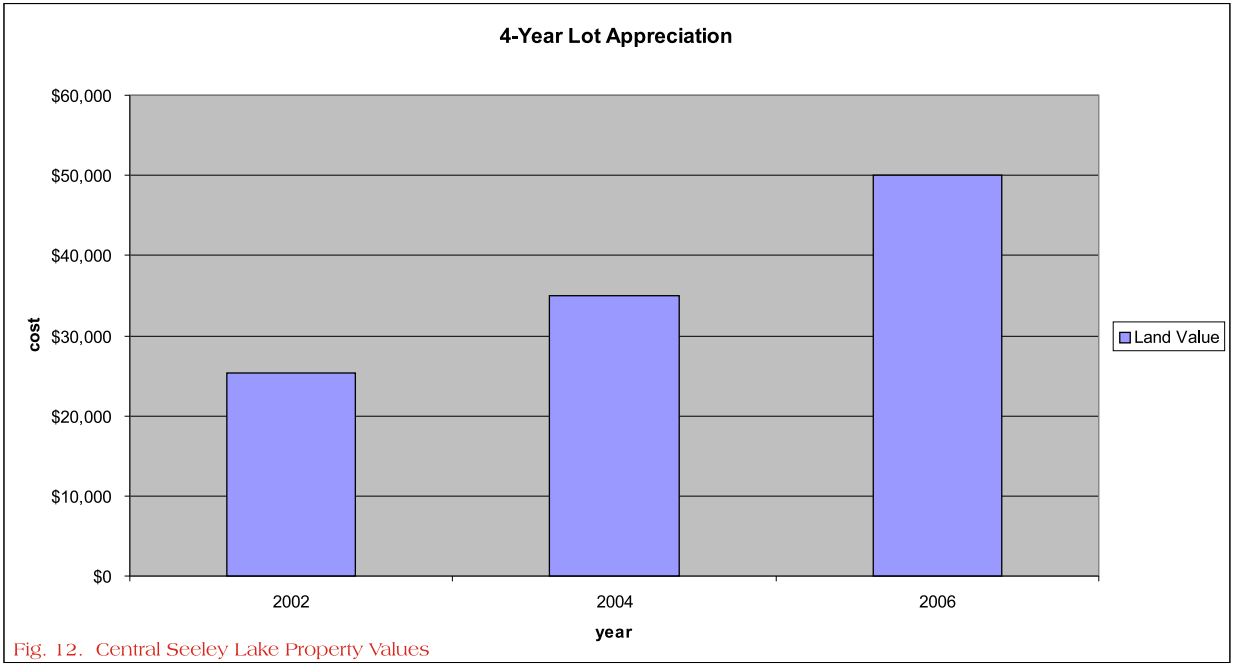


Fig. 12. Central Seeley Lake Property Values

place. The largest employer in the small community closed, leaving a large number of the residents unemployed. The town realized the drastic nature of what occurred, and the residents worked together to keep others employed. The town's remaining companies took in workers part time, and those employees who had the economic means available, started new businesses, employing a majority of the remaining workers displaced.[19]

In a more probable scenario, one which relates to the present economic situation of the mill and its workers is the implementation of the prefabricated home, community development program. From this community development, this thesis plans to provide new jobs, not only for the current working class of Seeley Lake, but also the next generation. As discussed previously in this proposal, one of the largest populations in Seeley Lake is the eighteen and under census range, accounting for 25% of the overall population. This 25% of the population equates to just over 500 people.[20] Due to the expanded production of Pyramid Mountain Lumber, the sons and daughters of the families currently employed by the timber industry will have the opportunity to remain in Seeley and raise their families in an economically stable environment. With the implementation of this development program, Seeley Lake's

economy will also be bolstered by the expansion of its strongest industry. There exists a great abundance of healthy timber resources in the valley according to the Clearwater Resource Council's 2006 assessment.[21] By continuing sustainable logging practices in the valley, the wealth of the young and old forests can be preserved and used as a tool in ensuring the economy of Seeley Lake. A local, fully operational lumber mill, available working staff, and a great desire for personal wellbeing and growth in the town make Seeley Lake the perfect site for implementing this community development program.

The housing typology proposed to be implement in Seeley Lake will be one in which the homeowner will purchase the central core—manufactured in town—and construct it on site through available labor in the community. The flexible homes would then be expandable with panels and units which also will be manufactured in town. With this idea of incremental growth in housing, costs for the homeowner may remain low due to the ability to grow and finish the interiors at their own pace. This technique is similar to Avi Friedman's "progressive occupancy" in his book, The Adaptable House, Designing Homes for Change.[22] Through this design, the involvement

in the home will produce the most favorable results for a family, and even further, the community. The community, comprised of individual houses alone, cannot be a successful place. As Kingston Heath notes, "buildings, alone, do not define place; people in their interactions with the natural and built environment, define place."[23] This quote sums up the essential qualities that must be present in order for the central community of Seeley Lake to thrive. These qualities will be achieved through the proposed incremental growth strategy. Through the construction cycles of the replacement homes in the community, interest and experience are developed between the new home owners and those residents who have yet to begin the replacement process of their own homes. As families complete their homes they may share their increased knowledge and experience with others as well as possibly assist in the construction of the new homes.

In the development of this community, the site considerations are very important. To retain the sense of personal accomplishment and growth, the existing property lines will be acknowledged. While ownership will be respected, the arrangement and interaction of the open spaces both public and private are crucial for a successful, growing community. The interstitial spaces could be maintained by the closest homeowners, or a

community landscaping crew. The details of this maintenance would be up to the homeowners. While many communities are extremely different in size, structure and market, the general strategies are applicable to this thesis. Examples supporting such community development include Radburn, New Jersey, and the suburban design principles used. The idea of the un-built space between homes as a fabric in which residents share the available resources and attributes is a valuable concept which supports the core values of community.[24] This proposal does not seek to replicate the organization or design of communities such as Radburn. This proposal seeks to learn from the methodologies and apply an interpretation to the current site development. In Clare Cooper Marcus and Wendy Sarkissian's Housing as if People Mattered, "social homogeneity" is essential for successful growth and evolution of a community. For the residents to feel as part of a community, the neighboring residents must relate some way in age or financial situation for example.[25] With the primary focus of this thesis resulting in the production of new homes in a community for the working class of Seeley Lake, Marcus and Sarkissian's theories support the intentions present. While having some level of homogeneity is necessary for this community to thrive, by no means is it proposing a "class"

stratification system as this may actually perpetuate the current problem. The homogeneity being sought after in this situation is that of a social nature, one where similar attitudes and identities may be forged rather than by economic status. By having similar families near one another, a cooperative, supportive community may be kindled. The sustainable community does not strictly cater to this working class. The new development may include homes for the elderly locals, and young families looking for an economical, first home solution as well as newcomers to the valley seeking residence.

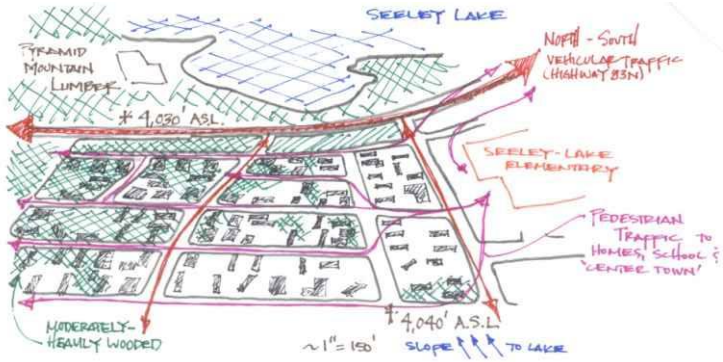
In a sense, the new community in Seeley Lake may be seen as similar to New Urbanism approaches to development. Through its planning and development, the resulting spaces will work in unison, much like what one may experience in a neighborhood with New Urbanistic ideals; mixed use development, walkable streets, positive public space, and accessible open space.[26] From the interconnections between not only the residential aspects of the community, but also the schools and commercial development, both new and old, a true sense of place may be found. While this approach of programming a small village-like community, relationships and experiences will develop.[27] As these experiences expand between parents,

children and neighbors, a stronger sense of pride will be nurtured; reinforcing the most cherished values of Seeley Lake. The principles prescribed by Seeley emphasize how this sustainable community will be applicable to similar towns struggling with comparable problems and aspirations. This community works in multiple locals due to its initial "independence of setting."[28] The community retains an ambiguous character until it bonds with its given environment. Once the inhabitants have gained a sense of place and acceptance, the growth and interaction with the existing town or city begins. When the roots, the core values of the community have set the success seen by those residing outside this community will spur the continuation of such developments on a larger scale. The resulting community will become a strength in Seeley Lake. Initially the community may be seen as a development comprised primarily of affordable housing based on the economic assistance from the state. Eventually, over a period of a few years, the costs will be covered due to the growth of the communities, land values and attention from general character. As Sam Davis suggests in his book; this growth is a direct result of the new homes acting as an "…instrument of community activism."[29] Through the activism of others come new growth, excitement

and community interest. This duality of activism and physical growth is what will make Seeley Lake a smart town. Much like Habraken discusses in Supports;

> To arrive at a better housing we must begin by refusing to separate town and population, for the form of one determines the form of the other, and consequently the form of the one cannot exist before that of the other. A town is not a thing without people; a town is man and matter together. This concept is related to live and inanimate matter at the same time. The notion that there can be talk of two entities can arise only because it fits into the concept behind MH. If a town is created before there is a population this fatal separation is implied.[30]

This quote sums up the essential qualities that Seeley Lake will exhibit at the completion of this project through the community involvement, excitement and the economic investment in a local economy. As of right now, Seeley Lake has the people and the economy, but there is generally no sense of town and full community involvement. With the redevelopment in Seeley Lake, a true sense of community and town will be present to current residents, and those who will be drawn to the town due to the strong sense of place in the future, both socially and economically.



The possibilities of the homes designed according to this thesis could be endless. Nonetheless, due to the economic constraints of the residents of central Seeley Lake, the scopes of the homes are considerably narrowed. As previously mentioned, the current residents have a home that currently works—up to some extent. In regard to size, the current homes are roughly 800 to 1,500 square feet. There currently exist approximately 90 homes on a total of 25.27 acres (1,100,784 sf.) in the proposed development site. By respecting existing home sizes, at an average of 1,200 sf/home; it may be expected that roughly 96,000 sf of building footprint be implemented. 96,000 sf is

only 8% of the available 1,100,784 sf of development site. While the potential exists for each of the 90 homeowners to design an entirely unique home, four initial core housing units will be developed. After the successful completion of the development with the replacement of all mobile homes, at the land owner's discretion, a second phase of building may be proposed. The second phase of development would permit one additional home per every lot owned. The second home placement will be determined on a per lot basis, as seen in Fig. 13, the dashed green lines represent the first potential building site until the mobile home is removed from the site after the house is occupied.

After the mobile home is removed, if the site conditions allow, a second home may be constructed. From the sale of these homes, the owner may be able to gain income, while increasing the density of both the community and the town as a whole while not overbuilding the site. This building restriction is provided to allow future growth while retaining the spatial characteristics intrinsic to Seeley Lake. The homes that will replace the trailers, and other homes on the site, will respect the current overall size. However, the footprints will change. From this thesis a greater sense of permanence will be established in the center of Seeley Lake through the intervention of new homes. No more

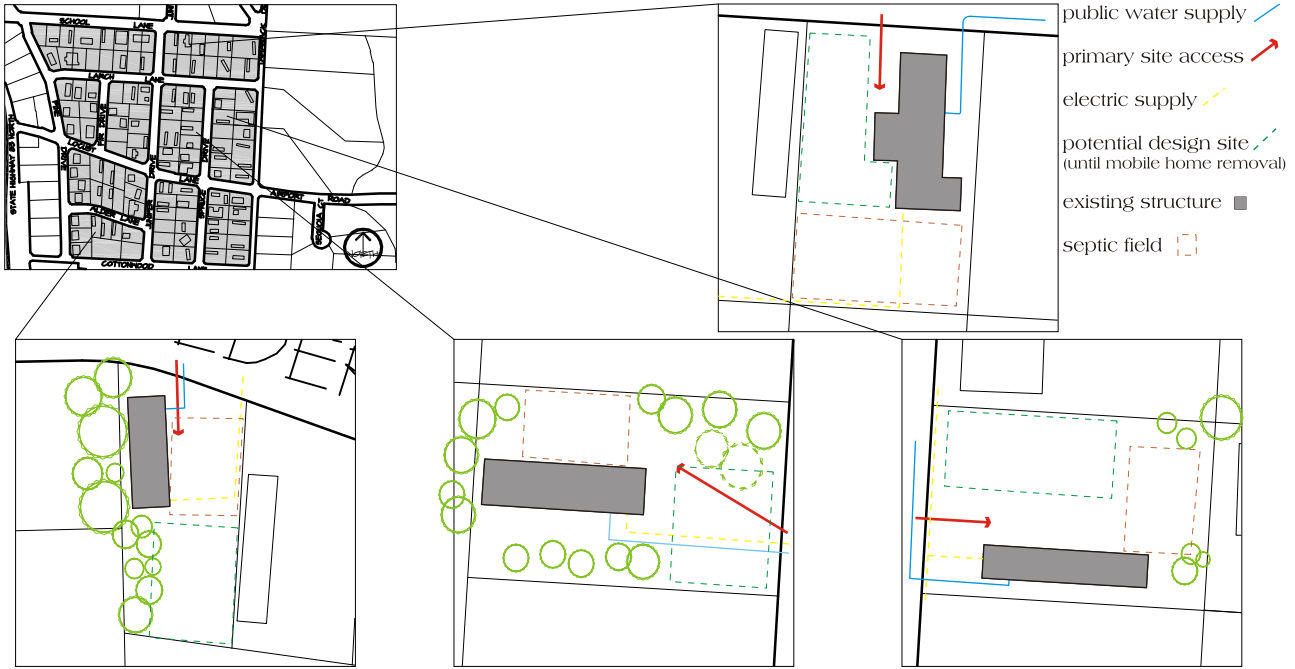


Fig. 13. Central Seeley Lake Basic Site Analysis

will there be “temporary permanence”, trailer homes on blocks and wheels which have been stationary for years. These homes will range from smaller one-two occupant homes to four bedroom homes. The homes will have to cater to the elderly, and lower mobility citizens, while also being able to accommodate a growing family and their rapidly changing needs. Due to the varied needs of the families, the homes will institute flexibility and ease of construction. Interior finishes can be utilitarian in nature which will work appropriately for younger and lower income situations. By using particle board, rough lumber and stone; materials readily available in town, a multitude of simple finishes may be applied. These finishes could range from simply sanding, finishing, and coating particle board, to using the particle board as a base under tile or finished hardwood floors, counters and the like. (Fig 14.) Wall construction would be locally prefabricated wall systems, fully insulatory based on the climate. These wall panels will be similar in construction and nature to structurally insulated panels (SIPs) and will be developed fully in the design phase of this thesis. The panels will be easily integrated, and connected allowing maximum user flexibility in design. Roofing material will be tin roof, to compliment the existing architecture in the town, while also providing optimal forest fire protection



Fig. 14. Interior Finish Sample

and snow shedding ability. The articulation of the replacement homes will require a degree of finesse. From the existing home layout, (Fig 15.) the replacement homes will need to be arranged in such a way on the development site, that there is proper space for construction to occur without creating problems with the existing trailers. The development of the final arrangement will allow for maximum solar exposure for efficient design and to preserve the environmental character of central Seeley Lake. The existing block structure apparent in the development site will undoubtedly help order, and dictate the proper home positioning for the community.



Fig. 35. April, 2006 Aerial Site Photograph

Building Program Abstract:
4 Building Core Typologies.

Single Bedroom Core: 800 square feet.
1 Bedroom, 1 Bath, Kitchen/Dining

Two Bedroom Core: 1000 square feet.
2 Bedroom, 2 Bath, Kitchen/Dining

Two Bedroom Accessible Core: 1,200 square feet.
2 Bedroom, 2 Bath, Kitchen/Dining

Three Bedroom Core: 1,500 square feet.
3 Bedroom, 2 Bath, Kitchen/Dining, Study

Possible expansion units:

- Office/Multipurpose room
- Bathroom
- Bedroom
- Garage
- Workshop
- Individual Panel purchase.

Code Analysis: 2003 International Building Code- Residential[31]

Type A-1 Single Family Residential
Studs: Minimum grade level: Standard Grade #3, maximum spacing, 24" O.C.
Glazing: No more that 15% of total wall area
Smoke Detectors: Minimum, (1) one per bedroom, adjacent vicinity hallways.
Egress: No less than (1) one exit door with egress without a key, or special knowledge to operate. Door size: 3'x6' clear minimum.
Class A roof covering, Metal roof in accordance with ASTM D 2898

Off-grid refers to the ability of a community to function independently, or in the next best case, selective interconnectivity with the public utilities of electric, sewer, water and LP gas. In this thesis, sustainability refers to the capability of the community as a whole, and individual households to remain economically and socially viable. Sustainability also describes minimizing resource use through sustainable energy generation, water collection and waste reduction. While the initial cost of the units, and the sustainable technology proposed in this thesis may be higher than the costs of the trailers there today; the operational costs are extremely low.

Sustainability in the most basic form means to continue to exist.[32] The intensive grid employed by basic infrastructure dictates the size, location of development. For a small, growing town, this grid does not support economically struggling families due to the high costs of implementing such a system. Per a September, 2005 Seeley Lake Sewer District meeting in Missoula, the initial costs for implementing a public sewer system would cost nearly $150/month.[33] Furthering the definition relevant to this development, sustainability references the capability of the community to work in conjunction with Seeley Lake, sustaining its existence.

Sustainable development in Seeley Lake can be achieved on multiple fronts. The houses proposed by this thesis will be designed for purchase and construction within the budgets of the residents in Seeley Lake. The technology involved within each unit must be sustainable in cost to the consumer, thus, affordable. Many of these costs may also be controlled through optimizing the building site for daylighting, natural ventilation, and solar gain. Through these factors, as well as material explorations in the design phase, high sustainable technology costs may be averted. The majority of the community today is on the Seeley Lake Water District's public supply, this

system of fresh water may remain in use for the development site. Water in the area is plentiful with Seeley Lake being the primary water source for the town, and domestic water wells being used for homes further from the lake.[34] The public water system is a treated, gravity fed design, which services central Seeley Lake, and the seceded phase of the Double Arrow.[35]

During the summer months, May-August, Seeley Lake has an abundance of sunlight. This solar energy will be captured with the use of photovoltaic panels mounted to the roofing of each unit. In western Montana, an average of four to five hours of prime sunlight may be gathered. From a small 2 Kw. photovoltaic system, in one day 23 Kw of electricity may be produced, while the average home in Montana only consumes 15 Kw. per day.[36] Even with the colder, yet still sunny climate in late fall before the first snow, supplementary photovoltaic systems may be used for water heating in housing situations which may be economically supportive. This would be achieved through the use of Glycol in the heating lines rather than water due to freeze points.[37] With the use of passive solar technology in conjunction with existing electric utility, electric charges can be held to a minimum. From a very small, 2kw photovoltaic system, the electricity produced in Seeley Lake amounts to a

yearly total of $199.08.[38] This cost does not take into account the amount of money potentially gained through net metering buy-back. While the cost of many of these systems may seem out of reach for the residents of Seeley Lake, there are economic incentives in place from the State of Montana to help balance the costs of "green" systems. Incentives available for residents using sustainable energy, water, heating, waste management can be seen in Fig. 16.[39] Also available for residents who implement photovoltaics which may produce more electricity than currently drawn, the excess electricity may returned to the grid for use by the community. The return of this electricity would be purchased back from the local electricity supplier. These incentives plus the available capital resultant from borrowing against the current land values of the central portion of Seeley Lake provide a strong argument in support of building permanent homes with sustainable energy systems inbuilt.

A grid intertie system will be the most realistic strategy for the development. Grid intertie is an economic strategy in which the building is connected to the public infrastructure, most popularly electricity, and is able to sell (return) electricity generated and unused to the grid, while being able to use the supplied energy when needed. A grid intertie will allow each household,

State of Montana Sustainable Energy Incentives for Residential Projects			
Name:	**Value:**	**Duration:**	**Requirements: (partial)**
Residential Alternative Energy System Tax Credit	up to $500	4 yr	Photovoltais, Low Emission Wood Stoves, Passive Solar Heating
Property Tax Exemption	N/A	10 yr	Non Fossil-Fuel energy genration systems up to assessed value of $20,000
Alternative Energy Revolving Loan Program	up to $40,000	10 yr repayment @ an annually set interest rate	Solar Water Heat, Photovoltaics, Geothermal
BEF - Renewable Energy Grant	up to 33% of Capital Costs	N/A	Community based incentive for community energy generation systems

Fig. 16. State Sustainable Energy Incentive Spreadsheet

based on budget; decide which sustainable strategies would be most viable towards their economic and physical wellbeing. The grid intertie would allow the family to be off grid for some services, while having a backup connection to the grid. This intertie would allow private water and private energy when available.[40] The intertie strategy would also have to potential to benefit the individual household and the community by taking advantage of electricity buyback when the household is producing more electricity than the current draw. (Fig 17.)

While the temperature in Seeley of often reaches 90 degrees Fahrenheit, the humidity is generally very low. The climate in the valley is very dry with moderate heat in the summer. In some cases, the dryness results in disastrous forest fires. In the fall and winter, cold temperatures move in fast, and stay until early to mid May. During this time period 15-25

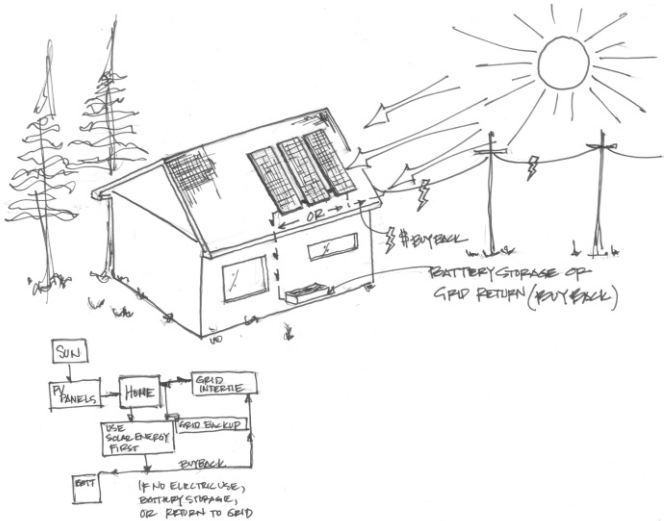


Fig. 17. Grid Intertie Diagram

In the winter, heat will be primarily produced with wood burning stoves or less polluting pellet stoves.

The families may see these costs as excessive, but in reality the amount of money saved by investing in an essentially maintenance free system as opposed to supplying energy-thirsty forced air heater for over half a year far outweighs the initial cost. (Fig. 18) Traditionally the only cost [other than the stove itself] incurred would be for the purchase of wood, or pellets to burn, however, in the valley, wood for stoves is abundant. As a back up for heating as well as for primary cooking, LP gas would be used to power small, high efficiency forced air heaters and stove-tops. Ovens and other high-drain systems may also be serviced by gas or full electric. A solution for sewage treatment in the community could potentially be a community composting system or individual household units capable of filtering grey water. The advantages of a community compost vat would allow minimal maintenance and a useable byproduct.[41] The fertilizer produced from the compost would then be used in the community for public green spaces, and if abundant, distributed to the town.

Cost Comparison of Electric Heating and Air Conditioning Costs vs Wood Stove	
Winter Months October-March: on average $115/month	$805
Summer Months April-September: on average $75/month	$375
yearly heating/cooling cost:	$1,180
Wood Stove: Initial Payment, for a 800-1,600 sf home: ~$1,200 one time payment	

Fig. 18. Heating Cost Comparison Spreadsheet

8 Precedents

The precedents discussed below have and will continue to support the development of this thesis proposal both in the written stage as well as in the design development. Discussed below are a series of studies supporting this thesis. Stelle, Illinois is a community developed in 1973 which uses common sustainable technology approaches to housing. Currently, there are 44 households which exist self sufficiently. The Stelle community is a precedent for the community involvement that this thesis hopes to establish in central Seeley Lake. Stelle also provides this thesis with valuable information on the possibility of the community development becoming a non-profit

cooperative, which may help gather economic grants and funding for Seeley Lake. Some of the technologies used in their community include local water/waste treatment, solar driven telephone company, wind generation, and photovoltaics.[42]



Fig. 19. Stelle Community Home



Fig. 20. Stelle Community Map

Another precedent study is Kremmling, Colorado. This community, while not pertaining to the sustainable aspect of this thesis, provides a similar response concerning the loss of an industry. When the small community (1,200 residents) of Kremmling lost its largest employer, Louisiana Pacific wafer-board plant, employing roughly 20% of the town, it had to devise a way to keep its residents employed as the means were not available for the families to move.[43] Overall, the community distributed the newly unemployed amongst the local businesses as part time worker prior to opening new businesses where more residents could be employed gainfully. This precedent is important due to its support of the economic situation in Seeley Lake if Pyramid Mountain Lumber, the town's largest employer, was to go out of business. The similarities in both size, and industry type provide a measuring stick to which Seeley Lake may compare to. The lessons which may be applied to this thesis are ones concerning economic wellbeing and the rapid growth which may be prompted by change. The way in which a community responds to change is invaluable in determining the social structure of place.



Fig. 21. Kremmling Colorado

Village Homes, in Davis, California is another precedent which relates to this thesis. The Village Homes project is one of the first "green communities" in the nation. This community is very much like what is proposed for central Seeley Lake. The homes were designed and developed with sustainable technology at hand. The homes and homeowners in the community work together to maintain the public green spaces between homes, and the community areas central to the development. Most pertinent to this thesis is the idea that the residents make informed, community decisions for public spaces and greenbelts. Also supporting the theory of this thesis is the ideology

found in Village Homes that families opt to expand or remodel their existing homes rather than moving or building anew. From this precedent, the lessons learned regarding the community space, home organization will be applied in the layout of central Seeley Lake. Many ideas from this precedent will help define the social and physical character of the community in the design phase of this thesis. The technologies used in Village Homes include passive heating and cooling, natural lighting, solar water heaters and reduced pavement use.[44]



Fig. 22. Village Homes House



Fig. 23. Village Homes Aerial Photograph

Precedents of the building technologies to be deployed in the homes created through this thesis include; Twin Lakes Cabin, Twin Lakes Minnesota, Simplified Living Project in Pipe Creek, Texas, and the Reade Street Townhouse, in New York, New York. Each of these projects exhibit strategies, and technologies which are common to the ideas presented. The Twin Lakes Cabin in Minnesota is a very small, residence which uses a high efficiency wood burning stove to provide heat for the home. This project also uses rainwater collection for general grey-water use on site. Propane tanks are used to power the stove, and refrigerator.[45]



Fig. 24. Twin Lakes Cabin

The Simplified Living Project, in Texas is a 925 sf. residence using photovoltaic systems for water heating and general electric use through the home. The home also uses a composting toilet system to process waste rather than typical septic tanks in the region. The home also utilizes natural ventilation and heating when applicable.[46] The final technology precedent is also residential. This townhouse in New York uses geothermal systems to assist in heating and cooling the home. While this project is dissimilar to the homes in this thesis, it does utilize grid-intertie technology for all electricity it produces to keep operational costs of the home at a minimum. The use of a grid-intertie

system is a primary technology used throughout this thesis.[47]

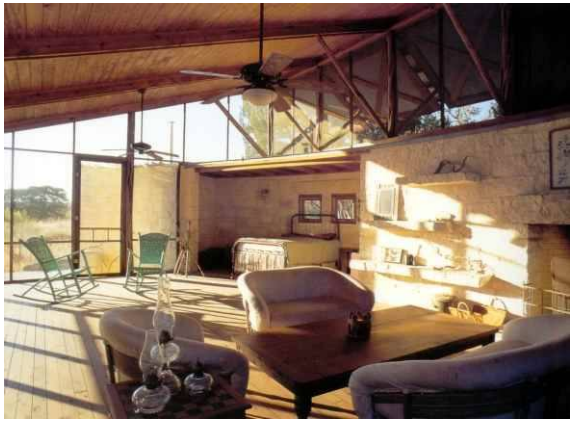
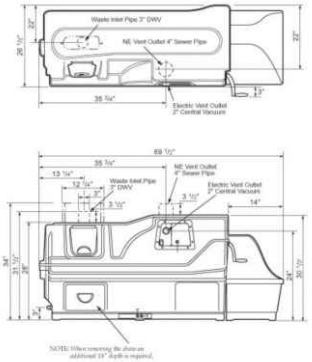


Fig. 25. Simplified Living Project, Texas



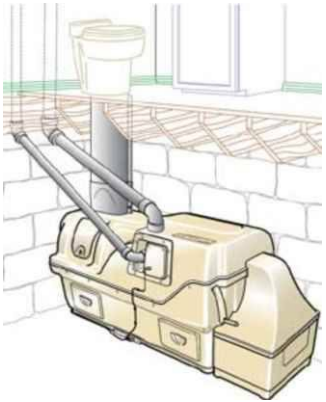


Fig. 26. Single Family Composting Toilet System



Fig. 27. Residential Photovoltaic Systems (non-integral)



Fig. 28. Residential Photovoltaic System (non-integral)

Precedents of the housing typology and theoretical position include Avi Friedman's Grow Home. The Grow Home is an example of affordable housing, while allowing freedom of expression of the owner. The flexibility afforded to the owner allows each home to be entirely different from the next while essentially remaining the same structure. Also the ease of construction through efficient use of materials supports this thesis in regards to home construction and installation on site by local labor.[48] Two other precedents which exist are large scale, built theoretical proposals. Operation Breakthrough, of the 1970's was a nationwide, prefabricated affordable housing proposal. In the

1970's there was a large housing crisis in the United States. The Government's Department of Housing and Urban Development (HUD) had to realize the problem at hand, and produce a viable solution to the problem. The solution to the housing crisis was to design a housing typology that could be implemented in any location, mainly small communities on the outskirts of cities.[49] However, these HUD development sites failed due to the lack of site specificity and user needs. Over the past three decades, the topic of prefabricated, modular, affordable housing has risen and fallen with the U.S. housing demand. Many of the surges in this typology rapidly died out due to the costs required for such a proposal, and the general design; a nationwide standard. However, within the past five years, the prefabricated, affordable housing boom has risen again, and this time, maybe feasible. The Dwell Home II, sponsored by Dwell Magazine is a prefabricated housing strategy for a model sustainable home. While affordability is not the primary concern of the Dwell Home II, the inclusion of sustainable technologies, and methods for reducing utility costs, and maintenance, make this latest attempt at prefabricated housing successful.[50] Also affecting the success of the Dwell Home is the fact that the project does not attempt to work on every potential

site, each home responds to its environment differently and carries site specificity.

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[11] Anonymous Citizen Interview, Feb-Mar, 2006

[12] Anonymous Family Interview #2, Feb-Mar. 2006

[13] Anonymous Citizen Interviews Feb-Mar. 2006

Anonymous Family Interview #2, Feb-Mar. 2006

[14] Anonymous Family Interview, #2. Feb-Mar. 2006

Anonymous Citizen Interviews Feb-Mar. 2006

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Image Credits

Fig. 1. Map, modified by author. Original from Missoula County Office of Public Works <http://www.co.missoula.mt.us/mapping%5FGIS/index.asp>

Fig. 2. Map, modified by author. Original from Missoula County Office of Public Works <http://www.co.missoula.mt.us/mapping%5FGIS/index.asp>

Fig. 3. Missoula County Department of Planning And Grants, Zoning Map, <ftp://www.co.missoula.mt.us/opg2/Maps/Zoning_Maps/01%20Zone_Section_Index/ZONEAREA.PDF>

Fig. 4. Population Density Graph, by author

Fig 5. Photograph by author

Fig. 6. Photograph by author

Fig. 7. Photograph by author

Fig. 8. Photograph by author

Fig. 9. Photograph by author

Fig. 10. Photograph by author

Fig. 11. Illustration by Author, from resident interview

Fig. 12. Data Courtesy of Clearwater River Realty, Seeley Lake, Montana

Fig. 13. Illustration by Author

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Fig. 15. Aerial photograph by Kevin Jones, piloted by Wade Cebulski

Fig. 16. State Energy Incentive Spreadsheet, by author

Fig. 17. Energy Cycle Diagram, by author

Fig. 18. Heating Cost Comparison Spreadsheet, by author

Fig. 19. Stelle Community, Illinois, 20, Mar. 2006 <http://www.stellecommunity.com/>

Fig. 20. Stelle Community Map, 8, Apr. 2006 <http://www.centerforsustainablecommunity.org/map%20of%20Stelle.html >

Fig. 21. Kremmling, Colorado. 8, Apr. 2006 <http://community.webshots.com/photo/64627625/109283756901264495 8iSVRcK>

Fig. 22. Village Homes, Davis, California, 20, Mar. 2006 <

http://www.villagehomesdavis.org/>

Fig. 23. Village Homes, Davis, California Aerial Photo. 8, Apr. 2006 <http://www.earthfuture.com/stormyweather/gallery/11%20-%20VillageHomes.jpg>

Fig. 24. Ryker, Lori, Off the Grid, Modern Homes + Alternative Energy, (Gibbs Smith, Publisher, UT, 2005) 73.

Fig. 25. Ryker, Lori, Off the Grid, Modern Homes + Alternative Energy, (Gibbs Smith, Publisher, UT, 2005) 92.

Fig. 26. Sun-Mar Composting Toilets, 10, Mar. 2006 < http://www.sun-mar.com/products/Centrex3000.php>

Fig. 27. Solarplexus LLC. Missoula, Montana, 8, Apr. 2006 <www.solarplexus1.com>

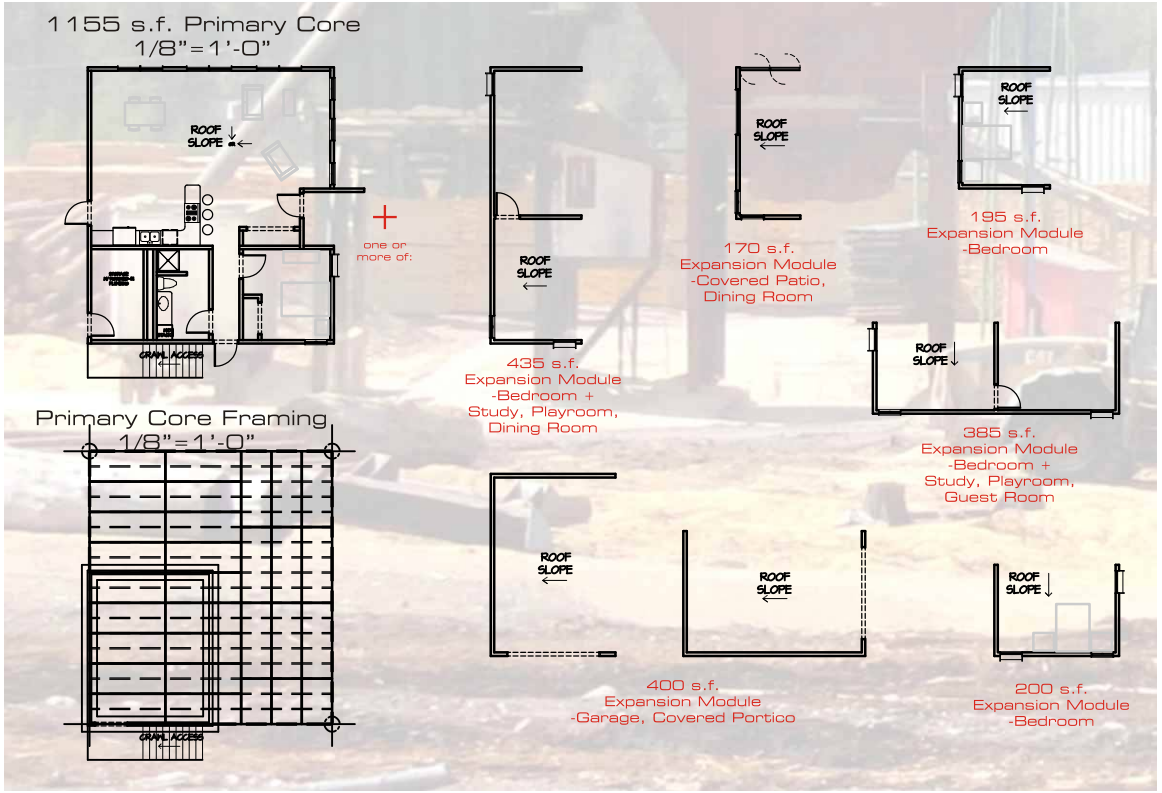
Fig. 28. Residential Photovoltaic Systems, 8, Apr. 2006, <http://www.billyland.com/solar/images/sol4.jpg >

Seeley Lake, Montana Developing a Sustainable Community Within a Grid-Dependent Town

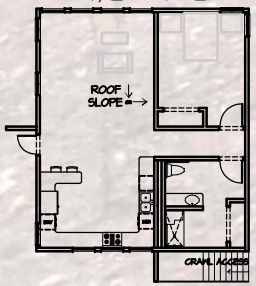
9868



Justin B. Jones
April 19th, 2007
Montana State University, Bozeman
School of Architecture

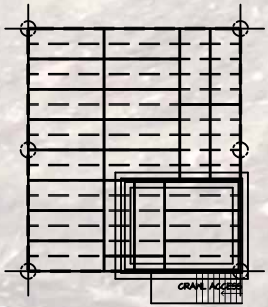

1155 s.f. Primary Core
1/8"=1'-0"
ROOF SLOPE
GRAVEL ACCESS
+
one or more of:
Primary Core Framing
1/8"=1'-0"
GRAVEL ACCESS
ROOF SLOPE
435 s.f.
Expansion Module
-Bedroom +
Study, Playroom,
Dining Room
ROOF SLOPE
170 s.f.
Expansion Module
-Covered Patio,
Dining Room
ROOF SLOPE
195 s.f.
Expansion Module
-Bedroom
ROOF SLOPE
385 s.f.
Expansion Module
-Bedroom +
Study, Playroom,
Guest Room
ROOF SLOPE
ROOF SLOPE
400 s.f.
Expansion Module
-Garage, Covered Portico
ROOF SLOPE
200 s.f.
Expansion Module
-Bedroom

900 s.f. Secondary Core
1/8"=1'-0"



\+
one or more of:

Secondary Core Framing
1/8"=1'-0"





385 s.f.
Expansion Module
-Bedroom +
Study, Play Room,
Storage



200 s.f.
Expansion Module
-Guest Room, Study

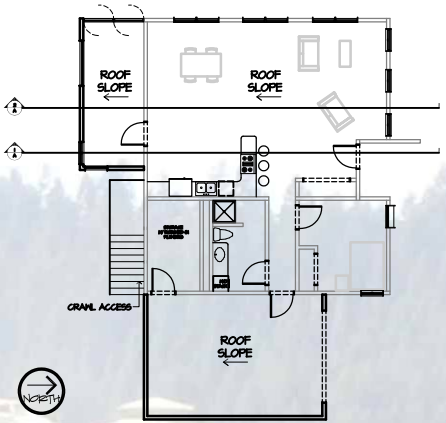


400 s.f.
Expansion Module
-Garage, Covered Portico

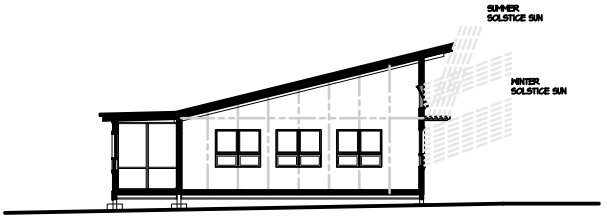


190 s.f.
Expansion Module
-Covered Patio, Living Room

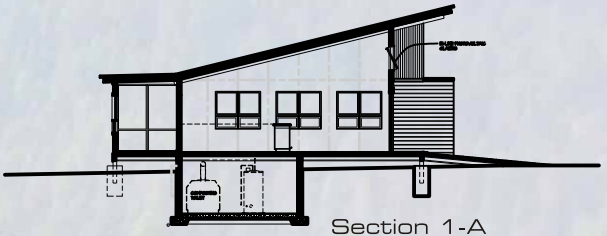
In the sections shown below, the viewer can see where the additions are easily installed onto the existing core structure. With the use of Glu-lam grade beams, plywood I-Joists, the Murus® wall, floor, ceiling panels and simple Sonotube® footings, site disturbance is kept to a minimum, allowing a quick and efficient construction addition--both economically and physically.



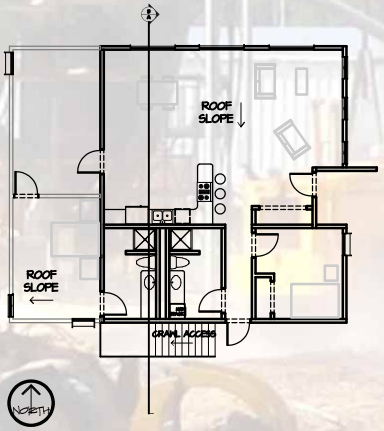
1720 s.f. Expanded Core
1/8"=1'-0"



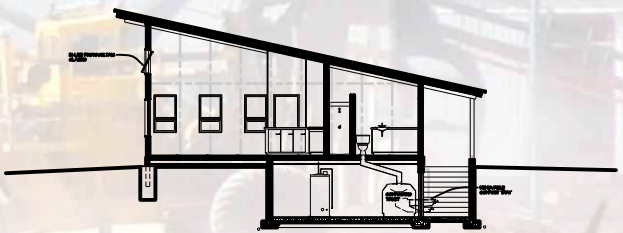
Section 2-A
1/8"=1'-0"



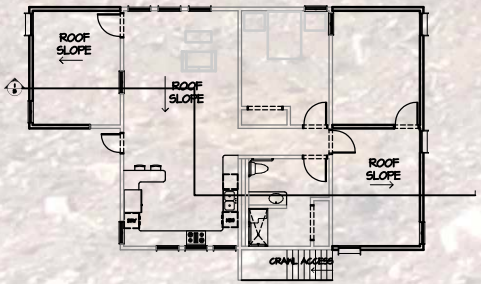
Section 1-A
1/8"=1'-0"



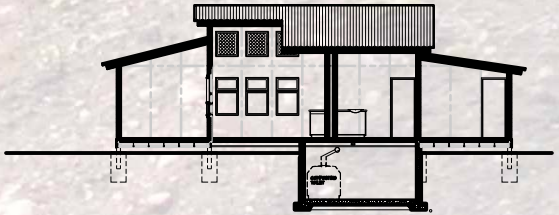
1595 s.f. Expanded Core
1/8"=1'-0"



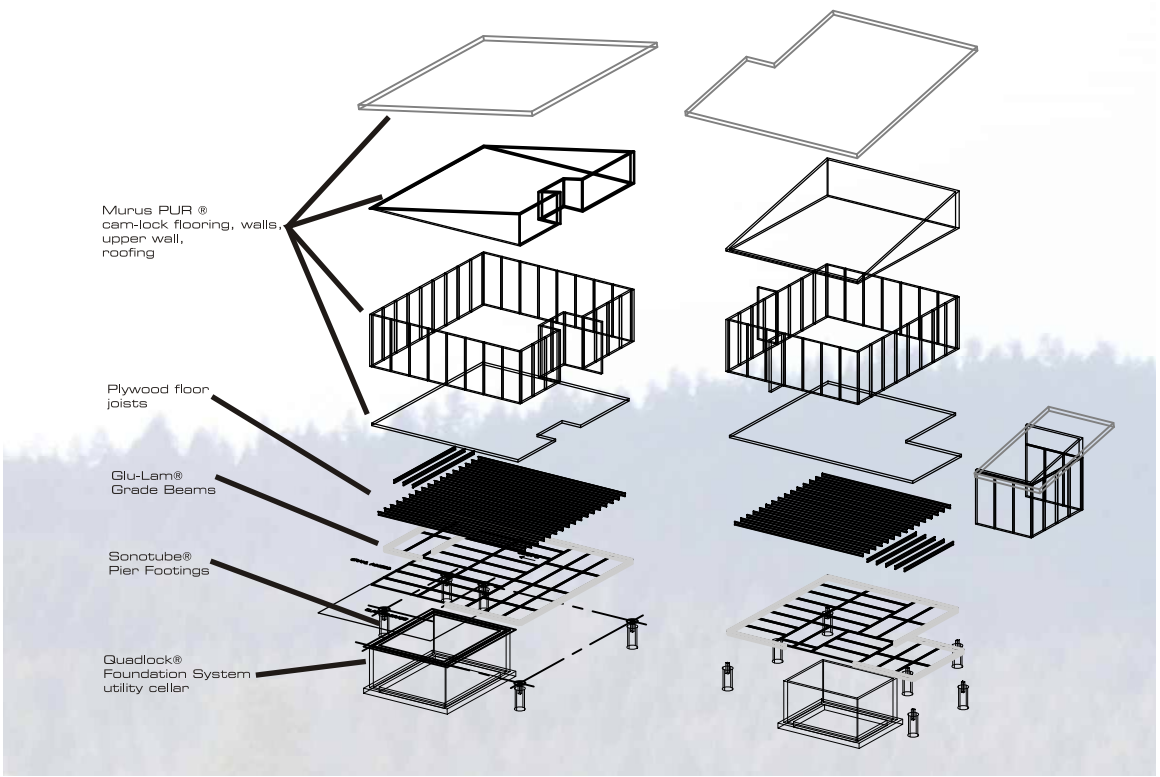
Section 3-A
1/8"=1'-0"



1475 s.f. Expanded Core
1/8"=1'-0"



Section 1-B
1/8"=1'-0"

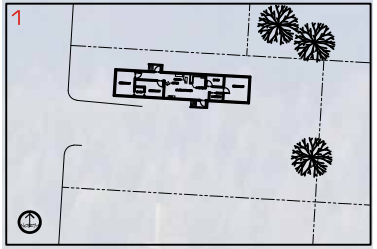

Murus PUR ®
cam-lock flooring, walls,
upper wall,
roofing
Plywood floor
joists
Glu-Lam®
Grade Beams
Sonotube®
Pier Footings
Quadlock®
Foundation System
utility cellar

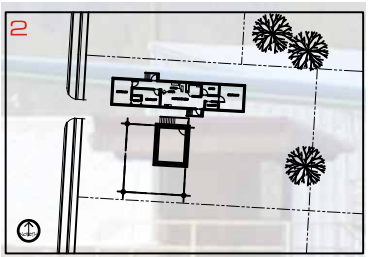


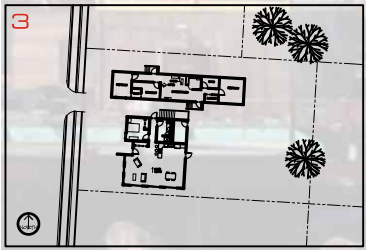


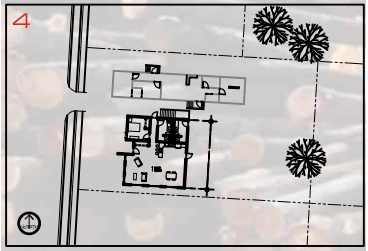
Lot Evolution Diagram
1/32" = 1'-0"

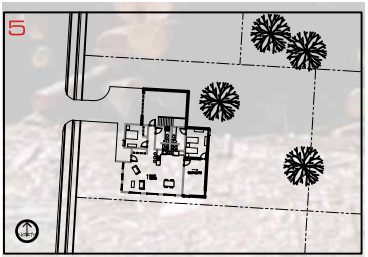
In the preceding frames the viewer can follow a time-lapse progression of a typical lot in the thesis site. Starting with the existing lot condition and trailer, evolving to the expanded site build-out of the primary residence and the optional secondary home. The stage at which the existing trailer is moved off site will vary upon the individual economic situation of the family. In a situation where the family is attempting to save money, moving into the replacement home prior to full expansion (assuming more bedrooms are desired), may be necessary to avoid dual home & utility payments.

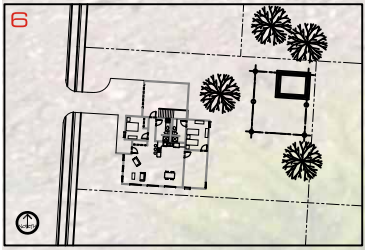


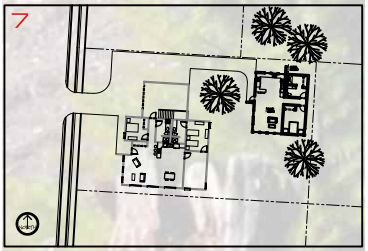


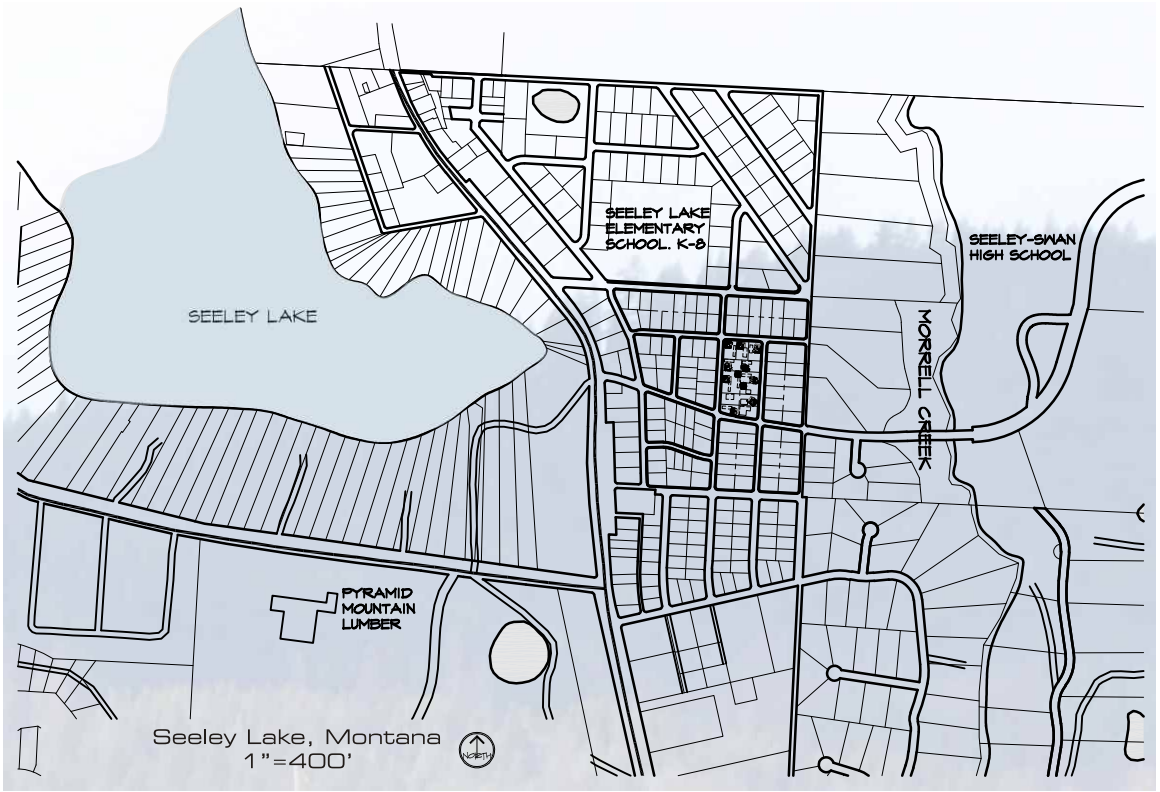


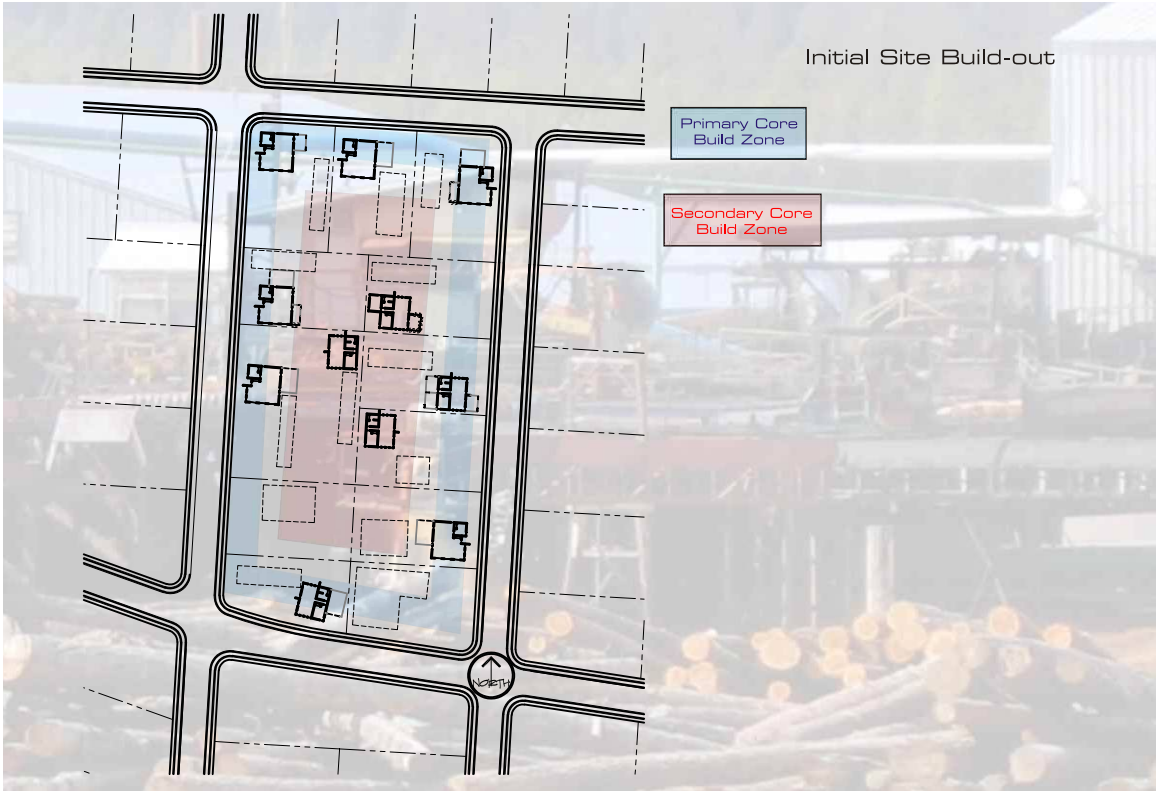


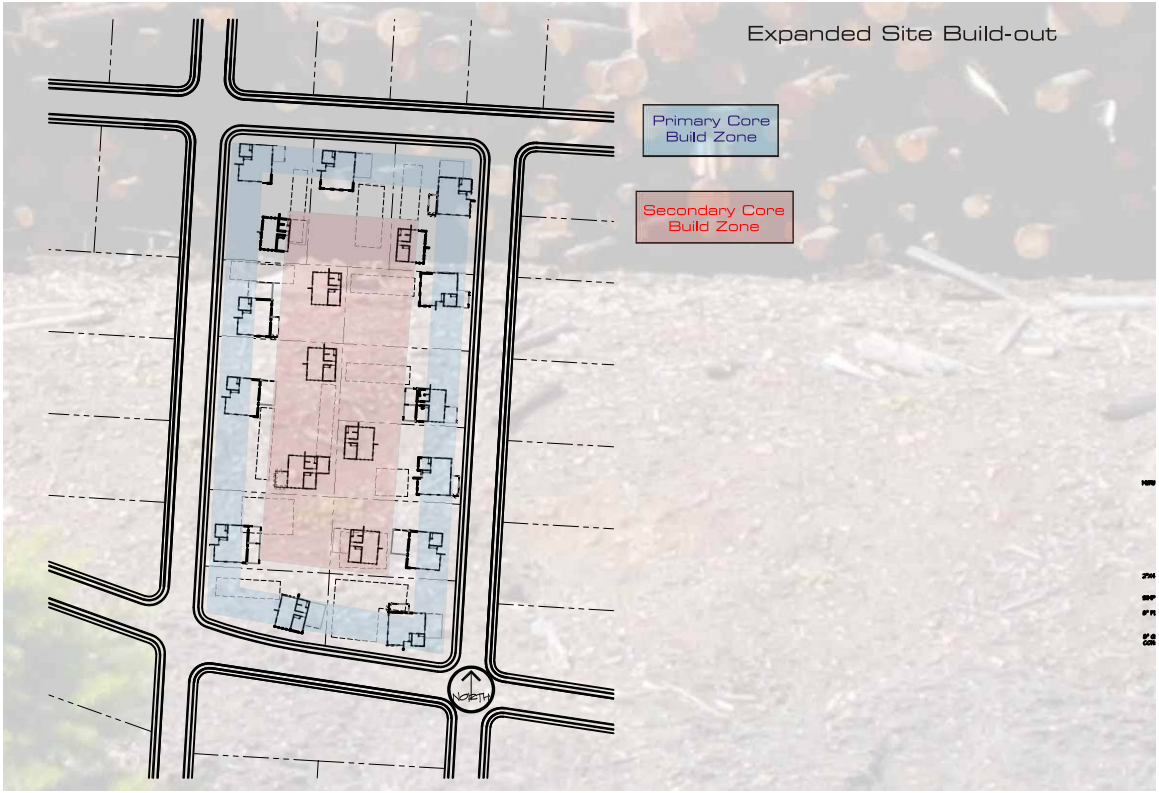







SEELEY LAKE
SEELEY LAKE ELEMENTARY SCHOOL, K-8
SEELEY-SWAN HIGH SCHOOL
MORRELL CREEK
PYRAMID MOUNTAIN LUMBER
Seeley Lake, Montana
1"=400'
North


Initial Site Build-out
Primary Core Build Zone
Secondary Core Build Zone
NORTH


Expanded Site Build-out
Primary Core Build Zone
Secondary Core Build Zone
NORTH

Sustain

sus·tain
-To keep up, prolong

Sustainability: "the capability of the community to work in conjunction with Seeley Lake, sustaining its existence."

In defining "...sustaining its existence.", sustainability may be dissected into the economic, social, and physical aspects of the individual entity in direct association with the town as an entity

Economics

Thesis Home

- One Time $5,000 loan down payment
- Home & Lot payment $625/month 4% L.I. APR Amortized over 30yrs
- Utilities (Water, Electric, Propane) $75/month
- Home & Lot Appreciation $1000/month- 12%/yr Seeley Lake avg. gain

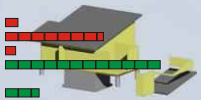
First Year Totals:
- One Time $5,000 loan down payment
- Home & Lot payment $7500
- Utilities $900
- Home & Lot Appreciation $12,000

Total: $13,400 + $12,000 Equity = $1,400



Five Year Totals:
- One Time $5,000 loan down payment
- Home & Lot payment $37,500
- Utilities $4,500
- Home & Lot Appreciation $60,000

Total: $47,000 + $60,000 Equity = $13,000



Ten Year Totals:
- One Time $5,000 loan down payment
- Home & Lot payment $75,000
- Utilities $9,000
- Home & Lot Appreciation $120,000

Total: $89,000 + $120,000 Equity = $31,000



Mobile Home

- Lot Payment $200
- Summer Utilities (Water, Electric, Propane) $280month
- Winter Utilities (Water, Electric, Propane) $400/month
- Home & Lot Depreciation $325/month- 8%b/yr Seeley Lake avg. loss
- Unforeseeable Maintenance $0-200/Month

First Year Totals:
- Lot payment $2400
- Utilities $3840
- Home & Lot Depreciation $3,900

Total: $6,240 + $3,900 Realized Loss = $10,140



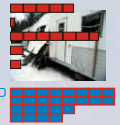
Five Year Totals:
- Lot payment $12,000
- Utilities $19,200
- Maintenance $1,000
- Home & Lot Depreciation $19,500-
- Trailer Resale Value Lost

Total: $32,200 + $19,500 Realized Loss = $51,700



Ten Year Totals:
- Lot payment $24,000
- New Trailer payment $120/month x12=$1,440
- Utilities $38,400
- Maintenance $5,000
- New Home & Lot Depreciation $3,900

Total: $68,840 + $55,600 Realized Loss = $-124,440



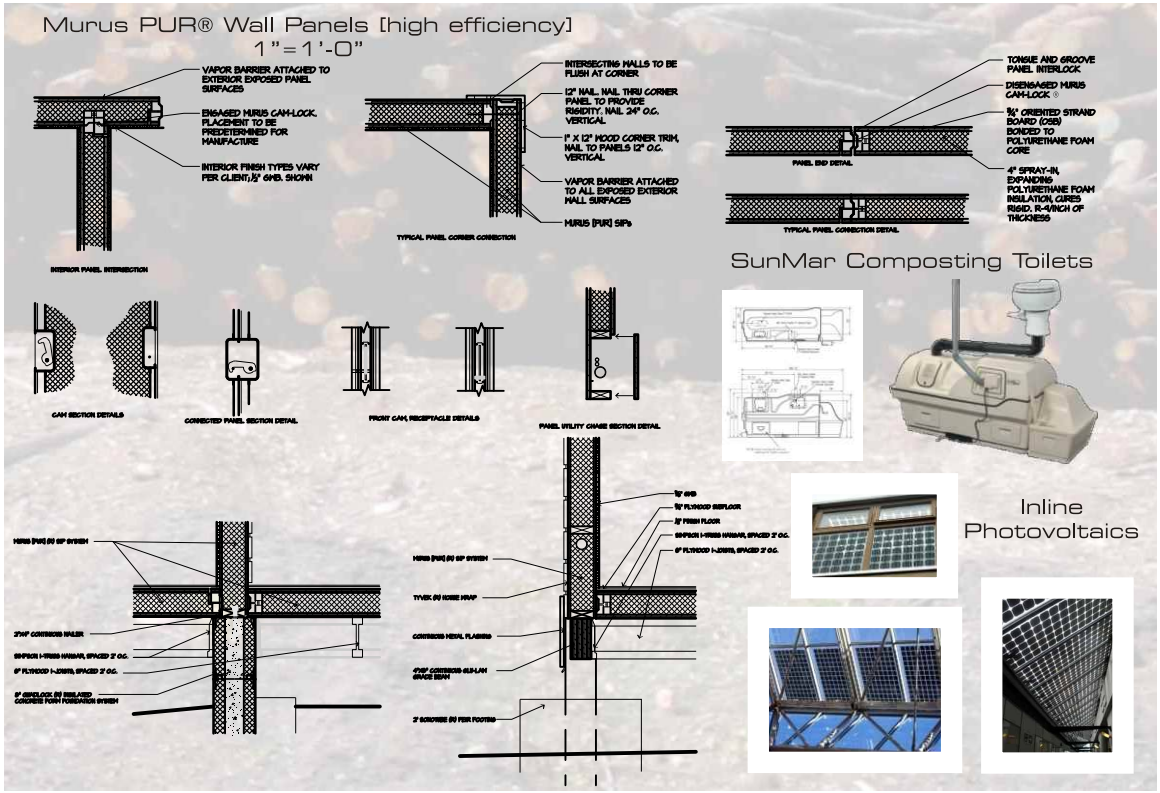











Murus PUR® Wall Panels [high efficiency]
1"=1'-0"
VAPOR BARRIER ATTACHED TO EXTERIOR EXPOSED PANEL SURFACES
ENGAGED MURUS CAM-LOCK. PLACEMENT TO BE PREDETERMINED FOR MANUFACTURE
INTERIOR FINISH TYPES VARY PER CLIENT, ½" GWB. SHOWN
INTERIOR PANEL INTERSECTION
INTERSECTING WALLS TO BE FLUSH AT CORNER
12" NAIL, NAIL THRU CORNER PANEL TO PROVIDE RIGIDITY. NAIL 24" O.C. VERTICAL
1" X 12" WOOD CORNER TRIM, NAIL TO PANELS 12" O.C. VERTICAL
VAPOR BARRIER ATTACHED TO ALL EXPOSED EXTERIOR WALL SURFACES
MURUS [PUR] SIPs
TYPICAL PANEL CORNER CONNECTION
TONGUE AND GROOVE PANEL INTERLOCK
DISENGAGED MURUS CAM-LOCK ®
PANEL END DETAIL
TYPICAL PANEL CONNECTION DETAIL
4" SPRAY-IN, EXPANDING POLYURETHANE FOAM INSULATION, CURES RIGID, R-4/INCH OF THICKNESS
CAM SECTION DETAILS
CONNECTED PANEL SECTION DETAIL
FRONT CAM, RECEPTACLE DETAILS
PANEL UTILITY CHASE SECTION DETAIL
SunMar Composting Toilets
Inline Photovoltaics