49TH PARALLEL

SCHOOLS OF ARCHITECTURE CONSORTIUM

VOLUME 1
May 2017

49th PARALLEL
Journal of the 49th Parallel Schools of Architecture Consortium

VOLUME 1

49th Parallel is published annually by the 49th Parallel Schools of Architecture Consortium, on the subjects of architectural education, design, theory, and practice.

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The *49th Parallel* ejournal will be published annually according to a topical theme that is of common interest to the member schools, this theme may guide design studios in the various schools and allow for various scholarly and project-based submissions. *49th Parallel* will publish blind peer-reviewed articles, student work, invited contributions (including articles, interviews, profiles, and reviews), and reprinted material -- these will be clearly distinguished in the structure of the journal. It is intended that each issue will provide an informed and provocative interpretation of the theme. *49th Parallel* will be "open source," freely available to anyone who wishes to view it; it will have a regional focus, but international reach.

The 49th Parallel Schools of Architecture Consortium members are:

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EDITORIAL

Randall Teal
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I recently spent a year teaching and researching in Finland. Over the course of the year I was impressed with the large number and variety of foreign students that came to study in the program; in our studio we had students from Finland, the Czech Republic, Poland, Lithuania, Japan, China, Spain, Portugal, Germany, Italy and France—the European Erasmus program that made this movement possible. When I returned to the US I wondered if it would be possible to create an Erasmus-like program here. I spoke to a number of colleagues at different institutions about this idea, and although there was interest so far nothing that could be seen as analogous has materialized. However, other interesting opportunities and ideas did crop up, the 49th Parallel Schools of Architecture Consortium being one.

Specifically, the *49th Parallel* ejournal arose out of discussions around the ErasmusUSA concept with Graham Livesey. I recall talking to Graham about opportunities for exchange of students and programs, he said something to the effect of I've always thought there should be consortium of architecture schools around the 49th parallel that establishes the border between the US and Canada. Boom. Done. We then moved to mobilize others from the schools of the region, which led to a small conference at the University of Idaho in the Fall 2015, and several online meetings to identify commonalities, meaningful differences, ideas and opportunities.

From these discussions a more informed notion of the consortium arose, that imagined it to be a vehicle for student and faculty interaction, the sharing of knowledge, and a way to bring attention to the region as a place that holds unique and interesting challenges for architecture and design. Particular topics that we thought would be interesting to explore include: vast distances, winter cities, oil boom impacts, unfathomable landscapes, tribal lands, medium-sized urbanism, rural poverty and rangelands in the context of architecture. The first major unified effort of this group is this journal that will highlight topics listed above, work being done in the region by students and faculty, and will ultimately solicit national and international submissions for peer-reviewed content on related issues and ideas. Through the journal we hope to create a dialogue between issues characteristic of this region and parallel issues which manifest in other areas of the world.

In this first edition of the journal we provide a broad overview of some of the topics and schools that are associated with the 49th parallel. We hope that this inaugural offering will serve as a formal introduction of the schools of the 49th parallel to the greater architectural community and initiate speculation about other ways for the schools to collaborate and lead on issues that are unique to the region.

In this first installment we feature three different regional perspectives on architecture: University of Calgary Professor George Melnyk provides a brief history of the architecture of Western Canada and offers some thoughts on how it can be considered unique; University of Idaho Professor Emeritus Wendy McClure brings attention to the questions of changing definitions of prosperity over time as seen in Northwest mining towns; and Montana State Associate Professor Maire O'Neill Conrad examines the Gabriel log barn as an evolutionary study of permanence in the northern Rockies through a combination of drawings and text. Washington State University Associate Professor Ayad Rahmani fictionalizes a brief time during the life of an architecture student. An interview with the former dean at the University of Minnesota Tom Fisher looks into some pressing issues for architectural education. We follow that up with our first in a series of school profiles, this one featuring University of Minnesota. And then the final section highlights the recent student work from Washington State University, the University of Manitoba, Montana State University and the University of Calgary.

On behalf of the 49th Parallel Consortium of Architecture Schools—thanks for joining us!

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Regionalism Redux:
Originality and Architecture in western Canada

George Melnyk
Emeritus Professor, University of Calgary

In 1981 I published a collection of essays titled *Radical Regionalism*. In that collection were two essays that have relevance to the issue of regional architecture in western Canada. One was titled “On Originality” and the other was titled “Douglas Cardinal: Architect of the Spirit.” In the former essay I wrote, “In western Canada those who are seeking to be original in their art are those who are trying to create an indigenous form. The extent to which they are able to generate such a form is the extent to which they can be called original.” By original form I meant a distinct cultural expression or simply style. I went on to say that unless a culture created a distinct style that culture lacked originality and lacking originality it could barely be described as a separate culture. I answered the call to originality in the latter essay on Douglas Cardinal. In it I argued that the then Edmonton-based Alberta architect, Douglas Cardinal, who was of aboriginal background, offered precisely the kind of originality I was writing about. He inaugurated an architectural style that was indigenous because it was based philosophically and visually in aboriginal identities that had evolved in western Canada for thousands of years. His development of curvi-linear design and emphasis on circular patterns was meant to convey First Nations traditions and worldviews about existence. No other architect in western Canada had created such a vision. He had created an original form, which gave western Canada a claim, of sorts, to distinctness as a culture. I say “of sorts” because his vision was not rooted in the settler culture that dominated the region, but in its oppressed minority, the original inhabitants of the region. So his work came to be read as an expression of that particular group, of his own cultural origins, rather than a reflection of the whole region and its general population. The great divide between aboriginal and settler societies and cultures made his designs a specific voice, not a general one. In order to understand more fully what originality means for western Canadian architecture in the 21st century, in particular in the age of the internet, we need to study how settler society in the region handled architectural values and identities.

Originality and Western Canadian Architecture: From the Edwardian Period to Late Modernism

In western Canada the dominance of an agrarian-based society lasted from 1900 to 1970. It ended with the rise of OPEC (1973) and the birth of a powerful oil and gas extraction economy, primarily in Alberta, but also involving Saskatchewan, which also developed a separate mining economy based on potash extraction. Settler architecture arrived with the rise of an agrarian society and urban centers, like Winnipeg. In 1905 both Alberta and Saskatchewan became provinces. To announce their new political status they commissioned the construction of legislative buildings. These buildings were monumental in scale and reflected the British culture that dominated the region’s settler society, in particular, its elites. Manitoba, as the first province in western Canada (1871) had a head start on the other two, but the current Manitoba Legislative Building was begun in 1913 and completed in 1920. The style is “neoclassical” and the design is by the U.K. architect Frank Worthington Simon (1862-1933). The building is topped with a gilded statue of the Greek god Hermes. The Saskatchewan Legislative Building reflects a similar style. Built between 1908 and 1912 in what has been termed the analogous “Beaux Arts” style, which is simply the neoclassicism taught at the École des Beaux-Arts in Paris. The Canadian architect William Sutherland Maxwell studied at that school, as did the architect of the Manitoba building. The Alberta Legislative Building was completed in 1913 and designed by Allan Merrick Jeffers and Richard Blakey and displays the same style as the other two prairie legislative buildings. The Beaux-Arts style was fashionable at the turn of the twentieth century. Jeffers (1875-1926) was an American from Rhode Island, who was the provincial architect for Alberta. The nationalities of the three main designers of these buildings, Anglo-Scottish, American, and Canadian are a reflection of the elite nationalities of the settler society. This elite championed the creation of an architecture espoused in Paris and based on Greek, Roman, and Egyptian motifs. This architecture had no roots in the region. Curiously at the same time these monuments to colonial political power and prestige were being erected in a late-frontier society, an indigenous form was being developed in the United States, called “The Prairie School.” Its leading proponent and architectural genius was Frank Lloyd Wright (1867-1959) who espoused “organic architecture” that drew its inspiration from the geography in which the building was situated. The Prairie School was known for its horizontal style, especially in residential buildings, which were meant to express the terrain in

The Manitoba Legislative Building
Source: Government of Manitoba

Saskatchewan Legislative Building
Source: commons.wikimedia.org

Alberta Legislative Building
Source: Wikimedia.org

St. Mary's Roman Catholic Church in Red Deer, Alberta
Source: openbuildings.com

which they were located. The whole idea of working organically re-appeared in western Canada decades later with Douglas Cardinal, who trained in Texas. In his collected essays from the 1970s we find titles such as "The Human Organism versus the Mechanical Grid" and "The Indian Concept of Oneness." What we find in this earlier Edwardian period the first movement in a conflicted architectural trajectory—that of the imported styles fashionable in metropolitan and imperial centers eventually being challenged by indigenous creativity. Cardinal's architecture was an indigenous reaction to importation.

Flash-forward to the 1960s. We are in the late modernist period of architecture and the projected conflict has become real. In Alberta Cardinal builds St. Mary's Roman Catholic Church in Red Deer. It is 1968. In Winnipeg the Macau-born Portuguese architect Gustavo Da Rosa (1933-) designs the Winnipeg Art Gallery (1971) with its ship-like prow. Da Rosa had trained in the U.S. and moved to Winnipeg in 1960 to teach. Both buildings represent forms of originality that differed from the elite creators of the Edwardian period. For Cardinal it was aboriginality; for Da Rosa it was his ethnic heritage based in a seafaring nationality. Both men represented minorities and neither building was inspired by the former American Prairie School. Western Canada was beginning to create architecture that was not linked to contemporary movements fashionable in other places. The general historical context for the appearance of Cardinal's work was the radical sixties with its anti-war and civil rights protests in the United States and the emergence of a Red Power movement.

In the case of Da Rosa the influences are less clear. In the jury's report the drawing used to illustrate his winning design includes the Manitoba Legislative Building in the background, which is the view from the prow of the building looking south to the legislative grounds. The juxtaposition of the two buildings is symbolically historic. The triangular site was perfectly suited to the ship design and Manitoba, while a prairie province, is the home of two of the largest fresh-water lakes in the world that take up a total of area of almost 30,000 sq. kms. At the same time a geographically-inspired building was designed for the University of Lethbridge by Arthur Erickson (1924-2009), Canada's leading modernist architect. Situated in the coulees that run down to the Oldman River, the building (1969-1972) is a nine-level facility built into the landscape in such a way as to disappear from prairie level, while appearing in as horizontally bold design from below. As a western Canadian from British Columbia, Erickson was influenced by the dramatic geography features of his home province, from the vastness of the Pacific Ocean to its towering mountain ranges. Erickson's vision became enviro-centric with an emphasis on space and grandeur. Drawing on the natural landscape where the University of Lethbridge is situated, the building becomes a bridge across a ravine, a structure that brings together two similar formations to capture the prairie-like flatness that surrounds the river valley.

One could argue that the three late modernist buildings by three different Canadian architects cannot be compared properly with the single-function legislative buildings of the Edwardian period. One is church, another is an art gallery, and the third is a university. While the Edwardian buildings are all stone construction, the late modernist buildings use different materials—the church is built of brick, the gallery of Tyndall stone, and the university is of concrete. I believe this diversity and the diversity of its architects is integral to the indigenous moment in western Canadian architecture. Originality was not one-dimensional or singular; it was pluralistic and diverse. The sameness of the Edwardian buildings reflects the colonial mentality of its day and its desire for conformity. Canada in the late sixties was alive with the celebration of Canada's centennial with a strong emphasis on an emerging identity that was separate from its colonial ancestry. This nationalism, which carried on into the 1970s, was the ideological context that allowed architectural innovation to occur.

To respond to the issue of my argument comparing apples and oranges, I will broaden my argument from simply legislative buildings in the Edwardian period to Winnipeg's St. Boniface Cathedral, a powerful expression of Franco-Manitoban Catholicism designed by Jean-Omer Marchand of Montreal and built early in the twentieth century. The cathedral was an expression of a religious and linguistic identity that had been part of western Canada since the fur trade era. The cathedral's style is French Romanesque revival, which

University of Lethbridge, southern Alberta
Source: University of Lethbridge

The Winnipeg Art Gallery
Source: National Gallery of Canada Magazine

St. Boniface Cathedral, Winnipeg (1906-1968)
Source: University of Manitoba Archives

found its inspiration in the French churches of medieval times. It was not done in the Beaux-Arts neoclassical style of the legislative buildings but it was a similar expression of non-indigenous cultural values. Its design supports my argument that the central feature of settler society was the importation of colonizing values and the rejection of regional originality.

Originality and Postmodernism

While the settler society promoted conformity and replication of mother-country identities in architecture, the 1960s represented an outburst of originality because of the historic forces at play—from political radicalism and the emergence of oppressed minorities to a strengthened Canadian nationalism. By the 1980s these forces had subsided and a new era of economic emphasis began, signaled by the North America Free Trade agreement. Then came a resurgent capitalist global marketplace with the demise of the communist economies of the Soviet Union and China. Technological innovation such as the internet added to the globalization of the world's marketplaces. In this new context the promotion of originality as a regionalist project no longer appealed or made sense. The region economically was post-agrarian and very much part of First World attitudes and pre-occupations. This orientation continued into the digital era of the twenty-first century, where instant communication became both innovative and all-powerful. Originality became a commercialized product that was marketed globally by corporate interests. If one had the money, one could hire the best in the world. As a result importation of architectural designs came back to prominence. A good example of this reality is expressed by the Bow Tower in Calgary that was constructed between 2007 and 2012. The wealth of the city is based on oil and gas revenues from traditional and oil sands extraction in the province. The tower was named after Calgary's main river, but that was the end of indigenous references, other than the two Calgary-based energy companies that inaugurated the project as their headquarters. The building was designed by Foster+Partners of the United Kingdom, an international powerhouse with projects around the globe. The building was meant to reflect the success and ambitions of Calgary's elite that had created a narrative for itself as "world-class."

The Bow Tower in Calgary
Source: the-bow.com

This emphasis on world-class status meant engaging the leading architects in the world. It also meant having the funds to pay for this status. At the same time that the Bow Tower was opened, the City of Calgary opened a pedestrian and cycling bridge across the Bow River. The Peace Bridge was designed by the Spanish architect Santiago Calatrava. While stunning

The Peace Bridge, Calgary
Source: shutterstock.com

in appearance, the bridge was a reflection of the aspirational concept of Calgary as a world-class city. The bridge could have been situated across most any urban river in the world.

Regional architecture has come full circle from the Edwardian to the postmodernist period. What began as a cultural importation has returned to cultural importation and for similar reasons. A century ago western Canadian architecture was meant to express the dynamic colonization of the region and its roots in European identity and what the region's elite considered fashionable. There was a short period of originality during late modernism, but that originality was displaced by the globalized consciousness of postmodernism. Fundamentally, there have been two opposing forces in western Canada's regional identity—the forces of conformity and the forces of originality. One should consider conformity as the base or horizontal stream that, from time to time, is disrupted by a vertical stream of original creativity reflecting the indigenous history and geography of the region. Like predictions of volcanic eruptions, one can only say that an eruption of originality is inevitable, but its timing is dependent on historical forces beyond our control.

Notes:

1- The essay was originally the preface to my edited collection of Douglas Cardinal's writings. The book was titled *Of the Spirit: The Writings of Douglas Cardinal* published in 1977.

2- George Melnyk, *Radical Regionalism*, (Edmonton: NeWest Press, 1981), 39.

3- For a discussion of the ideological manifestations of various socio-economic periods in the region see George Melnyk, ed. *Riel to Reform: A History of Protest in Western Canada*, (Saskatoon: Fifth House Publishers, 1992).

4- George Melnyk, ed. *Of the Spirit: The Writings of Douglas Cardinal*, (Edmonton: NeWest Press, 1977).

5- http://www.winnipegarchitecture.ca/wp-content/uploads/2013/06/Architecture-Canada_February_1968.pdf

Sustaining Reliable Prosperity:
Profiles of Northwest Mining Towns, Past and Present

Wendy R. McClure
Professor Emeritus, University of Idaho

In the case of mining towns and cities of the Old West, sustainability, whether economic, cultural, or ecological, could be considered an oxymoron. Founded in the spirit of taking rather than making, late Nineteenth and early Twentieth century placer mining towns were volatile and environmentally destructive, amplifying challenges concerning their survival. The mountainous regions of the western United States are littered with remnants of former mining communities and their polluted landscapes. Those mining cities that sustained the initial boom and bust cycle of placer mining operations and the exploitive behaviors of fortune seekers, exhibit similar capacities; most developed lode mining operations, which spanned 80 -100 years, afforded gainful employment; mining populations built permanent and distinctive residential and commercial neighborhoods within the confines of challenging geographies and fragile ecosystems; place attachment was strong; extractive resources eventually played out creating a need for adaptation; and environmental degradation and pollution was pervasive. In their contemporary state, former mining communities continue to present inherent challenges to the goals of achieving long term sustainability culturally, economically, and ecologically. Their stories, past and present, can provide insight for contemporary generations of community builders as they pursue strategies to revitalize and adapt inherited historic contexts for new west economies and contemporary culture. Discussion will profile a spectrum of former mining towns in the Northwest's mountainous regions.

"Reliable Prosperity" during the mining era - Overview

According to Ecotrust's model for "reliable prosperity," communities achieve a sustainable state by maintaining healthy eco-systems, affording social equity, and developing an economy that does not compromise capacity for future generations to meet their needs. How would mining towns have measured up historically against Ecotrust's model for reliable prosperity? (www.reliableprosperity.net)

Economic sustainability. Throughout the intermountain west, gold strikes attracted the first wave of settlers in the form of placer miners between 1863 and 1878, generating the earliest stages of town development. Placer miners were migratory by nature and generally focused on taking rather than place-making. Parasitic businesses including saloon keepers, prostitutes, and gamblers followed on the heels of stampeding prospectors, hoping to siphon a portion of their daily bounty. In an 1867 report, The Secretary of the Treasury acknowledged the inadequacies of the placer mining as an economic force to steward sustainable town-making. Most intermountain mining cities can attribute their initial formation to placer mining. Sustainability, once placer claims played out, depended upon finding alternative sources for long term economic development. In many cases, deeper discoveries manifested in corporate lode mining, which employed hundreds of workers and operations that sustained for nearly a century.

Social/cultural sustainability. A community's capacity for economic diversification, in turn, depended upon building social capital in the form of an industrious people who remained after placer mining played out. According to late Nineteenth century observers, an invested citizenry of community builders were needed who "could enable solid steady growth and development of resources leading to the advancement of a country and the enobling of its people." (Howe, p. 115) In most cases, mining towns achieved long term economic and social sustainability if and when they could develop lode mining operations to attract immigrant mining populations in search of steady work, a permanent home, and supporting businesses. Achieving "reliable prosperity" in the Nineteenth century west also depended upon securing access to railroad shipping routes. Towns supported by promising lode mining operations provided powerful economic incentives for railroad companies as they decided where to locate their transcontinental lines.

Ecological sustainability. Mining towns historically developed unique, dynamic, and often unsustainable relationships with their supporting landscapes. On-going processes of extraction beneath, surrounding, and within developing human settlements, generated an ever changing landscape. In extreme cases, the relationship between town and its supporting landscape was cannibalistic as expanding extractive processes actually consumed neighborhoods. Mining operations, by the very nature of their extractive purpose, altered landscapes. By-products, whether in the form of excavations, piles of tailings, altered streambeds, machinery, or pollution are not readily erased. Natural landscapes remained scarred and transformed by exploitive human intervention. From the onset, mining communities faced serious challenges concerning environmental sustainability. Processes of ore extraction disturbed natural systems, permanently altered landscapes, generated polluting byproducts, and eventually depleted non-renewable resources. During the Nineteenth century, most mining communities did not focus on processes for remediation. Their community planning decisions either served to mitigate damage to areas inhabited by humans and wildlife, or to exacerbate it. (McClure, 2013)

"Reliable Prosperity" during the mining era - Overview

Virginia City: a virtual ghost town. Virginia City's short lived boom and precipitous decline echoes the story of ghost towns throughout the west's failed gold mining regions. In 1863, gold deposits along a 14-mile section of Alder Gulch attracted over ten thousand placer miners from other gold rush territories in the western US. Within a few days of the rush, prospectors, seeking order amidst chaos, empowered the Verona Town Company to plat 320 acres as a town site. Virginia City, claiming to be the largest settlement in the Rocky Mountains, served as the social and commercial hub for regional mining camps.

Initial prosperity positioned the town as the territorial capital of Montana from 1865-1875. A detailed plan of Virginia City featuring gridded streets and a Georgian style capitol building was created by civil engineer JL Corbett "by order of the city council" in 1868, in anticipation of becoming Montana's state capitol. Virginia City ultimately failed in its bid to become the new state's capitol and the plan was never realized. Instead, Virginia City's population plummeted in the 1870s to less than 800 when more promising strikes siphoned off prospectors to other parts of Montana. (Van West, 1986) (Fig.1) Very little development occurred in Virginia City after 1900, indicating the town's inability to cultivate "reliable prosperity." (Van West, 1986)

Butte, Montana: a global copper metropolis. Butte, Montana, originally founded as a gold rush settlement in 1864, hovered on the threshold of extinction until silver and copper deposits were discovered in 1876. The town was subsequently re-platted in a grid configuration on the slopes of a steeply rising, south-facing hill replete with copper. (Reps, 1979) Discovery of rich copper reserves throughout the hillside under and above Butte attracted a steady influx of hard rock miners, setting the stage for Butte to become the world's leading copper producer and a new city of the Industrial Revolution.

An 1884 birds-eye rendering captures the intensity with which urbanization occurred in Butte and the unmistakable source of economic growth residing in close proximity beneath its urbanizing surface. A network of head frames used to support vertical lifts in underground mining operations provided an industrial crown for the crest of "the richest hill on earth." Smokestacks - the skyscrapers of industrialization - emanating from smelters are depicted pervasively, serving as a billboard for Butte's prominence in the economy of an industrializing western landscape. (Fig. 2)

The seemingly limitless supplies of copper and other metals in Butte fueled corporate mining operations for more than a century. Immigrants from over 38 countries flocked to Butte to work in the mines. The combined influences of mining operations, geographic conditions, and ethnic backgrounds helped to shape both the distribution and segregation of neighborhoods. In spite of pollution hazards, most neighborhoods were located in close proximity to mine entrances to lessen miner's exposure to Butte's frigid temperatures as they returned home after work shifts. The most marginalized populations were housed on the east side of town in the path of prevailing winds, which carried smoke from reduction plants and smelters. (Gibson 2009)

Early residents maintained a love-hate relationship with the industrial city's gritty, hard-edged character. Writer Mary Maclane described the marred, treeless landscape and polluted air as "the near perfection of ugliness….Pitiable,

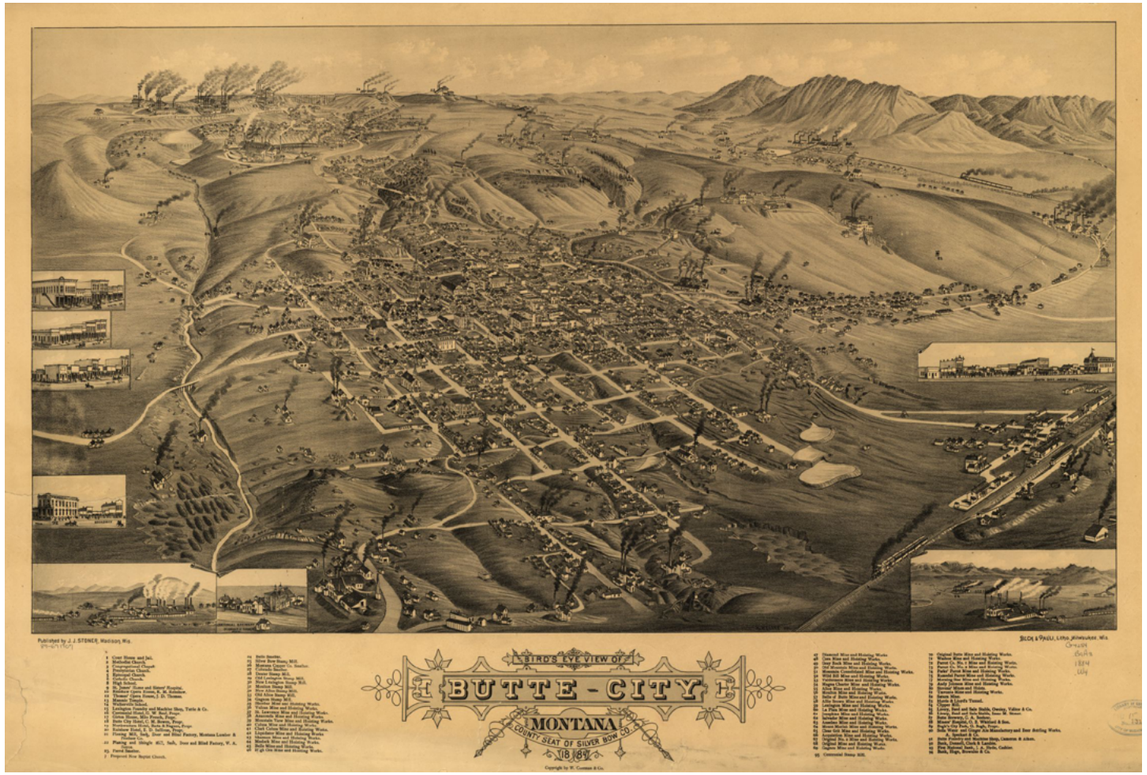

Figure 1

Bird's eye view of Butte-City, Montana, county seat of Silver Bow Co., 1884
https://www.loc.gov/resource/g4254b.pm004530

barren, contemptible, damnable, nothingness. But there is love for me in this Butte…the stone streets full of houses and persons…the little mines in unexpected mid-town blocks with their engines and hoists and scaffolds and green coppery dumps." (Gibson p. 149). The Happy Traveler's Club, which authored travelogues for the Northern Pacific Railroad, optimistically nicknamed Butte and its hillside of steel headframes, the Paris of mining towns." (Howe p. 122)

Butte's population declined in tandem with a gradual decline in the demand for copper following World War I. Depletion of high quality ore precipitated closure of underground mines in the 1950s. The Anaconda Company replaced underground mining with strip mining operations as a means to sustain itself and local employment. Between 1950 and 1980, as much as 50,000 tons of rock per day was removed from the Butte Hill. The social and environmental consequences of strip mining were monumental; entire ethnic neighborhoods, including Nineteenth century houses, churches, and commercial buildings, were literally swallowed up and city water sources became contaminated. The Berkeley Pit as the largest of Butte's strip mines, reached a perimeter size of 1 x 1.5 miles and a depth of 1800 feet. Described as "an inverted monument to human labor," the Berkeley Pit encroached steadily westward towards the core of uptown Butte, threatening to subsume it as well. (Van West, 1986)

Throughout the 1960s and early 1970s, the Anaconda Company purchased fringes of uptown and demolished historic buildings in order to maintain a buffer between mining operations and neighborhoods. In anticipation that the uptown business district would also be sacrificed, property owners neglected their properties, fell delinquent on taxes, or relocated to the sprawling valley, further precipitating erosion of the once bustling town center. Property values plummeted. Arsonists attempted to accelerate the destruction, many hoping to collect insurance money. In the 1970s, the Anaconda Mining Company proposed that the city relocate its business district to "the flats" and engaged Rouse Co. Developers to design a new town commercial center in the corporate fashion of Columbia, Maryland. In 1976, their relocation proposal was put to a vote by city council and defeated by a single vote, sparing uptown Butte. (Gibson, 2009)

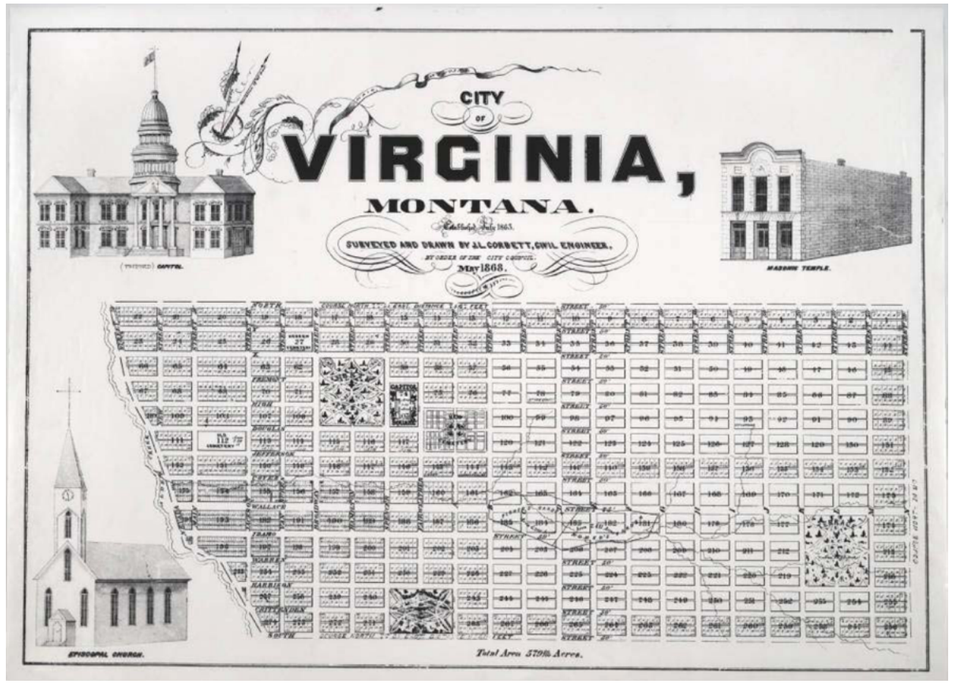

Figure 2

City of Virginia, Montana, established July 1863
http://mtmemory.org/cdm/singleitem/collection/p15018coll5/id/13/rec/58

From the outset, reliable prosperity in Butte was compromised by the unbridled environmental consequences of mining. Historically, city government made decisions that would best profit mining interests and provide jobs for its substantial mining population, sacrificing the city's culturally rich, humanly-created environment and supporting natural landscapes. Economic pursuit transformed and inverted the natural landscape, creating barren surfaces incapable of supporting ecological systems. A barren landscape serves as a perpetual reminder. Additionally, closure of mining operations in 1982 created unforeseen environmental consequences. The Berkeley pit and underground mines began filling with water, generating one of the biggest challenges for environmental clean-up in US history. The polluted landscape remains as a major health hazard and impediment as the community seeks to attract new industries to employ its underutilized workforce. (Gibson, 2009) (Fig. 3)

Wallace and Kellogg, Idaho: a Silver Legacy. Gold strikes in the Coeur d'Alene Mountains initially led to the formation of tent cities and small settlements in Idaho's Silver Valley along the Coeur d'Alene River and its tributaries. While towns located outside of the valley's central spine were abandoned when resources played out, Wallace and Kellogg prospered for several reasons; both towns were centrally located along the Coeur d'Alene River; the railroads constructed direct linkages between them and urban marketplaces; and the Silver Valley's most productive mines, which included the Bunker Hill complex, Sullivan Mines, and Sunshine mines, were within Kellogg's city limits and in close proximity to Wallace. Economic stability resulting from highly productive corporate mining, enabled multiple generations of miners and their families to tap deep roots and local businesses, both legitimate and illicit, to prosper.

The capacity to achieve "reliable prosperity" in social dimensions throughout their 100-year mining history is captured in their expansive cultural narrative in song and literature. Wallace's iconic commercial district heralds the will and aspirations of previous generations of community builders as they rebuilt from the catastrophic 1889 fire and continued building fine architecture well into the 1930s. By contrast, the cumulative environmental toll resulting from 100 years of mining, was catastrophic; toxic emissions from smelters denuded hillsides; lead-laden tailings contaminated soils in communities; and hundreds of millions of tons of hazardous waste was dumped into the Coeur d'Alene River. Downstream effects contaminated the river basin, bordering wetlands, Lake Coeur d'Alene, and the Spokane River. Toxic smelter emissions contaminated soils and caused unprecedented lead levels in resident children. In 1983, the Environmental Protection

Agency designated 21 square miles of the Silver Valley, which included both towns, as the largest Superfund Cleanup site in history. High lead levels and other hazardous pollutants continue to pose a downstream threat to human health, wildlife, and plant ecosystems to this day. (www. wallace-id. com/history.html)

Both communities persevered through the 1893 national economic crisis- floods- catastrophic fires - including the complete devastation of Wallace's commercial district in 1889 and the Big Burn of 1910 - and periods of violent union strikes. They reached peak populations in 1960 in tandem with a robust national silver market. Their populations declined throughout the 1970s in tandem with silver prices. In 1981, the largest mining company, the Bunker Hill, shuttered operations leaving both communities in economic distress. (Hart and Nelson, 1984) (www.lib.uidaho.edu/special-collections/Manuscripts/mg367.htm)(sspa.boisestate.edu/idaho/exhibitions-tours/idaho-issues-online/cities/kellogg-redefined/)

"Reliable Prosperity" during the mining era - Overview

Today, former mining communities persist in a variety of forms including virtual ghost towns, places that have been preserved by neglect, skillfully adapted for contemporary uses, or transformed by unbridled development. Each representative case study town reflects philosophical differences regarding treatment of its cultural resources. Discussion about differences in sample communities, including attitudes, approaches, and policies, follows.

Virginia City: a living museum. Virginia City persists, frozen in time, as a living museum. The town's preservation can largely be attributed to the private efforts of Montana ranchers, Charles and Sue Bovey, who purchased and restored a majority of the remaining buildings, including prime examples of Victorian-era territorial architecture. (Van West, 1986) In the 1990s, the Virginia City Preservation Alliance helped facilitate the town's purchase by the state of Montana and currently curates the town as a living museum and tourist attraction. Virginia City's contemporary state illustrates the community's failure during the Nineteenth Century to sustain as a living community by cultivating reliable prosperity in social and economic dimensions. The surrounding landscape, which was altered by Nineteenth Century mining operations, continues to communicate irreversible transformation of the area's natural geography and polluting impacts on supporting ecosystems.

Butte, Montana: preservation by neglect. Although Butte was designated as a national historic landmark shortly after the national program's inception in 1961, the community was slower to realize the value of its mining heritage as manifested in historic buildings and neighborhoods. Butte City council's decision to turn down The Anaconda Company's plan to

Figure 3

The Berkeley Pit located at the eastern edge of uptown Butte

demolish the urban core marked a turning point. Beginning in 1977, the city adopted historic preservation and revitalization of uptown as its official policy; the community began to view Butte's historic buildings as assets instead of liabilities and to recognize their potential to stimulate economic development. (Quivic, 2009)

Today, six square miles of uptown Butte are designated as a national landmark, positioning the city as a destination for cultural tourism. The city became proactive about historic preservation in 2007, by adopting a comprehensive preservation ordinance that establishes a local register for historic properties. Accompanying design guidelines empower the county historic preservation commission to review publically funded rehabilitation projects and all proposed demolitions of historic structures. Local preservationists and the urban renewal agency prepared attractive financing packages to encourage developers to purchase and rehabilitate foreclosed buildings. In spite of these incentives, historic buildings throughout uptown and residential neighborhoods await a new economic purpose. (Gibson, 2009) (Fig. 4)

Place attachment remains strong in Butte. Multiple generations live in close proximity to one another. While the community retains strong cultural ties to the mining era and a remarkable inventory of mining era architecture, continuing environmental challenges cast doubt concerning the city's ability to attract growth and to re-purpose its historic core.

Idaho's Silver Valley: *Kellogg and Wallace*

Kellogg: a theme town and downhill skiing destination. In an effort to overcome high unemployment and the stigma of being designated as an EPA superfund site, the Kellogg

Figure 4

Uptown Butte's Inherited Mining Era Architecture

Figure 5

Uptown Kellogg's ill-fated Bavarian style make-over

community sought new avenues to restore reliable prosperity by becoming a destination for outdoor recreation. First, the community taxed itself and acquired federal funds to expand and upgrade its local ski area by constructing a gondola leading directly from town. Local decision makers abandoned its authentic mining town identity by adopting a theme town approach to economic revitalization. Hoping to match the economic success of Leavenworth, Washington, a Bavarian theme town in the Cascades, Kellogg instituted development guidelines during the 1990s. The guidelines called for Bavarian detailing to be applied to the facades of mining era buildings, new commercial development, and signage throughout town. The newly adopted community identity was a mismatch for its deeply rooted mining heritage. Ultimately, a ten-year effort to market the Bavarian image failed. In 2005, the city initiated a second misguided, but short-lived, attempt to recast the former mining community as an "alpine resort." Guidelines recommended that storefronts be reconstructed using heavy timbers. In recent years, some mining era buildings have been appropriately restored and adapted for contemporary uses in the uptown area. European style mixed development at the gondola base seeks to regenerate a form of active public space that once characterized uptown Kellogg. Recently constructed single family housing appropriately reflects the mining era's scale and simplicity. (sspa.boisestate.edu/idaho/exhibitions-tours/idaho-issues-online/cities/kellogg-redefined/) (Fig. 5)

Wallace. Downtown Wallace, which served as the Silver Valley's commercial heart, was largely constructed between 1889 and 1920. The picturesque downtown features a substantial inventory of late Victorian-era commercial buildings. Interstate 90 was originally routed directly down Main Street. During the 1970s, the Federal Highway Administration's plan for improvements to the I-90 corridor called for demolishing the entire mining era commercial district. Local citizens and decision makers rallied to protect their cultural heritage by seeking designation of the iconic downtown as a National Historic District. Ultimately, the will of the community prevailed and national register designation forced the FHA to alter their plans; the interstate was elevated to by-pass the downtown, sparing Wallace's cultural heart. Today, local citizens and business owners view inherited resources as a source of community pride and cultivate heritage tourism as an economic development opportunity. (Fig. 6)

Conclusion

Mining era townscapes in the mountainous Northwest persist in varying degrees of clarity, their contemporary state determined, in part, by the quality of balance between social, economic, and environmental priorities achieved by former generations of community builders. As evidenced by historic profiles, mining communities faced significant challenges to their sustainability; their economies were founded on non-renewable resources, their natural landscapes were continuously subjected to damaging and polluting practices, and long term thinking was compromised by transient fortune seekers and speculators. In the face of these challenges, deeply rooted mining cultures built places worth caring about.

Current generations face new challenges as they pursue avenues for reliable prosperity; processes for environmental remediation are on-going, economic opportunities are needed to reverse steady declines in population, sprawl threatens to replace mining as the primary agent of land consumption, and historic resources are in need of community stewardship and investment. How can community builders in former mining

cities such as Butte, Kellogg, and Wallace achieve a more sustainable state in the future? Their collective histories reveal important considerations as follows:

1) Economic endeavors that negatively impact human health and ecosystems, upon which communities depend, are not sustainable

2) Social well-being and long term economic prosperity depend upon maintaining healthy ecosystems

3) Mining cultures with an invested citizenry built distinctive and memorable places; they set the bar for new generations of community builders

4) A plan for economic development should be founded on authentic place-identity, cultural integrity and stewardship of inherited architectural resources.

5) Community memory and place-identity are sustained through stewardship of its architecture and neighborhoods

A community's collective sense of self, today and in the future, is also critical to a more sustainable future. The inevitable growth and change that accompanies economic development should be guided by regulating plans and preservation policies that appropriately define and protect authentic community character, encourage adaptive use of inherited fabric and quality integration with contemporary development. A successful quest for reliable prosperity will depend on it.

Figure 6

Historic preservation in downtown Wallace, Idaho sustains authentic mining era identity

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Tracing: Gabriel Log Barn As A Reflection Of Speculation, Growth, And A Developing Sense Of Permanence In The Northern Rockies

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For many of the early agricultural settlers of the Northern Rockies, the northern latitude combined with the high elevation presented conditions for raising crops and livestock that were entirely new to them. The climatic and geographic setting also imposed numerous unfamiliar demands and constraints on the buildings growers used to house and shelter their harvests and livestock. In terms of economic development, the region remained effectively a remote frontier until 1883, when the Northern Pacific Transcontinental Railroad reached the high mountain valleys of the Montana Territory. The tools and resources available for construction in the region were therefore limited well into the 1890s, when the establishment of industrial and commercial enterprises that supported construction, such as large scale lumber milling operations and the importation of hardware, materials, and machinery began to widely influence building practices.

This essay examines a two story log barn on the Damon Gabriel Homestead in the Gallatin Valley, Montana, and the ways in which it reflects shifting attitudes toward permanence and the evolution of construction capabilities during an era of dramatic change nearing the turn of the century. A homestead is by definition agricultural, hence the changes in building practices are explored in parallel with the development of agriculture in the region. Detailed documentation of the Gabriel homestead site is available thanks to the efforts of a group of graduate students at Montana State University, School of Architecture.[1] The record drawings and historical report they produced make possible an in-depth analysis of circumstances, materials, construction technology, and building design.

According to Stroebe, et. al., Damon Gabriel was Canadian of French descent, entering the United States as a mercenary in U.S. military. He fought in the Great Sioux War of 1876, The Battle of Powder River and the Battle of the Rosebud, and shortly afterward he narrowly escaped death at the Battle of the Little Bighorn because his exhausted regiment was assigned instead to a resupplying expedition. His decision to join the U.S. military may have been motivated not only by wages, but by the opportunity for citizenship and the right to homestead, a process which was less restrictive in the U.S. than in Canada at the time. After his military discharge he settled in the Gallatin Valley, Montana Territory, and worked as a farm hand for Frank Savar. By 1880 he bought Savar's homestead, 160 acres of fertile bottomland on the Gallatin River at about 5,000 feet elevation, and filed his own homestead claim on the adjacent 160 acres to the west.[2]

The construction sequence of the 3-bay log barn on his homestead suggests a chronology that reflects evolving attitudes toward tenure and permanence in the region

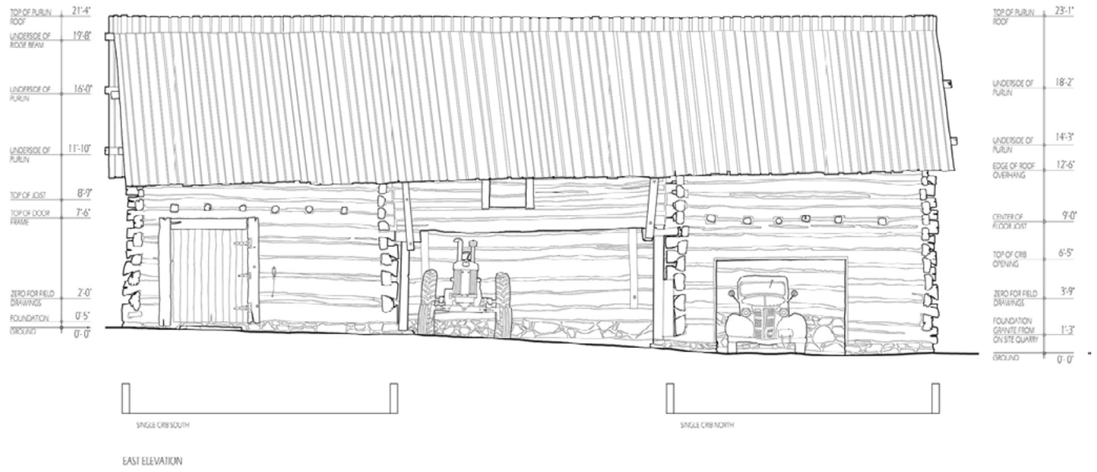

Figure 1

East elevation of the Gabriel log barn as recorded in 2014. Hannah Stroebe, Kate Tilleman, Chelsea Holling, Jessica Proctor, Theresa Lindenau, Urvi Shah, and Andi Duroux, "Gabriel Homestead" Historic American Buildings Survey, National Archives, Washington, D.C., (June 2015), document MT-174, sheet 7.

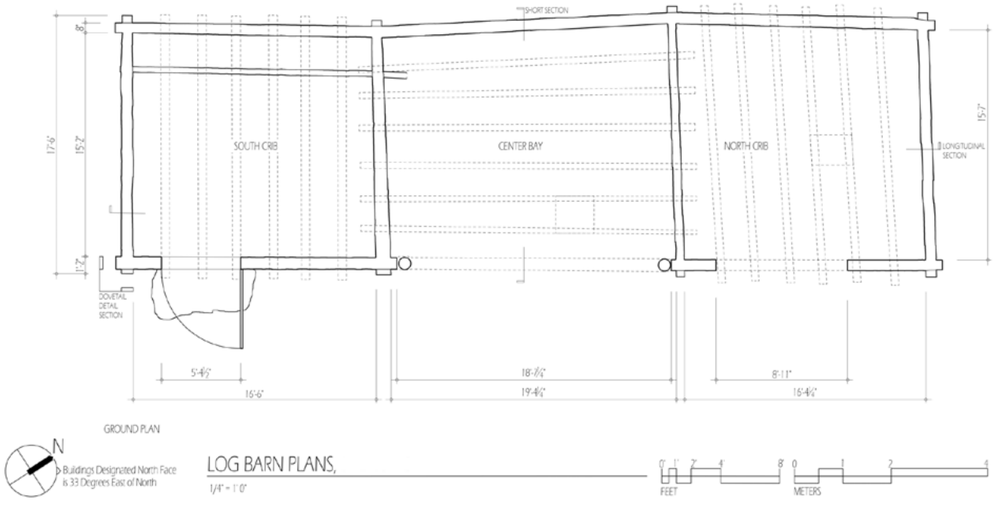

Figure 2

The irregularity in the ground floor plan reveals the hand-built quality of the building. There were no machined materials in the original construction, so squareness was not a primary concern. It was built with a few simple tools that could be carried overland in a wagon, and probably few measuring tools. Drawing from Stroebe, et al, sheet 6.

(figure 1). A theme of speculation and growth is reflected in its gradual evolution. Analysis of the line drawings suggests that this building began as two single-story, single-crib log structures both built by the same craftsman with simple tools and a knowledge of solid joinery.[3] The immense size of the logs (up to 18 inches deep) and full dovetail notching indicates the cribs were built with the intention to hold-up under heavy use – probably as shelter for large stock – but may also suggest that they were built with the intention of ultimately supporting a second story. The timber is cottonwood, undoubtedly cut a few hundred yards away on the banks of the Gallatin River. Although its irregularity made it difficult to produce a tight, refined wall, this readily available resource offered an economy of time that might otherwise have been spent in harvesting from evergreen forests a considerable distance away. The timbers are roughly hand-hewn, reducing their weight and bulk, and presenting a moderately finished surface of considerable substance.

In floor plan the north and south cribs are similar in scale, they are relatively un-square, and their depth is loosely matched (figure 2). If the initial intention was to eventually combine them into a single building, the builder worked with limited measuring tools and perhaps haste due to the onset of a long, cold winter. The extent of the original cribs is apparent from the height at which the corner notching changes character entirely, from dovetail to crowned square notching (figure 3). Their height measured from the ground is similar, adding strength to the view that they were a first stage of a speculative, phased construction sequence. However, as they currently sit on sloping ground, this effectively makes one crib a foot shorter than the other (see figure 1) – an unlikely difference if they were built in this location. They may have been built as a matched pair on level ground and moved to this site at a later date. Moving buildings by skidding them on the winter snowpack with horse teams was not uncommon in the region – it allowed many farmsteads to adapt to new demands in an economical way by recycling buildings for new uses.[4] Stroebe et al hypothesize that the two cribs may have been originally built on Frank Savar's homestead, as his acreage lay only a few hundred feet to the east.[5] Since Gabriel had bought Savar's homestead, it is entirely possible that he moved Savar's outbuildings to establish evidence of settlement that would help him qualify for the patent on his own land claim. A settler had only a few years after filing the initial homestead claim on the land, before they had to prove-up by completing specific improvements such as the construction of a dwelling, corral fences and agricultural outbuildings, in addition to farming the land. Re-locating Savar's buildings to his own farmstead represented not only an economy of materials, but of construction time – a strategy which freed him up to make other improvements.

A second phase of construction is represented in a photograph

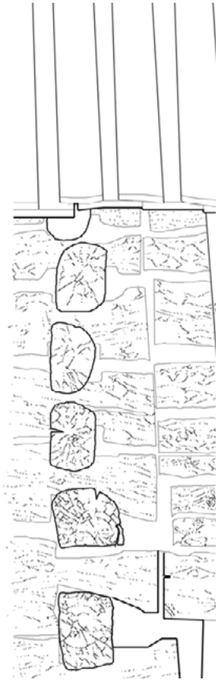

Figure 3

Typical detail of notching in the cottonwood logs. The first story uses full dovetail notching, while the second story is crowned square notching – the difference in character is indicative of two different builders. The change occurs at approximately 8'-6" from the ground in both cribs. Drawing from Stroebe, et al, sheet 8.

probably taken in the 1880s (figure 4), which illustrates a single-story double-crib building in the location of the present barn, and a twin counterpart to the south. The two log cribs were combined under a single roof, forming a third space between them of similar size (figure 5). The roof was a low-profile ridgepole and purlin form common in early construction in the Rockies, as it was expedient and suitable for sod, a readily available roofing material.[6] Moisture retained by the sod typically rotted the purlins, and these roofs did not last, but they served the purpose of affordable, rapid, and effective (though temporary) protection from the elements. The center bay between the cribs was originally open to the east and west as a drive-through for a wagon, and may have served as a threshing floor and as shelter for valuable investments such as farm implements. It is clear from the photograph that a single-crib log dwelling (figure 4, lower left), had undergone two expansions by this time – indicating a process of incremental enlargement of a first-season shelter as time and finances allowed, and reflecting a need to accommodate a growing family.

The addition of a second story loft and a steeply sloped gable roof marks the next construction phase on the log barn, visible in a photograph from 1903 (figure 6). It appears to be an improvement made to both of the log barns, representing considerable growth and confidence. This addition is clearly carpentered by a different craftsman than the original cribs, as the log joinery is crowned square notching, similar to the early log dwelling on the site, and the cottonwood logs are a significantly smaller diameter than those in the first story. If these additions are attributed to Damon Gabriel, this adds strength the hypothesis that the original single story cribs were built for Savar's homestead. The steep gable form – a substantial improvement which sheds snow and rain effectively – is supported by log purlins and ridge beam on queen and king posts which stand atop the log crib walls. The floor joists and roof structure are built entirely with peeled lodgepole pine which provides the requisite straightness, and was an economical choice at the time, as dimensional lumber was highly priced because local lumber mills lacked competition. The outward roof material, however, is board-on-board milled planks, signaling the beginning of a machine age of building, and presenting a more refined appearance and a desire to project a progressive image.

The barn loft space is indicative of the need to store quantities of dry hay. Most ranches began to produce hay in great quantities only after the devastating winters of 1886-87, when large cattle herds starved to death. After this experience a cattle operation which intended to protect its investment against the unpredictable winter elements had to produce an adequate hay supply during the summer months, and to feed cattle daily throughout the winter. Getting hay distributed to herds required the use of working horse teams all winter to draw a large feed sled on the snow. The loft of the log barn would not have stored enough hay for a cattle herd, but it would provide adequate space for some high quality hay and possibly grain needed to feed a pair of working draft horses during a long winter. Hence the addition of the hayloft represents a business decision to invest more heavily and to persevere even in the face of major setbacks and newly understood limitations. It suggests an optimistic attitude toward the promise of the future. Numerous other indications of growth and overt expressions of permanence in the homestead site by 1903 reinforce this view, such as the completion of the two-story stone masonry house, stone root cellar, and other outbuildings. These improvements are evidence of a family that no longer thought of themselves as pioneers on a remote frontier, but as progressive entrepreneurs, taking calculated risks, growing their business, and participating with confidence in a national market for beef and grain.

Another change was made to the building around the turn of the century. The center bay of the barn was enclosed completely on the west, and its loft was enclosed on the east (figure 7). This log infill was done without the benefit of notching into the existing cribs, instead the entire wall was splinted to the purlins at the eave. The lower story of the west wall was built with the same large diameter cottonwood logs, and similarly hewn as the 1870s crib construction – the tool marks in the surfaces of the logs are identical. This indicates yet another resource-efficient strategy which involved the reuse of construction m¬aterials from disused buildings. In this case the logs appear to be from another building of Frank Savar's tenure. An aerial photograph from 1964 (figure 8) reveals that a possible source for these materials is the twin barn to the south, which was partially dismantled when the photograph was taken. The enclosure provides greater security and shelter for the center bay, an alteration perhaps motivated by the need to house new farming machinery. There were rapid advances in time-saving farm implements which were mass-

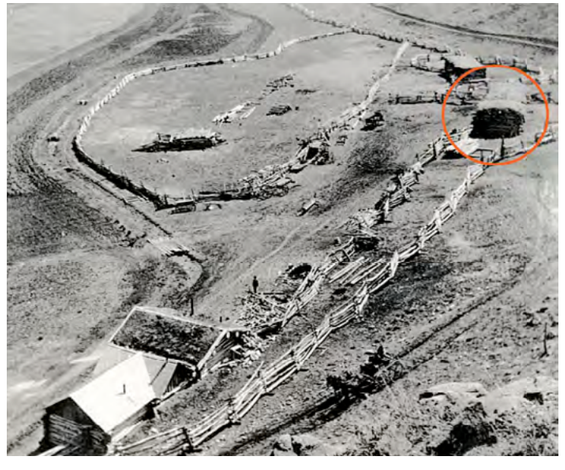

Figure 4

Earliest known photograph of the Gabriel Homestead site, taken from the adjacent buffalo jump. The location had been well-known to local Native Americans probably for many generations, due to the topographic feature of the cliff combined with the nearby spring, making it ideal for harvesting and processing buffalo. The photograph was probably taken in the 1880s, when the Gabriel family lived in the small log dwelling, lower left, and the low profile dog-trot log barns were roofed with sod. Note that an irrigation ditch was already developed around the eastern perimeter (to left of fence). Photo: Dr. Francis and Deloris Kelly family archives.

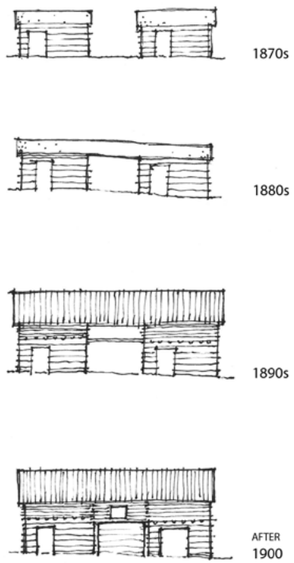

Figure 5

A probable sequence of construction from the 1870s to about 1910. The first phase may have been built by Frank Savar for his 1878 homestead a few hundred yards to the east. Subsequent phases are attributable to Damon Gabriel. The sequence makes a convincing case for a builder with a vision of future growth. Drawings by the author.

produced, affordable, and widely available by mail order after 1900. Implements like the disk plow, seeder, sickle bar, binder, and thresher enabled a tremendous increase in productivity for hay and grain producers, and Gabriel's log barn may have been adapted to protect these investments.

A final improvement and gesture of permanence was undertaken approximately 130 years after the initial single-crib construction. The Kelly family, owners of the homestead since 1968, saved the log barn from imminent collapse due to subsidence which was rotting the base logs. They dismantled it piece-by-piece and replaced the granite blocks on which it had stood with a contemporary foundation. The building was completely restored (completed 2008), with the intention that it stand for many decades to continue to tell the story of early agricultural settlement in the Gallatin Valley. With this intent, one of the most effective decisions the family made was to protect the landscape surrounding the building site from development which threatens rural lands in the region. They placed the acreage that was once held by Damon Gabriel into a conservation easement to preserve the open space, agricultural uses, natural habitation, the creek and the bank of the Gallatin River on the east of the property.[8]

Figure 6

Photograph from 1903. A significant burst of construction, growth, and an expression of permanence is evident in the entire homestead site within a period of 20 years (compare to figure 4, from 1880s). Both of the log barns have a second story addition with steep gable roof, dramatically increasing the capacity for storage of hay, and clearing the ground floor for draft animals. Stroebe, et al report that Gabriel modeled the stone house after a military fort building he had known in Montreal. It served as a projection of successfulness, protection, and permanence. Photo: Dr. Francis and Deloris Kelly family archives.

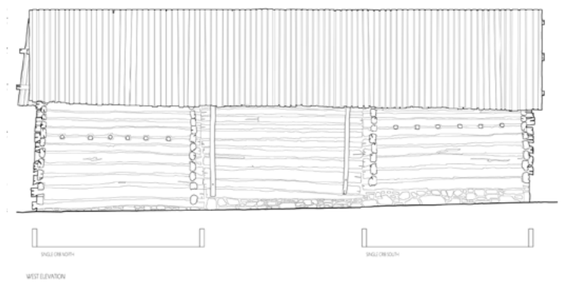

Figure 7

The west elevation reveals the character of the infill at the center bay. None of the added cottonwood logs, either at the ground floor or the second floor are notched into the north or south crib -- evidence that the infill was done after the second story was completed. Since local storm weather tends to blow from the southwest, this enclosure creates great protection from moisture at the center bay, giving it new utility. Drawing from Stroebe, et al, sheet 7.

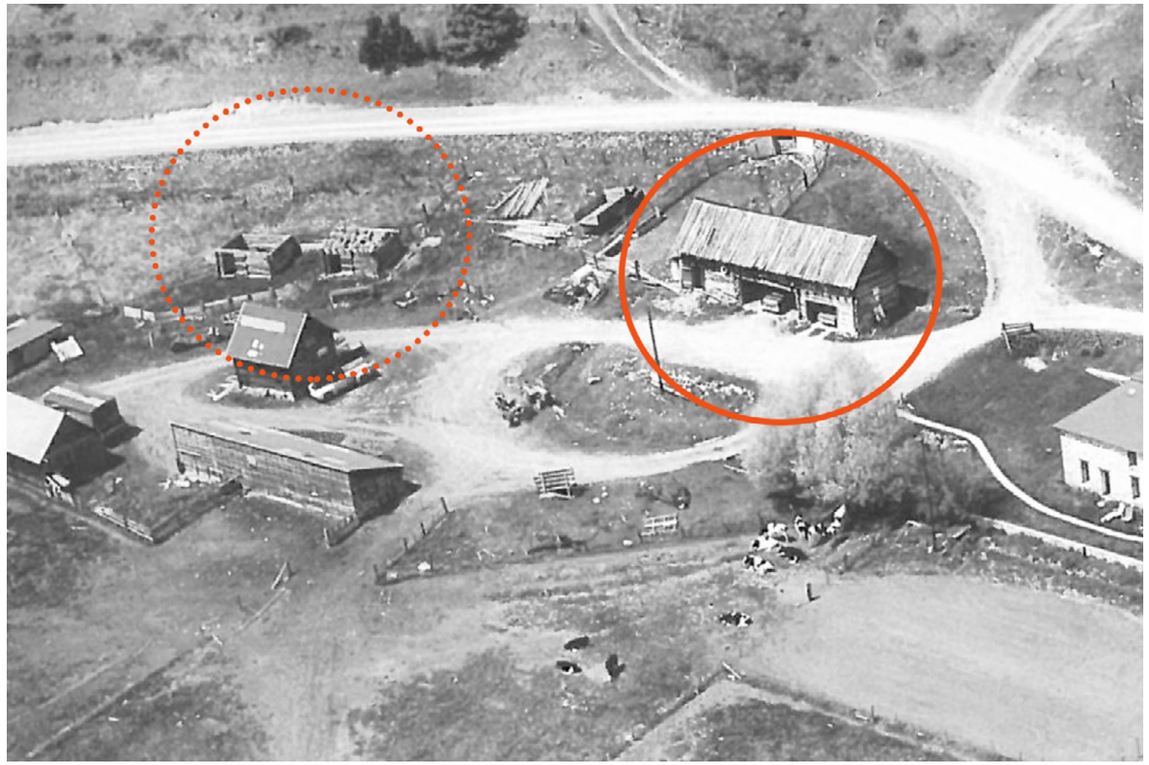

Figure 8

Aerial photograph from 1964. Partially dismantled log barn at left may have been a resource for the logs used to enclose the center bay of the log barn at center. Photo: Dr. Francis and Deloris Kelly family archives.

Notes:

1- The documentation was completed in 2014 as part of a graduate course taught by the author, and was submitted to the Historic American Buildings Survey, and is now housed in the National Archives. Hannah Stroebe, Kate Tilleman, Chelsea Holling, Jessica Proctor, Theresa Lindenau, Urvi Shah, and Andi Duroux, "Gabriel Homestead" Historic American Buildings Survey, National Archives, Washington, D.C., (June 2015), document MT-174.

2- Ibid, Historical Report, 1-2.

3- It is important to note that the granite foundation wall shown in the drawings was introduced during a 2008 restoration. The building originally rested on corner stones of granite, and had dramatically subsided, rotting the base logs. Hannah Stroebe, et al, Historical Report, 5.

4- Maire O'Neill, *Learning Rural Perceptions of Place: Farms and Ranches in Southwest Montana*. Doctoral dissertation (Bozeman: Montana State University, 1997), 93-137.

5- Stroebe, et al, 3.

6- The ridgepole and purlin roof is defined by Terry Jordan, Jon Kilpinen & Charles Gritzner, *The Mountain West: Interpreting the Folk Landscape*, (Baltimore: Johns Hopkins University Press, 1997), 80-81.

7- A photograph of the Gabriel children from 1910 provides a close-up view of the corner notching of the early log dwelling on the homestead. It is a combination of lapped and crowned square notching, and its construction is attributed to Damon Gabriel. Stroebe, et al, 17.

8- Montana Land Reliance holds this easement in perpetuity.

Three Thirty Six

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It is 2:30 in the morning and the last person in the building has not yet left; she has quit her desk and is currently drooped on the edge of a sofa nearby, gifted to her by one of her friend's grandparents. Her selfie at that hour showed her smiling but drained, resigned to the realization that no matter the effort the body can only take so much. In the background the ceiling is a glare, in part due to the quality of the picture, taken by a low res Iphone old enough to date to Obama's second term acceptance speech, and in pat excess neon.

"I am the last one around," her text declared, to which the only reasonable response could be why, "why not come home," which I texted with some relish, feeling my fingers strike a particular punch at the glass. But then there was no reply and in checking my message 30 seconds later I realized I had forgotten the "not" and so instead of "why not come home" I had typed "why come home." "Darn," I muttered to myself, slapping my thigh harder than I thought I wanted, my mind still with the broken text. "Is it just me or does everyone do this, forget to type half an intended text," I quizzed myself looking sideways at a drifting black hole. "Isn't it interesting," I continued ruminating "how texting had made it clear that between thinking and typing there is a lag, sometimes bad enough to destroy a perfectly good relationship, at least for a brief time." Franticly I typed again, this time capitalizing the "NOT". A minute later; still no words back.

I looked at the selfie one more time and began to dissect it. My friend's head, also my roommate, was only half visible, cut off as it were at the nose, leaving ample space for other information to seep through. Just beyond the sofa three desks managed to make it into the picture. On them strewn were signs of a serious model underway, a combination of wood, metal and glass, big enough to be real life, something you could stick your whole head in and be in a different world instantly. "What was that," I wondered looking closer at the image as my phone dimmed, until I touched it again and back to life it came.

I should know as I too am studying in the same building and on the same floor and have walked over to those very same desks and perhaps have seen at least the beginnings of that model. "What, what is that model," I pressed my brain to remember, my mental presence now back staking a spot between sofa and desks. My friend was majoring in architecture while I in interior design and on that note of difference one could have excused my ignorance of my friend's undertaking. Yes "could have" but in reality "shouldn't have" because those who know what is happening at the school also know that since the merging of the disciplines - architecture, interior design, landscape and construction management - three years ago the majors have been spatially mixed and organized so as to coexist on singular floors. Indeed my desk was only on the opposite side of the same floor as my friend's. I really should

have known the nature and purpose of that model.

I gave up and sat back in my dark room, against pillow and wall, now made darker by the fact that my phone had just died. But just as my eyes were beginning to shut I plugged it back in and it beeped. I slid the bar over and there the image returned, half head, sofa and desks. Ceiling lights still blaring. I looked around further and noticed the number, 336, printed large on a medium sized white paper and hung seemingly independent of other numbers or words. What were those numbers, my brain burned yet again? The time now was 3:00 AM and my concentration was just not there. I let my eye zone out across the little screen, and in a short while, without thought or purpose, it had located a mirror diagonally across from the mysterious number and by sheer luck of angle and location I could now see what was only half told previously. 336 as it turned out was the number associated with a furniture class, one made famous by a state of the art fabrication lab, endearingly referred to as the “fab lab”, fabulous for the way it can take complex demands and run them effortlessly through a CNC machine, slicing and carving pieces that when assembled generate the creamiest results ever. The lab is fabulous also for the reason that the person running the show in it is a work of art in his own right, a jack of all trades, at once literary critic and master carpenter.

“The shop opens at 7 and I want to make sure I get the first go at the machines,” a text finally chimed. The girl must have gone mad, not the least because our professors had specifically and on repeated occasions said make sure you get rest, even if it means incomplete work. I needed to go get her, walk to studio and insist she return. I parted the curtains in the one window in my room and looked out, at what I am not sure. Snow was falling, in big chunks, stuff you wish for Christmas but not in the middle of the school year and on February 23rd. The lights of the stadium nearby had been strangely left on, maybe not in full numbers, but enough to give campus a divine aura, something out of Tolkein’s fantasy lands. To the left and just barely within my cone of vision the rolling hills of the Palouse could be seen in outline, rendered not in the usual earthy greens and browns of the daytime but in layers of gray and white as if scratched hard on a surface not unlike canvas by charcoal and white pencil. Suddenly I had the urge to draw, recalling a sketching class I took a summer ago in which the professor divided the class into two segments, one manic the other placid, one encouraging channeling our demonic side, mashing tool and paper to the mutual dissolution of each, the other calm and karmic and to the effect of letting the spiritual liquid inside us bubble up and pool at the table.

I looked on for what must have been a long five minutes, captivated by the art outside. But soon also by the stadium lights, not as contributors to the poetics of monochromy but as consumers of energy being wasted for no particular reason. I began to think of a required class I had just finished a semester ago on sustainability, touching among other things on something called the “ecological footprint,” originally developed by Canadian academics named Matthis Wacker and William Rees, in which algorithms quantified rates of consumptions and translated them into area. “What was the ecological footprint consequence of turning the night sky into day,” I thought to myself, blinking compulsively? I did not have a quick answer of course and felt somewhat discouraged. Other lessons popped into my mind, of sensors and electrical circuitry that made it automatic and self-reflexive for shutters, dimmers and a battery of other energy saving features to operate in unison, calibrating electrical supply against demand regulated by the hour. Big urban data was part of the class and while the professor did not fully understand the topic in detail she did say that it had to do with creating a network of information about city functions tying the operation of one with those of another for maximum efficiencies.

“Could this be applied to our school”? Could the merging of Architecture, Interior Design, Landscape and Construction Management be more than a gluing exercise, give our school a certain professional appeal? There is no question about it, gluing or otherwise, the move was an exciting one, but one also riddled with fears and insecurities, of turf battles fermented over years of understanding and misunderstanding between the fields, some stemming from legitimate differences in values, others in narratives willfully constructed to mislead and self serve.

Could big data be appropriated to advance a healthy integration between our four programs, distributing information in such a way so that knowledge is monitored and calibrated against a specific demand for it? developing collaborative links to solve emerging problems. This way schedules and disciplinary barriers would melt away in favor of a dynamic system in which learning is based not on agendas but flows of energy, more search than established wisdom. Where there used to be a drive for the finished now would get replaced with the open-ended, like someone had just split coffee and watched its droplets streak down a no particular path.

I was getting tired but also determined to go get my friend. Stabbing in the dark for my jeans my phone brightened once again, this time with an image of me sitting at the window, my face drenched in electronic light against an otherwise perfectly charcoal frame. I smiled and opened the door. It was 3:36 AM.

INTERVIEW

Questions for Tom Fisher

Professor, College of Design, University of Minnesota
Director of the Minnesota Design Center
Dayton Hudson Chair in Urban Design

Randall Teal
Associate Professor, University of Idaho

Ayad Rahmani
Associate Professor, Washington State University

The following questions were generated in light of an interest on behalf of 49th parallel ejournal to start a new online journal speaking to shared regional values and aspirations.

Q1. It is by now a well known fact that our world has been pried open by globalization, including the way we communicate, do business, and learn. Even our empathetic meme has acquired a new dimension, feeling the plight of distant disasters in ways that weren't there just few years ago, through videos, social media and so on. Is there room anymore for regional education in light of this?

Thinking of globalism and localism as somehow opposed to each other is a mistake. The human ecosystem is like any other ecology, which is always global and local at the same time. Every ecosystem remains a part of a global flow of energy and resources, but it thrives or not locally. One reason modern civilization has done so much damage to the world is that our knowledge of it is misaligned with the way the world is organized; we sort knowledge into terms of disciplines, while the planet and its ecosystems are sorted by place. In the future we not only need global knowledge paired with local action, but also place-based knowledge in an increasingly place-less civilization. As one of the few place-based design disciplines, architecture has much to contribute to this.

Q2. As a tag-along to the previous question; does regional practice mean anything anymore, especially given that a good part of the last recession was overcome on the backs of projects preformed overseas? China and Dubai played no small part in helping the likes of NBBJs and the SOMs stay afloat, which in turn kept a few local firms intact as well.

Humanity has had a couple-hundred-year Ponzi Scheme with the planet, where the one billion or so people now at the top of this pyramid scheme have done very well by exploiting the other six billion, by exhausting natural resources needed by future generations, and by extinguishing other species at record rates. As we learned from Bernard Madoff, Ponzi Schemes collapse when they run off the planet and that is exactly what has happened with humanity; it now takes 1.5 earths to meet our current needs. So the game is over. Our Ponzi scheme is poised for collapse and those at the top of the pyramid, the global rich, the wealthiest countries, and the biggest firms, all have the farthest to fall, and fall they will. A post-Ponzi-Scheme existence will look a lot like human existence before it began, with communities of people living in resilient ways, in local economies, husbanding local resources. In the near future, regional practice will be everything.

Q3. As inland schools we have a unique opportunity to work with rural communities and open landscapes, and yet the world is on a hyper mission to urbanize, to densify, and gentrify. Might there be a unique role for the inland school to ruralize the urban, and vice versa?

Humans are moving into cities of all sizes as a survival strategy, since cities may be the one ecosystem in which our vulnerable species can survive. But the megacities emerging around the world are not sustainable, since they depend upon too much land and too many resources in order to survive, so we will also see the re-emergence of smaller cities and revitalized towns more able to support themselves on the resources – the food, water, energy, and materials – within their immediate control. The rural/urban dichotomy will not mean much going forward. The two are interdependent and need to reinforce each other at a scale that can ensure the survival of both.

Q4. Collaboration has become a buzzword and just like any other it embodies both the valuable and the trite; what may be a good model for teachers and students to follow to be effective consumers of the term.

We have entered a sharing or collaborative economy in which cooperation will increasingly prevail over competition, access over ownership, and social networks over hierarchies. Properly understood, collaboration isn't a buzzword, but a fundamental shift in the way in which people will relate to each other and to the world around us. And it has to be at the center of how we educate – and relate to – students, clients, and communities.

Q5. The journal for which these questions have been devised was set up under the auspices of collaborative aspirations, is it time to break down some of the boundaries between schools, or is there still a need to uphold them?

We have entered a time in which networks and webs have replaced the machine as the dominant metaphor for reality, as we move from mechanistic to ecological ways of seeing the world. In that light, the hierarchies within and boundaries between schools makes little sense and we would all do well to find new ways to connect institutions and link faculty and students with each other, which in the digital age, has become much easier to do.

Q6. On a slightly different topic: what is the role of the architect today as a public intellectual, what pressing issues should he or she speak to?

Even when doing private commissions, architects make environments that affect the public and that convey an answer to the fundamental question of all architecture, which is: How should we live? As such, every architect is already a public intellectual, a person putting ideas into the public realm that prompt a discussion and provoke a response. As to the issues we should take up, they remain much as they always have been: we build in order to create a place for ourselves in the world and to improve human, social, economic, and environmental health.

Q7. What is the relationship between the public intellectual and the region? Is there such a thing as a regional ethic?

Those questions, like all architectural questions, happen in particular places, and so unlike the public intellectuals who use print or digital media to convey their ideas, architects necessarily have to do so in a given location. Like politics, all architecture is local and however global it may appear, our field remains one tied to specific geographical regions and we should embrace that reality.

Q8. Back to education; what is the role of "theory" in education today. In the past it borrowed heavily from linguistic examinations of text, diagnosing issues related to sign and signified: what might its value be for us today? Now that the world has been probed and opened through Google, superficially or otherwise, and if theory was in effect an attempt to demystify things unknown, is there really a need for theory as knowledge anymore?

Theory puts forward propositions about the world. Every building represents a "theory" about what it means to live a good life and to be in the world, in a particular place and time. Architecture cannot exist without theory, without an idea about what it is doing and what it means, but our field goes through cycles in which we put more or less emphasis on thinking or doing, on theory or practice. But should not think that we can do away with one or the other, since architecture always involves both.

Q9. The studio has always represented the core platform on which we test ideas, teach creativity and practice design. Does it need to change, cast a greater influence on distant locales, work with the UN in rebuilding marginalized communities, corporations in improving our cities, airports etc?

Studio offers an excellent pedagogy, one that other disciplines have wanted to emulate because of it flexible, interactive nature, ideally suited for the digital age. That said, the studio can also become too hermetic, too closed off from the challenges people face in the world, which, however avant garde the work in the studio may appear, represents a profoundly conservative point of view by refusing to deal with social, economic, and political realities. We can no longer remain a profession of the rich, designing primarily for wealthy individuals, communities, and companies, if we hope to have any credibility or viability. We need to declare human shelter as our purview, as medicine has health and law justice, and find ways to serve the shelter needs of all 7+ billion people on the planet, and studio becomes a place in which we can begin to figure out how.

Q10. What ideas might you have for ways the schools of the 49th parallel can physically communicate and connect? For example one thought is that the 49th parallel schools agree to build/buy a shipping container that makes the rotation between the schools, setting shop at each and over the duration of say a month it serves as symbol and space for interactive/collaborative/immersive work, helping communities address pressing spatial and environmental problems, but serve as hub for social and creative production.

In an era in which we already produce far too many greenhouse gasses and use far too much of the globe's finite supply of oil, we need to stop moving bodies and begin to move more bits instead. So, how can the 49th parallel schools communicate? Skype, Facebook, Twitter, Snapchat, Instagram, e-mail, video conferencing, and cell phones, among many other means. We don't need to be in another place in order to be present and our schools could lead the way in this.

SCHOOL PROFILE

Disciplinary Leadership through Critical Thinking and Engagement

Marc Swackhamer
Associate Professor and Head of School
School of Architecture, University of Minnesota

While it is difficult to reduce a school's identity to just a handful of descriptors, the University of Minnesota School of Architecture can roughly be understood through its investment in two particular areas. First, we focus on design grounded in critical representation (materials and media literacy, or drawing and making as a way of thinking), and second, in social engagement (ethically motivated work that strives to make the world a better place). These two areas grow from the strong reputation of the school as a place where students learn how to beautifully draw and build, and from the state of Minnesota's history of social progressiveness and humanitarianism.

Architectural design, with a particular emphasis on design process, is the elemental competency uniting our school's diverse research agendas, approaches to teaching, and visions for the future. For us, process is intrinsically bound to ethical decision-making. Our students are aware of the interconnectedness of their choices and understand that those choices have consequences for the people and communities they serve and the environments within which they design.

The school aims to prepare students for leadership in the rapidly changing field of architecture. We value inquisitive, curious, and adaptable thinkers, those who engage the fundamental disciplinary provisions of architectural practice while challenging its boundaries. To this end, we focus on learning experiences that imbue particular ways of thinking, with an emphasis on lateral, synthetic, and discursive approaches. We focus on the "why" as much as the "how." We encourage questioning, risk-taking, and embracing failure. We believe that these are the qualities common to all leaders. They are not about skills or technical knowledge, but rather about a particular disposition - a way of being in, and seeing, the world.

The three examples below illustrate how we are developing not just exceptional architects, but also the future leaders of the discipline.

For a recent panel discussion at the AIA Minnesota Convention, I was asked to speak on digital parametric technologies and how they influence our studio curriculum and culture. Knowing my background, I think the audience was surprised to hear that while our school is generally quite invested in digital technologies, we only promote them in as far as they scaffold particular habits of mind in our students. We are not interested in technology for its own sake - in teaching software so that students can simply check it off of their list of required skills to secure a job. At Minnesota, we actually frame the benefits of parametric software in terms of how they build an ability to think parametrically, or in a rule-based, disciplined, and interconnected way. For this reason, we teach parametric thinking, as distinct from parametric software, through both digital and analog methodologies. In our first year graduate studio, for example, our students document the use of a hand tool through photography and film, then analyze it through hand drawing. Progressively, they move away from pictorially accurate depictions and towards abstraction. They then develop instructions, or rules, that they use to generate drawings by hand. This is their first introduction to parameters. If a dot is placed here on the paper, then a line is extended from that dot in this way, which leads to second dot, and so on. The students do not know what their drawings will look like until they actually produce them. Rule-based formal generation is then similarly used to make a physical model. Not until they are familiar with this kind of rule-based thinking do students actually crack open software to learn digital parametric techniques. Close observation, thinking, and questioning are privileged over techniques and skills (although the resultant drawings and models are quite beautiful).

What is vitally important to us about emerging software and technology is that it promotes, in the students, an ability to understand the interconnectedness of their decisions - that a choice they make over here has a consequence way over there, where they may never have imagined. This foregrounds for the students, the importance of critical decision making and judgment as essential qualities for not just an architect, but also for a disciplinary leader.

A similar focus on disciplinary leadership can be seen in our school's Masters of Science in Research Practice (MS RP) degree program. This relatively new program is so exciting to us because it provides a platform for students to work on applied research projects in collaboration with both an architecture firm and a faculty member. First, firms identify research topics that interest them. The program then matches the firm with a graduate student and faculty member who have overlapping interests and expertise. What distinguishes this program from others is that as the student spends time in the firm conducting research, he or she is also enrolled in school, consulting with a faculty member on campus. This tight link between practice and academy yields surprising and novel solutions to persistent, professional challenges. In some cases, however, it also opens new opportunities within firm's existing business models. After graduation, students who have been leading the research often transition into professional leadership positions in these newly identified areas of research practice. The program is mutually beneficial to firms and students alike. Firms venture into new, untapped territories that expand and challenge their existing business models. Often these new areas of development represent current topics, about which young, emerging, and talented architects feel especially passionate (climate change, resilience, social engagement, good design accessible to all). When firms demonstrate genuine investment in these topics, they are better positioned to recruit top talent. Students emerge as thought leaders in these new territories, benefiting, along the way from close partnership with a faculty member and developing an expertise in his or her area of research. In 2016, the MS RP program was recognized with a National AIA/ACSA Practice and Leadership Award.

Like the development of critical thinking skills in the first year graduate studio experience, the MS RP program positions our graduates to take on leadership roles in the discipline. Students are simultaneously introduced to the culture of professional practice and asked to challenge that very culture. They represent a catalyst for change within the discipline and are looked to for leading the charge into new areas of research and practice. This is remarkably empowering.

Finally, we are further developing future professional leaders by cultivating in our students a passion for community-engaged, interdisciplinary design work. One shining example of this is our third year Design Duluth project. It is a collaborative, interdisciplinary graduate studio offered in the third year of the M. Arch and MLA programs. Funded by the Bush Foundation's Community Innovation Grant program, and internally by the University of Minnesota, the design studio challenges norms of academic autonomy by emphasizing the best in community design practices. Partnered with non-profit organizations in Duluth, Minnesota, the studio has developed extensive links with local government, state agencies, non-profits, public and private stakeholders, and community activists.

The studio is a multi-year initiative that was organized loosely around former Mayor Don Ness' "90 by 20" initiative, which calls for establishing the economic and cultural conditions to attract 4,000 new residents to Duluth by the year 2020. Motivated in part by catastrophic flooding in June 2012, the studio now works with a network of over 30 partners to propose resilient, multi-scalar solutions to long-term problems (climate resilience, economic instability, social paradigm shifts, and massive infrastructural reconstruction). The current studio process links architecture, landscape architecture, and urban planning graduate students with surrogate clients, local experts, and stakeholders throughout the design process. In a departure from the service design model, the students, while intensely engaged with the community stakeholders, generate forward-looking speculative design projects that address community issues from a deep base of analysis.

The studio was recognized by the ACSA with a Community Design Practice Honor in 2015. At present, the studio is led by faculty from Architecture and Landscape Architecture, and benefits from the extensive expertise of local practitioners, designers, and researchers. It imbues in our students a deep passion for architecture that benefits everyone and strives to make the world a better place. Students feel emboldened to go out into the community and to effect real change. As they graduate and accept positions in firms, they take with them this appetite for community engagement and thus shape the future direction of practice.

These are just three curricular areas where we are, at the University of Minnesota, preparing our students for professional leadership. While technologies and ways of producing architecture change rapidly, and we cannot comprehensively, or with any degree of accuracy, anticipate specific shifts in software, building technology, construction, or project delivery, we can, and will continue to, inspire our students to think critically and cultivate their capacities for self-learning and reflection. We believe that this is what a university education does best.

STUDENT PROJECTS

Unearthing the Palouse Topography:
Reconciliations of constructed flatness and natural slope

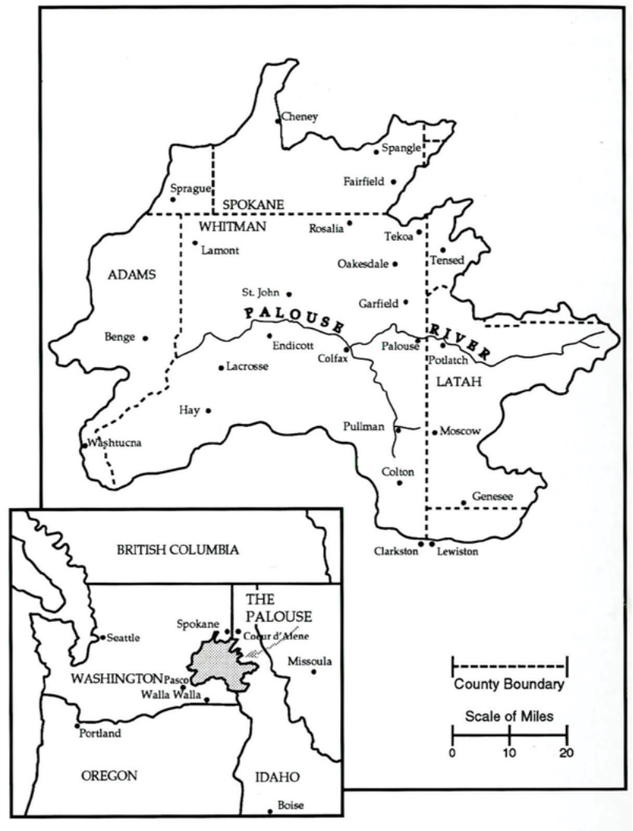
Introduction by Paul Hirzel
Professor, Washington State University

The provocation for this study by 8 Washington State University graduate architecture students, is the accelerating degradation of an extraordinary contoured landscape called the Palouse through building construction. Located in southeastern Washington State this remarkable topography has been a draw to artists, photographers, (see Figure 2) tourists, and geologists for many decades, and considered by many as one of the most beautiful landscapes in the world – featured in *The Most Beautiful Places in the World* by Jay Maisel. Covering a land area of approximately 4000 square miles (the size of Connecticut) this mountain girdled prairie resembles an ocean of rolling hills, "a rough sea at the height of storm" notes Alexander McGregor in the book *Palouse Country* (see Figure 1). This unique topography is the result of a traumatic geological history beginning 12 million years ago – first, massive lava flows inundated all but the highest peaks (Kamiak and Steptoe Buttes) resulting in the thickest basalt layers in the world. Then southwesterly winds carried rich silt from the Pasco basin to form top soil dunes resembling waves of up to 200 feet thick. These spectacular geological events produced topography that David Alt, in his book *Northwest Exposures*, calls one of the "strangest of western landscapes." The Palouse embodies a landform type where, he continues "the logical continuity of an erosional landscape is missing. Hills do not continue into ridges, and the valleys do not connect into an integrated network of streams".

The Palouse landscape is a sprawling plain of "gigantic earthen dunes connected by twisting benches, amphitheaters, and saddles" notes another Palouse author Richard Scheurman in his book *Palouse Country*: *A Land and Its People*. Inspired by this remarkable landscape and distressed by it continuing destruction, the students were first presented with the task of analyzing the current conditions. Using the community of Pullman at the local scale and Whitman County at the regional scale for case studies, the students first inventoried examples of recent building construction which (to varying degrees) overwhelmed the native slopes of the Palouse by flattening - cutting, filling, and retaining (see Figure 3). They discovered that early building construction in the Palouse was far more sympathetic and respectful of the existing topography (perhaps because of limited excavation options. Towns were located in the flats near rivers and streams and farms were located in the valley folds for protection from the winds. This produced a more congenial relationship between the human need for flatness and protection and the preservation of the natural slopes of the Palouse. Unfortunately, as new excavation equipment and advancements in explosives made earth moving more economical, combined with population increases, both housing and commerce spread onto the adjacent hills – flattening the contours for parking lots, big box stores, an housing developments (see Figures 3 and 4). The availability of low cost air conditioning, insulation improvements, and high performance siding and roofing made it more feasible to locate your house anywhere – people felt sheltered by the house structure itself and no longer used the topography as a means of protection. Houses started to be located on ridgelines to enjoy the view (see Figure 5). Driving through the Palouse, one can see the contrast between the early farmsteads, carefully hidden in the protective folds (see Figure 6), and the new housing, precariously perched on ridgetops and windward faces.

Figure 1

The Palouse country today. Photo courtesy of The Palouse Country: A Land and it's People, by Richard Scheurman



THE PALOUSE COUNTRY TODAY

Figure 2

Photographing the Palouse, Photo by Scott Stulberg

Following their inventory analysis, students developed proposals to reconcile this difficult conflict - our desire to make the world flat in a landscape of rolling hills “at the height of storm.” They “unearthed” ways to both preserve this iconic heritage of topography and respond to life in a world of shopping carts, wheel chairs, and cars. Matt Bardon looks at bringing miniature examples (inspired by Japanese gardens) of the Palouse topography to the university campus to create an enticing topographic pathway to connect downtown Pullman with the summit of campus. Lauren Cherry looks at how a big box store might be redesigned from one level to two– reducing land area requirements for parking and commercial space by half to save money and preserve farmland. Plus it provides the added benefit of improved cardiovascular health from stair climbing – getting your work out shopping, versus using the Stairmaster at the gym. Samantha Stanfield challenged the idea that we love flatness. She argues that we secretly love slope, referencing fashion examples such as high heel shoes - which allows one to carry slope with you. Her invention was a topographic flooring system that can transform your banal flat floor into sensuous hills and valleys. Josh Neumann reveals natural flatness in the Palouse with a series of interventions that use light, plastic tubes, chairs, tie down straps and anchors, and imagination to create secret flat places to wander in the Palouse countryside.

Figure 3

Demolition of the contour. Photo courtesy of Google Earth

Figure 4

The scars left behind by big box stores. Photo by Lauren Cherry

Figure 5

Building on the ridgelines. Photo by Jose Hurtado

Figure 6

Building in the folds

Kevin Jones uses the potential energy of slope and rainwater to design housing that uses rain to power micro turbines. Multiplied - a sloping housing subdivision creates community by sharing power. Xixi He brings an international perspective to the problem by using the ancient traditions of Feng Shui to reconcile slope and construction. She considers the continuity and disruption of the dragon veins of Qi, to envision a Pullman that maximizes “harmony with nature”. Finally, Jose Hurtado and Ashley Swanson, taking a more pragmatic view, researched slope preservation strategies from other regions in the United States. From regulations to prevent sky lining (building on ridgelines) to limits of building footprint size and contour modifications, they make a series of recommendations as to how Pullman and Whitman County governments might encourage future protection of our iconic natural slopes. In closing, it is our hope that these essays will provoke dialogue about how we might better protect the beauty of the Palouse topography and, at the same time, recognize our desire for flatness – we are always searching for “the path of least resistance”. This effort is not a “either/or” but a “both/and” proposition. If these imaginative and heartfelt perspectives add to this discussion, this effort will be considered a success.

Miniaturizing the Landscape by Matthew Bardon
Graduate Teaching Assistant, Washington State University

This study focuses on the iconic landscape of the Palouse, and how specific architectural elements can respond. Understanding how the Palouse turned into the iconic topography that it is today leads us into a geologic study of the Region. The windswept formations are explained in order to grasp the geometric arrangement. This leads into a digital analysis of the Palouse and it's contours. Isolating certain recurring topographical features, we can further our understanding of the dynamic nature of this landscape. These typologies were then documented and analyzed in 3D. The importance of flatness in the human condition means grading is investigated in order to provide one way in which architecture can interact within topography. With this investigation, a new way of incorporating topography into design is explored: miniaturization. In an effort to build a relationship between the iconic landscape of the Palouse, and Washington State University, the design proposal will create a series of urban interventions set around campus that reference the topographic typologies of the Palouse. In the end, we will reflect on the architectural potential of miniatures.

Figure 1 (next page)

These landscapes have all been formed with the same loess soil as the Palouse. This Loess soil is a result of glacial silt that was blown onto the landscape and settles. The wind continues to erode the glacial silt creating rolling hills as we observe in these areas of the world. Photos: Google Earth Database

Figure 2

The majestic rolling hills of the Palouse inspired a study into the causes and the effects that this iconic landscape can have within design. Photo by Author

The Palouse is a diverse mosaic of topographic conditions formed by some of the most catastrophic geologic events on record. Lava flows, volcanic eruptions, glacial floods, and wind swept loess dust have created the dynamic topography that is the Palouse.[1] This Loess soil is responsible for the formation of similar hills in other parts of the world as seen in Figure 1. The Palouse is defined as the area to the east of the Columbia Plateau that sits on an ancient basalt that rises into the foothills of the Rockies. The most iconic feature of the Palouse are the majestic rolling hills. These hills are comprised of a fine grain silt, or loess, that sits on top of the basalt bedrock. The hills form a wind-based pattern when observed as a system. The windward side to the south of the hills gently slope, while the leeward side to the north is considerably steeper.[2] The Palouse is a complex network of sloping features acting as a system. The hills of the Palouse are dune-like, but a network of crests emerges to connect them. These crests can be spotted from photographs of the Palouse, as seen in Figure 2. Using 3D mapping I have identified ten different topographic conditions on the Palouse to be used as a portfolio of recurring typologies within the Palouse. These areas within the landscape will provide the samples necessary for a digital analysis. This exploration led into a documentation of how slope begins to inform architecture, and how these topographic features have been conditioned for human habitation. This attitude towards the contour changes the landscape for human development.

Relating architecture to topography is something that we continue to struggle with, and this analysis provides other ways for architecture to relate to the iconic landscape of the Palouse.

The Palouse is one of many Loess formations around the world that exhibits rolling hills. Loess is windblown silt made up of clay, sand, and cemented by calcium carbonate. It is a siltlike substance that can be found all over the world, as seen in the photos in Figure 1. Loess, the word itself, comes from the German word Löß which translates to loose, describing soil conditions in the fertile Rhine Valley.[3] The dune-like formations of the Palouse can be attributed to this silt that is constantly eroding at the mercy of the wind. These samples display a pattern of erosion present within the Palouse topography, as a result of wind and water erosion. There are ten digital samples of the landscape that have been compiled to display the complexity of the Palouse landscape (see Figure 4).

Figure 3

10 samples were taken from Google Earth, and by using 3D modeling programs converted into 3D topographic regions

Figure 4

1. The Snake River exhibits the typology of the gully, which drain water down into the river. 2. Kamiak Butte exhibits the Butte typology, and possesses a discernible leeward and windward side like the rolling hills 3. This flood plain south of Colfax displays both the valley typology as well as the rolling hills surrounding it. 4. This area above the Snake river represents the typology of the gully. 5. This area of the Palouse displays both the rolling hills as well as the connected crests. 6. This sample at the base of Moscow mountain represents the crest. 7. This area near Palouse represents the typology of the valley, hill, and crest 8. Pullman sits within a the typology of the Valley among three hills. 9. This area near Uniontown represents the Butte typology. 10. This area on the way to Wawawai landing displays the valley typology.

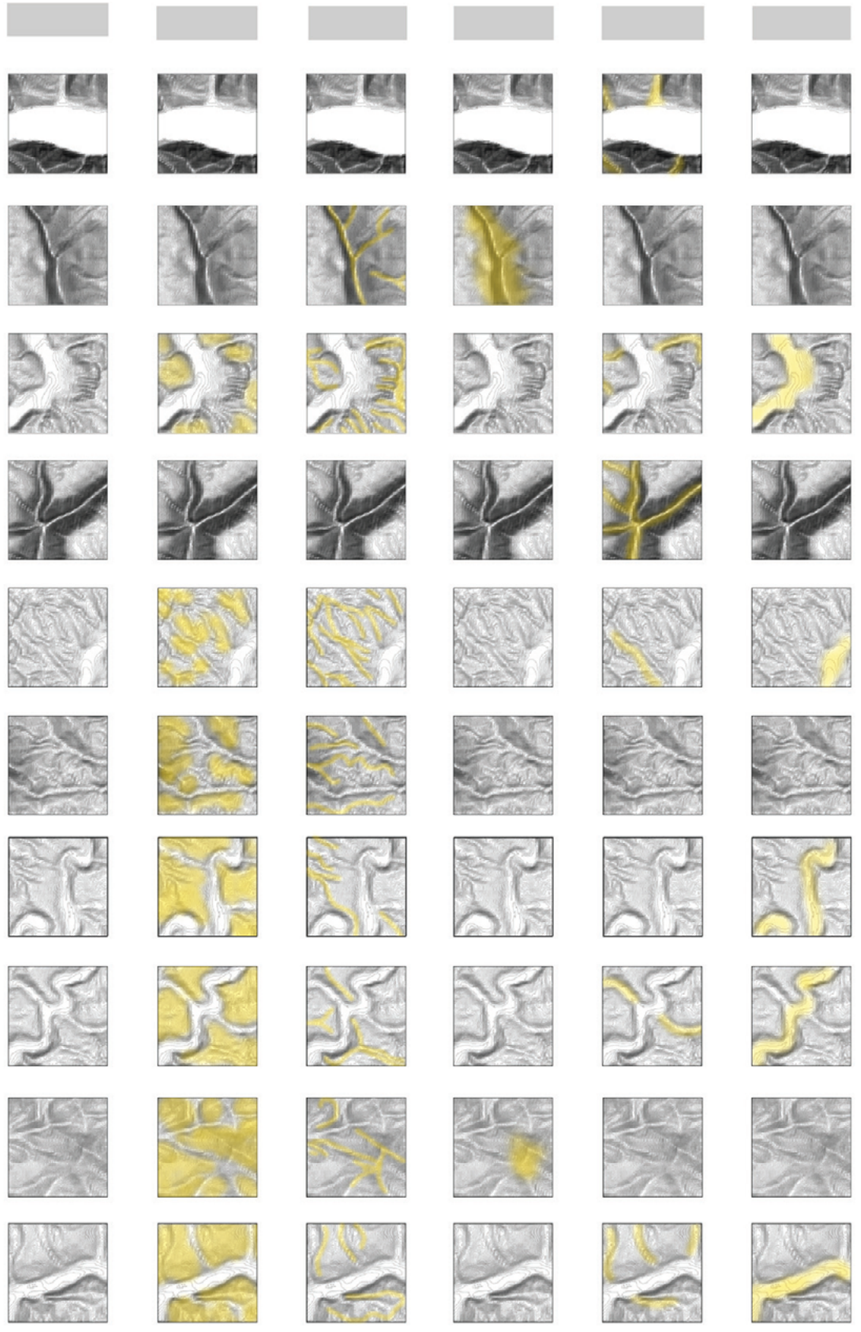


Figure 5

The ten samples inform the five typologies by using color mapping of the slope conditions in order to pinpoint the topographic typologies. The yellow areas show how these typologies can sometimes overlap.

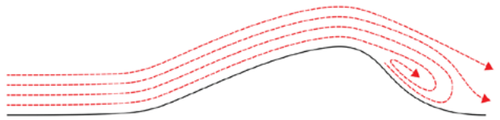


Figure 6

The windward and leeward side of hills are one of the five major typologies. They form as a result of the wind. This diagram exhibits the windward side on the left, and the leeward side on the right.

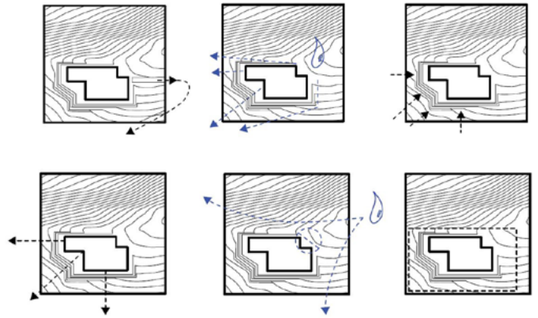


Figure 7

The following diagrams outline the strategies used in grading to control water flow and accessibility. Grading is seen here as a strategy at odds with topography. This technique is the basis for most architecture within the Palouse. The black arrows identify soil erosion, while the blue arrows highlight water movement across the site.

Through analyzing the Palouse as well as these regions I have discerned that there are five major topographical features that form a pattern within the landscape (see Figure 5). The first major topographic typology is the dune-like fine grained **HILL**, with a steep slope on the leeward side and a gentle-sloping windward side as seen in Figure 6. These small hills create the visual presence in the landscape. From satellite imagery, we can also see that these hills tend to be connected with an undulating linear crest. These fine-grained folds separating the leeward and the windward side of hills are the crests of the Palouse, and these **CRESTS** represent the second major typology. The third major typology within the Palouse is the **BUTTE**, large pieces of rock where Loess has accumulated, such as Kamiak and Steptoe butte. These features emerge from the landscape often inviting dense tree cover on the leeward side. The fourth major typology is the **GULLY**, a small creek of water that cuts through the Loess creating a natural drainage system. These gullies slowly erode the basalt bedrock, where they form the fifth topographic typology, the **VALLEY**, where many of the roads as well as cities are built. These areas are relatively flat and often follow common drainage routes from the networks of hills. These topographic conditions can be observed within the Palouse in a myriad of different areas as seen in Figure 5. It is these five typologies that dominate the morphology of the Palouse.

Within the morphology of the Palouse there are seldom areas untouched by humans, but these loosely scattered areas tend to be the most dramatic topographically. Common areas of human habitation tend to be the valleys, where our species gains access to water, as well as larger plots of flat land. These surfaces are where the Loess silt has settled as a result of runoff from the hills. Yet the cities easily out grew these valleys and grading is a common practice. Plots of land have been cut out of hills leaving scars. Despite our power to analyze and understand the landscape, construction often employs grading to reduce cost. Grading can have one of three attitudes: a cut, a fill, or as a combination of cut and fill. There are several criteria to consider before developing a grading scheme.

The following criteria, listed in *Grading for Architects and Landscape Architects*, highlights some important considerations before grading that are outlined diagrammatically in Figure 7:

1. The grading around buildings should always be oriented to fall away from the building.

2. Level areas with puddling water should never be allowed to occur.

3. Site grading extends only to the site boundaries.

4. The grading concept always starts with elevations of existing building, roads, and paths.

5. An initial grading concept on sketch paper with contour lines should be further developed in parallel with the overall design and drainage concept. The end result should be a grading and layout plan with existing and proposed contour lines, spot elevations, gradient indications, grade parting (crown) lines, and layout of all important construction elements.

6. The maximum and minimum gradient of various surfaces must be observed. Gradients of 4% and above are visible to the naked eye![4]

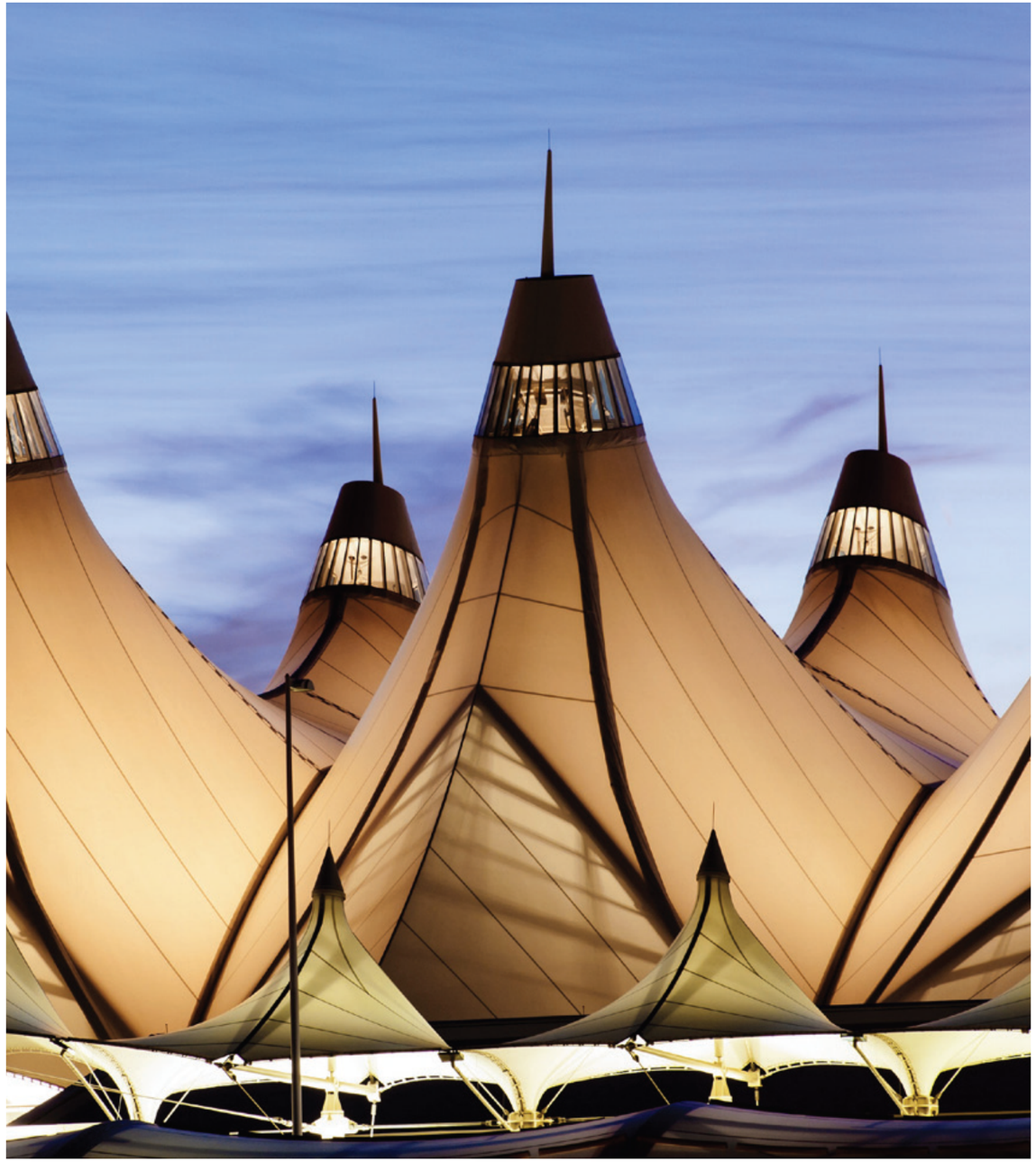


Figure 8

The Denver Airport by Curtis Fentress uses the landscape to inspire an iconic building that is set on a relatively flat site. It mimics the undulating peaks that surround the city to create an iconic building that relates to the context through miniaturization. Photo by Denver Post

Considerations for grading can be applied to the Palouse, but this outlines a formal grading strategy based on a cause and effect relationship with a predetermined building. The idea that we should design based on the flatness requirements of a particular building is one way to approach the problem, but we should consider the topographic conditions before and after we design. If we consider flatness as a requirement for building we may use the topography to our benefit instead of viewing it as the problem. It is important for the purposes of creating flatness to see the ways in which flatness can be created despite drastic changes in elevation. The Washington State University campus represents an entire area that has been planned with very little acknowledgment towards the changes in elevation. The attitude on campus has been one of creating buildings that cut into the topography, and connecting these buildings with the landscape. This cut and fill strategy is based within the grading criteria listed in Figure 7. Is there another way that we can connect to topography that rises above the dialogue between the topography directly around a building?

Seeking a strategy for both referencing and reconciling the conflicts between grading and natural slope, representation and miniaturization were researched. Can we create architecture that is born out of a quest to experience features of the landscape at a more accessible scale? Japanese rock gardens, and the Denver airport, inspired by the rocky mountains, as seen in Figure 8 and 9 Inspired by these ideas by miniaturization, five architectural interventions are proposed for the Washington State University campus. The concept of miniaturizing topography into architectural elements that we can experience in our daily life fulfills a psychological need for people to associate physical objects with memories. The landscape and topographic features of the Palouse form an indelible mark on the psyche of those who visit the area surrounding Pullman. Miniaturizing the Palouse can create delicate hardscape and softscape designs.

Figure 9

The dry-landscape Gardens of Japan reference landscape paintings of the Song dynasty, creating landscape elements that hint towards the topography at a smaller scale. These beautiful works of art inspire what relationship architecture could have to the landscape.5 Photos from top to bottom: Summer Mountains, Northern Song dynasty (960–1127), 11th century, Met Museum; Best Home Design, Japanese Rock Gardens; Thousand Miles, Wang ximeng, Northern Song Dynasty (1096 - 1119); Ryoan-ji Dry Landscape Garden, Nathan Bauman Photography.

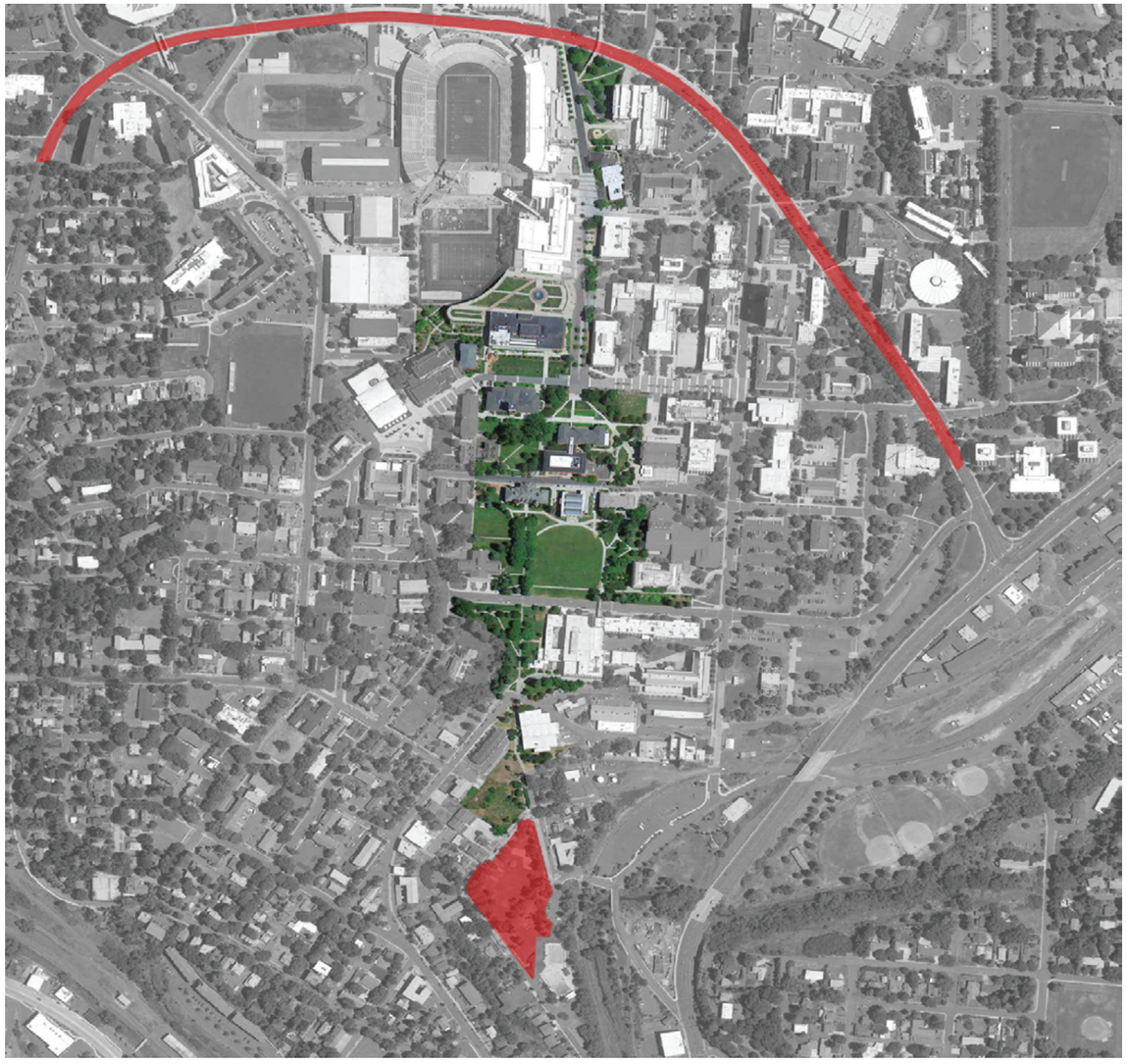


Figure 10

This a site plan of the Washington State University Campus, Stadium way and Reaney Park are highlighted in red, with the pathway going through campus. Photo courtesy of Google Earth

Washington State University is situated on one of four hills within the city of Pullman. The main axis of the Campus cuts through college hill, from the bottom of Reaney Park over to Stadium way labeled in red in Figure 10. The picture above represents this axial progression through the campus where there is opportunity for architectural interventions. Mixing the concept of the five typologies within the Palouse landscape as well as the concept of miniatures, the design essentially illustrates the Palouse. As you are walking across campus these follies recall the landscape around them. These miniatures are shown by location on the path in Figure 11.

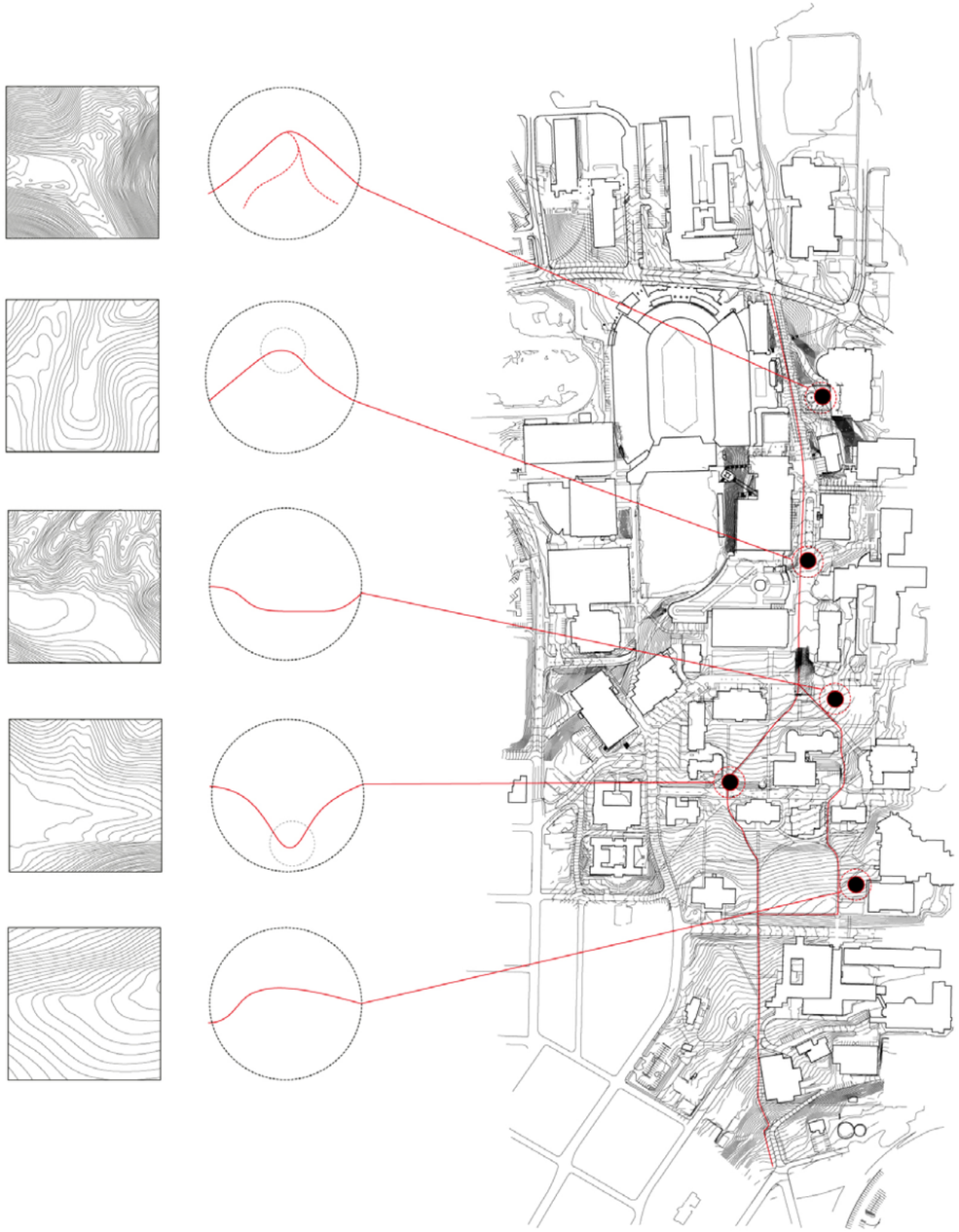


Figure 11

Typological miniatures top to bottom on the pathway through campus: 1. Butte 2. Crest 3. Valley 4. Gully 5. Rolling Hills

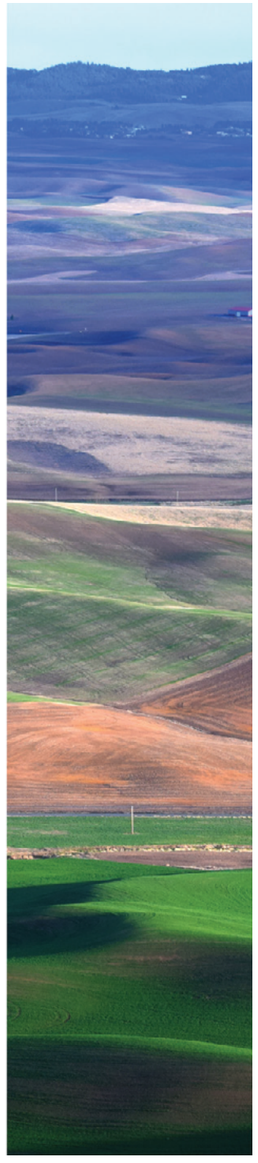


Figure 12

The colors of the Palouse are used in the designs to create another level of association within the landscape.

While the design is not meant to mimic nature, it uses nature as inspiration. By exploring the processes of the landscape, we can create colorful architectural abstractions that are based on the dynamic landscape of the Palouse (see Figures 13-15). The softscape miniatures relate to the Palouse directly in Figures 16 and 17. Design can look at nature through many lenses, and miniaturization is just one. These designs create abstractions that display of the wider context of the Palouse in an accessible way.

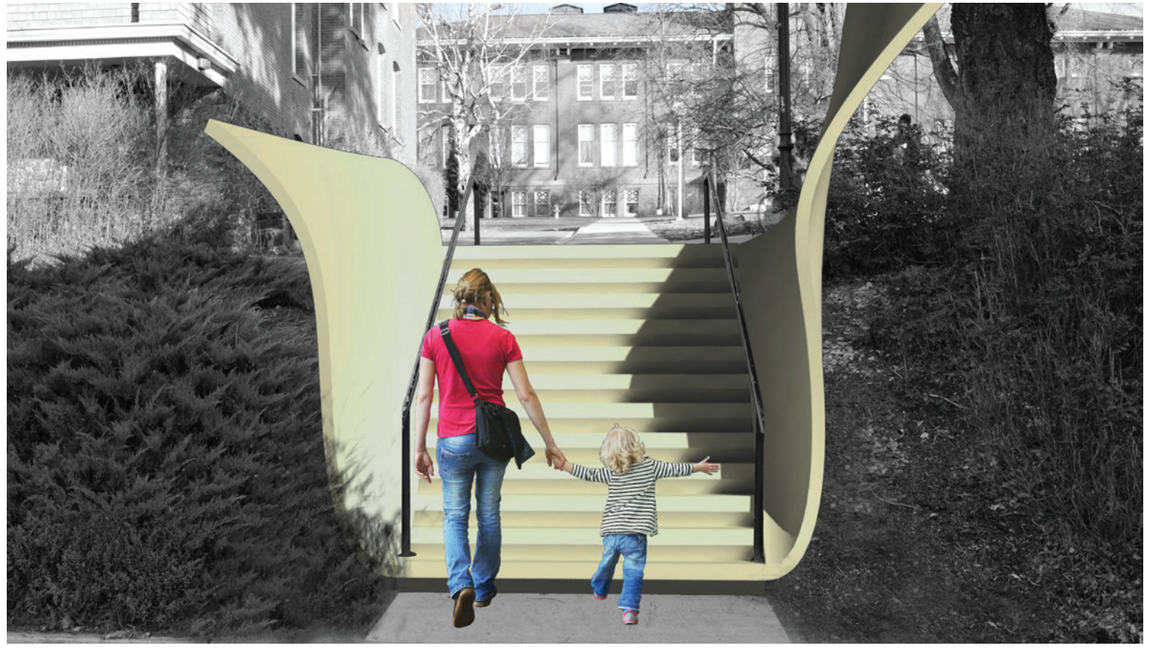


Figure 13

The light brown coloration represents the native grasses that tend to occupy the gullies in the Palouse. Photo by Author

Figure 14

The coloration within the concrete comes from the contrast of color within the hills of the Palouse. Photo by Author

Figure 15

The brown and green is inspired by the butte's coloration. Photo by Author

Figure 16

The valley provides a place to relax and enjoy flatness, night or day. Photo by Author

Figure 17

A subtle miniaturization of this Palouse landscape. Photo by Author

References:

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4. Petschek, Peter. *Grading for Landscape Architects and Architects*. (Basel: Birkhäuser, 2008).

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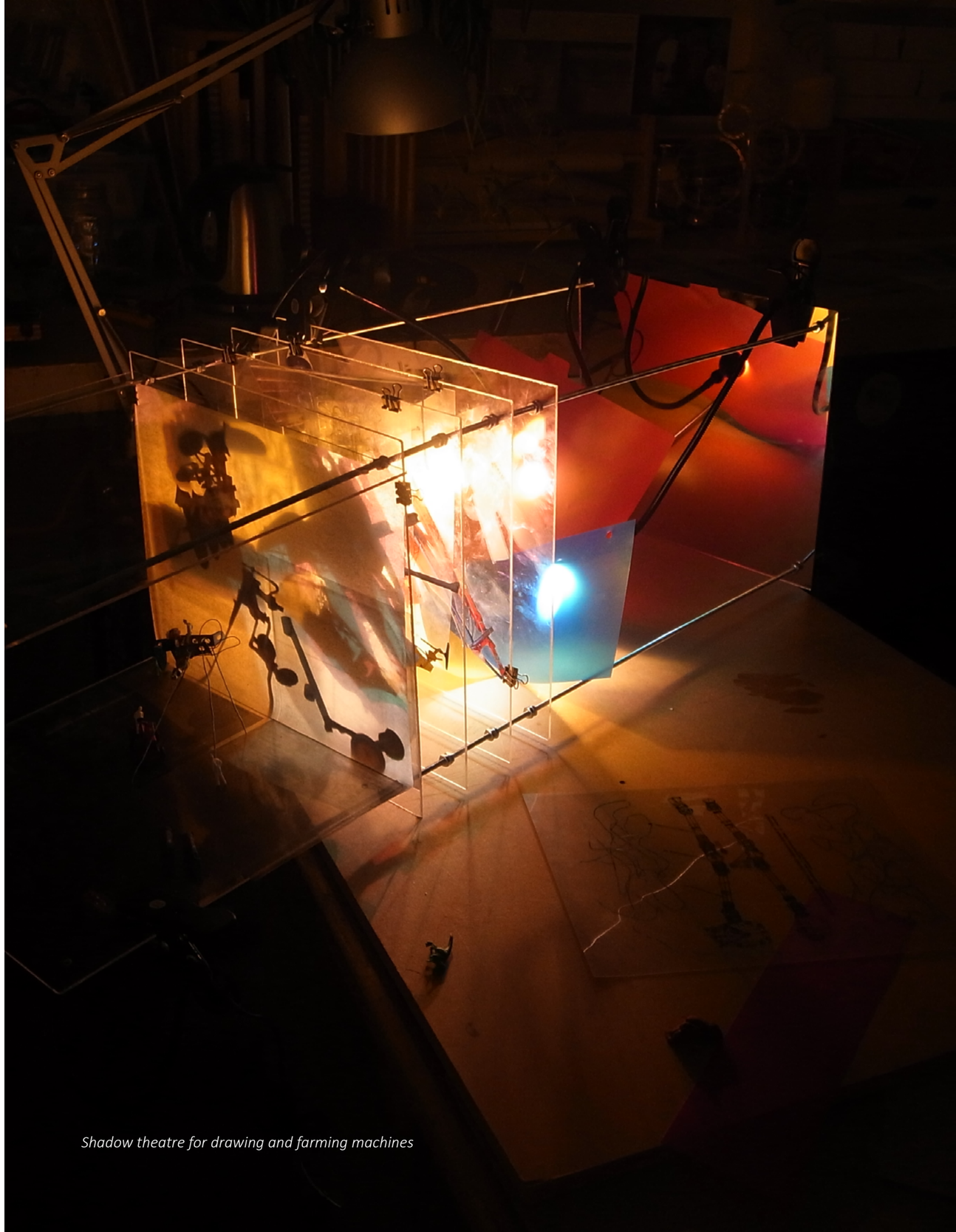
Drawing, Dwelling and Cultivating Agricultural Imagination

Xue Wei
Architecture Student (M1), University of Manitoba

Instructor: Lisa Landrum
Associate Professor, University of Manitoba

In an era of instant information, when everything seems to be explained away, Phantasmagoria Studio challenged students to genuinely wonder about the world, about regional topographies, about shared human conditions, and about architecture.

In response to this challenge, Xue Wei pursued his fascination with the fantastic agricultural equipment and landscapes surrounding and shaping the city of Winnipeg. His project began by studying how farming machines, both new and old, geometrically re-configure the earth by drawing large-scale on, in and with the ground. Though techniques of collage and capriccio, and engaging fragments of tractors, plows, combines and threshers, Wei fabricated a fleet of analogous drawing machines. This ensemble of re-invented equipment generated a crop of geographic shadow studies, yielding both illuminating imagery and wonder-inducing dwellings: one permanently perched within an irrigation system's pivoting armature, others ephemerally arrayed in its orbit. Planted on the expansive property of the Manitoba Agricultural Museum in Austin, this "machine for living" brings order to the surrounding campsite, where thousands of visitors gather each year for the Thresherman's Reunion—a kind-of Burning Man Festival for the Canadian heartland, celebrating Manitoba's agricultural history with parades of antique farm machines. The central dwelling is designed for the festival's grounds-keeper, providing a place to live, sleep and dream amid fields periodically flooded with farming-enthusiasts. Made from pragmatic devices associated with the agricultural trade, this seasonal dwelling serves as a magical locus of collective re-orientation, providing a place to contemplate horizons extending far beyond the obvious field.

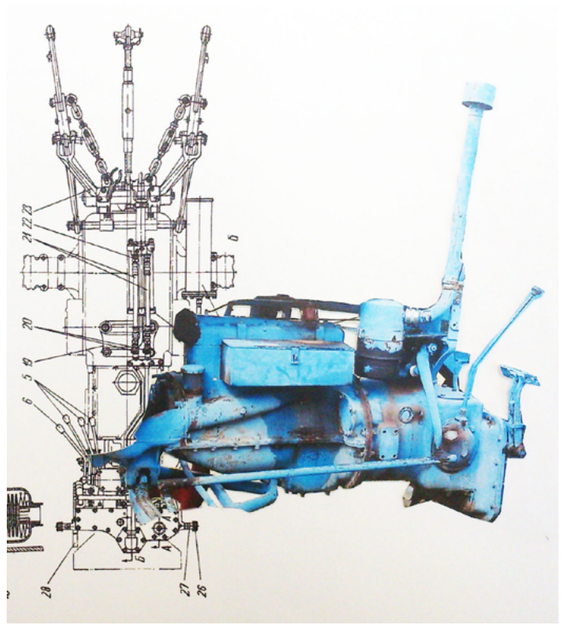


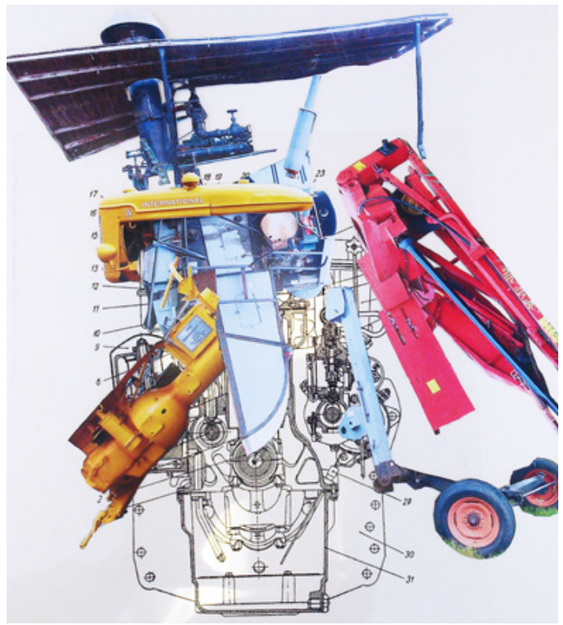
Shadow theatre for drawing and farming machines

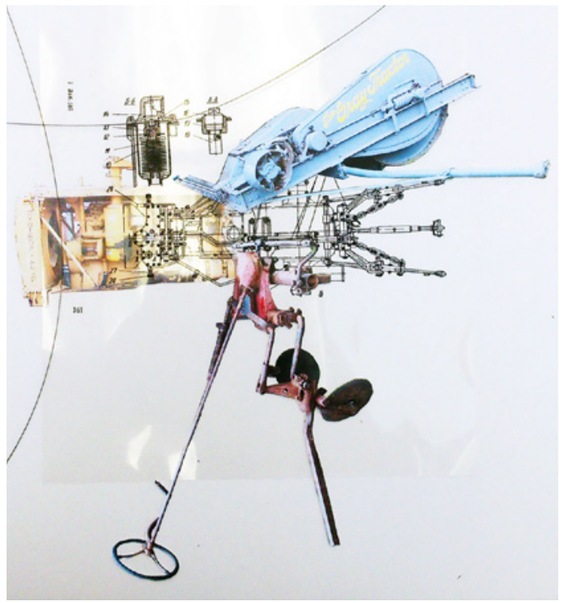
Geographic shadow study

Aerial view: Manitoba Agricultural Museum in Austin, Manitoba

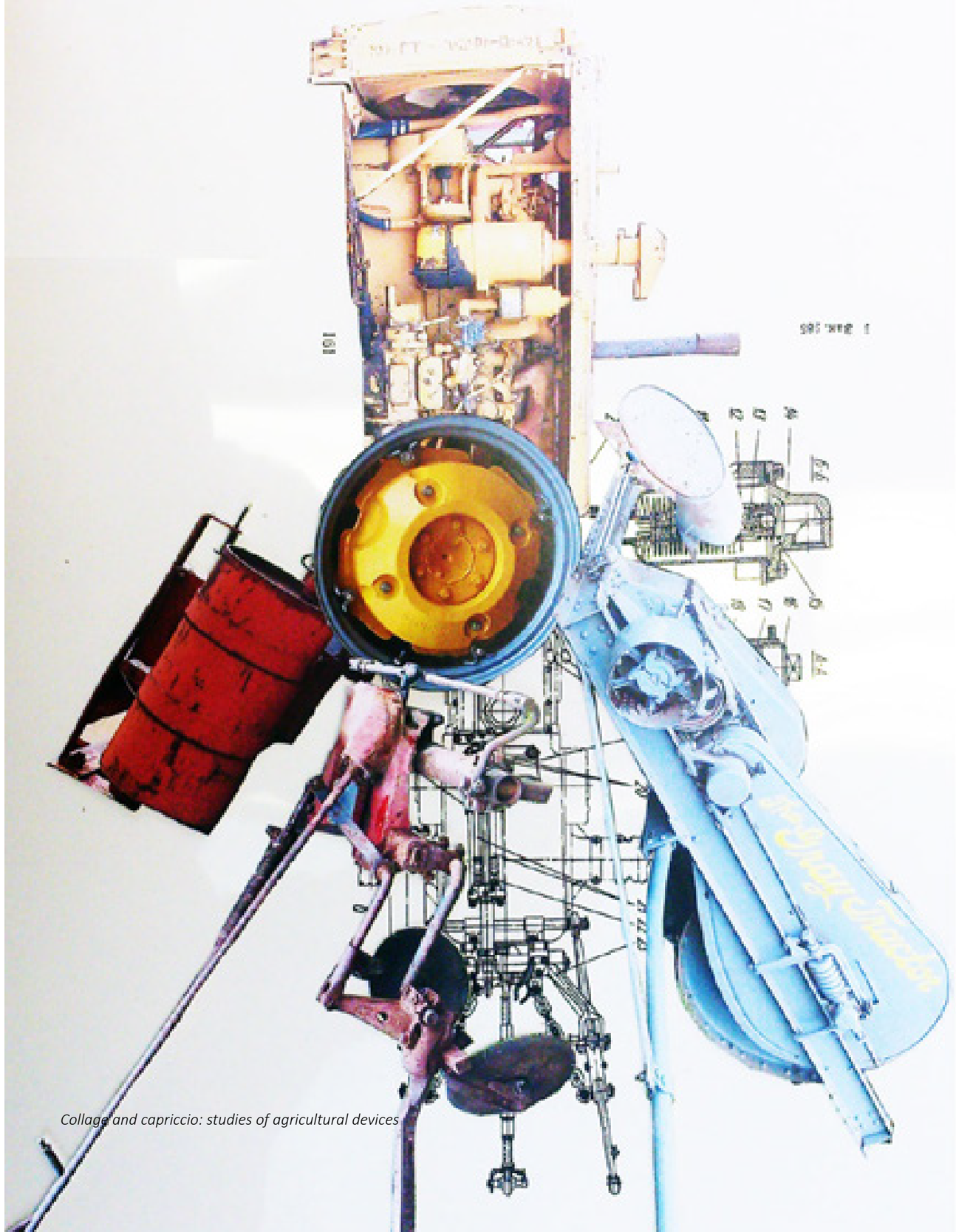
In the second term, Wei brought the magic of the countryside to the centre of the city by designing an urban complement to the rural museum. The new Manitoba Agricultural Museum and Farmers' Market is sited on Winnipeg's former rail yard site, at the juncture of the Red and Assiniboine Rivers, known as the Forks. Located within an open area between the elevated railway and the Canadian Museum for Human Rights, the new Agricultural Museum is well planted: between active infrastructure linked to the prairie's agricultural history, and a national institution calling for justice on many fronts—including land rights, ecological protections, and respect for indigenous sites. As a public space, the Forks is also a place of play. Designing in creative response to each of these opportunities, Wei's hybrid Museum-Market evokes a vast agrarian ruin while accommodating urban festivities in a generous marketplace and public park. The museum features dramatic spaces for the display of agricultural equipment large and small. Backlit at night, the functional farm equipment undergoes a metamorphosis. Becoming characters in an interactive shadow play, they tell stories of transformative strife and prosperity on the prairies. The building geometries reinterpret the logic of the land; its structure learns from the syntax of silos; and its colorful finishes emanate dreams of lush and lively bounty. Roving gates, tracks and screens—reinterpreting the rhythmic mechanisms of farms and railways—animate building thresholds, while facilitating daily deliveries of fresh produce. This phantasmagoric edifice, a machine in a garden, cultivates urbanity while reminding urban dwellers of their fundamental interdependence with surrounding farmland and nourishing dreams.



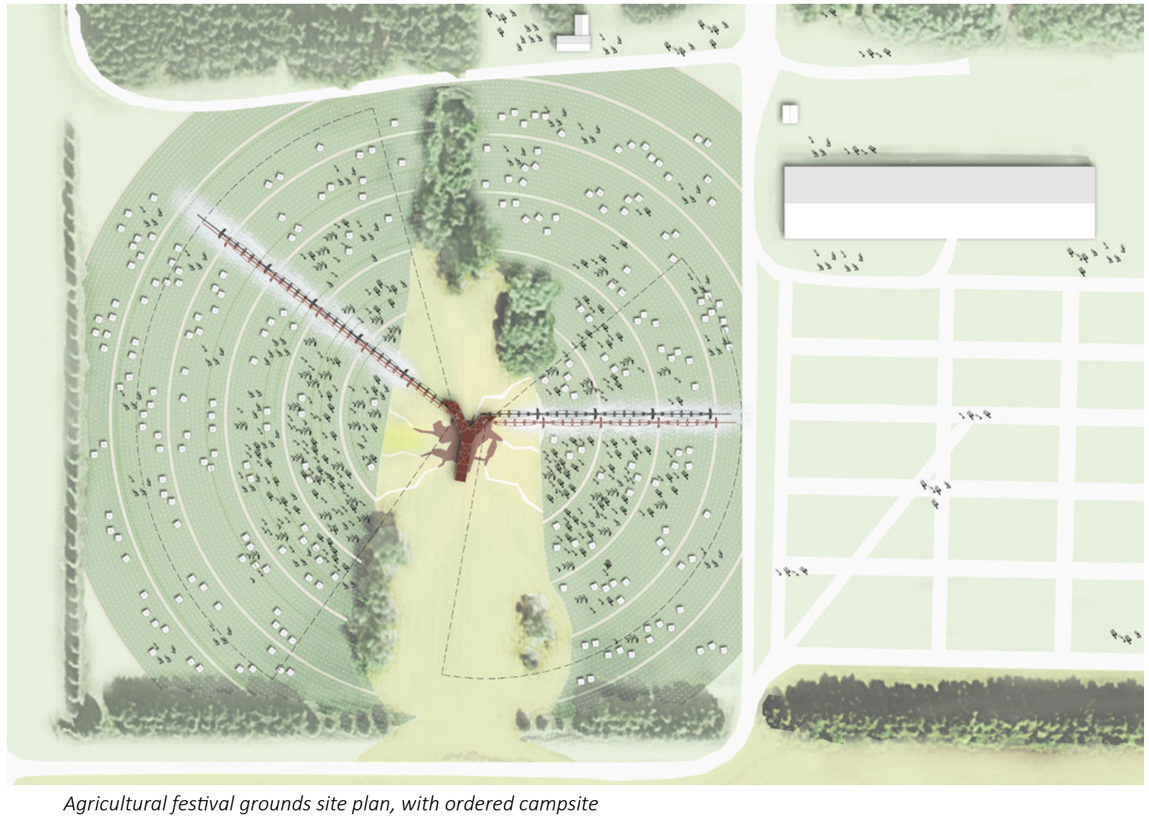




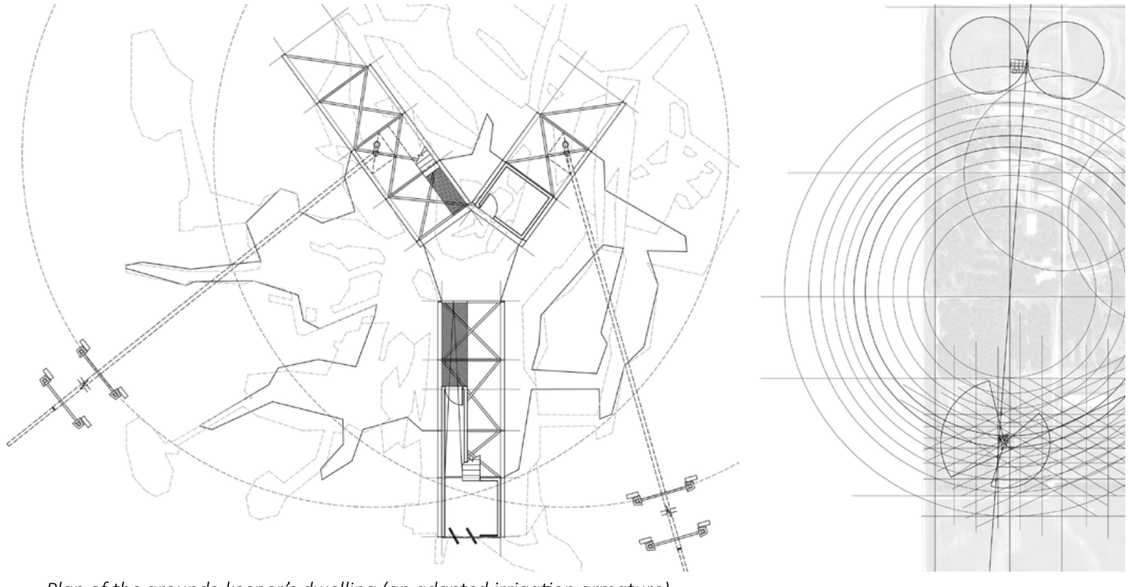
Collage and capriccio: studies of agricultural devices



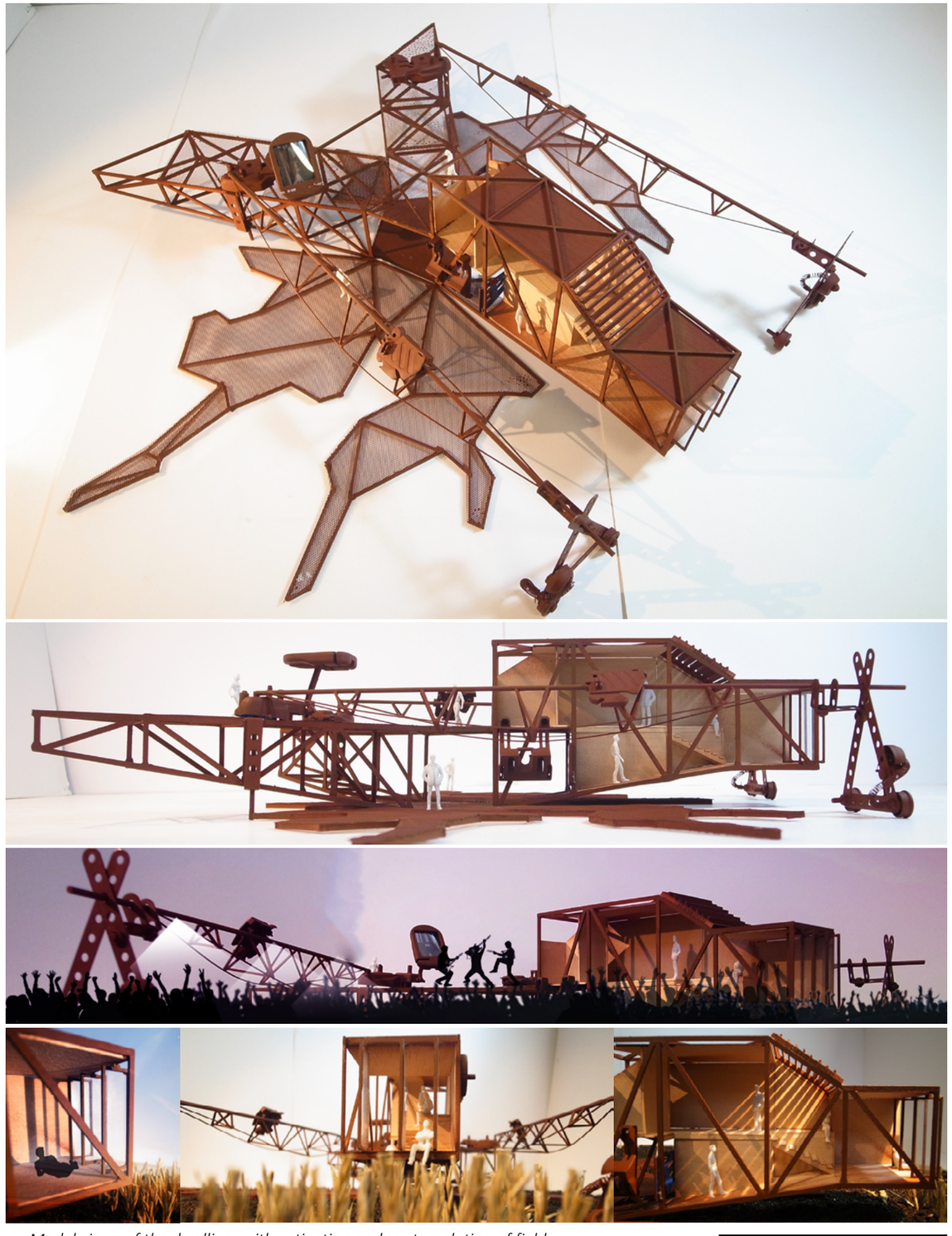
Collage and capriccio: studies of agricultural devices



Agricultural festival grounds site plan, with ordered campsite



Plan of the grounds-keeper's dwelling (an adapted irrigation armature)

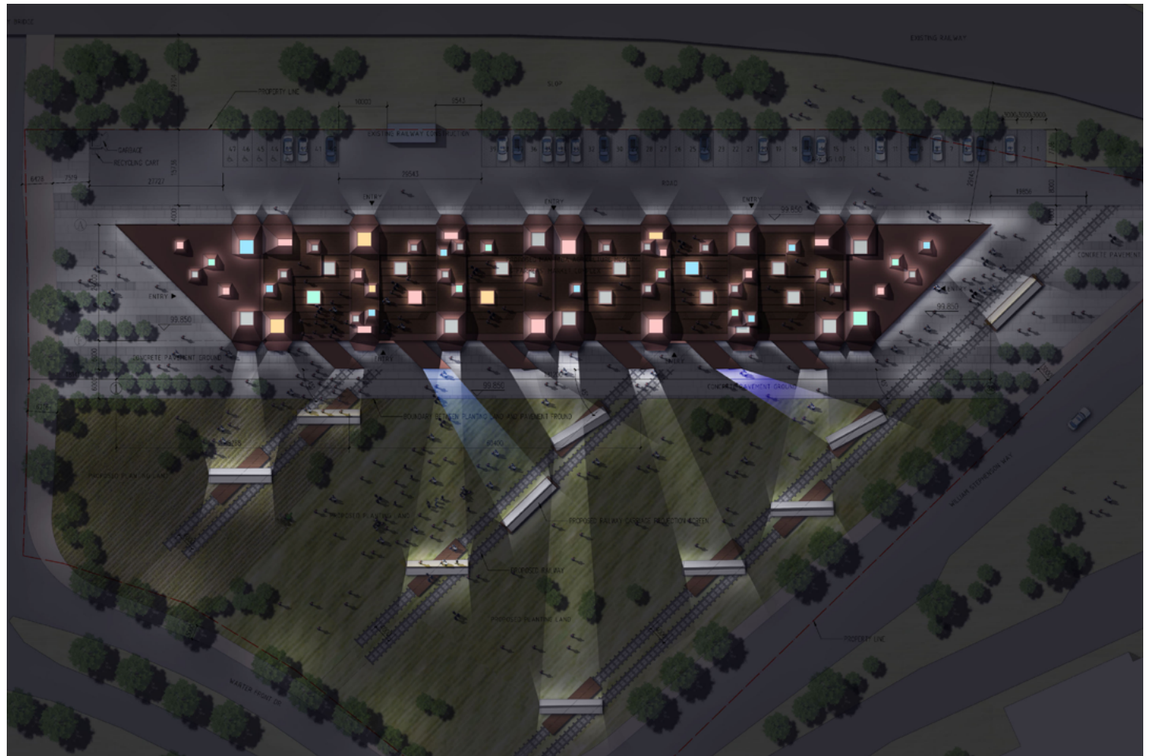


Model views of the dwelling, with activation and contemplation of fields

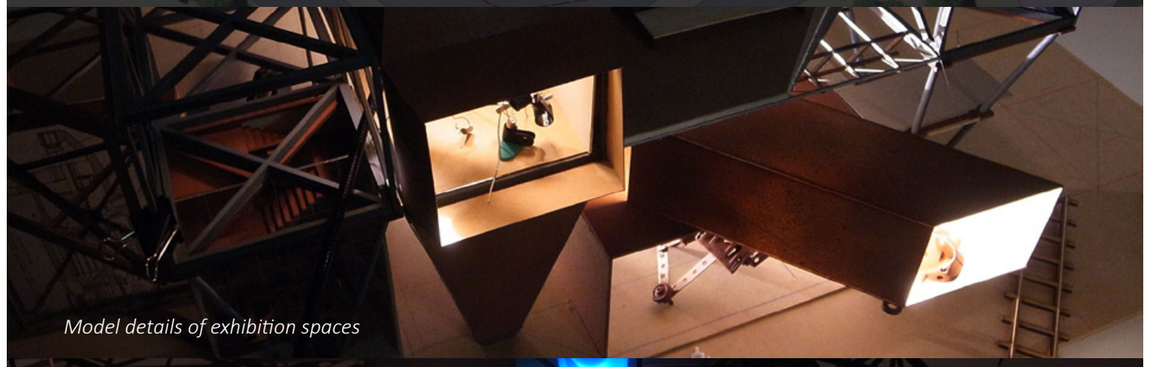
Plan: new Agricultural Museum and Farmer's Market and Park at Winnipeg's Forks

Section, showing relationship to elevated railway and park

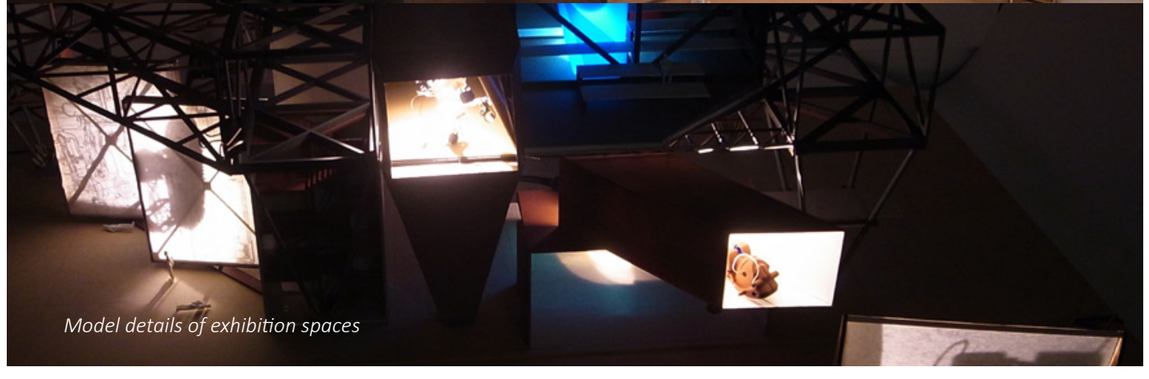
Elevation, with downtown Winnipeg in the distance



Nighttime plan, showing animation of the museum and park



Model details of exhibition spaces



Model details of exhibition spaces

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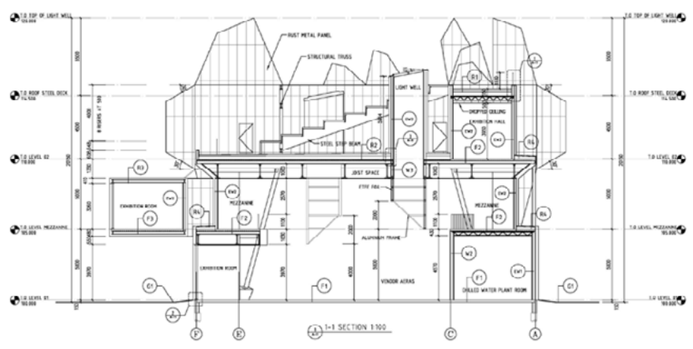
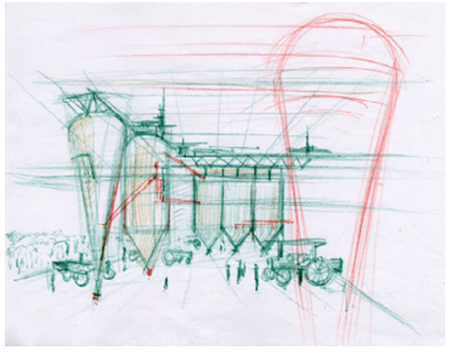
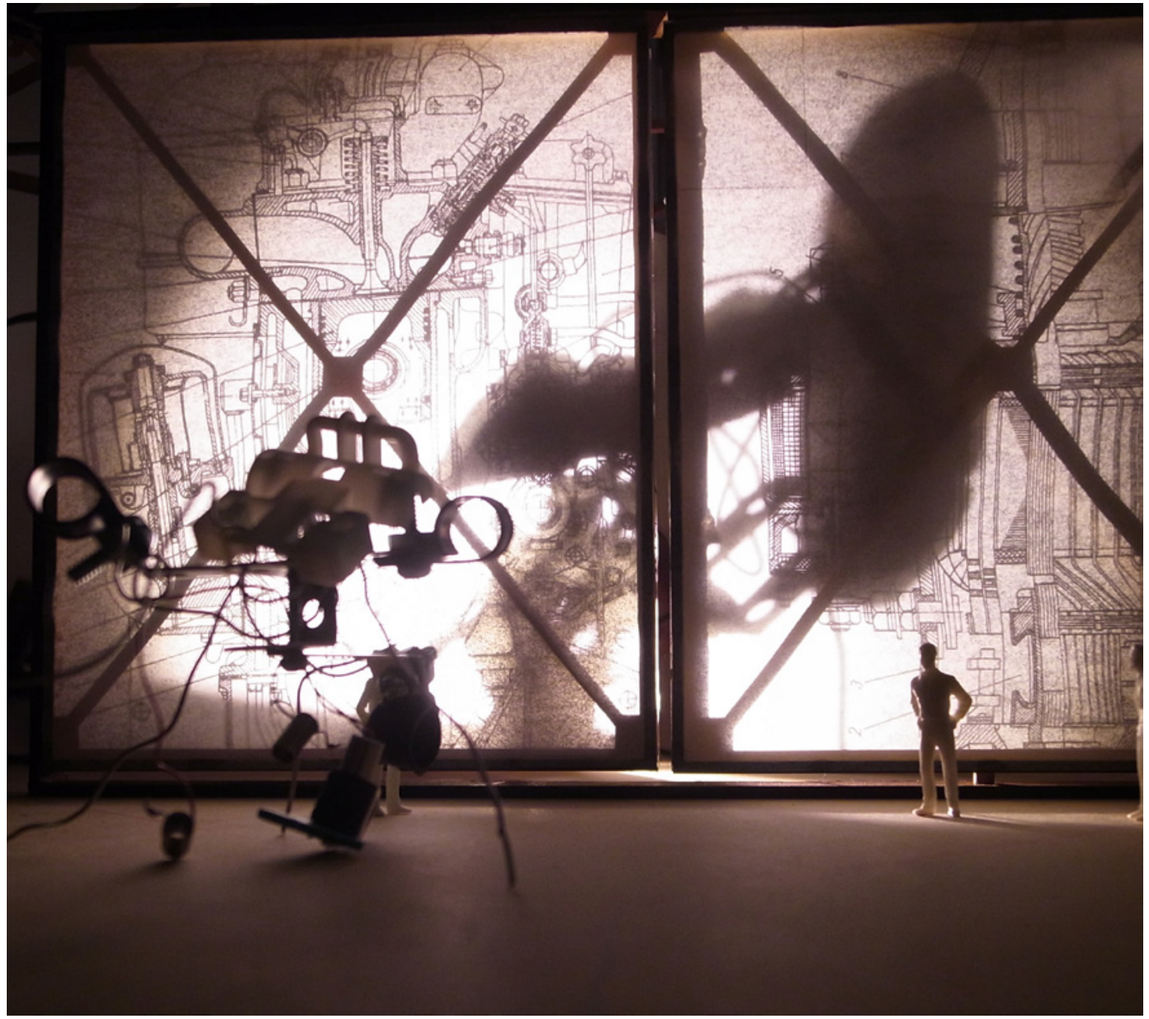
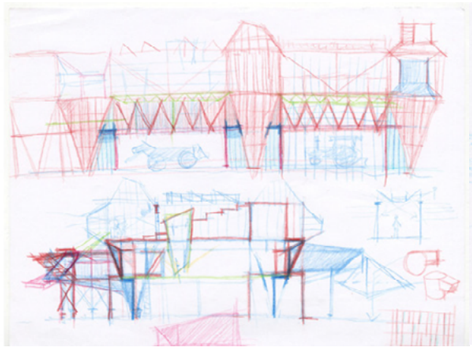


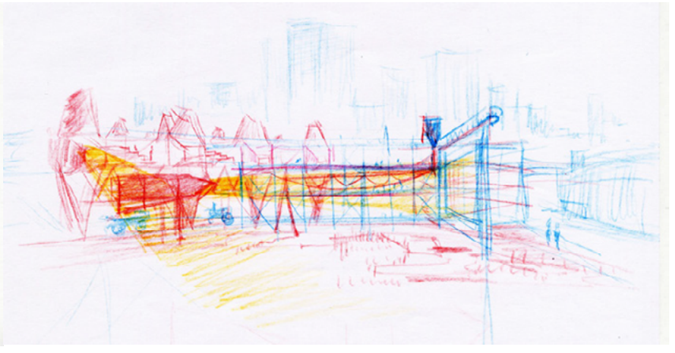


Construction details and design sketches



Shadow studies of the Museum's agricultural equipment





Construction details and design sketches

Brewery, Gallatin Valley, MT

Brent Huntley
4th Year studio, Montana State University, 2011

Instructor:
Jack Smith, Teaching Professor, Montana State University

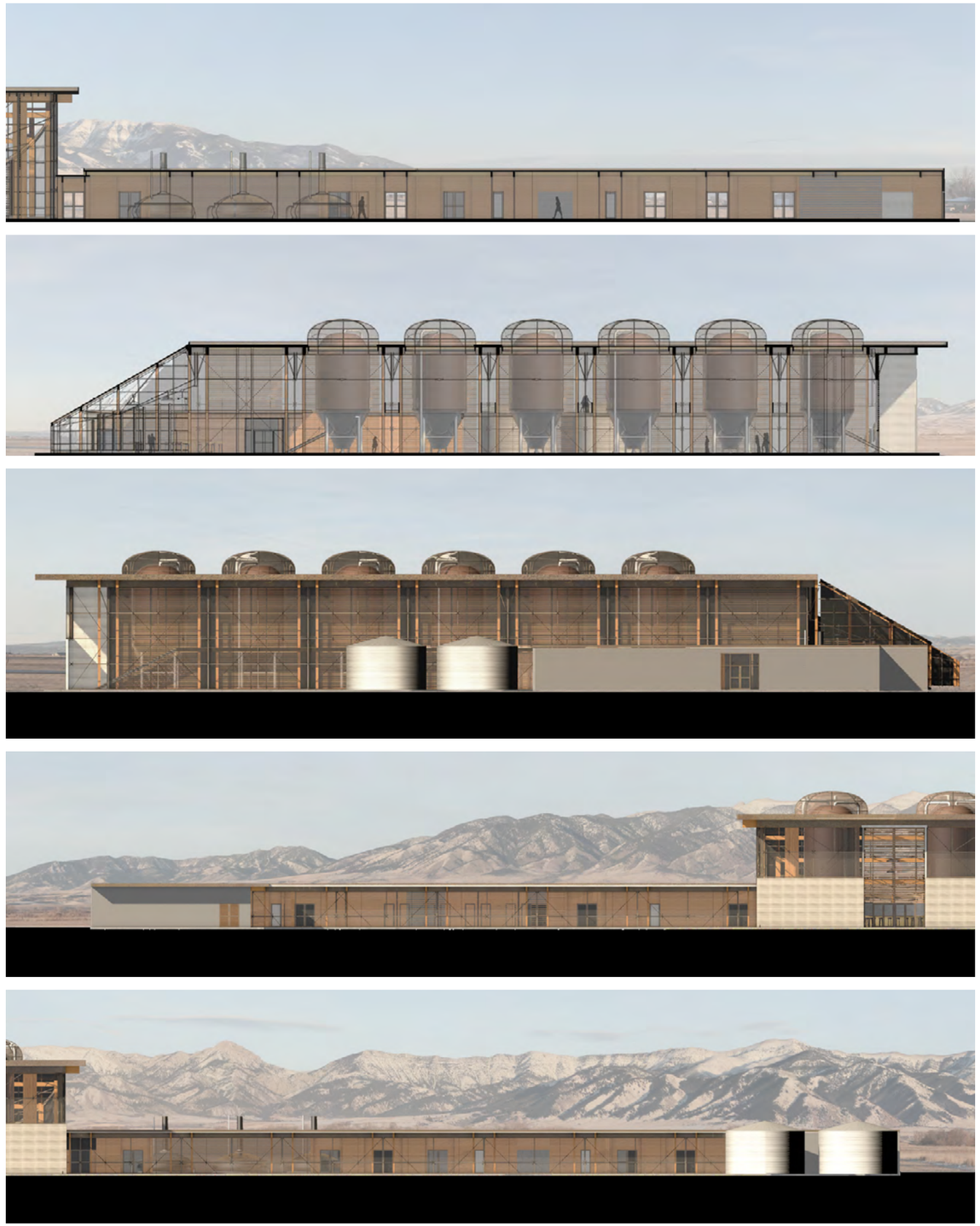
Bozeman has a rich history of brewing beer dating back to the late 1800s when The Bozeman Brewery was comparable to large domestic beer companies today. The goal of this project is to expand the current brewing establishment in Bozeman and bring back the spirit of the brewing history to the community.

The brewing process is a very careful and skillful art which began as a spiritual process for monks within monasteries. A monastery plan was reconceived in this project to retain the historic and spiritual qualities of the process.

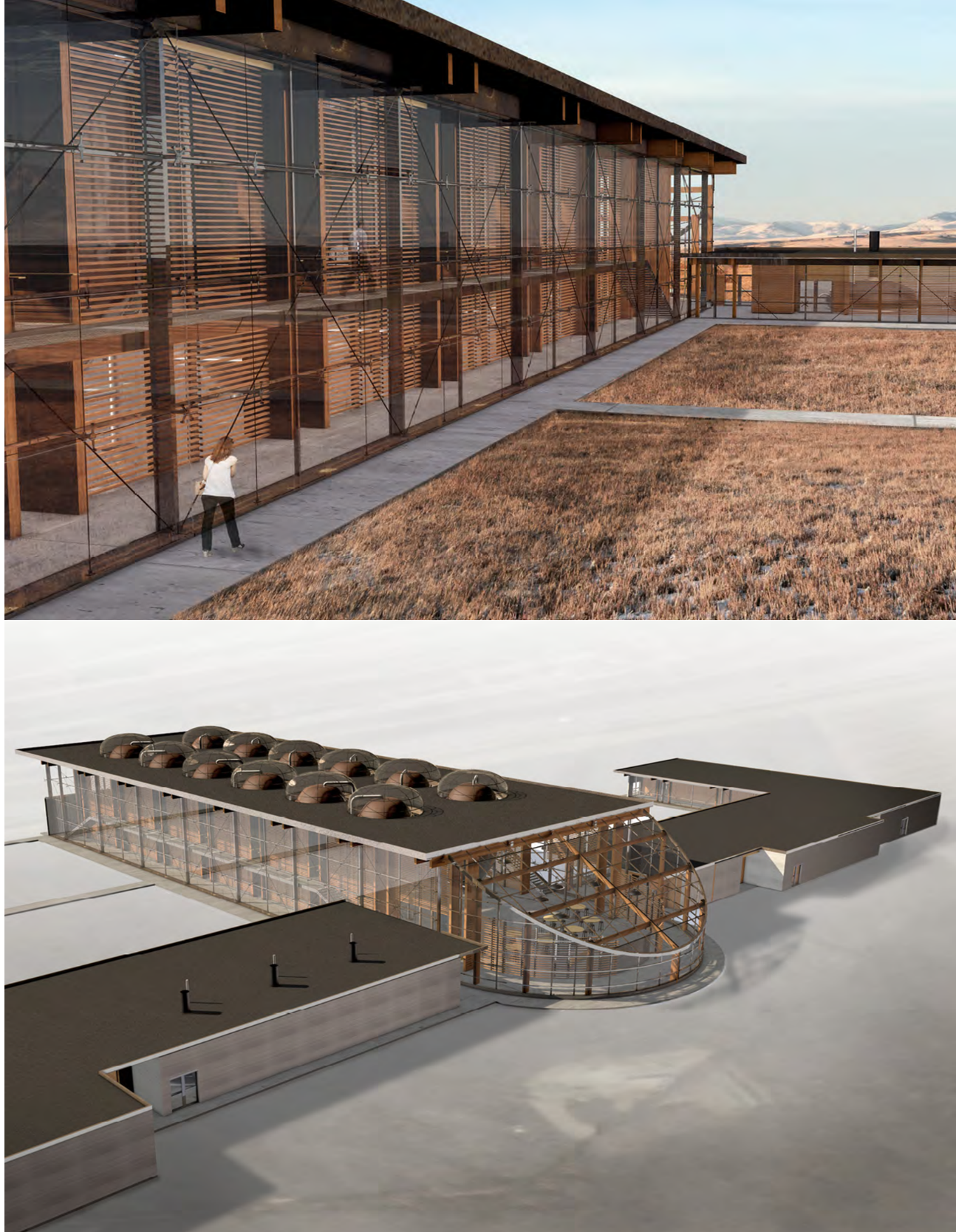
The project is organized on two axes with the primary axis providing a great hall which contains the fermentation tanks for brewing the beer and a tasting room for patrons. The “fermentation hall” displays the brewing process to patrons while also materializing the spirituality of brewing. The second axis contains the program for the lineal brewing process. The process follows along a single corridor which ends with the distributing center for the brewery.

Site Plan

Plan



Sections and Elevations



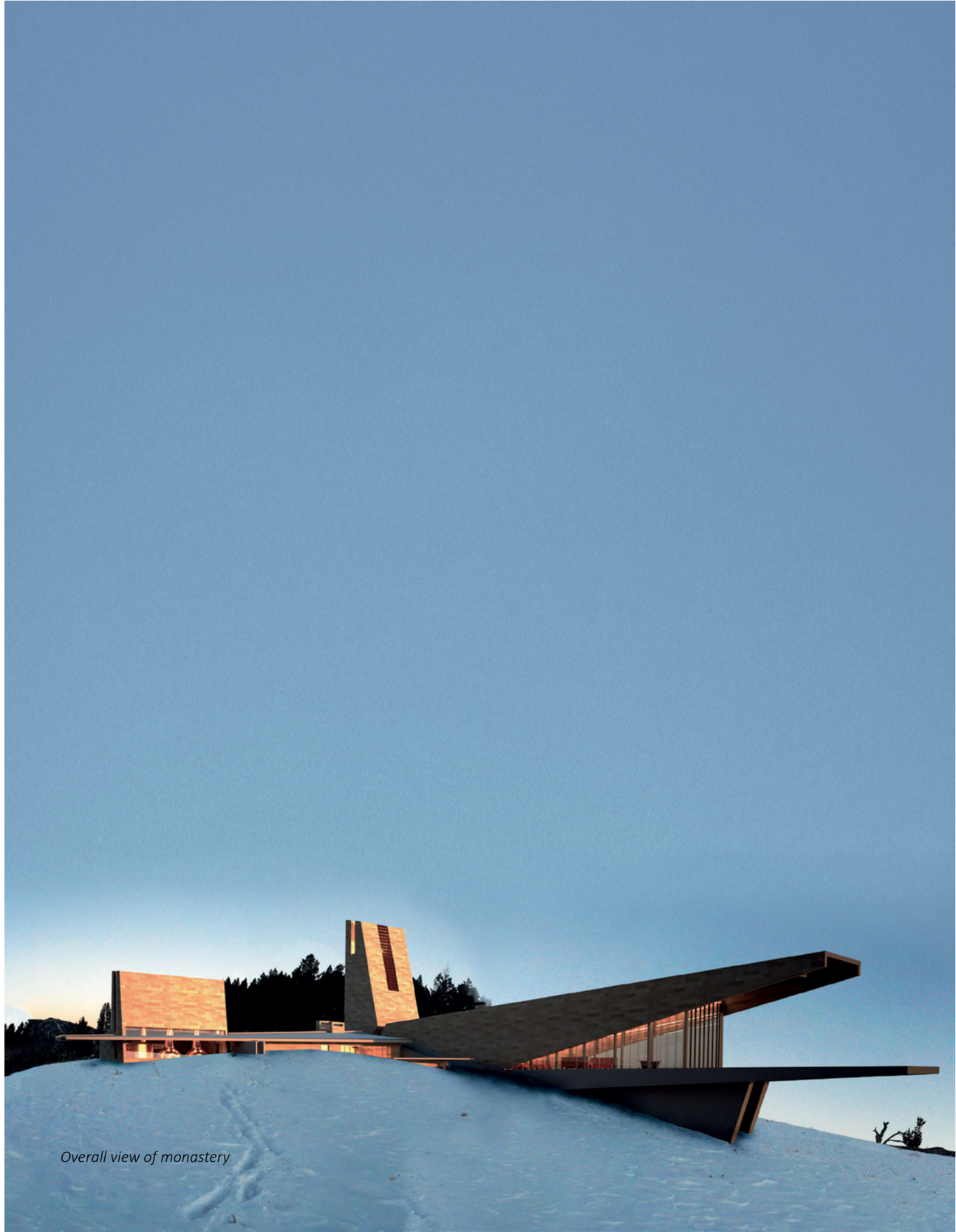
Spanish Creek Monastery, Gallatin County, MT

Scott Freimuth
5th Year Studio, Montana State University, 2012

Instructor:
Chere LeClair, Associate Teaching Professor, Montana State University

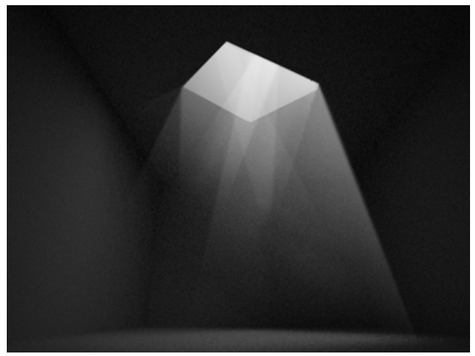
The Spanish Creek Monastery rests in the Madison mountain range south of Bozeman in Gallatin County, Montana. Despite being only a short drive from Bozeman and Big Sky, Spanish Creek feels completely remote. This beautiful ecosystem provides a rare retreat from modern society that is spiritually inspiring. The program provides all spaces for monks of the Trappist order to live in seclusion and devotion to their faith. This includes space for worship, meditation, living, studying, as well as working. An attached distillery provides space for the craft of spirits; which the monks produce to generate money for the monastery. The monastery also serves as a non-denominational spiritual space for the nearby public to retreat, worship, and meditate.

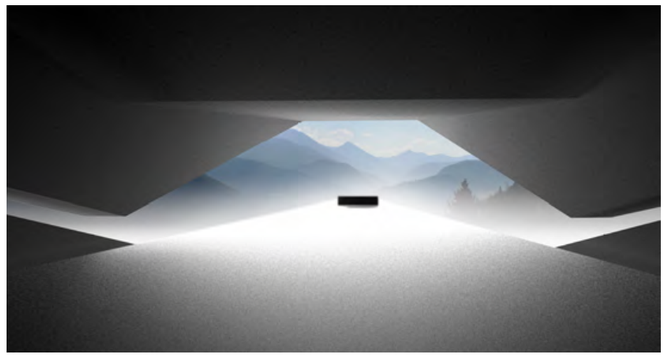
The poetic scheme explores the relationship between architectural phenomenology and spiritual reflection. Specifically, how form, light, and a space's relationship to the cosmos affects individual and collective meditation on the infinite. The infinite manifests in both the awesome cosmos as well as the mysterious self, and specific moments of awe and mysticism are distilled by controlling the relationship to the cosmos through the manipulation of the reveal. The reveal, the Connection to the landscape, is manipulated by the form of a wedge; creating spatial compression or release. This spatial nature of the wedge invokes a feeling of depth at both ends. Whether immersed in the landscape or deep within the building, the degree of depth is choreographed in specific spaces to inspire varying depths of spiritual reflection. Furthermore, the degree of compression and release correlates to the social nature of the space. Collective spaces are released into the landscape while the landscape is compressed into solitary spaces.



Overall view of monastery

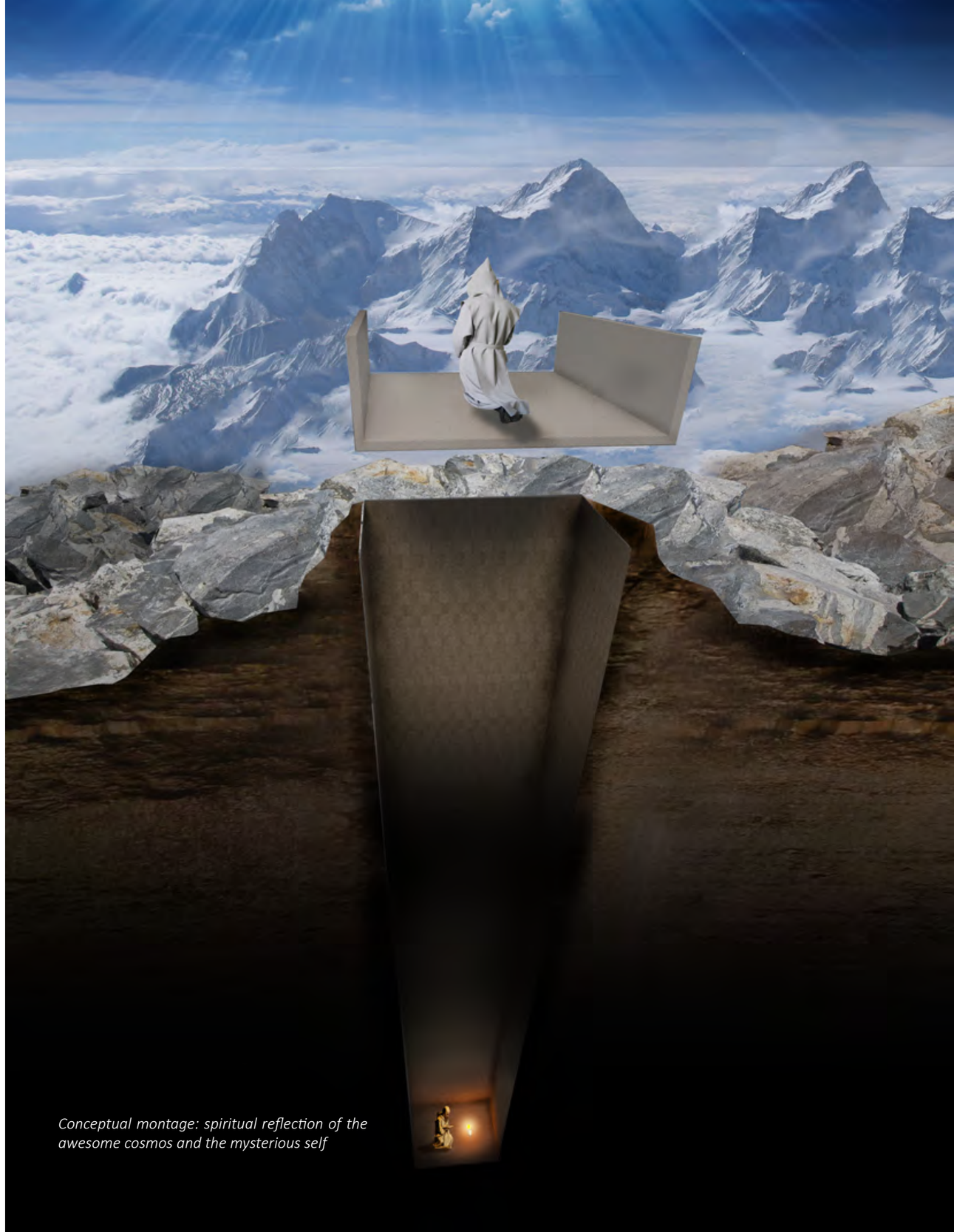
View of monastery on approach from the valley floor



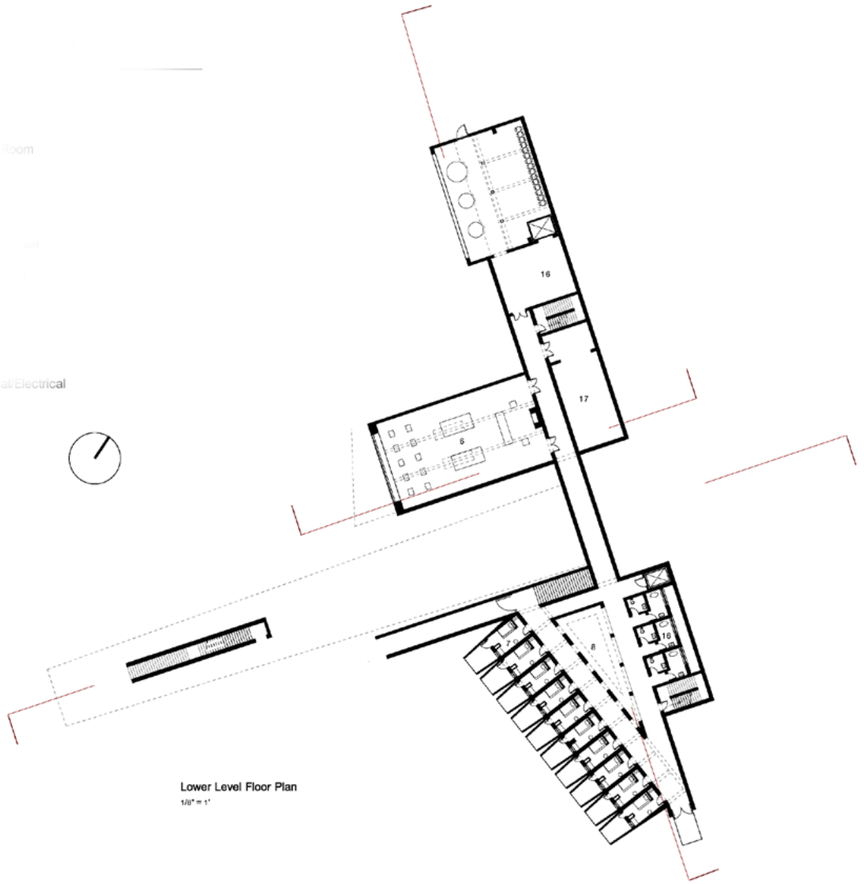


Conceptual renderings: exploring spatial compression and release, Mystycism and Awe

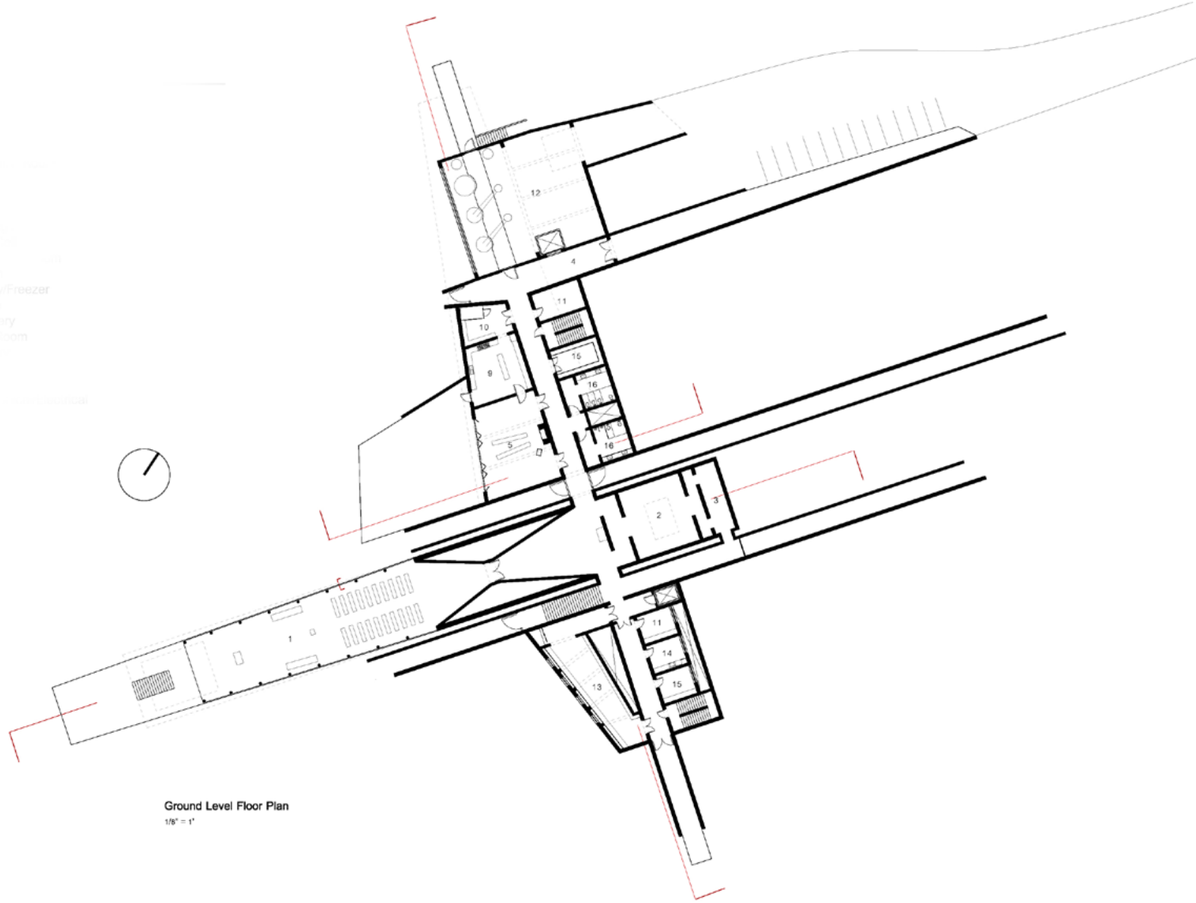
Conceptual model: wedge compressing and releasing space



Conceptual montage: spiritual reflection of the awesome cosmos and the mysterious self



Lower level plan

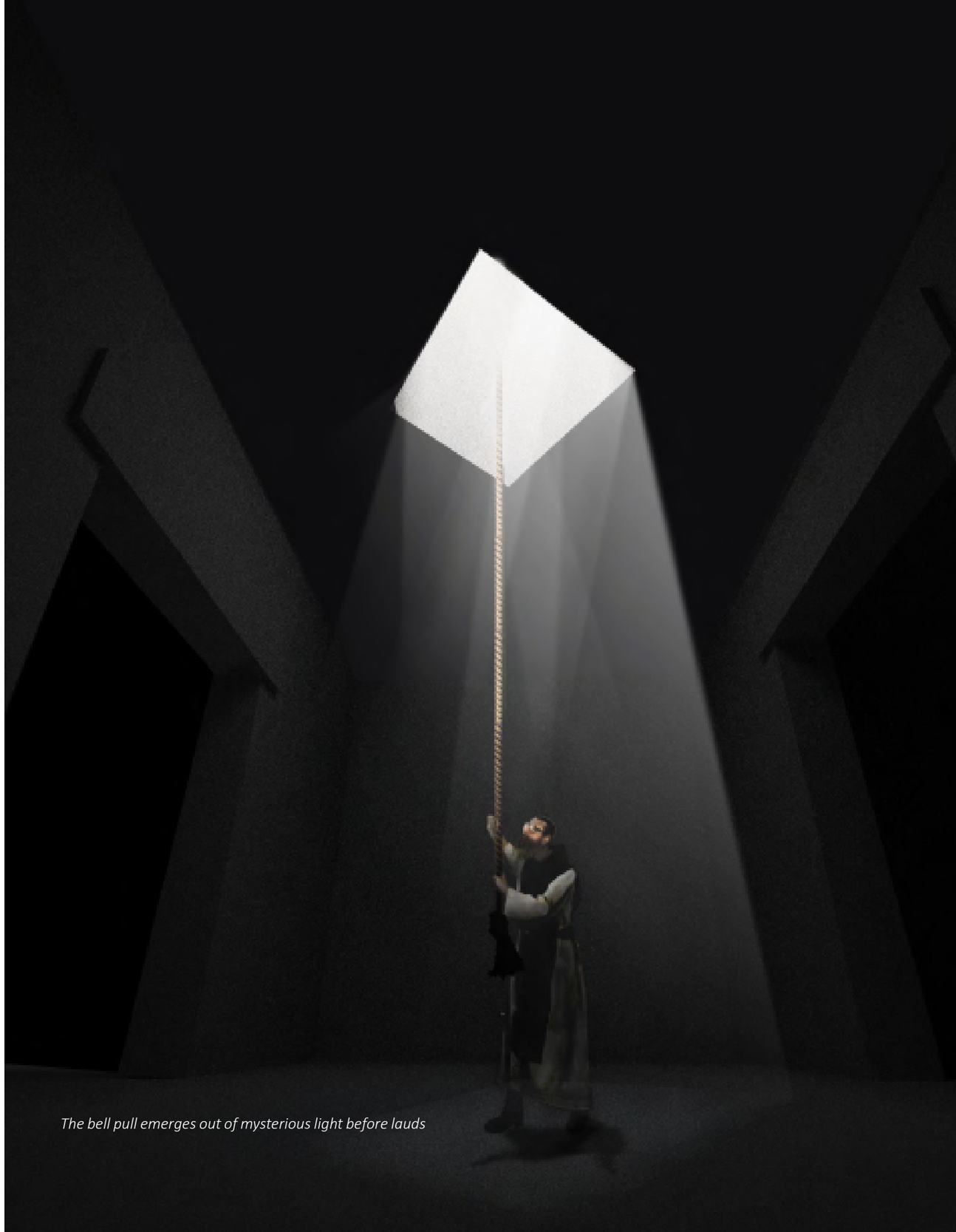


Ground level plan

Cross section: Through sacristy, meditation room/bell tower, and chapel

Monks end the day with evening evening compline

Released into the infinite: Mass mid-morning



The bell pull emerges out of mysterious light before lauds

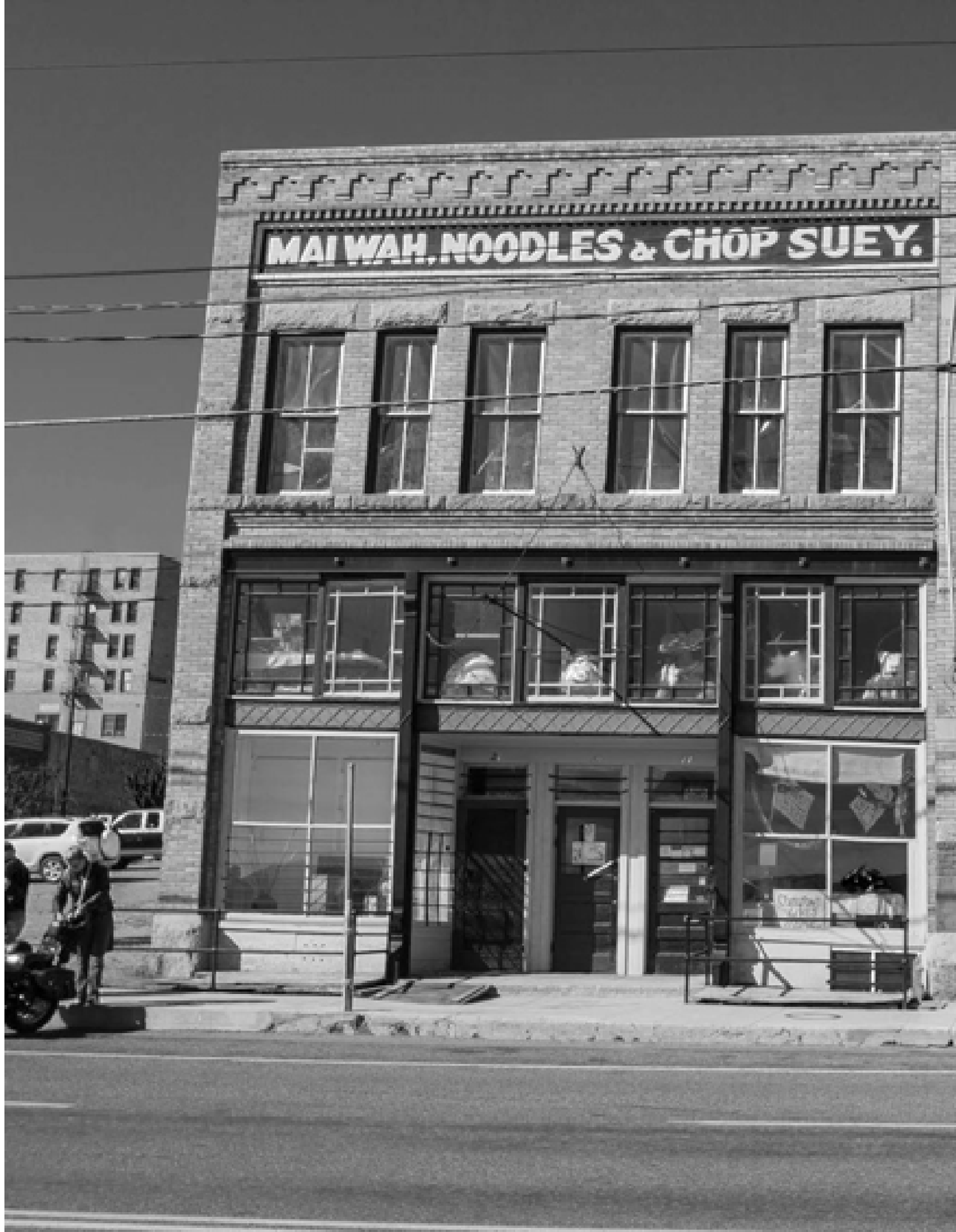
Digital Cobbling, Butte, America

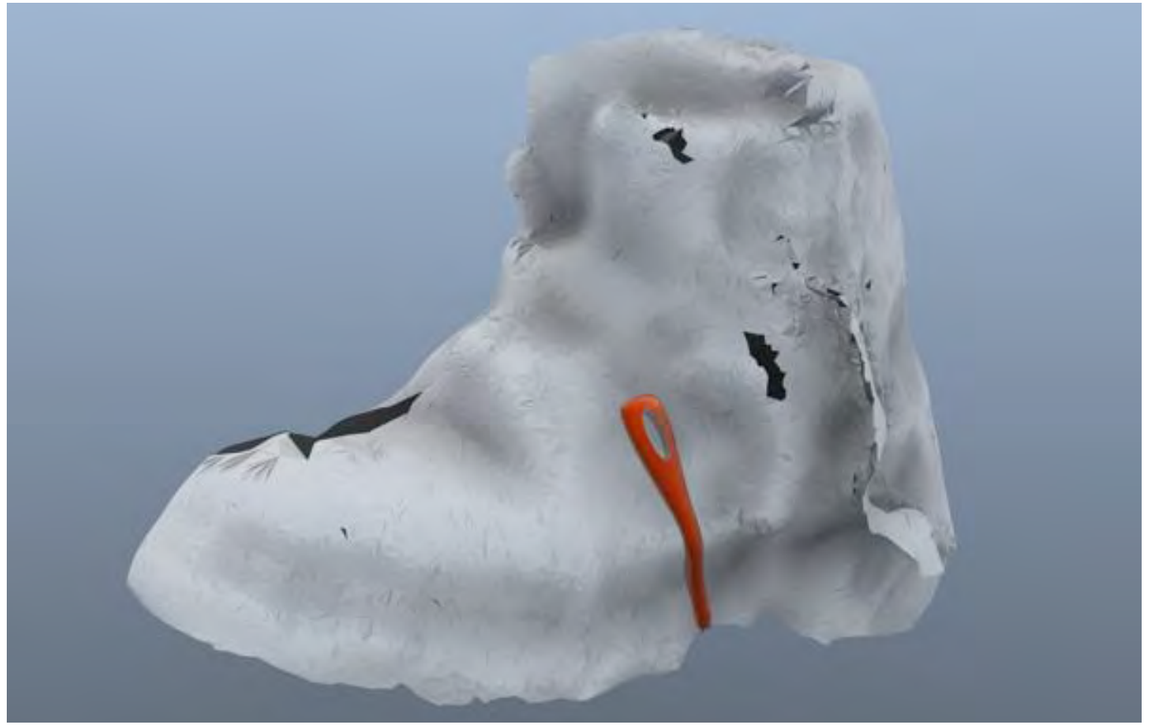
Zach George
5th Year Independent Thesis, Montana State University, 2013

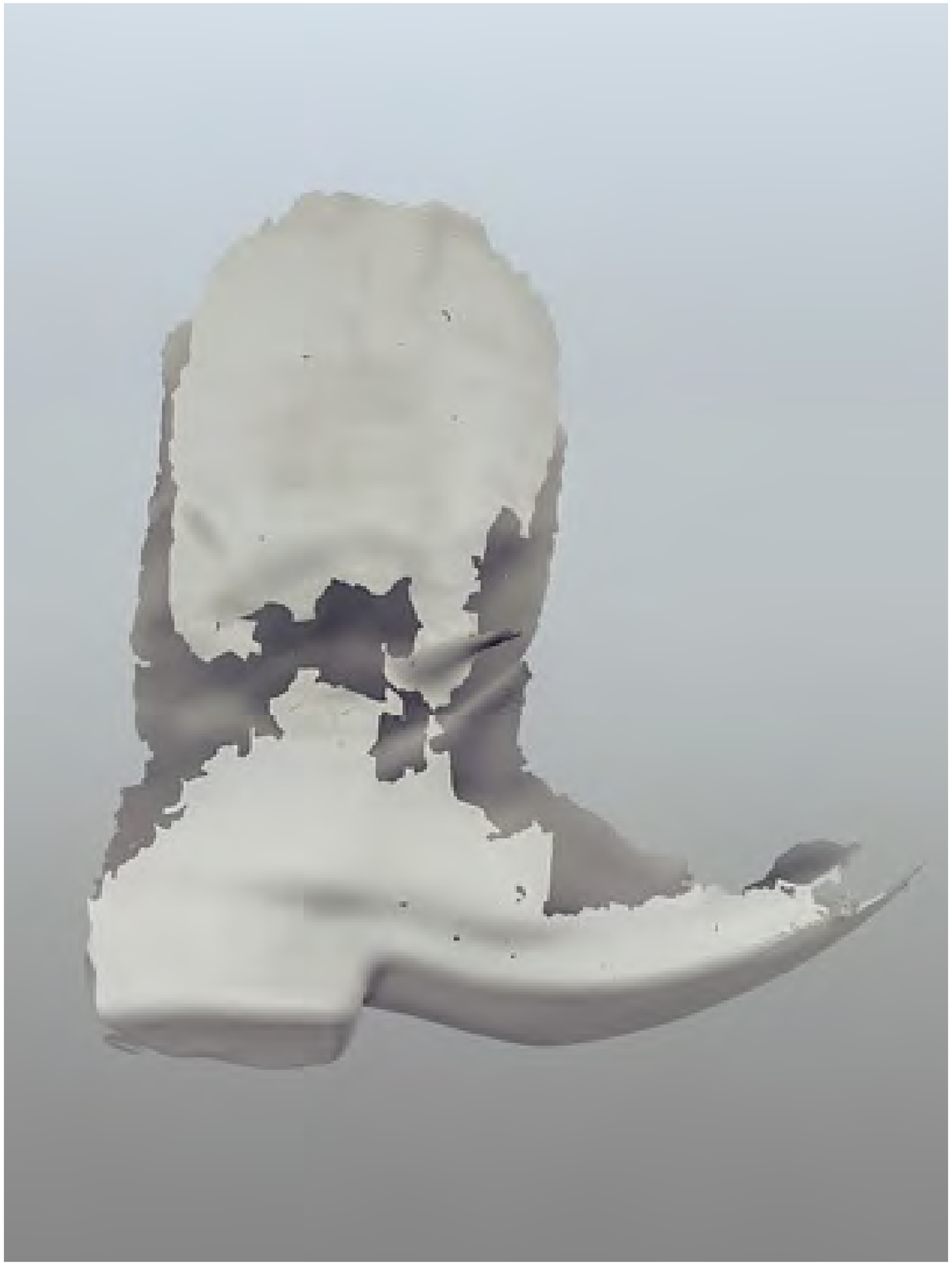
Advisors:
Barry Newton, Teaching Professor
David Fortin, Assistant Professor
Elisa Renouard, Visiting Faculty
Bradford Watson, Assistant Professor

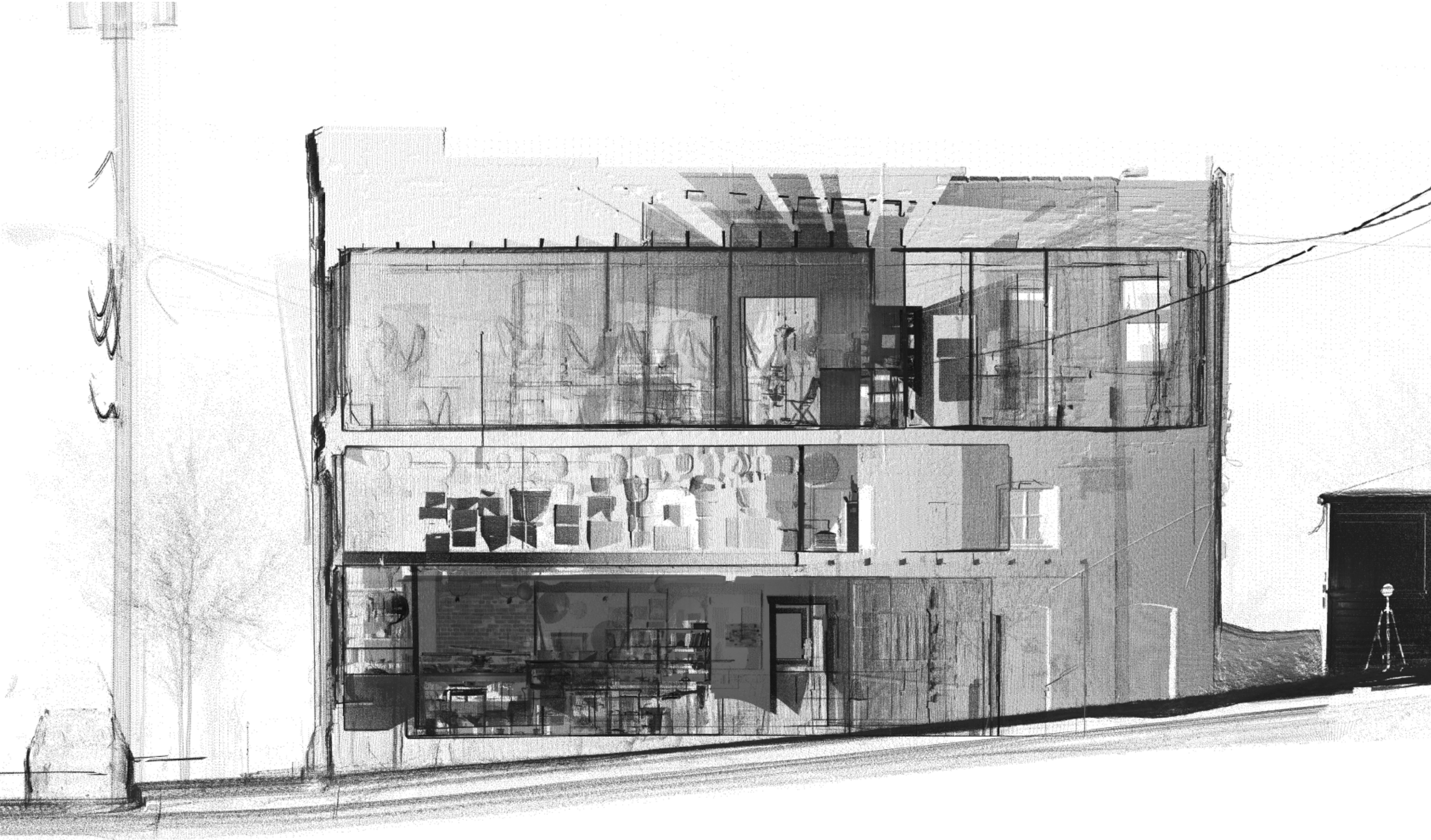
A series of methodology studies on the topic of repair. Discarded shoes were found and repaired utilizing various types of digital technologies to engage in the old world profession of cobbling. Shoes were scanned and documented using an Xbox Kinect. Using this “digital last”, repairs were constructed in the computer which engage with the existing decay of the shoe. Embracing this decay and repurposing the shoe creates value in an object which society had previously deemed unfit for further use.

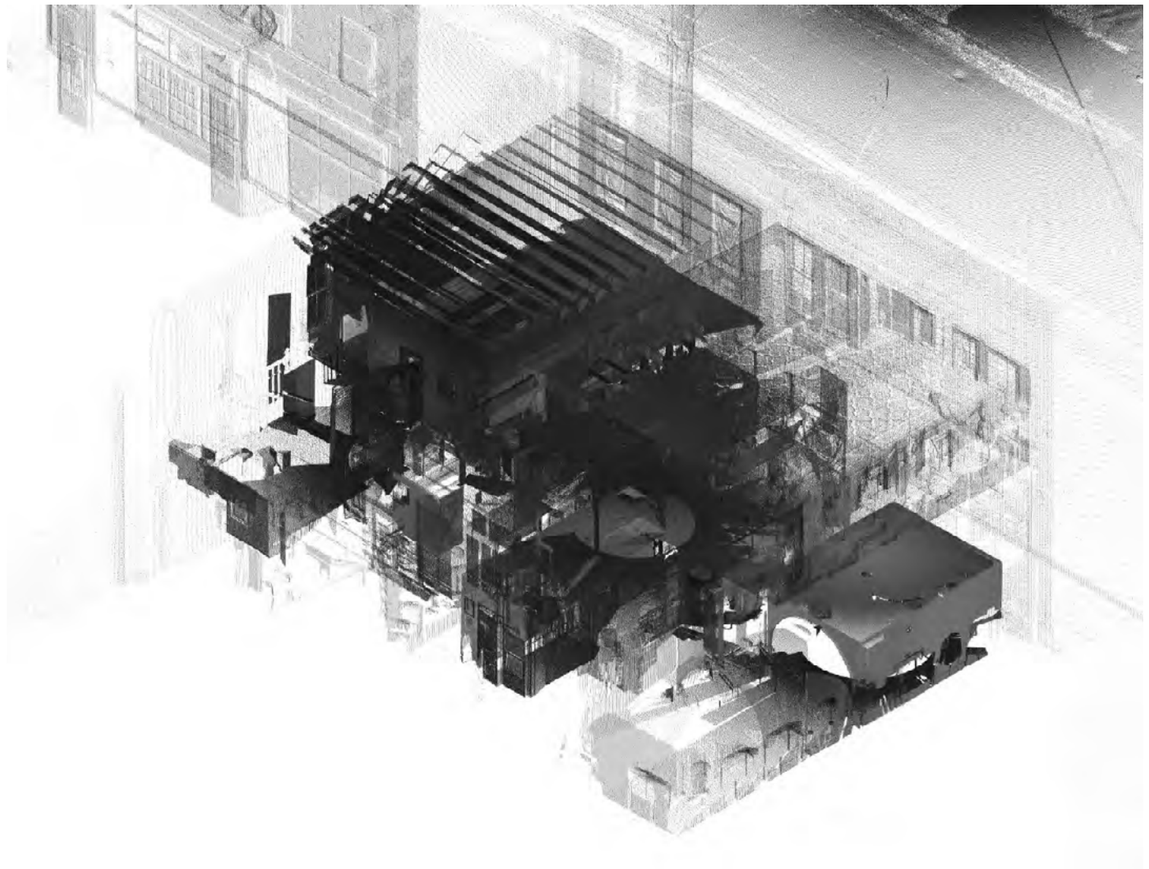
Moving on to the scale of buildings, the exploration continued with a series of point cloud scan drawings of the Mai Wah Building in Butte, MT. The scans were done with the use of a Leica ScanStation as part of a larger study on the value of repair. The study explores abandoned and partially used buildings to see how they might be repaired in a way which both highlights the beauty of their decay and allows for their continued use. The texture of the drawings comes from the millions of individual points that make up a 3d scan. Through a series of layered points, the drawings begin to display x-ray type qualites as the viewer begins to understand the individual spaces that make up the Mai Wah Building.

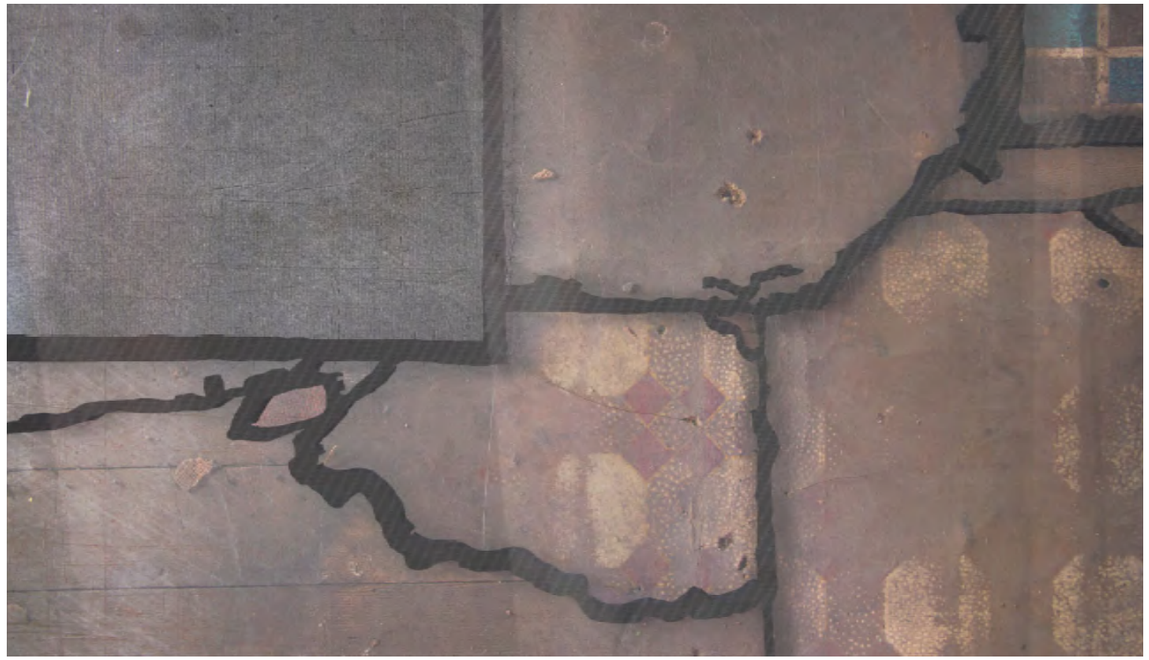


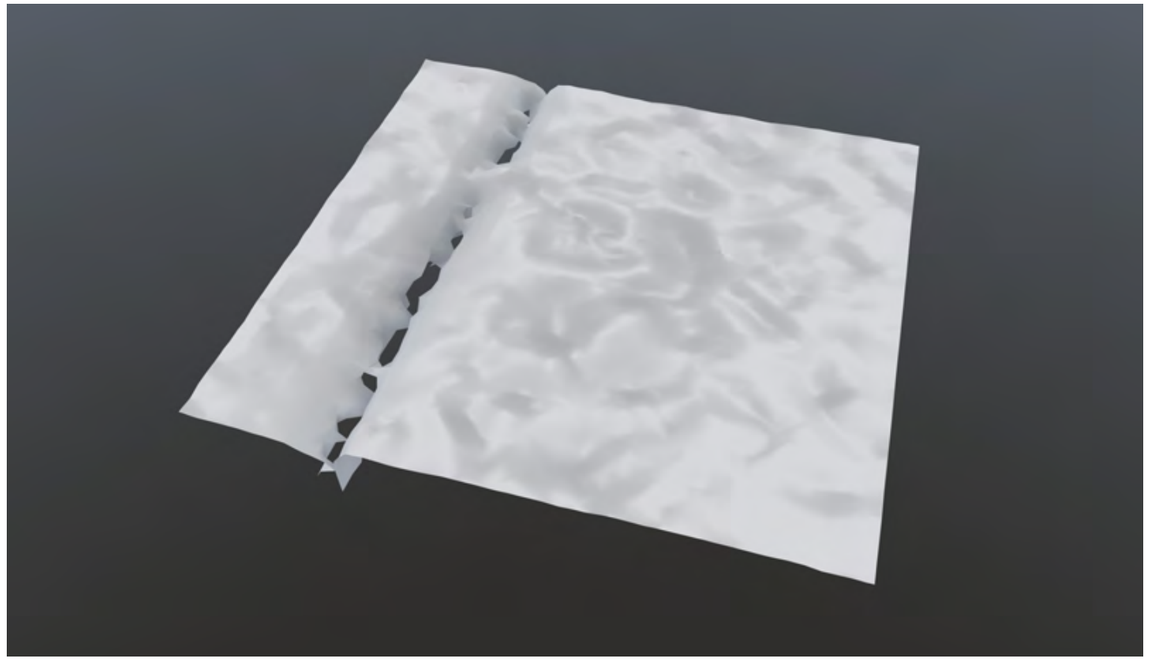










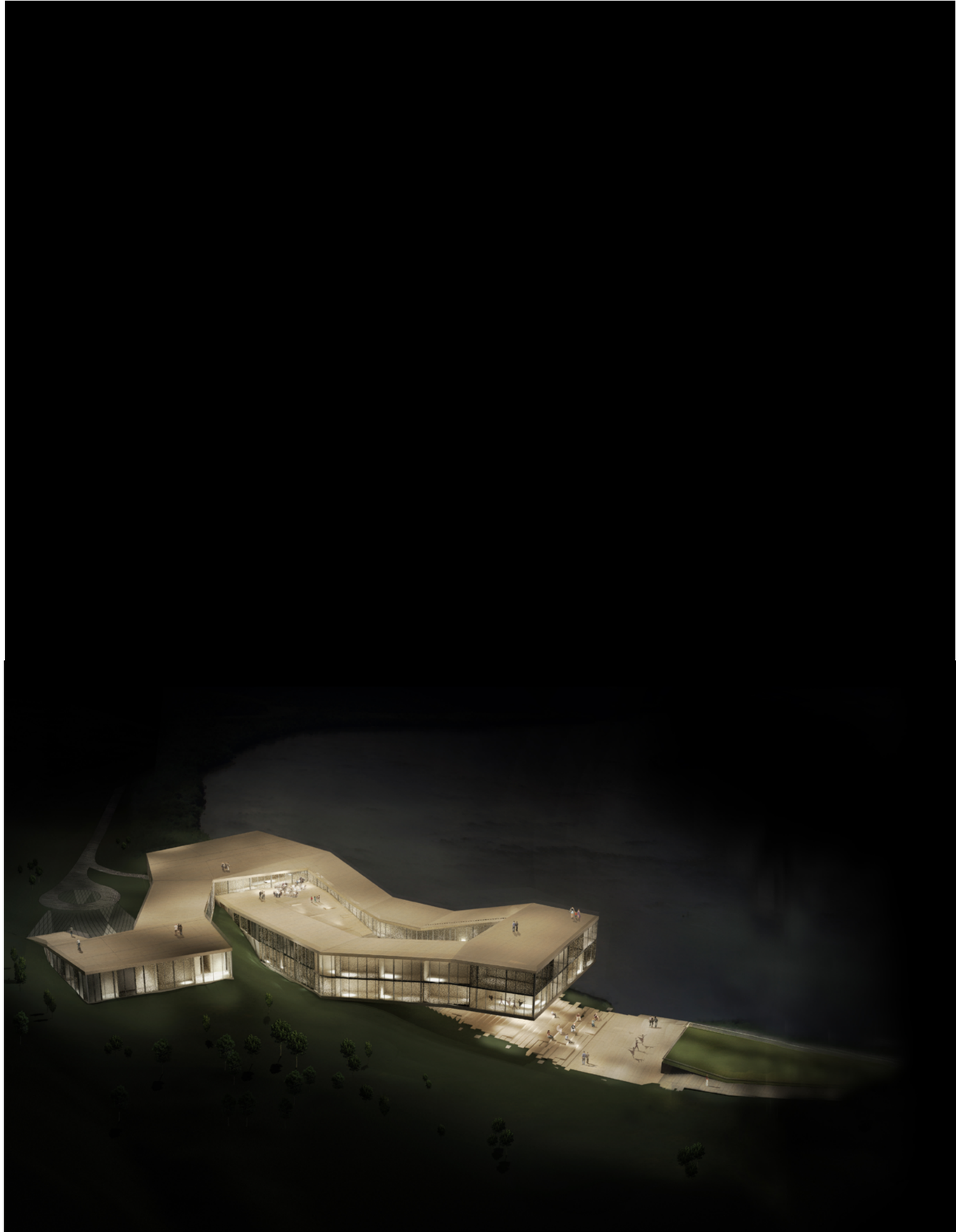


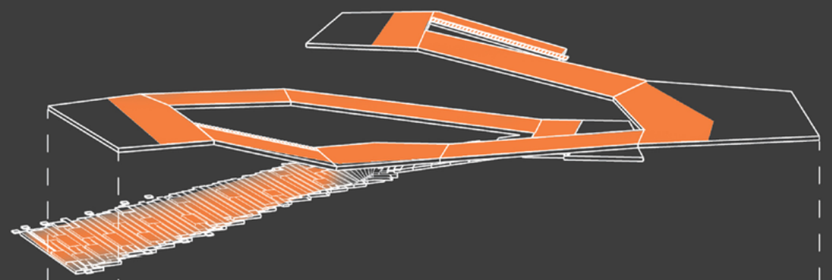
Flood Architecture

Yves Poitras
M1 Student, University of Calgary

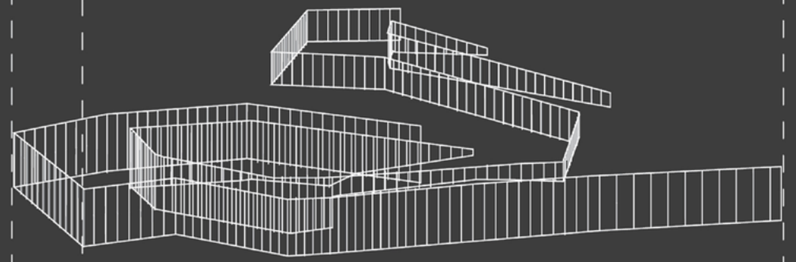
Instructor:
Graham Livesey, Professor, University of Calgary

In response to the 2013 Calgary flooding, studio III focused on designing a performance arts high school that reacted to a flooding environment. Located in Beaumont Park across from neighborhood of Bowness, the resulting design is centered on creating an extension of the river valley pathway via the school's ramped roof.

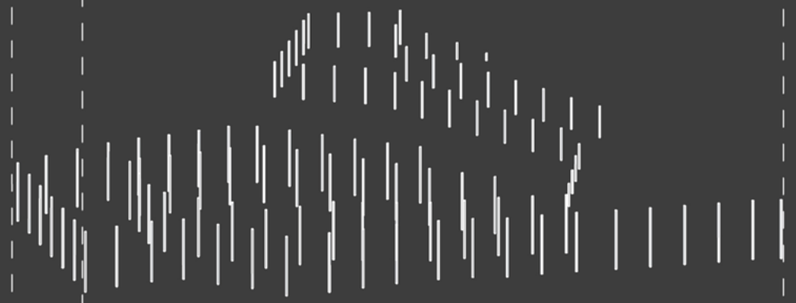




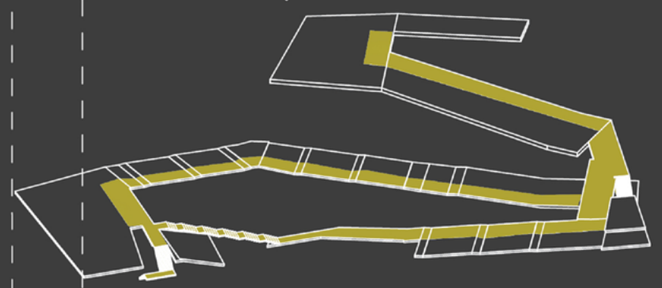
PUBLIC ROOF CIRCULATION



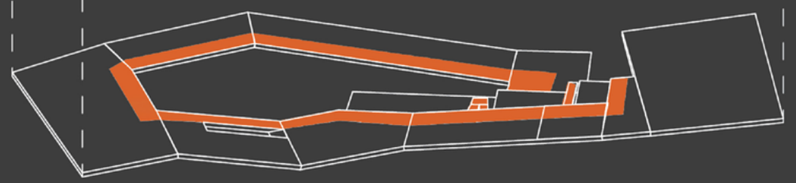
CURTAIN WALL SYSTEM



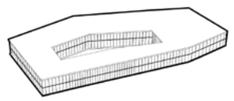
STRUCTURAL COLUMNS



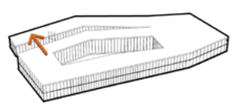
CIRCULATION (MAIN FLOOR)



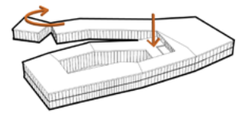
CIRCULATION (GROUND FLOOR)



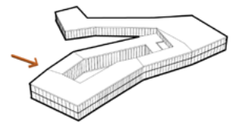
01: INITIAL CIRCULATION LOOP



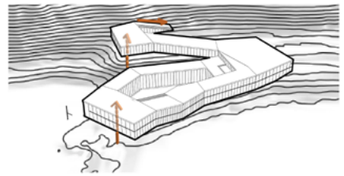
02: BRANCH OUT



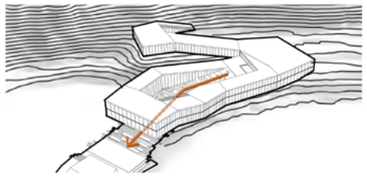
03: ROTATE + SINK



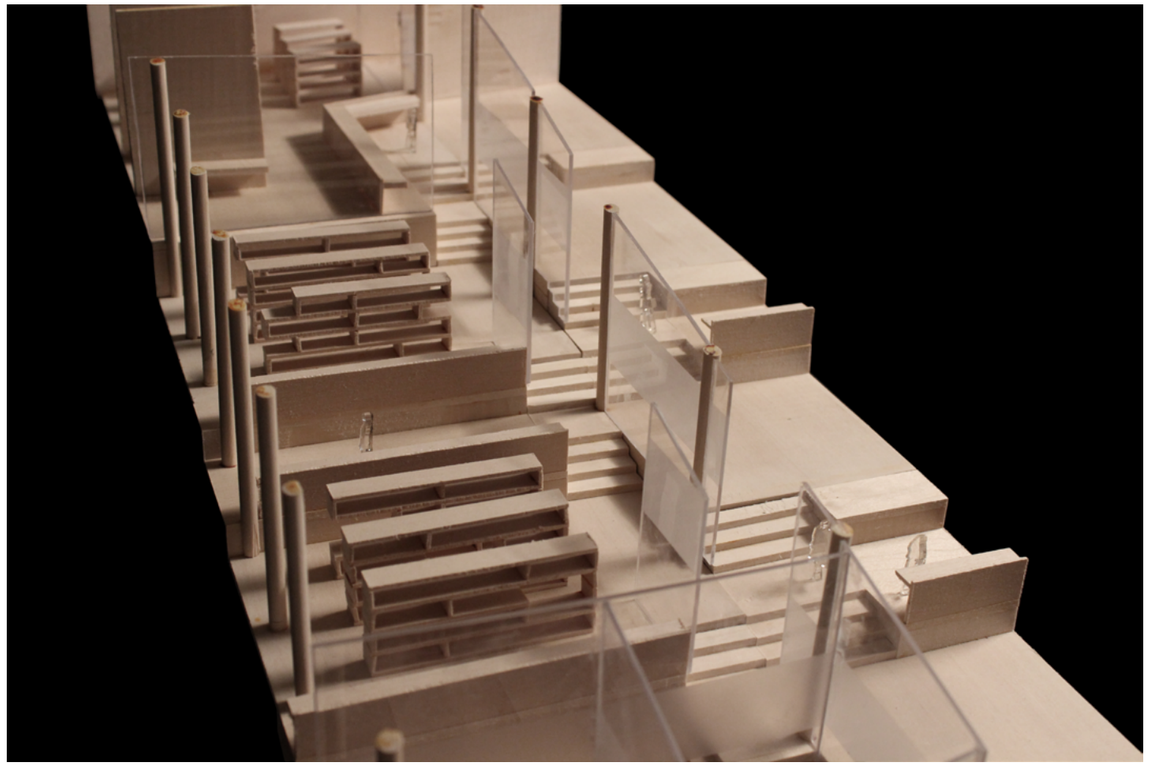
04: ORIENT TOWARDS VIEWS



05: LIFT ABOVE FLOOD PLAIN + ROOF ACCESS

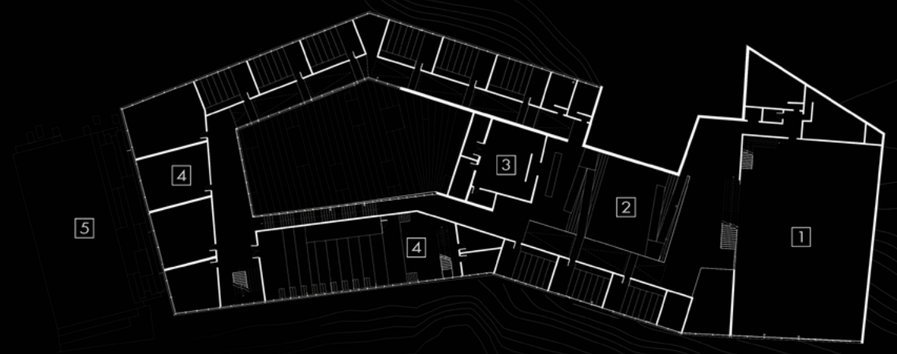


06: COMPLETE ROOF ACCESS



MAIN FLOOR PLAN

1 GYMNASIUM
2 CAFETERIA
3 KITCHEN
4 THEATRE
4 LOWER STUDIOS
5 OUTDOOR AMPHITHEATRE



MAIN FLOOR PLAN

1 MAIN ENTRANCE
2 ADMIN
3 LIBRARY
4 GYMNASIUM
5 CLASSROOMS
6 THEATRE
7 STUDIOS
8 PUBLIC ENTRANCE/ ROOFTOP CAFE

District 5: A living landscape made from our waste

Caitlyn Browning
M2 Student, University of Calgary, 2014

Instructor:
Vera Parlac, Assistant Professor, University of Calgary

This is a design experiment that seeks to explore notions of reality and non-human oriented discourses. By looking to our ‘waste’ and pollutants as material builders, this project yearns for a new type of sustainability that fosters growth from waste products. This growth is what becomes a design mechanism for remediation of the land and offering a new type of terrain on which the evicted ecosystem may re-inhabit. A type of urban ‘reef’ that bridges nature and the synthetically alive.

The protocell will act as my co-designer in this experiment. They are “not merely materials or instruments that obey human-led architectural programs” (Dr. Rachel Armstrong, 2011), but offer a new ecological and sustainable paradigm for the production of architecture.

The protocell is a new type of material and method that will aid the design process in terms of architectural programs that go beyond the conceptual and practical constraints of modern design practices.

REality: a ‘sick’ environment [site: Detroit’s Zug Island]

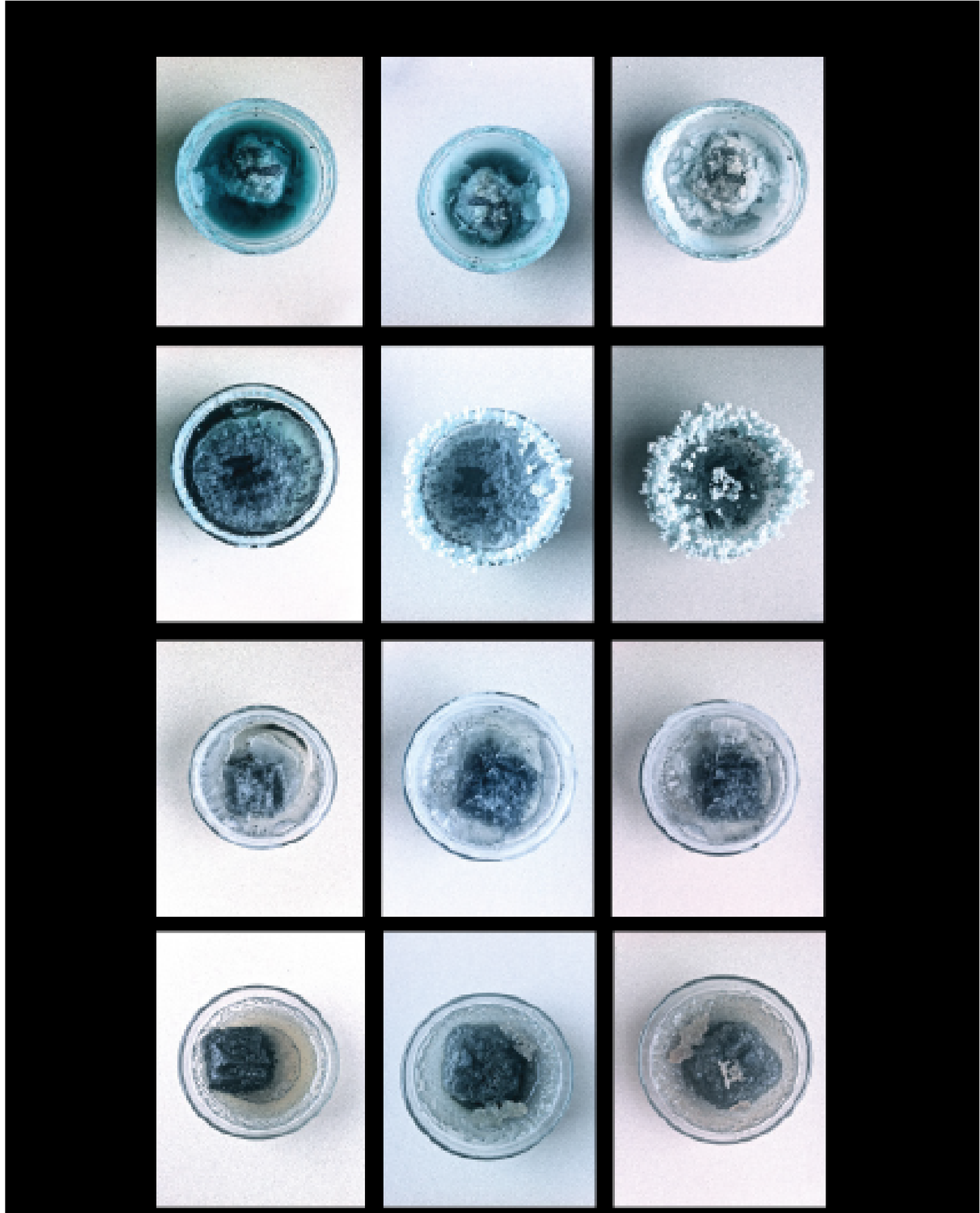
REmediation: remediate the stressed ecology and produce a new topography to allow the soil below to recover [phyto- & bio-remediation]

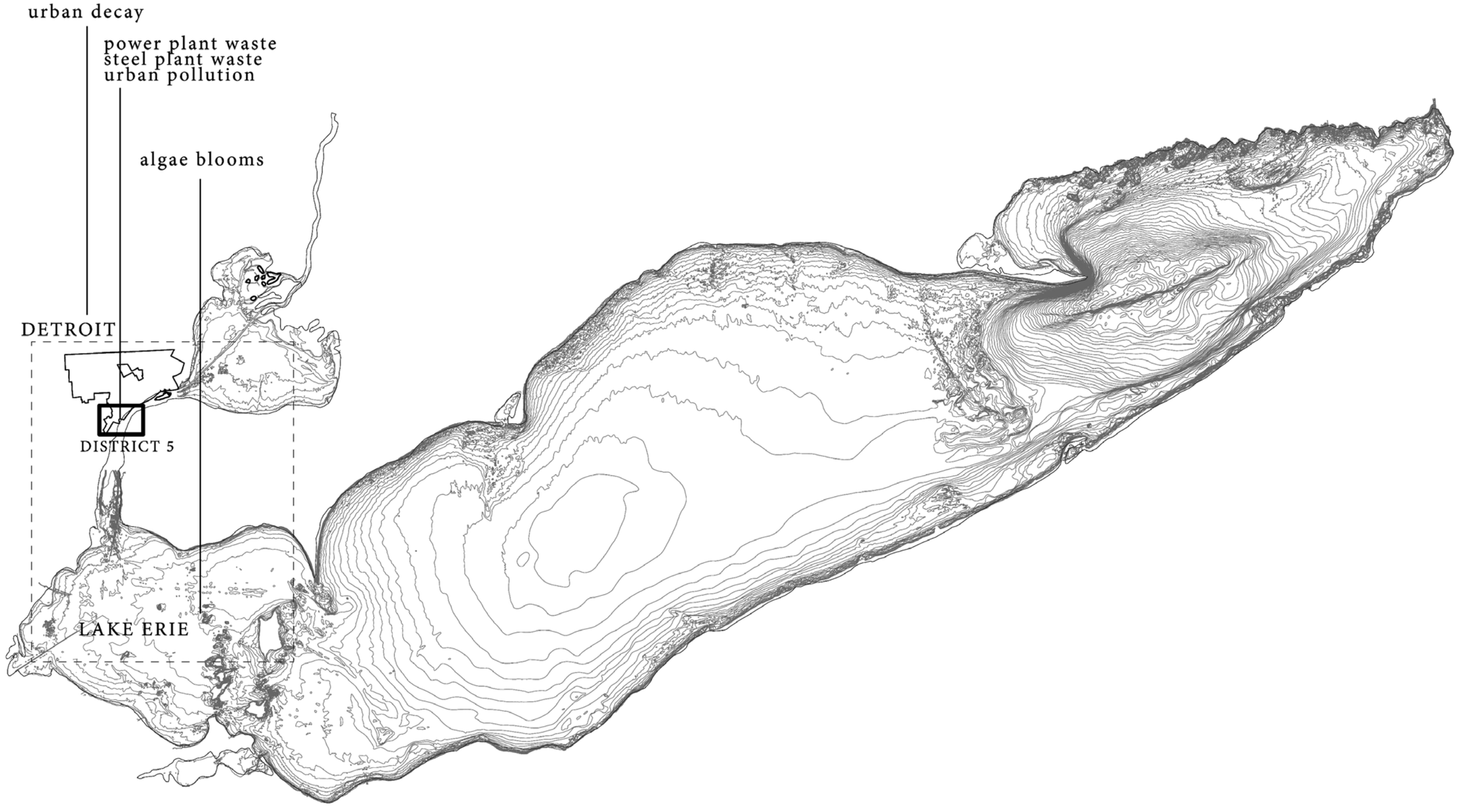
REgrowth: utilization of waste CO2 and heat in a chemical reaction with protocells to produce hardened matter [a new landscape to be inhabited]

Can protocells create a new landscape of matter from our waste that becomes a place for future generations to inhabit? THE NOMAD, nomadic architecture… A ‘city ‘reconstituted from its own waste?

What is the result of a population of protocells programmed for a metabolic response to pollutant|waste-based CO2?

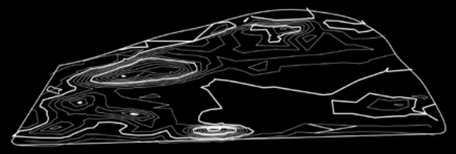
How can I channel the production and formation of matter? How can this become architectural matter?




urban decay
power plant waste
steel plant waste
urban pollution
algae blooms
DETROIT
DISTRICT 5
LAKE ERIE

2014

existing conditions

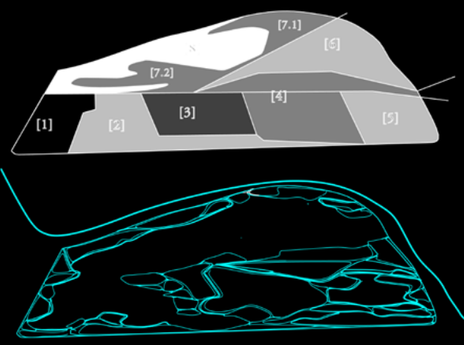


site territorializing

Territories are established based on levels of relative toxicity on site (given the existing conditions).

- [1] coal yard
- [2] ship canal
- [3] steel plant one
- [4] wasteland one
- [5] steel plant two
- [6] stock yard
- [7.1] wasteland two
- [7.2] wasteland three
- [8] 'green' field|reserve

lower — higher



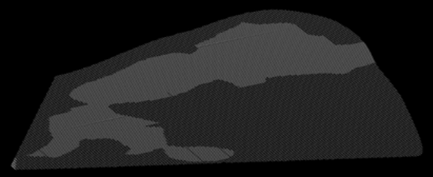
1 PHASE [ONE]

canal system | hydrology

Based on the existing topography of the site, water from the surroundings rivers (Detroit and River Rouge) are brought into the land through a canal system.
The canal system feeds a series of water catchments that will support bioremediation pools and subsequent protocell growth.

irrigation

n irrigation system is implemented to allow for clean [bioremediated] water to be used for watering phytoremediation zones. Upon completion of phytoremediation, the irrigation system serves to flood the areas to supplement protocell growth.



2016

2 PHASE [TWO]

bioremediation

Remediation of water: Algae from Lake Erie is harvested and used as a bioremediator in flooded water catchments on site. It serves to rid the water on site (including runoff) of toxic chemicals like Pb, Cu, Zn, etc.

phytoremediation

Remediation of land: The zone designated for phytoremediation is organized with a set of plants that are able to uptake harsh chemicals into their roots. Once the plants are deemed saturated, they are dryed and used as biofuel.

- blue sheep fescue
- mustard
- ragweed
- bamboo

3 PHASE [THREE]

infrastructure:

carbon pipeline

Waste carbon, from coal power plants and steel plants around the area, is piped in to be injected in to the protocell 'soup' (chemical environment within the water catchments that is necessary for precipitate growth).

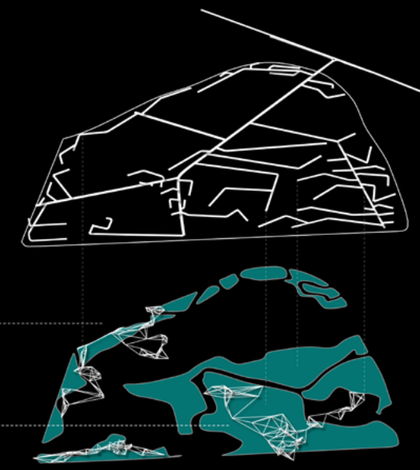
programmatic elevation requirements:

the new terrain will offer thickened and thinned areas to be carved out for built programming, the required heights for certain programming can be controlled through the swarms.

- research labs 3m
- living pods 3m
- biofuel plant 6m
- education complex 4-10m
- science centre 4m
- gallery 4m
- fueling station 3m

swarm [one]

the first swarms are deployed in bioremediated sites as heat pipelines.



2020

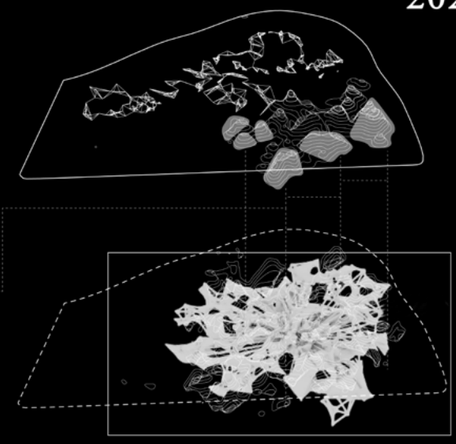
4 PHASE [FOUR]

swarm [two]

Flooding of phytoremediated sites occurs in order to create the 'soup' [chemical environment] needed for protocell growth.
Secondary swarms are deployed in bio-and-phyto-remediated areas.
Growth begins to emerge on the initial swarms - protocells are heat-seeking - populations will gather along the heat lines and produce thickened growth around the pipes - the more dense the swarm (or heat lines), the more growth will occur

inhabitation

program can now start to emerge on site by carving in to the growth.



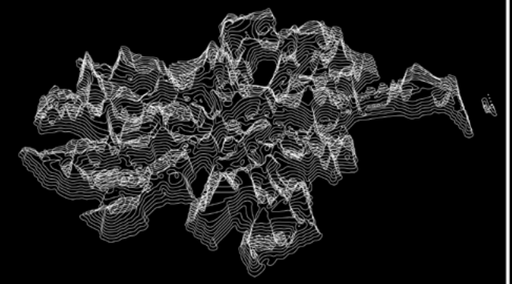
5 PHASE [FIVE]

growth

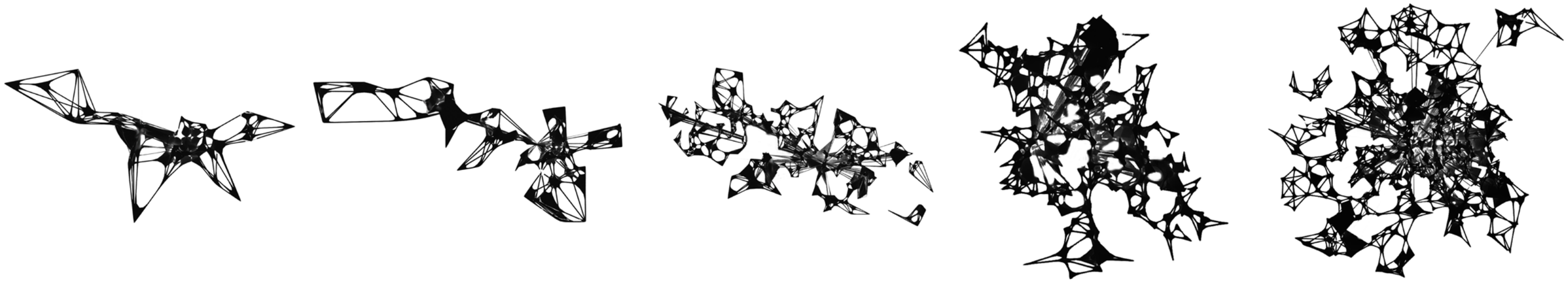
A continual process of flooding, swarming and growth occurs. The process can potentially continue and push into the city of Detroit, using abaandoned buildings as scaffolding, the potential for growth is seemingly endless until, of course, there is no more waste carbon and heat to be salvaged.

inhabitation

program continues to be implemented when growth sites become ready for carving.



2050




Complete ['non-living'] Pods
Gallery|Museum Complex
Fueling Station
Docking Station
Docking Station
Biofuel Plant
Water Catchment
Algae Stores
District 5 Science Center
Living Pods
Living Pods
Swimming Holes
School of Science and Technology Complex
Natural Growth Area
Research Hub
Docking Station
Sanctuary
Docking Stations
to habitate
to fuel
to play
to explore
to discover
to learn
to nurture
to showcase
to grow

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