Argument for a Critical Perspective in Residential Architecture

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Argument for a Critical Perspective in Residential Architecture

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A Thesis Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Architecture

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August 2, 2021
COMMITTEE APPROVAL

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Abstract

This thesis analyzes the theories of Critical Regionalism, including specific building techniques that use timber frame construction, site planning, and energy analysis, and applies them to a property in southwestern New York state.

The property is situated on a small body of water called Loon Lake. This is a rural setting, but is highly populated along the waterfront. The lake is about three miles in length and the site of approximately 120 homes and cottages. The lake is considered private; however, there are frequent visitors who are granted access by local property owners to the water via boat. The lake has unique natural conditions in that it lies at an elevation of 1700 feet above sea level and atop a hill. It is subject to high winds and storm fronts, while precipitation is often higher than in the surrounding area. Temperatures are typically 5 degrees cooler than in nearby, lower-lying areas.

The goal of this thesis is to create an energy-efficient, residential structure suitable for this environment. This involves creating a working custom model that incorporates sustainable building techniques and can be adapted to the unique requirements of a specific location.

Aesthetically, the building challenges the conventional local architecture due to its methodology and techniques, which take advantage of and conserve local resources in a holistic way. Site planning through to the finished design is not only sustainable in terms of materials and energy use but is also intended to be economically feasible, providing a model that can be duplicated and transposed to other locations.

The design accurately represents the theories of Critical Regionalism and expresses a balance of tectonics and technology working together in a way that promotes a progressive policy of sustainable human craftsmanship.
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Argument for Critical Perspective in Residential Architecture

This thesis takes a critical stance toward the architecture of a region of New York state that tends to use a conventional aesthetic and ready-made materials. Instead, a sustainable, model home design is proposed that can serve as a template for other buildings in the local area.

The property in question covers 0.4 acres at the southeast end of Loon Lake in Cohocton, NY, and is set about 15 feet above the lake level. It lies between East Lake Road and New York State Route 121. The back of the lot is sloped up toward the state highway while the front of the lot faces the lake and East Lake Road.

Figure 1

Overview Presentation – Basis of Design

Critical Regionalism in Upstate New York: Sustainable Building on Dense Rural Site

1. Site Development

2. Timber Frame: CLT and DLT Mass Timber

3. Passive Heating and Cooling
   - Summer Shading
   - Winter SHG

4. Energy Efficiency

5. Sustainable Building Practice: source local materials and local craft

   Finger Lakes Region

The site development studies include topography, daylighting, shading, wind, and exploitable sight lines that occur throughout the year. It is important to consider not only the
warm months of summer on a lake but also to consider how the low sun angle and strong winds can affect the property, as well as other location effects.

Figure 2 shows the location of the site in upstate/western New York state, honing in on Steuben County and Loon Lake in Cohocton. The elevation, prevailing wind, and summer/winter sun paths are shown, as are the site boundary lines (in red).

Note the easement west of the main property that gives the property owner access to the water. This “right of way” is shared between four properties and makes for a unique place that separates the lake from direct view, allowing additional privacy for the shared owners.

**Figure 2**

*Building Site Overview*

**Thesis Objective**

The objective of this thesis is to create a design methodology based on Critical Regionalism theory, creating a model home design for Upstate New York. This template can be
replicated and adapted to unique, site-specific applications and the requirements of regional, sustainable architecture elsewhere.

Components considered in the design include local and site-specific history. The design process involves choosing specific features that pay homage to local connections, including the historical relevance of the site and surrounding areas. Research into the history of the local area is therefore included in the design process. Locally sourced materials such as stone, timber, and cementitious components are used, while local crafts people were consulted on issues such as constructability, materiality, and design.

Topography, solar, wind, climate, and other site data were analyzed to establish the main criteria for replication. The design process involved setting a series of objectives and expected outcomes that suit the criteria of Critical Regionalism as well as sustainability guidelines for the local area. These processes can be used for both residential and commercial buildings.

**Problem Statement**

What is “Critical Regionalism” when applied to residential architectural practice in Upstate New York?

Quality of design, sustainable practice, design aesthetics, and design performance are all driving factors behind Critical Regionalism. Locally sourced materials and local craft are also important, as they help to create a design connection to the community and therefore local culture. The strengths of the region and its history are all considerations, as they better inform the designer as to what challenges, inspirations, and necessities drove local builders to build in the way they did, in terms of forms and essential functions. Ingenuity is another factor to consider.

A definition and understanding of the elements listed above are pursued prior to start of the design process.
The Problem

Generic architecture and the “ready-made” create a reliance on predetermined design. Residential architecture so often relies on convenient popular imagery that designers and builders do not consider what truly relates a design to its environment or culture. The site conditions and local materiality which can offer many unique and useful aids in the creation of form, and in the function of architecture design, are often overlooked or not considered.

This is not a new problem but one that has persisted for generations, from the creation of the United States to the present day. A “Palladian complex” or persistent form of neo-classicism has been perpetuated with varying degrees of materiality over the centuries, recycling known forms without discretion. Some define this problem as the “ready-made,” holding mass production and the industrial revolution responsible for the phenomenon.

Several architects have employed aggressive techniques in their building processes to counter these generally accepted solutions. Wright commented through his use of a perverse horizontality in his early residential works to widen your eye, while Gehry embraced the ready-made, using off-the-shelf materials in unconventional ways. The challenge is how we use what we have to the best of our ability. The acceptance of style without a critical perspective cannot produce a unique and efficient design that is an expression of who we are or where we come from. Without using the lens of Critical Regionalism in design, we are designing for the technological and economical paradigms that produce building components.

Designers need to express who they are and what they do. This contributes to established culture with new trends and ideas in a way that reexamines or deconstructs the recent past. To accept only an economically driven design allows a fissure between the individual and regions, as well as our culture. We are no longer creating places, but only spaces, and what we create
from the “ready-made” is sold and supplied by a vast network of imagery broadcast at light-speed into our spaces with no critical lens.

A critical lens must represent a region and perspective—that which is being designed for—and materiality must include resources that are local to that region. This methodology is the basis of any design based on Critical Regionalism.

*As trees bend towards the light, so should the design environment. J. Burns, 2021.*

The orientation of a building must use the given constraints and allowances of the site to “make” place. A building must also bend towards the light, or away from it, as it may be. Shade, or the ability to shape our buildings according to the natural light through the seasons, should be a basic requirement of any well-intentioned design. A simple approach is the use and orientation of solar panels to capture sunlight, therefore creating energy, more light equaling more energy. The same logic stands for shading. When cooling is desired, it makes sense to reduce a building’s exposure to the sun. If a site in the northeastern United States is shaded, it would be logical in winter to expose the southern façade to allow the sun to help heat and add natural light. It would also be logical to limit the exposure of this façade in the summer to help reduce solar heat gain and the need for cooling. Natural shade or shading devices also make sense and if there is a way to design shading into a building it can lower dependence on mechanical cooling equipment and lower energy consumption. Aesthetically, the building starts to take shape as it bends with the sun, with shading devices articulating the façade, and the orientation of the site starting to alter the geometry of the building. The typical rectangle or square building footprint changes to allow or disallow the sun’s light.

Metaphorically, society and culture are like the sun, and have shaped and been shaped in our buildings. Our culture builds what we know and builds with what is afforded to us. It is this
critical lens that allows us to recognize that anything we build is a true expression of our strengths, weakness, and vision, or lack thereof. Our buildings can be holistic or single-minded. Like our eyes, we need to focus on both the near and far to create a three-dimensional plane, “a place.”

This work takes the ideas of Critical Regionalism to identify what can be analyzed and used in a specific location by identifying and creating a set of options and constraints that will influence a design. A program is created and a form selected. When this form is oriented and presented on the proposed site, daylighting and passive solutions can be employed. Only after this initial process is completed are certain materials and crafts applied. The form is by no means limited to the built structure but can also include landscape design and environmental influences.

Critical Regionalism

Critical Regionalism: as defined by Merriam-Webster.com and Oxford University Press (encyclopedia.com): search for word definition.

Critical: Merriam-Webster.com

i. Exercising or involving careful judgement or judicious evaluation.

ii. Relating to or being a turning point or especially important juncture.

iii. Relating to or being a state in which or a measurement or point at which some quality, property, or phenomenon suffers a definite change.

Regionalism: Merriam-Webster.com

i. Consciousness of and loyalty to a distinct region with a homogenous population.
ii. Development of a political or social system based on one or more such areas

iii. Characteristic feature (as of speech) of a geographic area

Critical Regionalism: *Oxford University Press, encyclopedia.com*

i. *A strategy for achieving a more humane architecture in the face of universally held abstractions and international clichés.*

History of Critical Regionalism: Oxford University Press, encyclopedia.com

- *Alexander Tzonis and Liane Lefaivre coined the name Critical Regionalism in 1981.*
- *Kenneth Frampton (1995) argued that architects should seek regional variation in their buildings instead of continuing to design in a style of global uniformity, “consumerist iconography masquerading as culture”.*

**An Overview**

Critical Regionalism is often considered “reactionary” in that it is an approach that has created dynamic or contrary designs -- ones that step off the path of convention and venture towards highly stylized structures.

Style does not have to be the primary focus of a critical response to the built form. A form can be responsive while being designed objectively. In other words, style should not be the only reactive force in a design, but stylistic and aesthetic directions can and should emerge from the methods set forth for a purposeful reaction. This is not a spiteful venture but a form of ideal geometries that seeks to use the limits of what surrounds the form to the best advantage possible. It is a negative space that uses additive or subtractive methods to define its form.
In an organic sense, the planning process may start from a simple geometric shape such as a square or rectangle, and evolve. If this form was a tree it would grow towards the light, and bend with or divide the air that moves over and around it. The elements should help shape the form and its geometries would take on the path of least resistance. This is the idea of “making” a place: something that cannot be created anywhere else because there is no other place like it. The form becomes an imprint or product of its environment.

A critically responsive design is important because it deconstructs global icons and draws instead from a regional sensibility and its idiosyncrasies. Critical Regionalism uses the uniqueness of a region, as well as the precedents of established architectural typologies, to create and design the built form. While refusing to fully accept post-modernism, Critical Regionalism attempts to create a fusion of global generalities and regionally specific ironies, norms, and quirks to achieve a sense of place.

In addition, this thesis helps to define how Critical Regionalism as a theory can be used to create designs that are sustainable, unique, and simple, while providing a complex human connection to a region and its culture.

Using a critical approach, the designer must use a methodology that defines the form by reacting to what is typically accepted: style and materiality, and economic means. Regions provide not only a climatic and geographical character but also a human character. This can be seen through a socio-cultural lens, in terms of what people do or think. This paper will analyze how people have traditionally built, and why they have decided to build that way. This will provide the argument for why there needs to be a critically responsive design process and how that process can be achieved simply and objectively, before stylistic approaches to materiality and convention take premature precedent over a design practice and the built form.
Practices of convenience and economy have removed us from our environments and our desire to create. A critical response to that convention should provide an alternative method that can be achieved through a simple process. To wit, each region of our country has a unique character and provides a certain set of design constraints when local conditions are realized and strongly considered. This set of conditions will help a designer analyze the site, its climate, and the local availability of materials, before a form can be decided on and oriented. For example, the use of sunlight must be considered as a resource. How a form can harvest the benefits of solar radiation while avoiding overexposure is a major key to a design.

Designs that rely strictly on mechanical fixes are not considered in this study unless they are the only reasonable and measured solution that is left to the designer. Typical mechanical solutions such as air conditioning can aid a design but are not primarily relied on to solve a challenge such as solar heat gain or poor ventilation. Passive techniques are the primary resource used when designing a built form that can critically respond to a site.

**Planned Outcome**

As a design progresses, it can be adjusted according to daylighting conditions, while exposure to other climate conditions such as snow, rain, and temperature extremes can also be analyzed and used to determine, passively, how a building will function. Turning away from style, this objective lens can be used to produce a form that performs efficiently and sustainably, and from which an intentional design emerges. Such designs consider the options of the ready-made but sets a constraint upon the use of “over-the-counter” remedies. This is a design that prescribes through the analysis of locally available materials, passive design techniques, and reacts not stylistically to norms, but reacts critically with a method that addresses the need for sustainability and data-driven design.
Criteria and Methods

Sustainability, as defined by Merriam-Webster.com

i. *the ability to be maintained at a certain rate or level.*

ii. *Avoidance of the depletion of natural resources in order to maintain an ecological balance.*

Data, as defined by Merriam-Webster.com

i. *facts and statistics collected together for reference or analysis.*

Sustainable design is not just data-driven. However, this analysis will use objective data and other sustainable elements that can be used to design an energy-efficient building model that offers the user the benefits of the site, outperforms conventional residential architecture, and does not depend upon ready-made materials or conventional design elements that have little or no regard for the surrounding environment. The end-user will not only enjoy energy efficiency but also create a deeper connection, physically and culturally, to the environment they use, live in, and share.

It is the ability to identify what makes a place a place and then develop a process that can include the elements of that place into a design which makes critically responsive design so important to the whole of architecture.
**Literature Review**

The purpose of this review of scholarly papers is to reinforce the use of timber frame, or “mass timber,” in the construction of architecturally relevant and sustainable buildings. Timber is often thought of as an old fashioned material. However, the use of new technology in the manufacturing of timber components, for example, cross-laminated timbers (CLT), has proven that timber is once again a relevant, viable, and sustainable resource. Its thermal, structural, and naturally fire-resistant qualities make timber active again in the discourse of emerging building practices in an ecologically challenged industry. Given the industry’s technological bent toward new materials, conventional timber has lent itself in a sense to bio-mimicry. The ancient techniques of harvesting and assembling a great renewable resource have resulted in a new engineered material, CLT, that is capable of outperforming steel and concrete.

Choosing mass timber as a structural building material can itself prove to be a sustainable solution that meet today’s demands. It is not only the built structure that is essential in meeting an ecologically responsible demand, however. A building’s operations are an even more important factor. It is also necessary to use passive and active heating and cooling strategies in combination with shading and optimal site placement for energy efficiency and conservation.

The following review will compile information to support the use of wood timber as a viable building material while also employing and or supporting other points in achieving optimal energy efficiencies and thermal comfort.

*The Impact of Solar Shading Design and Control on Building Cooling and Lighting Demand* by Anthanassios Tzempelikos and Andreas K. Athienitis (2006) examines the effects of shading on building cooling and lighting energy demand. Factors including window size and electric lighting consumption, as well as the impacts of cooling energy demand and shading on a
property in Montreal, all serve as the basis of thermal performance and lighting usage. The authors’ aim is to prove that cold climates that have reduced light levels and large numbers of heating days can also be affected by proper shading and cooling that can positively reduce energy demand.

The work makes detailed examples and mathematical quantifications to support points of effective shading and lighting to reduce energy consumption.

A relevant work that deals with a similar climate is *An Interferometric Study of Convective Heat Transfer From an Irradiated Complex Window Assembly* by M. Collins, S.J. Harrison, D. Naylor, and P.H. Oosthuisian (2001). Experiments using a shading device such as a venetian blind on a window surface are correlated with a numerical study. This experiment works well with the shading and cooling properties of passive technologies.

*Energy and Environmental Performance*, by Kildsgaard, Jarnehammar, Widheden 2013, analyzes summer indoor temperatures and occupant behavior in a Swedish eight-story apartment building. Energy performance is analyzed through studies of monitored energy and occupant behavior. The structure is timber frame with concrete slab on the grade and first floor, while other floors are of timber. The use of energy is primarily reduced by using timber construction; however, the building performance is not affected so much by construction methods as by the occupants. More efficient appliances are seen to affect the energy consumption of the building more than building construction type.

*Energy and Environmental Performance* gives a good example of timber frame construction and lays out the timber construction technique. Essentially the study states that “no matter what construction type you build with, it is the use of the building that will ultimately determine its primary energy consumption. Natural and passive cooling can be achieved using
the layout and orientation of the building, its shape, insulation, high thermal capacity and the resistance of building material, as well as landscape design, shading devices, overhangs, and external surface finishes”. The case is made that the most effective way to cool a building is to not to get it hot in the first place. Lighting can be influenced by shading and redirected to distribute light. Thus, energy costs are kept low and additional heat not created through energy use. A list of effective techniques and outcomes is given.

In *Traditional Sustainable Solutions in Iranian Desert Architecture to Solve the Energy Problem* (2011), B. Ahmadkhani Maleki makes the point that traditional Iranian architecture reacts to the climate with sustainable and ecological resources while increasing the native spirit of Iranian architecture and traditional expression.

B. Ahmadkhani Maleki (2011), illustrates how residential buildings in Germany account for a third of a country’s energy demand. The facade of the home is highly important when considerations of energy consumption are concerned. To reduce energy use in residential homes, improvements must be made to existing structures. Old buildings account for three times the amount of energy as new buildings.

Quantitative approaches are taken to two different building styles, one timber frame and the other steel and concrete. Window replacements, and heating system refurbishment are completed and small differences measured in heat loss between the two structures, primarily due to difference in style. For example, the modern steel and concrete building had larger overhangs and lost heat faster than the traditional timber frame home. The aim of the author is to reduce the energy consumption of residential German homes by making improvements to the façade and heating systems.
“A Natural Fire Tests the Behaviour of Modern Timber Construction Techniques: Light Timber Frame vs. Glued Laminated Timber” Dionysios I. Kolaitis, Eleni K. Asimakopoulou, George Zannis and Maria A. Founti, (2016) compares conditions when light timber framing (LTF) and glued laminated timber (GLT) systems are exposed to fire. Fire resistance tests are conducted under rigorously controlled conditions. It is mentioned that there is little literature focused on the fire behavior of load-bearing timber elements. The differences in LTF and GLT is explained. Layers of gypsum components are placed to protect the LTF and GLT and tested with fire. The tests prove that with proper protection, wood framing using LTF or GLT can be protected from fire without char. The author points out that, with proper protection, wood can be a viable building resource without fear of fire hazard and that more testing needs to be done to verify fire-resistant layering and results.

“Natural Full Scale Fire Test on a 3 Story X-Lam Timber Building”, A. Frangi and G. Bochicchio and A. Ceccotti and M. Lauriola, (2008), addresses additional fire testing in a timber frame building. Fire testing is a macro sample to scale and shows overall performance and fire conditions on a CLT timber frame construction. The performance of the timber in a fire to scale demonstrates the fire resistance of natural timber and documents its safety as a structural material as it measures and quantifies damaged areas consumed by a fire.

In conclusion, the information provided by the literature review supports the use of timber as a renewable resource to help the building industry achieve an ecologically responsible solution, while moving beyond currently conventional materials such as steel and concrete. By using the simple shading techniques of older generations and civilizations we can create a holistic approach that allows regional culture and authentic design to flourish not only out of necessity, but also a conscious effort to improve our ecological understanding of local surroundings and resources.
Theory and Methods

Local Culture

Research for a typology in critically regional architecture should begin with local landscape and the surrounding site. To that point, “place, craft, and community” set the precedent for design. For example, the site for the project in this thesis is a personal property in Upstate New York. As discussed, the study consists of site research including local building materials such as stone and lumber. Stony Brook Park outside of Dansville NY. The park was built with local stones. The photo in Figure 3 is the wall of the public summer swimming pool.

Figure 3

Stony Brook State Park

Critical Regionalism, as stated by Bryan MacKay Lyons, is an evolving approach that takes on a “poetic construction”. So how to measure poetry? Poetry is measured in an expression of the surrounding landscape, a measure of local beauty, of materiality, and community. A design
that uses all of what is available in its consideration would be difficult to comprehend without explanation.

**Socio-Cultural Context**

Community is a culmination of individuals or a sum of many parts. It is a human element and therefore always subjective in nature. Research in the community may not be as necessary as it would be for a public project, but a private enterprise must still consider what the effects on the community might be.

The private owner is bound by the limits of local zoning and building codes. A variance may be applied in certain circumstances that may limit the project. Local building officials and town board members may decide on behalf of the public whether such a variance will be granted. Therefore, the community will be expressed at the beginning of the project via zoning and building codes, and through the public official who oversees the building permit process. In short, the community is manifest in those rules. It can present its objections to a board as it sees fit and plead a case for or against a proposed project.

So, should the public be considered when designing a project for a private residence? Should the public be consulted beyond the permitting process and typical adherence of local building and zoning codes? For example, if a building is permitted should local neighbors be considered when designing a project? Should the wider community? Is the question of community based on local building typologies, local craftsman, and local consent, or is it appropriate to challenge the norms of the community?

Community can mean many things and so a project design should consider those aspects. One measure of the local community would be matrices of qualitative pros and cons, and possible actions and reactions. Ultimately, the design as seen by the public may not be
understood unless it is explained, and then there may be a negative public reaction to the process. The community is more than a neighborhood. The community consists of many things including but not limited to opinions.

There are qualitative measures. Just as poetry is the written or spoken word of an author, so the work of an architect is a building. Yet the expression of a building occupies volume and mass, something that is only truly understood in full scale. Building a model is a great practice in defining the proposed structure, but the idea may not be fully understood until it is completed. Poetry on a page can exist in our minds while architecture can exist on a page it will never truly exist until it is built.

**Site**

The site should dictate the conditions of the design process. These include the location on the parcel and positioning to the sun’s path, as well as elements of light and shade, wind, and sight lines.

A holistic design should capture every angle and exploit subtle details of the surrounds, as well as consider whether this is a design that is intended to be shown off or concealed. An advantage of the site is that it is on high ground in relation to the surrounding parcels of land, and set away from a lake shore. This is positive in that there is only one boundary that is restrictive, and that is Route 121 directly behind the property. The lake lies about 200 feet to the west across East Lake Road. Multiple lots surround the lake, and have a varying topography ranging from swamp frontage to steep inclines from the shoreline. The ground is a combination of rich soil provided by years of vegetation, and a certain amount of clay that covers a sand and gravel base.

The parcel of land in question lies approximately 12 feet above the lake level. A limitation of the sight lines from the property are in part due to an elongated diamond shape that
changes an individual viewing position quickly. This does provide opportunities for private, intimate areas inside the property, however, that are not exposed to neighboring properties and East Lake Road. There are also landscaping opportunities. As large concave pasture on the eastern side of the property abuts the shortest end of the lot but offers an undisturbed and unmaintained portion that for now has returned to nature. The fallow field is pitched upward towards a large silo and weathered barn. In years past, the barn housed a local herd of dairy cows that would graze the neighboring pastures, providing a link to a community past like other childhood memories. See Figure 4, the Silo, Barn, and empty pasture that provide a backdrop to the opposing view of lakeside properties and East Lake Road.

**Figure 4**

*View to North-East Property Boundary*

The property thus becomes part of the past, present, and possible future. Part of its sustainability is its relevance to the community at large and the northern side of the property. The
longest and most exposed side of the parcel borders a neighboring property and looks onto a mostly vacant area. Today a new owner has planted trees and mows the lawn regularly.

Figure 5

*Existing Structure as Seen from the Neighborhood Lot*

---

**Sustainability**

The narrative of a property involves finding the definition and typology of a place. The building is a sum of its parts, including the site and surrounding area and position in history. To be truly sustainable, a building must be long-lasting and make a long-term statement to the community and its direct users. This is an opportunity to let life happen.

Ideally, technology can help drive a design to use the structure and to help determine the systems that drive it. Energy considerations including efficiency are paramount to creating an effective design. There is no shortage of fuel-efficient systems that can control the climate inside the structure. It is a greater challenge to use the energy that surrounds the site in relative abundance.
“Understanding how to have the wind come into the house the way you want is so important, so that when the wind is blowing in a certain direction and you want to direct it, you can open up the roof here and there, and create positive fresh air over here, negative fresh air there” (Murcutt, P., Local Architecture, p. 46).

**Materiality**

Materials should be sourced locally. These include trees on the property that have been felled or field stones that the previous owner has left behind in what is now a series of disassembled water features and a crooked, stone-lined driveway.

**Figure 6**

*Conventional Timber Frame Using Northern White Pine from Adirondacks*

Typically, local lumber would be a primary source of material for any structure, but venturing into engineered mass timber is an alternative. Timber materials can be produced
efficiently and effectively, so that waste is reduced, as is the need to harvest large trees to supply large timber sections. Relying partially on mass-produced timber, local materials can still be used for a vast amount of finish applications. The property has large poplar trees that will be felled within the next year so it is expected that there will be large amounts of readily available interior finish and paint-grade-quality materials.

Mass timber also lends itself to solid wood platforms, which would reduce the need for assembly while ensuring fire safety and a structural density that surpasses a conventional timber frame or light wood frame structure. By its very nature, a structure that has a solid 8 inches of wood between the interior and exterior will be well insulated. Every inch of softwood provides an R-Value of about 1.4. Multiply by 8” and the simple math equals R=11.2. That is over 90% efficient without adding additional insulation.

The structure provides more than just a framework and girders to attach components. The beauty of exposed joinery is in its transparent simplicity. The materials speak for themselves because there is nothing to hide.
Aesthetics

The challenge is to introduce critically regional architecture in an area that has become accustomed to a mass-produced and ready-made materiality. Multiple generations have lost the sense of what nature is and where they live. Instead, theirs is a village or town of cultivated green grass and weekly bands of powered lawn mowers, with a sense that the baby boomers have never moved beyond their childhood, and the following generations may be too complacent to care.

A conscious aesthetic follows form and function and uses holistic reasoning to passively and actively engage in the day-to-day functions of the built place. The additive process of building creates a deeper, denser palette of rich definition, many pieces assembled into one true form.
At this point in the study, the research and methods are becoming clearer terms of components needed and subjects covered. Even at an early stage the design is starting to take shape according to the features of the basic site and local means.

“Critical Regionalism. While it is not able to alter the dominant spectacular, technoscientific global corporate discourse, it is nonetheless still able to articulate a resistant place-form within a smaller society, which, here and there, may maintain a dissenting cultural and political position.” Kenneth Frampton, *Local Architecture*, (1995, p. 29).

**Historical Perspective**

In supporting the need for a critically responsive design, there is an attached history of local residential design in upstate New York that needs to be considered. An argument can be made that much local architecture is only a simple adaptation of what we see as conventional nostalgic forms. Many buildings are just forms that have no connection to the landscape and have only become part of an architectural vocabulary due to repetition over time. Other than the use of wood to mimic western European design, they did not “speak” to their physical context or site. Typically, architecture seen as representing “local” history is borrowed and shows very little design reaction to the local region. It is often derived from the media of the day, from magazines and newspapers featuring common popular designs, for example. Something similar is repeated today across television and the internet, featuring homes with no regard to the local region or a critically responsive design. Styles and typologies are adapted to mechanical technologies. Heating and air-conditioning take precedence over passive solutions such as shading or ventilation.
Traveling to different regions, for example to the northern or southern states of the U.S., the design of early American residential architecture, which represents the common architecture of the United States, is generic and largely based on western European designs. A region may demand subtle design adjustments for climate, such as fenestration or porches, but at best the only true response of local residential architecture is to pay homage to the ready-made and homogeneous materiality of industry.

American mass production is the ultimate response and rationale of our culture to the built form. We have removed ourselves from our natural environment by substituting mechanical solutions for natural solutions just as we have chosen to remove the “Bee” from its place and disallowed ourselves from becoming one with our environment. So, perhaps the American identity is no identity. Local American architecture chooses to remove itself from what is an abundance of natural forms and creative origins by choosing the generic. Is this in fact the “American response” and have we chosen to remove the place from our process of place-making?

This is the reason for a critical response to architectural design: the creation of a “true” place that is unique to its origin while being inclusive of history, materiality, technology, sustainability, the past, present, and the future.
Case Studies

The purpose of the following case study is to show what has been commonly accepted in regional Upstate New York architecture, in the form of a recently completed meditation center that has implemented design concepts that can be used to represent Critical Regionalism in local architecture. The first part of the case study will exhibit what is referred to in this thesis as “generic” architecture. The second part will consider the mediation center a representing the “critical” perspective of regional architecture.

**Case Study Part 1: Residential Architecture in Upstate New York, “Generic Architecture”:**

The following Case Study 1 photographs of residential housing represent what are the typical architecture types of the local area. All the photographs were taken by this author in Bath NY, Dansville NY, Geneseo NY, Wayland NY, and the immediate townships surrounding the communities. The figures will show commonly accepted architectural styles and typologies and present them as generic, due to the absence of consideration of the local site, and as a representation of the popular styles of the time (See figures 8 – 27).
Case Study 1: Figures 8 - 27

Figure 8

Log Cabin, Geneseo NY. Recreation Circa 1965

NOTE: When homes become our historical record and tell a story of times past. Nostalgia crystalizes to tell a different story less connected history
Figure 9

*Figure 9*

*Barn Geneseo NY. Built Circa 1940*

NOTE: The barn is a symbol of collective memory that reminds one of simpler times, however, losing the sense of the moment in which it was created
Federalist Style

Figure 10

Greek Revival Stone House, Henrietta NY. Built Circa 1840
Figure 11

*Federalist Stone House, Henrietta NY. Built Circa 1860*
Figure 12

Federalist Duplex House, Dansville NY. Built Circa 1870


Often styles were adapted and “mixed” intentionally or unintentionally to create a hybrid of styles. This can be common as details were often chosen from catalogs. This becomes confusing when trying to identify a period and style.
Figure 13

*Federalist Farm House, Geneseo NY. Built Circa 1870*

NOTE: Farmhouse missing porch and entry stair. Typical corbeled overhang and long window. Arched window lintel and frieze board. Farmhouse that is now within the commercial district, however, inside of setbacks allowing historical significance. Structure is part of historical record of community commercial center outside of village center.
Italianate Style

Figure 14

Italianate House, Dansville NY. Built Circa 1870

NOTE: Late 19th Century Italianate Style wood home in Dansville NY. Mansard style cupola and ornate architectural iron. Corbelled eave and overhang typical to the period. Single entry is with stairway made to meet current code. House was converted into apartments sometime in the late 20th century.
Figure 15

*Italianate House, Geneseo NY. Built Circa 1870*

*NOTE: The tower and arched windows give an otherwise short profile structure verticality. A large porch also adds to the horizontal profile.*
Victorian Queen Anne

Figure 16

Victorian Queen Anne, Geneseo NY. Built Circa 1870

NOTE: Wooden 19th century Queen Anne with octagonal turret and porch, and bay window.
**Victorian/Edwardian**

These village homes will typically honor the street side facade and ornate wooden trims and embellishments would be used to style the exterior. The zoned lots would have been planned with a hierarchy of streets taking precedent over orientation.

Generally, the use of passive techniques would not have been a primary concern, but if available there may have been a porch or picture window placed on the “sunny side” of the facade. Steeper pitched roofs allowed for living spaces within would also maintain a cavity of tempered area in hot and cold seasons. The homes would not have been insulated when originally built.
Figure 17

Edwardian House, Geneseo NY. Built Circa 1890
Craftsman Style

Figure 18

Craftsman Style Home, Geneseo NY. Built Circa 1920

NOTE: Characterized by short columns and supporting a single porch on a smaller scale shingled wooden home.
20th Century Ranch and Split Level

Homes built in second half of the 20th century. Typically, low pitch gable roof with wood siding and asphalt shingle roof. Exterior decorations may include inoperable window shutters and simple to semi-ornate facial and gable details. For example, the first home located outside of Dansville, NY looks similar a chalet and is located on a country hillside. Interior spaces are small to medium in size and the ceilings were typically much lower than 19th century homes. The homes are positioned to face west southwest and parallel to the contour of the lot grade. The third of the five homes on this page is has the entry facing east uphill while the backside is towards the west southwest. These homes while having a partly southern exposure do not take complete advantage of solar exposure, however, there is benefit in the orientation and broad side exposure. Small overall glazing areas help reduce heatless and solar heat gain
throughout the year, but do not provide open views throughout the space. Neither home has a solar array or wind turbine on site. This area is known for a consistent northerly wind throughout the seasons. Most homes in the area would be heated with natural gas or propane forced air units. Air conditioning may be centralized; however, it is not uncommon for homes in the area to use window type a/c units for space cooling/conditioning. Double ventilation would be limited as the wind and air currents would be coming from primarily from the North and mainly entering the home from the short/narrow sides of the structure

**Figure 20**

*Ranch Style Home, Dansville NY. Built Circa 1960*
Figure 21

Split Level Ranch Home, Dansville NY. Built Circa 1960

Figure 22

Craftsman Style Ranch Home, Dansville NY. Built Circa 1990
Passive House

Figure 23

Passive Home, Wayland NY. Built Circa 1980

NOTE: Circa 1980 residential home that exhibits many passive techniques including southern light exposure and circulation tower. The Northern side of this home is below artificial grade for insulation effects. Location Wayland NY. The architecture takes on a very utilitarian style that honors the passive energy technique without equal sensitivity towards the natural landscape. Simple geometry honors the ready-made and economy of horizontality in wood construction. An example of a critically passive reaction to site exploiting clerestory windows, south facing glazing, and earth mounding to protect and insulate the form.
Post Modern: Eclectic

Figure 24

Eclectic, Geneseo NY. Built Circa 1985

NOTE: Geneseo NY. Residential construction with a bent towards vaulted ceilings and efficiency of glazing proportions. Solar heat gain uses some passive techniques but does not for exploit light and southern exposure as a paramount of design. Design becomes more additive and motley as the facade returns to the southern side. The driveway approach intends to attract attention towards the structure rather than protect or privatize the home. The driveway sacrifices an otherwise useful landscape for inward and outward sightlines and street side exposure.
NOTE: A rural response in a monolithic form. Responsive to a 1990's flattened and increased scale trim details. A mish mash of styles with utilitarian exterior lap siding finishes. Very difficult to tell if this is vinyl siding or wood clap board because of its plastic like quality.
Post Modern: Victorian Eclectic

Figure 26

Victorian Eclectic, Geneseo NY. Built Circa 2005

NOTE: Adaptation of the conventional residential form. Some elements that are Edwardian, and mimic Federalist but in asymmetrical ways. This model seems to disregard the site altogether, as well as the congruity of the facade. This form uses the ready-made arched window as its primary distinction. By removing itself from its own “place” the large viewports allow the occupant to view outward and less inward into its own setting. Typical vinyl siding facade and prefinished aluminum trim with minimum shading or passive devices. A consumer delight in that the fenestration appears to be completely “over the counter” windows and doors that are easily purchased at the local retailer. The façade may have become crowded with the number of different shapes and sizes it starts to look like a “Robert Venturi” conceptually.

All the natural foliage has been stripped away and replaced with a “Generic Lawn”.

NOTE: Adaptation of the conventional gabled form. The applied finish and projected elements in the facade have removed the local response with the ready-made plastic form. The generic lawn is paramount in the interaction of the occupants. If Tschumi might have it, there would be no human in site if the lawn was not being actively mowed and therefore does this facade become architecture only if the lawn is being maintained? The lawn as a symbol of American architecture, with other natural elements removed.

The reaction is to remove nature and dominate the landscape with a “generic place”. The “pop-out” gables and multiple siding styles finishes make it difficult to see what is being expressed. This speaks more to the consumerism in our contemporary repertoire. We can have a style of finishes created in plastic or composite materials cheaply enough that it becomes more common to overstate our intention rather than speak in functional subtly.

It is curious to wonder if the owners know what truly inspired their dream home.
Case Study, Part 2: Critical Perspective: Won Dharma Zen Meditation Center

This is a new meditation center built in 2011 that overlooks the Hudson Valley and Catskill Mountains. The intent of the architect and client was to build an ecologically friendly meditation center. Is this an ecological development? Is the use of materials such as cedar, that are not necessarily local but more sustainable than steel or concrete, an ecological choice?

Figure 28

*Won Dharma Meditation Center Meditation Hall. Arch Daily.*

Site

“Architecture is a threshold to nature.” Thomas Hanrahan.

The interconnected buildings and sight lines that allow for trees to compliment the site have a success that is subtle and yet geometrically coarse. The experience is one that balances man and
nature. Rolling lawns seamlessly bring the site together. Geometry is minimal and creates a timeless place.

**Figure 29**

*Won Dharma Site. Arch Daily.*

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**Program:**

- **Site Area:** 500 acres
- **Building Area:** 32,000 sq. ft
- **Occupancy:**
  - Guest Residence: 80 persons
  - Permanent Residence: 24 persons
  - Meditation Center: 100 persons
The purpose of the project was to design a meditation retreat center using as many natural materials and ecological solutions as possible, to be in harmony with the surrounding Hudson Valley and Catskill Mountains.

Field Work/Behavior in Space

Figure 30

Won Dharma Site with New Buildings.

Driven by the Wan Dharma “dual mantra of void and concepts”, the buildings and spaces are oriented to the points of the compass. The four exterior walls of each building face respectively the north, east, south, and west. The guest residences turn into themselves from their courtyard entry points. The symbol of the Won organization is an open circle, suggesting both a void without absence and infinite return.

Solar, thermal, and cross ventilation features, geothermal wells, photovoltaic arrays, and bio-mass boilers are present on the site and aid in the production of heat, electricity, and hot and cold water. The problems solved involve ecological design and the incorporation of architecture into the landscape, providing an appropriate setting for the Korean Buddhist meditation center.
Design Inquiry and Philosophy

A large model of the site was constructed and many light studies were made. The final model was 6 feet long and the massing and light studies were so detailed that no further field work was done.

Figure 31

Won Dharma Site Model

The simplicity of shape and interior finishes accomplishes the Zen aesthetic. However, some issues of craft leave areas of detail burdened with mass-produced solutions. For example, off-the-shelf ceiling fans, lighting fixtures, and the steel framing straps used for the exterior beam and rafter connections, are typical and reduce the finish quality. Interior finishes such as applied baseboards over drywall have a hard and edgy quality that breaks from the tranquility and beauty inherent in the use of the raw natural wood. The conventionally applied baseboard in the dining hall and adjacent room seems to break the Zen continuity with a lack of follow-through. “Less is more” suddenly becomes “too much” as the budget drives a solution.
Less is more only when the continuity achieves harmony. Better use of available local materials, for example site quarried stone for hardscape and locally harvested lumber, would be more sustainable, ecological, and aesthetically appealing. The use of cheap fixtures such as lighting and ceiling fans detracts from the overall aesthetic. The use of better hardware and better framing and finish techniques would yield better results. Yet the place is beautiful and is an aesthetically ecological precedent for local site design in the Upstate New York area.

The Won Dharma Center is not labeled a Critical Regional design; however, it displays many characteristics of Critical Regionalism. For example, the site has a pervasive influence on the scale of the interiors, while the buildings reflect the setting throughout their design. The use of wood and the simplicity of the design reflect the purpose of the building without needing an explicit label. In other words, the design of the site and buildings speak to their use with visual language. This is Zen rhetoric, which needs not instruct its users of its implied intent. By the very nature of its design, the users approach the site and are drawn into the meditation center’s purpose without our commonly found media-style billboards or televised graphic instructions.
The design is always reminding us and engaging us, the users, through its forms and tectonics and reference to the site. In conclusion, the building is unique to its region while respecting the site with the programmed use as a meditation retreat center.
Regional Materiality

Locally Sourced Materials

Critical Regionalism is by its nature inclusive of many elements of a building project. There is no single direction. Choices of material can project the economic, social and cultural constraints and desires that a designer must make. If there is a large construction budget materials can be chosen with less regard for cost. If the budget is low, then cheaper materials must be chosen to complete the program of the project. In the North East of the United States we are surrounded by abundant forests, with many species of trees. It would therefore make sense that local designs would be constructed from wood. Local crafts people familiar with the processes of wood construction should be selected to help in the building process. Stone is plentiful and the local geology is rich with glacial deposits from the last ice age. Choosing the two most bountiful resources in the area should certainly be considered when developing a basis for design.

How will materials be used? Timber has long been used as the structural components of construction for thousands of years. “Wood is one of the longest standing building materials in existence, with evidence showing homes built over 10,000 years ago used timber as a primary source for construction materials,” writes Sarah Woods (“Wood from the Stone Age to the 21st Century.” Architect, July 18, 2018).

As stated on Geneologytrails.com for Steuben County, NY, in 1792 Charles Williamson, agent for the Poultneys, “built two sawmills on the Cohocton river near Bath, also in Steuben County, and later employed several men to remove all the obstructions on the Cohocton and Mud Creek, making them both navigable for ‘arks’ and rafts” (Steuben County NY Genealogy and History. p.427, Geneologytrails.com/ny/steuben/lumberhistory.html). It is also reported that in
1816, Frederick Bartles, a local lumber mill owner, rafted 100,000 feet of boards from his mills on Mud Creek to Baltimore.

The history of wood from this area represents an economic and cultural connection. This connection is also deepened by the connected rivers and lakes that make up the local watershed feeding the Cohocton and Chemung Rivers. Local geological formations also help make this possible, enabling the local lumber mills to transport their lumber outside the area and as far as Baltimore, MD, for sale.

Wood is a proven construction material and is also a renewable resource. Lumber production helped establish the initial economy and there is a rich history and cultural connection to not only the forestry but also the ingenuity of wood production. These criteria make wood or timber a very important component to not only the building process but to the local culture. Today there are still many loggers in the area. However, the timber industry is not a primary source of the economy.

Stone and gravel quarries are also prevalent in the local area due to glacial deposits from the last great ice age that began over 2 million years ago. The terminal moraine stretched from New York City to the Missouri River.

*Terminal Moraine: britanica.com*

A terminal, or end, moraine consists of a ridgelike accumulation of glacial debris pushed forward by the leading glacial snout and dumped at the outermost edge of any given ice advance.

V. Schmidt, in his work on *Glacial Geology of the Western Finger Lakes Region* (University of Brockport, c. 1970), identifies Loon Lake and much of the glacial drift in knobs and terraces. This drift is identified as Arkport Moraine and encompasses a local hillside and
gravel pit 0.2 miles northwest of Country Road 92, west of Loon Lake. It can further be
described as an “irregular, steep gravel slope with hollows and projections. Gravel is bright,
containing many rounded exotics, somewhat sorted and stratified. A very small percentage of
rounded pebbles and cobbles consist of conglomerate containing a variety of pebbles including
crystalline, red sandstones, limestones, and dolomites – all firmly cemented”.

The local geology tells a story of the region connecting local culture to natural
phenomenon. With little choice, the region was formed in part by glacial movement which
carried what is now the gravel and stone that is commercially sourced for much of the local
roadways and construction material. This physical connection to the region, be it transient
material or pre-glacial slate in its origins, tells a story that evolves in a culturally significant way.
The residents of the area could be related whimsically to their transient origins like the stones
and pebbles from the glacial deposits. This is a narrative that connects the local people, the
economy, and the natural landscape of the site to the design of the project.

Additionally, we see how natural formations have also played a role in the local region,
from lumber shipped downriver to market to the watersheds of hills and knobs shaped by ice
formations created thousands if not millions of years ago. The area is often thought of as
dependent on the industrial creations of the railroad systems. Today the equivalent is a system of
highways that takes goods to and from markets on similar pathways to those used hundreds of
years ago through a land formed by glacial ice. The local site is again perpetuated in this
narrative of unique local qualities and enriched by local culture influenced by the land.
“Tectonics” do not seem to have played out in such a unique way, but this is the challenge of
Critical Regionalism - finding a way to make meaningful connections through the built form.
As a building material, stone requires no manufacturing beyond the cutting, and it is so durable that stone structures built thousands of years ago are still used today—characteristics few contemporary “green” products can equal (Ehrlich, 2013).

‘A project is an AND/AND/AND/AND story, in which the social, the ecological, the economic, the cultural and the temporal must be dealt with simultaneously. The pursuit of great ideas such as the ‘international style’, ‘modernism’, ‘regionalism’ or the
‘vernacular’ is no longer sufficient to give direction to the great common efforts that architectural projects are today.’ (Ken De Cooman.)

The table of design criteria below uses a simple method to analyze materials qualitatively to demonstrate a scale of importance. The chart was then created that ascribes quantitative as well as qualitative values to each material type based on categories including: locally sourced; locally available; distance to site; carbon emissions of production; and values of Critical Regionalism.

**Table 1**

*Basis of Design Criteria: Materials*

<table>
<thead>
<tr>
<th>Sourcing/location</th>
<th>Material Use Type</th>
<th>Trade</th>
<th>Pros and Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locally Grown and Quarried Materials</strong></td>
<td>Timber and wood lumber:</td>
<td></td>
<td>The local area is abundant with heavily forested regions. History and cultural connection to wood. Large number of tree species including hard and soft woods like oak, maple, ash, hemlock, cedar, and pine.</td>
</tr>
<tr>
<td></td>
<td>Exterior:</td>
<td>Wood Siding and Trim:</td>
<td>Locally sourced pine, cedar, and can be locally treated if necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pine, cedar, hemlock, fir: Both can be stained and painted to suite with cedar being more weather resistant but also more costly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exterior Decking:</td>
<td>Pressure-treated wood can be obtained from local facilities and used in combination with other weather resistant wood species. It is unfortunate that there are few wood species</td>
</tr>
</tbody>
</table>
widely available in the North East that can with-stand the elements. It would be worth investigating why cedar and other resistant species are not widely available locally.

<table>
<thead>
<tr>
<th>Interior: Trim Carpentry</th>
<th>Poplar is a locally available hardwood and can be easily milled to suite. Poplar is a highly paintable/stainable hardwood but should not be used in wet/damp or exterior applications.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring:</td>
<td>Reclaimed hardwood flooring can be obtained. Local mills can process wood flooring in decent quantities, however, most of the flooring mills are located south of this region. There are some flooring producers in the Pennsylvania and Virginia if reclaimed flooring is not available.</td>
</tr>
<tr>
<td>Stone:</td>
<td>Local glacial deposits of exotic pebbles and stones in gravel and natural cement.</td>
</tr>
<tr>
<td>Locally Produced Materials:</td>
<td>Concrete: Foundation Walls: Premanufactured concrete, steel, and XPS insulation Ease of insulation and time saving Cost is comparable to that of cast in place concrete with less construction time and therefore less labor. Transportation of materials if direct from local manufacturer. Foundation systems eliminates need for additional damp proofing material Walls are pre-insulated and can be made with additional R-values. Foundation can be built upon immediately after installation. Condensing construction schedule Premanufactured foundations walls are not self-supporting.</td>
</tr>
</tbody>
</table>
Installation requires additional joist and deck diaphragm on top of finished premanufactured foundation walls to stabilize panels and prevent collapse prior to backfilling. Premanufactured walls must be installed in standardized geometric shapes with square angles (squares and rectangles) to make continuous shape. Must be installed by manufacturer. Installation and design must be approved by manufacturer prior to manufacturing.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>a. Production of a ton of concrete produces 0.4 tons of carbon dioxide.</td>
<td>Can replace up to 25% of cement in concrete.</td>
<td>Can replace up to 75% of cement and improves durability of the concrete.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduces C02 emissions.</td>
<td>Can be obtained from local concrete plants but currently unavailable at local cement plants.</td>
<td>Can be obtained from local concrete plants</td>
</tr>
<tr>
<td></td>
<td>30% fly ash mix will increase strength of concrete 25%.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can be obtained from local concrete plants.</td>
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</tr>
</tbody>
</table>
Micro Silica “Silica Fumes”: uses micro silica, a byproduct of ferrosilicon alloy and silicon production. Can displace 10-20% of cement in concrete. 15% Micro silica increases concrete strength 30%. Not available in local area.

Tile: Int/Ext. Finishes: Wall and floor tile had been locally produced in large quantities until recently. Fortunately, there has been some storage of previously produced tile material and large enough quantities are available to use at bathroom and kitchen areas. This requires very conscious design layouts as quantities are limited.

**Carbon Emissions Comparisons of Various Building Materials and Assemblies**

To better understand what materials will be selected there is a standard of criteria that can be met to reduce carbon as well as improve upon the Critical Regional perspective.

For example, the following figures are taken from AIA Continuing Education Systems (AIA/CES), Carbon Implications of Building Materials Selection, by Jim Bowyer of Dovetail Partners, Inc., Minneapolis (2016). The course is registered with AIA and CES and present comparisons of typical building materials. Materials can be selected to have less carbon emissions based on production, and in fact some material can also sequester carbon rather than release it. Wood is a prime example of a building material which stores or sequesters carbon, making it a carbon negative material.
See Figures 34 and 35 (AIA/CES) Jim Bowyer that follow, quantifying typical carbon emissions per wall structure type by components and assemblies, in the production of each material, and the carbon stored in material post production per material type.

**Figure 34**

*Fossil Carbon Emitted in Production of Common Building Materials*

![Table of Fossil Carbon Emitted in Production](image)

Carbon content of 49% assumed for wood. (measured values range from about 47-52%)
The figures show that when wood is used in place of other materials, such as steel and concrete, carbon emissions are avoided. When wood is considered from a Critical Regionalism perspective it represents historical elements, is abundant in the local area, and there are local crafts people who can fabricate and assemble wood structures. Therefore, wood should be considered as a primary building material for all projects when possible.

The following outline and spreadsheet will show a list of materials based on availability and price and compare each selected relevance in multiple categories to help in the material selection process. Each material will have a value placed with its importance to a Critical Regional perspective from 1-10 and evaluated based on a total score (1 being the lowest/least

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**Figure 35**

*Net Carbon Emission of a Typical Wall Assembly Type*
desired and 10 being highest/most desired score for per category). See the attached Critical Regionalism Basis of Design Spreadsheet, Figure 24.

**Special note:** This thesis was developed during the Covid-19 international crisis. The pandemic affected supply chains throughout the industrial world, causing prices to rise to levels unseen before. In March 2021, the retail price of a nominal 2”x4”x8’ white spruce (softwood) kiln dried stud was $10.00 each (compared to approximately $3.50 pre-2020). Capturing a constantly changing material price and finding consistency in such a volatile market was difficult at best. The greatest accuracy in terms of information current to the writing of this thesis is presented. Availability of materials and pricing are subject to change daily.
Orientation

Orientation: Britanica.com

(from Latin oriens, orientum, “the rising sun”), in architecture the position of a building in relation to an east-west axis.

Figure 36

GIS Parcel / 10 East Lake Rd. Cohocton NY

Note the hillside to the southeast of the site on the east side of County Route 121. The lowest site elevation is on the western boundary along the roadside. There is a six-foot elevation change from the most westerly boundary along East Lake Road to the east, where the existing structure is located, and an additional 16 feet of added elevation from the structure to the County
Route 121. In short, the site slopes upwards gradually from west to east and eventually comes to a steep grade approaching Route 121.

Drainage is not a problem due to the soil being mostly sand and gravel with large stones. Care should be taken when structures are placed close to or into the slope bank as run moisture should be diverted away from structures and directed down grade.

The orientation and position of a structure on the site is absolute from a Critical Regionalism perspective. The design of this project took many individual components into consideration with regards to the orientation of the final design. The outline below will highlight the key considerations that determine where the structure will be placed and how the design would interact with the site.

In terms of orientation criteria, the climate data was chosen for Rochester and Elmira NY. There is no specific data for Cohocton, NY. However, using Rochester, NY (45 miles to the north from the site) and Elmira NY (40 miles east of the site) there was sufficient weather data to make assumptions. Data provided by Climate Consultant was used in the figures below.

**Design Constraints**

Most things have limits. Within these limits a designer can find challenges that help define a limit that one will design in. For example, the site geography can define the shape of the site and the site’s natural, as well as human-imposed, boundaries.

The existing structures on site can also play a role if they are to remain. The existing 22’x 50’ structure is to remain and provides support to the new design through construction and post construction as an auxiliary structure. The existing structure is sound and eliminates the need for complete demolition, therefore saving resources and providing a context for the new design.
Any new design should complement and not impede or detract from the use of the existing structure. In this case, the existing structure remains as an auxiliary space for warmer months and can be used for guests and family. It is not to be emulated as a design precedent but the historical context and “tectonics” of the existing structure can be borrowed and used in the new design as deemed appropriate.

**Solar Exposure**

Shading is important during the summer months on the northern and western facades. Solar radiation is strongest in June through August while shading is required from late mornings to evenings.

**Figure 37**

*Climate Consultant, Sun Shading Chart June 21 to December 21 for Rochester NY*
Solar Heat Gain: SHG

The site is limited by its surrounding topography as it sits on the lower edge of the hillside bordering the southern boundary. Most of the year, southern sun exposure is limited and throughout the winter and cooler months, daylighting and solar heat gain will be limited. Therefore, glazing facing the south does not provide much of an advantage in winter. Sun exposure in winter is limited to the southwest in the afternoon, so glazing should be employed for daylighting and SHG. Western and northern exposure should be mitigated in the warmest months with shading devices.

An important condition to note is the increased solar reflection off the lake in late afternoon. As the sun starts to set, its light is amplified by being reflected off the lake towards the eastern shore, therefore increasing solar radiation and heat gain in the summer. Typically, a shoreline structure will see a temperature increase of 20-25 degrees F. during a summer sunset with a clear sky. Shading devices are therefore important when trying to lower summer afternoon sun exposure and influence cooling cycles. Limiting the broad side exposure of the structure at the warmest times of the summer months are important when designing efficient and effective passive and or active cooling systems. Additionally, placement of deciduous trees is beneficial in reducing the amount of solar heat gain by providing seasonal shading, however, properties without substantial shoreline frontage do not have the option to plant trees and must rely on shading devices. The property at 10 East Lake Road will use a combination of shading devices, trees, and orientation to reduce the solar exposure on the northwestern façade.
In Figure 38 North is at the top of the image and south at the bottom. The center of the site is at the vertex of yellow sun angle lines. The sun angle is very low and does not permit sunlight exposure until late in the afternoon, as shown in the bottom left of image. The yellow lines represent the sun and the sun angle from noon at the bottom right through 5pm at the upper left. Loon lake is to the west or left as represented by the lighter blue area.
Figure 39

*Autodesk Revit Sun Path Analysis on southwest façade.*

*Note.* Showing multiple sun angles simultaneously to help position the façade for optimizing daylighting and views. The yellow lines represent sun angles at different seasons and times of day while the blue lines represent the desired and open sight lines. The light green lines represent the property boundary.
Site Lines: Views

With the Loon Lake view being obscured by other residences it was a logical choice to design vertically to achieve a lake view and increase solar exposure. Designing vertically also reduces the footprint of the new structure and lessens its impacts on the site while allowing a useful residential program. See Figure 21 for topography, showing surrounding properties.
Figure 41

Revit Model Showing sight lines onto lake at bottom left where possible and open vantages to open farm pasture and barn silo to the North.

The view of the neighboring pasture to the east is also important as it is unique to the site and offers an open view of a large solitary wood barn and silo, creating a pleasant view. The current structure does not take advantage of the pastoral view as most lake residents do not have access with an unobstructed border to the farm property. See Figure 4 for the pasture, barn, and silo.

Site lines to the south are not desired as Route 121 is directly in view. Limited glazing is advised at southern facades to help prevent road noise from entering the structure. A balance is required between allowing maximum daylighting and STC levels from the road while also maintaining privacy. As the structure rises vertically, the daylighting improves but also exposure to the road increases. Placing an open stair tower on the southern façade allows daylighting and limit exposure to the road while allowing a maximum amount of glazing for daylighting that can
be shared throughout each floor plan. The stair tower can also reduce the sound transmission from the road and aid in ventilation, as the glazing can be operated to increase cross ventilation via passive wind tower designs.

With the roof being 32 feet above grade, views can be enhanced without obstruction. Northern and eastern views are virtually endless as the neighboring structures are at lower elevations. Due to the location of the site and Route 121 there is not a residence to the south and therefore no sight line conflict with neighboring properties. All the neighbors are to the north and west and therefore not infringed by the site as they are oriented.

**Wind: (see Climate Consultant data, Figure 42).**

Wind is typically felt from a northwesterly direction but the historical diagrams record the prevailing winds as primarily coming from the southwest. An assumption can be made that the local geography redirects the wind movement as it gains elevation from the southwest. The wind charts also show a substantial amount of wind coming from the north, however, it would be assumed that it would be felt differently due to the local hillsides and valleys creating a wind tunnel from the northwest.
Figure 42

Showing the wind speeds and durations for Rochester NY. Local site may vary slightly but the Rochester Charts closely represent the site wind conditions if rotated slightly to the North so the winds would be felt from a more North Westerly direction.

When designing the geometry of the structure, it seemed possible to limit the broad side exposure of the structure to the frequently recorded winds. Orienting the building would split the wind at a vertex, lessening the force and therefore reducing heat loss through the façade, wind load, and audible wind noises throughout the year. Southern and easterly winds are muted by the hillside topography elevations at the south and east facades.
Climate Summary: Rochester (ROC) NY

Figure 43

Climate Consultant Design Guidelines using ASHRAE Standard 55-2004

| DESIGN GUIDELINES (for the Full Year) | LOCATION: Rochester, NY, USA |
| All Design Strategies, Default Criteria | Latitude/Longitude: 43.12° North, 77.67° West, Time Zone from Greenwich -5 |
| Data Source: TMX—14768 7215200 WMO Station Number, Elevation 554 ft |

Assuming all 16 Design Strategies were selected on the Psychrometric Chart, 100.0% of the hours will be Comfortable. This list of Residential Design guidelines applies specifically to this particular climate, starting with the most important first. Click on a Guideline to see a sketch of how this Design Guideline shapes building design (see Help).

1. **For passive solar heating face most of the glass area south to maximize winter sun exposure, but design overhangs to fully shade in summer**
2. **Provide double pane high performance glazing (low-e) on west, north, and east, but clear on south for maximum passive solar gain**
3. **Lower the indoor comfort temperature at night to reduce heating energy consumption (lower thermostat heating setbacks) (see comfort low criteria)**
4. **Keep the building small (right-sized) because excessive floor area wastes heating and cooling energy**
5. **Heat gain from lights, people, and equipment greatly reduces heating needs so keep home tight, well insulated (to lower Balance Point temperature)**
6. **Tiles or slate (even on wood floors) or a stone-faced fireplace provides enough surface mass to store winter daytime solar gain and summer nighttime ‘coolth’**
7. **High Efficiency furnaces (at least Energy Star should prove cost effective**
8. **Some wind-protected outdoor spaces can extend living areas in cool weather (seasonal sunrooms, enclosed patios, courtyard, or verandas)**
9. **Extra insulation (super insulation) might prove cost effective, and will increase occupant comfort by keeping indoor temperatures more uniform**
10. **Sleep pitched roof, with a vented attic over a well insulated ceiling, works well in cold climates (sheds rain and snow, and helps prevent ice dams)**
11. **Traditional passive homes in cool overcast climates used low mass tightly sealed, well insulated construction to provide rapid heat buildup in morning**
12. **Locate garages or storage areas on the side of the building facing the coldest wind to help insulate**
13. **If a basement is used it must be at least 18 inches below frost line and insulated on the exterior (flemish or on the interior (fiberglass in turned wall)**
14. **Organize floor plan so winter sun penetrates into daytime use spaces with specific functions that coincide with solar orientation**
15. **Trees (either conifer or deciduous) should not be planted in front of passive solar windows, but are OK beyond 45 degrees from each corner**
16. **Use exterior entries (air locks) to minimize infiltration and eliminate drafts, in cold windy sites**
17. **Small well insulated linestuds (less than 3% of floor area in clear climates, 5% in overcast) reduce daytime lighting energy and cooling loads**
18. **Insulating blinds, heavy draperies, or operable window shutters will help reduce winter nighttime heat losses**
19. **Carefully seal building to minimize infiltration and eliminate drafts, especially in windy sites (house wrap, weather stripping, tight windows)**

**Tectonics**

(see attached design sheets p.88-95)

Critical Regionalism design methodology uses the topography of the site to aid in the position of the structure. The immediate geography and topography allows the site, climate, desired sight lines, and solar studies to influence and locate the form and facades to exploit all influences to maximize advantage.

Timber frame construction makes an obvious connection to the local culture by using readily available wood timber and craft of building type. Open floor plans allow access to outward sight lines from the west to east and allow daylighting throughout the plan.
Daylighting and glazing allows the maximum amount of sunlight in the winter months to increase solar heat gain and natural light, as well as using shading devices and overhangs to reduce light and solar heat gain in the summer months. The aim is to create a system that is flexible to fluctuations in the local climate. Daylighting and temperature changes are dynamic, and the design should reflect this through the structure’s ability to change with the seasons to perform as necessary for its occupants.

It was decided based on the solar charts that movable or sliding shade devices would be an efficient way to provide summer protection from the solar heat gain and an abundance of natural light, while multi-level, overhanging decks use the solar angles to aid in daylighting and shading.

Glazing must be positioned to maximize daylighting in all seasons. Strategically placed glazing enables us to maximize sight lines from west to east, while southern glazing can exploit daylighting and passive ventilation techniques while also providing privacy from Route 121.

Orienting a multi-level stair tower to the southern façade, there is a maximum amount of space allowed for the residential program without imposition. The stair can also be used as a main source of passive cooling and ventilation by incorporating it as a wind tower.

The sight lines and views exploit the immediate surrounding lake, farmlands, and dynamic topography. Wrap-around multi-level and rooftop decks hold secondary purposes and wed the indoor and outdoor spaces to access major sight lines surrounding the site.

There are large existing garden flower beds and multiple tree species on site. The existing garden with natural stacked stone constructions is used to create distinct places within the site. Stacked stone walls and boundaries create a natural garden environment and exhibit the existing gardens.
Conclusion

Critical Regionalism lends itself to the built environment because it deals with multiple elements contained in the process of design. The built environment is a product of our society as much as it is a product of the builder and its occupants. We the occupants are the end users of what we can supply ourselves with, either in a material or physical form, or figuratively in the forms we are familiar with and surround ourselves with.

As a “culture” we tend to choose what is already accepted, so the norms of society repeat themselves without critical analysis as to why we using and adapting such forms for our use. Simply put, we create what we know and seldom question its origins.

Results and Findings

If we truly want to design something new, be it a building or a widget, we must explore the origins of our constructions and make decisions that are based less on what we are used to. Traditional conventions were at one time new ideas in the context of a history that is seldom revisited. A pediment becomes typical in institutional typologies, for example. However, the need to make the connection between the pediment and ancient Greece or Rome is not what we think about when we look at our neo-classical relics, for example the U.S. Senate or Capital Building. Is the implication that the United States is a version of Rome in the present day, or to broadcast that U.S. is going to fall like all great nations before it? We do not even think about why our buildings have borrowed classical conventions, or where these conventions began. It is just assumed that this institutionalism symbolizes a permanence and timelessness like cultures that came before. Designers would need to employ other means to achieve a similar likeness and prowess. A different set of pentameters to express the poetics of our time or the creation of a nation.
Analyzing the building conventions of our day, there is a need to think in more critical terms about the reasons for a design, considering the site and orientation of the built form and the geometry needed to activate the design. “Activating the design” means fully expressing the built form in its uniqueness, which is directly tied to its location, be it the surrounding topography, materiality, culture, climate, or these factors. There must be a direct relationship between the intention and the outcome. A fully realized design cannot exist if there is no connection to the site and its idiosyncrasies, challenges, and exploitable qualities.

Historical information relates the site and the local uses to what is or what has been available in the past. The Loon Lake site lends itself directly to the rich history of the wood mills and the plentiful forests that surround it. The earth is rich with geological history that can be traced back to the previous ice age, while the constructability of materials provides endless options for a creative mind. The site’s connection to the land creates a palette of tones and colors, from the green and brown hews of trees to the multiple stone and gravel mixes found throughout.

**Best Practice and Evaluations**

Simplicity of criteria based on local sourcing and availability helps provide direction in materiality which in turn relates to a design’s sustainable qualities.

Climate and day-lighting on the site shape geometry. The form begins to move or bend within these constraints, flexing through the seasons to help the form meet its function. The blending of function and form drives the performance of the design so that it organically and holistically supports systems. This thesis deals less with quantitative systems than with qualitative systems that help drive the design, using the rationale of passive systems which, when exhausted, can be supplemented with active solutions. With the active heating and cooling technologies available today we can easily become dependent on a mechanical solution and
disregard or ignore more holistic options. There is a temptation to design based on what we can economically budget for in the short term while we let long-term and more permanent solutions fall to one side.

**Lessons Learned**

There are many facets and functions of a design that need to be incorporated in the form and function of a building. At some point assumptions need to be made and the analysis evaluated and employed. There is not always the time and or information readily available to make decisions that affect a substantial portion of the design at every turn. Small incremental steps need to be taken and documented so that practices that are not well established can be realized in good time.

Material choices can be made through means of economy or desire and there may be a better balance if there is a combination of the two. As design decisions are made there is not always an immediate solution or resolve. Critical Regionalism involves many components, any of which can be analyzed to move a design forward. The theory requires a narrative that involves the local context. When there is a strong story behind the design, connecting it to the area, the possibilities are endless and true design can be achieved.

For future research, more attention should be paid to the mechanical systems that can be employed, while more detailed model studies would help exhibit the performance of the combined systems.

A great deal of information is supplied by manufacturers and best assumptions must be made for a given material or system. It must be assumed that manufacturers are in the business of selling products and services and do not always give objective information and data. Validity of
manufacturer supplied data should be reviewed against other manufactures and science-based research data as materials are selected.

Critical Regionalism is not the same as regionalism, but a local vernacular can be used to express a critical perspective if there is a direct connection to the project’s purpose, history and socio-cultural meanings.

Analysis and best practice do not end when the design is finalized. A critical perspective involves always questioning the design from the initial design process through to the building’s occupancy. Critical Regionalism offers a practice that is inclusive and meaningful in terms of both regional identity and global knowledge. We cannot return to a nostalgic sense of yesterday or isolate ourselves from a world that is always changing without denying ourselves.

**Closing**

Critical Regionalism is a theoretical process that includes all possibilities relevant to a given design including local and global influences. Designs should consider socio-cultural factors and the realities of the site, its climate, and local history. This is not a “regional architecture” but an “architecture of a region” – highlighting and utilizing what is unique about a site. The “making of places” is an inherent purpose of Critical Regionalism, and the site we design for and on should provide the basis of a design.
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Photography Reference

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