I, Jaimie Roudebush, hereby submit this original work as part of the requirements for the degree of Master of Architecture in Architecture (Master of).

It is entitled:
Mitigating the Effects of Seasonal Affective Disorder Through Architecture

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This work and its defense approved by:

Committee chair: John Eliot Hancock, MARCH

Committee member: Jeffrey Tilman, PhD
Mitigating the Effects of Seasonal Affective Disorder Through Architecture

A thesis submitted to the Graduate School of the University of Cincinnati in partial fulfillment of the requirements for the degree of:

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in the School of Architecture and Interior Design of the College of Design, Architecture, Art, and Planning

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Extreme arctic cultures are split into two very different lifestyle dynamics depending on the time of the year and the drastically different amounts of sunlight available. Winters are very introverted as a result of the extreme cold and twenty-four hours of darkness, while summers and the midnight sun are celebrated and very social. Because of this contrast, winters are often accompanied by Seasonal Affective Disorder (SAD), a type of depression directly related to the amount of sunlight a person receives. It is theorized by psychologist Dr. Norman E. Rosenthal and sociologist Marcel Mauss that by creating more social interactions in the winter and through the use of light therapy, the physical, mental, and emotional conditions of people affected by SAD could be more balanced year-round.

Vardø is the terminus of the National Tourist Route project in Norway and a small arctic island that has fifty-six days of darkness each winter. Located in the center of Vardø, the project will house multipurpose rooms for meetings, clubs, pilates, etc.; a small theater; a community restaurant/cooking classroom; an interactive play area for children; a SAD retreat for light therapy; as well as an external sauna located on the water. These spaces will encourage interaction among people in the community year-round. A dynamic and unique exterior form incorporates both natural and artificial lighting, showcases tree and plant life that people this far north are unable to cultivate, and provides innovative social spaces and an atmosphere that will draw people inside. Both tourists and locals alike will be able to experience this unique interaction, which will, in turn, mitigate the effects of Seasonal Affective Disorder on the community.
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The summer after my third year of undergraduate study, I took the chance to study abroad in Copenhagen, Denmark. Living in a different country for a long period of time allowed me to experience both a culture and situations vastly different than those available to me in the Midwest. I was able to travel through each of the Scandinavian countries and as a result I gained a fascination for Scandinavian design, as well as design for the extreme climate found in northern areas. When I first arrived in Copenhagen at the beginning of July, it was still light outside at midnight. When I left two months later, however, it was getting dark around nine in the evening. Experiencing that quick and dynamic change in both climate and lighting was eye opening for me. People and buildings in these northern areas must constantly adapt their lifestyle to the changes occurring outside. During the summer in many far northern countries there are long periods of time in which the sun never fully sets. This is countered in the winter with intervals of darkness uninterrupted by daylight. Not only does this cause problems with lighting and heating spaces, but it also affects the people that inhabit these countries.

The difference in seasons becomes an issue when one begins to understand just how much of an effect the cycle of light and darkness has on a person's psyche. The human body becomes confused when it experiences such drastically different conditions, which can cause depression (in the winter) or hyperactivity (in the summer). People who are affected by light deprivation (and most people are to some extent) are said to have the winter blues in less intense cases, or Seasonal Affective Disorder (SAD) when the symptoms are more extreme. This is not a new condition. In some areas of Scandinavia, “recognition of the
problem was accepted as part of the culture”. Research shows that the Inuit people had a way of decreasing the effects of seasonal affective disorder by having two very different lifestyle dynamics depending on the season. “In summer, the members of a settlement live in tents and these tents are dispersed; in winter, they live in houses grouped close to one another”. Summers were more introverted and focused on immediate family, whereas winters were extroverted and centered around community and celebration. In this way, the dark winter months that often cause Seasonal Affective Disorder became a season with a high concentration of excitement and social activity. This helped to alleviate the effects of twenty-four hour darkness. Since these northern climates have become somewhat less isolated and more commercial, they’ve lost this seasonal lifestyle change and therefore have also lost their lifeline of social connections to help them through the dark periods.

Historically, Inuit communities had a kashim, a gathering place or games building, where the people were reunited each winter after returning to their communities. Because of this social space, winter became a “season when Eskimo society is highly concentrated and in a state of continual excitement and hyperactivity”. Today this seems to be the opposite for most civilizations; summer and good weather are celebrated while people spend more time alone in the winter. Perhaps if arctic communities were to take the Inuit seasonal lifestyle as an outline for a successful plan of living, their physical, mental, and emotional condition in the winter and summer would be more balanced. Studies performed on the functions of Inuit kashims state that by increasing the social experiences in the winter and decreasing them in the summer, there is a balance created that lessens SAD’s symptoms.

Obviously a contemporary kashim would be much different than those used by the Inuit people. It would need to relate specifically to the culture using it and create opportunities for socialization that fit into the lifestyle of the users. However, it is helpful to reflect upon and take into consideration aspects of the kashim’s original structure, functions, and formal attributes. By using these sources in conjunction with histories of arctic people, sources that explain climatic concerns for building in these areas, and studies on Seasonal Affective Disorder, a relatively set of design strategies emerge to inform how this project should develop.

The key question is whether, or how, an innovative building type (hybrid community center) and its architectural treatment can help mitigate the extreme climate, social/cultural, and psychological conditions associated with the far north.
1 Rosenthal, Norman E. Winter Blues: Everything You Need to Know to Beat Seasonal Affective Disorder. New York: Guilford, 2006. Print. 8


3 Marcel Mauss

4 Marcel Mauss
Dr. Norman E. Rosenthal is the psychiatrist and researcher who initially described Seasonal Affective Disorder (SAD). In his book, Winter Blues: Everything You Need to Know to Beat Seasonal Affective Disorder, Dr. Rosenthal gives background information and treatment advice on the condition known as SAD.

“Over hundreds of thousands of years, the architecture of our bodies has been shaped by the seasons and we have developed mechanisms to deal with the regular changes that they bring. Sometimes, however, these mechanisms break down and cause us trouble”. This trouble, known as Seasonal Affective Disorder is not a new concept. SAD was recorded in psychiatric texts prior to the 1900s, and even in ancient times exposure to sunlight was recommended as a cure for depression. However, the National Institute of Mental Health (NIMH) has only documented SAD as an actual syndrome since the early 1980s. The reason SAD took so long to come to the attention of the medical world is because its symptoms vary in both intensity and timing from one person to the next, and people often don’t realize that what they are experiencing is not normal mood fluctuations. A study that recently took place showed that the average person suffering from SAD went through fourteen winters before they were diagnosed and received treatment.

While it is believed that decreased exposure to sunlight is why people get Seasonal Affective Disorder, the reason certain people respond to it differently from others has not yet been proven. Dr. Lewy, at NIMH, suggests that, “Since bright light is necessary for melatonin suppression in humans, it might similarly be necessary for altering mood and behavior. This reasoning was based on two pieces of information:
first, the secretion of melatonin is an important chemical signal for regulating many different seasonal rhythms in animals; second, the nerve pathways involved in the suppression of melatonin secretion by light pass through parts of the brain that we believe are important in regulating many of the physical functions that are disturbed in depression, such as eating, sleeping, weight control, and sex drive”.

There is not primarily one race, ethnicity, or occupation that seems more inclined to be affected by Seasonal Affective Disorder. One of the interesting things, however, is that women are four times more likely to have SAD than men, and people between the ages of twenty and forty are the most vulnerable.

Seasonal Affective Disorder affects more than just moods; people also notice differences in their cognitive abilities, social life, sex life, and physical health. Typically people suffering from SAD experience these differences seasonally. For example, Jenny, a female patient who was receiving treatment from Dr. Rosenthal, said she felt like two entirely different people in the summer and the winter. Another lady, Peggy, shared a story that I feel is one of the best explanations for non-sufferers of just how serious this condition can be:

“It was mid January. There had been a string of gray days but nothing bad had happened… but I felt so weighed down and in such a state of despair that I saw no future for myself… I went down into the basement, found a water pipe, got a piece of clothesline, and tried to make a noose out of it, but I was unable to do so. I just didn’t have the energy to figure out how to do it properly or the strength to do it… I went back upstairs to my bedroom… and lay down on the bed crying, disgusted that I couldn't even commit suicide properly… The next day was sunny and I said to myself, ‘had you committed suicide yesterday, you wouldn't be alive to see this beautiful day’ and I felt better”.

Peggy’s moods fluctuated in the most extreme sense depending on the weather. On gloomy days she was depressed enough to attempt suicide, but at the appearance of the sun Peggy’s disposition was immediately more cheerful. Her life was like a yo-yo. As in Peggy’s case, others also tend to have cognitive problems in the winter. “Decreased concentration, productivity, interest and creativity; inability to complete tasks; increased interpersonal difficulties in the workplace; and increased absences from work” are all common to SAD sufferers when they have less exposure to sunlight. Tasks that are usually very easy for
them to complete become impossibly difficult in the winter. On top of this, these people are often getting more sleep than the average person but feel unrested at all times.\textsuperscript{14} They have no interest in sex, though in the summer they can often be insatiable and need multiple partners.\textsuperscript{15} Additionally, eating habits become abominable and some people gain as much as forty pounds each winter; lucky ones shed the weight quickly once summer starts, but others are unable to lose it all and slowly become substantially heavier as the years pass.\textsuperscript{16} Considering all of these issues, what Jenny said about being two different people depending on the season seems depressingly accurate.

A group of students and a professor from the psychology department at the University of Tromso in Norway, known as the Winter Depression Research Group, completed studies about SAD and its symptoms across Norway in December of 1999. Following Rosenthal’s Seasonal Pattern Assessment Questionnaire (SPAQ), the group tested 6,313 people (primarily women) between 58° and 70° North Latitude in Norway. According to the results, there is a much higher prevalence of SAD in northern Norway (66-70°N) than in southern (58-61°N) and mid (62-65°N) Norway. The one inconsistency is that the percentage of people affected by SAD in southern Norway and mid Norway were relatively similar. The population with the smallest percentage of people affected by SAD (only 15%) was Kristiansand, located at 58°N, while the highest was in Bodø (67°N) with 27%.\textsuperscript{17} There have not been an abundance of studies about SAD completed in Norway, so the facts are somewhat sparse. However, the results of this study show a substantial difference in the prevalence of SAD in northern latitudes when compared to locations in the United States shown in the image below.

![Figure 1: Prevalence of both Seasonal Affective Disorder and the Winter Blues in the United States](image-url)
Luckily for the millions of people suffering from SAD, there is a relatively simple cure for their problem - exposure to light. It was found in a study at the University of North Carolina, Chapel Hill, that light therapy as a treatment for SAD is as effective as antidepressants are for people with non-seasonal depression. Light therapy is simple; all it requires is sitting in front of a light box for twenty to ninety minutes each morning, in close enough proximity to the light source to receive the correct amount of light. Light boxes are usually two feet long and eighteen inches high “containing ordinary fluorescent light bulbs set behind a plastic diffusing screen, which houses a film that filters out most of the ultraviolet rays from the fluorescent bulbs… the amount of light (or intensity) that has been found to be therapeutic ranges between 2,500 and 10,000 lux”.

Of people suffering from Seasonal Affective Disorder, over eighty percent of them see significant results after starting light therapy. “In the days that follow, people report that it feels as though some fundamental problem is being corrected; ideally the symptoms of SAD disappear, one by one or all at once”. People start to feel more energetic, they sleep better and for fewer hours, they are able to think quicker, and exercise is no longer quite the task it was before. And most people feel these effects within two to four days of starting light therapy. For a condition that causes so many problems for the people suffering, the cure to it is relatively simple and works extremely fast. Being able to help people overcome this problem would be incredibly rewarding.

Rosenthal’s Winter Blues is a valuable resource on the topic of Seasonal Affective Disorder, particularly in incorporating patient’s narratives alongside clinical studies and factual as well as theoretical data. The book provides good background for how to go about treating the condition, and for how architecture might have a therapeutic impact. My hope is that people who visit the community center are able to receive treatment, especially during the polar winter. If there is a way to make people feel immensely better not only via structured treatments but simply by being within the architecture, that would be a worthwhile goal.
The town of Vardø (the ø is pronounced much like when someone doesn’t know what to say, like “uuuuuh...” or “eh”) is the most northerly fortress town in the world and the only town in Western Europe which lies in the arctic climatic zone. It is also Norway’s most easterly town, Norway’s oldest town, [the county] Finnmark’s oldest fishing community… and the home of Pomor trading. The town lies on an island that is lung-shaped with the main community functions located at the connection between the two “lungs”. At 70°20′36″N 30°51′17″E, Vardø is located inside the Arctic Circle, which lies on the latitude 66° 33′ 44″ north of the Equator. The island’s total land area is about 224 square miles, with a population of 2,100 people. The majority of the development on the island has occurred around the connection between the two lungs. The topography is relatively flat with the coastal areas sloped down to the water. Most of the northern part of the western lung is very rocky with rolling hills, and mostly undeveloped. Because of the harsh winters and inability of plants to grow in this climate, the landscape of Vardø is considered to be arctic tundra.
At about the time when Europe was pulling itself out of the dark ages (AD 800), a group of warriors were exploring and raiding their way around Europe, Asia, and the North Atlantic. This Norse group, known as the Vikings, had a need to show off wealth and personal power, which they accomplished by searching for exotic objects in far-away countries. This in itself was not uncommon in other countries, but the Vikings were seen as the worst such group of people for one main difference – they also raided churches. Because of the reputation the Vikings had acquired, their homelands were also thought of as being extremely violent, which is largely untrue. The Vikings were “the young men sent off each summer to gather the wealth and slaves required to validate the positions of their masters in the development of a flourishing northern civilization. Behind them lay communities of craftsmen, artists, merchants and, most importantly, farmers.”

Up until this time the Scandinavian people had been unable to travel the long distances required to reach most of Europe. There was one specific advancement in technology that changed all of this: the invention of the longship, which enabled the Norse people to travel long distances in a short amount of time. However, there was still one drawback: the lack of a compass or any other form of navigation. The uncertainty of their navigation resulted in the Vikings never knowing where they would land. This provided one advantage, of sorts, as they discovered and settled areas of Thule, Ireland, Scotland, Iceland, Greenland, and anywhere else they happened to land.

In the three hundred years of Viking activity, there were large changes back home in Scandinavia. During this period, Denmark, Norway, and Sweden started to shape into their own kingdoms. Christianity had claimed Denmark and Norway, and Sweden wasn’t far behind. This religious shift greatly changed the lifestyles of the Norse people.

In the year 1307, the king of Norway and the Archbishop of Trondheim built a fort and a church respectively in Vardø, Norway. “Located about 200 kilometers to the east of North Cape, where the coast turns south into Varanger Fjord, [Vardø] seems to have marked the boundary between Norwegian and Russian lands.” It became a destination of sorts for northern explorers and was the final stop for those traveling to Svalbard. One of the more interesting things about the port of Vardø is that, though it is located in the Arctic Circle, the water never freezes.
“Driven by trade winds and the forces of the turning earth, a vast vein of blood-warm water sweeps west from Africa to the Caribbean, circles the Sargasso Sea and swings northward along the coast of North America. Here it is known as the Gulf Stream… When it curves eastward… and crosses the Grand Banks south of Newfoundland, its fog-haunted boundary with the subarctic water of the Labrador Sea is marked by a temperature difference of between 10° and 15° C [50°-60° F]. Icebergs drifting south from Greenland melt like ice-cubes in a warm bath… One branch of the current washes the Norwegian coast while another swings offshore and strikes northwards across the Norwegian Sea.”

This phenomenon creates some rich paradoxes that could be exploited in a project designed on this site.
During the 1600s, Finnmark county was the site of the largest witch-hunt in the country, with about ninety people found guilty. Of these ninety people, fifty women and two men were found guilty and killed in Vardø alone, a town of somewhere between only 100 and 200 inhabitants at the time. These “witches” were burned at the stake at Steilneset, where there is now a memorial that was designed by Peter Zumthor and Louise Bourgeois.

In the 1700s, Vardø was a common stop for explorers. Because the harbor never froze, it became a trading center, which enabled it in 1789 to become the first Northern Norwegian town. Unfortunately, many of the original buildings in Vardø burnt to the ground in August of 1944 when the town was bombed by the allied forces. There are still a number of buildings that remain (among them the old children's school which is the largest wooden building in Northern Norway), but most of the town had to be rebuilt.

Today Vardø is a small fishing community that has recently become more involved in tourism as a result of its unique climate, location, and history.
The majority of the existing structures in Vardø are brightly colored wooden buildings with regular-shaped plans. Only a few are brick or concrete. The buildings are relatively dense in the settled areas with small yards in some cases. There are also a few parks that people are able to use for recreational purposes. The bright colors used on the buildings are thought to help with depression during the desaturated winter months, as is the situation in Svalbard, an island located halfway between mainland Norway and the North Pole.

In 1981, the town of Svalbard made an audacious move and hired Grete Smedal, a color expert and environmental designer, to color the town. Smedal came up with a plan of action that incorporated public and residential construction and sought to enliven the predominant colors of the town: black, gray, and white. In her wisdom, Smedal took into consideration the varying ambient colors of each season, “total darkness for 3 months… twenty four hours of sun in the few summer months… [and t]he rest of the time, there are blue shadows and a sky that changes from pink, to turquoise to lilac … All the colors [Smedel chose] were of medium lightness, which allowed the color scheme to offer sufficient contrast in any season.”³³ So all year round in Svalbard, there are colors to liven up the otherwise depressing color palette. These buildings did not need color added to them; because of the arctic climate, the wood is not going to rot. The entire purpose of adding color to the buildings was to cheer up a community that rarely saw anything outside of what used to be a very monochromatic town. So as one can see, color is a very important aspect of construction in areas like Svalbard and Vardø.
Land- The largest amount of space on the island is undeveloped land. With only 2400 inhabitants, and 231.7 square miles of land, there is approximately 1 square mile for every 10 people on the island. A large portion of the shore and the northern part of the island is uninhabited because the conditions are so poor. The soil is very rocky and the terrain rough.

Buildings- The buildings on Vardø are mostly concentrated around the land bridge connecting the two “lungs”. Houses start where the tunnel comes above ground and spread north either until water is reached or the terrain becomes too rough. Most of the buildings are square in plan, though the civic and community buildings become more irregular.

Roads- The roads on Vardø are almost all bordered by buildings. They function mainly to get from one building to the next. There is one road that continues north on the western part of the island and drives through empty land to get to the northernmost point of the island; this is the only road with nothing bordering it.
There were several factors that went into choosing the site (both Vardø itself and the specific site in town) for this project. The town motto for Vardø is “Cedant Tenebrae Soli”, meaning, “Darkness shall give way to the sun”. If there is any motto more perfect for a location to help people with SAD, I would be surprised. Second, the tunnel that connects Vardø to the rest of Norway is the culmination of E75, a highway that begins in Crete and runs 5,321 kilometers until it reaches the Arctic Circle. This is one of the longest North-South running highways through all of Europe, which would hopefully make it both easy for people to enter the town and a destination. For visitors or people driving into Vardø via the tunnel from mainland Norway, the chosen site will be the first thing seen when re-entering the light. It is also located in the heart of the town, adjacent to the intersection of the two separate lungs. It is in close proximity to the church, the kommunehus (government building), as well as most of the houses. This will allow easy access for people and high visibility.
Figure 12
Panorama of the site from the residential street to the west

Figure 13
Panorama of the site from the main road leading from the tunnel (left side of the image) to City Hall (the red brick building on the right side of the image)

Figure 14
View of the site upon exiting the tunnel (site is to the left)

Figure 15
View of the site from the center of the two lungs (top right corner of the image)

Figure 16
View of the site from the opposite lung

Figure 17
View of the site from the west (site is where the gazebo is currently located)
Figure 18
Map showing where all of the images from the previous page were taken
Color is one of the few things continually changing in Vardø. In the spring, once the sun has risen, there is a season of high contrast. The weather is still extremely cold and the ground is white and snow covered, making the colorful buildings pop against the pure snow. In the summer, Vardø is very green and earthy colored; another season when everything appears to be in high contrast. Then the winter approaches, and Vardø is ensconced in darkness. In these conditions, everything appears blue except for the effect created by electric lighting, and even the colorful facades of the buildings tend to lose some of their contrast. However, the arctic is blessed during the dark winter with another way of bringing in color; the aurora borealis, or northern lights. Different colors spread across the sky, filling the long, dark nighttime with a beauty usually only revealed to the far north.\textsuperscript{36} Perhaps this is a way of making up for the long periods of darkness.

The buildings are all on a very small scale, with the tallest being the church located in the center of the city. Everything else seems to be three stories maximum. However, to contrast the small scale of the buildings, the land appears to spread out quite far because of how flat it is. As in the American Midwest, the flatness of the land can make it seem as though it goes on forever. The contrast between the two scales, the intimacy of the buildings and the immensity of the landscape, is very powerful and poetic. As a result, the whole community seems very open spatially.\textsuperscript{37}
The Koppen Climate Classification was created in 1884 by the climatologist Wladimir Köppen. It is sometimes referred to as the Koppen-Geiger Classification because after it was published it was updated with the help of Rudolph Gieger, a German climatologist. The boundaries for this system are defined by the vegetation, as Koppen “based [it] on the concept that native vegetation is the best expression of climate.” The Koppen-Geiger method combines temperatures and precipitation as well as the seasonality of precipitation in order to define the different groups and subgroups.

Vardø is located in group E: Polar Climates. Group E climates are unique because they have cold summers; their average temperature is below 10°C (50 °F) year-round. Polar Climates actually cover 20% of the Earth, though there are very few towns that fall into this category. Their cold climates result in treeless tundra, glaciers, or a layer of ice that is either permanent or semi-permanent. E can be subdivided into two categories, T (Tundra) and F (Ice Cap). The difference between the two is that T climates have one month per year over 0°C (32 °F), while F climates have none. Because of this, T climates have specialized plants that can grow whereas ice covers the land in F climates, removing the hopes of seeing plants.

Vardø is an ET, along with these other cities: Iqaluit, Nunavut, Canada; Barrow, Alaska; Provideniya, Russia; Grytviken, South Georgia; Nuuk, Greenland; and Longyearbyen, Svalbard.
Figure 23
The Koppen-Geiger Classification Map showing Vardø located in the ET range (Polar Tundra)
Because Vardø is located in the arctic, the angle of the sun is low at all times of the day, year-round. This is caused by the tilt of the Earth’s rotational axis as it revolves around the sun.

“In a mid-latitude summer the sun is high enough above the horizon each day that its main impact occurs on horizontal surfaces—flat roofs, parking lots, and beaches. At high latitudes the angle of incoming sunlight remains low, so low that the sun’s main impact occurs on vertical surfaces—walls and windows. But the low angle means that sunlight has to travel a longer distance through the energy-absorbing atmosphere.”

This means that the light from the sun is weaker when it reaches a surface in the arctic than it is in a mid-latitude area. At low latitudes, where the sunlight travels through the smallest area of atmosphere and is therefore the strongest, the solar shading strategy is to block the sunlight year-round. At mid-latitudes where the solar radiation varies with seasons, the goal for shading is to filter sunlight when it is strongest and letting it through when weakest. But in high latitude areas, “where sunlight is weak or nonexistent much of the year, it must be captured and focused by vertical surfaces to provide a thermal comfort zone for people working or playing near a building.”

---

**Figure 25**

Climate charts for Vardø
Each season in the arctic is marked by specific changes in light and temperature. January 19th heralds the return of sunlight each year for Vardø. Each day it rises slightly higher in the sky until May 14th, when it is above the horizon continuously until the end of July. In the spring the snow and ice start to melt little by little. June starts the summer in the arctic, which is noticeable by the sudden increase in water in rivers, which after being frozen most of the winter, are now flowing quickly; they can even become difficult, if not impossible, to cross. Along with the increase in water in rivers, the ground also becomes saturated, making travel across the ground more difficult. Extreme amounts of moisture are released into the atmosphere, making the days foggier. Plants start to emerge from the ground. The midnight sun ends on July 29th as the days gradually become shorter. Fall in the arctic brings frequent days of rain- and snow- storms and the rivers once again start to freeze as the cold nights get longer. Fall's storms become unending as winter is ushered into the arctic with “increasing darkness... Snowfall through the winter is usually low, and many areas receive less than a metre in total”.

After a period of constant darkness in the winter, the arctic experiences an extended interval of twilight before the sun fully rises in the sky in the spring. This is followed by the twenty-four hour sunlight in the summer, called the midnight sun. Because the sun's rays are curved the midnight sun lasts longer than the polar night—people are actually able to see the light from the sun when it is below the horizon.

Weather in the arctic is not consistent across all of the northern part of the world; it varies depending on the location. However, there are general weather conditions that relate to much of the arctic. During the midnight sun, temperatures are often in the double figures on sunny days. In the polar night (when there is no sun), temperatures can reach -40° C or even lower. There is a condition known as a “white out” which is extremely dangerous. The wind gathers speed and blows snow in every direction, disorienting people very easily. It is hard to distinguish up from down and people have been known to walk over a cliff to their death without being aware.
The abundance of snow and ice in the arctic makes the warmer weather associated with global warming even more distressing than in other areas. In a vegetated location the ground absorbs the sun's rays, but in polar regions the sun's rays are reflected off of the white surfaces causing a faster melt. If the polar ice were to melt permanently, the ocean would be a darker color and would absorb the heat of the sun, causing the water to warm at an even faster rate.

What land in the arctic isn't covered by ice is still controlled by frost action; temperatures below zero degrees for much of the year mean that the ground is frozen to extreme depths in many areas. The very top surface of the ground in most arctic areas, known as the 'active layer', ranges from eighteen inches to six feet depending on the location, and thaws each summer. The layer of soil and bedrock below this, sometimes greater than 3000 feet deep stays permanently frozen because it has stayed below zero degrees for a number of years: permafrost. This makes construction difficult because disturbing it can destabilize the soil and therefore any foundations built into it are no longer structurally sound. If cars, buildings, heat, shade, etc. affect the stability of the active layer of permafrost when it is thawed, the qualities of the soil can change depending on its composition. Transfer of heat from buildings to the ground, causing thawing, is another issue; to stop this, buildings are often built up on wooden piles in the arctic. This strategy also requires that utilities like water and sewage be seriously insulated and kept above ground.

The arctic region is something unto itself—there is no other area in the world similar to it. The climate, the geography, the plants and animals, the natural phenomena, and the many different forms of ice that have made it so unique are discussed in depth in Islands of the Arctic by Julian Dowdeswell and Michael Hambrey. The book is a comprehensive guide to the arctic.

It is critical to successfully design buildings in northern climates in a way that understands the unique site and climate conditions and also their social and cultural ramifications. There are many aspects of design that are not necessary to take into consideration for mid-latitude construction.
There are aspects of northern terrain that differ greatly from a mid-latitudinal environment, which as a result must be treated differently. Spring melt, glaciers, and permafrost need to be taken into consideration. These occurrences affect buildings in ways that people uneducated in arctic construction would not be aware of. For example, permafrost causes problems for building foundations because in warmer weather ice in the soil thaws and the volume shrinks. This movement of the ground and the permafrost table can cause foundations to shift and settle.\textsuperscript{49}

One of the aspects of northern life that makes it so challenging is sunlight. Though the sun is up in the summer, the sun angle is still too low to make much of a difference; the average angle for June is only forty degrees, while in Cincinnati at that time the sun is angled around seventy-three degrees. This explains why the heating season in high latitudes never ends. When wind, rain, and snow are added into these already cold temperatures, it makes for a rather miserable climate.\textsuperscript{50}

All of these natural processes also have an affect on buildings: wind causes pressure on buildings as well as creating snowdrifts. Rain and snow infiltrate any openings in a building and abrade exposed materials. Humidity is a concern for construction in this climate that most people wouldn't realize is an issue. Architects must control all phases of water in their design, not only to keep it out of the building but also to ensure the strength of the building materials used; too much moisture can cause rot while too little can cause cracking. It is important for a person designing in high latitudes to understand these principles and to use that knowledge to create a building that works in its environment.\textsuperscript{51}

An excellent resource for architects designing something in the arctic climate is the book \textit{Bare Poles}, by Harold Strub. It covers climate issues like sunlight, temperature, wind, precipitation, and humidity and how these forces affect the design and construction of buildings in the far north. Through the incorporation of images, drawings, diagrams, and charts, a novice in extreme design can gain an unbeatable knowledge base on the topic.
Based on the suggestions for this climate zone given by Climate Consultant, a climate analysis software, the design project will:

1. Face away from the polar wind
2. Keep the building small (right-sized) with multiple stories because excessive floor area wastes heating and cooling energy (minimize surface to volume ratio)
3. Snug floorplan with central heat source and roof pitched for wind protection
4. Steep pitched roofs, vented to the exterior with a well insulated ceiling below (sheds rain or snow, prevents ice dams)
5. Use vestibule entries (air locks) to minimize infiltration and eliminate drafts
6. Locate storage areas on the side of the building facing the coldest wind to help insulate
7. Sunny wind-protected outdoor spaces can extend living areas in cool weather
8. High performance glazing on all orientations should prove cost effective (Low-E, insulated frames) in hot clear summers or dark overcast winters
9. Tiles or slate or a stone-faced fireplace can help store winter daytime solar gain and summer nighttime “coolth”
10. Organize floorplan so low sun penetrates into daytime use spaces with specific functions that coincide with solar orientation
11. Windows can be unshaded and face in any direction because any passive solar gain is a benefit, and there is little danger of overheating
Figure 26
Sun path chart showing the angle of the sun between February and June. Notice that the angle is very low.

Figure 27
Sun path chart showing the angle of the sun between June and October. Even in the height of summer, the sun is never above 43°.

Figure 28
Wind rose for Vardø in the autumn. Average wind speed is 6.6 m/s

Figure 29
Wind rose for Vardø in the winter. Average wind speed is 9.4 m/s

Figure 30
Wind rose for Vardø in the spring. Average wind speed is 7.7 m/s

Figure 31
Wind rose for Vardø in the summer. Average wind speed is 5.0 m/s
Figure 32
This chart shows when Vardø experiences total darkness. For fifty-six days there is no sun. It is interesting to see how quickly the island loses and gains sunlight in the fall and spring.

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erosion and/or flooding

strongest winds

**Figure 33**
This diagram shows areas where erosion could be an issue in the future and also in which direction the strongest winds come from annually.

**Figure 34**
Wind rose for Vardo based on yearly averages. Wind speed averages at 6.9 m/s.


Strub, 41-42


Dowdeswell, 56-60

Dowdeswell, 60

Dowdeswell, 60-62

Dowdeswell, 72

Dowdeswell, 144-145

Strub, 71

Strub, 113

Strub, 41-42

Strub, 53-57

ECOSYSTEM

tundra [tuhn-druh]
n. A level or rolling treeless plain that is characteristic of arctic and subarctic regions, consists of black mucky soil with a permanently frozen subsoil, and has a dominant vegetation of mosses, lichens, herbs, and dwarf shrubs. Merriam-Webster Dictionary

Tundra is a harsh environment; these areas receive little energy from the sun, are located atop permafrost, receive little snow or rain, and must withstand strong winds. Because of all this, there are relatively few plants, animals, and birds that can survive here. Plants that usually grow in the tundra are cotton grass, sedge, and dwarf heath, mosses, and lichens. By adapting to the wind and soil disruption, and being able to photosynthesize in a cold climate with long periods of very weak daylight, these plants can survive in the tundra.53

Amazingly, though Vardø is located above the tree line, a few trees have grown here over the years. In 1960, the town planted seven Rowan trees (which are not native to the area), only one of which survived.54 Each winter the Rowan was covered by the townspeople to protect it from both the wind and the sea salt. Then each June would bring a celebration when the school children unpacked the tree. Twice, in 1974 and 1981, the Rowan even managed to bloom in this cold climate.55 The original tree did eventually die in 2002, but two have been planted at the Vardøhus Fortress to replace it.56

Figure 35
Map of the tundra region

Figure 36
Norway’s land area by cover
- Mountain and plateau
- Forests
- Freshwater and glaciers
- Agriculture
- Marsh/wetland
- Built-up area
The cold climate of tundras also limits the number of animal species that can survive here. "Musk-ox, caribou, and reindeer are the dominant large grazers, feeding on grass, sedge, lichen, and willow. Arctic hare, or snowshoe rabbit, and lemming feed on grass and sedge. Predators include the wolf, artic fox, and snow owl. Polar bears, and sometimes brown bears are seen". Whether or not all of these animals exist in Vardø is unknown, but these are the species typical to the climate. Many of these animals do not stay active during the cold winter; they hibernate, migrate, or go underground. One of the most common mammals found in Finnmark (Vardø's county) is the reindeer. Reindeer were domesticated in northern Eurasia about two millennia ago from wild fell deer and are still herded in many of those areas. The reindeer are able to survive in the tundra so well because they have adapted to the conditions of the cold climate. Reindeer hair creates insulation for them by trapping air, and also helps to keep them buoyant in water.

Vardø is located on the Barents Sea, which is bordered on the south by the Scandinavian countries and Russia, the north by Svalbard, the west by the Norwegian Sea and the east by some Russian islands. This sea is a great place to find herring, capelin and cod, which swim to the coast of Norway each year to spawn. Other fish that spawn in the same general area are Haddock, redfish, Greenland halibut, char, grayling, trout, and salmon. Because there are so many fish in this area, they ensure a heavy crop of seabirds each year. One of the best places to see the birds is on Hornoya Island, a ten-minute boat trip from Vardø. Some of the species found here are puffin, kittiwake, seagulls, razorbills, arctic razorbills, cormorant, and eider duck, along with many others. These birds and Hornoya Island are another large tourist draw for the area, as most of these species can't be found anywhere else nearby and there are daily boat trips from Vardø to Hornoya in the summer.
PERMAFROST
GROUND IS PERMANENTLY FROZEN
LIFE FORMS (IF ANY) PROBABLY DORMANT

WATER-SATURATED GROUND -- SMALL SHALLOW LAKES

NEMATODES
BACTERIA

TINY FLOWERING PLANTS
GRASSES
SEDGES

PRIMARY PRODUCERS -- 4” OR LESS IN HEIGHT

PRIMARY CONSUMERS
MUSK OXEN
INSECTS
LEMMINGS
VOLES
HARES

TINY FLOWERING PLANTS
GRASSES
SEDGES

MUSK OXEN
INSECTS
LEMMINGS
VOLES
HARES

SNOOT OWL
ARCTIC FOX
BROWN BEAR
WOLVES

Figure 37
Diagram showing the plants and animals typical to tundra

Figure 38
Vegetation greenness chart showing values for the percentage of a given area that is generally covered by dense green vegetation in Vardo


56 “Vardo.”

57 Thurston High School


"We can never get a re-creation of community and heal our society without giving our citizens a sense of belonging."

Patch Adams

People living in or around Vardø, Norway will make up the majority of the users of this project. For this reason, the town of Vardø itself, and also Finnmark County would be proponents of this project since it would help to enrich their area. This building would be valued for both providing activities for the locals to take part in that would promote physical and social fulfillment as well as bringing interesting architecture into the area (and in turn tourists). From a survey of similar towns’ posted mission statements, it is reasonable to assume that Vardø’s would reflect a desire to sustain and enhance community character; economic viability/sustainability; natural resources; transportation; housing; cultural resources; recreational resources; educational and government institutions; population; and the built environment. By making the project a community space, it will serve a large group of people and many organizations would support its design and construction. More detail on the specific user groups and activities is given in the program section.

Though in essence my building will be a type of community center for the town of Vardø and its people, I am also interested in making it a place that tourists visiting the area can use and will be attracted to. Although the main focus is on creating a space for socialization in the community as a way of lessening the effects of seasonal affective disorder on the inhabitants of Vardø, it should also act as a bridge between the Norwegian culture and that of the tourist; introducing visitors to new interests and traditions. When in Scandinavia, my class took part in several activities that were traditionally Scandinavian; saunas, kayaking, etc. Those memories made Norway, Sweden, Finland, and Denmark seem more real and not just one more stop on a planned route. It helped me to learn more about and to respect the culture in which I was just a visitor.
As one of the most rapidly growing industries today, tourism is important for any country. Norway, because it is one of the most isolated countries in Western Europe, has been working on ways of increasing the number of international tourists visiting. The strategy developed by the Norwegian government states that “Norwegian nature and people in nature shall form the basis for highlighting Norway and marketing the country to prospective tourists”. Norway has a unique geography that is relatively untouched because of its inherent structure; between the fjords, mountains, the coastline, and arctic Norway, this country has a lot to offer geographically that can’t be found elsewhere.

Currently Norway is in the process of designing the National Tourist Routes, a collection of scenic roads in which to view the natural beauty of the country. These roads are accented with iconic architecture as another way of drawing tourists into the country. “Enhancing the experience of nature and the atmosphere of each location is of key importance in [the] planning and implementation” of both the architecture and the routes themselves.

Vardo’s location at the end of the Varanger Route of the National Tourist Routes and in the very northern part of the country (the only Norwegian mainland town in the arctic circle) makes it a prime spot for tourism. The Norwegian Public Roads Administration (NPRA), the group behind the whole tourism project, helped to fund Peter Zumthor’s Steilneset Memorial to the Victims of the Witch Trials that is also located in Vardo. By adding architectural significance to the town it would create a larger draw for tourism, which would in turn bring people across almost the entire country of Norway. As with the national tourist route, the intention of the community center in relation to tourism is “to offer a total … product that provides the itinerant tourist with not only the tourist attraction itself but also service and other high-quality content-rich experiences and activities”.
Travelling along major routes in the United States is often boring and uninspiring. To the left, lanes of traffic with cars driving in the opposite direction fill the view, and to the right are often monotonously repetitive fields. Exits off of the road are exploited by fast-food chains, cheap motels, and competing signs advertising them. The focus of these roads is in getting from one place to the next in the least amount of time possible with few distractions. The Norwegian Public Roads Administration, however, wishes to change the way a person interacts with the road along which they are driving. Through highlighting the unique landscape that composes Norway and creating opportunities for tourists to interact with it, the NPRA expects to create an experience for travelers totally different than that found elsewhere. The architecture along these routes, therefore, must enhance the landscape without taking away from it.

Each site along the route has a history, a context that is integrated into the architectural narrative. The Norwegian Public Roads Administrations has stressed that the architecture on these routes is not meant to act as an isolated building that has no connection to its location; it is supposed to analyze the history of the site and incorporate it somehow into the story being told. An example of this along the National Tourist Route is in the industrial town of Sauda in Southern Norway, between Bergen and Stavanger. Sauda developed as a result of the first mining ventures that took place at the Allmannajuvet gorge nearby, and therefore the architecture of this site tells a story about not only the countryside surrounding it but also “the town’s history and use of natural resources”.

Because the majority of the funding for this design will be coming from the Norwegian Public Roads Administration for the National Tourist Routes, there are going to be guidelines that need to be followed regarding site, context, program, etc. However, these are well documented in *Detour: Architecture and Design along 18 National Tourist Routes* and are all understandable given the terms of the project as discussed above.
LANDSCAPES ALONG THE NATIONAL TOURIST ROUTES

Figure 47
Varanger Route
Vardø is the island in the distance

Figure 48
Lofoten Route

Figure 49
Havøysund Route

Figure 50
Rondane Route

Figure 51
Atlanterhavsvegen Route

Figure 52
Varanger Route

Figure 53
Heigelandskysten Route

Figure 54
Valdresflye Route
“Town of Breckenridge”


Berre, 8

Berre, 9

Berre, 9

Berre, 21
The primary building-type precedent for this project is the Inuit kashim. During the highly social winter season, the Inuit people spent a lot of time in their kashim, a gathering space for the community. Traditional kashims were “used to shelter a wide variety of activities, including competitive games, singing, dancing, feasting, and shamanic performances”. The kashim is a relevant building type because people in Vardø go through the same cycle of daylight and darkness that the Inuit people did. Perhaps through incorporating a cycle of social activity that responds to this cycle of lighting, or lack thereof, a balance can be struck in the community that mitigates the effect of prolonged darkness on the human psyche.

The concept of “community centers” was largely started by activists in developing cities who wished to use school buildings after hours. One of the best-documented early examples of a community center is in Rochester, New York, started in 1907 and headed by a local Presbyterian minister, Edward J. Ward. He helped to organize a national conference in 1911 “on schools as social centers in which centers were endorsed as agencies of reform”. This conference was so influential that less than a decade later there were community centers in 107 cities.
In England at about the same time there was a movement focused on creating community centers that generated opportunities for different social classes to interact. A British organization in the late 1940’s, the National Council of Social Service (NCSS), defined community centers in the most influential terms to date:

“A Community Centre may be defined as a building which (1) serves a community organized in an association which is responsible for the management of the building; and (2) provides facilities for the development of the recreational, cultural and personal welfare of members of that community; and (3) constitutes a meeting place for voluntary organizations or other groups in the community which need accommodation. A community Association may be defined as a voluntary association of neighbours democratically organized within a geographical area which constitutes a natural community, who have come together either as members of existing organizations or as individuals, or in both capacities, to provide for themselves and their community the services which the neighbourhood requires”.

Though the mission foci of community centers have changed over the years, what with the social service aspect losing some importance to educational functions, community centers are still a vital aspect of social life in many areas. In non-arctic communities, the best-known community center precedent is the YMCA, which currently has centers in 125 countries with a total of over 45 million members. The YMCA organization focuses on youth development, healthy living, and social responsibility; to “enable kids to realize their potential, prepare teens for college, offer ways for families to have fun together, empower people to be healthier in spirit, mind and body, prepare people for employment, welcome and embrace newcomers and help foster a nationwide service ethic”.

Though a lot of these same concepts can be transferred to a community center in Vardø, there are obviously cultural differences that would be reflected in the program and design of such a building in Norway.


“Architecture is the learned game, correct and magnificent, of forms assembled in the light”
Le Corbusier

Light is an intrinsic part of our life; every day starts with the rising of the sun and ends when the sun once again lowers past our vision. Though this is true in most parts of the United States, it is not true in arctic regions. For this reason, it is even more important to incorporate lighting into everyday life in these regions. The book *Light Perspectives, Between Culture and Technology*, the six editors discuss the many characteristics of light that enable it to create different atmospheres or feelings in people that occupy spaces; diffuse vs. directed light, warm vs. cold light, radiance vs. illumination, brilliance vs. glare, and natural vs. artificial light.

Diffuse and directed light evoke entirely different experiences in a space. If the designer wants a space to be evenly lit with very few shadows, diffused lighting is the solution. It creates an even glow through a space without giving a sense of hierarchy to any particular object. Directed light on the other hand has a definite sense of hierarchy; one particular aspect is highlighted while its surroundings are cast in shadow. There are also instances when diffuse and directed light are used together, often in museum lighting. This allows for a less drastic highlight of certain objects while creating much softer shadows.71 “Objects can be subtly emphasized and shadow can bring out their three-dimensionality without creating a false tension via excessive light-dark contrasts”.72

When light and color are used together, there is a perceived temperature of a space; reddish tones create a sense of warmth, while blue-green tones appear cool. The color of a room is one of the most important choices a designer must make when creating an atmosphere for the space. This one decision can make a space range from cool and business-
like to warm and cozy with infinite variations in between. Not only does this choice affect the way a space appears, it also alters the way materials look, both on the interior and exterior of a building. During the course of a day materials can change from appearing cool in tone to warm as the sun changes from directly overhead at noon to setting at twilight.73

In general, there are two main types of architectural lighting, natural and artificial. Natural lighting is interesting in itself because it changes throughout the day. “The versatility of daylight with its constantly changing direction of light, changing color of light as well as the change from diffuse to directed light continuously reveals the space in a new way”74 Artificial lighting is used because it is more flexible than daylight; it is available night and day and can be used to illuminate spaces that sunlight cannot reach. Until recently artificial lighting was designed to imitate daylight. Lately, however, it has been used to create effects that natural lighting is incapable of. In fact, some cities today are more recognizable at night than during the day because their aesthetic appeal is in their use of electric lights. This is true of Las Vegas and Tokyo, or of course Times Square or Piccadilly, among others.75

Architectural lighting is also able to express social relationships - the difference between public and private spaces. Public spaces generally must have a high enough level of lighting to allow the widest range of people to use the space comfortably. In contrast, in the private sphere lighting can be designed to create whichever mood the user would like in any particular space. “The private focus is on exclusivity, whereas the public orientation strives towards comprehensive inclusion”.76 A reading space in a public building would be lit very differently than a reading space in a private building. This is to ensure that all users of those particular spaces are as comfortable as possible doing their task.77

All of the topics discussed here will be important to consider when designing in the arctic, but the warmth of color, distinguishing between public and private spaces, and natural and artificial lighting will be especially significant in the arctic climate.

72  Karcher, 28

73  Karcher, 36-37

74  Karcher, 76

75  Karcher, 70-71

76  Karcher, 172

77  Karcher, 172-173
The following are projects that have inspired my design process, whether through location, building type, materiality, or some other quality.
The Svalbard Science Centre, designed by Jarmund/Vigsnaes Architects (JV A), is located at 78 degrees north latitude on the island of Svalbard, halfway between Norway and the North Pole. Besides functioning as a museum, it also houses the University Centre in Svalbard (UNIS), the Norwegian Polar Institute, and the Governor of Svalbard. Using computational fluid dynamics (3D computer simulations) the form of the building was designed in a way that made it aerodynamic, allowing no snow to collect on any part of the building. Through the incorporation of angled facades, experimenting with entrance locations, and playing with the roof form, JV A was able to remove the threat of snowdrifts in specific areas (windows, the roof in certain areas, etc.). To prevent thermal bridging, the majority of the structure is prefabricated timber. This is then enclosed in an insulated copper-clad skin that creates the fluid shape of the building. The entire structure is raised off of the ground to protect the permafrost and to create a gap underneath the structure in which wind and snow can flow.

Because of the varying amounts of daylight in different seasons, the intention for the interior of the building was to create an “interior campus” with warm-toned pine spaces. This is supplemented by bold colors to give users the idea of a bright, airy, open space.

Any building located in an arctic or subarctic climate will most likely have to deal with the same issues JV A responded to. Depending on the site chosen, wind will be a concern, making wind studies on the form a viable way to shape the building. As discussed before, permafrost is a serious issue in most of the Arctic Circle and will require the majority of buildings to be raised from the ground. Another laudable aspect of JV A's design that other designers should take notice of is their ambition for the Science Center interiors "to make it easier to endure the two-month-long polar night". JV A's interior aesthetic of a welcoming, warm, almost daytime-like appearance in their building through the use of color and warm-toned woods is a desirable interior treatment for a climate that is so often imbued in the cold blue tones of the polar night. If other buildings in comparable conditions adopted a similar interior treatment, perhaps it would help to create more welcoming spaces, no matter the season of the year.
Figure 55
Wall section through the sloped window. Shows possible details for arctic insulation and glazing.

Figure 56
Exterior perspective showing the form angled for aerodynamics. Visible window in the roof to make usable daylight interior spaces.

Figure 57
The interior of the building is very open and warm to invite people out of the cold.

Figure 58
Pine and colors are used to create bright spaces. Artificial lighting is used in the absence of daylight.
John Tizya Visitors Center
Kobayashi + Zedda Architects
Old Crow, Yukon Territory

Kobayashi + Zedda Architects is a firm based in Whitehorse, Canada that focuses on architecture suited to the Yukon Territory. The visitor’s center they designed, located at 67 degrees latitude, shares some of the same design concepts as the Svalbard Science Centre. The building is oriented to make the most of southern solar exposure, it slopes to protect itself from the strong northeasterly winds, and it is raised off of the ground to maintain the stability of the permafrost soil. On the south façade of the building, where there are many windows to bring in natural light, some of the overhangs have been replaced with solar cells to provide for up to seven percent of the building’s electrical usage. In order to minimize the amount of materials that needed to be flown to the site (there is no road access), the design of the building was simple, which also allowed Kobayashi + Zedda to ensure as many jobs as possible to local workers. The building is composed of structural insulated-panels (SIPs), which are covered on the exterior with horizontal cement board and corrugated steel siding. Though it may not be the most interesting building, it is an excellent example of architecture that is responsible in its interaction with the environment.

Figure 59
The Visitor’s Centre in Old Crow was designed to use local labor and materials that could fit inside of the plane that would be used to transport them to the site.
Saunders and Wilhelmsen designed the Aurland Lookout, located atop one of the largest fjords in Norway, with one thing in mind at all times, “nature first and architecture second”. The intention behind the design was to create something that didn’t interfere with the stunning beauty onsite; it would be easy to mar the landscape with architecture, but much, much harder to actually highlight it. To create a new experience for the user, Saunders forced them out from the mountain and created a new, dramatic horizon. At the end of the four-meter-wide pine “bridge” is a slanted piece of glass that allows the user to actually look straight down, 600 meters, into the Fjord below. Up the road a bit is the parking location and separate restrooms for the lookout, the purposeful separation between the different programmatic functions was to reinforce the solitude and natural beauty of the landscape.
Flydalsjuvet Rasteplass
3rw arkitekter
Geiranger, Norway

The Flydalsjuvet Rasteplass is located on one of the mountains surrounding the Geiranger Fjord. An old timber farm building that was several centuries old and in poor condition was used to build the restrooms. The timbers were taken to local craftsmen who repaired the old, partially rotten wood using traditional methods. These logs were then layered above structural glass that allows daylight in at the floor level of the restrooms. By designing the rest stop in this manner, 3rw was able to preserve and display some of the traditional Norwegian construction methods while creating a restroom that is beautiful both inside and out. Down from the restrooms on the lower plateau, the “Fjordsetet” or Fjord Seat (Figure 64), is an installation that was given to Queen Sonja in 2003.
Viewpoint Askvågen
3rw arkitekter
Atlantershavsvieien, Møre Og Romsdal, Norway

Viewpoint Askvågen is located on an existing pier in the Atlantic Ocean, overlooking several islands that used to house fishing villages. Composed on a large slab of local Visstallitt stone, the architecture is very simple. A glass balustrade connects into the Visstallitt stone itself to provide safe access out over the water. The Cor-ten steel stairs that lead up to the stone landing are directly anchored into one of the existing boulders on the pier. It was intended by 3rw that this viewpoint would show people the change in culture Norway is currently undergoing; “from food-providing, fishery based societies to service minded, adventure-providing ones. A transformation which is affecting and increasing number of coastal communities in the region.”

Figure 66
View of the lookout as it is approached.

Figure 67
The steel stairs are connected directly into the rock adjacent to them.

Figure 68
The glass handrail around the lookout connects directly to the stone floor allowing visitors to see the structure from the outside.
Material similarities between the three National Tourist Routes precedents.

**ASKVÅGEN**

- glass plates
- visstallitt stone
- concrete foundation
- cor-ten steel

**FLYDALSJUVET**

- refurbished timber
- structural glass
- glass

**AURLAND**

- glass
- wood laminate cladding
- structural steel

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**Figure 69**

Sketches showing some of the connection details and different materials used in the construction of Viewpoint Askvågen.

**Figure 70**

Sketches showing some of the connection details and materials used in the Flydalsjuvet Rasteplass.

**Figure 71**

Elevation and structural drawings with material callouts for the Aurland Lookout.
Similar responses to the site and program for the three National Tourist Routes precedents.

Visual separation between parking and architecture to keep the lookout immersed in the landscape.

Multiple views along the site, not just focused on one thing in particular.

Focus of views both up and down and in all directions. The lookouts celebrate that the natural beauty of each site is in every direction.

Figure 72
Diagrams showing how all three of the pieces of architecture on the National Tourist Route have similar responses to organization and views.
Steilneset Memorial
Peter Zumthor and Louise Bourgeois
Vardø, Norway

As previously mentioned, Vardø is the site where almost 100 people were burned at the stake in the 1600s during the witch trials. Chosen specifically for this project was the collaborative team of Peter Zumthor and Louise Bourgeois, who the town of Vardø hoped would create a memorial “to remind us of the ongoing danger of collectively creating scapegoats.” The building designed by Zumthor acquired its form from fish drying racks that are located all along the coast of Vardø. Wrapped in a tensile fabric, the building is scarcely warmer than outside, and users can feel and hear the wind pushing against the building, which creates an eerie atmosphere. Inside the building, a small window was made for each person that was killed, and in each window hangs a single light bulb.

Adjacent to Zumthor’s building is the dark glass cube that holds Bourgeois’s piece de resistance, an aluminum chair spouting fire and surrounded by circular mirrors, “like judges circling the condemned.” Both buildings are powerful and provocative.

Figure 73
View of both Zumthor’s and Bourgeois’s contribution to the memorial.

Figure 74
These are the fish drying racks that inspired the form Zumthor used for the building.
Figure 75
The fabric material for the facade had to be heavily reinforced to withstand snow and wind loads.

Figure 76
Interior of the exhibit

Figure 77
Bourgeois's flaming chair

Figure 78
The mirrors reflect the flames and act as judges.

Figure 79
Perspective view showing the wooden structure of the building.
Floating Sauna
Casagrande & Rintala with Västlands Kunstkademiet
Rosendal Village, Hardangerfjord, Norway

The floating sauna is a design-build project that was taken on by Casagrande and Rintala, along with students of the Västlands Kunstkademie in Bergen. It was constructed over an eleven-day period in September of 2002. Floating in the Hardangerfjord, the sauna is accessible to people of Rosendal only by boat (or if you choose to swim to it). The beauty of this project is that the plunge pool for the sauna is the fjord itself, and swimming up through one of the two holes in the floor is the entrance. At night, the sauna, which is constructed of pine and translucent plastic, shines like a beacon to the town of Rosendal when in use. This project is only possible because of the Gulf Stream current warming the water.
Gleneagles Community Center
Patkau
West Vancouver, British Columbia

Patkau took an interesting approach when designing the Gleneagles Community Center by arranging everything to one side of the three-level gymnasium. Not only does this allow a direction connection between the gym and the outdoors, but the full wall of glazing separating the gymnasium from the rest of the program creates the opportunity for numerous visual connections in the space. While eating or working in the café upstairs, a parent can watch their child playing one level down. While on a treadmill, they can still watch from two levels above. This serves dual purposes; it allows for different age groups to be active from different locations, but it also imbues the whole space with the idea of fun and fitness. “These simultaneous views of multiple activities animate the interior; the life of the building and the energy of the place are palpable”92 which convinces bystanders to join in.

Figure 82
Interior of the gymnasium. From most rooms in the building parents can watch their children playing.

Figure 83
A picture inside the café showing the view into the gymnasium.
The Marion Cultural Centre
ARM (Ashton Raggatt McDougall)
Marion, Australia

The Cultural Centre meets the functional needs of the community (3,600 people) through the provision of a library, art gallery, a multi-function performance space, café and meeting rooms.

1. Theatre- Can seat as many as 280 people and is used for theater, music, “product launches, banquets, film screenings, seminars, meetings and conferences”.

2. Meeting Rooms- Two rooms used for meetings that no more than 50 people. The rooms incorporate any audio or visual equipment necessary for the average meeting.

3. Library- Open every day, has “Internet PC Access, Visitor and Tourism Information Service, Imaging Service, Large print editions, Magazines, Videos, DVD’s, CD’s”.

4. Café- Open daily for light fare and can provide catering for events in the Centre.

5. Gallery M- 215’ of hanging space used for both “local and touring art exhibitions” as well as other activities. The gallery shop sells locally made arts and crafts.

Events- “The Marion Cultural Centre hosts a number events regularly including Matinee and Cabaret performances, School Holiday performances, Author Talks and Special Events”.

Figure 84
Plan that shows where each of the programmatic areas is located inside the Cultural Centre.

Figure 85
Exterior of the building.

Figure 86
Birdseye view from inside the cafe. The bright colors help to make the large space inviting.
The House of Culture and Movement contains seven “zones” that are divided based on what will be done in each. Each zone has been given a color and form that has been derived from “the character and expression... inspired by the nature of the activities they will contain”. Each of the zones fits into rectangular box with the voids between the zones becoming both circulation and the “Play Zone”.

1. Think Zone- Information Searching, Periodicals, Multimedia Art Installations/Exhibitions, Lectures, Computers

2. Zen Zone- Meditation, Yoga, Pilates, Tai Chi

3. Pulse Zone- Martial Arts, Aerobics, Dance, Cross Fitness, Trampoline, Running, Biking

4. Play Zone- Playground, Wii, Climbing, Transitions between Zones

5. Food Zone- Cafe, Kitchen, Herb Garden, Cooking Classes, Take Away, Reception

6. Health Zone- Health Check, Discussion, Physical Therapy

7. Performance Zone- Concerts, Plays, Performances, Lectures, Films, Dance, Poetry Readings, Exhibitions, Installations

Figure 87
Exterior rendering of the proposed building.
Figure 88
Rendering of the Think Zone

Figure 89
Rendering of the Zen Zone

Figure 90
Rendering of the Pulse Zone

Figure 91
Rendering of the Play Zone

Figure 92
Rendering of the Food Zone

Figure 93
Rendering of the Health Zone

Figure 94
Rendering of the Performance Zone

Figure 95
Proposed Floor Plan showing how the different Zones are separated inside the building.
Sports and Leisure Center
KOZ Architectes
Saint-Cloud, France

The Sports and Leisure Centre in Saint-Cloud, France is a bright, simple building that does not match the rows of traditional Parisian-style single family homes surrounding it. Composed of colorful glass panels ranging from green to red, the building brings to mind childhood and fun. Both the interior and exterior use a form of color-coding to let the children know which spaces serve which function as a way of orienting themselves. On the interior, circulation spaces become wider than necessary in the hopes that users come up with other ways to take advantage of them; be it for performances, games, or even just running.

Figure 96
View of the exterior during the day showing the colored panels of glass.

Figure 97
At night, lights inside the building make the colored glass look like different colored beacons.

Figure 98
Bright colors are used on the interior and exterior to define different spaces. This is an accessible rooftop kids can play on.

Figure 99
Interior climbing wall room.
The Culinary Loft is a 2,000 square foot space in Soho, New York City with a modern 400-square foot kitchen. Used for both dinner parties and cooking classes, the loft is a very flexible space; it is open and able to be reconfigured to set the desired mood for the event. Up to seventy people can be served in the space at one time, and the highest quality chefs are available if a meal is to be prepared.96

For the most part, I like the flexibility of the space. The fact that it can be very fancy for entertaining or very casual for educational cooking classes appeals to my desire for a flexible “restaurant” space.
Cabin Vardehaugen
Fantastic Norway
Fosen, Norway

Cabin Vardehaugen was designed to create usable exterior spaces on a windy site. “The inspiration was drawn from a good mix of historic, traditional and contemporary ways to give shelter in response to landscapes” said architect Blakstad Haffner. The form of the building was designed to resemble a fox curled up to protect itself from the wind. By placing the building to block the windier directions, Fantastic Norway was able to create an outdoor courtyard that was protected by the building itself.

Especially endearing is the use of white as a demarcation of public space, while the black facade is a place to keep moving, as the wind does across its surfaces. On the most exposed surfaces the black wraps to form the roof to create a fluid surface for the wind to move across. Fantastic Norway decided which aspects would be the most important for the project (views, aerodynamics, public outdoor spaces) and made them all work together.

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**Figure 104**
The building took this form to create exterior spaces that are protected from the wind.

**Figure 105**
Covered exterior spaces are painted to white to reflect the sun and to separate them from the rest of the building.

**Figure 106**
The two separate structures work together to create a protected courtyard.

**Figure 107**
Exterior perspective.

"Wissenschaftszentrum in Longyearbyen”, 1476


Wissenschaftszentrum in Longyearbyen”, 1476


Saieh, Nico, "Aurland"


Stephens, Suzanne.


**Program**

**General Users**
- Park
- Welcome
- Move through space
- Help/directions
- Use bathroom
- Light therapy
- Group classes
  - Yoga
  - Pilates
  - Tai chi
  - Dance
  - Biking
  - Cooking
  - Crafts
- Play
- Prepare food
- Eat food
- Study
- Meet with people
- Sauna
- Performances

**Staff Only**
- Park
- Bring in supplies
- Store things for facility
- Manage
- Clean
- Help visitors
- Lead classes
- Use bathroom
Qualitative Descriptions of summer

- warm
- fun
- sunny
- colorful
- lazy
- freedom
- lovely
- fresh
- lively
- happy
- sizzling
- hopeful
- bright
- breezy
- full
- active
- fun
- cheerful
- blazing
- sweaty
- light
- vibrant
- relaxing
- rejuvenating
- unpredictable
- fearless
- stifling

Figure 108
Summer is the beach, water, hot, and sun

Figure 109
Summer is fun, freedom, and active

Figure 110
Summer is popsicles, refreshing, and bright

Figure 111
Summer is flowers, high contrast, and sun

Figure 112
Summer is sand castles and playing outside

Figure 113
Summer is relaxing, green, and lazy

Figure 114
Summer is pools, swimming, and rejuvenating
As the goal of this project is to create a space that will be used during the contrasting seasons, it is important that the negative qualities of winter not be visible in the design while the positives of summer be highlighted.

Figure 115
Winter is snow, white, blurred horizon

Figure 116
Winter is cold, bundling, and calm

Figure 117
Winter is peaceful, beautiful, and frozen

Figure 118
Winter is sledding, fun, and blustery

Figure 119
Winter is grays, ice, and dormancy

Figure 120
Winter is frozen, inactive, and low-contrast

Qualitative Descriptions of winter
dormant frigid white dreary un-ending dark blustery wet windy bitter arctic frozen sparkly polished gray beautiful harsh blustery calming delicate slow crisp sharp solitary
“Users” and Their Usage

**User**

**Decision to Go**

**Activities, Spaces, & Atmosphere**

**Decision to Return Home**

![Diagram showing how different people could move through the building and the desired atmospheres for each space.](image-url)
Space Number: 001 & 002
Space Name: Multipurpose Room
Number of Occupants (max): 30
Area and Min/Max Dimensions: 750 SF
Ceiling Height: 10'-0"
Activity Description: multi-purpose rooms where classes can be taught (both fitness/recreation as well as arts and crafts). These rooms will not always be in use and can also be rented for parties or other get-togethers
Adjacencies: gym, locker room, storage
Fenestration: Natural Light is best because it is energizing, but because it will be dark part of the year, views should not be highlighted (it would just be black during the winter). Perhaps skylights or clerestories are a better option to bring light into the space.
Floor Finish: Wood Floor
Acoustical: Music will often be played in the space for classes and there will be an instructor so the sound needs to be good for those
Lighting: Electric lighting will have to supplement daylighting for part of the year. Mark Oser, an interior designer that often does home and residential gyms, says, “It's best to use ceiling lighting design to optimize floor space for workout machines and fitness activities, like stretching.” He also says that for a softer light, recessed lights work best. Full-spectrum daylight light bulbs are also the best option because the lighting they provide is not as yellow as most artificial light; they emit a glow closer to daylight.99 Maybe one wall could be translucent and backlit. It is best if at least 500 lux (footcandles) of light is available in areas.100
Other: Some small cubbies would be nice in case the users do not go to the locker room first. Mirrors on walls help people monitor their progress - 2 or three walls of mirrors would be preferable.101 “A ballet bar... 42 inches above the finished floor... 1.5-2 inches in diameter, and... 6 to 7 inches from the wall, should be mounted along one wall for stretching”.102
System and Utility Requirements:
Audio Visual: Both. Music is necessary for fitness classes and a projector to project scenes of spring and summer to immerse the user in the idea of brighter seasons
Ventilation / Exhaust: HVAC controls. Because people are working out, there should be about 10-12 air changes/hour103
Electrical: A few outlets should be at the front and the back for the instructor
Furnishings and Equipment: “Aerobic steps/benches, tubes/bands, and weights. Exercise mats. Drinking fountain - located adjacent to room. Wall clock. Storage space for instructor's platform, stereo system, exercise mats and equipment”.104
Socio-Cultural Character: The space should feel bright, open, and welcoming. There will be a lot of warm colored wood and bright walls, with natural and electric lighting to make the space feel bright.
Space Number: 003  
Space Name: SAD Treatment  
Number of Occupants (max): 30  
Area and Min/Max Dimensions: 800 SF  
Activity Description: This space will be used for people to get treatment from Seasonal Affective Disorder, primarily in the winter. The best time for treatment is in the morning, so I would like these spaces to function as a meeting space/coffee hour where getting treatment seems more like a social activity than a chore.  
Adjacencies: lobby, restaurant, bathrooms  
Fenestration: It would be best if the room does not have windows because they might confuse the body during the winter  
Finishes: warm colors, perhaps a combination of wood and other materials  
Acoustical: Music will be playing inside.  
Lighting: Overhead lighting will light the space sufficiently, but there will be additional lights set up around the room for light therapy. “The amount of light (or intensity) that has been found to be therapeutic ranges between 2,500 and 10,000 lux... Recently, the higher levels of light intensity have been preferred because they are more effective and allow for shorter daily treatments. Fluorescent bulbs are preferable to incandescent ones because they spread the light out over a wide surface area, which is safer and probably more effective.” I would like to incorporate the lights into the design of the space, perhaps by creating a wall that has strips of lights placed into it. Some of the more respected companies that sell these light fixtures are: SunBox Company, Apollo Health, Inc., Bio-Light by Enviro-Med, Bio-Brite, Inc., and Northern Light Technologies.  
Other: The treatment rooms should be set up like living spaces with couches and chairs for people to sit on a socialize. It is not necessary to stare at a light box, but each person does need to be facing the light with his or her eyes open. “Usually, the distance at which the light is active will vary between one and three feet”.  
System and Utility Requirements:  
Audio Visual: Audio; Music will play, televisions should be provided  
Ventilation / Exhaust: 10 air changes/hour  
Electrical: There should be many outlets for lights, television, and computers  
Furnishings and Equipment: As previously mentioned, there should be couches, chairs, and tables to sit thirty people and their light boxes.  
Socio-Cultural Character: This space should advertise socialization as well as therapy. It should be a place for people to meet in the mornings before work and socialize and get light treatment as a healthy way to start their day. It should be a bright and welcoming space with warm colors.
Space Number: 004
Space Name: Community Kitchen
Number of Occupants (max): 40
Area and Min/Max Dimensions: 2,000 SF
Ceiling Height: 12'-0"

Activity Description: This space will be the kitchen for the restaurant. Families in the area will cook each night of the week, though there may also be a specific cook that is hired to work a couple days each week. There will also be cooking classes held in the kitchen, and people can also rent out the space

Adjacencies: lobby, restaurant, bathrooms, storage, entrance (to bring supplies in)

Fenestration: Not necessary

Finishes: Floors need to be non-slip to prevent accidents. The walls should be covered with ceramic tiles, which though are more expensive than high-gloss paint initially, are less expensive in the long run and are easier to keep clean.

Acoustical: The sounds from the kitchen should be muffled to nearby spaces

Lighting: "Every kitchen must be well illuminated to prevent accidents, increase efficiency, facilitate quality control and prevent waste. Fluorescent light fixtures are advisable for their efficiency and cool operating temperatures."

Other: It would be ideal if the kitchen and dining area were partially open to each other. Maybe you can see all of the cooking from the dining area. This allows the people cooking to feel connected with what is going on in the dining area, and since locals will often be cooking this will be desirable.

System and Utility Requirements:

Audio Visual: Audio; Music will play

Ventilation / Exhaust: 10 air changes/hour. "Ventilation is of great importance in any kitchen. It prevents odours from penetrating the dining area and increase the well being of cooks."

Temperature: should be controlled from inside the room

Piped Services: sinks, refrigerator, and dishwasher

Electrical: There should be many outlets for lights, television, and computers

Furnishings and Equipment: There are five kinds of equipment necessary for a kitchen: storage-, preparation-, cooking-, accessory- and service equipment. Storage requires shelving both in the room and also the refrigerator and freezer. Preparation equipment "constitute[s] all equipment employed in food preparation (chopping, dicing, cubing, peeling, slicing, mixing, processing)." Cooking equipment is generally ranges, deep fryers, broilers, salamanders, kettles, ovens, griddles, and frying pans.

Socio-Cultural Character: The kitchen should feel open and the layout must be well designed to make it useful. People should be proud to use the kitchen and to cook for their friends and family.
FOOTNOTES


101 Sheehan, Jan

102 United States, 18

103 United States, 9

104 United States, 19

105 Rosenthal, 118-124

106 Rosenthal, 312-313


108 Berberoglu

109 Berberoglu
For the design of Vardø's community center, the most important aspects are creating gathering spaces, both for large and small groups; using lighting (both daylight and artificial light) to make an inviting space to fight SAD; incorporating vegetation that is unable to grow in this environment; making the space useful during all seasons of the year; and staying true to the culture of Norway.

The form of the community center was derived by taking the footprint of the town, abstracting it, and then manipulating the two volumes to create an inner courtyard protected from the strong arctic winds. The existing courtyard across the street at the town hall has been abandoned in the last decade because of the strong winds that come across the water. By allowing the wind on site to influence this design, the town will have a new central courtyard with little wind movement. As a result of the sun's 360 degree rotation across Vardø's sky each day in the summer, the curved forms of the building will create interesting interior spaces that track the sun's movement through light and shadow. These curves also create a more aerodynamic form, allowing blowing snow to easily move around the building during the winter. Tucked into the courtyard, each entrance into the community center is protected from both wind and snow accumulation.
Most of the buildings in Vardo are two to four floors, rectangular in plan, with a pitched roof. In order to respond to its surroundings, the new community center relates to these existing structures by maintaining the same scale in height and by adapting a more modern representation of the pitched roof. Though similar in those ways, the curved walls and clean lines of the community center will make it obvious that this is a new addition to the town. Protruding from the exterior walls are glass alcoves, which on the interior are large planters. These protrusions and the trees and plants they contain create secondary alcoves for seating and tables. Because only two trees grow in Vardo, the intention behind this space is to create a feeling of utopia, an interior garden with seating meandering throughout where groups can meet, an individual can sit to read, an adult can rest while the children play, etc. No matter the season of the year, these spaces will feel very natural and lively, and will invite interaction.
On the first floor, adjacent to the restaurant, is the Seasonal Affective Disorder Retreat. This room functions as a wellness center, providing a space for those people who are affected by the long periods of darkness to receive treatment. The concept of community light therapy is more beneficial than individual treatment because not only does the light heal, the social interaction also helps to mitigate SAD’s symptoms. Organized like a living room, the retreat’s intent is to create a welcoming room for people to lounge and heal. The focus wall has strips of light incorporated into it that function as a more aesthetic interpretation of the light box. Its location next to the restaurant was purposeful, in that it allows people to grab coffee and a snack next door and then converge in the retreat for light therapy. While this is taking place, the users’ children can be across the courtyard playing in the children’s space, and afterwards both can meet up to go about the rest of the day’s activities.

Figure 125
Collage showing some of the qualities desired in the SAD retreat including the focal wall of lights.
From the second floor of the community center there is a bridge to the outdoors, which connects the building to the sauna located in the harbor. After walking across the bridge and over the road separating the site from the water, stairs lead down to a small, simple sauna. Exterior cubbies provide storage for clothing and belongings, while inside the structure there is only an oven, holes in the floor for the cold plunge, and wooden benches to sit on. The bridge and sauna represent most what the National Tourist Routes is about; architecture, nature, and Norwegian culture. Here, both tourists and natives will be able to experience the very Scandinavian pastime of the sauna.

Hopefully as a result of this new community center, the citizens of Vardø will be able to have a more balance lifestyle year-round. They will now have a place to spend time where they will be surrounded by vegetation, light, color, and activity. In addition, hopefully by bringing more architecture to the town, there will be more for tourists to see and do. In a town with fifty-six days of darkness and a large economic reliance on tourism, these results will have a resounding impact on the lifestyle of Vardø's people.

Figure 126
Diagram of the relationship between the Community Center and the Sauna
BIBLIOGRAPHY


