RETHINKING THE POST-EXTRACTION LANDSCAPE

An Architectural Inquiry into Post-Extraction Conditions

by
Andrea Vettoretti
Bachelor of Architectural Science,
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ABSTRACT

A common theme amongst all communities dependent upon the extraction of mineral resources is their dependence upon a finite mineral reserve. Once exhausted or abandoned due to a loss of economy in extraction or in favour of more promising and profitable prospects, communities are frequently left to contend with the residual impacts of mining. The effects of which have only been amplified in recent years due to changing modes of production and consumption. As a consequence of these conditions, former industrial sites, particularly those related to primary resource extraction, have fallen into disuse. Physically altered and transformed by extractive industry, these once active extraction sites now remain as dormant voids, artifacts of industry.

In light of these conditions, this thesis advocates for the reclamation of post-extraction landscapes using architecture as a tool for highlighting, preserving and repurposing the now dormant industrial void. Having evolved in relation to both natural and cultural conditions, architecture acts to inform and reconnect users with former extraction sites, while fostering a greater understanding and awareness of the intertwined nature of industry, landscape and the history of place as it is linked to former industry (Hough M. , 1990).

Marmora, located in southern Ontario and one of the first iron mining communities in Upper Canada, is the context for this investigation. This community, like many others, flourished with the discovery of rich mineral deposits in the region early in the 19th century. Dependent upon a finite mineral reserve Marmora's economy deteriorated with the collapse of industry in the region late in the 20th century. Despite this condition, this small community continues to thrive due to its strong agricultural, recreation and tourism sectors which continue to drive the community's economy since the collapse of industry. What remains of the community's fleeting industrial past however, is a now abandoned open pit mine, the place of intervention for this study.

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DEDICATION

To my family, for all of their patience, understanding and support and David, of course.

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INTRODUCTION

"A hill becomes a quarry hole and later falls out of use - and an obsolescent landscape tilts toward a balance of fluctuating water levels, successive plant communities, exfoliating rockface, and marginal human occupation. Obsolescence, the state of becoming obsolete, is a process whereby artifacts have become "out of their time" – superseded or exhausted of resources"

- Berger, Hermann, Wong, & Rhode Island School of Design, pg. 98

Canada's wealth of renewable and non-renewable resources has been vital to the success of the nation's primary resource sector. Industries considered part of this sector include agriculture, oil, gas, logging, forestry, fishing and trapping and mining. Despite these very industries contribution to the nation's economic development, it cannot go without mention that these industrial and often extractive processes have also wreaked havoc on the natural environment (Kirkwood, 2001). Today, the Canadian landscape, mediated by both technological and economic forces, remains testament to the transformative power of industrial enterprise.

Furthremore, due to processes of deindustrialization that have over the latter half of the 20th century, once productive industrial centres throughout the developed world now face the threat of obsolescence. This condition is due to the fact that mineral extraction often becomes too costly to continue operation as resources are depleted. In addition, it has grown more common for materials to be sourced from extraction sites off shore where reduced labour and production costs are available. As a result of this, many mine sites lay dormant. This condition is only amplified by changing modes of production and consumption and the relocation of manufacturing and processing facilities with globalization.

Having been physically altered and transformed by extractive industry, these once industrial landscapes remain as dormant voids, artifacts of industry with little

suggestion to their future use. However, this predicament is not unique to Canada or the developed world, but is rather a universal condition affecting all those reliant upon the extraction of natural resources. Currently, there is little discussion as to how these landscapes may be preserved, converted and even repurposed beyond their customary return to pre-industrial conditions. These sites have typically been ignored in mainstream discourses on design (Berger A., 2006). This is the result of contemporary mining laws and regulations which require that post-extraction sites be returned to a quality as close as possible to pre-development conditions (Government of Ontario, 2012). In turn, the pervasive conditioning of these sites has been one of subversion and concealment.

This is of growing significance in the developed world where sprawling conditions continue to reduce the availability of undeveloped land. Once located along the periphery, these former extraction sites are now closer than ever before. This is due to sprawling development patterns and expanding communities. Thus, it can be argued that post-extraction landscapes become opportunities for redevelopment, assisting in relieving pressure on undeveloped green sites while also reducing the conditions of urban sprawl (Kirkwood, 2001). In response to these conditions, this thesis advocates for the reclamation and reuse of post-extraction landscapes marred by extractive processes. It is in these unique and often ignored conditions that architecture becomes a tool for highlighting, preserving and more importantly repurposing the dormant industrial void. Rather than allow these sites to fall victim to generic, superficial, and even cosmetic procedures promoted by contemporary mining laws, architecture can act as a mechanism for reclaiming, reprogramming and repurposing former extraction sites (Berger A. , 2008). [1]

This thesis, divided into five parts is presented as follows: Part 1, *Condition*, provides the basic situation and condition under which this thesis is conceived, Part 2, *Interpreting the Post-Extraction Landscape*, explores various themes associated with post-extraction landscapes, Parts 3 and 4, *Design Principles and Design Context* respectively, are investigated and, Part 5, *Design Response + Documentation*, explores final design exploration completed in part of this study.

[1] While a number of post-extraction sites require environmental remediation, this investigation is presented as a speculative study. It operates under the assumption that the extraction sites under investigation will have undergone environmental remediation by way of human intervention prior to architectural engagement on site.

CONDITION

1.1 INDUSTRIALIZATION

Having evolved in relation to the natural world, it is the nature of man to modify and appropriate his environment. This history dates back approximately 9000 years here in Canada with the use of naturally occurring resources in the construction of early settlements and in the fashioning of early tools by the First Nations people (Canada, 2010). Later records indicate the use of naturally-occurring metals (i.e. copper and iron) and minerals for trade. This tradition continued with the arrival of early Canadian pioneers whom made use of natural resources for the construction of initial settlements (Mining Industry Human Resources Council). However, our relationship with the natural world has since drastically changed. This is most apparent in the physical landscape which is now modified for reasons beyond basic survival (i.e. production and consumption of manufactured goods). As such, the physical landscape is testament to the transformative powers of industrial enterprise. This condition ideveloped most significantly in the years since the Industrial Revolution which occurred over the latter half of the 18th century and early 19th century (1750-1850). It is during this period that industrialization revolutionized traditional ways of life, making significant improvements to agriculture, manufacturing processes, transportation and most importantly within the context of this thesis, mining and other extractive pursuits. The following explores the integral role of industrialization in the historic development of the nation.

THE INDUSTRIAL LANDSCAPE

Figure 1
In The Nickel Belt
Franklin Carmichael

Prior to industrialization, pastoral communities across the nation looked toward forestry and agriculture as their primary means of sustenance. However, with the onset of industrialization in Britain during the 18th century, there came a significant shift. This shift would transform agriculturally-based economies into those invested in machine-based manufacturing.

In the context of natural resource extraction, the Industrial Revolution is of significance not only in relation to technological developments, but also in relation to new mechanisms of transport and travel which provided access to once isolated regions. In an attempt to further this notion one can look to canal and rivers systems long used as transportation and travel routes prior to the Industrial Revolution by traders, colonists and early pioneers. This condition remains legible in the Canadian context where many of our largest cities have evolved in relation to significant watercourses (i.e. Ottawa – Rideau Canal, Peterborough – Trent Waterway). Nonetheless, it is only as a product of this industrial period that the steam engine and locomotive trains were invented and developed for popular use. Most significantly, these new means of transport provided access to once remote and inaccessible communities of the interior which harbored valuable stocks of natural resources while opening new territory to future development.

Similar to those industries that existed prior to the Industrial Revolution, the extraction of natural resources is entirely dependent upon location. As a result, mining communities developed in tandem with the expansion of rail lines throughout much of the nation. These remote communities, referred to as “company towns”, were owned and constructed by mining companies, as a means of securing and maintaining a workforce in these remote areas. Furthermore, lodging and community services were often provided as additional incentives to work and live in these remote locations (Borges & Torres, 2012).This condition led to the growth of larger communities which provided additional services such as schools, churches and a number of commercial enterprises. Due to these unique conditions, many of these initial settlements have evolved into permanent communities. Thus, mining has acted as a pioneering device, fostering the growth and transformation of once remote and inaccessible regions into town and community centers.

A distinctive example of a company town is Sudbury, Ontario. Despite its success as a community built upon more than 125 years of nickel mining, it too, will be exhausted over time. Like Marmora, the site under investigation, Sudbury will be required to reclaim and repurpose the residual industrial landscape. For these reasons, communities invested in extractive industries must begin to consider post-

extraction land uses and look to the post-extraction landscape as an opportunity for architectural engagement.

Rail and transport innovations coincided with technological innovations that occurred during what some refer to as the Second Industrial Revolution (1870-1914). This period was characterized by physical, chemical and engineering innovations which enabled the rapid exploitation of mineral resources (Bray & Thomson, 1996). Over the latter half of the 20th century, these circumstances lent themselves to technical innovations that would facilitate significant advances in the efficiency of automated production processes. In the years following these advances, those formerly employed in agricultural sectors were quickly superseded by newly-mechanized processes. This led to the migration of workers toward industries invested in machined-based manufacturing. For many, especially in regions across Canada, these opportunities were primarily facilitated by the development of extractive industries in natural resource sectors. When viewed through the lens of the mining industry, improved automated processes enabled greater control and accuracy in the manipulation of the land as well as the extraction of material at greater scales and with greater economy than ever before.

Figure 2
Hematite Bound for the Great Lakes Via Rail

Despite the numerous economic benefits afforded by more efficient and automated processes, one of the most significant impacts is the depletion of mineral reserves, faster than any other time in modern history. This is supported by Mining Watch Canada's report noting that most new mines are expected to last less than 15 years due to new technological developments (Kuyek & Coumans, 2003).

What remains in the wake of industrial extraction are obsolete landscapes, physically transformed and no longer operational for their intended use. These landscapes now lay dormant, artifacts of industry (Trieb, 2009). This condition is only further compounded by qualities inherent to the extraction industry itself, including its dependence on a finite mineral reserve. While inevitable, industrial collapse is expected to become more frequent with the growing demand for mineral resources from emerging economies throughout the world (Marshall, 2012). Once depleted of its resources, the form of the land is an immediate by product of human land use and changes in technology. In turn, it becomes our responsibility to re-evaluate, recover, and project these landscapes toward new ends (Corner, 1999).

1.2 RECLAIMING THE POST-EXTRACTION LANDSCAPE

WASTE

In order to address our ability to reclaim the post-extraction landscape, one must first speak to the issue of waste. The term waste which comes from the Latin root vastus, is defined by the Oxford Dictionary as,

- *An act or instance of using or expending something carelessly, extravagantly, or to no purpose.*
- *Unwanted or unusable material, substances or by-products.*
- *A large area of barren, typically uninhabited land.*
- *Damage to an estate cause by an act or by neglect* (Press, 2013).

These four conditions, while individually related to traditional patterns and flows of waste, can be easily attributed to the extraction industry. For example, the extraction of resources is primarily driven by a culture of consumption, or as defined above, our careless and extravagant use of material resources. This has led to the consumption of unprecedented amounts of waste, as referred to in the second definition. This is echoed in our landscapes, where, as a by-product of our demand for resources, vast tracts of uninhabited land remain in the wake of extractive industry. These areas of land are often neglected due to their peripheral location. However, with new patterns of urbanization, particularly urban sprawl, communities are beginning to encroach upon these once isolated areas. This is of particular relevance in the North American context as it is rapidly deindustrializing while "…simultaneously urbanizing faster than at any other time in modern history" (Berger A., 2006, p. 46). As a result, these conditions are being taken more seriously by architects, planners, and politicians alike as they are now seeking opportunities to transform wasted places, reclaiming and repurposing them for post-extraction land uses. This is evidenced in the number of contemporary case studies examined in part of this thesis.

'Wasted place' is defined by Alan Berger in *Drosscape: Wasting Land in Urban America* as that which has been transformed by

> *"…contemporary modes of industrial production, driven by economical and consumerist influences, [which] contribute to…the formation of waste landscapes – meaning actual waste (such as municipal solid waste, sewage, scrap metal, etc.), wasted places (such as abandoned or contaminated sites), or wasteful places (such as huge parking lots or retail malls)"* (Berger A. , Drosscape: Wasting Land in Urban America, 2006, p. 14).

RECLAIMING THE POST-EXTRACTION LANDSCAPE

Concern over the ability to reclaim post-extraction conditions is relatively contemporary despite the fact that land has been altered with the extraction of resources since the onset of industrialization. For example, it is only during the 1960's and 1970's that concern over the degradation of the natural environment became widespread. It is during this period that land artists such as Robert Smithson, Robert Morris, and Michael Heizer began to challenge long-established traditions in both art and landscape design; bringing art from the confines of the gallery into the natural world, choosing 'wasted' or obsolete landscapes as the setting for their work (Engler, 1995). The result of these projects was the creation of large scale art pieces that went beyond mere environmental reclamation; instead challenging our existing understanding and perceptions of place (Figures 3-6).

Despite recent concern over our ability to repurpose the post-extraction landscape, this is by no means a new concept. This is evidenced in two examples dating back to the mid-19th century and early 20th century are the Parc Des Buttes Chaumont in Paris, France (1867) (Figures 7,8) and *Butchart Gardens*, located on Canada's West Coast (1906)(Figures 9, 10, 11). While indicative of early concern over the re-appropriation of former extraction sites, the concept is one that ultimately failed to catch on.

Today, these concerns have only re-emerged in response to the growing speed and scale at which extractive industries now operate, transforming vast tracts of land at an unprecedented rate. This condition is referred to in Berger's, *Designing the Reclaimed Landscape* where he notes that "…most of the mineral resources will be mined out…during the twenty-third century. Although the acreage is difficult to predict, a vast new post-mined landscape, approaching the scale of a hundred thousand square miles, will be created in the wake of US mining alone" (Berger A. , Designing the Reclaimed Landscape, 2008, p. xvii).

In response to these developments, there has been renewed interest into the ability to reclaim and repurpose 'wasted' landscapes. Often consigned as useless or wasted space due to their lack of definition and use following the collapse of industry, sites of this nature are now being reconsidered as places of future opportunity. The reconsideration of these sites is featured most prominently in the work of Alan Berger whose work is situated within previously developed concepts and theories of wasted place including Ignasi de Sola-Morales' *Terrain Vague* and Lars Lerup's characterization of *Stim & Dross*.

Figure 3, 4
Broken Circle/Spiral Hill
Robert Smithson

Figure 5
Johnson Pit #30
Robert Morris

Figure 6
Effigy Tumuli
Michael Heizer

Note: For more information on projects completed by Smithson, Morris and Heizer refer to Appendix A | Land Art

Figure 7, 8
Park des Buttes-Chaumont

A former gypsum and limestone quarry, Parc des Buttes-Chaumont, was converted into a public park in 1867 as part of Haussman's plan for Paris. What remains of the former quarry has been sculpted to appear more picturesque.

Both written in the 1990's, Lerups' *Stim and Dross*, and Sola-Morales' *Terrain Vague* are both studies into the undefined space of our cities; those areas which remain unoccupied or with an absence of use. Unlike Lerup whom merely differentiates the stimulating areas of our cities from the inactive, Morales' work acknowledges the voids created by processes of deindustrialization and disinvestment as evocative absences; as those which are full of promise and potential for future development (de Sola-Morales Rubio, 1995). Morales suggests that rather than attempt to remove these now voids conditions from communities, using design as a means to 'solve' these conditions, one should look to their unique qualities as inspiration and opportunities for design. When effectively repurposed the post-extraction landscape provides an opportunity for users to not only engage in the examination and evaluation of post-extraction conditions but reflect upon the impact of industry and transformation of the physical landscape.

Despite the fact that both Lerup and Morales' work is situated in the urban condition, both research models resonate with the nature of post-extraction landscapes. Furthermore, both models act as the framework for Berger's later characterization of waste landscapes, a term he refers to as *drosscapes.*

Berger classifies *drosscape* as

> *"…the creation of a new condition in which vast, wasted, or wasteful land surfaces are modelled in accordance with new programs or new sets of values that remove or replace real or perceived wasteful aspects of geographical space. Drosscape, as a verb, is the placement upon the landscape of new social programs that transform waste (real or perceived) into more productive urbanized landscapes to some degree" (Berger A. , 2006, p. 237)*

This is of particular relevance in the context of North America which continues to expand with rapid urbanization. As a result of these conditions, once isolated mine site are now located along the periphery expanding communities (Berger A. , 2006). As these conditions continue with ongoing extraction of resources worldwide, the need to reclaim and revert these blighted landscapes back to productive use becomes paramount (Berger A. , 2006).

ABANDONED & ORPHANED MINES

Post-extraction sites are fostered by not only ongoing economic and consumerist forces, but are also the result of former mining practices. For example, prior to the introduction of mining laws late in the 20th century, it was common practice that once exhausted or no longer profitable, extraction sites were abandoned. According to Mining Watch Canada, a national non-profit organization dedicated to protecting communities against irresponsible mining practices, "…[mines were abandoned] because there was not a legislative mechanism to prevent them from becoming so, and not enough understanding of the physical and environmental hazards involved in mining. During this period, there were no rules in place that required clean up" (Mining Watch Canada, 2009). The government simply provided mining companies with exit tickets that allowed the return of land to the crown following the closure of extractive industry. This process acted to relieve former operators of all responsibility regarding any and all future damages related to the site. These practices have resulted in approximately 10 000 abandoned mine sites in Canada with approximately 6500 of those being located in Ontario alone (Tremblay & Hogan, 2012). These sites, now referred to as abandoned or orphaned mines, are those "…which the owner cannot be found or the owner is financially unable or unwilling to remediate the site" (Natural Resources Canada, 2011). It is only in the 1980's and 1990's that legislative policies and regulatory departments were developed. Today, these policies are such that mining companies are to provide both a closure plan and financial assurance prior to the commencement of mining on site (Fraser Institute, 2012). Financial assurance is required as means of guaranteeing that monetary resources be available to meet closure requirements in the event that companies are unable to complete the cleanup (i.e. bankruptcy) thereby preventing the continuing abandonment of mines (Fraser Institute, 2012).

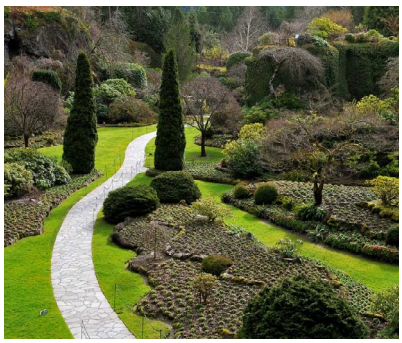


Figure 9
Former Quarry
Figure 10
Butchart Gardens - Sunken Garden
Figure 11
Fountain Located in the Former Quarry

What is known today as Butchart Gardens was once a limestone quarry. Upon the exhaustion of materials from the quarry, the remainder of the open pit was transformed into a garden between the years of 1906-1924. Today, little remains as indication of the site's former occupation except for exposed portions of the former quarry's walls and the chimney of a former kiln (The Butchart Gardens Ltd., 2013)

Having only been introduced late in the 20th century (1970's), remediation practices are relatively new to the long history of mining in Canada. It is during this period that there was mounting awareness of the damage caused by humankind on the natural environment. This concern came off the heels of seminal books such as Rachel Carson's *Silent Spring* (1962) and Ian McHarg's *Design with Nature* (1969) which were both published in the years prior to the introduction of remediative practices. Together, the books promoted a new ecological awareness regarding human actions and their impact on the natural environment. Both McHarg and Carson promoted a new ecological attitude which encouraged coexistence with nature. Prior to these movements, land was largely viewed as a commodity, a place to be extracted from and transformed in the pursuit of economic progress. This was only fueled by technological advances developed in part of the industrial revolution which enabled greater control and efficiency in the extraction of

resources. However, this perception of the land as resource has and continues to prevail with our desire for progress despite growing environmental concern.

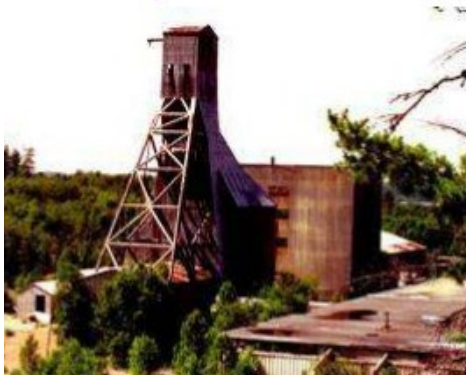
Although it has become standard practice within the mining industry to remediate these once industrious sites, there is currently little specification as to how it is to be performed. Mining laws simply call for a return to a quality and appearance as close as possible to pre-development conditions (i.e. those that existed prior to mine development) (Government of Ontario, 2012). For many sites, this requires the removal and containment of any physical or environmental hazards. [2] Other factors affecting the treatment of post-extraction sites are their proximity to community developments. Those located in close proximity are likely to be remediated to a higher standard. In conditions such as these it is likely that former equipment and structures be removed and landforms be capped and re-graded as a means of containing environmental hazards or contaminants (Figures 12-14). This restructuring of place is performed as a means of not only reducing liability in populated regions but as a means of concealing the scars of extraction. The one exception to this condition is open pit mining. Open pit mines often remain open following closure due to their inability to be filled in by the quantity of material extracted following the closure of industry. For these reasons, they are often filled with the remaining overburden (waste rock from the mining process) collected from the site itself (when it does not provide a risk of further contamination) and enclosed by chain link fencing as a means to prevent unwarranted access to the site.

Much like other mines which have faced closure following the instatement of mining laws, former open pit mines are likely to have existing infrastructure associated with their former occupation removed from the site. However, in more recent years, there has been growing interest in the ability to convert former open pit mines into opportunities for recreational space for surrounding communities following the closure of industry. This is more problematic for extraction sites located in more remote areas. Here, it is unlikely that structures be removed or dismantled unless they are found to pose considerable risk to the public. Often, local municipalities will only install basic barricades (i.e. fencing) as a means to prevent access to areas that pose the most risk.

While effective in addressing safety concerns (i.e. reducing potential threats to

[2] Physical hazards include any former equipment, structures and openings that remain on site, while environmental hazards account for those less visible to the eye (i.e. acid mine drainage, contamination and other pollutants left on site) (Mining Watch Canada, 2009).

human and environmental health), these blanket strategies are only superficial solutions. They fail to address the post-extraction condition beyond the reduction of safety hazards and future liability. Reclamation performed in this manner lacks foresight into how these sites, when effectively repurposed and reclaimed, can make positive social and economic contributions following the closure of local industry. Two examples of this condition include the *Eden Project* by Nicholas Grimshaw and *Evergreen Brickworks* by Diamond and Schmitt Architects, both of which will be discussed at greater length in the following section.



Mine Reclamation Efforts
Figure 12
North Coldstream Mine
Butchell Lake, Ontario

Figure 13
INCO
Sudbury

Figure 14
Mine Albert
Quebec

CONTEMPORARY CASE STUDIES

Figure 15
Ballast Point Park
McGregor Coxall and Choi Rophia Fighera

Figure 16
C-Mine Cultural Complex
5IN4e

Figure 17
Eden Project
Nicholas Grimshaw

Figure 18
Evergreen Brick Works
Diamond and Schmitt Architects

In response to the aforementioned conditions, a series of contemporary case studies are presented as examples of how the post-extraction landscape can be better repurposed and reclaimed. Unlike reclamations performed according to contemporary mining laws (i.e. Figures 12-14), those selected for examination illustrate active engagement in the pre-existing conditions of place. Beyond this relatively basic screening requirement, projects have been categorized and further examined based on three criteria including social, cultural, economic and historic sustainability (See Table 1). These criteria have been selected based on common objectives or goals for architectural developments situated in the post-extraction landscape. These objectives range from an attempt to return place to an economically productive state, to those that seek to create sustainable hubs in their cities which actively preserve the history of place.

It is important to note that the criteria for evaluation and selection do not address environmental reclamation strategies as this is to be considered the baseline condition (Much like this thesis, it is understood that environmental reparation would be addressed prior to any proposal. Discussion however, will address baseline site conditions).

SOCIAL

Projects that have made positive social improvements and/or contributions to the local community following the closure of industry include *Ballast Point Park*, by McGregor Coxall and Choi Rophia Fighera (Figure 15), *Stearns Quarry Park* by D.I.R.T Studio (Figure 24), the *Eden Project* by Grimshaw (Figure 17), *Zollervein Industrial Complex* (Figure 26), and *Evergreen Brick Works* by Diamond and Schmitt Architects (Figure 18). What is of most significance amongst these projects is their recovery of former extraction sites for recreational use by local residents. For example, *Ballast Point Park* (located in Sydney, Australia) has provided residents with renewed access to its waterfront through the remediation and reclamation of a former stone quarry. As a result of the intervention, this once wasted place has been fully converted into a public park. A similar project is *Stearns Quarry Park*. Located in Chicago, *Stearns Quarry* was once the site of a former limestone quarry. In the years following its closure, the site became a city landfill for construction debris. It is only years later, after the site had been all-but-filled by debris, that the site was transformed into a recreational amenity for local residents. Much like *Ballast Point*, the form and condition of this site has been dictated entirely by former industry, lending to the unique character of the site. Common amongst the two projects is their infrastructural rather than architectural focus. Their designs provide the means for users to access and move through the newly reclaimed sites. Although limited in terms of physical engagement with the site, the reclamation of these former extraction

sites has played an active role in the regeneration of the surrounding community by improving both safety and livability. Additional projects which have made positive social contributions to their local communities through creative social programming include *Evergreen Brick Works* , the *Eden Project*, and *Zollervein Industrial Complex*.

In summary, the case studies examined here illustrate the limited role of architectural intervention in post-extraction conditions. As seen in both *Stearns Quarry* and *Ballast Point Park*, structures are reduced to ancillary functions. It is only in later case studies such as the *Evergreen Brick Works*, and *Zollervein Industrial Complex* that architectural form accommodates and houses significant social space. In light of this, the mere provision of such social and recreational program is not only enabled by the remediation of the land itself, but architectural space and form.

CULTURAL

Projects that have and continue to make significant cultural contributions to communities following the closure of local extractive industry include *C-Mine* (Figure 16), the *Eden Project* (Figure 17), *Evergreen Brickworks* (Figure 18), *Roman Quarry* (Figure 21), *Wieliczka Salt Mine* (Figure 15) and *Zollervein Industrial Complex* (Figure 26). Common amongst the projects listed here is the provision of programming (i.e. cafes, restaurants, museums, and performing art venues) that not only replaces the economic void but invests in the community culturally. Transformation of this nature illustrates the ability to convert now void industrial spaces into those that are culturally relevant and active spaces , providing a positive legacy for future generations through the re-appropriation of space.

ECONOMIC

By and large, most, if not all contemporary projects operating in post-extraction conditions seek to make economic improvements to communities and or regions that have suffered economically following the closure of local industry. In conditions such as these, it is common for architectural form to be treated as a means of generating attraction rather than awareness of former extractive processes and their role in transforming the landscape. This is evidenced in the fact that architectural interventions in post-extraction conditions are often of a superfluous or ostentatious nature, taking on superficial forms, with little relationship to the conditions or character of place (Figures 19, 23). While this condition is most evident in projects such as *Dawang Mountain Resort* (Figure 19), *Songjiang Hotel* (Figure 23) and the *Quarry Garden* in Shanghai, China (Figure 22), projects including the likes of *Zollervein Industrial Complex* (Figure 26), *C-Mine* (Figure 16) and *Evergreen Brickworks* (Figure 18) become understated

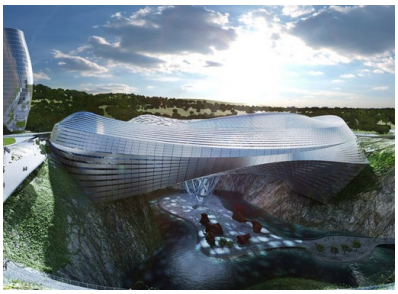


Figure 19
Dawang Mountain Resort
Co-op Himmelblau

Figure 20
Inujima Seirensho Art Museum
Sambuichi Architects

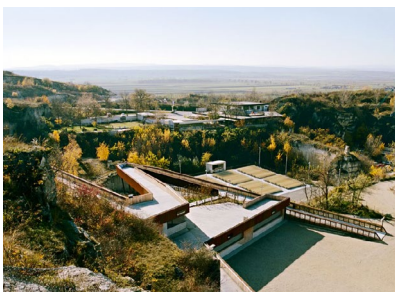


Figure 21
Roman Quarry
AllesWirdGutArchitektur

Figure 22
Quarry Garden in Shanghai Botanical Garden

Figure 23
Songjiang Hotel
Atkins

Figure 24
Stearns Quarry
D.I.R.T Studio

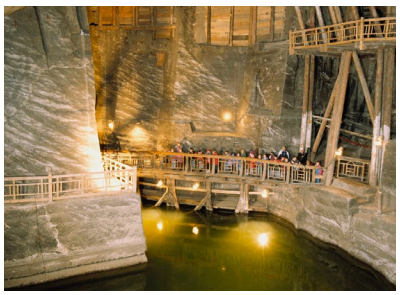


Figure 25
Wiedliczka Salt Mine

Figure 26
Zollervein Industrial Complex

examples of the ability to generate attraction and in turn economic value through the reuse and renewal of preexisting facilities (i.e. historic structures on site).

HISTORIC

All of the projects reviewed here were found to engage the history of place. Connection to the history of place, however, is realized through two means: the retention of historic building fabric and the preservation or exposure of the industrial landscape itself. These two aspects allude to former operations on site and the very nature of industrial transformation.

Projects that engage the history of place through the preservation of pre-exiting landforms include *Ballast Point Park* (Figure 15), *Roman Quarry* (Figure 21), and *Quarry Garden* in Shanghai, China (Figure 22). While this strategy is effective in revealing the sites history through the form of the land, this is often performed as a means of exploiting the environmental conditions of place for their potential economic benefits rather than the retention and or reference to history. These conditions are best illustrated in projects such as *Dawang Mountain Resort* (Figure 19) and *Songjiang Hotel* (Figure 23). Here, the form of the land as it has been altered by industry has been preserved only to be capitalized upon by architectural form which makes no reference to the history and or narrative of place.

In contrast to these conditions, are those projects which engage the history of place through the retention of historic building fabric. Projects of this nature include *Zollervein Industrial Complex* (Figure 26), *C-Mine Cultural Complex* (Figure 16), *Wielickzka Salt Mine* (Figure 25), and *Ballast Point Park* (Figure 15). Both *Zollervein* and *C-Mine* make reference to the history of place through the preservation and adaptation of existing building fabric (as several of the structures are historically protected) while *Wielickzka Salt Mine* conserves its history through the preservation of excavated landforms. A commonality amongst these projects is the preservation of industrial equipment which is intended to recall former industrial processes. This has also been done at *Ballast Point Park* which makes reference to its history through the use of follies. Following the site's initial use as a ballast quarry, the site later became an oil storage facility. Due to reclamation efforts, portions of former oil drums that occupied the site were retained as a narrative layer, thereby acting as palimpsest.

It is important to note that projects including the likes of *Evergreen Brickworks* (Figure 18), the *Zollervein Complex* and *C-Mine* are a rarity amongst post-extraction sites. Unlike most other extraction sites whose architecture is of a utilitarian nature, these projects boast a unique collection of historic infrastructure. Unlike the other projects

examined, the mere preservation of pre-existing structures pays homage to prior industry and in turn the history of the site. This condition is of utmost importance in the context of this thesis as it is through the interpretation of site and its existing conditions that architecture can engage the historical narrative of the site. In light this condition, this thesis reconsiders the means of engaging in post-extraction conditions. This requires one to reconsider the means by which the history of place and the role of industry is responded to and how it can be integrated into architectural form where pre-existing infrastructure pertaining to these conditions is absent from place.

Table 1 presents a summary of the contemporary case studies examined here. As previously noted, the case studies selected for examination have been selected based on their engagement in post-extraction conditions and evaluated on their social, cultural, economic and historical contributions to place following the collapse or closure of industry.

Table 1

Contemporary Case Studies

PROJECTS	SOCIAL	CULTURAL	ECONOMIC	HISTORIC
BALLAST POINT PARK McGregor Coxall and Choi Rophia Fighera Sydney, Australia 2009	- Reclamation Of Former Stone Quarry - Converted Into a Public Park - Renewed Access To Waterfront	- N/A	- N/A	- Preservation of Existing Landforms - Preservation of Industrial Follies
C-MINE CULTURAL COMPLEX 5IN4E Genk, Belgium 2010	- N/A	- Existing Structures Converted into Cultural Centre - Includes Design Centre, Music Room, Event Hall, Exhibition Space etc.	- Attraction in the Preservation and Renewal of Existing Facilities/ Historic Building Fabric - Programming Geared Toward Tourism	- Retention of Historical Building Fabric
EDEN PROJECT Nicholas Grimshaw Cornwall, United Kingdom 2003	- -Reclamation of a Former Quarry - Provision of Community Programming	- Event Space, Restaurants, Cafes	- Attraction in the Preservation of Existing Landforms - Attraction in the Creation of Superficial Architectural Form	- Preservation of Existing Landforms
EVERGREEN BRICK WORKS Diamond and Schmitt Architects Toronto, Ontario 2010	- Reclamation of a Former Clay Quarry & Brickworks - Preservation of Original Structures - Provision of Community Programming	- Farmers Markets, Local Artisans, Cafe	- Programming (ie. Farmers Markets), Local Artisans etc. - Attraction in the Preservation and Renewal of Existing Facilities/ Historic Building Fabric	- Retention of Historical Building Fabric
DAWANG MOUNTAIN RESORT Coop-Himmelbau Changsha, China 2013-	- N/A	- N/A	- Attraction in the Creation of Superficial Architectural Form - Programming	- Preservation of Existing Landforms
INUJIMA SEIRENSHO ART MUSEUM Sambuichi Architects Okyama, Japan 2008	- N/A	- Art Gallery/ Museum	- Attractive Destination/ Location Relative to the City	- Preservation of Existing Landforms - Retention of Historical Building Fabric
ROMAN QUARRY AllesWirdGutArchitektr St. Margarethen, Austria 2008	- N/A	- Outdoor Concert Venue	- Attraction Generated Through the Preservation of Existing Landforms - Programming	- Preservation of Existing Landforms
QUARRY GARDEN IN SHANGHAI Botanical Garden Shanghai, China 2012	- N/A	- N/A	- Attraction in the Preservation of Existing Landforms + Creation of Superficial Architectural Form	- Preservation of Existing Landforms
SONGJIANG HOTEL Atkins Shanghai, China 2012-	- N/A	- N/A	- Attraction Generated Through the Preservation of Existing Landforms + Creation of Superficial Architectural Form	- Preservation of Existing Landforms

STEARNS QUARRY D.I.R.T Studio Chicago, Illinois 2001	- Reclamation of a Former Limestone Quarry - Converted Into a Public Park - Provision of Recreational Amenity for Local Residents	- N/A	- Contributed to the Regeneration of Historic Neighborhood - Improved Property Values For The Surrounding Community	- Preservation of Existing Landforms
WIELICZKA SALT MINE Wieliczka, Poland 1966	- N/A	- Mine Itself Represents Centuries of Tradition (In Operation Since the 13th C.) - Houses Concert Venue, Exhibition, Meeting and Event Space	- Preservation of Existing Landforms	- Preservation of Existing Landforms
ZOLLERVEIN INDUSTRIAL COMPLEX Essen, Germany 2001	- Provision of Recreational Amenities for Local Residents	- Existing Structures Converted into Cultural Centre - Structures House a Performing Arts Theatre, Design Museum, Industrial Museum, Multiple Restauraunts etc.	- Attraction in the Preservation and Renewal of Existing Facilities/ Historic Building Fabric - Programming Geared Toward Tourism	- Retention of Historical Building Fabric

SUMMARY

While demonstrative of architectures ability to repurpose post-extraction landscapes, by and large the responses examined here fail to engage the nature of extractive industry and its subsequent transformation of the land. With the exception of *C-Mine* (Figure 16), *Zollervein Industrial Complex* (Figure 26), and *Evergreen Brickworks* (Figure 18), the role of architecture is reduced to either ancillary (i.e. washrooms or stair, infrastructure which provide access to place) or iconic interventions intended to generate attention and in turn economic value.

In turn, the projects examined here are fundamentally flawed due to their inability to engage and generate awareness regarding the history and or narrative of place as related to former industry. The projects examined make use of the post-extraction landscape as a means of generating attraction and in turn economic opportunity through the creation of superficial architectural form. In doing so, architectural form becomes a veneer detracting from the more pertinent issue of extractive industry and its physical transformation of the land. Alternatively, projects that engage in post-extraction conditions should strive to use the remaining conditions of place as a unique opportunity for architectural engagement.

Therefore, this thesis promotes an architecture that is capable of articulating not only the conditions of place, but the profound role of former industry. It looks to architecture as a medium for revealing and articulating the conditions of place while creating a venue in which users are capable of engaging in post extraction condition where pre-existing infrastructure and or historic infrastructure is absent from place. Within these conditions, architecture has the ability to act as a tool for engaging and providing users with insight into the post-extraction condition while creating a venue for users to re-evaluate these conditions and the place of man within them.

Based on these conditions and the previously selected case studies, I have established the following parameters for design. First, any intervention in these conditions must not be ancillary in its function. It must provide more than basic services and or access routes to and from the site under question. Secondly, the proposed intervention must not only be aesthetic (i.e. architecture as attraction or spectacle).Although the intervention may take on an iconic form, it must lend itself to the acknowledgement of post-extraction conditions. Third, architecture situated in the post-extraction landscape must allude to the role of industry in the creation of place. Lastly, the proposed intervention is to reveal and engage in the unique conditions of place beyond its mere physical preservation.

THEMES + INSIGHTS

2.1 TRANSPARENCY

Due to processes of deindustrialization few individuals experience the industrial landscape on a day to day basis. However, when opportunities present themselves, our view of the landscape is often averted by man-made interventions such as buffer strips intended to conceal the impact of extractive land practices (Hough M., 1990). This partnered with an increasing disconnection from industrial processes contributes to negative perceptions of industrial landscapes.

Unlike previous generations whose livelihoods were tied to industrial manufacturing and processing, many of us will never see the 'inside of a mine, mill, factory or power plant' (Hayes, 2005). Amongst other reasons, it is as a result of our increasing disconnection from industrialized processes that our perceptions of these conditions are often tainted with negativity. This is further explored by Hayes in the text *Infrastructure: A Field Guide to the Industrial Landscape*, where he notes "At a refinery or a petrochemicals plant, we don't know what goes on behind the chain-link fence or what comes out of the smokestacks, and therefore we expect the worst…" (Hayes, 2005, p. 504). This perception contrasts those of the 19th century, when man's ability to alter, harness and transform the earth was celebrated. As a consequence of these changing social conditions, buffer strips and innovative landscaping have been increasingly used as a means of reconstructing the post-industrial landscape, restoring place to its 'natural' condition.

As explored in previous chapters, former extraction sites are often re-vegetated and re-graded in a manner that implies that the physical damage left by extraction is not to be treated as permanent, but as that which can be effortlessly repaired (Katz, 1992). This practice continues to thrive under the pretense that when landscapes appear natural to place, they tend to create more meaning for the community. However, "Many of [us] were not even on the planet at the time the land was pristine" (Treib, 2002, p. 93). Often, these landscapes have been so dramatically altered by industry and are so engrained in the history of place, that new landscapes are "…not easily understood as references to the past by contemporary citizens" (Treib, 2002, p. 93).

Based on these observations, one must return to the question; why must the

original landscape be restored? And why is it that so much effort is being directed toward masking modern industrial landscapes? Is this treatment of the land fueled by romantic motivations or is the 'natural' appearance more likely to go unquestioned (Treib, 2002)? As suggested by Arnold Berleant and Alan Carson in their text, *The Aesthetics of Human Environments*, one must begin to appreciate and embrace newly industrialized landscapes on their own terms rather than in reference to picturesque landscapes made obsolete by extractive industry (2007).

2.2 THE PICTURESQUE

Our desire to look upon beautiful landscapes has been culturally engrained since the 18th century. It was during this period that our fascination with the picturesque was first theorized by William Gilpin, Uvedale Price, and Richard Payne Knight (Nassauer, 2009). Theories of the picturesque catered to the need to define and describe the appearance of scenes and objects that failed to be categorized into existing genres of the beautiful or the sublime (Meyer, 2002). Defined as that which was like or had elements of a picture, the picturesque accounted for landscapes that were rough and irregular in nature. These landscapes existed in contrast to the smooth lines of the beautiful and the terrifying landscapes of the sublime.

The first use of this term is attributed to William Gilpin, whom used it in his 1768 text entitled, *An Essay on Prints*. A travelogue, Gilpin's *Essay On Prints* was an account of the author's travels throughout Europe which documented specific elements of the landscape which he believed lent themselves to the construction of a picturesque landscape (Meyer, 2002). As a consequence of this text, landscapes were transformed into pleasing two dimensional images, objects of visual pleasure (Meyer, 2002). In the text, Gilpin notes that while nature is capable of generating the foundation for great compositions in the form of colour and texture, it fails to generate a composition, giving artist's free reign over the arrangement or configuration of elements in the work. The result of which was artists "improving on nature" (Thompson, 2009, p. 51). That said, contemporary remediation practices are that which engage the picturesque as an editorial process, altering existing conditions as a means of constructing environments which are 'most pleasing to the eye'. This superficial desire, particularly in the context of rehabilitating former extraction sites, has led to the construction of 'contrived and frequently misleading' landscapes (Nassauer, 2009).

While environmentally advantageous, current strategies for the ecological restoration of place are often cosmetic as they subvert and conceal the unique conditions of place. This conditioning of place is a squandered opportunity. Rather than continue to project false images of place, this thesis looks to embrace the post extraction landscape as an opportunity to promote, provoke and critically engage users in the issue of resource consumption while also challenging individuals to re-evaluate their relationship with the land.

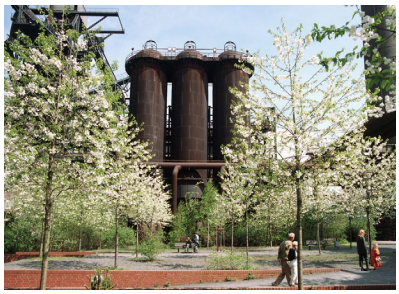


Figure 27, 28
Landschaftspark Duisburg-Nord
Latz + Partners

THE INDUSTRIAL REMAIN, NOSTALGIA + ROMANTICISM

The debate over industrial remains and their potential for re-use is often reduced to three alternatives: the preservation of the whole, the preservation of part or the complete elimination of all that was there before. However, the danger in preserving any one part risks being deemed nostalgic or romantic. This is most evident in the preservation of structures for reasons beyond their original function. An example of this condition in current practice is the preservation of historic facades and or structures as a means of lending historic value to new construction (Treib, 2002) (i.e. Facadism). While effective in lending an air of history to place, original structures suffer a loss of value and authenticity as the elements preserved are reduced to objects of visual or aesthetic pleasure. Although this condition is prevalent in recent urban developments, the trend can also be observed in a number of post-industrial developments. These conditions will be examined in three distinctive projects including *Landschaftspark Duisburg-Nord* by Latz + Partner, *Gas Works Park* by Richard Haag and *Shipyard Park* by landscape architects Kongjian Yu and Wei Pang. While illustrative of the ability to repurpose post-industrial sites, as a collective, these projects have retained former structures only as aesthetic objects and/or follies.

Figure 29, 30
Gas Works Park
Richard Haag

Located in Germanys Ruhr district, *Landschaftspark* is a former industrial iron works transformed into a public park. Reclaimed for contemporary use, the project has undergone significant remediation allowing most of the original structures to be retained. Having given the remaining structures new whimsical uses, the designers have leveraged industrial remnants as attractions in and of themselves (Figures 27,28).

Gas Works Parks in Seattle, Washington is a former coal gasification plant that has been converted into a public park. Having remediated the sites

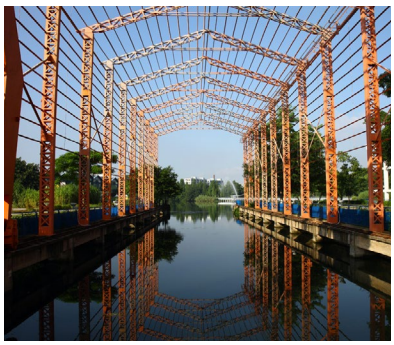


Figure 31, 32
Shipyard Park
Turenscape

polluted soils, the only remain of former industry on site today is the former boiler which has been incorporated as the central feature of the park. This has reduced this once integral element of industry to a mere sculptural object. This condition is only reinforced by Haag himself, whom has stated that he did not retain the structures for their historic value but rather their sculptural and/or formal aesthetic qualities (Wai-kin, 2013)(Figures 29,30).

The last example of this condition is *Shipyard Park*, located in the city of Zhongshan, China. Here, former shed structures have been stripped of their shells and preserved as outlines. In doing so, the structures have been reduced to follies, objects of visual interest in a landscape otherwise radically altered through reclamation(Figures 31, 32).

Commonalities amongst these projects can be summarized by the preservation of former industrial structures for reasons of aesthetics rather than functional or historic value (Loures & Burley). This is evidenced in the fact that most of what has been preserved or retained, with the exception Latz + Partners *Landschaftspark Duisburg-Nord*, fail to actively engage users. In turn, the structures themselves are reduced to decorative features valued for their aesthetic appearance alone. Alternatively, Latz + Partners have lent new functional uses to many of the structures that remain on site, using both design and function to capitalize upon the aesthetic character of the remaining structures.

This is referred to by Marc Treib in his short essay, *Remembering Ruins, Ruins Remembering*, where he notes that this treatment of architectural form not only fetishizes the structures that remain, but essentially "…strips them of their historical meaning" (Trieb, 2009, p. 208). Trieb goes on to say that unlike ruins, which hold meaning long after their occupation has ceased, meaning quickly evaporates from industrial structures once the use for place is gone (Treib, 2002). This condition is only amplified by the fact that former industrial structures are often of a utilitarian nature (i.e. constructed to house specific activities for a fixed period of time with little investment in the structures themselves). The one exception to this condition is the preservation of structures which explicitly pertain to the history or former industrial nature of the site. This is evidenced in projects including *C-Mine*, *Evergreen Brickworks* and the *Zollervein Industrial Complex* (referred to in earlier chapters) where the re-appropriation of existing structures actively engages the history of place.

In response to these conditions, this thesis looks not to the physical structures that remain post-industry but instead the landscape. This is proposed as landscapes, unlike most post-industrial building stock (which is often of a utilitarian nature), are universally reflective of issues pertaining to resource extraction. The importance of protecting industrial heritage is acknowledged by the *International Committee for the Conservation of the Industrial Heritage* (TICCIH), a world organization whose work promotes the protection, preservation, maintenance and conservation of industrial heritage. According to TICCIH, the protection of industrial heritage is of fundamental importance as what remains is physical evidence of social, technical and economic developments that have been ongoing since the "…Industrial Revolution in the second half of the eighteenth century up to and including present day…" (The International Committee for the Conservation of the Industrial Heritage, 2003). Unlike structures and or artifacts traditionally valued and protected for their historic or architectural significance alone (Bluestone, 2011), TICCIH looks beyond those monuments constructed in the 18th century and to those constructed more recently. These structures are considered a reflection of a common culture and values.

The goals of this committee are summarized in the Nizhny Tagil Charter for the Industrial Heritage. The charter itself defines industrial heritage as,

> *"…buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education" (The International Committee for the Conservation of the Industrial Heritage, 2003).*

To reiterate, despite the fact that many of the places listed here fall well outside sites traditionally valued for their historic or architectural significance they should and cannot be discounted. The sites listed hold significant value for today and the future as they are a significant reflection of our common culture and contemporary values. They provide the opportunity to reflect upon the role of industry, our consumption of resources as well as current and future land uses. The significance of this condition is reflected in the inclusion of several post-industrial sites on UNESCO's list of World Heritage Sites. Examples include *Zollervein Coal Mine Industrial Complex* (Essen, Germany), *Wieliczka and Bochnia Royal Salt Mines* (Poland), *Roros Mining Town* (Norway)(Figures 33-35).

Figure 33
Zollervein Coal Mine Industrial Complex

Figure 34
Wieliczka and Bochnia Royal Salt Mines

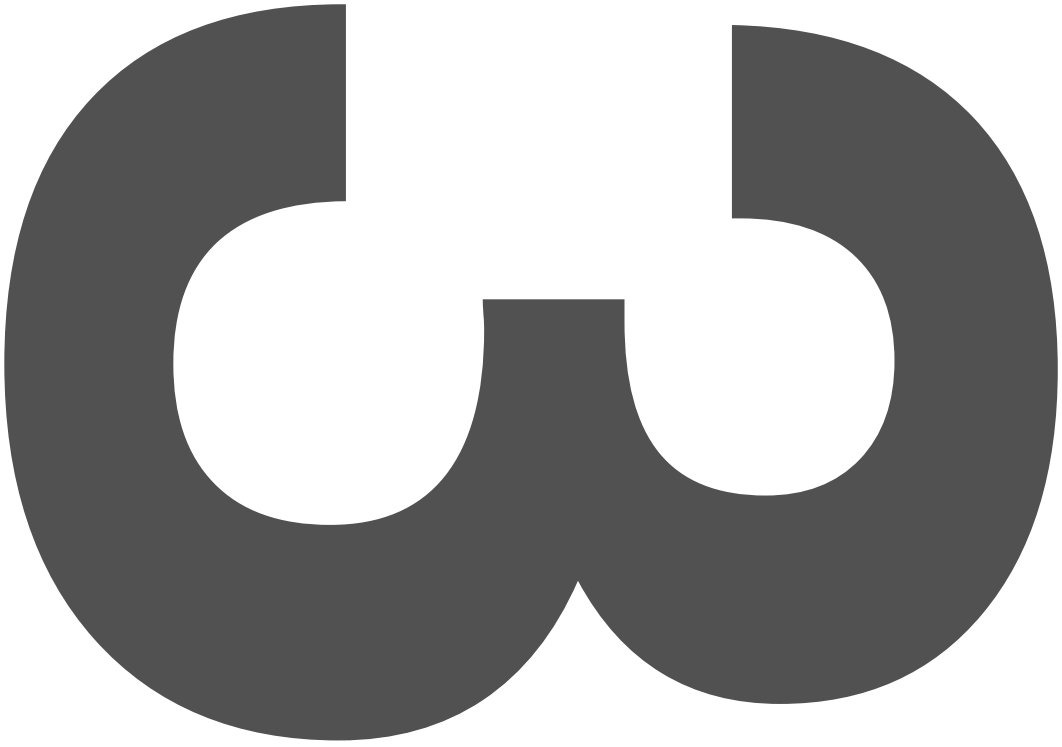
Figure 35
Roros Mining Town

Note: Refer to Appendix B for more information on the Nizhny Charter for the Industrial Heritage

CONCLUSION

In light of the research presented here, one has drawn a number of conclusions. First, new aesthetic categories must be developed for the preservation of post-extraction landscapes. This requires that the sites themselves be presented in ways far different than current remediation strategies suggest (i.e. masking the conditions of place). Based on topics explored in this chapter, particularly transparency and the picturesque, my belief is such that the site under investigation must not have undergone remediative action. Any design proposed requires that the site reveal and expose the form of the land as an immediate byproduct of extractive industry. Unlike physical structures which lack universal appeal and meaning for those whom have no association to place or former industry, landscapes are a universal medium of expression, offering significance to past, current and future generations independent of personal association. This is intended to provoke and stimulate public interest and awareness of ongoing resource extraction and consumption. Architectural engagement in these conditions is intended to challenge users to re-evaluate their relationship to the post-extraction landscape.

Second, structures that remain on site must be evaluated based on their historical value relative to the nature of former industrial processes. For this, one must first consider what best represents the history of the site (Loures, 2008). Where utilitarian structures, making little to no reference to former industry apart from housing former industrial processes (i.e. storage buildings), remaining structures are to be removed thereby preventing the use of aesthetic follies. This is intended to prevent the preservation of structures that carry little significance and meaning while creating opportunity for architecture to articulate pre-existing site conditions.

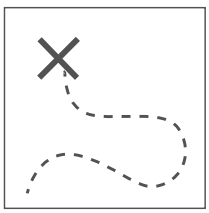


DESIGN PRINCIPLES

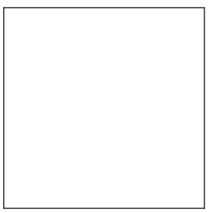
DESIGN RESEARCH + PRINCIPLES

In order to synthesize the previous research and gain greater insight into the role of architecture as a medium or vehicle for articulating the post-extraction landscape, this study has looked to the universal conditions of extractive industries and the commonalities amongst them. These industries include hunting, trapping, mining, oil, gas, and forestry industries. However, fishing and trapping have been eliminated as it is difficult to visually quantify the environmental implications. For purposes of this study, common characteristics amongst these industries have been identified as follows:

Latency

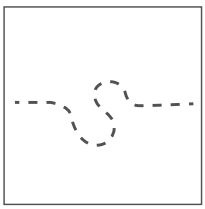


Dependence Upon the Location of Resources

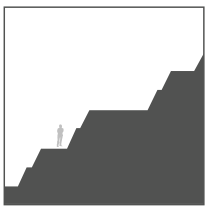


A Visible Absence of Resource Material

Readings of Time



Mutability of Landforms



Vast Scale of Operations

Perceived Loss of Value

These conditions become the entry point to the following design study, acting as the principles for design and the determinants of subsequent design strategies and tactics. However, specific strategies and tactics for implementation are further elaborated in the presentation of the thesis project. For a summary of individual strategies and tactics refer to section 3.8 *Strategies + Tactics.*

3.1 LATENCY OR INACTIVITY

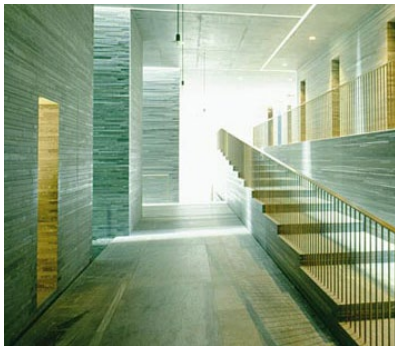


Figure 36, 37
Therme Vals
Peter Zumthor

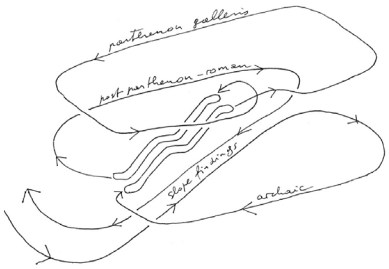


Figure 38
The New Acropolis Museum Bernard Tschumi Architects

Latency or inactivity refers to the fact that post extraction sites are often inactive and therefore lack the ability to relay information about themselves or their former occupation. In light of this, narrative strategies are investigated as the primary means of framing the conditions and character of place.

Narrative itself can be defined "…'as [a] structure, a particular way of combining parts to makes a whole…' or the process or '… activity of selecting arranging and rendering story material…" (Psarra, 2009, p. 19). Although there are numerous types of narrative in architecture, the primary focus of this thesis is sequential narrative. Sequential narrative refers to that which guides users through a series of episodes or events, either sequentially or in chronological order. However, one's experience and understanding of place cannot be reduced to any one event in the sequence but is instead the product of the entire experience. As noted by Bernard Tschumi, "...each form, each part of sequence qualifies, reinforces, or alters the parts that precede and follow it" (Tschumi, 1996, p. 163). Thus, the arrangement and configuration of architectural form and space not only determines and articulates one's movement through space but contributes to one's perception and understanding (Coates, 2012). However, it is not only the arrangement of space that determines movement, but the use of various design mechanisms which subtly orient and guide users through space. Examples of such mechanisms include the framing of specific views, light and shadow. Attention to the way in which architecture shapes movement through space can be seen in the work of a number of notable architects including Peter Zumthor, Bernard Tschumi and Daniel Libeskind (Figures 36-40).

Therme Vals | Peter Zumthor

Zumthor's *Therme Vals* makes use of light and shadow as a means of drawing users through space in a predetermined order. Further, the uses of planar architectural elements serve as a means of not only directing movement, but controlling individual's views and perspectives throughout the space (The Therme Vals / Peter Zumthor, 2009) (Figures 36,37).

The New Acropolis Museum | Bernard Tschumi Architects

Tschumi's *Acropolis Museum* was designed with the visitor's route in mind. The route through the building itself is in chronological sequence "… beginning with pre-history through the late Roman period… [reaching] its high point (literally and programmatically) with the Parthenon Frize. The visitor's route is therefore a clear, three-dimensional loop" (New Acropolis Museum / Bernard Tschumi Architects, 2010) (Figure 38).

Jewish Museum | Daniel Libeskind

Liebskind's *Jewish Museum* makes use of architectural form as a means of narrating the Jewish experience, particularly what it would have felt like to be of Judaic ancestry during World War II. (Kroll, 2010). Conceptually, Liebskind's architecture communicates and expresses feelings of "… absence, emptiness and invisibility – expressions of the disappearance of the Jewish Culture…and the effects of the Holocaust on both the Jewish culture and the city of Berlin" (Kroll, 2010). In turn, Liebskind's work can be read as that which makes use of architecture as a conceptual tool for translating and representing both human experience and emotion before, during and after the holocaust (Kroll, 2010) (Figures 39,40).

Figure 39, 40
Jewish Museum
Daniel Libeskind

Sequence and procession through space, however, is not restricted to the architectural environment as it also makes appearances in landscape architecture in projects like Maya Lin's *Vietnam Veterans War Memorial* (Figures 41, 42).

Maya Lin Vietnam Veterans War Memorial

Here, the project's formal configuration invites users to descend into the landscape. This condition reveals two polished black granite walls. Inscribed into the walls are the names of those who gave their lives in the Vietnam War (Maya Lin Studio). The granites reflective surface enables users to see themselves in the memorial. This conditioning of space creates a more personal experience for those accessing the site. Lending to the construction of meaning in this project is the memorial's orientation. Oriented in a way that is physically tied to both the Lincoln Monument and the Washington Memorial, the project's orientation is one that makes reference to freedoms afforded by earlier movements in American history (Maya Lin Studio).

Figure 41, 42
Vietnam Veterans War Memorial
Maya Lin

This is of particular relevance in that narratives are often already implicit in post-extraction conditions, having been "….inscribed by [both] natural processes and cultural practices …" (Corner, 2002, p. 136). This is most evident in post-extraction conditions which have yet to be remediated as they reveal the physical scars left by extractive industry. In turn, architectural form has the ability to engage with the narrative of place by drawing out pre-existing qualities of the landscape. It is only through this process that intangible qualities of place (such as the various forces and processes which have given rise to the sites current condition) are capable of being revealed and made legible to the user.

In response to these conditions, this thesis looks to narrative strategies, particularly curated or sequential experience. Both provide a means of not only organizing movement through space but act as a medium or vehicle for projecting and representing content. Strategies identified for engaging this condition include the use of curated or sequential narrative. Thus design can be treated as not only an organizational device, drawing users through space in a manner which not only best pertains to the story of place, but as that which enhances individuals cumulative understanding of place.

3.2 DEPENDENCE ON THE LOCATION OF RESOURCES

Dependence upon the location of resources as a universal condition makes reference to the fact that extractive industries are by nature dependent upon the location of the desired resource. Similarly, architecture is by its very nature situated somewhere. The corollary of this condition relative to this thesis is such that architecture must act as a vehicle for showcasing and revealing the form of the land as an immediate byproduct of extractive industry.

Although architecture is by nature situated somewhere, the means by which it responds to place are known to vary drastically. This is made evident in the observation of three distinct conditions. First, one can look to early shelters constructed out of sheer need or necessity. These basic structures were constructed with an awareness of local environmental conditions, including topography, sun and wind directions and even local levels of precipitation (Figure 43).

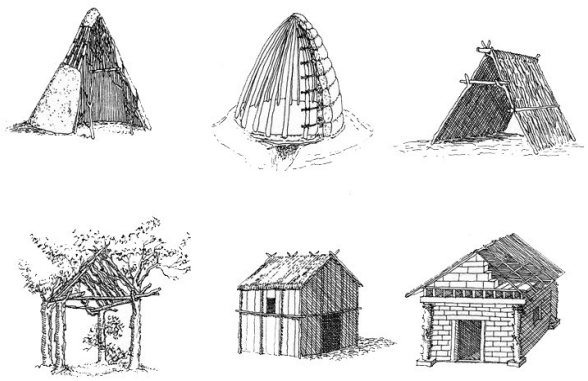


Figure 43
Evolution of the Primitive Hut

However, these traditions were all but abandoned with the onset of modernist construction. It is during this period that the *tabula rasa* concept rose to popularity, providing designers a blank slate upon which architecture could be constructed. This, partnered with ongoing technological developments enabled the construction of architectural forms which no longer depend upon existing environmental conditions and topography. The last condition is one that looks to architecture as a mediator of landscape conditions. This can be observed in the work of several architects including Frank Lloyd Wright, Alvar Aalto and Arthur Erickson as many of their projects retain existing landforms. Projects of this nature not only preserve the character of the site, but treat it as a generative concept for design (Burns & Kahn, 2005) (Figures 44-46).

By and large, however, it is common that those interventions that seek to engage with existing landforms do so in 'natural' environmental conditions which appear to have been unaltered by human activity. In contrast to this condition, this thesis proposes to reveal and articulate the unique character of post-extraction conditions through architectural form (Leatherbarrow D. , 2000). Although many of these conditions may already be apparent, architectural interventions in the post-extraction landscape have the ability to reveal conditions or forces present but not apparent to the user (i.e. forces which have influence the sites current condition) (Potteiger & Purinton, 1998). This treatment of architectural form lends itself to the creation of more legible landscapes, bringing new and greater awareness to the transformative nature of extractive industries. Fundamental to this condition, however, is the preservation of the manufactured landscape. As an immediate by-product of extractive industry, post-extraction conditions are not to be rebuilt or restored to their pre-industrial conditions but rather retained as unique opportunities for architectural engagement. This requires that landscape be treated as more than a backdrop to architectural form, as current policies suggests. Moreover, landscape is to be treated as that which not only delineates the conditions under which architectural form must operate, but as that which provides inspiration for architectural form. Architecture constructed in this manner not only engages with its context in a more meaningful way, but also actively embodies an understanding of place and context. Strategies identified for doing so include the articulation of topographic conditions.

Figure 44
Fallingwater
Frank Lloyd Wright
Wright's Fallingwater is best known for its seamless integration with the natural landscape.

Figure 45
Saynatsalo Town Hall, Finland
Alvar Aalto Architect 1952
Aalto's Synatsalo Town Hall illustrates his acknowledgement of existing site and or topographic conditions – here, through the articulation of existing topography through the use of various steps and terraces.

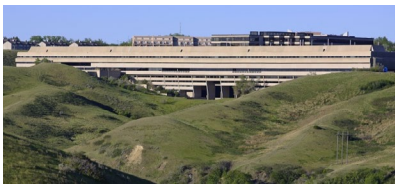


Figure 46
University of Lethbridge
Arthur Erickson
University of Lethbridge is a clear example of Erickson's desire to construct architectural form relative existing landform conditions, treating architectural form as complimentary to its setting.

3.3 A VISIBLE ABSENCE OF RESOURCE MATERIAL

Figure 47
Stratification on Site

As a universal condition, the visible absence of resource material refers to the fact that former extraction sites are often characterized by their inherent lack of material. This condition is referred to by Brian Hayes in *Infrastructure: A Field Guide to the Industrial Landscape,* where he notes that industrialized landscapes are often"… more remarkable for what is absent from place rather than what is present" (2005, p. 19). This condition requires that architectural form draw attention toward this unique quality of the land. Tactics for highlighting the absence of resource material include form, juxtaposition and contrast, where building mass and form can be used as a means of highlighting the unique conditions of place.

3.4 READINGS OF TIME

Absent of use, former extraction sites are indicative of the transience of all things over time. This is evident in the physical and aesthetic qualities of industrial remains that outlive former industry. Showing visible signs of wear and decay, the remains of former industry are not only reflective of nature's persistence over built and natural form, but are reflective of the passage of time. Consequently, this study looks to the nature of time as one of the primary principles for design.

In an attempt to gain greater insight into the role of time in the post-extraction condition, I have identified four independent notions of time. First, is geologic time which refers to the period during which sites have been created. Formed over the course of 2 million years, the natural landscape has "…a far longer past than anything man-made" (Tuan, 1977). Consequently, the landscape can be read as a physical and visual representation of a site's construction over time (Figure 47). This condition is one that enables individuals to both acknowledge and observe the temporal layers of the site and its physical transformation over time, contributing to a 'sense of temporal depth' (Tuan, 1977). The second concept of time is that of industrial time. Industrial time is the period of time over which sites have been transformed by industrial forces. Relative to geologic time, industry has rapidly transformed the shape and form of the land. Indicators of this period include the transformed landscape conditions and any structures that remain following the collapse or closure of industry. Next, is regenerative time which refers to the period of time required for sites to recover post-industry. As discussed previously, former extraction sites, when unremediated or abandoned, are subject to reclamation by natural forces. An example of this is forestry, where it may only take a few months to

see new growth on site after trees have been harvested. Former mineral extraction sites exist in contrast to these conditions as they can take anywhere from one to several hundred years to show significant signs of recovery. Whichever the circumstance, former extraction sites are fundamentally unable to be preserved in a state or condition that resembles their original likeness during the time of operation. Given these conditions, nature's reclamation of place can be read in reference to time as it reflects the site's belonging to an ongoing process.

The last concept of time is that of experiential time. Experiential time makes reference to the fact that one's experience of place fundamentally possesses a temporal dimension. This however is often limited to the duration of one's visit. When compared to the duration of geologic, industrial and even remediative changes, the individual's experience of place occurs over a much shorter duration or condensed period of time. The result of this is such that individuals are only capable of knowing events as they appear in the present.

The implications of these conditions on design are such that architecture must engage and highlight the temporal aspects of the site, giving visual and physical presence to various temporal epochs (i.e. geologic, industrial and regenerative). This treatment of architectural space, form and materially is intended to provide users with the ability to grasp and acknowledge a site's participation in an ongoing process, or as that which supersedes the short duration of one's visit (Pallasmaa, 2005).

As a result, time becomes not only the content of architectural form but the framework for one's experience of place. Thus, time will determine the order and relationship between various architectural events, where events are framed in relation to specific time periods.

FORM

Relative to time, architectural form is to translate significant temporal aspects of the site (i.e. those which pertain to the site's history) into physical and experimental form. An example of this condition is Amanda Levete Architects (AL_A): *New Exhibition Road Entrance for the Victoria & Albert Museum* in London (Figure 48). Here, a zigzag stairway that provides access to a gallery space below grade

Figure 48
New Exhibition Road Entrance for the Victoria & Albert Museum | Amanda Levete Architects (AL_A)

makes reference to seismic activity that occurred in the site's physical history while surface treatments used across the plaza are intended to reference geologic strata. According to Nigel Coates, author of *Story Buildings*, this temperament of space is intended to treat visitors to "…subtle flashbacks and forward glimpses" in time through architectural form and materiality (2012, p. 103)

MATERIALITY

> *"…one of the most ancient common places of architecture: buildings persist in time. Yet they do not. No building stands forever, eventually every one falls under the influence of the elements and this end is known from the beginning" (Mostafavi & Leatherbarrow, 1993, p. 5)*

Over time, the built environment is subject to temporal and environmental forces. These forces are reflected in the transformation of architectural surfaces which show evidence of wear and decay in their colour, texture and form, "In architecture, [this] gradual destruction of buildings by nature in time is weathering" (Mostafavi & Leatherbarrow, 1993, p. 6). Furthermore, weathering is a process that operates through subtraction; removing or wearing away existing surfaces to reveal the underlying character of materials and surfaces (Mostafavi & Leatherbarrow, 1993). As noted by Mostafavi and Leatherbarrow in On Weathering: The Life of Buildings in Time, this process is that which "…exchanges the roles of art and nature. In design, art is assumed to be the power or agency that forms nature in the life or time of construction, however, nature re-forms the 'finished' art work" (Mostafavi & Leatherbarrow, 1993, p. 64). Consequently, the weathering process becomes part of the building's completion over time (Till, 2009).

Despite the fact that aging is in an inevitable process, there is a general unwillingness or reluctance to accept time as an agent of architectural change. This is evidenced in the means by which structures are designed, often completely independent of the notion of time. This condition can be attributed to modes of representation ranging from hand or computer-assisted drafting which tend to represent architecture within idealistic conditions, completely removed from environmental or temporal forces or processes. When removed from these idealistic conditions, structures are invariably subject to environmental and temporal forces. According to Jeremy Till, author of *Architecture Depends*, this is due to the fact that time is a force which is beyond the architect's control; it is an 'uncertain and uncontrollable' aspect of design (Till, 2009). By contrast, this condition has been challenged and embraced by Carlo Scarpa, whose work actively embraces the weathering and

aging process. This is best reflected in Scarpa's Banca Populare di Verona (Figure 49) whose unique window details feature a vertical chase at the base of each circular window, accommodating the flow of water down the surface of the building (Mostafavi & Leatherbarrow, 1993). The effect of this unique detailing is such that water is concentrated in a specific area, as well as any surficial staining that may occur. This gesture not only accentuates the flow of water but acknowledges its ability to enhance and add value to the design itself.

Although often perceived negatively, there is a certain romantic appreciation for the character and history lent to place through the aging process. This is evidenced in the preservation of historic ruins and structures from the 18th century onwards. It is during this period that historic structures and ruins were first preserved and even cherished for their unique and irregular character earned over time. When ruins did not exist, it was common that structures be deliberately constructed to appear as ruins for the sake of generating an attractive image of decay (Lowenthal, 1985). In turn, one can look to the weathering process as that which adds 'age value'. According to Mostafavi and Leatherbarrow, "…'age value' can be identified within the notion of aging as enhancement and the idea that the various markings and layers of a surface record and allow one to recollect earlier stages in the history of a building and the human life associated with it" (Mostafavi & Leatherbarrow, 1993, p. 83).

While these traditions continue today, it has become evident that only some objects and materials benefit from the patina of age. Beyond a certain point the aesthetic attraction of decay may no longer beautify. This becomes most evident in the industrial context. Unlike historic ruins cherished for their character earned with age, wear and decay in the post-industrial environment is often considered an undesirable quality. In these conditions wear and decay can be indicative of loss, whether it is a loss of function, usefulness of space or the total loss of industry itself.

Beyond aesthetic value, weathering materials naturally lend themselves to temporal readings of the site, uniquely marking the passage of time while also representing time scales beyond the immediate present (Mostafavi & Leatherbarrow, 1993). This condition is readily reflected in materials such as limestone, marble and untreated wood, which show physical evidence of wear and use over time. Other common weathering materials include copper, corten and cedar which naturally show signs of change and transformation over time in their colouring (Figures, 50-53).

Figure 49
Banca Populare di Verona
Carlo Scarpa

Figure 50
Marble Steps Worn From Use

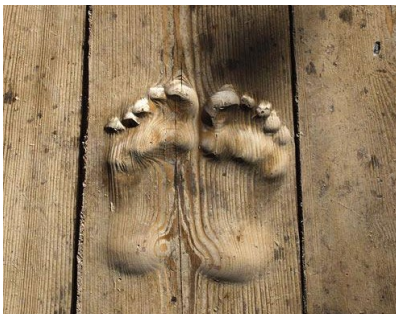


Figure 51
Wooden Floors Worn From Use

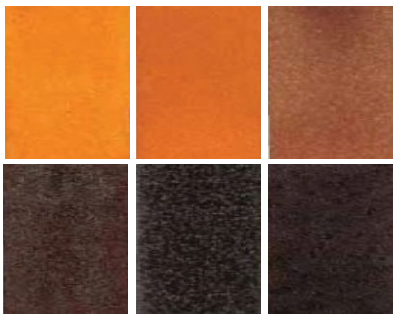


Figure 52
Cortens Change in Colouration

Figure 53
Coppers Change in Colouration

Beyond material reference to time, weathering materials indicate the transformative powers of nature. In this sense, the natural patina earned through erosion and wear is not only indicative of time's passage, but is a process that reminds users of the fate of all things, that no matter how substantial they appear, are gradually dissolved by natural forces (Mostafavi & Leatherbarrow, 1993). For these reasons, weathering materials not only make reference to time, but the raw power of natural forces and their ability to reclaim the works of man to overcome all that is manmade (Mostafavi & Leatherbarrow, 1993).

In light of these conditions it becomes clear that the temporal aspects of architecture, including both aging and weathering must be anticipated and designed for. One must take into consideration the interaction between buildings and the natural environment (Mostafavi & Leatherbarrow, 1993). The value in doing so is such that users and visitors are provided with the ability to engage with and appreciate the temporal aspects of a site beyond the present. While aged and weathered materials offer a range of unique aesthetic attributes, they mark and reflect the passage and duration of time thereby lending themselves to temporal readings of place. This condition is one that indicates the building's belonging to a larger continuum of time and as part of an ongoing temporal process (Till, 2009). In light of these factors, architecture situated in the post-extraction landscape is obliged to engage time through both form and materiality. It is to highlight the temporal aspects of the site relative to the site's history as a place of extraction.

3.5 MUTABILITY OF LANDFORMS

Extractive landscapes have been transformed with great ease, albeit sometimes at great cost, by former industrial occupants. Consequently, architectural form has the task of drawing attention to the mutability of landforms. The representation of these conditions within architectural form is intended to provide users with greater insight, understanding and awareness of extractive conditions and their alteration of the land. This requires that architectural form physically and visually embody site conditions and phenomena including the transformative forces of the site. The result of which is architectural form which treats existing landforms as inspiration for formal, spatial and material qualities of space, "[Giving] voice to sedimented patterns…" (Leatherbarrow D. , 2000, p. 256). However, this treatment of architectural form is not only intended to be representational. It is to reveal, articulate and engage users in the transformation and modification of the land at a

scale that is tangible to the user. It is intended to reinforce the nature of extractive industry by bringing those conditions found in the landscape into the material environment, promoting new and more informed readings of site conditions.

Figure 54, 55
Scale Comparison
Marmoraton Mine, Former Haul Road
1995

3.6 VAST SCALE OF OPERATION

The vast scale of operation refers to the growing speed and scale at which extractive industries now operate, transforming vast tracts of land at an unprecedented rate. This condition makes it difficult to attribute any sense of scale to these landscapes without the use of physical or visual cues. For these reasons, this thesis looks to architecture as a medium for not only relating individuals to space but giving measure and dimension to existing landscape conditions. This use of architecture is intended to create more legible landscape conditions while providing users with more informed readings of post-extraction conditions.

Scale and proportion are essential elements of design. In architecture, both properties are such that they give measure to space, however, they are capable of manifesting themselves in a myriad of ways. To investigate this concept, one has examined the definition of both scale and proportion and their meaning in relation to one another. First, scale refers to the physical size of an object relative to another. Proportion refers to the size of objects or elements in relation to one another or to the whole (Ching, 2010). This condition is summarized by Francis Ching whom notes that "…proportion pertains to an ordered set of mathematical relationships among the dimensions of a form or space, [while] scale refers to how we perceive or judge the size of something in relation to something else" (Ching, 2010, p. 329). This measure of space is most commonly performed in relation to our own bodies. This is evidenced not only in commonly held units of measure (i.e. feet, hands etc.) but the way in which individuals measure space relative to their body's location in space, influencing or changing one's perception of space. For example, when standing next to a tall building, users will often feel small. Alternatively, when standing near a building with an entry covering designed with human scale in mind, users will feel much larger relative to their previous position.

It is through this bodily experience that individuals are better able to attribute scale and measure to visual experience. Thus, scale and proportion are to be considered

physical and visual measures and are most successful in design when there is the ability to experience space relative to the human body. However, once individuals are no longer able to gauge space relative to their own bodies, "…[users] must rely on visual rather than tactile clues to give us a sense of the scale of a space" (Ching, 2010, p. 332). However, visual systems of measurement are inherently flawed in that perception of scale and proportion are often distorted by perspective and distance (Ching, 2010). This is most relevant when one considers the vast territory of land occupied by extractive industry. When viewed from a distance, these now unoccupied landscapes lack a sense of scale. These conditions are only enhanced by the lack of activity on site, imperceptible qualities of the land (where open pits, for example, often fill with water over time, masking their true depth), and lastly, the form of post-extraction landscapes themselves. These landscapes have not been created or designed for human inhabitation but rather industrial equipment and machinery capable of extracting from the land with great economy.

It is only when recognizable objects are situated in the landscape, that individuals are capable of attributing measure and scale to these spaces. In turn, architectural form can be treated as a medium for lending a sense of scale or measure to place. There are several ways in which architecture can provide more tangible measures of landscape conditions including the articulation of building form through massing and materiality. In turn, scale is an essential consideration for architecture situated in the post-extraction landscape as it has the ability to provide both physical and visual measure to these vast landscapes.

3.7 PERCEIVED LOSS OF VALUE

The final principle to be addressed is that which pertains to a perceived loss of value. Having been exhausted or depleted of material resources, the post-extraction landscape is often perceived as valueless as its remains no longer offer economic value. This perception is only amplified by the fact that post-extraction sites, when left unremediated, are considered environmentally unsafe and eyesores. In turn, architectural interventions in the post-extraction landscape must look to add value to place beyond the nature of resource extraction. This requires that architectural interventions return social, cultural, economic and environmental value to place. This is to be facilitated through architectural form and program.

3.8 STRATEGIES + TACTICS

Based on the aforementioned universal conditions, I have proposed a series of design strategies and tactics. When taken together these strategies and tactics make up the theoretical framework for design.

1 | *UNIVERSAL CONDITION* | LATENCY OR INACTIVITY

***STRATEGY* | NARRATIVE**

Having fallen into disuse, the post-extraction landscape is latent in its story-telling capabilities. For these reasons, interventions are to inform users as to the former use and or occupation of the site and those forces which have given rise to its current state.

***TACTIC* | CURATED OR SEQUENTIAL EXPERIENCE**

Design is to act as an organizational device, drawing users through space in a manner which best pertains to the story of place. This sequencing and/or ordering of space is intended to enhance one's understanding of place based on cumulative experience.

2 | *UNIVERSAL CONDITION* | DEPENDENCE ON THE LOCATION OF RESOURCES

***STRATEGY* | MANUFACTURED LANDSCAPE AS GENERATOR OF FORM**

Architectural interventions are to celebrate rather than subvert the existing conditions and character of the post-extraction landscape. As artifacts of industry, these sites possess unique topographic, cultural, and historic qualities and for these reasons may act as an architectural opportunity to engage in and articulate the unique conditions of place.

***TACTIC* | TRACING, MIMICRY, FORM AND INSERTION**

Architectural form is to amplify and reveal the manufactured character of the land. This can be done through mimicking and or tracing landforms already found in the landscape as a means to reinforcing the relationship between built form and existing landscape conditions.

3 | *UNIVERSAL CONDITION* | A VISIBLE ABSENCE OF RESOURCE MATERIAL

STRATEGY | PRESENCE

Architecture is to highlight and give presence to the absence of material.

TACTIC | FRAME AND PRESERVE

Architectural form is to aid in not only framing but preserving the void left by former industrial occupation.

4 | *UNIVERAL CONDITION* | READINGS OF TIME

STRATEGY | HIGHLIGHT

Former extraction sites, having been rendered obsolete, speak to the transience of all things over time. This condition offers the opportunity for architecture to highlight the temporal aspects of the site.

TACTIC | FORM AND MATERIAL

Within the realm architecture, the passage of time is to be translated through both architectural form and material application. Weathering materials in particular are suggested here as they naturally lend themselves to temporal readings of the site, showing signs of weather, change and transformation over time.

5 | *UNIVERSAL CONDITION* | MUTABILITY OF LANDFORMS

STRATEGY | REINFORCE

Due to the ease by which many landscapes are transformed by extractive industry, architectural form should seek to reinforce the extractive nature of industry.

TACTIC | DELIBERATE REMOVAL

The translation of this condition into architectural form is proposed through the deliberate removal of various portions of the existing landscape. This response is intended to echo and reinforce the extractive nature of industry within the architectural environment.

6 | *UNIVERSAL CONDITION* | SCALE OF OPERATION

STRATEGY | SCALE

Due in part to the vast scales at which extractive industries operate, architectural interventions are to give measure and dimension to existing landscape conditions as a means to provide users with more informed readings and greater understating of post-extraction conditions.

TACTIC | PHYSICAL AND VISUAL CUES

Architecture is to make use of legible measuring devices (i.e. physical and visual cues) as a means of enabling users to take measure of changes in the land relative to architectural form. This condition is intended to accentuate changes in landscape conditions.

7 | *UNIVERSAL CONDITION* | PERCEIVED LOSS OF VALUE

STRATEGY | RETURN VALUE TO PLACE

The residual landscape, having been exhausted or depleted of resources with extractive industry, is often perceived as valueless due to the absence of valuable materials. In turn, architectural interventions situated in the post-extraction landscape should look to add value to place beyond the nature of resource extraction.

TACTIC | SOCIAL, CULTURAL, ECONOMIC VALUE

Architectural interventions situated in the post-extraction landscape are to return social, cultural, economic and environmental value to place not through former industry but through architectural form and program. Together they are intended to facilitate greater awareness and understanding of the intertwined nature of industry and landscape while engaging users in the investigation and acknowledgement of human induced environmental change, former processes and their impact on the land. Relative to economic value, program must no longer be connected to the extraction of material resources. Socially, program is to enable users to reconnect with historic aspects of the site. Lastly, the conditions of place should allow individuals to connect with the ecologic conditions of place and what remains in the wake of industrial extraction.

DESIGN CONTEXT

4.1 HISTORY
Marmora, Ontario

With a population just over 1400 in 2011, Marmora, Ontario is a small community with a rich history in mining (Government of Canada, 2014). Marmora, which takes its name from the Latin word for marble, *marmor*, got its start in mining early in the 19th century (Community Features Development, 2013). Settled in 1820, Marmora became the first iron mining community in Upper Canada. During this period the region acted as a commercial outfit, smelting and processing materials that were mined near the western end of Crowe Lake, an area just west of Marmora. [3] However, this industry collapsed in 1875 as competing foundries, located in more accessible locations, deemed Marmora Iron Works too costly for continued production (The History of Marmora, 2009). Following the closure of the Iron Works, the site was purchased for use as a sawmill. Today, little remains as indication to these past industries.

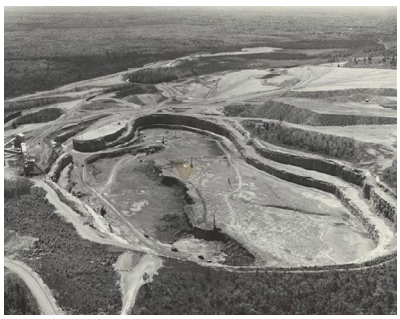


Figure 56
Marmoraton Mine
Marmora, Ontario, 1956

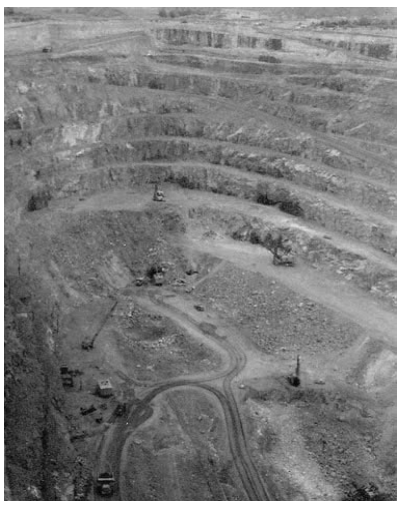


Figure 57
Marmoraton Mine
Marmora, Ontario

In the years that preceded the Iron Works closure, was the first discovery of gold in Ontario. This occurred in 1866 in Eldorado, a township east of Marmora. Although unprofitable in the years after its initial founding, the presence of gold brought with it considerable interest to the region. As a result, prospectors in search of their own riches flocked to the region, establishing a number of small mines throughout the area. This boom, however, was short lived as many of the mines founded in the surrounding townships were abandoned after only a few years of operation (Cook, 2013). As a result of mine closures, a number of communities in the area were abandoned shortly thereafter.

In 1947, mining experienced a revival in the region when an iron ore body was detected by a standard aeromagnetic survey performed by the government (Community Features Development, 2013). Purchased by Bethlehem Steel Mills of New York, Marmoraton Mine officially opened four years later in 1951. This four-year delay was caused by the need to remove approximately 120 feet (depth), or 20

[3] Smelting is a process used to extract metal from waste ore, it uses a combination of heat and chemical additives to decompose waste ore, or rock, leaving behind only the valuable metals.

million tons of limestone overburden prior to the extraction of iron ore on site. During operation, ore was crushed and beneficiated [4] to produce iron ore pellets (Warren, 2010). Iron pellets were then transported from Marmora to Picton port, located along the north shore of Lake Ontario, by rail. From here, pellets were shipped across Lake Ontario via the Welland Canal to Lakawanna near Buffalo, its primary market (Warren, 2010). Thirty years later, the market for Marmora's ore pellets collapsed when Lakawanna's steel mill was ordered to reduce its production by more than fifty percent. Unable to find another market for the material, Marmoraton Mine ceased operations a short 30 years after its opening in 1979 (Community Features Development, 2013), (Anderson, 1978).

Despite having been out of operation for over thirty years, a number of original structures remain on site. These structures include a storage building, a conveyor, and the open pit (Figures 58, 59).The remaining open pit measures approximately 2800 feet long by 1500 feet wide with an approximate depth of 550 feet while the site itself occupies an area of approximately 75 acres (Anderson, 1978).

While the aforementioned structures remain on site, nature has begun its own reclamation. This is most prominent in the physical decay of the existing structures and the slow but steady rise of groundwater which has since filled the open pit (Figures 59, 60, 61). This lake, as it is often referred to by local residents, is the result of natural groundwater which has continued to rise since the year of the mine's initial closure (Community Features Development, 2013). Of the 550 foot depth, approximately two thirds has since been filled with water (Community Features Development, 2013) (Illustration 1).

Due to the massive scale of the open pit and its inability to be returned to its original condition (i.e. filled), there have in recent years been a number of proposals for the potential reuse of the site in its existing condition. The first proposal for reuse came from the City of Toronto in 1990, which short listed the site among six other locations, in a proposal to be used as a landfill (Capon, 1990). Although there are a number of articles documenting this initial proposal, it was largely rejected by local residents who sought more positive opportunities to develop the site. Another significant reason for this proposal's rejection is the pit's location below an existing water table (as evidenced in the slow fill of water from natural springs located below

[4] Beneficiation is a process which crushes materials into a fine particulate, enabling the magnetic separation of particles rich in iron ore from those that are not. Once separated, materials are smelted to produce iron ore pellets which require further processing

Figure 59
Marmoraton Mine 2013

Figure 58
Original Structures Remaining On Site

Figure 60
Natures Reclamation of Original Structures on Site

Figure 61
Natures Reclamation of Original Structures on Site

the site). This condition could result in the leaching of contaminants to surrounding communities, and three local watersheds, the Crow, Moira and Trent, all located in the surrounding area (Capon, 1990).

Today, the site is being reconsidered for use by Toronto's Northland Power Corporation. Northland Power has proposed the site be transformed into a pumped hydro power storage facility. Although the project remains in the proposal phase, the community is largely in support of this development as the proposed project is both technologically and economically sound (Wright & Pritchard, 2013). Additional points in support of a project of this nature include: its ability to make use of the site in its current configuration, its ability to act as a new economic driver and employment opportunity in the region, its potential to be a positive opportunity to clean up and improve the landscape, negating years of damage done by previous generations while also improving the area through the clean energy project for generations to come (Wright & Pritchard, 2013).

4.2 CONTEXT

Located on Highway 7, part of the Trans-Canada Highway, Marmora, Ontario is approximately 60km east of Peterborough, halfway between Toronto and Ottawa (Figure 62). Situated between two of the most populous Canadian cities, Marmora has sought opportunities to attract tourists to the region in the years since Marmoraton Mines closure late in the 20th century.

Despite having experienced little growth since the closure of its mining operations, the small community continues to thrive due its strong agricultural and tourism sectors which the community has come to depend on since the closure of industry.

Located in Hastings County, which belongs to a region known as the Ontario Highlands, the area is the beneficiary of a number of recreational attractions including parks, lakes and trails; all of which have come to appeal to outdoor enthusiasts. As a result of both natural and recreational attractions in the region, the community thrives during the summer months. This condition is reinforced by Statistics Canada's Census Report from 2011, which found that approximately 30% of all dwellings in the Marmora Township are those occupied seasonally.

One of the most significant tourist attractions in Marmora is that of the Miner's Loop. The Miner's Loop is a self-guided tour, extending approximately 10 kilometres through the township, inviting visitors to explore the community's once active mine sites. Along the loop visitors are able to explore a number of sites including Hayes Iron Foundry, Millside Park, Hastings Heritage Trail, Central Ontario Railroad Crossing, Deloro Mine with the tour reaching its conclusion at Marmorton Mine (Livingstone, 2012). In light of this, Marmora's Miners Loop aptly sets up the framework for a recreational industrial tour in the area.

4.3 SITE SELECTION

Although the former Marmoraton Mine was not the first mine to be founded in the region, it has been selected as the place under investigation as it adequately represents and engages the scope of issues and conditions presented in this thesis. These conditions are such that the site selected respond to the universal conditions of resource extraction, the primary criteria for selection.

Figure 62 Marmora's Relative Location

Because of the site's location which is directly off of Highway 7, the primary transit route between Toronto and Ottawa; the site and community act as an attractive tourist destination

Illustration 1 Location of Marmoraton Mine

Located in Marmora, Ontario, the site itself is located 2km southeast of Marmora's town centre

As explored in earlier chapters, the nature of resource extraction is such that it is reliant upon the extraction of finite mineral reserves, a condition which has resulted in the proliferation of now derelict abandoned voids. For these reasons, the site selected must have been abandoned due to loss of economy in extraction or the exhaustion of resources. Furthermore, the site selected, must not have undergone remediation, but should instead reveal the conditions of the land as shaped by past industrial processes. It is only in this environment that one is capable of revealing the history of place and the land as a product of industrial processes. Next, the site selected must be located within the Canadian context. This parameter has been suggested as the extraction of natural resources across Canada has and continues to make significant contributions to the nations economy. The fourth and final condition for this study is such that one must be able to access information pertaining to the sites former use, history, and role in the growth and development of its respective community. This condition was also accompanied by the need to physically access the site for ongoing investigation and study. These conditions, while seemingly obvious have significantly reduced the number of potential sites for examination as numerous abandon mine sites are now inaccessible and lack historical documentation.

4.4 DESIGN FRAMEWORK + PROGRAM PROPOSAL

DESIGN FRAMEWORK

In response to the research performed in part of this thesis, this thesis critically frames the conditions of the post-extraction landscape. Architecture is to act as a vehicle for engaging users in the exhausted landscape while exposing and showcasing the effects of extractive industry on the natural landscape. In doing so, architecture is to articulate the conditions of the land as a means of creating greater awareness of extractive processes while enabling users to critically reflect on industry's role in transforming the landscape.

PROGRAM PROPOSAL

In response to theoretical research presented in part of this thesis, the architectural program proposed is that of an interpretive center which is to serve the study of earth sciences with a particular focus on the nature of the extractive industries. Also included in this program is an administrative component intended to house office space for a local branch of Ontario's Ministry of Natural Resources (this office space is designed to house approximately 25 employees). These programs have been suggested for three primary reasons. First, they aid in transitioning this former extraction site from its current industrial occupation to an alternative industry. Second, they facilitate awareness and understanding of the physical, social, and environmental impacts of extractive industries while commemorating the industrial age of the community and lastly, they act as a platform, catalyst or potential tool for future economic development in the region.

Before moving on, I believe that both architectural design and programming will serve to enhance the individuals understanding of post-extraction conditions. The program suggested here is complimentary to the goals of this thesis project; however, it is not an end in and of itself. Together, architectural form and program create a unique venue facilitating the individual's engagement with the post-extraction conditions.

Figure 63
Tiered Rock Formations On Site

Figure 64
Existing Haul Roads on Site

SITE CONDITIONS

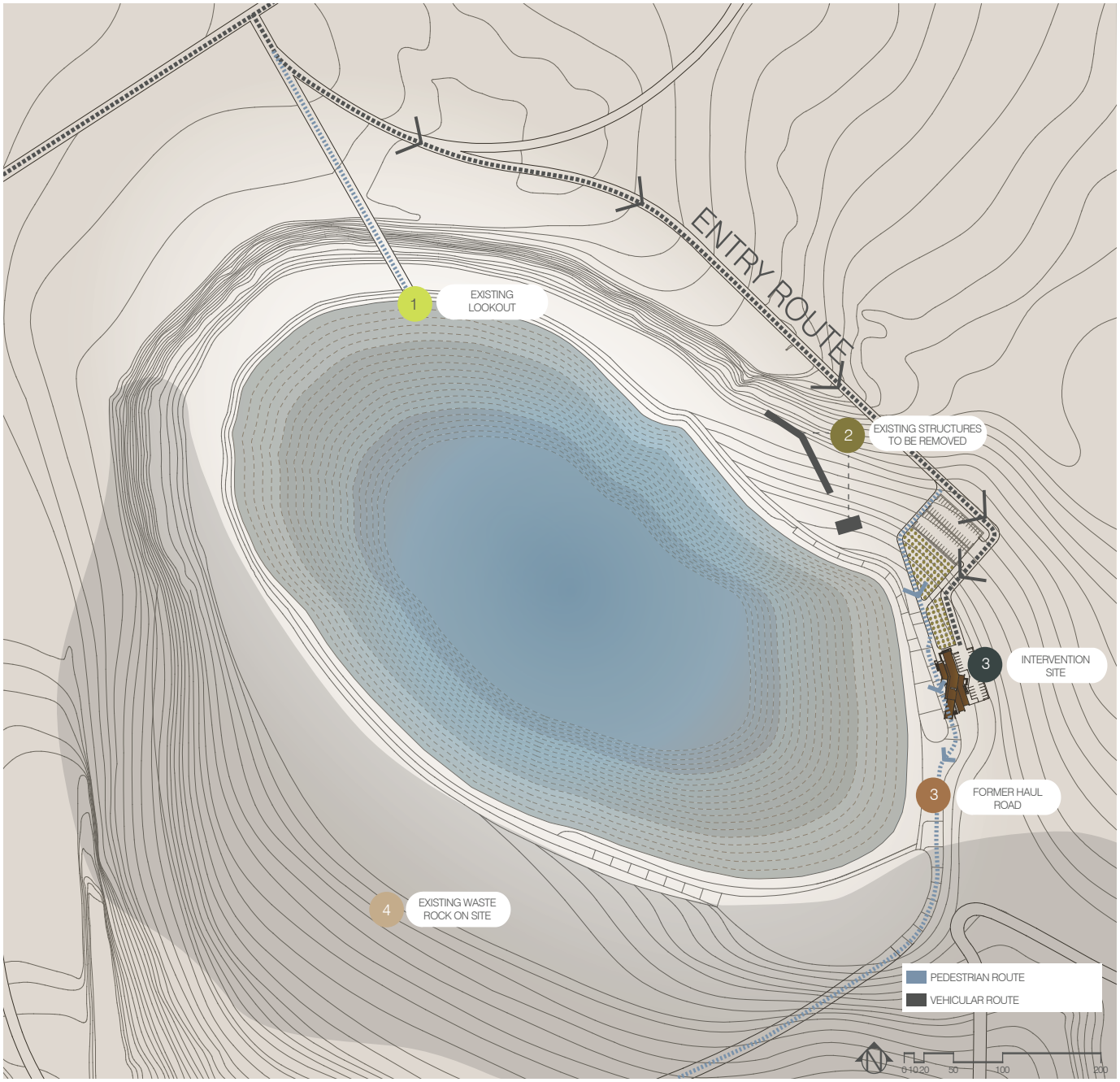
The former Marmoraton Mine site represents a unique opportunity for architecture to engage in the post-extraction landscape. In these conditions, architecture has the ability to act as a medium or vehicle for providing greater understanding and insight into post-extraction conditions while revealing and articulating the nature of extractive industry through architectural form. Unique opportunities for architectural engagement have been identified as the tiered rock formations (Figure 63) and former haul roads (Figures 54, 55, 64-66) as they present a distinct opportunity for architecture's mediation of existing environmental conditions.

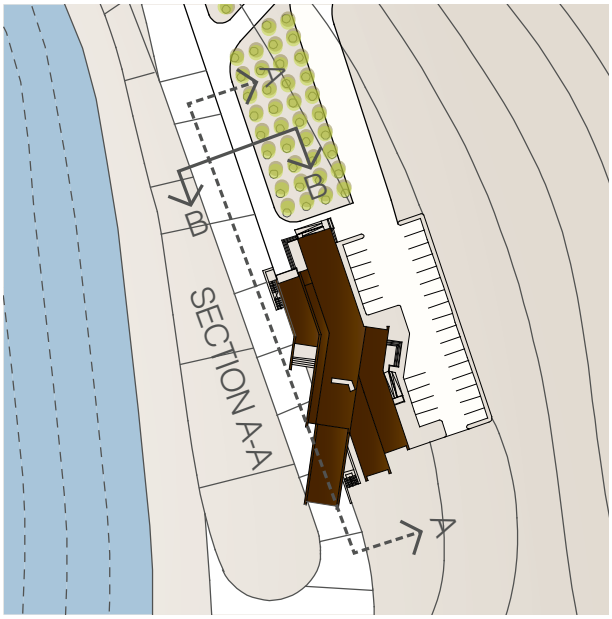
In light of this, the location for the proposed structure is along a former haul road once user to access the site (Figure 64, Illustration 2). Set off from the open pit itself, the site is defined by is sloping condition and its manufactured edges (Illustration 3, 4). It is important to note that this specific site condition has been selected as it embodies all significant site characteristics at a more concentrated and legible scale while enabling visitors to readily engage in and comprehend the conditions of the site.

Figure 65
Existing Haul Roads on Site

Illustration 2

Location of the Former Haul Road, the Place of Intervention for This Study





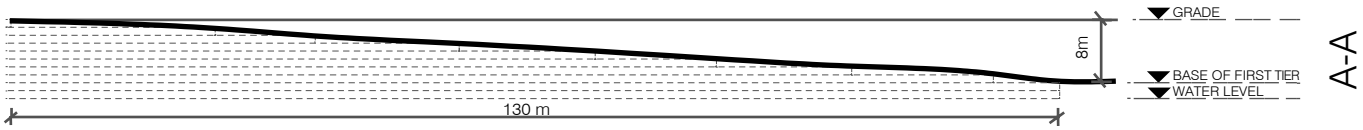


Illustration 3

Longitudinal Section Through the Former Haul Road (Section A-A)

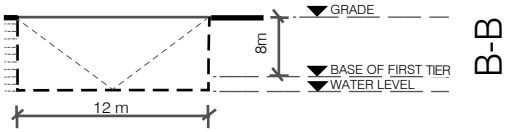


Illustration 4

Transverse Section Through the Former Haul Road (Section B-B)

Figures 66-71 illustrate the remainder of the existing site condition and its current context.

Figure 66
Existing Parking Area

Figure 67
Existing Path Toward Lookout

Figure 68
View From Existing Lookout

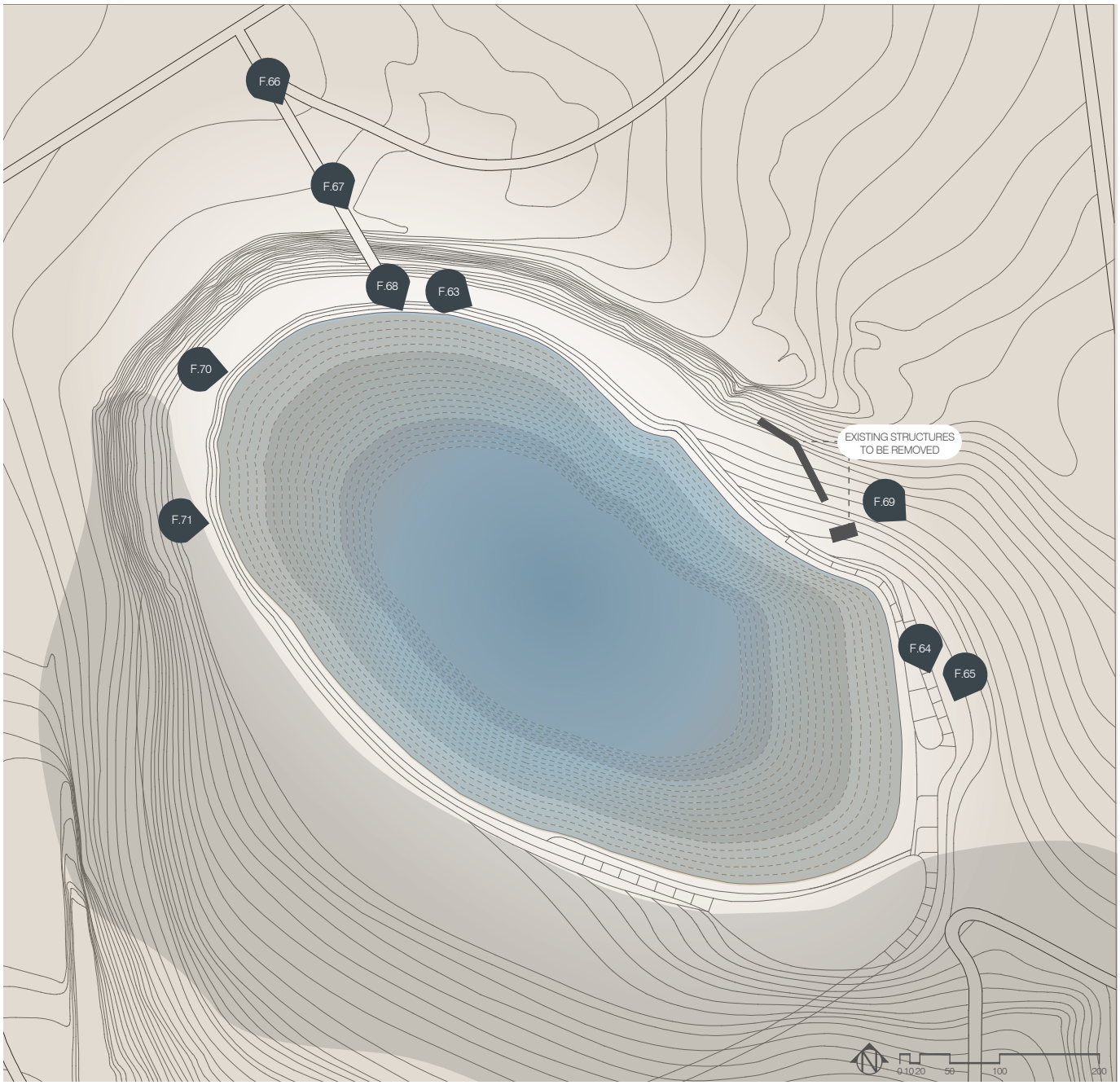
Figure 69
Existing Waste on Site

Figure 70
View Across Open Pit

Figure 71
View Across Open Pit

Illustration 5

Point of View Mapping for Figures 63-71



5

DESIGN RESPONSE + DOCUMENTATION

RETHINKING THE POST-EXTRACTION LANDSCAPE

This thesis project presents the following architectural intervention as a proposal to ameliorate the current disconnect between extractive industrial processes and the post-extraction landscape. The design itself is documented in the following drawings and images. Each drawing is accompanied by a brief description which addresses how each strategy and tactic has been incorporated and referenced in the design response.

5.1 DESIGN DOCUMENTATION

LATENCY

Given that post-extraction sites remain inactive if not reclaimed following the closure of industry, sites of this nature lack the ability to relay information about themselves or their former occupation. In turn, architectural interventions situated in post-extraction conditions must inform users as to the forces which have given rise to the site's current condition. The primary strategy proposed for addressing this condition is the use of architectural form as an organizational device, curating the user experience in a manner which enhances one's understanding and reading of place.

In response, a series of encounters have been mapped across the site which frame specific views and experiences. This has been executed through the formal arrangement of space with particular attention to the way in which users proceed and move through space itself. The images provided here map the user experience beginning first with one's arrival to the building itself.

Located in Marmora, Ontario, visitors arriving to site by vehicle emerge from the otherwise pastoral landscape that surrounds Marmora into what is now the former mine site. From here, users are afforded aerial views of the site, taking in distant views of the structure itself. From here, the building appears as a low lying linear figure in the land (Illustration 6).

Upon exiting their vehicles at the designated car park and approaching the building

Illustration 6
Users View Upon Entry
Upon entry to the site, the intervention appears as a low lying figure in the land

on foot, users move through an area where trees have been planted in an orchard like manner, contrasting those regions in the periphery. Here the green foliage is intended to contrast with views of the now derelict landscape (Illustration 7).

As users approach the building, its total mass is revealed (Illustration 8). This sheltering of the structure within the land is enabled by the site condition itself, which is as previously mentioned, a former haul road once used to access the site (for more information as to the location of this haul road refer to Illustration 2).

Upon arrival to the buildings entry, users are able to move through the former haul road toward the open pit. From within the former haul road, views toward the surrounding landscape are restricted, in turn directing all of one's attention toward the presence of the void and its inherent lack of material (Illustration 9).

Upon emergence into the expanse of the open pit, users are afforded a new perspective of the site, taking in views of the site from the lowest exposed tier of the open pit (Illustration 10).

Upon return to the exit, views of the new tree canopy are foregrounded with views of the surrounding pastoral landscape. This condition is intended to be a positive commentary on our ability to regenerate the nature of these sites after degradation (Illustration 11).

Illustration 7
Green Foliage Contrasts With Views of the now Derelict Landscape

Illustration 8
Building's Total Mass Revealed Upon Approach

Illustration 9
Individuals Experience from Within the Former Haul Road
Here, the building's form enables users to move freely through the former haul road while providing access to the open pit below.

Illustration 10

Individual's View of the Open Pit upon Emergence from the Former Haul Road

Illustration 11

Individual's View Upon Return To The Sites Entry

Here, the individuals views are directed toward the new tree canopy upon return to the sites entry. This condition contrasts the derelict surroundings.

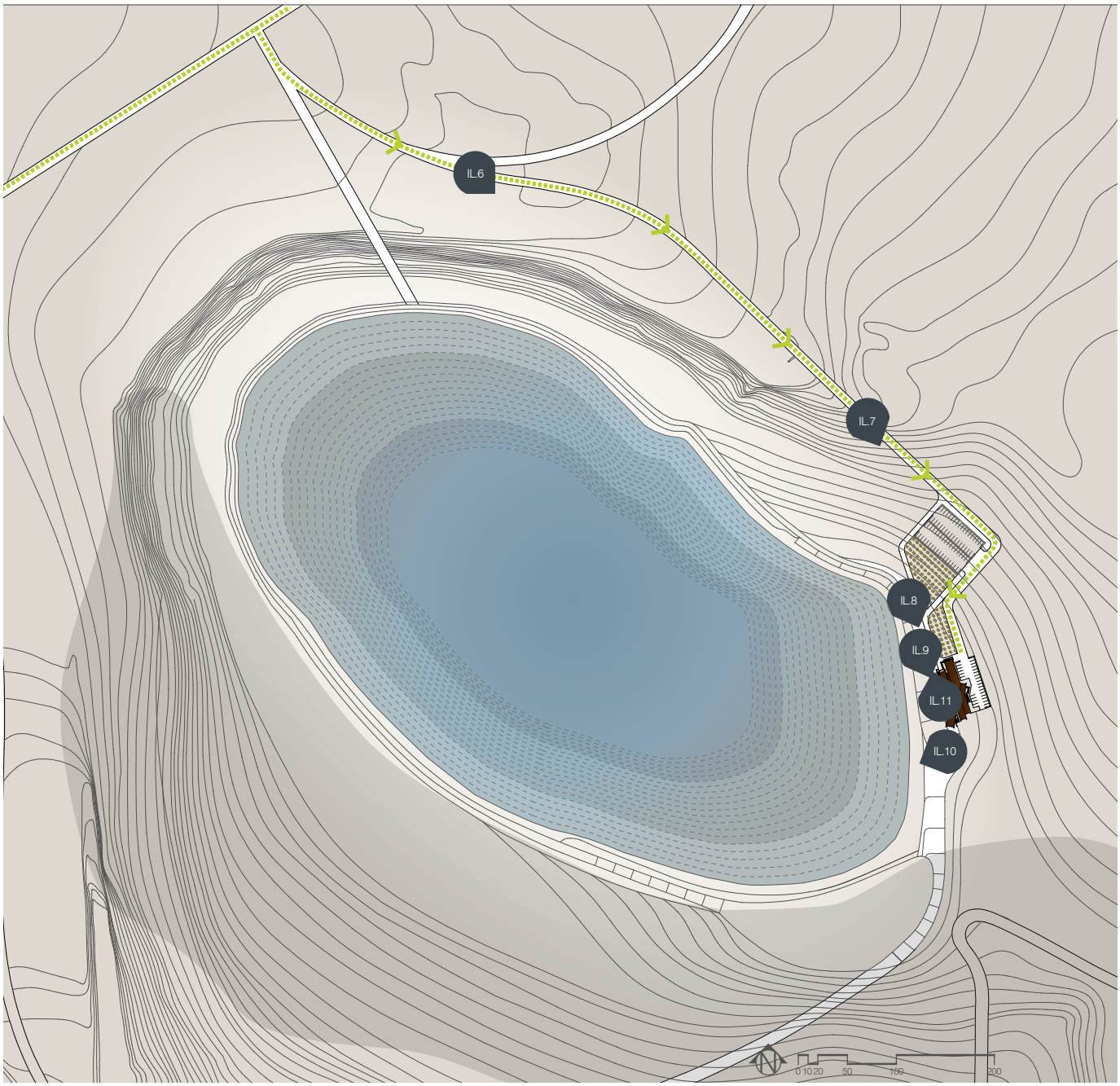


Illustration 12

Path of Movement on Site for Illustrations 6-11

LOCATION OF RESOURCES

Due to the fact that resource extraction is dependent upon the location of resources, architectural interventions have the responsibility to celebrate rather than subvert the existing conditions and character of the post-extraction landscape. Therefore architecture situated in post-extraction conditions must articulate and amplify the unique conditions and character of place, showcasing the form of the land as an immediate byproduct of extractive industry and as a generator of form. Specific tactics employed in articulating the conditions of place include tracing, mimicking, form and insertion.

Figure 72
Striated Landscape

This is achieved in this design through the creation of a low lying linear form intended to parallel the prominent horizontal lines found in the landscape, particularly the tiered formation of the land determined wholly by extractive processes (Figures 63, 72) (Illustration 13, 14).

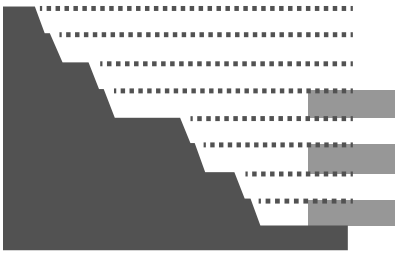


Illustration 14
Low Lying Linear Form Compliments Tiered Formation Of The Land

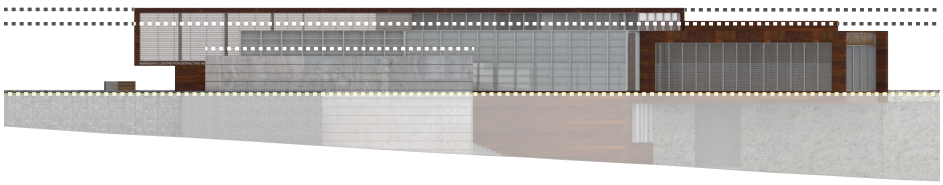


Illustration 13
Interventions Low Lying Linear Form

This condition is emphasized by the insertion of the building's mass into the landscape, reinforcing the nature of extractive industry while reducing the overall visual impact of the structure (Illustration15). Furthermore, this gesture intended to prevent the construction of a monumental form that might negatively impose on the landscape and potentially detract from more meaningful readings of it.

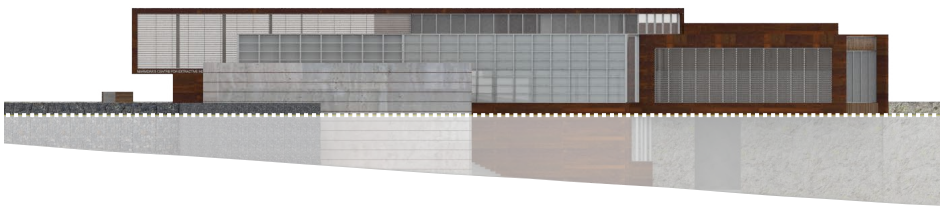


Illustration 15
Insertion of Building Form
Here, the building has been inserted into the landscape as a means to reduce the structures overall impact

Next, is the creation of a linear structure situated alongside the void, mimicking or tracing the topographic line formed in part of industry (Illustration 16). In doing so, the building can be read as an elaboration on the existing terrain (Leatherbarrow D. , 2004, p. 20), reinforcing and articulating the form of the land. The strategies and tactics noted are intended to reinforce the relationship between built form and existing landscape conditions.

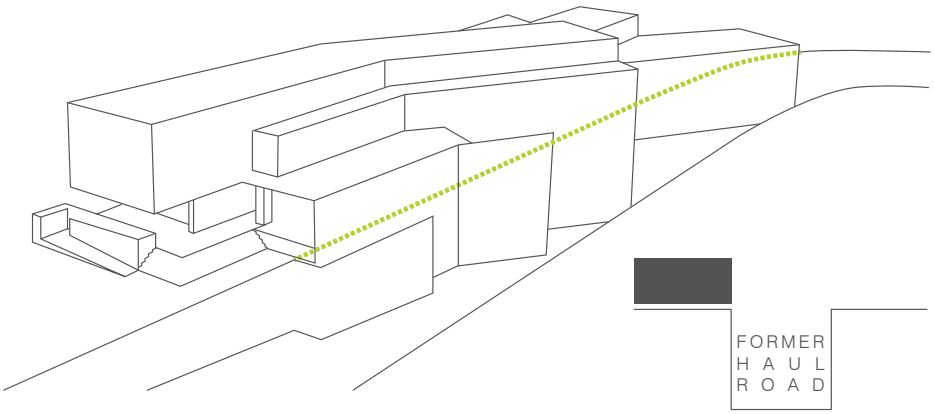


Illustration 16
Architectural Reinforcement of Topographic Conditions
Situated alongside the void, the building's form articulates and reinforces the existing topographic line.
Illustration 17
Abstract Section
Abstract section illustrating the relationship between building and landscape.

VISIBILE ABSENCE OF RESOURCE MATERIAL

Post-extraction landscapes are characterized by their inherent lack of material. Consequently, architecture situated in post-extraction conditions must highlight and give presence the absence of resource material. The primary tactics employed in highlighting this absence of material includes framing and preserving the void left by former industrial occupation. The way in which this strategy has been executed and resolved in design is through building form. More specifically, one has made use of a bridging mechanism which deliberately spans across the void, acting not only to mark but to contain and preserve the absence of materials (Illustration 18). This basic building form is that which invites users to descend into the former haul road while preserving access to the open pit below (Illustration19).

Illustration 19
Structure Bridges the Void That is the Former Haul Road

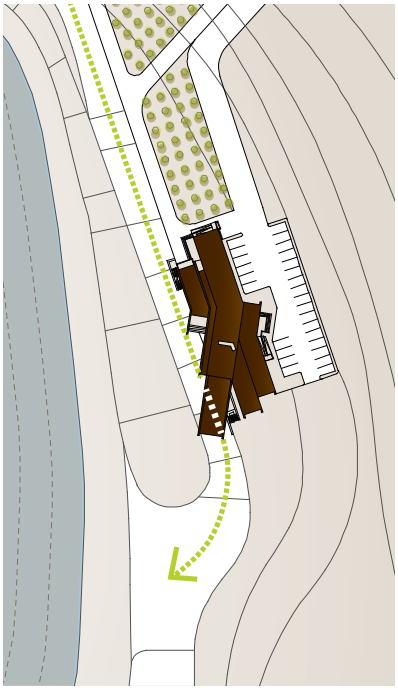


Illustration 18
Plan Illustrating Structure Bridging the Former Haul Road

TIME

Time is addressed in two ways: first through architectural form and second, material application. Relative to architectural form, the structure draws inspiration from geologic conditions, particularly geologic time. However, geology itself is not a measure of time, but rather movement. In light of these conditions, the building's form can be read as an abstraction of various geologic forces of movement (Illustration 20).

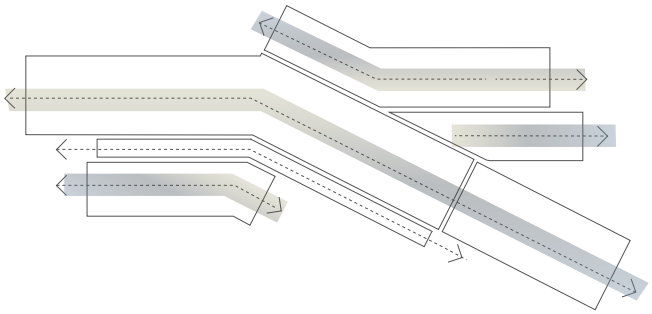


Illustration 20
Architectural Abstraction of Geologic Movement
Shown here is an abstraction of tectonic movement. This condition has been applied to architectural form, echoing those conditions found in the geologic environment.

Time however, has also been translated into architectural form through the mutability of space. This condition is implemented first through a gradual ramping condition which leads users toward the main atrium space (Illustration 21, 22, 23). Performed in relation to geologic time, this condition makes reference to the natural weathering and transformation of land over time.

In order to gain access to the lower floors, users proceed down a series of staircases. Here, the stairs articulate one's descent across space, one much faster than the ramping condition previously traversed (Illustration 25). This signals the beginnings of an environmental shift as the stairs themselves are contained by planar elements which serve two purposes. First, the use of planar elements highlight the alteration and transformation of space by unnatural forces thereby preventing any chance of users misinterpreting the form of space as an imitation of naturally occurring landform conditions. Second, is the use of planar elements as a means to restrict user's views into the main atrium (Illustration 27, 28). Because of this condition, the atrium space goes virtually unseen until users are fully immersed, a condition which responds to the rapid transformation in landform conditions by industry relative to those naturally incurred (Illustration 26).

As one enters the atrium, however, not only is a new spatial condition revealed, but also a shift in materiality, where materials within the space are more refined and polished (Illustrations 29,30). Here, refined materials are used because of their natural association to industrialized processes (these include metallic cladding, refined limestone and concrete) (Figure 73). This transition in material and environmental conditions is intended to reinforce and articulate the transition in time scales – from natural to industrial.

It is only once users have navigated the entirety of the space and overseen its transformation that they emerge from the lowest floor of the structure into the haul road (Illustration 31). From here, user's views of the surrounding landscape are restricted, directing all attention once again to the presence of the void and its inherent lack of material. Upon emergence from the haul road, users are afforded views of the open pit. This is the most powerful visual element of regeneration on site as the water has naturally risen to reclaim the open pit (Illustration 32, 33)

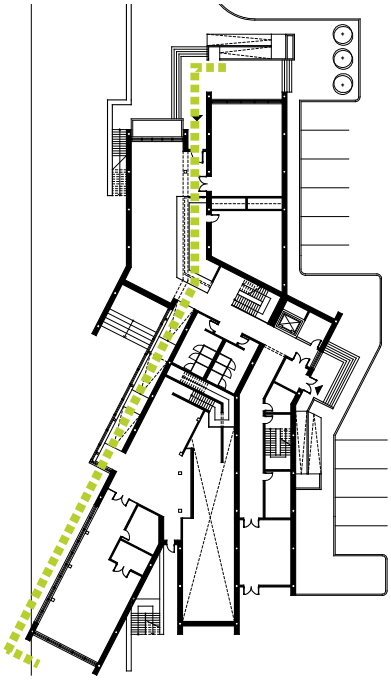


Illustration 21
Plan (Main Floor) Illustrating Section Through Ramping Condition

Illustration 22
Ramp Toward Main Atrium Space

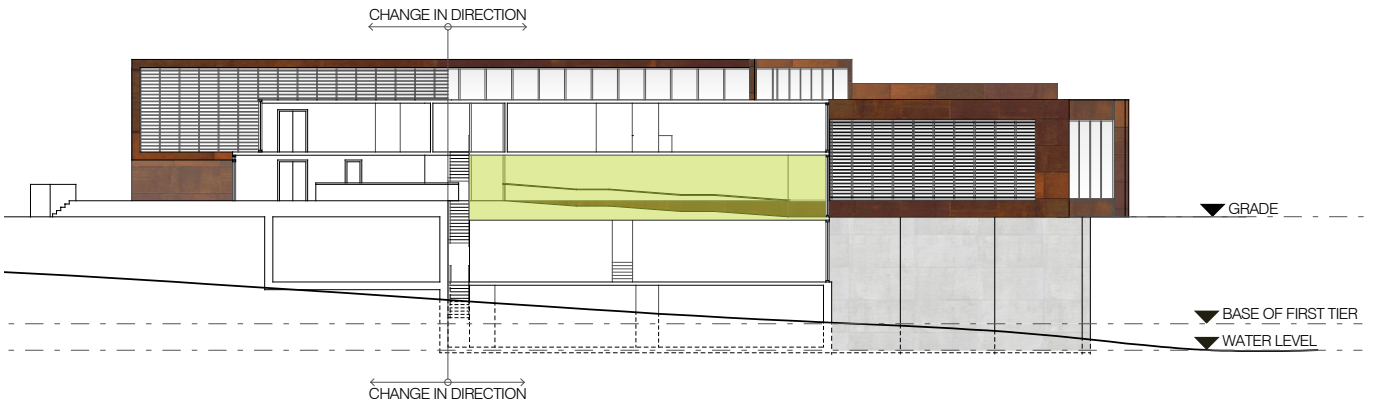


Illustration 23
Section Through Ramping Condition

Illustration 24

View 1 - Initial Display Space - Planar Elements Restrict View into Main Atrium

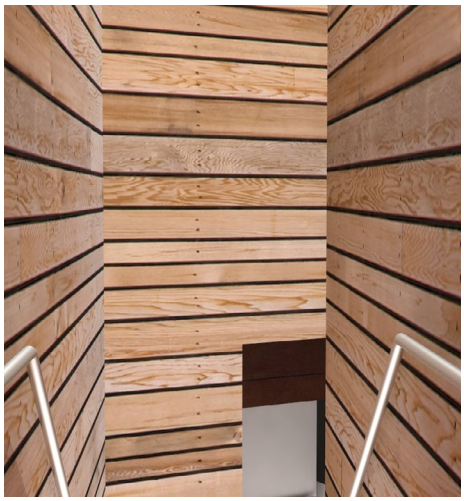


Illustration 25

View 2 - Descent Signals the Beginning of an Environmental Shift

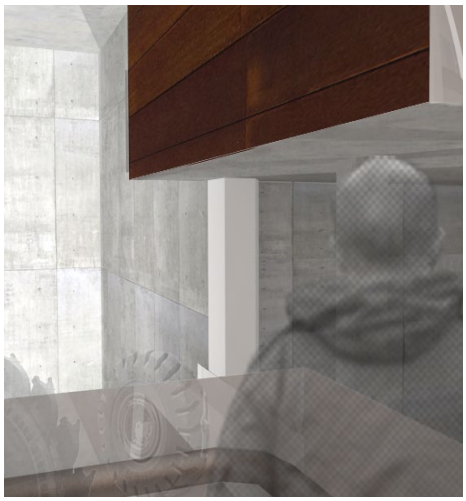
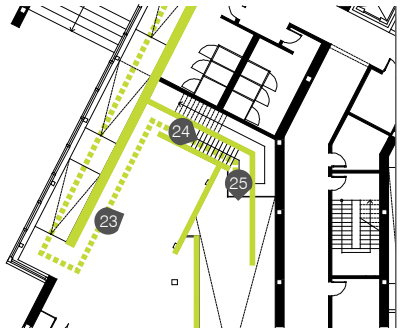


Illustration 26

View 3 - Emergence Into Main Atrium Space Reveals Dramatic Environmental Change



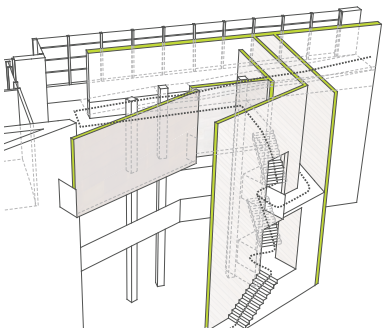


Illustration 27, 28

Planar Elements Contain Movement and Restrict Views Into Main Atrium Space

Illustration 29

Individuals First View Into Atrium Space

Illustration 30

Atrium Reveals Refined Material Pallet

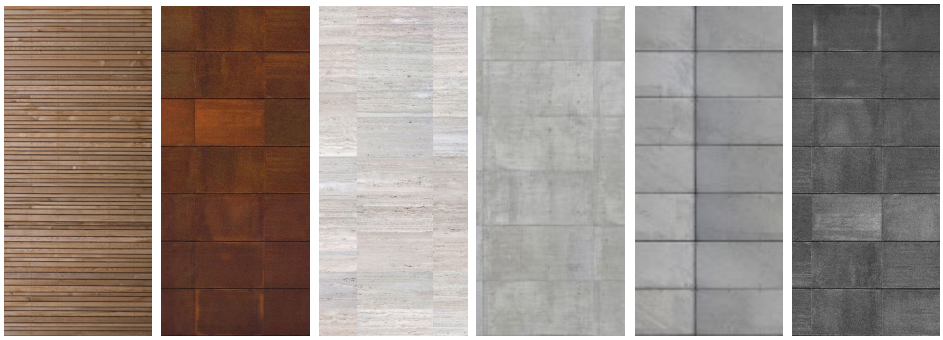


Figure 73

Material Palette

Illustration 31
View into Haul Road Upon Exiting Lower Floor (-2)

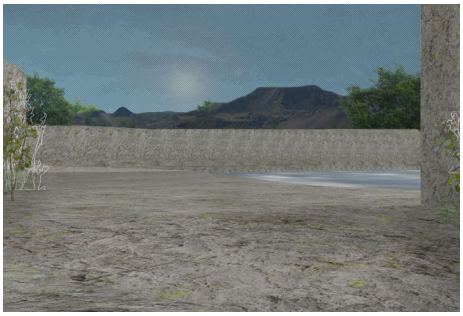


Illustration 32
View Across the Open Pit

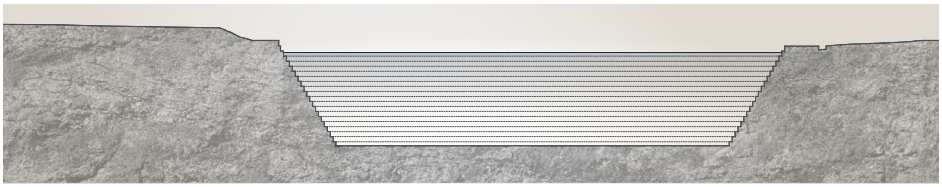
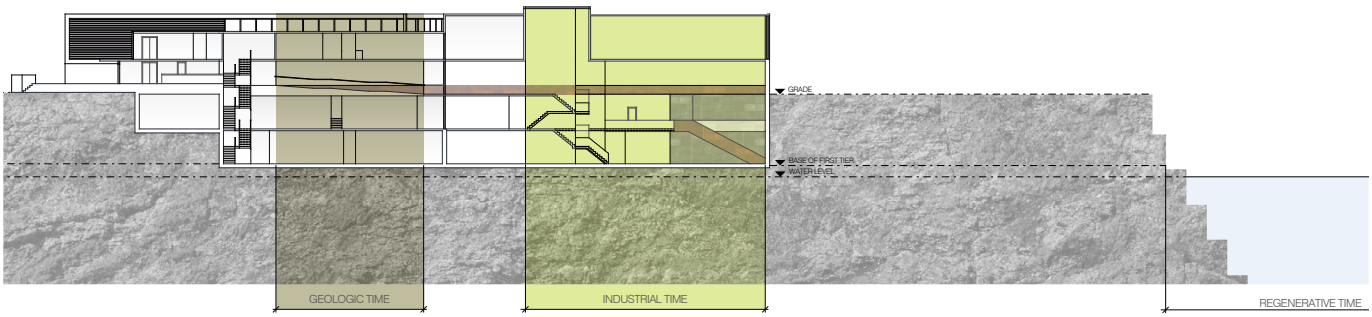


Illustration 33
Section Through Site Showing the Water Level Relative to the Depth of the Open Pit

MUTABILITY OF LANDFORMS

The mutability of landforms refers to the ease by which landscapes are transformed by extractive industry. In turn, deliberate removal of various portions of the existing landscape is intended to reinforce the extractive nature of industry within the material environment. As referred to in earlier sections, the removal of land is performed in reference to geologic and industrial timelines. This is implemented first through a gradual ramping condition that leads users into the main atrium space, making reference to the transformation of the land by natural processes (i.e. weathering). As previously mentioned users then proceed down a series of staircases in order to gain access to both the central atrium and lower levels. As users descend down the stairs, they move across space at a rate much faster than the ramping condition previously traversed, in turn signaling the beginning of an environmental shift. Because of the arrangement of the stairs the atrium space goes virtually unseen until users are fully immersed within the space. This condition is intended to speak to the abrupt change in landform conditions experienced with extractive industry. This transformation is reflected in Illustration 34 which reflects the various temporal periods engaged throughout the entire user experience.



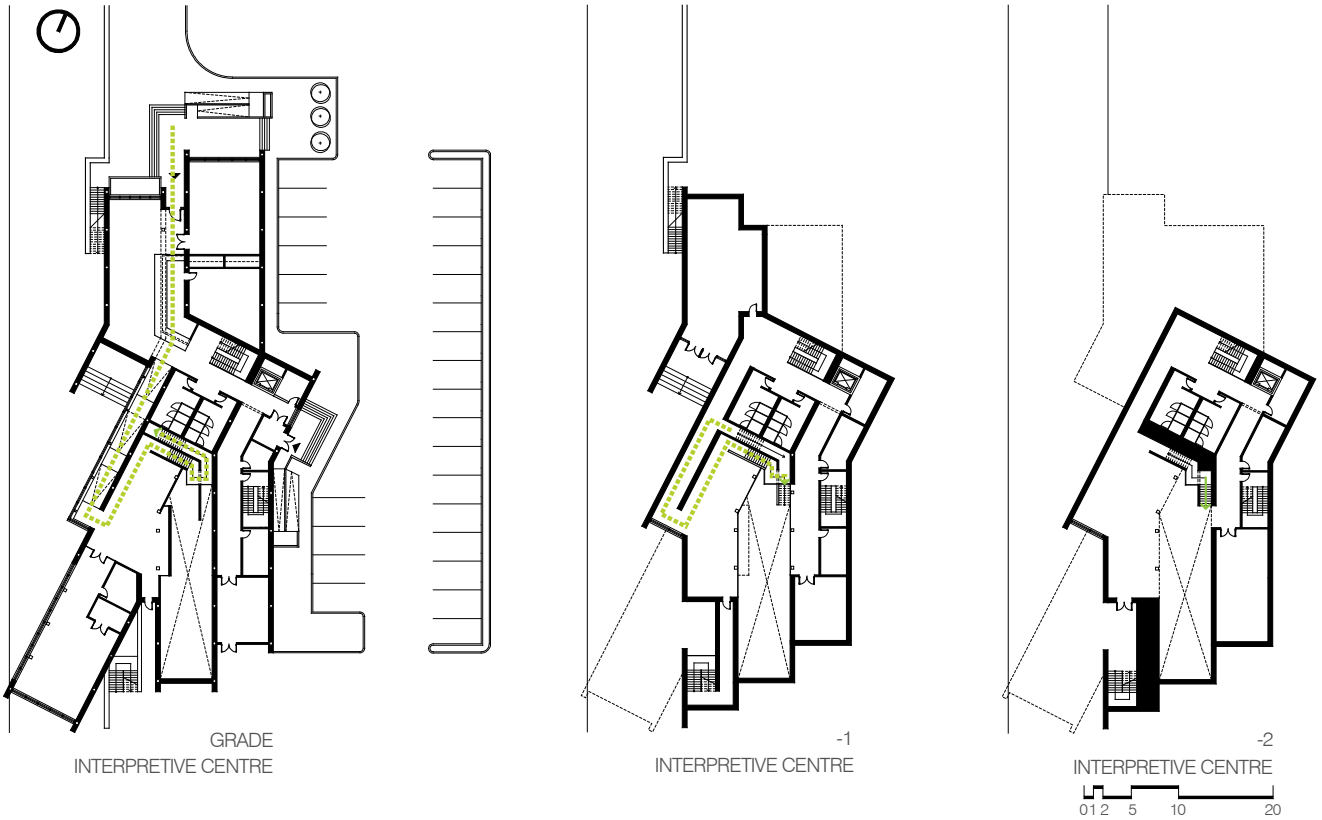


Illustration 34

Temporal Section (Shown in the floor plans provided is where the section has been drawn)

SCALE

Owing to the vast scale at which extractive industries operate, architectural interventions must give measure and dimension to existing landscape conditions as a means to provide users with more informed readings and greater understating of post-extraction conditions. For these reasons architecture must make use of legible measuring devices (i.e. physical and visual cues) as a means of enabling users to take measure of changes in the land relative to architectural form.

Scale is addressed in two ways. First, through the creation of a linear form. Differentiated formally and materially, this tactic provides individuals approaching the structure or those viewing the structure from a distance a means to attribute a sense of scale and height to both landscape and architectural form (Illustration 35).

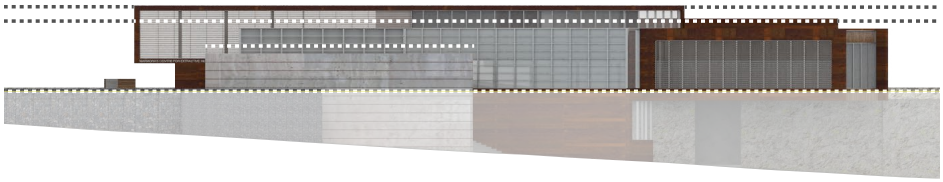


Illustration 35
Linear Datum's and or Architectural Differentiation Enables Users Approaching to Attribute a Sense of Scale to Architectural Form

Second, is through the creation of a continuous linear datum that marks the uppermost tier of the open pit. This is intended to act as a measuring device, enabling users to take measure of changes in the land relative to architectural form (Illustration 36). On the exterior, architectural form and materiality mark the uppermost tier of the open pit, providing a point of reference for changes in the landscape (Illustration 37).

Users occupying the lowest floor of the building are aligned with the lowest point of the first tier of the open pit. This alignment of space and form provides users with a more meaningful and attainable sense of scale relative to the existing landscape conditions, in turn providing greater insight into the nature of extractive industry.

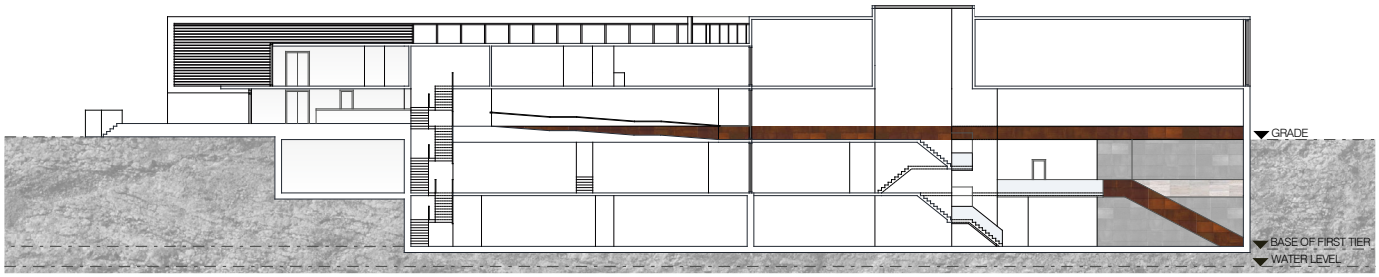


Illustration 36

Continuous Linear Datum

The demarcation of grade conditions begins with the initial ramp into the main atrium space. Once within the atrium space balconies act as physical and visual markers of height. This treatment of space and form make users more aware of cuts made into the landform as they descend into space.

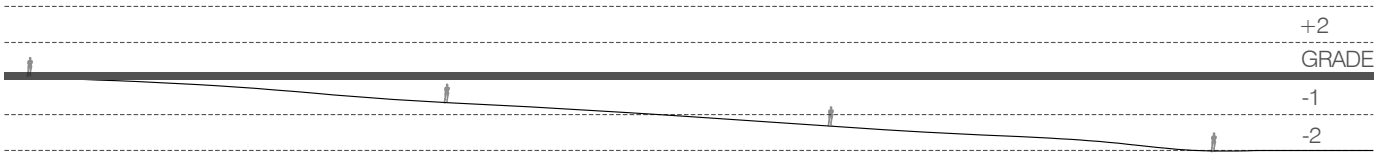


Illustration 37

Datum As Point of Reference

Here, the form of the structure acts as a datum or as a point reference for those moving through the formal haul road.

LOSS OF VALUE

In attempt to counter the perceived loss of value experienced with the collapse and/or closure of industry, two programmatic elements have been proposed: first, an interpretive centre to serve the study of earth sciences as related to extractive industry and second, office space to house a local chapter of the Ministry of Natural Resources (currently being housed in the neighbouring community of Bancroft). Both are proposed for their ability to make positive social, cultural and economic improvements while playing an active role in the recovery of the site. Benefits associated with a program of this nature include its ability to:

- Act as a catalyst for future economic development (i.e. drawing tourists & government funding through programming geared toward public education and the Ministry of Natural Resources)

- Educate visitors and contribute to the environmental reclamation of place through ongoing care (Note: It is proposed that part of the interpretive program is to have an outdoor education component that allows visitors to partake in the reclamation of place i.e. plant a tree as is often in done with similar reclamation programs)

- Facilitate an awareness and understanding of the intertwined nature of industry and landscape, while engaging users in the investigation and acknowledgement of human induced environmental change.

Although value has been primarily addressed through program, it is important to note that value is also returned to place through the combination of various strategies and tactics. Together, these engage users in the conditions of place, making them more aware of previous activities on site and their long term implications.

For more information on the distribution of program refer to Illustration 38 which documents various floor plans in greater detail.

1	RECEPTION
2	RECEPTION DESK
3	STAFF ROOM
4	MECHANICAL + ELECTRICAL
5	WASTE
6	JANITOR
7	CLASSROOM / ACTIVITY SPACE
8	DISPLAY
9	OFFICE
10	OPEN OFFICES
11	KITCHENETTE
12	CHAIR STORAGE
13	CONFERENCE / MEETING / EVENT SPACE
14	STORAGE

MNR OFFICES

PUBLIC PROGRAMMING

INTERPRETIVE CENTRE

Illustration 38
Floor Plans

SUMMARY OF DESIGN OUTCOMES

The strategies and tactics one has defined here determine the means by which architecture can best engage with post-extraction conditions. They are intended to not only highlight the existing condition and character of place, but reconnect users with former extraction sites. This treatment of architectural form encourages users to read the site's physical transformation through the material or architectural environment, lending itself to greater understanding and awareness of former industrial processes and their alteration of the land.

CONCLUSION
MOVING FORWARD

Although extractive industry has and continues to be one of the primary contributors to the Canadian economy, it cannot go without mention that these industries have wreaked havoc on the natural environment. As a result, what remains of these industries today are dormant industrial voids. As revealed in this thesis, this is a universal condition affecting all those reliant upon the extraction of natural resources. What is of greater concern, however, is that mineral reserves are being depleted at a rate much faster than at any other time in history. The consequence of this condition is such that new mines are only expected to last up to 15 years (Kuyek & Coumans, 2003). These conditions beg the question, in what way can former extraction sites be repurposed or re-imagined once industry has ceased to operate? In response, this thesis has explored the ability for architectural interventions to transform these now blighted landscapes into economically viable and culturally relevant landscapes, using architecture as a tool for highlighting, preserving and repurposing now dormant industrial voids.

As revealed through a number of case studies, current practices employed in the remediation of these sites is largely superficial or aesthetic in that many of sites are transformed into those most pleasing to the eye. This condition is due to the fact that extraction sites are often of a utilitarian nature in that what remains is often considered of little historic and or architectural value. In turn, interventions situated in these conditions are often reduced to either aesthetic or ancillary uses. However, there are a few exceptions to this condition, including *Zollervein Industrial Complex*, *C-Mine* and *Evergreen Brickworks* which make use of existing industrial infrastructure as a means of preserving the history and narrative of place.

In an attempt to remedy these conditions, a theoretical framework for architectural engagement in the post-extraction condition (where substantial infrastructure is noticeably absent from place) has been proposed. This framework has been derived from an analysis of post-extraction conditions. It is from this analysis that a series of design principles have been extracted and proposed. They include latency or inactivity, dependence on the location of resources, a visible absence of resource material, readings of time, mutability of landforms, vast scale of operation, and perceived loss of value. These principles for design are intended to not only reveal the transformation of the land by former industry but to inform and engage users in the acknowledgement of human induced environmental change, thereby contributing to a more informed understanding of place.

While the design strategies presented here provide a framework for architectures engagement in post-extraction conditions, it is not to say that every former extraction site warrants architectural intervention or reclamation. Rather, the research and design work presented in part of this thesis is intended to act as a case study which provokes greater discussion as to how these once industrious sites can be repurposed when appropriate.

In summation, the proposal presented is a re-evaluation of former extraction sites. Rather than consign these once industrious landscapes to wastelands, it examines the unique opportunities for architectural engagement. Having been transformed at the hand of industry, these landscapes must be re-evaluated and projected toward new ends (Corner, 1999). In doing so, they have the ability to be transformed into opportunities that provide social, economic and cultural benefits to local communities, becoming positive legacies for future generations.

APPENDIX A
Land Art

Broken Circle/Spiral Hill | Robert Smithson

Smithson whom was interested in creating pieces that didn't mask the qualities of the industrial landscape reclaimed this former sand quarry in the town of Emmen, through two installations. The first of which is the Broken Circle which sits at the edge of water. The second element, the Spiral Hill, is located on a sloping area of the land directly above the Broken Circle. This element is such that is has been constructed from the overburden on site. Carved into a spiral path, the form is intended to represent destruction of the landscape where together the two pieces make reference to the removal of materials and their deposit in other locations (Maskit, 2007, p. 330). Much like other earthworks, the projects were designed as temporary pieces; however, this community has preserved the pieces through continual maintenance.

Figure 3, 4
Broken Circle/Spiral Hill | Robert Smithson

Johnson Pit #30 | Robert Morris

Johnson Pit #30, completed in 1979 by Robert Morris is an early example of large scale land reclamation done by artists. Abandoned in the 1940's, the former sand and gravel pit was transformed by Morris to create a new public space for local residents. In doing so Morris cleared the site of its existing vegetation, terracing existing benches of the open pit, planted with rye grass to create a path enabling users to descend into the site. While it was Morris's intention to remind users of the sites industrial roots, it comes up flat because of his removal of existing conditions. What remains of the sites history today is only an approximation of its former condition.

Figure 5
Johnson Pit #30 | Robert Morris

Effigy Tumuli | Michael Heizer

Originally the site of a former coal mine, Heizer work, which has since become part of the Buffalo Rock State Park of Ottawa, Illinois distinctly draws from the history of place. Heizer designed five massive mounds, referencing Native American burial mounds constructed in the region. While indecipherable from grade, these mounds

Figure 6
Effigy Tumuli | Michael Heizer

are abstracted animal forms intended to reference indigenous species. Today, the mounds themselves have deteriorated to the point that their original form is barely recognizable. Whether intended or not, this transformation of the land over time makes reference to the state of the land after extraction has occurred.

APPENDIX B
The Nizhny Tagil Charter for the Industrial Heritage

July 2003

TICCIH is the world organisation representing industrial heritage and is special adviser to ICOMOS on industrial heritage. This charter was originated by TICCIH and will be presented to ICOMOS for ratification and for eventual approval by UNESCO.

Preamble

The earliest periods of human history are defined by the archaeological evidence for fundamental changes in the ways in which people made objects, and the importance of conserving and studying the evidence of these changes is universally accepted.

From the Middle Ages, innovations in Europe in the use of energy and in trade and commerce led to a change towards the end of the 18th century just as profound as that between the Neolithic and Bronze Ages, with developments in the social, technical and economic circumstances of manufacturing sufficiently rapid and profound to be called a revolution. The Industrial Revolution was the beginning of a historical phenomenon that has affected an ever-greater part of the human population, as well as all the other forms of life on our planet, and that continues to the present day.

The material evidence of these profound changes is of universal human value, and the importance of the study and conservation of this evidence must be recognised.

The delegates assembled for the 2003 TICCIH Congress in Russia wish therefore to

assert that the buildings and structures built for industrial activities, the processes and tools used within them and the towns and landscapes in which they are located, along with all their other tangible and intangible manifestations, are of fundamental importance. They should be studied, their history should be taught, their meaning and significance should be probed and made clear for everyone, and the most significant and characteristic examples should be identified, protected and maintained, in accordance with the spirit of the Venice Charter [1], for the use and benefit of today and of the future.

1. Definition of industrial heritage

Industrial heritage consists of the remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education.

Industrial archaeology is an interdisciplinary method of studying all the evidence, material and immaterial, of documents, artefacts, stratigraphy and structures, human settlements and natural and urban landscapes [2], created for or by industrial processes. It makes use of those methods of investigation that are most suitable to increase understanding of the industrial past and present.

The historical period of principal interest extends forward from the beginning of the Industrial Revolution in the second half of the eighteenth century up to and including the present day, while also examining its earlier pre-industrial and proto-industrial roots. In addition it draws on the study of work and working techniques encompassed by the history of technology.

2. Values of industrial heritage

I. The industrial heritage is the evidence of activities which had and continue to have profound historical consequences. The motives for protecting the industrial heritage are based on the universal value of this evidence, rather than on the singularity of unique sites.

II. The industrial heritage is of social value as part of the record of the lives of ordinary men and women, and as such it provides an important sense of identity. It is of technological and scientific value in the history of manufacturing, engineering, construction, and it may have considerable aesthetic value for the quality of its architecture, design or planning.

III. These values are intrinsic to the site itself, its fabric, components, machinery and setting, in the industrial landscape, in written documentation, and also in the intangible records of industry contained in human memories and customs.

IV. Rarity, in terms of the survival of particular processes, site typologies or landscapes, adds particular value and should be carefully assessed. Early or pioneering examples are of especial value.

3. The importance of identification, recording and research

I. Every territory should identify, record and protect the industrial remains that it wants to preserve for future generations.

II. Surveys of areas and of different industrial typologies should identify the extent of the industrial heritage. Using this information, inventories should be created of all the sites that have been identified. They should be devised to be easily searchable and should be freely accessible to the public. Computerisation and on-line access are valuable objectives.

III. Recording is a fundamental part of the study of industrial heritage. A full record of the physical features and condition of a site should be made and placed in a public archive before any interventions are made. Much information can be gained if recording is carried out before a process or site has ceased operation. Records should include descriptions, drawings, photographs and video film of moving objects, with references to supporting documentation. Peoples' memories are a unique and irreplaceable resource which should also be recorded when they are available.

IV. Archaeological investigation of historic industrial sites is a fundamental technique for their study. It should be carried out to the same high standards as that of sites from other historical or cultural periods.

V. Programmes of historical research are needed to support policies for the protection of the industrial heritage. Because of the interdependency of many industrial activities, international studies can help identify sites and types of sites of world importance.

VI. The criteria for assessing industrial buildings should be defined and published so as to achieve general public acceptance of rational and consistent standards. On the basis of appropriate research, these criteria should be used to identify the most important surviving landscapes, settlements, sites, typologies, buildings, structures, machines and processes.

VII. Those sites and structures that are identified as important should be protected by legal measures that are sufficiently strong to ensure the conservation of their significance. The World Heritage List of UNESCO should give due recognition to the tremendous impact that industrialisation has had on human culture.

VIII. The value of significant sites should be defined and guidelines for future interventions established. Any legal, administrative and financial measures that are necessary to maintain their value should be put in place.

IX. Sites that are at risk should be identified so that appropriate measures can be taken to reduce that risk and facilitate suitable schemes for repairing or re-using them.

X. International co-operation is a particularly appropriate approach to the conservation of the industrial heritage through co-ordinated initiatives and sharing resources. Compatible criteria should be developed to compile international inventories and databases.

4. Legal protection

I. The industrial heritage should be seen as an integral part of the cultural heritage in general. Nevertheless, its legal protection should take into account the special nature of the industrial heritage.

It should be capable of protecting plant and machinery, below-ground elements, standing structures, complexes and ensembles of buildings, and industrial landscapes. Areas of industrial waste should be considered for their potential archaeological as well as ecological value.

II. Programmes for the conservation of the industrial heritage should be integrated into policies for economic development and into regional and national planning.

III. The most important sites should be fully protected and no interventions allowed that compromise their historical integrity or the authenticity of their fabric. Sympathetic adaptation and re-use may be an appropriate and a cost-effective way of ensuring the survival of industrial buildings, and should be encouraged by appropriate legal controls, technical advice, tax incentives and grants.

IV. Industrial communities which are threatened by rapid structural change should be supported by central and local government authorities. Potential threats to the industrial heritage from such changes should be anticipated and plans prepared to avoid the need for emergency actions.

V. Procedures should be established for responding quickly to the closure of important industrial sites to prevent the removal or destruction of significant elements. The competent authorities should have statutory powers to intervene when necessary to protect important threatened sites.

VI. Government should have specialist advisory bodies that can give independent advice on questions relating to the protection and conservation of industrial heritage, and their opinions should be sought on all important cases.

VII. Every effort should be made to ensure the consultation and participation of local communities in the protection and conservation of their local industrial heritage.

VIII. Associations and societies of volunteers have an important role in identifying sites, promoting public participation in industrial conservation and disseminating information and research, and as such are indispensable actors in the theatre of industrial heritage.

5. Maintenance and conservation

I. Conservation of the industrial heritage depends on preserving functional integrity, and interventions to an industrial site should therefore aim to maintain this as far as possible. The value and authenticity of an industrial site may be greatly reduced if machinery or components are removed, or if subsidiary elements which form part

of a whole site are destroyed.

II. The conservation of industrial sites requires a thorough knowledge of the purpose or purposes to which they were put, and of the various industrial processes which may have taken place there. These may have changed over time, but all former uses should be examined and assessed.

III. Preservation in situ should always be given priority consideration. Dismantling and relocating a building or structure are only acceptable when the destruction of the site is required by overwhelming economic or social needs.

IV. The adaptation of an industrial site to a new use to ensure its conservation is usually acceptable except in the case of sites of especial historical significance. New uses should respect the significant material and maintain original patterns of circulation and activity, and should be compatible as much as possible with the original or principal use. An area that interprets the former use is recommended.

V. Continuing to adapt and use industrial buildings avoids wasting energy and contributes to sustainable development. Industrial heritage can have an important role in the economic regeneration of decayed or declining areas. The continuity that re-use implies may provide psychological stability for communities facing the sudden end a long-standing sources of employment.

VI. Interventions should be reversible and have a minimal impact. Any unavoidable changes should be documented and significant elements that are removed should be recorded and stored safely. Many industrial processes confer a patina that is integral to the integrity and interest of the site.

VII. Reconstruction, or returning to a previous known state, should be considered an exceptional intervention and one which is only appropriate if it benefits the integrity of the whole site, or in the case of the destruction of a major site by violence.

VIII. The human skills involved in many old or obsolete industrial processes are a critically important resource whose loss may be irreplaceable. They need to be carefully recorded and transmitted to younger generations.

IX. Preservation of documentary records, company archives, building plans, as well as sample specimens of industrial products should be encouraged.

6. Education and training

I. Specialist professional training in the methodological, theoretical and historical aspects of industrial heritage should be taught at technical and university levels.

II. Specific educational material about the industrial past and its heritage should be produced by and for students at primary and secondary level.

7. Presentation and interpretation

I. Public interest and affection for the industrial heritage and appreciation of its values are the surest ways to conserve it. Public authorities should actively explain the meaning and value of industrial sites through publications, exhibitions, television, the Internet and other media, by providing sustainable access to important sites and by promoting tourism in industrial areas.

II. Specialist industrial and technical museums and conserved industrial sites are both important means of protecting and interpreting the industrial heritage.

III. Regional and international routes of industrial heritage can highlight the continual transfer of industrial technology and the large-scale movement of people that can be caused by it.

---

[1] The ICOMOS 'Venice Charter for the Conservation and Restoration of Monuments and Sites', 1964

[2] For convenience, 'sites' will be taken to mean landscapes, complexes, buildings, structures and machines unless these terms are used in a more specific way.

Source | http://ticcih.org/

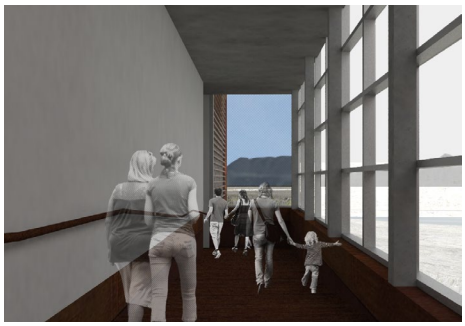
APPENDIX C
Path of Movement

View Upon Entry

View Upon Entry

Reception Area

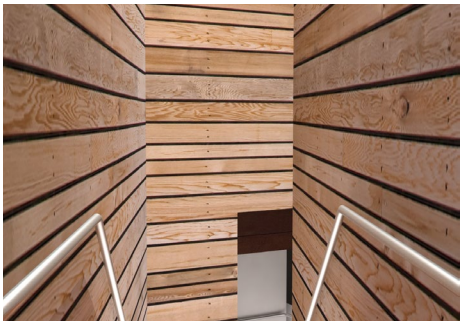
Reception Area
View Toward Rear, Moving Toward Entry Ramp



View Down Entry Ramp

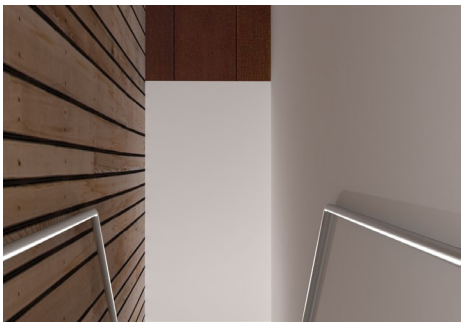
View Down Entry Ramp

Initial Display Space



Stairwell Access to Lower Floors and Main Atrium Space

Initial View Into Main Atrium



Stairwell Access to Lower Floors and Main Atrium Space

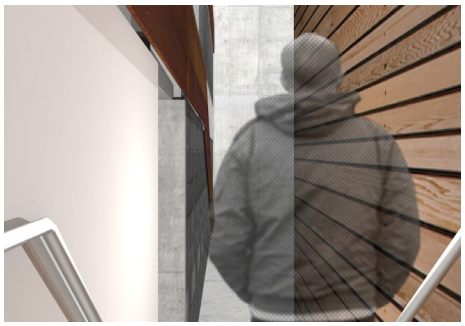
View Into Haul Road from Lower Level (-1)

View Into Haul Road From Lower Level (-1)

Lower Level (-1) Display Space

Stairwell Access to Lower Floor and Main Atrium

View Into Main Atrium From Lower Level (-2)



Stairwell Access to Main Atrium

Access To Haul Road from Lower Level (-2)

View Into Haul Road Upon Emergence from the Lower Level (-2)

APPENDIX D
Physical Models

Physical Model | 1:1000
Section Through Open Pit (Front)

Physical Model | 1:1000
Section Through Open Pit (Rear)

Physical Model | 1:1000
Section Through Open Pit (Aerial)

Physical Model | 1:00

Section Through Haul Road + Main Atrium (Western Elevation)

Physical Model | 1:00

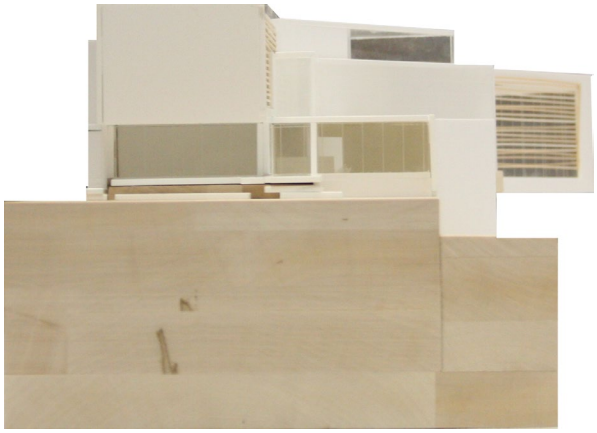
Section Through Haul Road + Main Atrium Space (Eastern Elevation)

Physical Model |1:100

Section Through Haul Road + Main Atrium Space (Aerial)

Physical Model | 1:00

Section Through Haul Road + Main Atrium (Southern Elevation)



Physical Model | 1:00

Section Through Haul Road + Main Atrium (Northern Elevation)

Physical Model | 1:00

Section Through Haul Road + Main Atrium (Perspective From the North-West)

Physical Model | 1:00

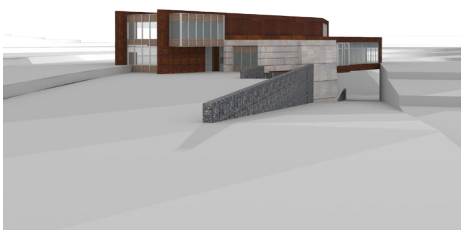
Section Through Haul Road + Main Atrium (Perspective From the South-West)

View Upon Arrival to the Site

View Upon Arrival to the Site

View Upon Exiting Vehicle

View as One Moves Closer to the Building on Foot



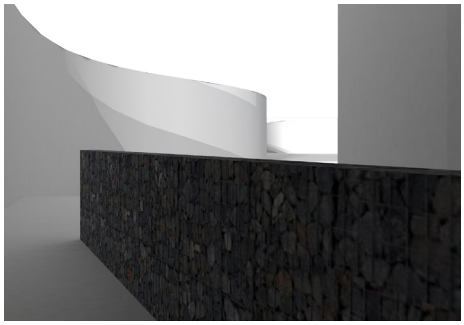
View Upon Entry to Haul Road

View Upon Entry

APPENDIX E
Design Development

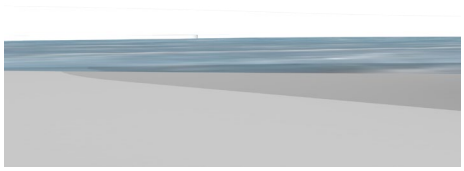
View from Within the Haul Road

View from Within the Haul Road

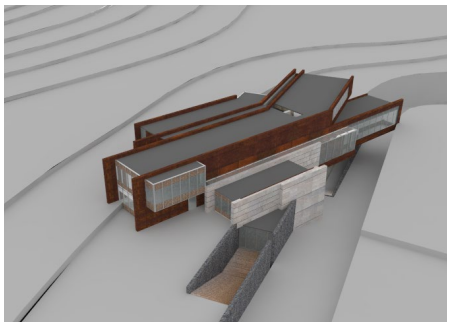


View Upon Emergence from Lower Level (-2) into Haul Road

View from Within the Haul Road



View of the Open Pit Upon Emergence from the Haul Road



Aerial View

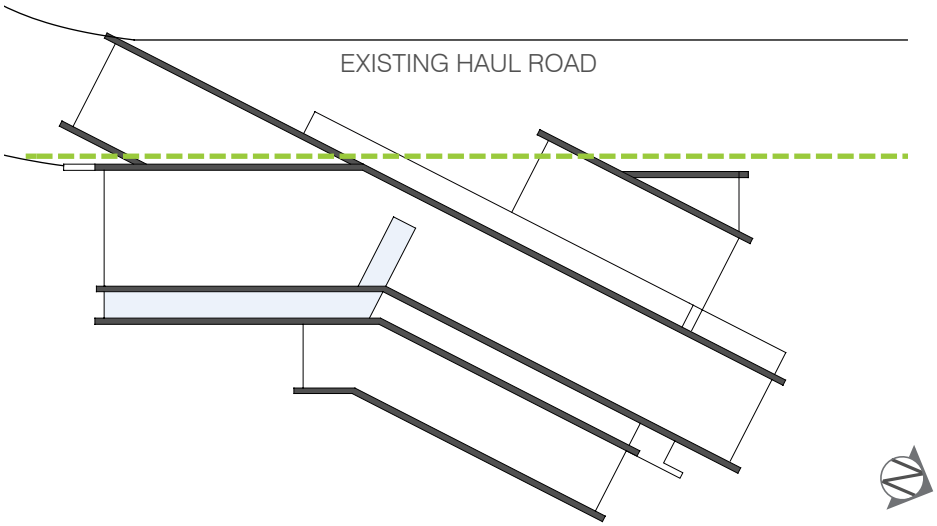
Note

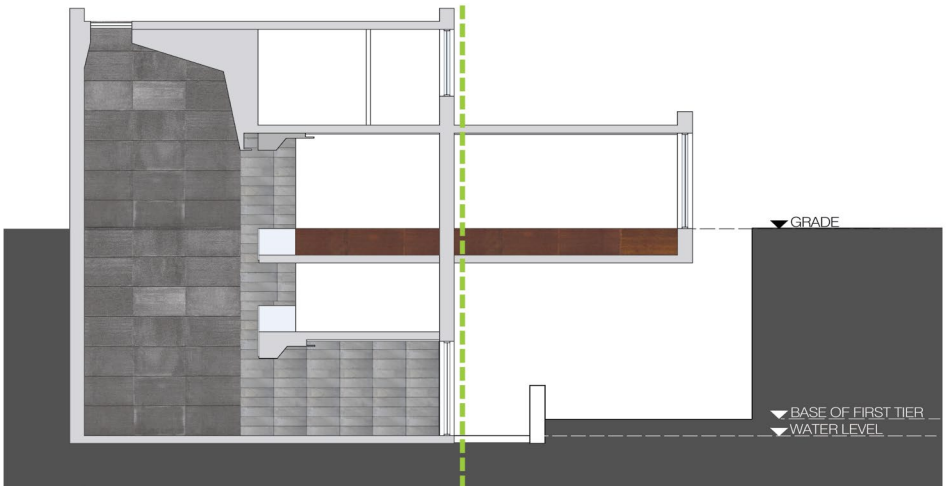
The following images and drawings were produced at the stage of substantial completion (February 2014). The design work presented here provides the foundation for the final thesis project.

Depicted in the images provided here is not only the design produced at this stage but ones arrival and experience of the site.

The images presented here respond to the universal condition regarding the location of extractive industries. During this phase, one explored the structures alignment with the pre-existing topographic line, tracing and or mimicking it as a means of articulating and reinforcing the conditions of place.

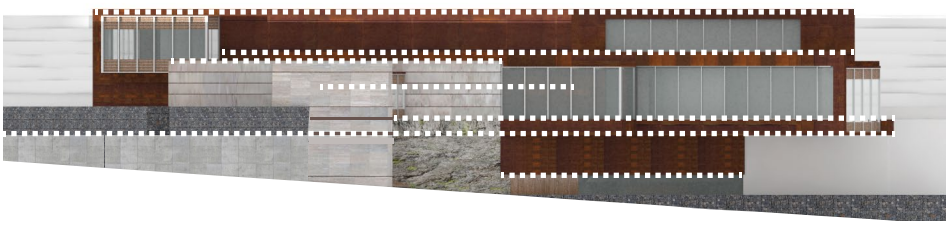
Although the form of the structure itself has changed following this iteration, the design intention remains much the same

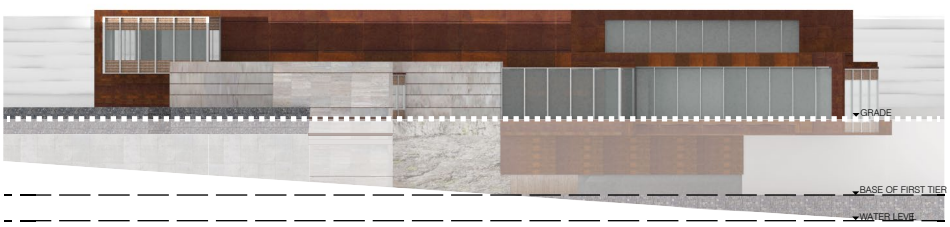


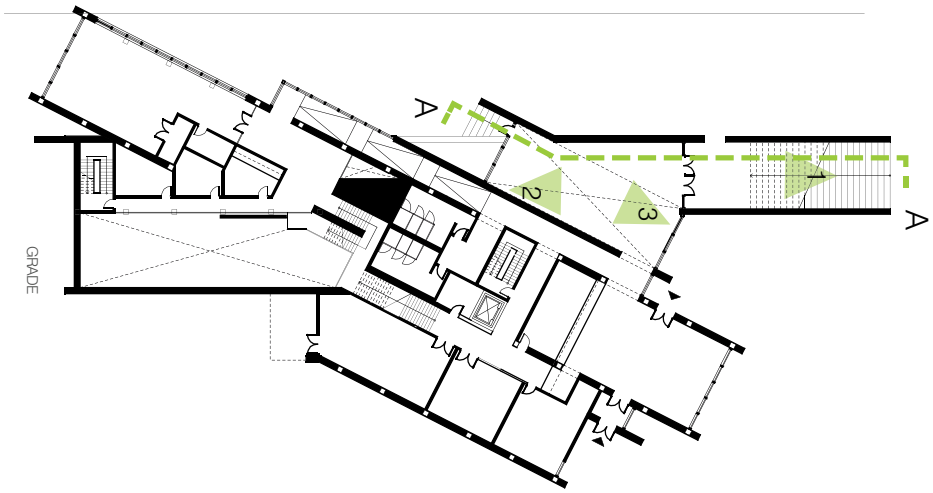


Part of one`s response to the existing conditions and character of place was the creation of a low lying form, complimenting the prominent horizontal lines found in the landscape. This condition is amplified by the insertion of form into the landscape itself.

Again, while the form of the structure has changed following this iteration, the design intention has remained much the same.

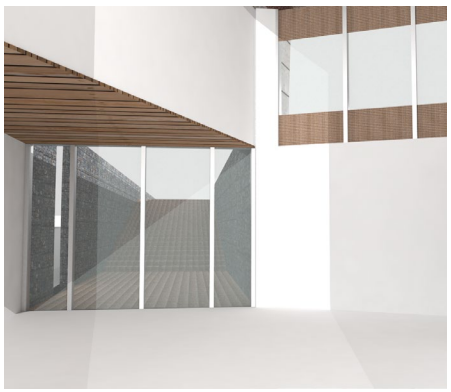




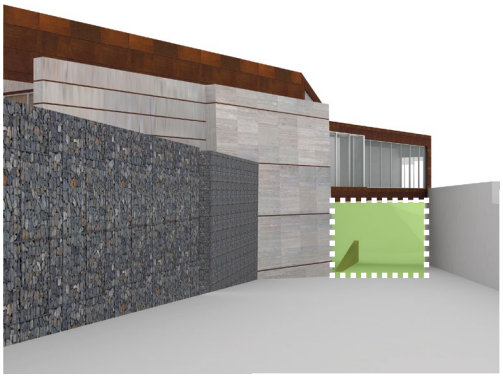


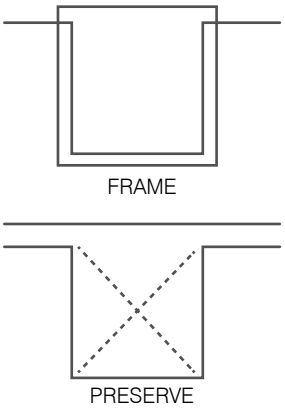
The insertion of form into the landscape enables access to various levels of the building and landscape for purposes of program - a condition illustrated in the images provided here where a classroom cut into the landscape provides external access for outdoor activities or events.

Again, although the means by which this has been acheivved in the final design response has changed the design intention remains much the same.

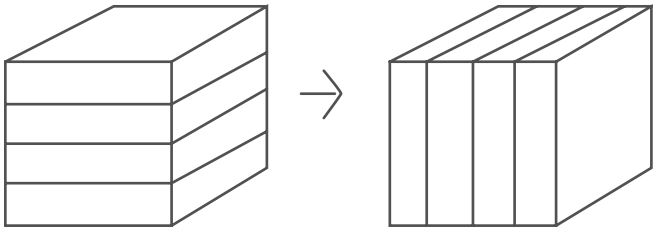


Represented here is ones initial response to framing and preserving the absence of resource material. This has been executed in design through a bridging mechanism which spans across the void.

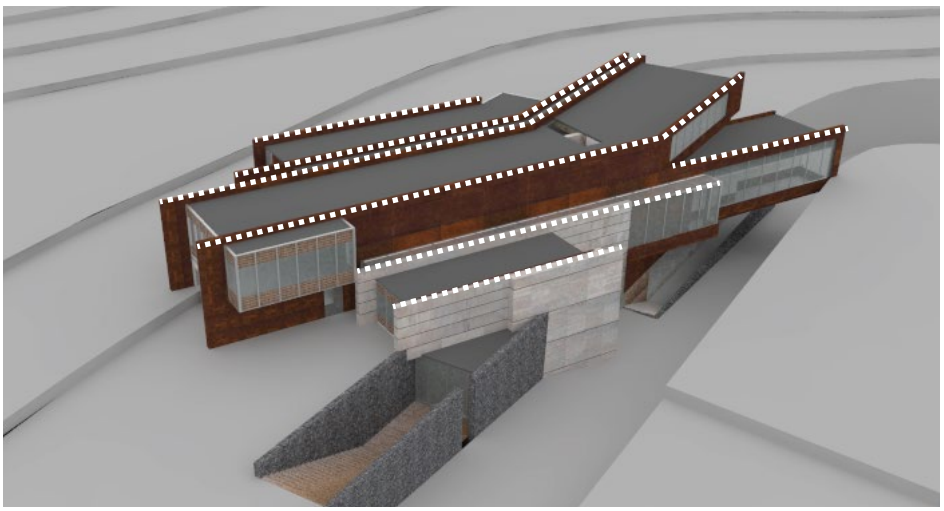


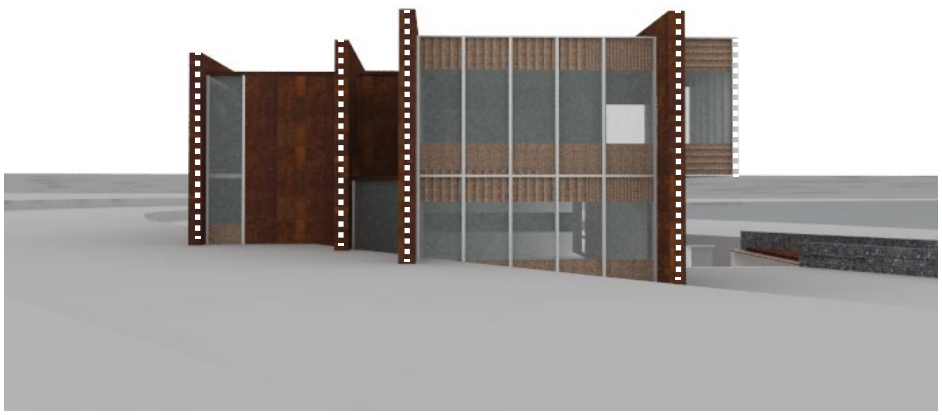


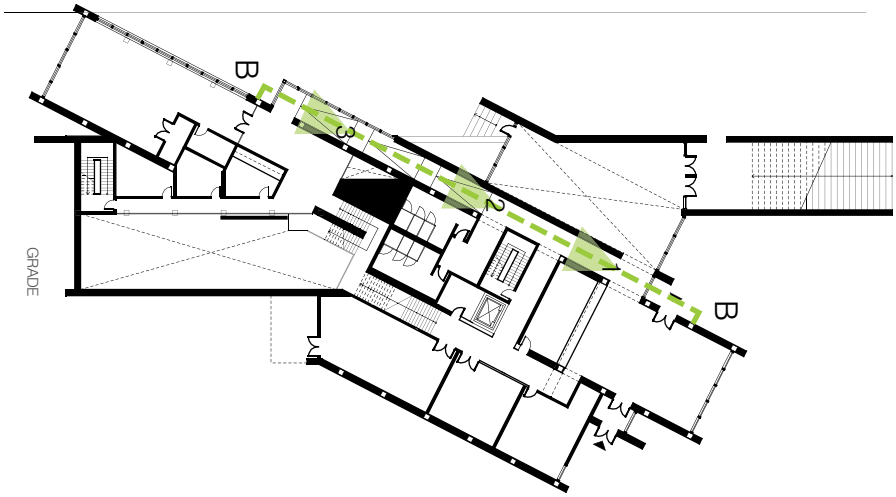
Shown here is ones initial response to the temporal aspects of the site. Formally speaking, the design presented at this stage was such that users were met with a series of projected planes, making reference to geologic time (layers of sedimentary land).



While the means by which this has been executed in the final design has changed, the intention remains the same.

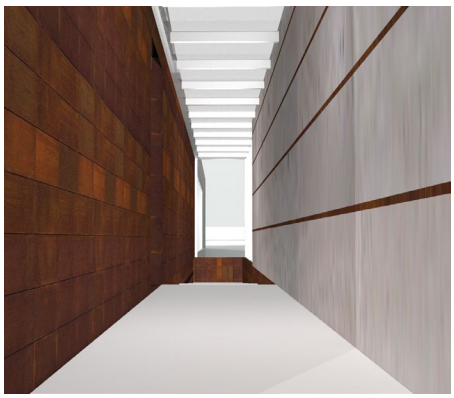


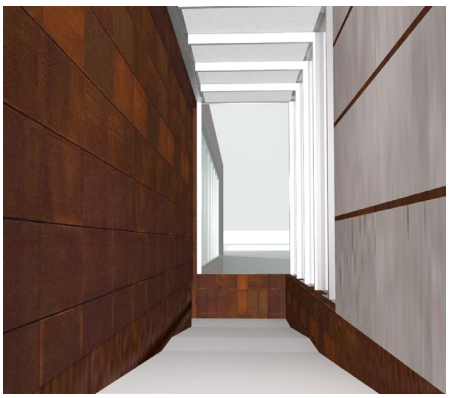


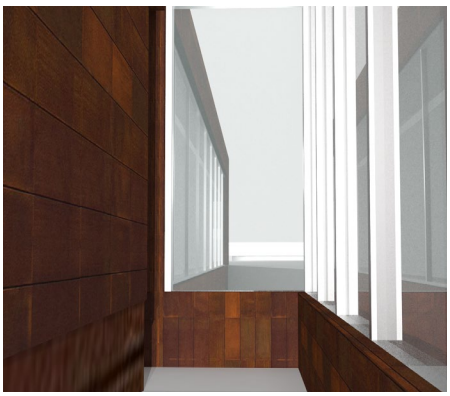


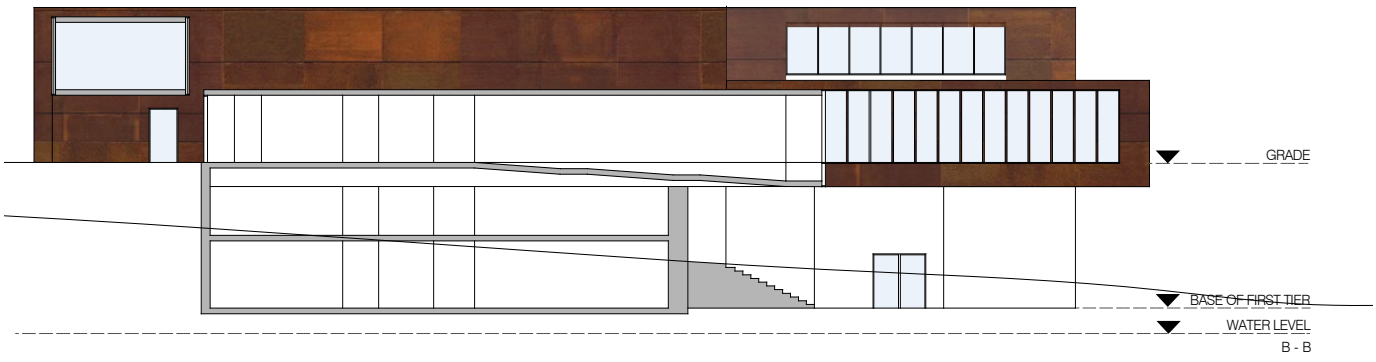
During this phase time was also translated into architectural space and form throught he mutability tof space, in turn echoing and reinforcing the nature of extractive industry

This is first implemented through a gradual ramping condition that leads users into the main atrium space. As illustrated here, users slowly descend through space, making reference to the natural weathering and transformation of land over time.

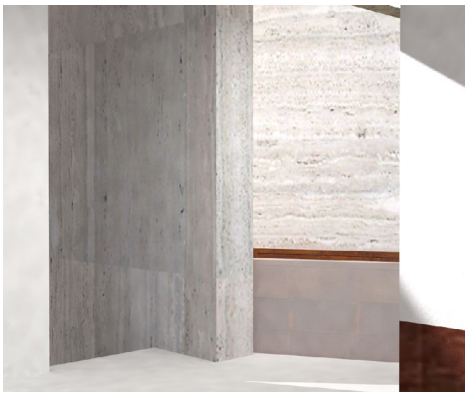


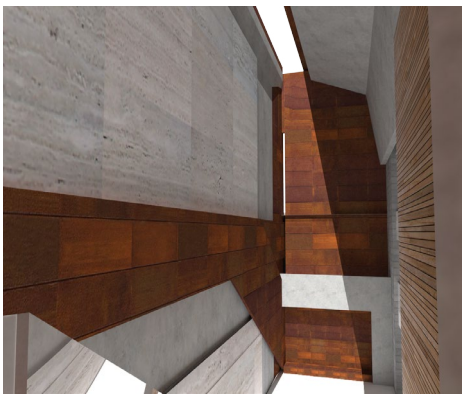


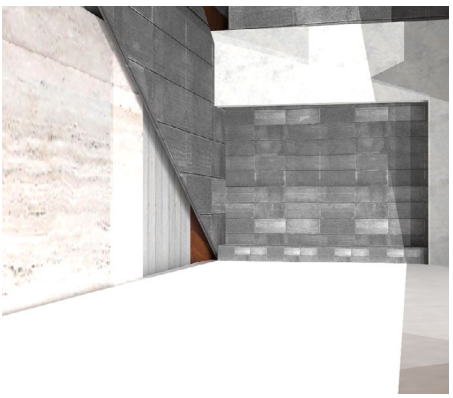


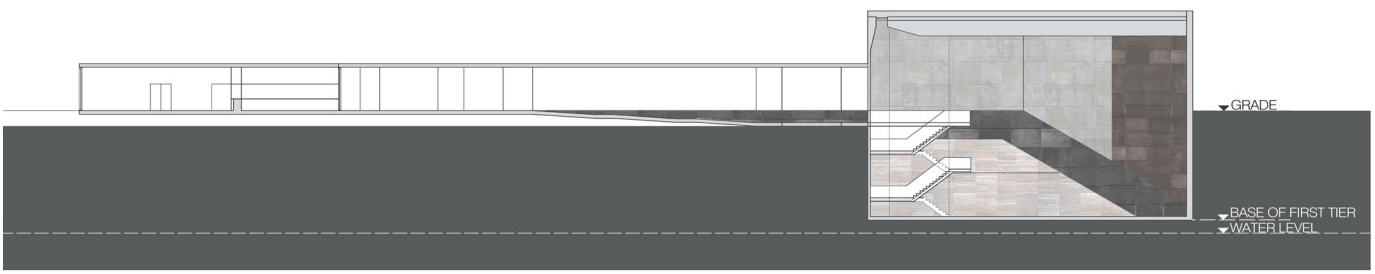


Upon exiting the ramp, users enter an intermediary zone where views toward the central atrium are restricted. The images provided here document the individuals journey into the main atrium and lower floors of the building. Similar to the final design response, the planar elements contain movement and restrict views contributing to the articulation and transition in time scales.



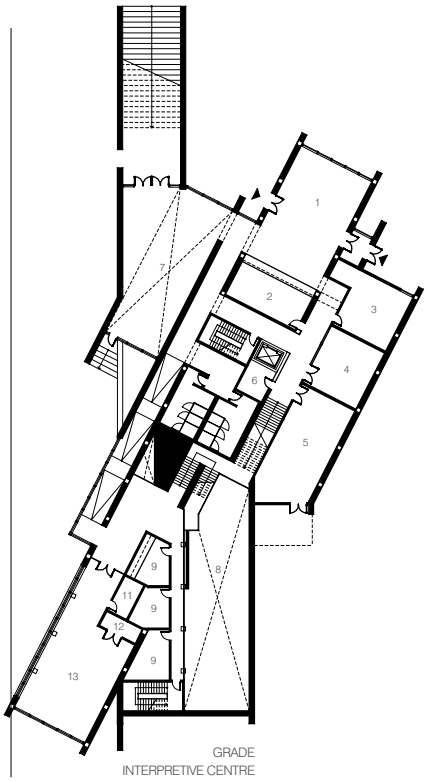




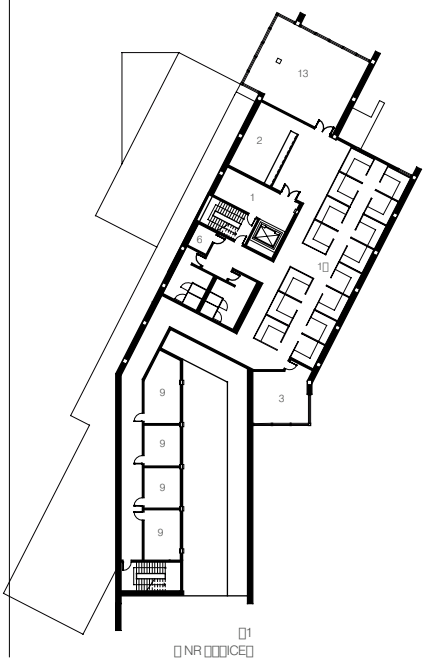


C - C

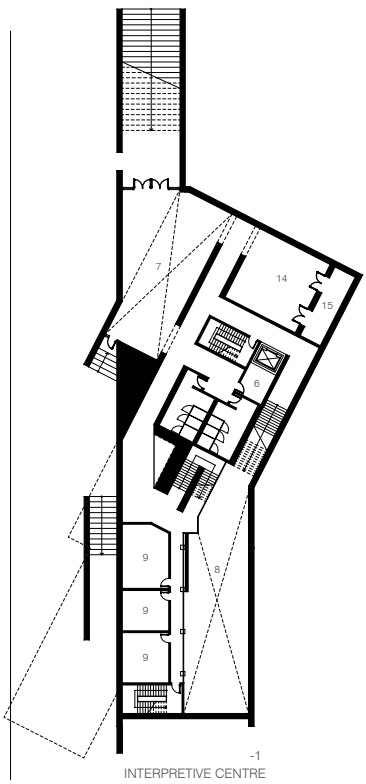
Illustrated here are the floor plans produced at the stage of substantial completion.



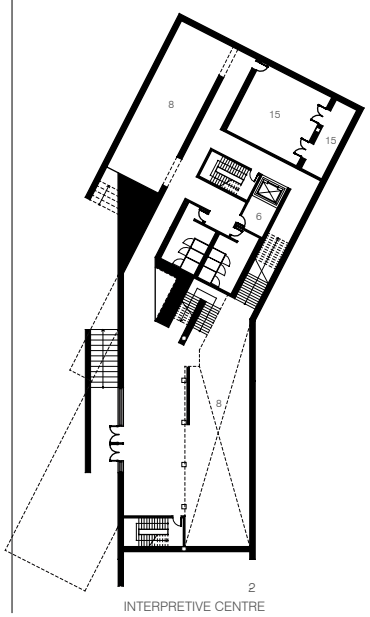
GRADE
INTERPRETIVE CENTRE



1
NR ICE



-1
INTERPRETIVE CENTRE



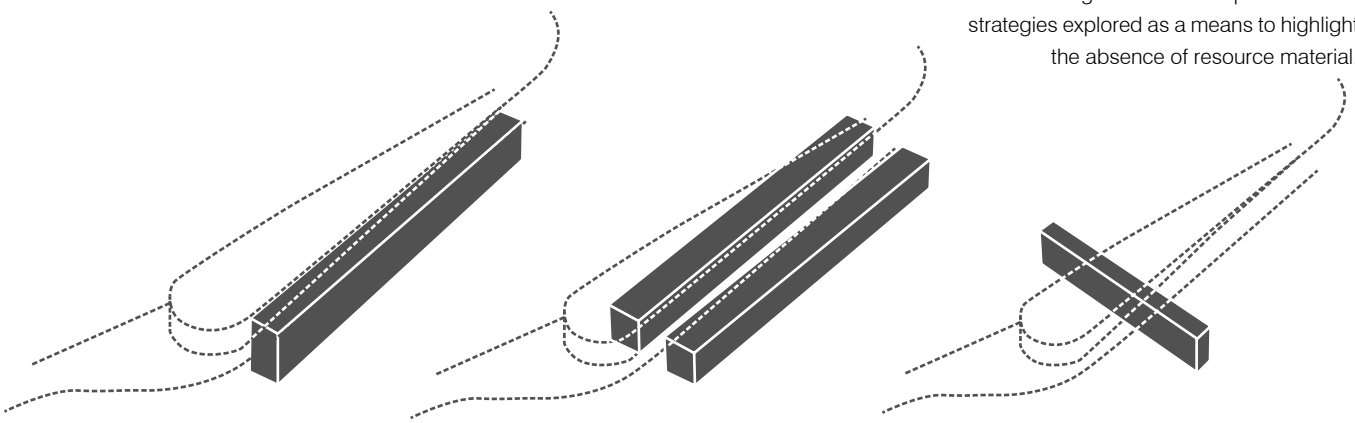
2
INTERPRETIVE CENTRE

1	RECEPTION
2	RECEPTION DESK
3	STAFF ROOM
4	MECHANICAL + ELECTRICAL
5	WASTE
6	JANITOR
7	CLASSROOM /ACTIVIY SPACE
8	DISPLAY
9	OFFICE
10	OPEN OFFICES
11	KITCHENETTE
12	CHAIR STORAGE
13	CONFERENCE/ MEETING/ EVENT SPACE
14	MUDROOM
15	STORAGE

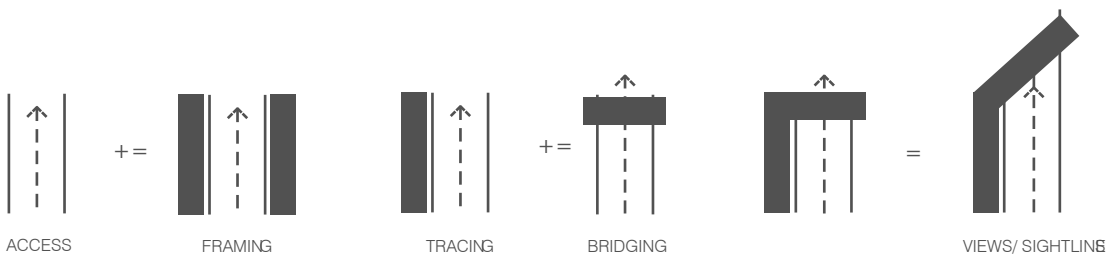
Note

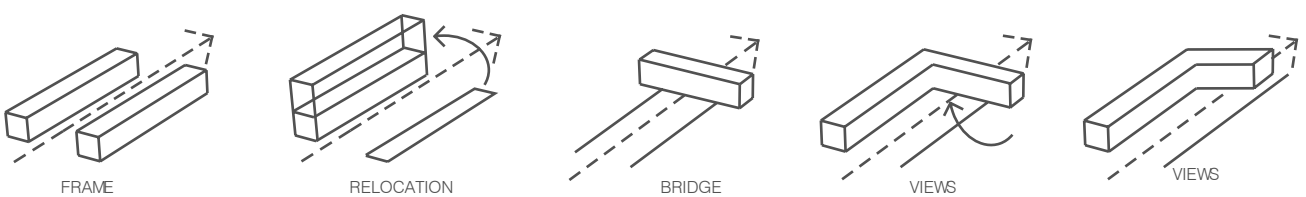
The following images and drawings were produced in part of an interim presentation (December 2013). The design work presented here provides the foundation for the final thesis project.

The following illustrations represent initial strategies explored as a means to highlight the absence of resource material.

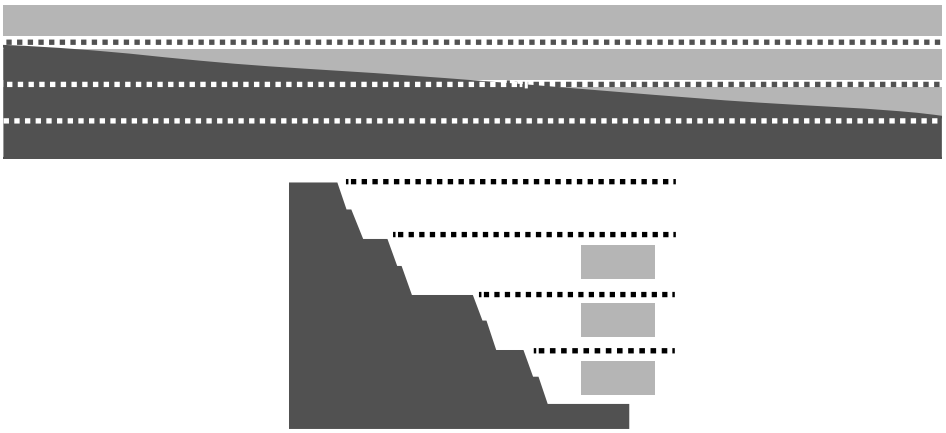


In consideration of these strategies, form was generated through a series of transformations beginning first with framing the void. This formal exploration acts as the foundation for all future design work

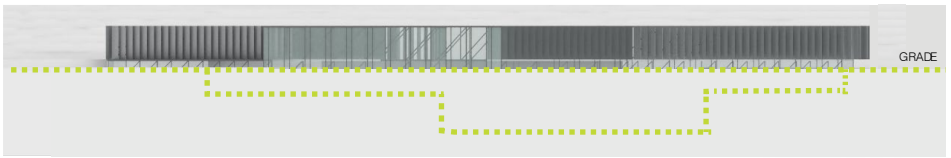




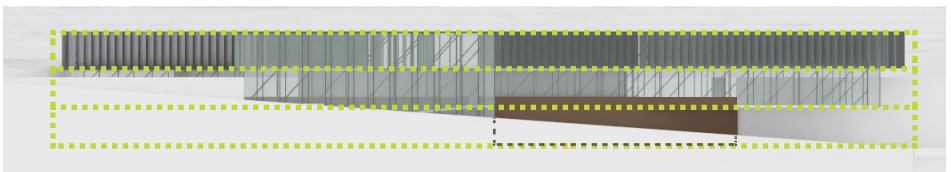
Here form is intentionally aligned with the existing topographic lines found in the landscape, particularly those formed in part of extractive processes. While this design move has remained consistent throughout the design process, this was first performed as a means of emphasizing the horizontal character of the land.

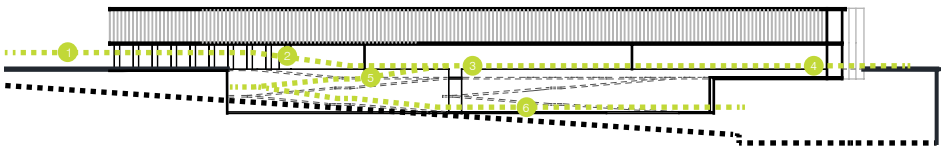


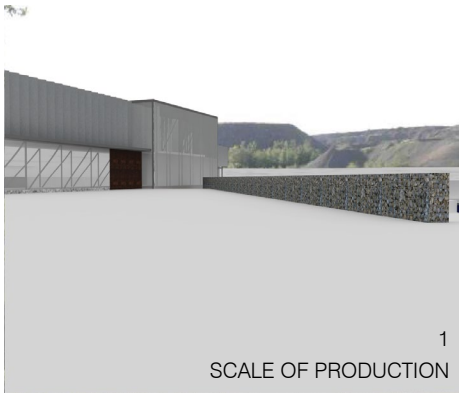
Contributing to this is the insertion of form into the landscape.

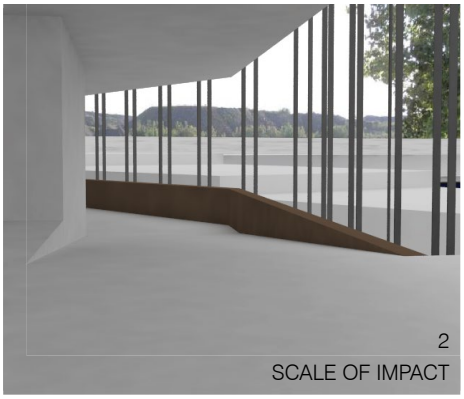


In addition to materiality, scale and proportion were first investigated a means to provide a sense of scale and measure to post-extraction conditions



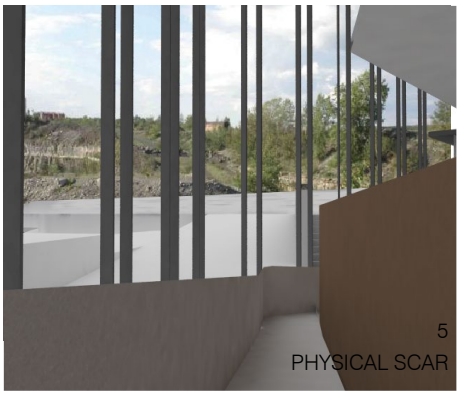



1
SCALE OF PRODUCTION


2
SCALE OF IMPACT


3
SCALE OF IMPACT


4
WASTE MATERIALS


5
PHYSICAL SCAR

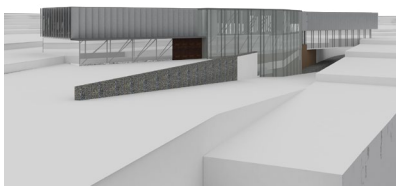

6
PHYSICAL SCAR

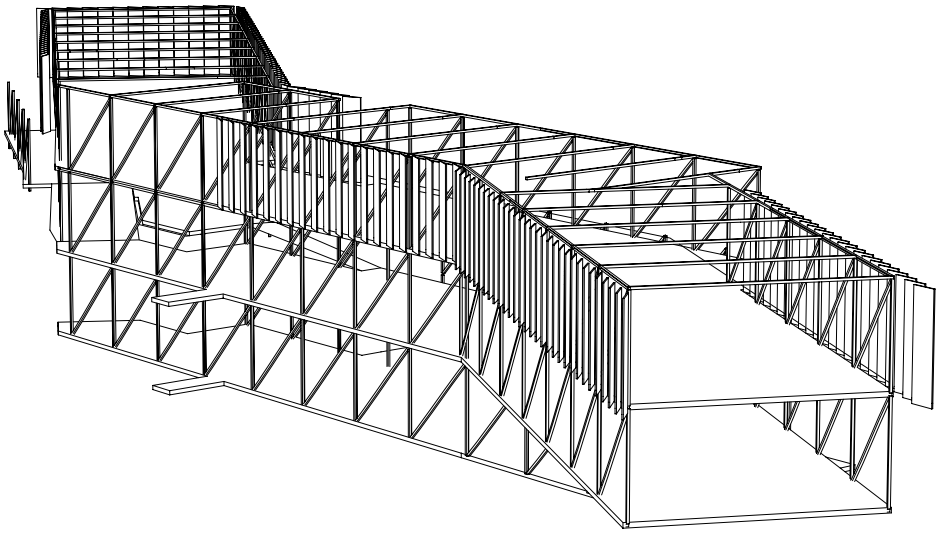
Much like the final desgn response, narrative strategies, primarily curated or sequential experience were investigated as the primary means of framing the conditions and character of place.The architectural narrative presented here is such that users are intended to engage with existing landscape condition at a variety of scales. This is broken down into four scalar conditions - frist the scale of production, the scale of devestation, the amount of waste left on site and the immediate scar of extraction itself - all of which have been framed through views and experience

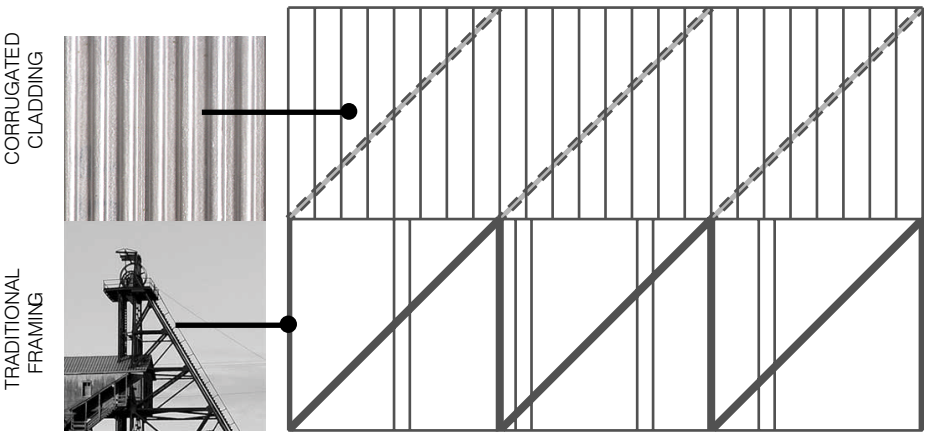
Additional gestures that play into the idea of narrative in this design iteration are both the facade and structure.

In this design, the top floors were transparent, shaded by vertical fins. While performative, these shades were intended to evoke the pattern of corrugated cladding traditionally used for the construction of utilitarian structures. Next is the open steel frame structure visible from both the interior and exterior, again, making reference to the industrial nature of the site and its former occupation.

While the desire to reference the history of place has remained consistent through the design process, it has been executed in a much more subtle way (i.e. materiality rather than overt formal gestures).

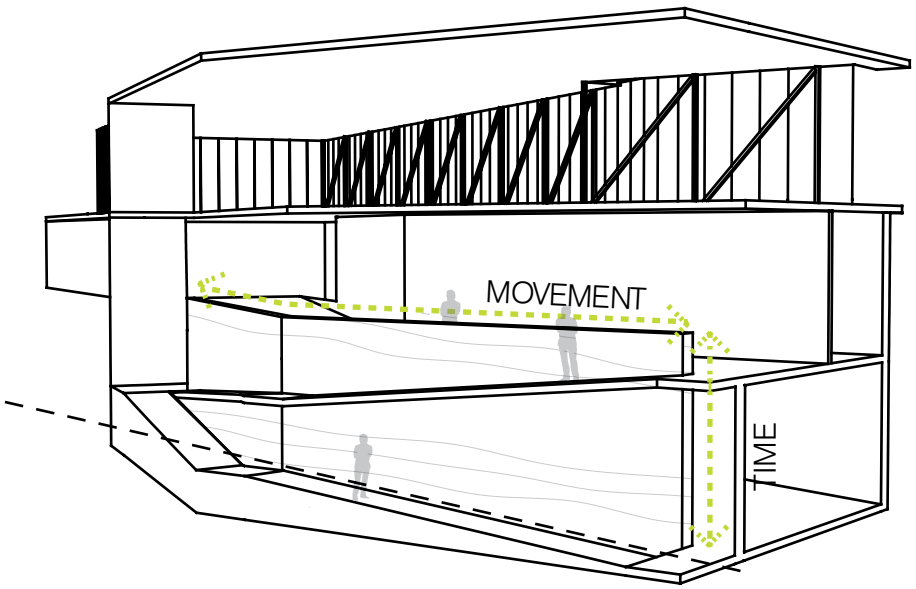


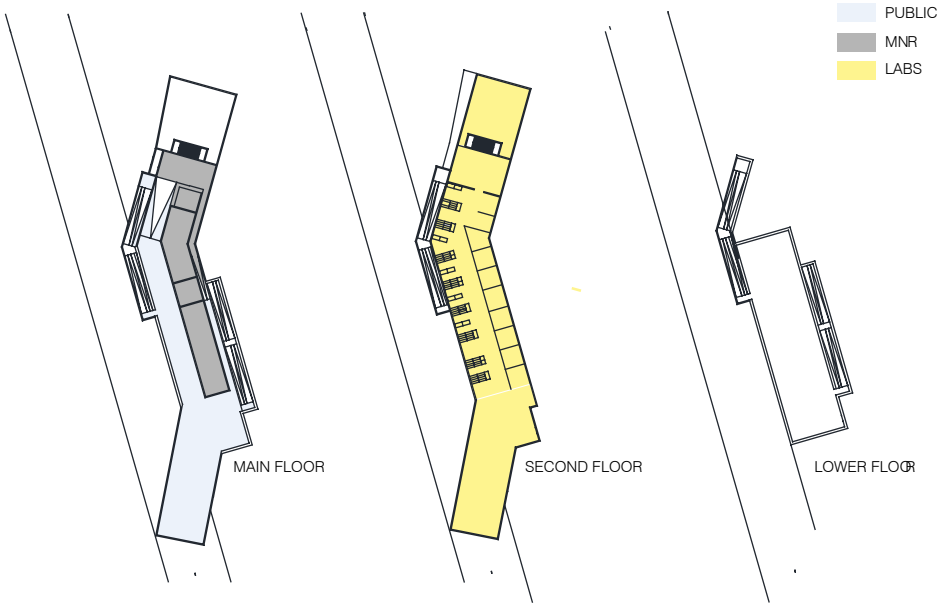




Displayed in the illustration here is a ramp that provides access to the lower floors of the structure. Situated alongside a pre-existing perimiter wall individuals are exposed to the sedimented land. This gesture was intended to not only reference the mutability of landforms, accentuating one`s descent into space, but provide an opportunity for users to engage in the temporal aspects of place.

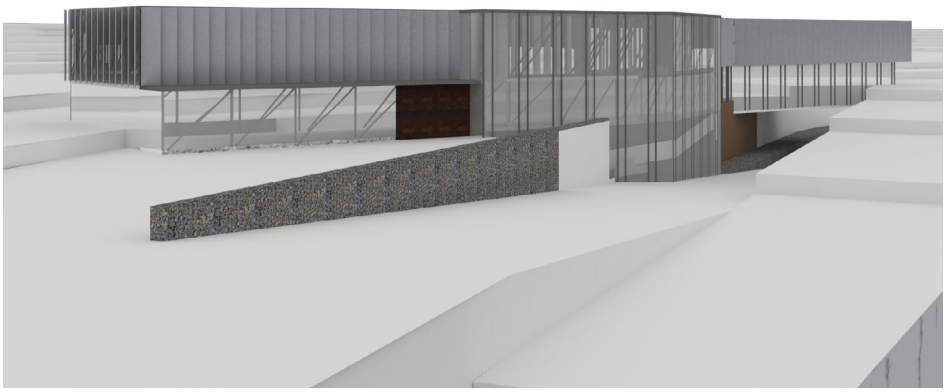
Overt in how users were to read and experience the temporal aspects of the site, the final design makes more subtle references to time through space, form and materiality, while also preserving views of the sedimented land as a means for users to read and engage in the temporal aspects of the site.

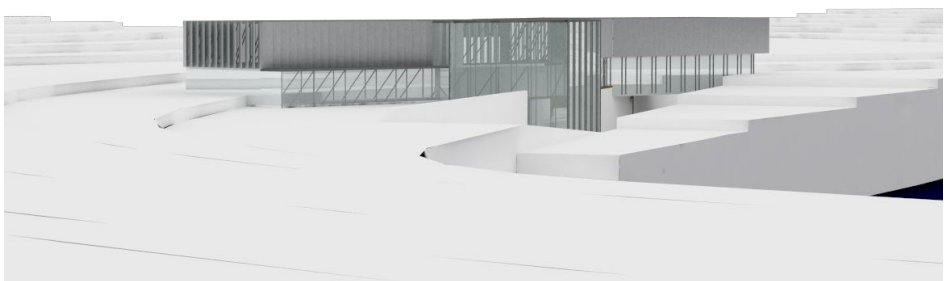




Displayed here are the floor plans developed in part of this design iteration. Although relatively simplistic, the plans presented here provide the foundation for future development. The most significant difference between the plans presented here and those in the final design is the programming and its distribution where labs were initially explored and located on the uppermost floor, while offices allocated for use by the Ministry of Natural Resources were located on the main floor with only the remaining space housing the interpretive centre.

Shown here are exterior perspectives produced at an earlier stage in design development (December 2013).





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