EROSION

DESIGNING WITH MATERIALITY IN IMPERMANENT LANDSCAPES

by
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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.
I understand that my thesis may be made electronically available to the public.

Abstract

Using the Buddhist notion that we conceive of time through observing change, this thesis attempts to answer the question 'how can we create the sensation of time in architecture?' It is important to acknowledge the fact that buildings will change over time. No building is above aging. "The transformation of a building's surface can... be positive in that it can allow one to recognize the necessity of change, and to resist the desire to overcome fate."[1]

To the modern movement, water stains and eroded edges are a tragic vandalism of the original design. Alternatively, this 'destruction' of architecture reminds us that materials are alive and changing. What we see is the impermanence of all things. A material will eventually return to its source. The death of one body is essential for the birth of another.

The thesis investigates impermanence in architecture through a four part studio: Studio 1 'Beginning Again' recounts the thoughts and theory behind the thesis. Studio 2 'Studies in Process' explores the balance between control and surrender through experimentation with the casting process. Studio 3 'Studying Site' engages with the Cheltenham Badlands through aerial photography, site sketches, and scientific studies. Studio 4 'Building on an Eroding Landscape' concludes the thesis with the development of a design methodology and a final proposition for the badlands. The architecture attempts to engage visitors with the materiality of the landscape and the ongoing processes which form it.

Designing through process rather than form, the thesis challenges the ego of the architect. I have found that letting go of some control and thinking through making has informed and inspired an approach to design that decentralizes the desires of the architect. Submaking (where willful control and surrender occur in the same place and at the same time) has revitalized my desire to make with time.

1 Mostafavi, Mohsen, and David Leatherbarrow. *On Weathering: The Life of Buildings in Time*. Cambridge, MA: MIT, 1993. Print.

Acknowledgements

To all the professors who loved my work, even when I did not. Matthew Spremulli, for encouraging me through the first steps when I was too depressed to try. I truly appreciate how you listened. Ryszard Sliwka, for finding me hiding somewhere in the school when I didn't want to talk. Andrew Levitt, for somehow being both a motivating pressure and an encouraging sage. I could not have done this without you. Anne Bordeleau, for not accepting anything but my best work, and for igniting in me a love of making. Jane Hutton, for your joy and enthusiasm during the final steps. You lifted my spirits and gave me direction.

To my external reader, Fred Thompson, thank you for inspiring and nourishing the side of me that wants to build cathedrals and speak from the heart. I hope I can continue to share with you.

To the UWSA, I hope this is not goodbye.

To my friends, for being my family, and for being young and stupid with me.

To my family, for always wanting to love each other more each day. I will not shy away.

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"It was a most extraordinary and terrifying sight. The floor consisted of some greyish material, glazed and shiny, which rose and fell in slow palpitation. The throbs were not direct, but gave the impression of a gentle ripple or rhythm, which ran across the surface. This surface itself was not entirely homogeneous, but beneath it, seen as through ground glass, there were dim whitish patches or vacuoles, which varied constantly in shape and size. We stood all three gazing spell-bound at this extraordinary sight."

Sir Arthur Conan Doyle – When the Earth Screamed, p. 22

fig 0.01 *Cheltenham Badlands* Parched, cracking, permeable earth

Introduction

FROM BELOW

I come up from below, as you dig down into.

I see everything from here:
the water that moves me,
the air that lifts off and flies out,
and the sun whose warmth moves like you do, down into life.

When you grow tired trying to lift off and fly upright, return to me.
Come back, ground yourself, rest on my shoulder.
I will dissipate your weight.

If you are brave enough, then go deeper. I am much more than this eroded surface.
I am filled with the dance of difference, with the play of imperfection.
Down here, everything is brought together, nothing is far apart.
A thousand differences makeup one small graft of skin, and millions makeup a mass of material.

I have a "both/and" philosophy.
I accept the black, the white, the red, the brown; all is one.
I am the support, the base, the ground.

I am the inevitable earth.

fig 0.02 *Cheltenham Badlands* facing west from the upper viewing area

"Architecture is situated between the biological and the geological - slower than living things but faster than the underlying geology. Resistance and change are both at work in the landscape: the hardness of the rock *and* the fluid adaptability of living things."

Stan Allen, *Landform Building*

fig 0.03 *Cheltenham Badlands* the traces of streams of water travelling from high ground to low land

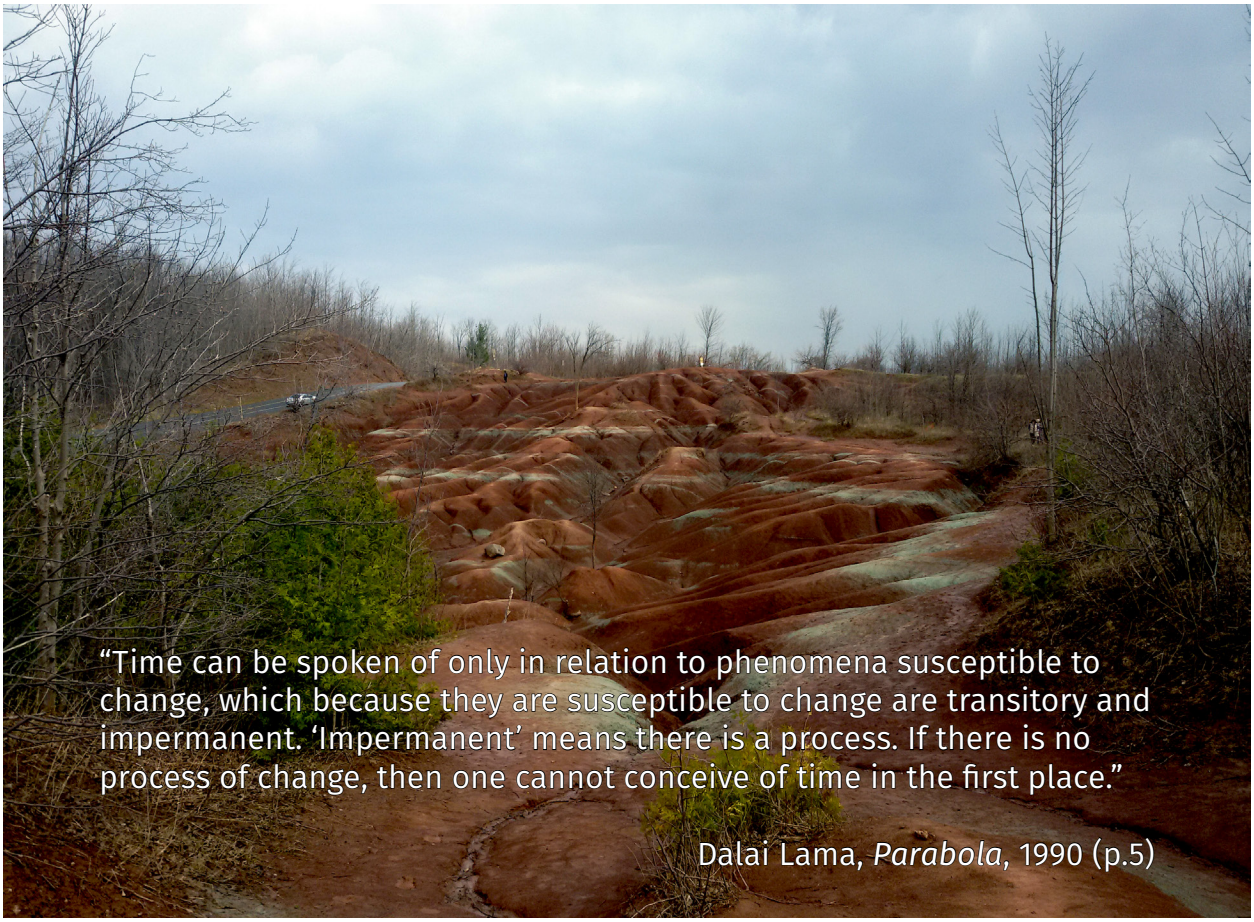

fig 0.04 *Cheltenham Badlands* view from the lower end of the badlands, looking east

fig 0.05 *Cheltenham Badlands* bedrock of queenston shale, transformed by erosion, with veins of green iron oxide running through it

I am more than matter. I am a slow force. I am material.

I am moving and being moved.
Life is pulled up from me, and yearns for its return.

You started from below, climbing through leaps and flights.
Now you move quickly, leaving nimble footprints.
You tend to leap ahead into the future. When will you surrender?
When will you dance in the unity of all things,
in the cycle of life, death, and rebirth.

If you only see the apparent fixity of forms,
be patient, take root, feel the slow formative forces,
gravity, weight, internal pressure.
These are the forces of my material, the hard movements and the fluid shifts.
If you wait long enough, you will feel my restlessness.

But do not be fooled.
Time is different for us.

fig 0.06 *Cheltenham Badlands* looking north tourwards the road from a rogue trail


“This is mortality: to move along a rectilinear line in a universe where everything, if it moves at all, moves in a cyclical order.”
Hannah Arendt, *The Human Condition*

fig 0.07 *Cheltenham Badlands* invited landscape architects on a site tour

You take photographs and put me into landscape images,
documenting, appreciating color, form.
Focusing on my extensive body of lengths, areas, and volumes,
you build a topographic understanding of the "badlands feature."

Why are the earth beneath the grass and the trees not included in who I am?
These plants have grown on my back,
protecting the shale which you now value.
I extend much farther than a camera can see,
but in this place, where the trees have been stripped off my back,
I lie open and exposed.

It's quite ironic, wanting to preserve this form after cleaving away all the plants that held me together.

Within my extensive body, resides intensive force.
You have lost touch with this world because it is abstract to your senses.

You can perceive it through the eroded traces of my dance with water.
You can begin to imagine cyclical time and impermanence.

People have found it before, through a fascination with what lies behind ordinary appearances.
They have surrendered to life, death, and time.

fig 0.08 *Cheltenham Badlands* view of the upper viewing area, rain water moves down from here

fig 0.09 *Cheltenham Badlands* one little patch of earth, clay and shale, blue and orange, both/and

fig 1.01 *Traces* Vaseline and silicone marks on the base that I use for casting

Beginning Again

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destruction is necessary for construction — ordering chaos — presence — awareness — awaiting inspiration — process — discovery — uncertainty — creativity — take chances — make mistakes — get messy

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March 13, 2016 My model making desk in a creative state

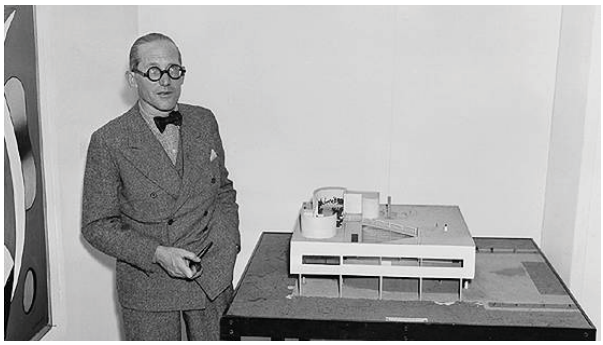


fig. 1.03 *1928 Original Design*

fig. 1.04 *1931 Built*

fig. 1.05 *1965 Abused*

fig. 1.06 *1997- Restored*

IMPERMANENCE AS PROCESS

In the 1970s, the Villa Savoye was faithfully restored to Le Corbusier's design as if a time warp had occurred. Now a museum with listed status, the villa exists as a simulacrum of Le Corbusier's original plans with all traces of the intervening years totally erased. This attitude of timeless design and preservation rejects the lived experience of the building, erasing the physical marks of its social and material life.

Life, to this building, or more accurately to this design, is through preservation. Time, to this design, is not a line, or a circle, but an eternal point. Time, as a force external to the design, is abusive. In 1965 the Villa Savoye was quite bruised.

To accept that the growth of life will borrow this structure is unthinkable. It would be abandonment, and neglect to release the Villa Savoye to the uncertainties of time. And so, we preserve it. I ask, by maintaining the building, what do we take away?

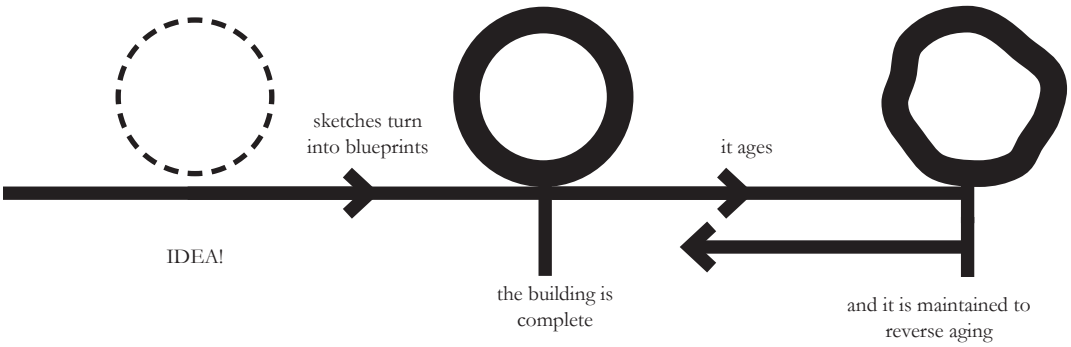
Though I seem to advocate for a 'let it be' mentality (acceptance of weathering rather than maintenance), I understand the cultural value of preservation. Some things are precious, rare, vulnerable, and loved. They enter into our value system, and it is right to preserve things that are cultural significant. Preservation can have a double personality, at once mired in tradition/stuck in the past, but also a keeper of things that would otherwise be carelessly lost. In this thesis, I explore a different relationship to the design and construction of architecture, where the architect embraces uncertainty and change, and makes a friend of constructive time.

"Is "death a birthright" for objects, symbols, and ideas just as it is for living creatures? To me this question also ties into [Mostafavi and Leatherbarrow's] comparison of a building's life to that of a human and the ways in which experiences and the passage of time builds upon and mark a being so that every past stage remains in the present. With people, we talk negatively about things like baggage and scars, but we also value experience and wisdom that time brings. How could we apply this same thinking to architecture? Does weathering grant a certain memorial authenticity to a surface?"

Hannah Sheldon-Dean, http://www.brown.edu/Departments/Joukowsky_Institute/courses/architectureandmemory/8274.html, 2009

FIXED IMAGE
Duration through maintenance

Time in the fixed model of architecture leads to damage, baggage, scars, and vandalism ruining the original design



IMPERMANENT MODEL
Duration through change

Time in the impermanent model of architecture leads to the accumulation of imperfections, experience, and wisdom through weathering

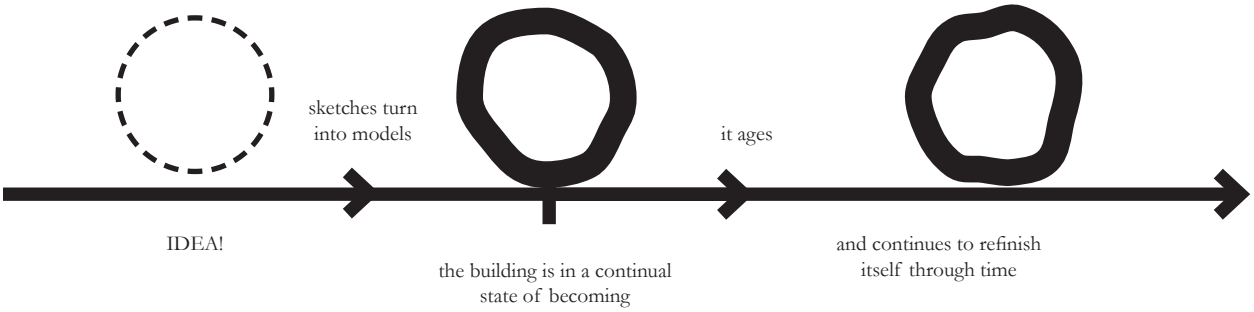


fig 1.07 *Two Modes of Design*

If architecture is conceived with a fixed image, it will require maintenance and replacement to maintain its aesthetic value. If architecture is conceived as an impermanent, living thing, then its aesthetics are in the appearance of its aging

Impermanence is sometimes liberating, sometimes heartbreaking, but it is always there. Nothing is permanent, and this truth is better accepted than denied.

The experience of impermanence is an important part of understanding life. It grounds us firmly, momentarily, in bare life. Being right here, right now, is not only an important break from the pace of a productive society, but also essential to the experience of architecture.

How does architecture create this sensation of time in us? Is it simply the people who are not present, and therefore unable to pay attention to their environment? Or is there an architecture that embraces, and enchants us, that slows us down to a pace more in line with its own?

The relationship that a building has with time is a designed relationship. If an architect lets go of control over some aspects of a building, and accepts that architecture causes and accelerates un-designed changes, then a building can age without appearing neglected. The architect must leave space in the design for imperfections to arise.

"With the change, there comes something particularly needed by the human spirit — an affirmation of that eternal change in nature which rules out stagnancy, and the appearance of the entirely new within the pattern of the old… I suspect that in human existence our problem is the finding of some like harmony between what is fixed and of the pattern and what is untried and eager to be born."

Henry Beston, *Northern Farm*

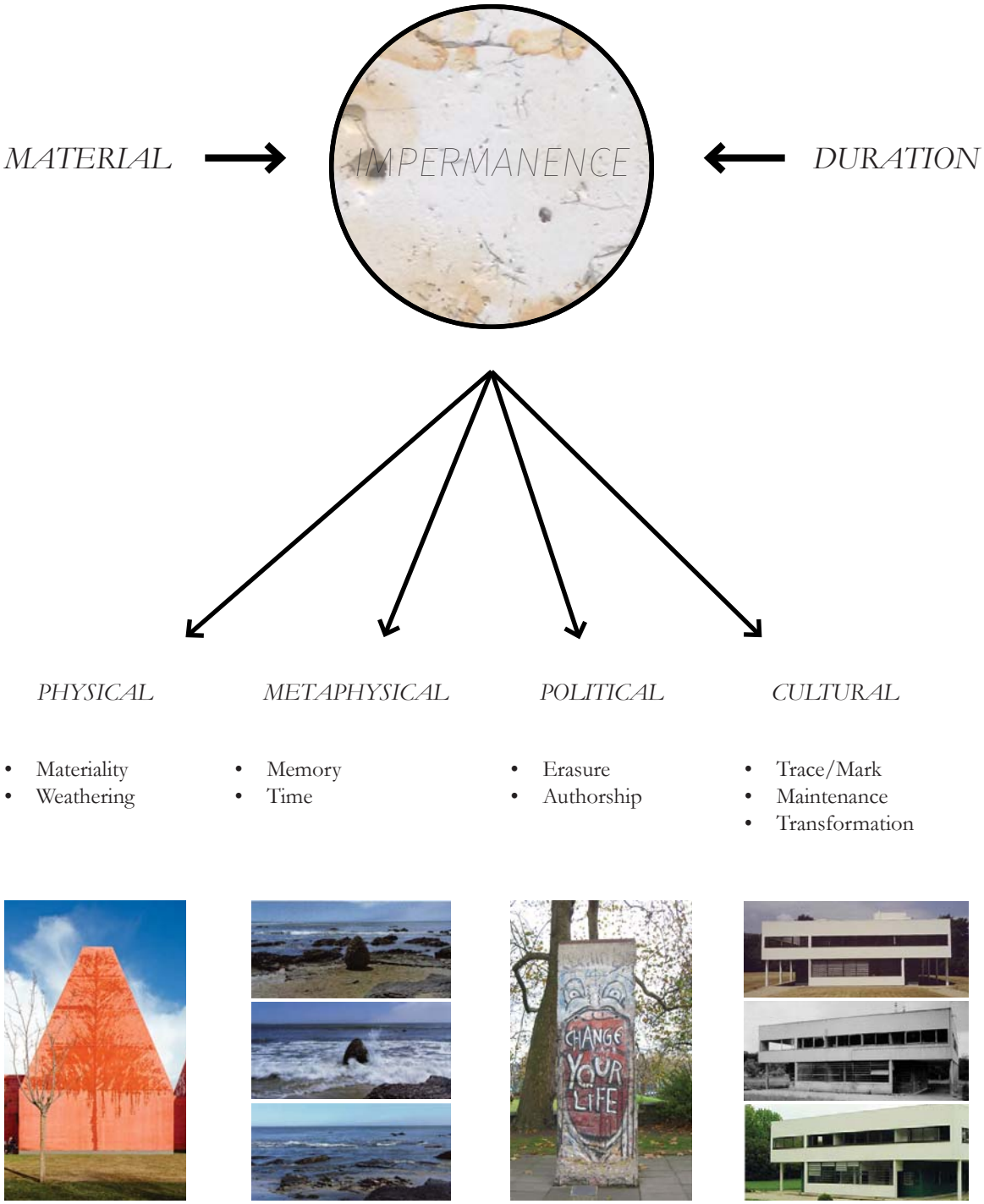


fig 1.08 *Dimensions of Impermanence*

In their book, *On Weathering*, Mohsen Mostafavi and David Leatherbarrow write about how weathering is a valuable reminder of change. This is a fair response to the question 'what is taken away from architecture through maintenance?' From a preservation standpoint, we take away damage that threatens to ruin architecture if left to compound. On the other hand, we take away this valuable reminder of the necessity and inevitability of change.

Mostafavi and Leatherbarrow only write about the value of weathering in so far as it reminds humans of the changing nature of matter and of the eventual dissolution of a body. Is this the limit of the value of weathering, or more broadly of architecture that is designed to allow change? Is an architecture that does not suffer from stains but rather paints itself with rain simply a reminder of death?

"The transformation of a building's surface can also be positive in that it can allow one to recognize the necessity of change, and to resist the desire to overcome fate" (p.120)

"The value, then, of works that suffer stains and abrasions is the revelation of the eventuality of this final justice" (p.69)

David Leatherbarrow and Mohsen Mostafavi, *On Weathering*

fig 1.09 *Site Sketch*

a creek trail
through the cat-tail
marsh
a crumbling wall

THE LIFE OF MATERIALS

When present and aware, we start to notice the mundane details that, in our haste, are overlooked. These 'obvious qualities' express their internal power, and a thing becomes a power in a larger assemblage of thing-powers.[1] This state of mind is important to the world view of Buddhist philosophy, of a continuous exchange of energy between all bodies; of a deeply interconnected universe, both chemically and consciously. I think perceiving bodies as discrete things can lead to a personal feeling of isolation, a disconnected daily routine, and the idea that something far away does not effect us locally.

Enchantment, as described by Thomas Moore in *The Re-enchantment of Everyday Life* and by Jane Bennett in *Vibrant Matter*, is when we break out of habitual haste through delight or disturbance. It is a feeling produced by the agency of things; a state of suspended suspicion. Enchantment is an important everyday experience that brings us closer to the beauty within the mundane. Though it can lead to clinging to beauty, it can also open us up to experiencing, appreciating, and letting go. It all depends on our relationship with impermanence. We must not desperately cling to things, because in that moment we separate ourselves from them, objectifying them as something to preserve, rather than something to come in contact with.

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1 Jane Bennett, *Vibrant Matter,* p. 2

"There is a secret bond between slowness and memory, between speed and forgetting. Consider this utterly commonplace situation: A man is walking down the street. At a certain moment, he tries to recall something, but the recollection escapes him. Automatically, he slows down. Meanwhile, a person who wants to forget a disagreeable incident he has just lived through starts unconsciously to speed up his pace, as if he were trying to distance himself from a thing still too close to him in time.

In existential mathematics, that experience takes the form of two basic equations: the degree of slowness is directly proportional to the intensity of memory; the degree of speed is directly proportional to the intensity of forgetting."

Milan Kundera, *Slowness*

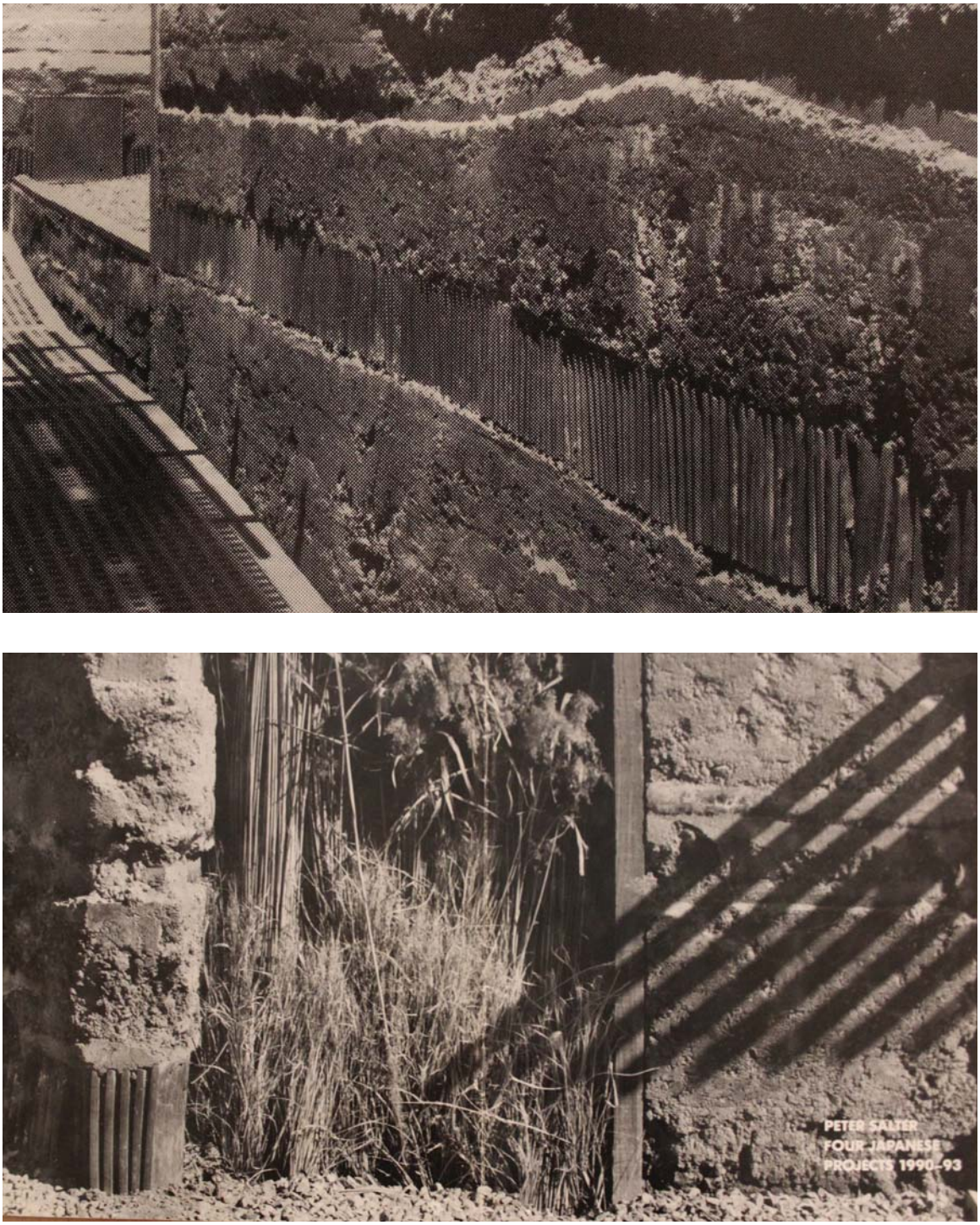

fig 1.10 - 1.11 *Peter Salter, Four Japanese Projects 1990-93*

Our sense of change is tied to how present and aware we are. We cannot perceive change without the patience to observe through time. This sense of change, of phenomena unfolding, may develop into a meaningful encounter with the simple existence of the world around us. This experience takes patience and time.

Our sense of change is influenced primarily by the time-scale in which we live, as human bodies of flesh, blood, and bone. Time is perceived through the change of physical things. Sense perceptions exist in the present moment, but extend into a sense of time when we take a slower pace and perceive the unfolding of difference. Real-time, for the human eye, exists within 60 rotations per minute. Anything faster is perceived as instantaneous jumps between states. A flash, pop, or explosion that needs to be recorded and slowed down so that we can see change unfolding. On the other extreme, when things change too slowly (as with mountains, or flowers blooming) we see change as subtle differences with more-than-human time between them. Thus, meditation (staying present for long periods of time, and watching fast and slow change unfold) is a good tool for developing the connection to our ever changing world.

"We are living in a culture entirely hypnotized by the illusion of time, in which the so-called present moment is felt as nothing but an infinitesimal hairline between an all-powerfully causative past and an absorbingly important future. We have no present. Our consciousness is almost completely preoccupied with memory and expectation. We do not realize that there never was, is, nor will be any other experience than present experience. We are therefore out of touch with reality. We confuse the world as talked about, described, and measured with the world which actually is."

Alan Watts

fig 1.12 *Umwelt* Stills from a short film by Yoshiyuki Katayama.

Phenomena outside the speed range of our bodies become imperceptible (if not for cameras that can speed up and slow down, and lenses that zoom in and out). Not to say that we only sense time visually; we perceive it with all our senses, some are just tied more to present lived experience while others can be mediated by lenses and recordings, stretching and compressing time. We often perceive of time by observing two distinct states, our imaginations filling in the movements in between. For instance, we rarely see the unfolding of a flower (one day it was a bud, and the next it has bloomed). A glimpse, a snapshot, can lead us to perceive stillness and permanence where there is actually slow change. If you wait long enough, fluidity will begin to have a tangible presence.

At our speed, we only experience the apparent fixity of forms, imagining its fluidity in time. The distinction we make in our minds between a thing that is slowly changing and a thing that is unchanging depends upon how open we are to the objectified surprising us with its subjectivity. Mount Everest has risen 8 meters over the span of 160 years (since 1856).[1] It too is in a state of flux, still becoming-mountain. However, that quantity of change is so slow relative to us, that we don't perceive a phenomena. The mountain is known (and has for many centuries before its English naming) as *Chomolangma* (Mother Goddess Of Our World).[2] It has been a more-than-human power long before it has been a namesake. I urge us to continue to think/feel the reverberations from its beginnings 60 millions years ago as a tectonic collision of the India and Asia continental shelf.[3] Geological time works with the slow formative forces of pressure and tectonic shift. These are material forces, the hard movements and the fluid shifts that lie behind the apparently fixed face.

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1 Great Trigonometrical Survey of India 1802-1871, http://news.bbc.co.uk/2/hi/south_asia/8608913.stm

2 http://www.everestian.com/mt-everest-en.html

3 http://www.everestian.com/mt-everest-en.html

"You count the centuries, [and] I blink my eyes."

Bjork - *Oceania*

fig 1.13-1.14 *The First Cup*

The first two casts that I made for this thesis. To make the first model (top image), I covered my hands in Vaseline and iron powder, and then had a friend pour plaster into my cupped hands. The second (bottom image) was the exact same process, except my hands were covered in talcum powder

THINKING THROUGH MATERIALITY

Materiality challenges the top-down convention of form imposed on passive matter. A top-down approach to design determines the form of the building before determining the medium (material) of the building. It is important to not design away all the wildness of a material by imposing a perfect form onto it. Is our desire for a specific form-fate superceding the material's own form-fate?[1]

Materiality is simply defined as the aliveness of matter. Matter has its own force, its own will and fate. To say that force possesses matter and matter awaits possession by force reinforces the idea of matter as a passive and inert substance. Materiality is more than the physical, chemical, mechanical perception of matter. It is the metaphysical reality of matter as alive, as a terrestrial substance that is both possessed by force and alive with its own vibrancy.

I want to play the game of tricking the mind to see 'dead' material come alive, to see its living restlessness, its will-to-form.[2] The empirical truth of matter's chemical restlessness is usually at a size and time-scale different from our own. If we see time through the differences between states, how do we perceive a material's aliveness?

1 Mark West, *The Fore Cast*, p. 134
2 ibid, p. 134

"Understanding all matter as 'living' is, in part, a game. It is a trick of the mind to see a 'dead' material (graphite or concrete, for instance) come alive, restless with its own desires and will-to-form or form-fate. But it is not simply a game of pretend. Putatively 'dead' matter can be understood in an entirely objective sense as truly alive. For this we can refer to the ferocious empiricism of Teilhard de Chardin's physics, where he observes that all matter is everywhere prodigiously active, organized as a kind of protolife (and for Chardin, a protoconsciousness). The truth of this is seen every day in matter's chemical restlessness: the rusting of iron, the peeling of paint, the decanting of odors, all the result of restless and incessant material (molecular) action, though usually at size and timescales far different from our own."

Mark West, *The Fore Cast,* 2012 (p.134)

fig 1.15-1.16 *Intensities of Plaster and Iron*

The second set of models I made. The first (top image) was done in three plaster pours: one just plaster, the next plaster mixed with iron dust, and the last was steel wool placed inside the mold and plaster poured in over it. The second (bottom image) was a mold filled with steel wool and then filled with plaster.

I started model-making to gain an understanding of materiality, in order to design *with* materials. Through a dialogue between idea and making, one encounters external creative forces (resistance, translation/transformation, and efficacy).

My first models aim to show how surface weathering is a dialogue between materiality and environment (the surface of the wall rusts as the steel oxidizes under the exothermic and evaporative hardening process of plaster).

Model making helped me focus on *process* as a way to include materiality into design. Materiality inspired and influenced every model's formation. The form that the model takes, is part my will and part material will. I try to restrict the material to a defined space, but within that space the material can act out its own desires.

Casting is of particular interest for two reasons. One, the process of casting reproduces form, but when you encourage material will, the same process will reproduce form with difference. Two, Casting is a liquid to solid process. I set out a process which would capture the fluidity of stone. Casting in a way that makes this fluid-static tension visible may inspire the perception of objects as living materials.

"All matter is... **active**...the truth of this can be seen everyday in matter's c**hemical restlessness**: the rusting of iron, the peeling of paint, the decanting of odors, all the result of restless and **incessant material** (molecular) **action**."

Mark West, *The Fore Cast*, 2012 (p.134)

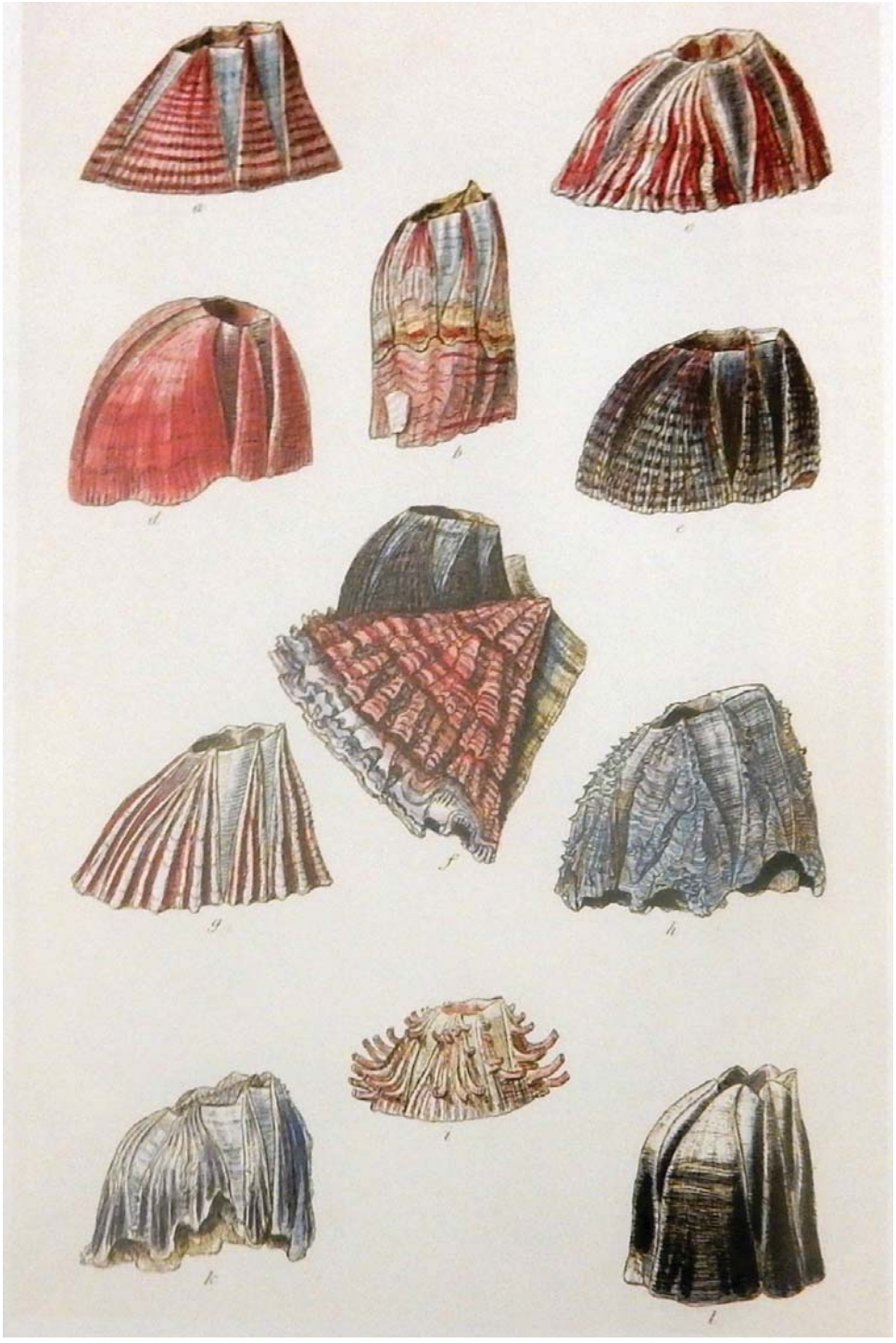

fig 1.17 *Balanus Tintinnabulum* A barnacle, which Darwin found to be the most variable species in its genus.

Darwin helped me understand my models and their iterations as 'species.'

This image (fig. 1.17) from *On the Origin of Species* captures the beauty of repetition with difference. There is a general logic to the barnacles growth. What is the logic of their differences? There is no concrete answer to why there is so much variety within one species because it is a combination of many forces, varying in degree over time. Understanding the 'why' of difference would help inform a design methodology focused on achieving formal variance, but I think this approach misses the point. Variance is a result, a natural outcome, of a porous approach to design. There are many wills at play in the process of something emerging, and in the becoming reality of that thing. That is to say, form is the natural outcome of a process, and is never fixed. Darwin's study of variance reveals the creative potential of iterative evolution through the interaction of internal and externals forces (material and environment).

"The term ' variety' is... difficult to define; but here community of descent is almost universally implied, though it can rarely be proved. We have also what are called monstrosities; but they graduate into varieties. By a monstrosity I presume is meant some considerable deviation of structure in one part, either injurious to or not useful to the species, and not general propagated. Some authors use the term 'variation' in a technical sense, as implying modification directly due to the physical conditions of life; and 'variations' in this sense are supposed not to be inherited: but who can say that the warped condition of shells in the brackish waters of the Baltic, or dwarfed plants on Alpine summits, or the thicker fur of an animal from far northwards, would not in some cases be inherited for at least some few generations? And in this case I presume that the form would be called a variety."

- Charles Darwin, *On The Origin of Species*

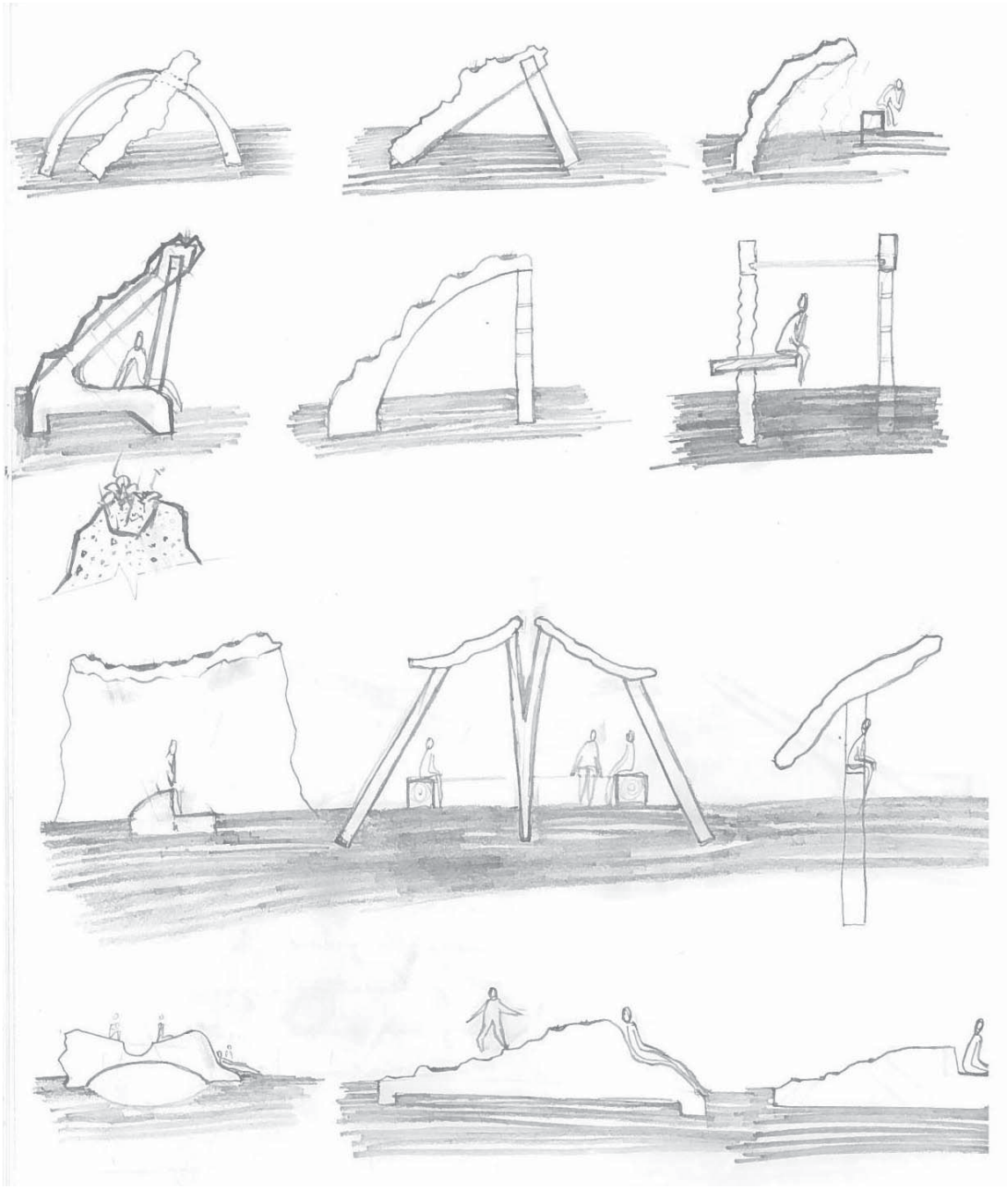

fig 1.18 *Infinite Sketches*

I attempted to design a viewing shelter through iterative sketching. This exercise revealed to me, the desire to include indents that hold water, and perhaps hold plants, but this concept alone is not enough to design with. Indents can exist in many forms and through many materials.

On paper, there is an infinite potential for design variations (infinite within the realm of pencil and paper). This left me wondering, how and why do I make design decisions? Without the constraints of human and material will, there is little to base form on. I thought to make models that are as much a reflection of the my desires as they are a reflection of the self-organizational tendencies of materials, or assemblages of materials. Doing this, I was able to focus on the infinite variations within a physical, three dimensional, situation.

As I transformed my sketches into physical models, I reflected on the materials used. I was transforming them, not from a dormant to an active state, but from one form into another. The unmaking of the raw material feeds the making of the models, and vice versa. This collusion of opposing forces, of construction through a destructive process, I call *submaking*.[1] Submaking does not only acknowledge and accept the inconstancy of matter. It directs this life-principle into a design methodology that shifts creative focuses to the process of creation, rather than the final form. The architects craft in submaking is learning "how and when to get out of the way, how to make a space of action in which materials can self-organise their own shape of resistance unmolested by human will."[2]

1 inspired by David Gissen's concept of *subnature*
2 Mark West, *The Fore Cast*, p.139

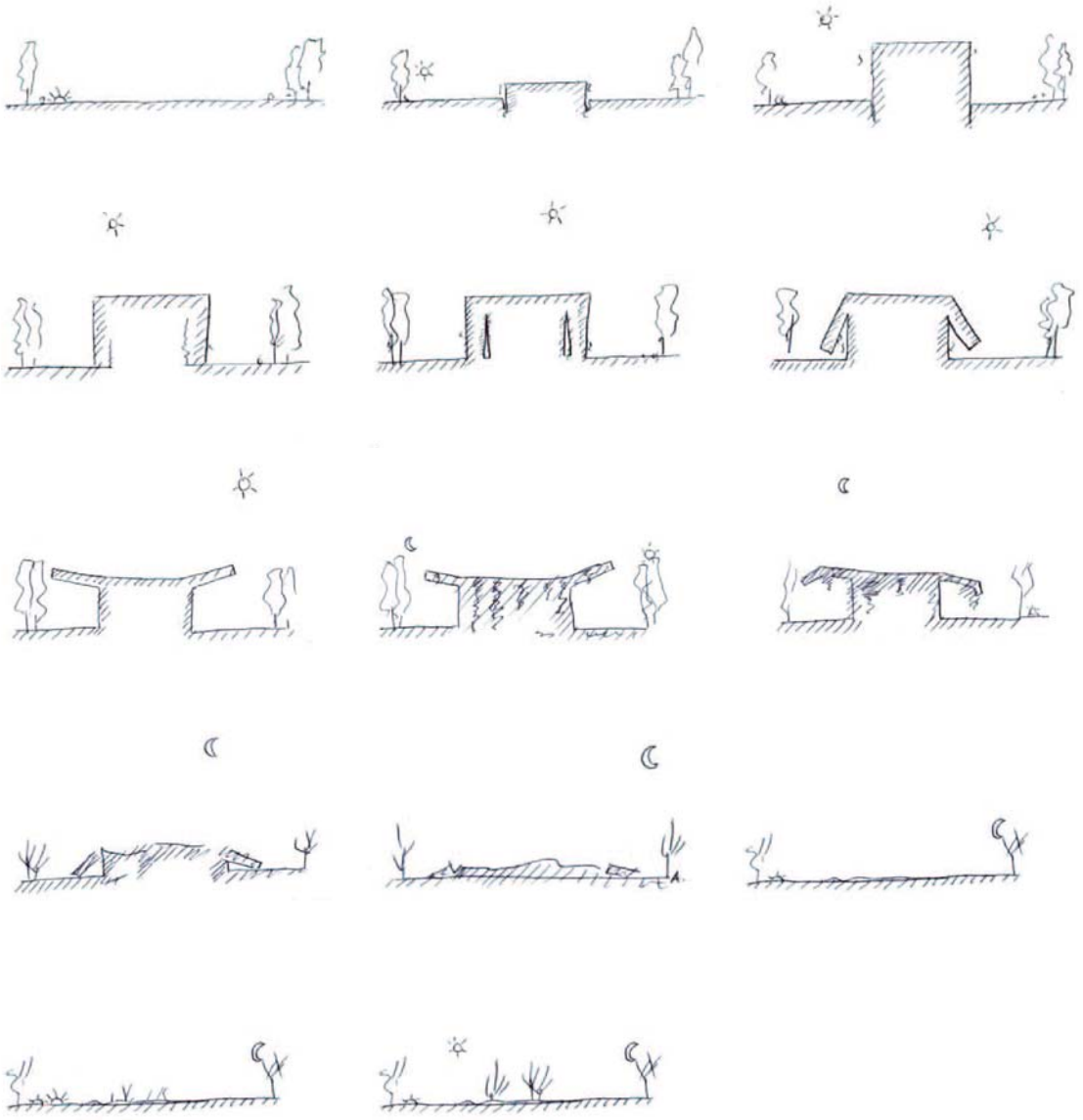

fig 1.19 *The Life of Architecture and Beyond*

This series of sketches, done by Natacha Bauer, Svend Reymond, and Arnaud Bovet, depicts the life and death of Herzog & DeMeuron's Ricola Packaging and Distribution Center.

Monism can be a way of thinking about materials and architecture, akin to sustainability (cradle-to-cradle), the dissolution of a construction over time, and about the source (what is being reformed/transformed into a new construction).

"Ontologically one, formally diverse"[1] is a philosophy aligned with the science of atoms, particles, and quarks. Everything is made of the same stuff, but takes many diverse forms (because of different ratios/mixes of the same stuff over different amounts of time and within different environments.)

If we take a universal, eternal perspective, it becomes clear that all material forms will return to the immanent sameness, from which all else emerges.

1 Deleuze, *Expressionism in Philosophy,* p. 67

"The earth is our support, our base - the root that will, eventually, allow us to fly. To speak of the earth requires us to think about **water**, the **slow force** that moulds, cracks and bores it. That **transforms** it and sometime **weakens** it. It also requires us to think about air, empty space, the wind that moves over the surface of the earth's crust and which our buildings, extension of that crust, **channel or resist**. Speaking about the earth represents another form of encounter with the **local**. An encounter with the remains of the wreckage: **bones** - the **transformation** of the organic into the inorganic -, stones, old foundations, **traces**. The earth - **the start and the end** of architecture."

- Josep Lluis Mateo, *Earth, Water, Air, Fire. The Four Elements and Architecture*, p.35
(emphasis by author)

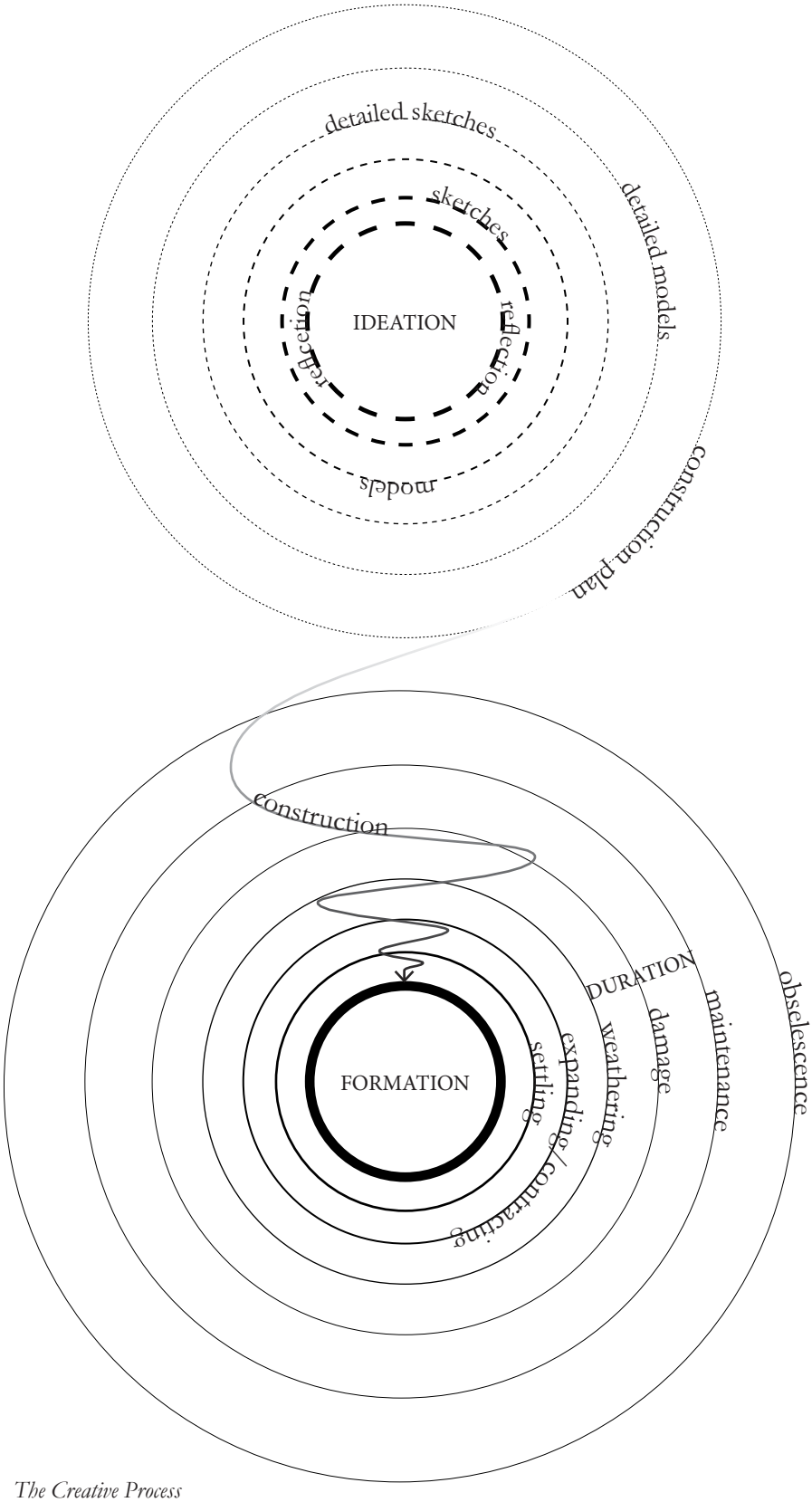

fig 2.01 *The Creative Process*

Studies in Process

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certainty and risk — materiality — force — submaking — indeterminacy — listening — unfinished — living — becoming — weathering — environment — thermodynamics — erosion — destruction — evolution — species — variety

—

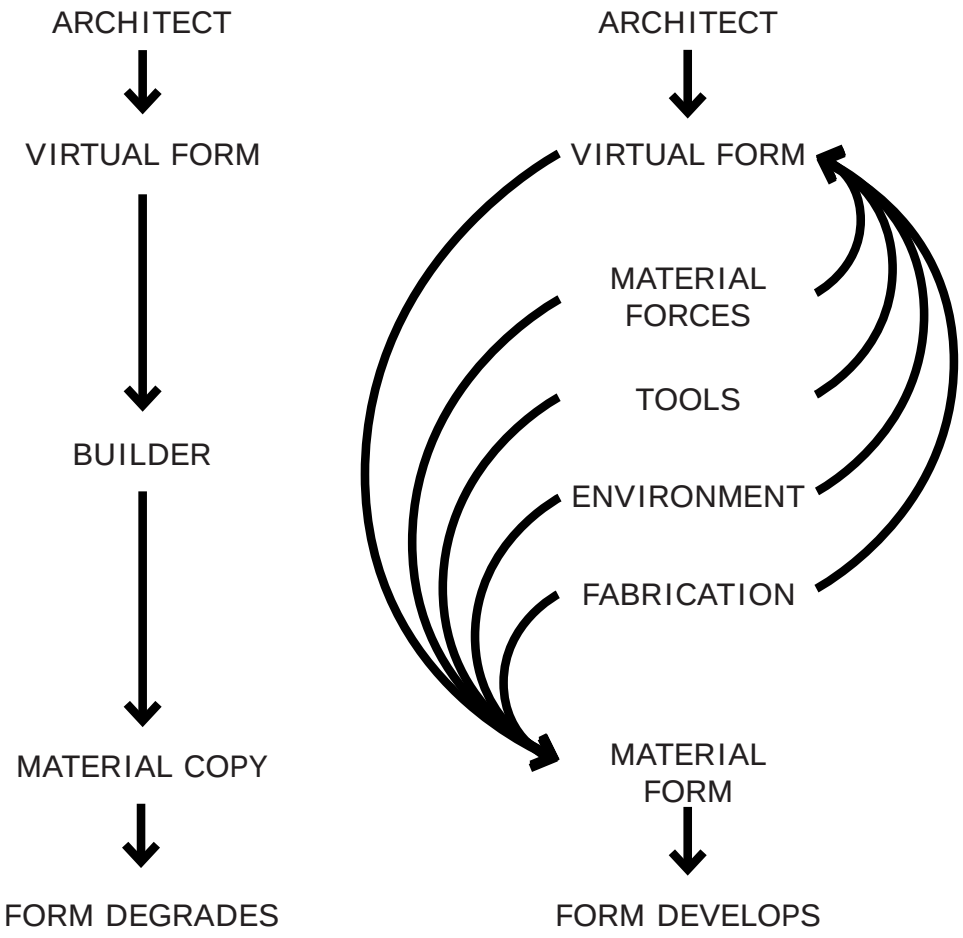

fig 2.02 *Two Modes of Architecture*

On the left, the process of design is streamlined; blueprints are sent to a builder, and the building is copies the blueprints as closely as possible. On the right, the design process includes feedback and alteration, resulting in an architecture that is cooperatively designed and constructed.

fig 2.03 *Turbelence, Flow*

This cast was made by spreading a bed of talcum powder inside a square mold. Plaster is then poured into the bed of talcum. The two materials fold into each other, and the plaster eventually hardens into a fluid-solid form.

ANIMATE MATTER

Materiality is the metaphysical reality of matter as alive, as a substance that is both pushed by external force and pulled by its own will-to-form.[1] For a material, 'will' is in close relation to tendency, trajectory, propensity, and desire.

There is a power to anthropomorphic words, such as will or desire. While it may be 'too subjective,' inspiring a more naive and open perspective toward matter, it does keep us from being 'too empirical,' perceiving matter as passive stuff, automated, or machinic. I agree with Jane Bennett on this point, "We need to cultivate a bit of anthropomorphism—the idea that human agency has some echoes in nonhuman nature—to counter the narcissism of humans in charge of the world."[2]

To understand matter as animate, empirically, one need only look at everyday chemical restlessness: the rusting of iron, the peeling of paint, the decanting of odors.[3] However, this alone will lead us to demystify matter as automatism and mechanism, as slaves to their own chemical makeup.

Bennett makes the point that the perception of matter as law-governed is essential to the everyday instrumentalization upon which our survival depends, but by living this fiction all the time[4] we run the risk of alienating ourselves from nature and developing a culture that discredits mysticism.

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1 Mark West, *The Fore Cast*, p.134
2 Jane Bennett, *Vibrant Matter*, p.xvi
3 Mark West, *The Fore Cast*, p.134
4 Jane Bennett, *Vibrant Matter*, p.xvi

"Metaphysics... has been developed... by the union and conflict of two very different human impulses, the one urging men towards mysticism, the other urging them towards science... But the greatest men who have been philosophers have felt the need both of science and of mysticism: the attempt to harmonize the two was what made their life, and what always must, for all its arduous uncertainty, make philosophy, to some minds, a greater thing than either science or religion."

- Bertrand Russell, *Mysticism & Logic and Other Essays*

fig 2.04 *Light Talcum Cast*

fig 2.05 *Excess Talcum Cast*

fig 2.06 *Vaseline Cast*

WAVE FORMS

November 6, 2015
viscosity — turbulence — flow

Today I found someone's garbage. It was a piece of foam with three identical wave forms milled into it. I prepped them for casting with Vaseline. Since all three sections are identical, the process was the only thing that could add variance. The first was simply coated with Vaseline. The second, Vaseline and an excessive amount of talcum powder. The third was coated in Vaseline and only as much talcum as would stick to the Vaseline. All three were cast from the same plaster mix.

The light talcum cast is not as shiny as the Vaseline cast. The raking is not as deep. It is quite even, smooth and matte.

The excess talcum cast shows brush strokes only in the thickest (heaviest) spots, or perhaps the spots where I poured from a great enough height. Lines of thick powder curl into the mass of plaster and press against its surface.

The Vaseline cast is shiny, abducting most of the Vaseline from the mold onto it. The surface is raked with the strokes of the Vaseline brush.

I now want to try to pour a flat/thin sheet of plaster and pile talcum onto its wet surface. I imagine the weight/mass of talcum will vary how deep it pushes into the plaster mass

fig 2.07

fig 2.08

fig 2.09

fig 2.10

fig 2.07-2.10 *Earth Cast Tiles*

DEEP SURFACE

The surface of a material is much deeper than the hairline we normally associate with it. Though we first perceive the surface image of a body, if we continue to look, we may perceive its process of formation. The surface is the presentation of internal force and external impact. When described anthropomorphically as a face, it begins to carry agency and personality. The sur-face, as a mysterious presentation of process, speaks. One can say that it tells a story, but a partial story in a nonhuman language. That is to say, the face is not decipherable to any degree of scientific certainty. Instead, it is the aesthetic interface that shows us the unfolding of an event.

The face of any body mixes with whatever it comes into contact with. It is a porous skin. A body can thus be defined as thick material with a surface of interaction.

fig 2.11

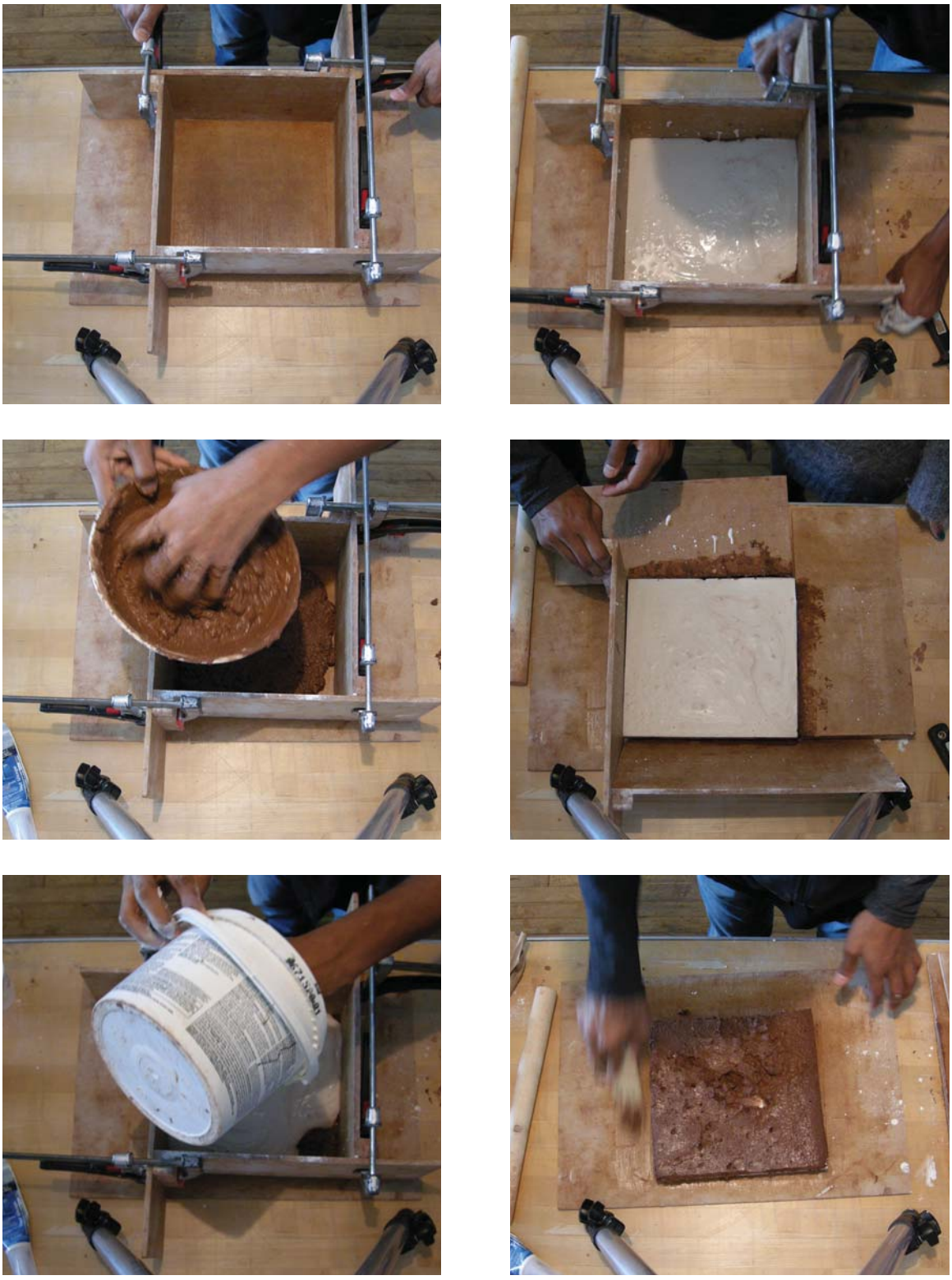

fig 2.12 *Earth Cast Tiles - Process*

EARTH CAST TILE

January 18, 2016
gravity — viscosity
resistance — flow

The tile species, shallow square casts on mud (earth and water) started as an exploration of deep surface. I simply wanted the plaster to carry the texture of earth (rough, noisy, layered).

The viscosity of the earthen base layer and the plaster was one factor to experiment with. What I was really altering was the resistance strength of the earth. The more liquid the earth was, the less it resisted the mass and force of the plaster pour.

In the first tile (cast on quite muddy/watery earth) there are ridges, plateaus and hills. The ridges seem to be lines of immiscible interaction between the two liquids. The plateaus are formed from the pour. Plaster, with gravity, pushes through the mud to the baseboard.

fig 2.13 *Single Points Pour*

fig 2.14 *Point and Line Pour*

fig 2.15 *Travelling Line*

fig 2.16 *Intersecting Lines*

fig 2.17-2.22 *Model Species - Striated Walls*

OPEN PROCESSES

Detecting the force of materials requires us to follow with a willingness to be a beginner, to not know. If we want material will to influence what we do, then we need to be careful to maintain this unknown space in our perception of the world We need to acknowledge the independent life of materials without explaining away the mysterious echoes they share with our own life.

This embrace of mystery, of that which we do not quite understand, shifts our reaction from judgement to curiosity. As architects, we tend toward technical certainty in the process of construction for many reasons, chief among them are knowing that the space will be comfortable and structurally sound.

Opening the design process up to include the uncertainties of material will is much more circuitous, as one ventures into unknown territory. The methodology becomes one where and idea is made physical, not as an accurate replica, but as a simulation with many possible outcomes. The range of possibility becomes the territory to explore through playfulness and spontaneity. The results, partially planned and partially discovered, with their unthinkable forms and finishes, would then need to be tested for technical performance.

In the beginning, it is important to keep the design process open to chaotic influence.

"I think that spontaneity and playfulness [are] really... the roots of [the design] profession. Design is all about these kind of unexpected creative breakthroughs that we always strive for."

- Bertrand Russell, *Mysticism & Logic and Other Essays*

fig 2.23 *Striations of Plaster and Talcum*

fig 2.24 *Striations of Plaster and Clay*

fig 2.25 *Earth Cast Columns*

November 10, 2015
earth casting
earth formwork

UNEARTHING

Today I excavated the earth cast models that I made yesterday. Removing the stuck on moist earth, felt like archaeology. An archaeological toolset would be poignant, and useful. There is a 'ruin' quality to them, which feels too easy to accomplish. They are obviously cave-like, reminiscent of stalactites and eroded walls. Is this accomplishing my ambition to create space which reminds us of impermanent nature? Perhaps I need to articulate what this sensation of time is, what emotions are tied to our sense of time? Melancholy, forgetting, guilt, shame, remorse, appreciation, gratitude, revery, serenity, stillness. These are evoked through 'seeing' and through architecture's affect. Dereck says my affect, or force of chaos, is 'becoming.' I say it's 'impermanence.' Erosion is the falling, typically. I do wish to reframe this falling as a rising of its absence, the rising of space for another being to rise into. The ambition in this reframing is to embed, in architecture, the sense that we are not slowly dieing, but nurturing and protecting life. We are slowly becoming other than our self. Perhaps self is the only thing that dies, and is constructed.
The earth casting has potential, but I need a clearer, more articulated goal.

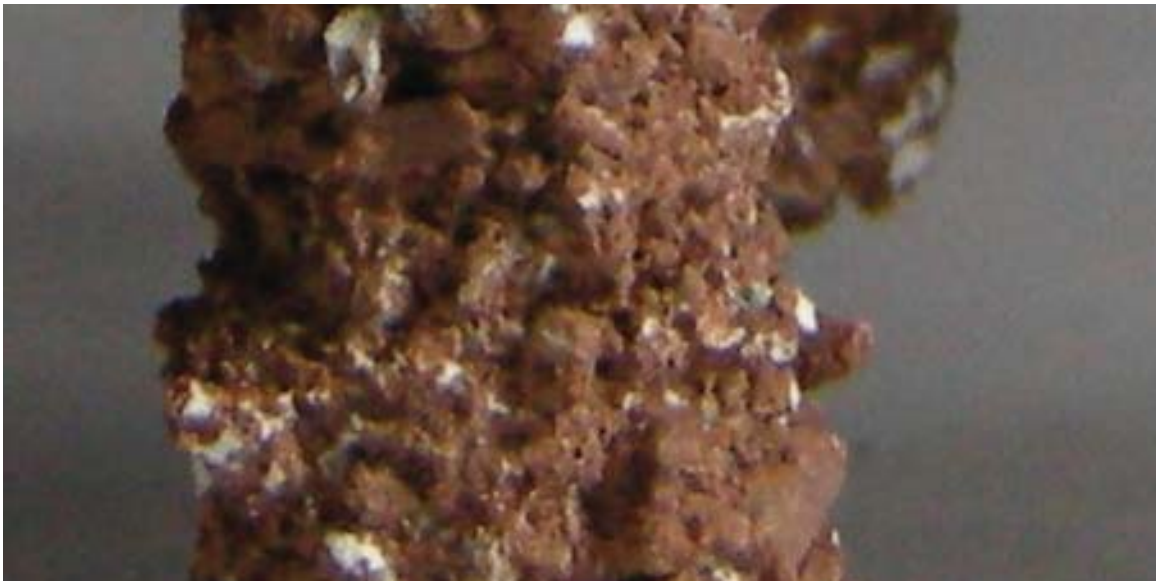

fig 226-227 *Earth Cast Columns I*

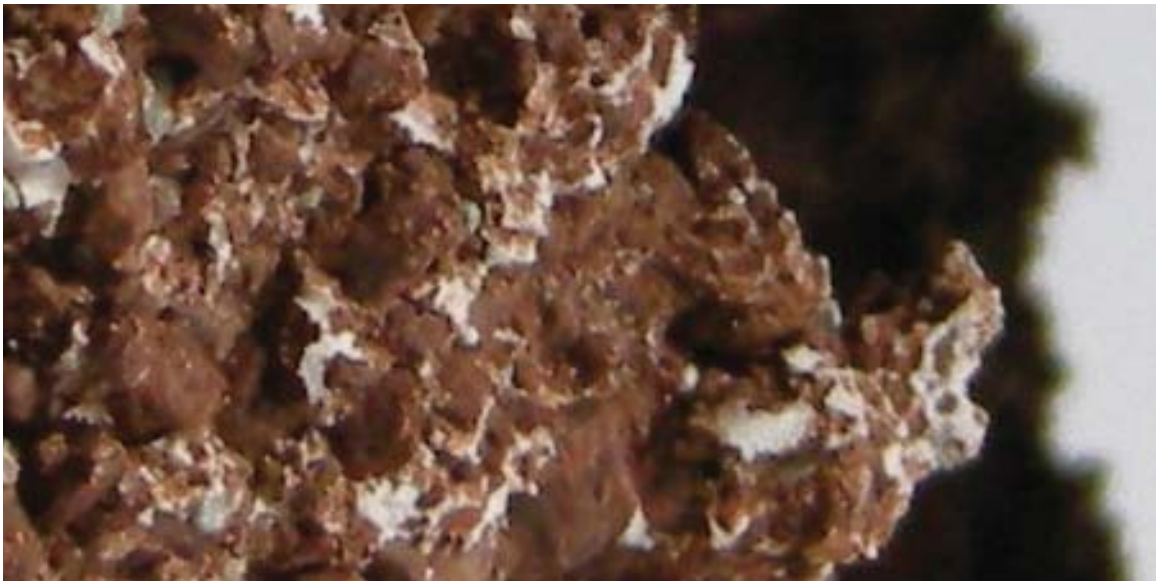

fig 228-229 *Earth Cast Columns II*

fig 3.01 *Orthomosaic 2016-07-24*

Studying Site

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perception — distance — site — pixelization — remoteness — aerial photography — satellite imagery — drones — temporal observation — landscapes as living materials — topology — atemporality — preservation — agency — areas of natural and scientific interest

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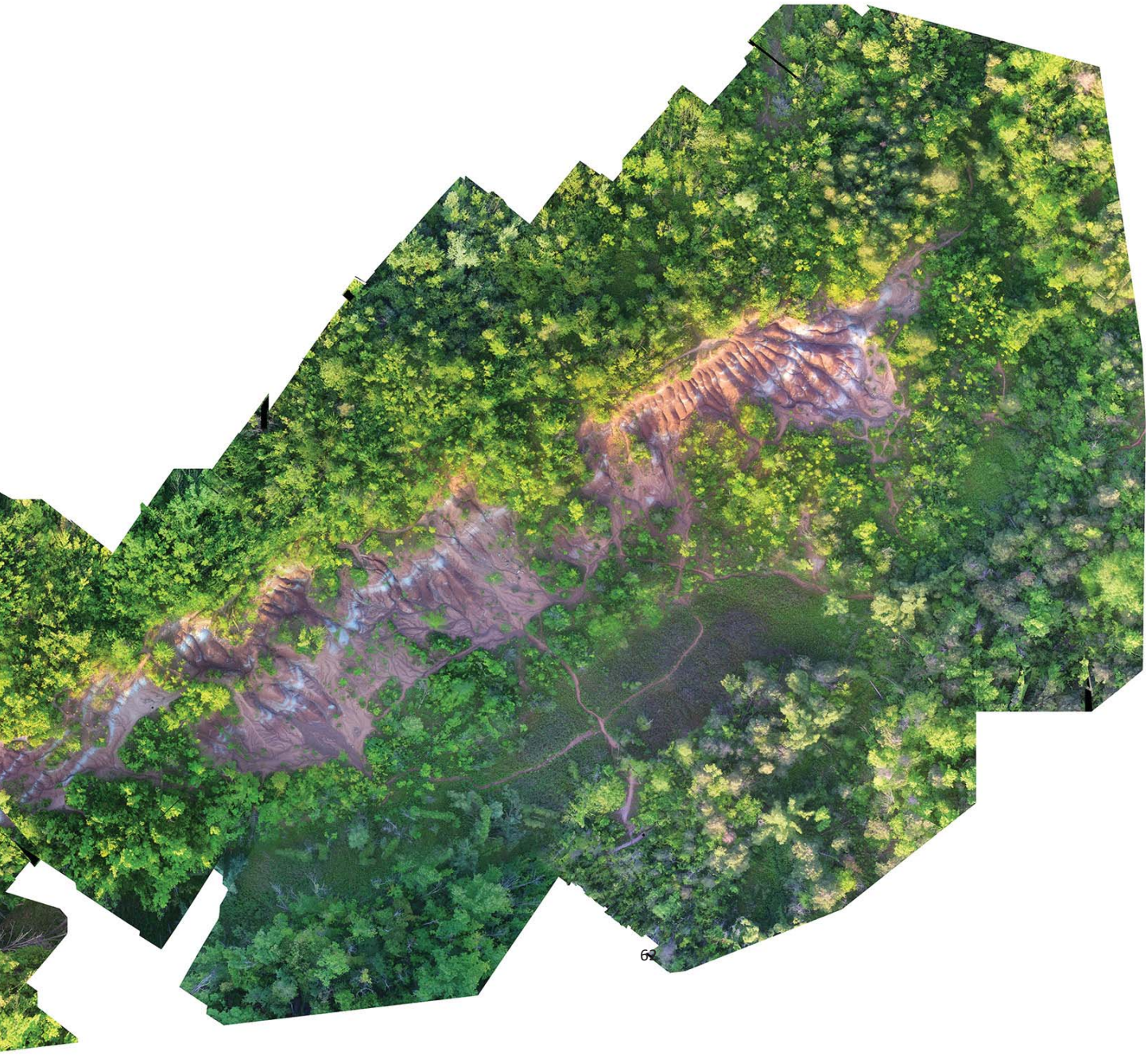

material

eye-level

aerial

cartographic

fig 3.02-3.05 *4 Ways of Looking*

THE CHELTENHAM BADLANDS

After expressing an interest in writing about earth, a friend suggested that I visit the badlands in Caledon. I looked it up online and was immediately in awe. A week later, two graduates posted a kind of job offer, looking for a local collaborator for an upcoming master planning project for the same badlands. This was serendipity at its finest; the thesis gods were smiling down on me. Sadly, the graduates decided not to pursue the project, but had already posted the date and time of the site tour. I attended as an independent student, amongst the invited participants. I put my information down on the sign in sheet, but was not contacted with further information. I decided to undertake the project nonetheless.

fig 3.06 *Site Tour*

I began to wonder, how do I study this site? Given my interest in materiality, it was clear that I had to study and represent this place as a material body. This necessitated visiting the site in person and spending some time there. I was quickly captivated by the red clay, the bands of green iron oxide, and the eroded forms of hummocks and gullies. I continued to visit the site periodically over the next year, to revitalize my engagement with the badlands and to observe it in various weather conditions. I witnessed the surface cracking after heavy rain, the burrowing of rain water, the melting of snow, the falling of leaves, the awakening of spring, and the many people who come to take pictures. My collection of photos, writings, and sketches grew, but they only covered two scales of investigation (the material scale, and the first-person scale). There was still the aerial and regional scale to explore.

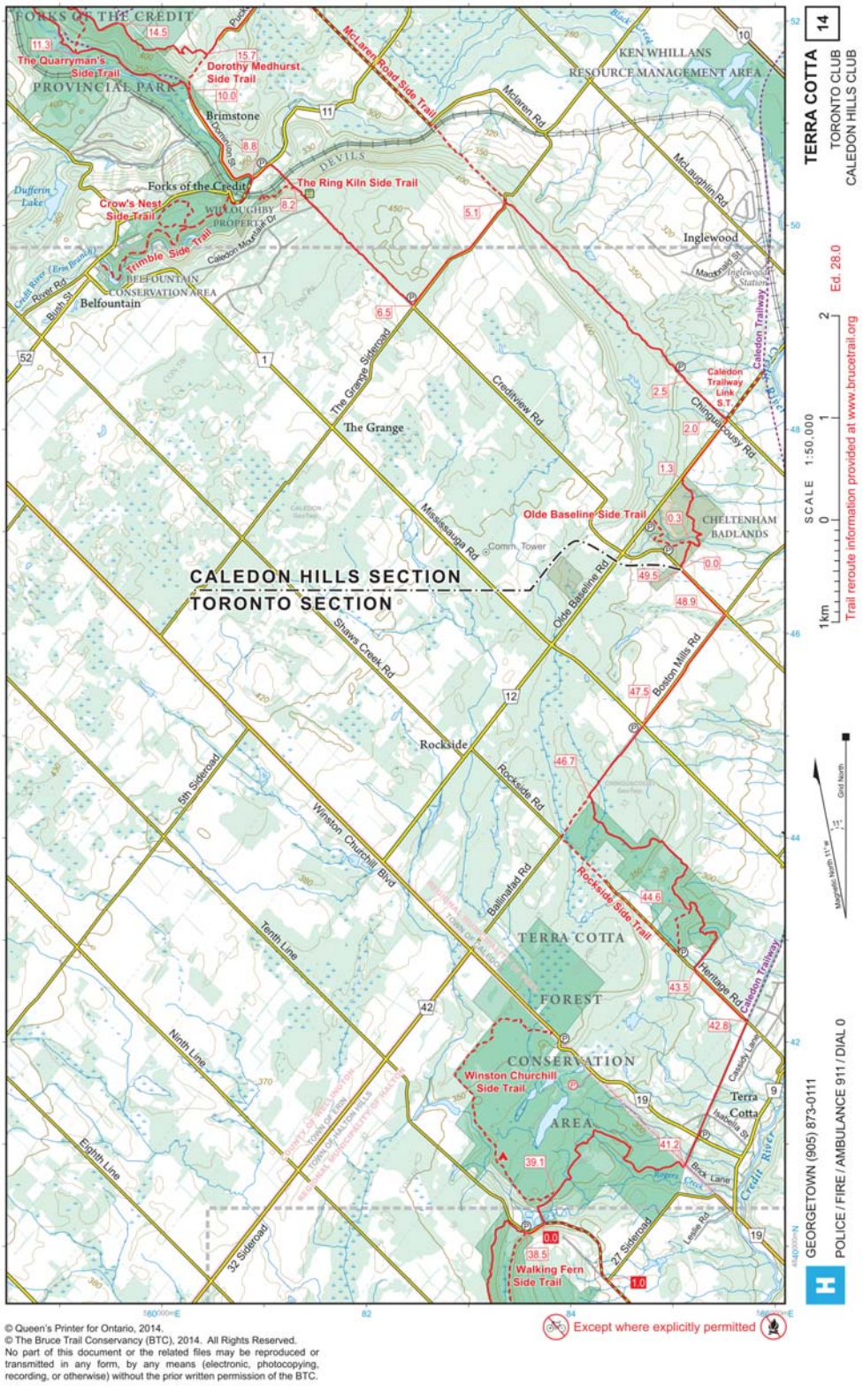

fig 3.07 *Terra Cotta*

PRESERVATION, CONSERVATION, AND NEGLECT

PRESERVATION — CONSERVATION — REWILDING — NEGLECT

Preservation and conservation have defined our conversations around environmentalism. On the far side of the spectrum, preservation takes a strict stance on the human use of natural areas, seeking to maintain the pristine form of a place. At the other end of the spectrum, is the neglect of natural areas. Neglect may seem akin to the 'untouched nature' that preservationists seek to maintain, but the paradox of preservation is in the management and maintenance of pristine natural areas. In George Monbiot's book, Feral, he seeks "to encourage a positive environmentalism."[1] Environmentalism, in North America, begun during the mid-late 19th century, in reaction to deforestation and clear-cutting. This degradation and destruction has continued through the twentieth and twenty-first centuries. Monbiot continues, "Environmentalists, in seeking to arrest this carnage, have been clear about what people should not do. We have argued that certain freedoms - to damage, to pollute, to waste - should be limited. While there are good reasons for these injunctions, we have offered little in return. We have urged only that people consume less, travel less, live not slithely but mindfully, don't tread on the grass."[2]

Monbiot brings another approach to the table, rewilding. "Rewilding recognizes that natures consists not just of a collection of species but also of their ever-shifting relationship with each other and with the physical environment. It understands that to keep an ecosystem in a state of arrested development, to preserve it as if it were a jar of pickles, is to protect something which bears little relationship to the natural world."[3]

In my approach to this rare and vulnerable badlands formation, and my attempt to design within an Area of Natural and Scientific Interest, I have struggled with the very idea of construction. I ask myself, does anything need to be built here? Should what I design be almost non-existant? These are the troubling questions that arise when human agency is subsumed by the guilt of our past and ongoing actions. We estrange ourselves from the land, believing that we can only do harm. The chain reaction that is set off by our every step, echoing out a thousand kilometres away and into an unknowable thousand year future, can be a crippling source of fear. Rewilding reminds us that ecosystems are beyond our comprehension. There are no property lines within which nature needs to be maintained. Change is natural.

1 George Monbiot, *Feral,* p. 12
2 ibid. p.12
3 ibid. p.8-9

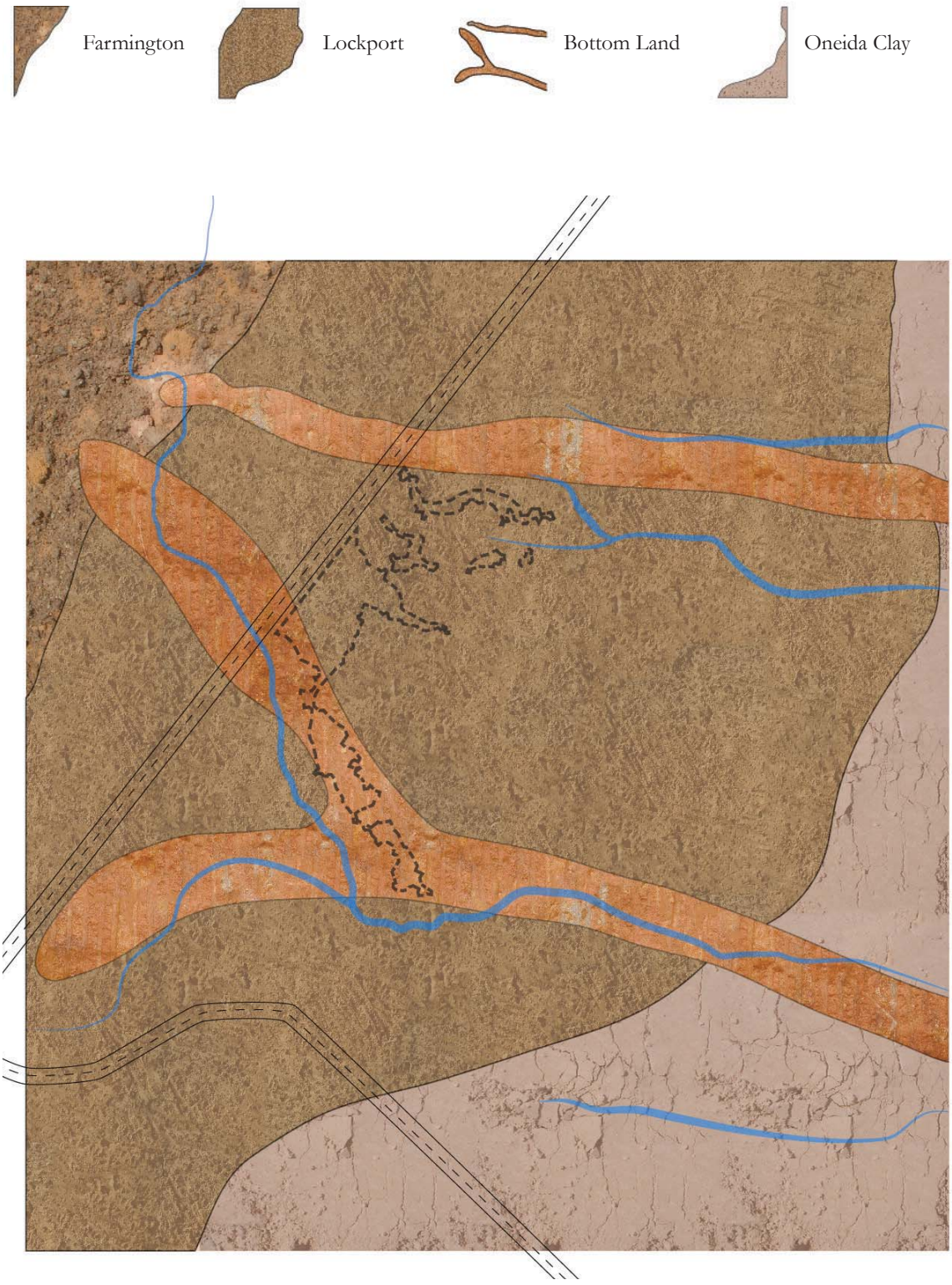

fig 3.08 *Geology, Hydrology* Compiled from the 2012 Management Planning Background Information document produced by the Bruce Trail Conservancy, this image show subterranean bodies of earth, major creeks, and roads.

MANAGEMENT PLANNING

The Cheltenham Badlands is owned by the Niagara Escarpment Commission (NEC) as part of the Niagara Escarpment Parks and Open Space System (NEPOSS), funded by the Ministry of Natural Resources (MNR), and managed by the Bruce Trail Conservancy (BTC). It is a Provincially Significant Earth Science Area of Natural and Scientific Interest (ANSI), and part of Ontario's Niagara Escarpment, a United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Biosphere Reserve.[1] The badlands lie within the Inglewood Slope Environmentally Sensitive Area (ESA), an important groundwater discharge area. Groundwater emerges from the escarpment face into many streams that flow into the Credit River[2]

On May 10, 2015, the badlands were closed. A wire fence was placed around the feature area to prevent human impact on the site until a new master plan and schematic design had been chosen and implemented. The master planning effort began with the initial site meeting on April 21, 2015. Following this was four public meetings (Octber 13, 2015, January 25, 2016, June 1, 2016, and one yet to be scheduled).[3]

The Ontario Heritage Trust (OHT) and the Cheltenham Badlands Management Planning Team (CBMPT) have been planning the future management of the site since 2008, under four guiding principles:[4]

- Safety for all individuals who visit the site
- Conservation of the property's cultural and natural heritage values
- Improved accessibility for those who wish to access the site
- Enhanced opportunities for interpretation and public education

1 Bruce Trail Conservancy Cheltenham Badlands Management Planning Background Information, Updated October 2012, p.2

2 ibid. p.5

3 http://www.heritagetrust.on.ca/Conservation/Natural-heritage/The-Cheltenham-Badlands/Master-Planning-process.aspx

4 Master Plan for the Cheltenham Badlands, Public Meeting #1, October 13, 2015

fig 3.09 *Racing Along the Edges*

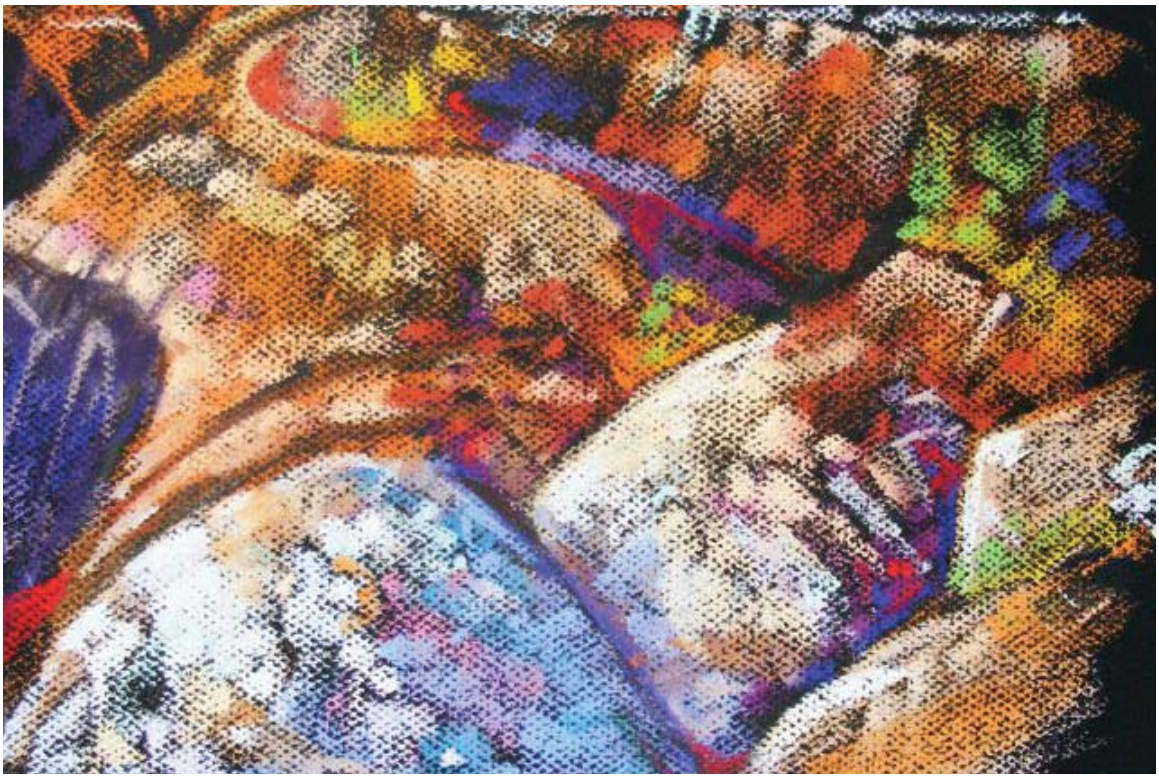

fig 3.10 *Beautiful Erosion*

TOPOLOGY OF A CONSTRUCTED LANDSCAPE

Topology has layers beyond materiality. So far, I have discussed the politics of material only through preservation and value judgements based on beauty and enchantment. The majority of my thinking revolves around materiality as the "secret life of matter."[1]

Topology is quite synonymous with materiality in my mind, however, it encompasses more than the material reality of a place. It also refers to the culture of a place and what makes a landscape a place of significant meaning for people. The Cultural genealogy of a 'constructed landscape,' the history of external influences on the ground, is part of a topological study.

The Cheltenham Badlands is undergoing social changes. Different interests, from the many conservation authorities, scientists, and members of the public, have meet to discuss the human occupation of the land. The friction here is in having to let go of certain uses of the site, namely play. The counties and conservancies who own and manage the land have had a shift in consciousness toward protection and guided use. The children and teens who use the badlands as their hill or their stomping grounds may be unaccepting of this change as they are now trespassers. I would not like to see this playful use of the badlands made a rogue activity.

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1 Mark West, *The Secret Life of Structures,* https://architecture.mit.edu/building-technology/lecture/secret-life-structures

"Topology is about the intelligence of a site perceived, and shaped by society topically"

"Topology must be understood as a holistic approach to a landscape that has always been in the making"

Christophe Girot, *The Elegance of Topology*

fig 3.11 *Site Section* An imagined section of the badlands based what appears on the surface

The Cheltenham Badlands are a popular tourist destination because of their striking topography and proximity to urban areas. The Niagara Escarpment and the Bruce Trail also pass through here.[1]

The badlands topography is rare in Ontario as most areas of shale are protected from erosion by overlying sand, gravel, or hard rock (sandstone, limestone, dolostone).[2] In the early 1900s, the site was used for agriculture and the quarrying of sandstone and limestone. This region was uncharacteristically devoid of natural barriers, common along the Niagara Escarpment, so it was extensively cleared of its forests. This removal of trees initiated the erosion.[3]

This formation clearly illustrates the erosions of shale, which once established continues rapidly.[4] The exposed shale is very soft, and turns into thick sticky clay with rain and melt water. It takes 2-3 days to dry. During this time, human use becomes a concern.[5] The green-white bands are also shale, but with a different chemistry. This chemical change is due to ground water percolation, which changes the red iron oxide into green iron oxide by depriving it of oxygen.[6]

Erosion sites are typically stabilized, as the washing of sediment into creeks and rivers can have negative downstream effects on flora and aquatic life. The Cheltenham Badlands remains unstable, and is only monitored. This is because the site offers interpretive and aesthetic value.[7] Its impermanence offers people the opportunity to contemplate time, fragility, and beauty. The aesthetic value inherent in landscape impermanence questions what beauty is. Rather than being a quality of form, to be preserved and stabilized, it suggests that beauty is in the appreciation and experience of change and loss.

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1 Bruce Trail Conservancy Cheltenham Badlands Management Planning Background Information, Updated October 2012, p.1
2 ibid. p.1
3 ibid. p.3
4 ibid. p.4
5 ibid. p.10
6 https://www.torontohiking.com/tohi/the-cheltenham-badlands.html
7 Bruce Trail Conservancy Cheltenham Badlands Management Planning Background Information, Updated October 2012, p.10

fig 3.12 *fall, October 2016*

fig 3.13 *early spring, March 2016*

CHANGE THROUGH THE SEASONS

fig 3.14 *winter, February 2016*

fig 3.15 *summer, June 2016*

fall, October 2016

fig 3.16

fig 3.17

fig 3.18

fig 3.19

late fall, November 2015

fig 3.20 *Across the Road* Earth spilling out over the road

fig 3.21 *Retreating Earth* As the earth erodes and lowers in areas, the roots of dead trees are slowly exposed and brought above ground.

late fall, November 2015

fig 3.22

fall, October 2016

fig 3.23

fall, October 2016

fig 3.24

fig 3.25

fig 3.26

fig 3.27 Just as the roots of the trees begin to emerge, so do rocks and boulders embedded within the body of earth.

winter, February 2016

fig 3.28 *Have Your Say* A sign inviting the public to weigh in on the master planning project

fig 3.29

winter, February 2016

fig 3.30

fig 3.31

fig 3.32

fig 3.33

early spring, March 2016

fig 3.34

fig 3.35

fig 3.36

fig 3.37

The frequent rainfall in the spring has soaked into the badlands, causing the entire surface to crack as it dries.

early spring, March 2016

fig 3.38

fig 3.39

fig 3.40

fig 3.41

Though the badlands have been fenced off, people continue to create paths over the fences and across the creeks

early spring, March 2016

fig 3.42

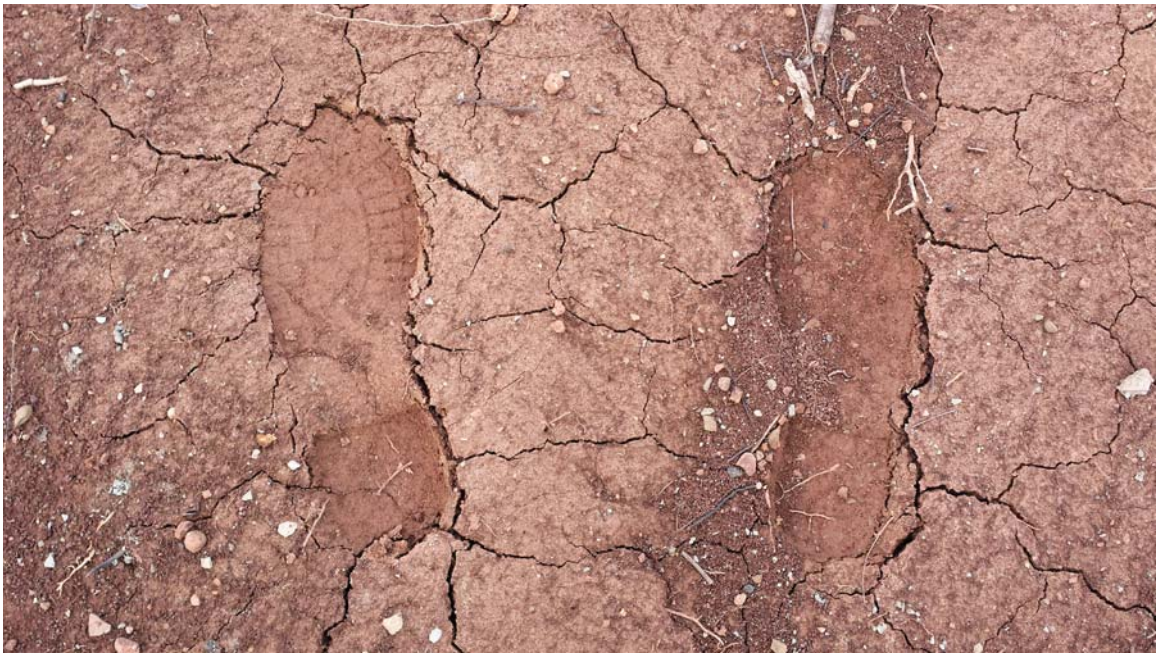

fig 3.43

fig 3.44

fig 3.45

Water trails and softer earth in the spring mark the beginnings of hummocks and gullies..

summer, June 2016

fig 3.46

fig 3.47

fig 3.48

fig 3.49

For a barren landscape, this badlands is oddly overgrown in the summer. Plants poke out from the ground after a winter of dormancy.

summer, June 2016

fig 3.50

fig 3.51

The creek skirts the badlands with dense foliage. The contrast between the barren and overgrown is another enchanting quality of this badlands formation.

fig 3.52

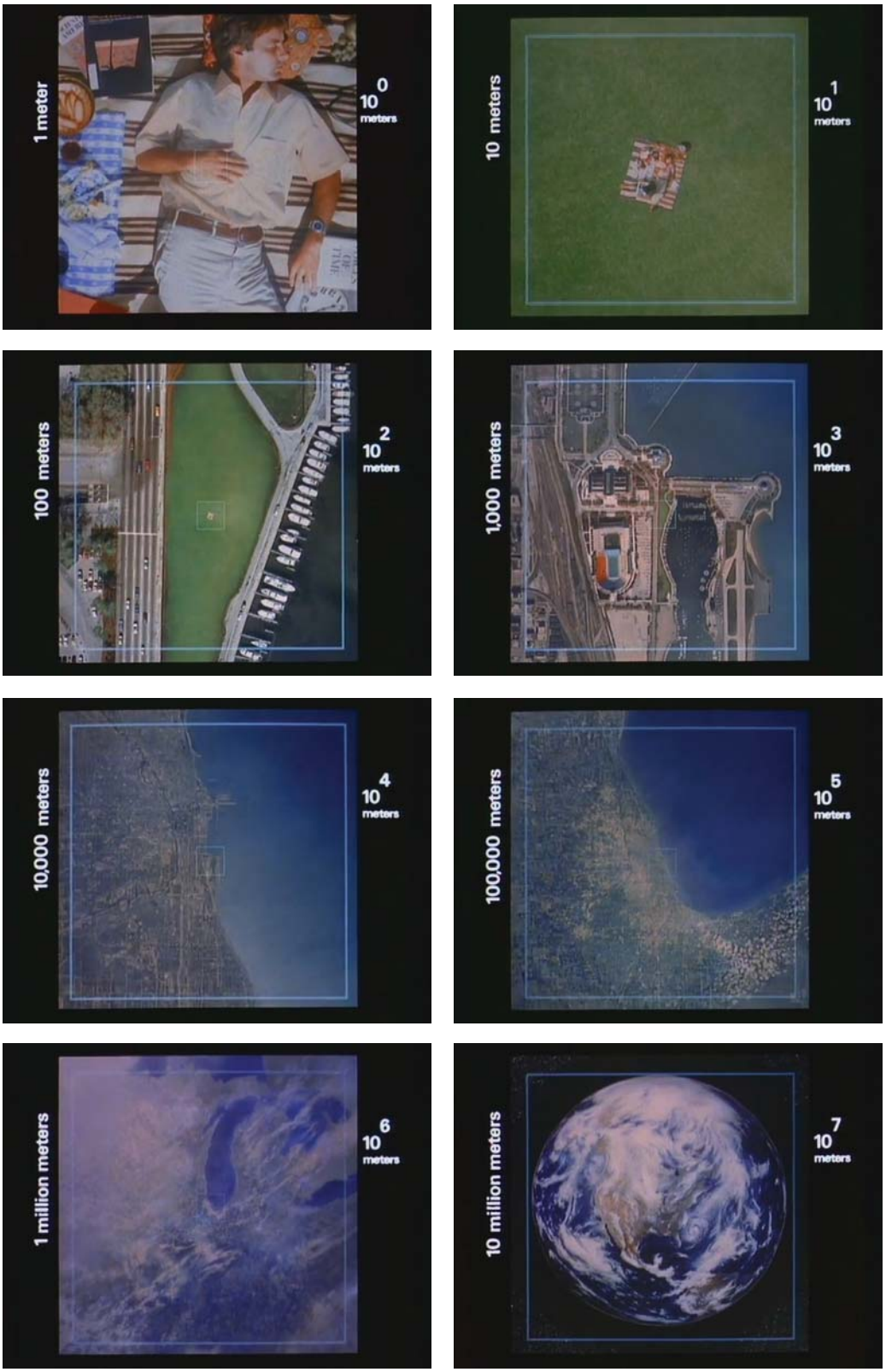
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fig 3.53

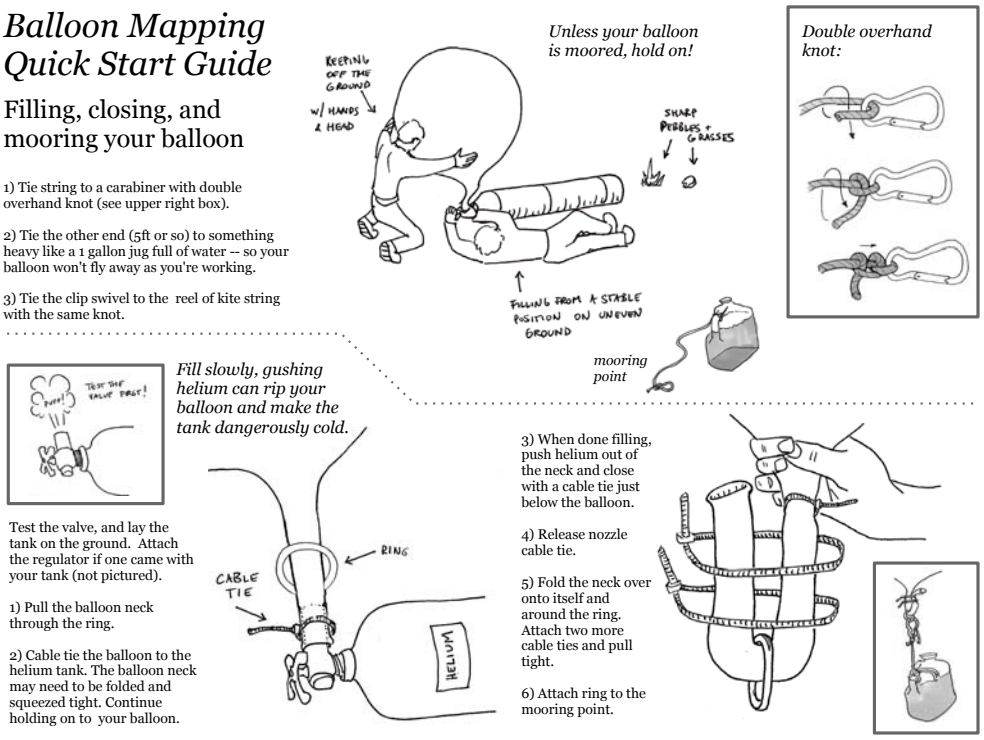
PIXELIZATION AND REMOTENESS

What we perceive as a alive changes based on distance and time. From farther and farther away, atoms blur into masses which blur into landscapes which blur into continents. With greater distance, we begin to perceive vast homogeneity where there is bustling life.

The film *Powers of Ten* by the Eames Office constructs a seamless zoom to show the relationship between how we see and how far we are from what we're looking at. The images look down on the subject from the eye of a satellite. Satellite images are still photographic, but they do not have perspective. They flatten and map the subject out on a homogeneous Cartesian plane. In the satellite image, we can apply scale and measure the image, extracting data about the subject. For example, at 10^0 meters, we know the size of this man's hand, we don't know the size of the blanket, and we can identify him, whoever he is. As we move further away, our eyes readjust to the different scale of information. We now know the size of the blanket, the fact that there are two people, and the fact that they are in a some kind of field. We simultaneously take in more information and less information as they blur to a dot. The larger context is revealed. There are streets, trees, water, and boats. Now we are unable to see them. We see a large stadium complex and a marina. Patterns become recognizable. We are on a large body of water. There is a city, comprised of many pixels that may contain other people. Further still, at 10^6 meters, shapes become even more abstract and difficult to reconstitute. The resolution makes it difficult to discern what is going on at the ground level. If we dropped a bomb from this height, we would not know what we'd have killed, and could continue living with that ignorance. At 10^7 meters we stare at a floating globe, an abstracted sphere. We don't see the man on the picnic blanket, but we know they are there. All the individualistic and nationalistic differences have blended in the geometric space of satellite imagery. We are presented with a catalyzing world view of planetary unity. Have we now reached an ethical understanding of landscape as alive and interconnected?

"When there is great distance between the soldier and the victims and when the soldier cannot see those victims, the soldiers 'can pretend they are not killing human beings,'... At close range, the resistance to killing an opponent is tremendous. When one looks an opponent in the eye, and knows that he is young or old, scared or angry, it is not possible to deny that the individual about to be killed is much like oneself..."

David Grossman



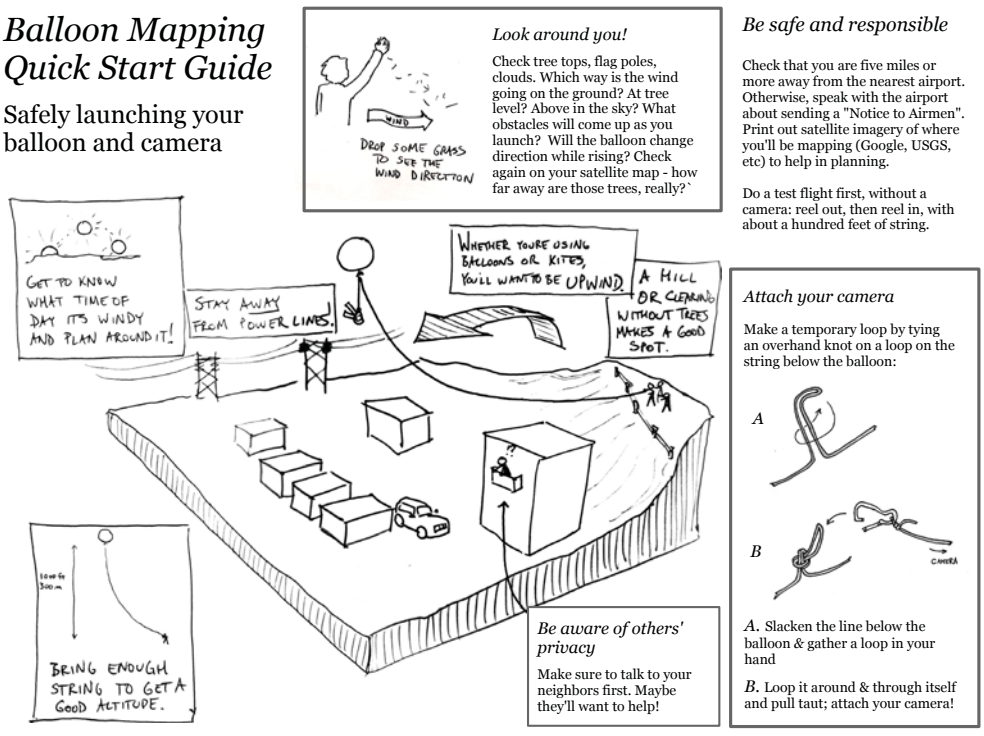


fig 3.54 *Balloon Mapping Quick Start Guide*

The kit I purchased is put together by Public Lab, a non-profit open scientific research community whose goal is to free maps from exclusive hands and into the hands of communities.

BALLOON MAPPING

fig 3.55

From a distance, the figure of the badlands takes shape. Patterns that I could not see from the ground were more apparent. At this scale, one can study the site as a large body.

Capturing aerial images through the use of a large helium balloon had its challenges, which ultimately lent a character to the images. I created a stabilized camera rig out of a plastic bottle, and strapped a camera into it with rubber bands. That rig was hung from the balloon, and the balloon was tied to a 305m spool of kite string. There was only so much I could control as I let go of the balloon and let the spool unwind. The wind took the balloon, and the camera rig swung wildly, taking pictures every half-second. The result produced many happy accidents, angles and perspectives that I would not dream of if I was afforded a great degree of control.

Balloon mapping offers the opportunity for any person to capture aerial images on-demand. What is normally mapped from satellites and planes, can be done with a modest budget from the ground. This, and other, mapping tactics can open up territory to any individual and to any community. The ability to document and produce maps is quite empowering.

late fall, November 2015

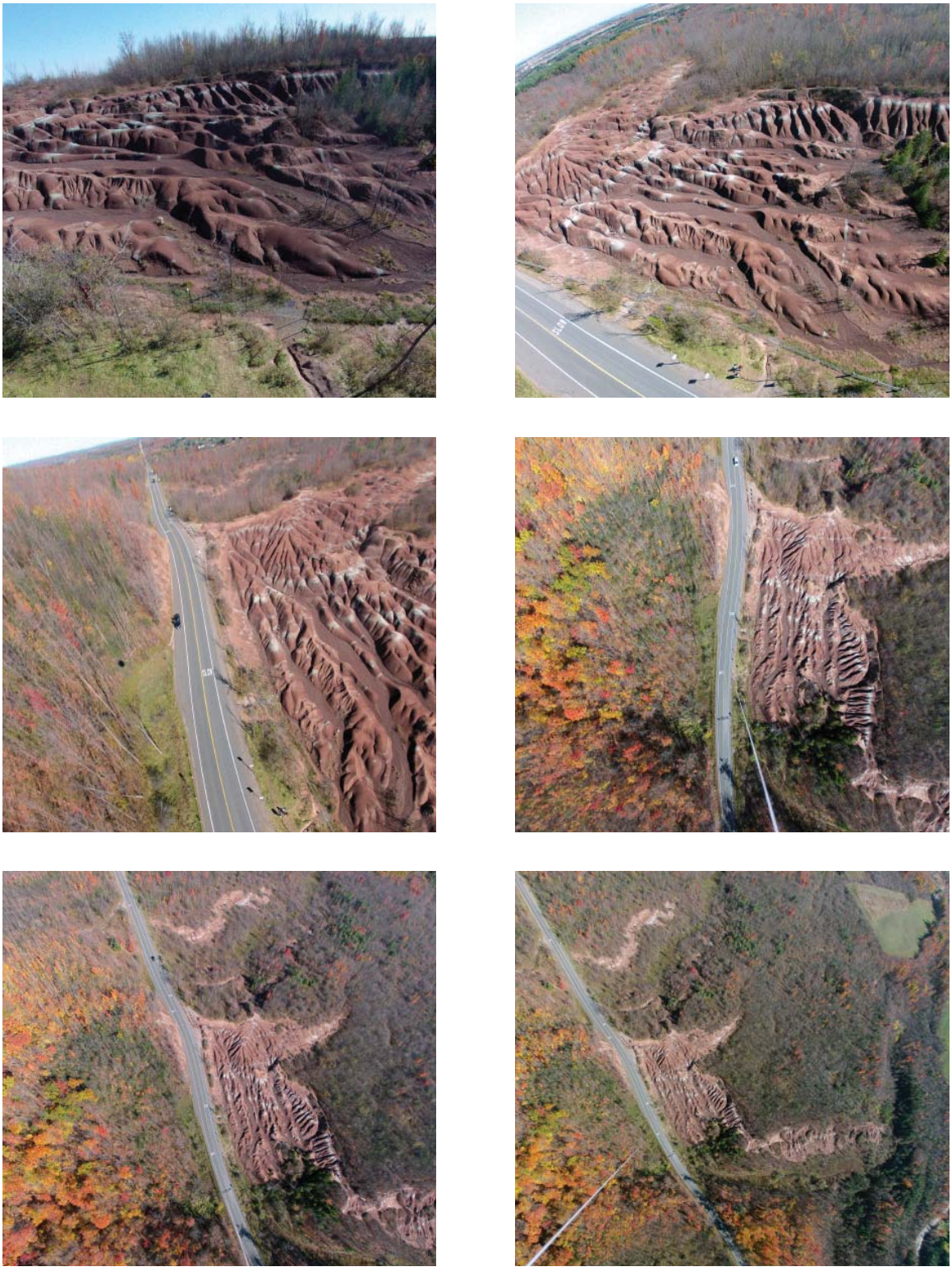


fig 3.56 *Balloon Mapping*

fig 3.57

late fall, November 2015

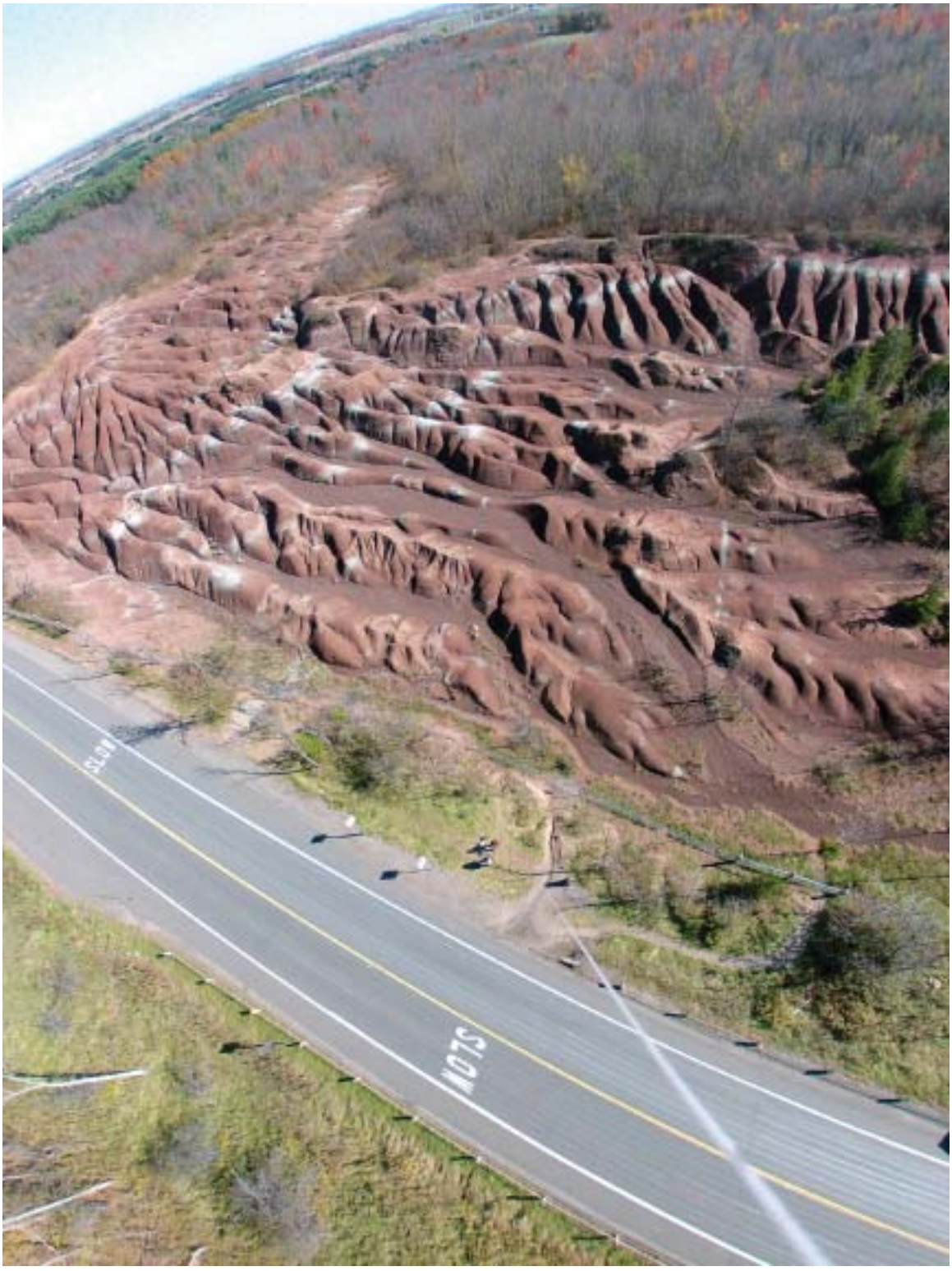


fig 3.58

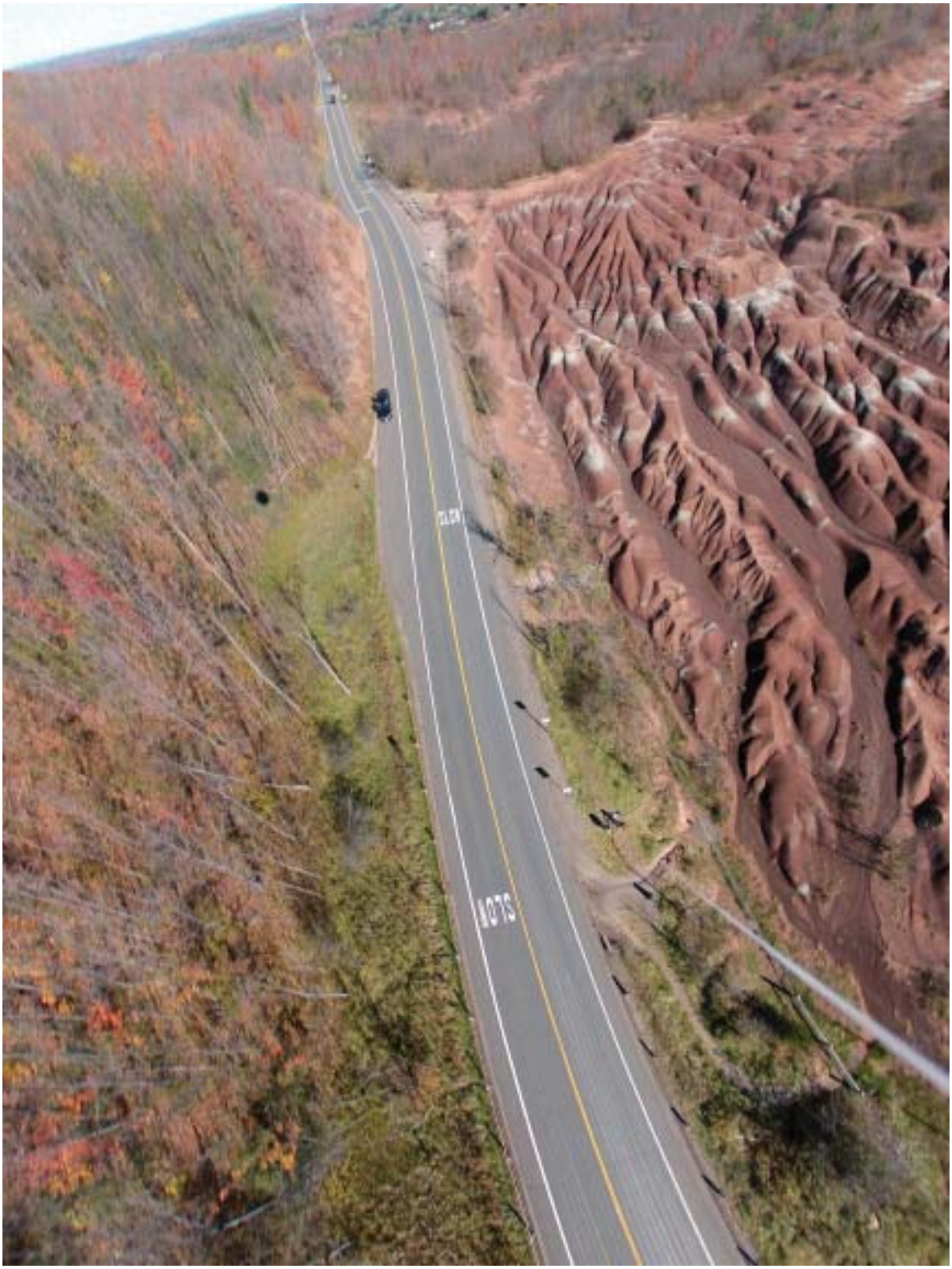


fig 3.59

late fall, November 2015

fig 3.60

fig 3.61

late fall, November 2015

fig 3.62

fig 3.63 *Orthomosaic 2016-06-02*

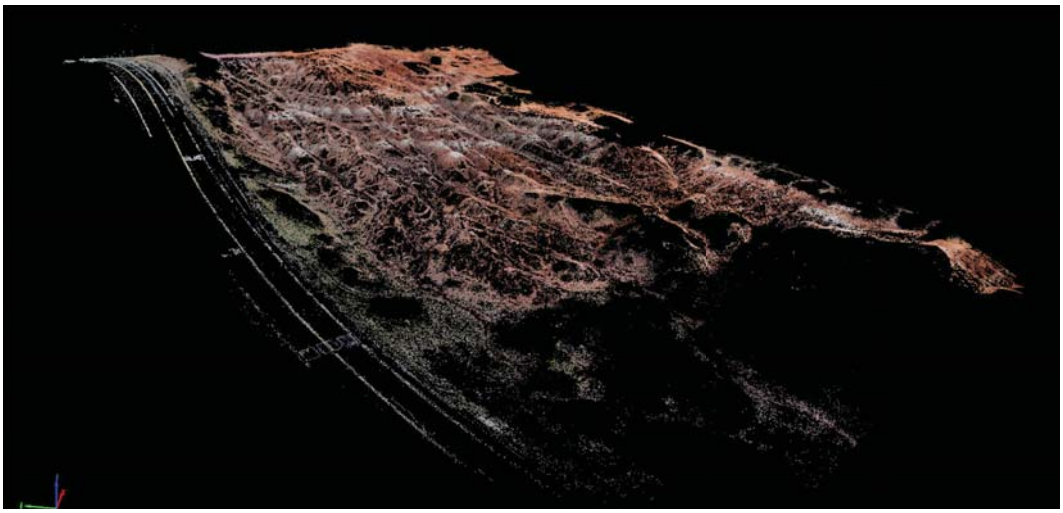
DRONE MAPPING

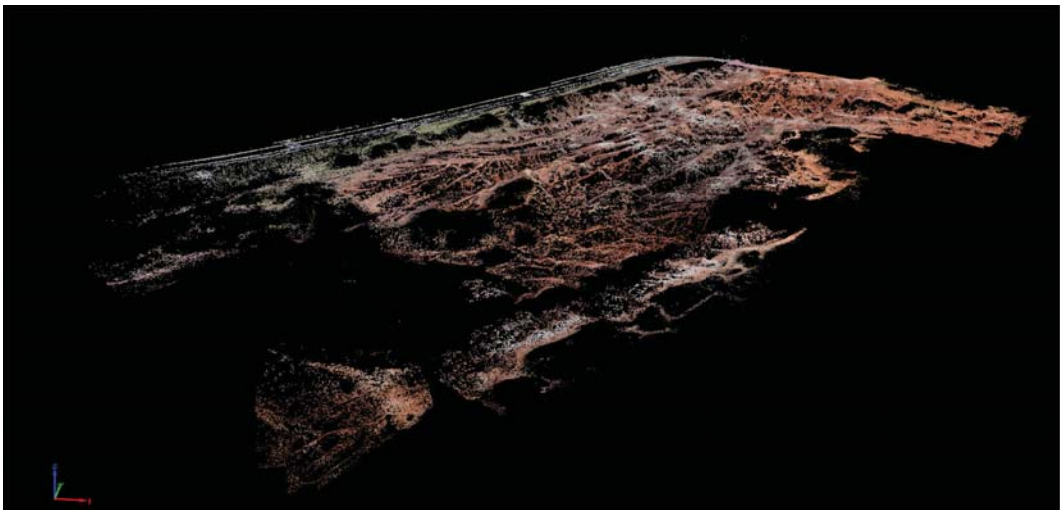
fig 3.64

I was delighted with the character of the balloon photo. It was quite a playful exercise, but it did leave me wanting a greater level of control. I turned to drones knowing their 3D mapping capabilities. With a controller in hand, I was able to be very precise with what I captured.

I had heard of a photogrammetry software that is used to create 3D models of anything from historic buildings to mining sites, using a large collection of GPS tagged photos. In order to create site models of the badlands, I thought to use the same method. It took several attempts to achieve a satisfactory model, and in doing so I began to understand the limitations of this technology. It was not fool proof or perfect. In fact it has many flaws, but once understood, the drone and the software together were able to produce impressive 3D models and mosaics.

The digital reproduction of the site seemed contradictory at first. I set out to study and represent the material reality, but, through timely influences and my own interest, had undertaken an exercise in creating an accurate digital model of the badlands. The model is instantly an obsolete depiction. It is an accurate model of the badlands, of the day the images were taken. This point may be obvious, but it is important to remember the archival and immaterial nature of digital models. They are powerful tools for the study of site, but they are not all knowing. Each model is an infinitely thin surface. We must take it upon ourselves to dig deeper.





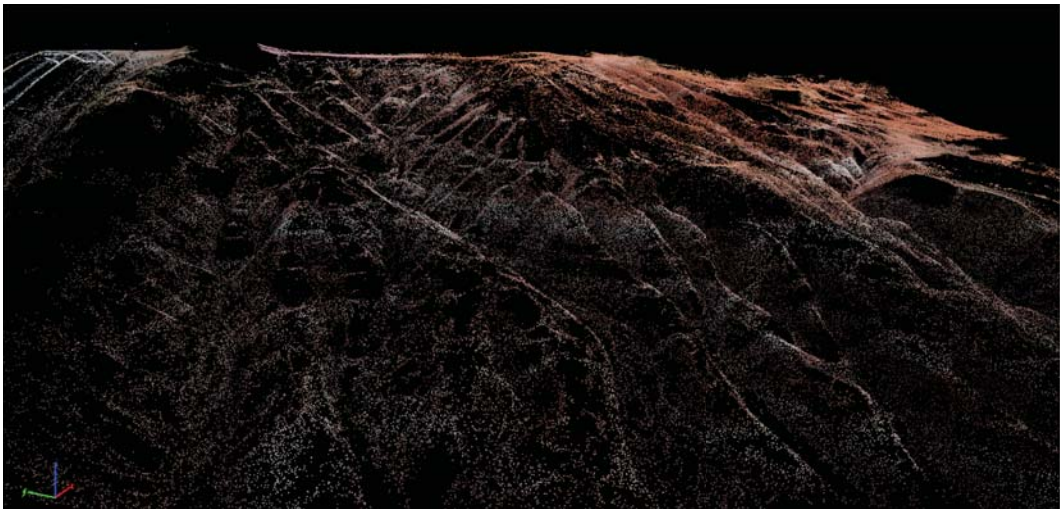


fig 3.65 *Point Clouds* Perspectives of the first point cloud generated through a photogrammetry software from 298 photos.

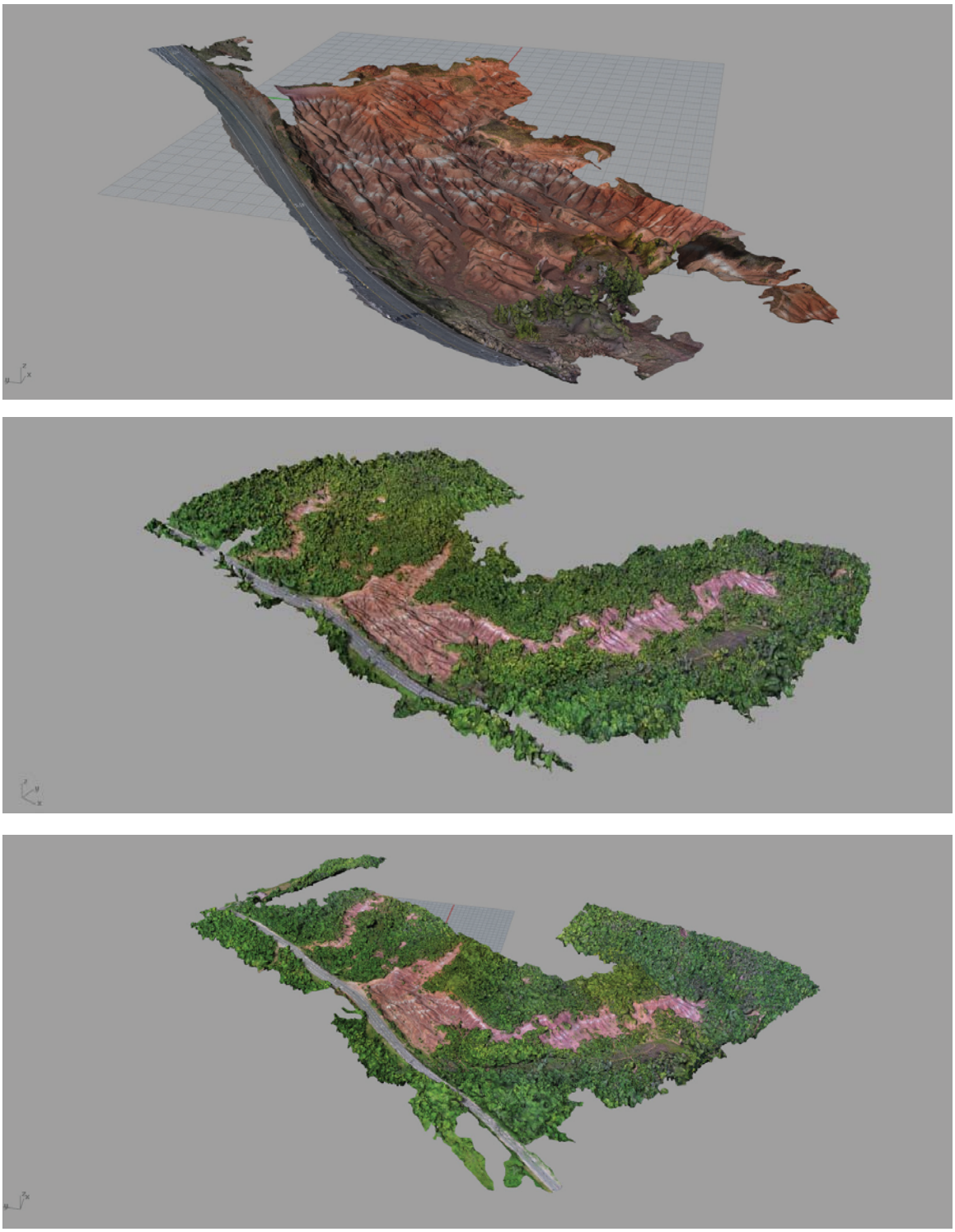


fig 3.66 *3D Meshes* The first model is composed of pictures taken from 30m above ground, the second from 50m, and the third from 75m. The resultant mesh models have less detail as the photos are taken from greater heights, but the photos capture a larger area so the software is less likely to 'get lost in the woods'

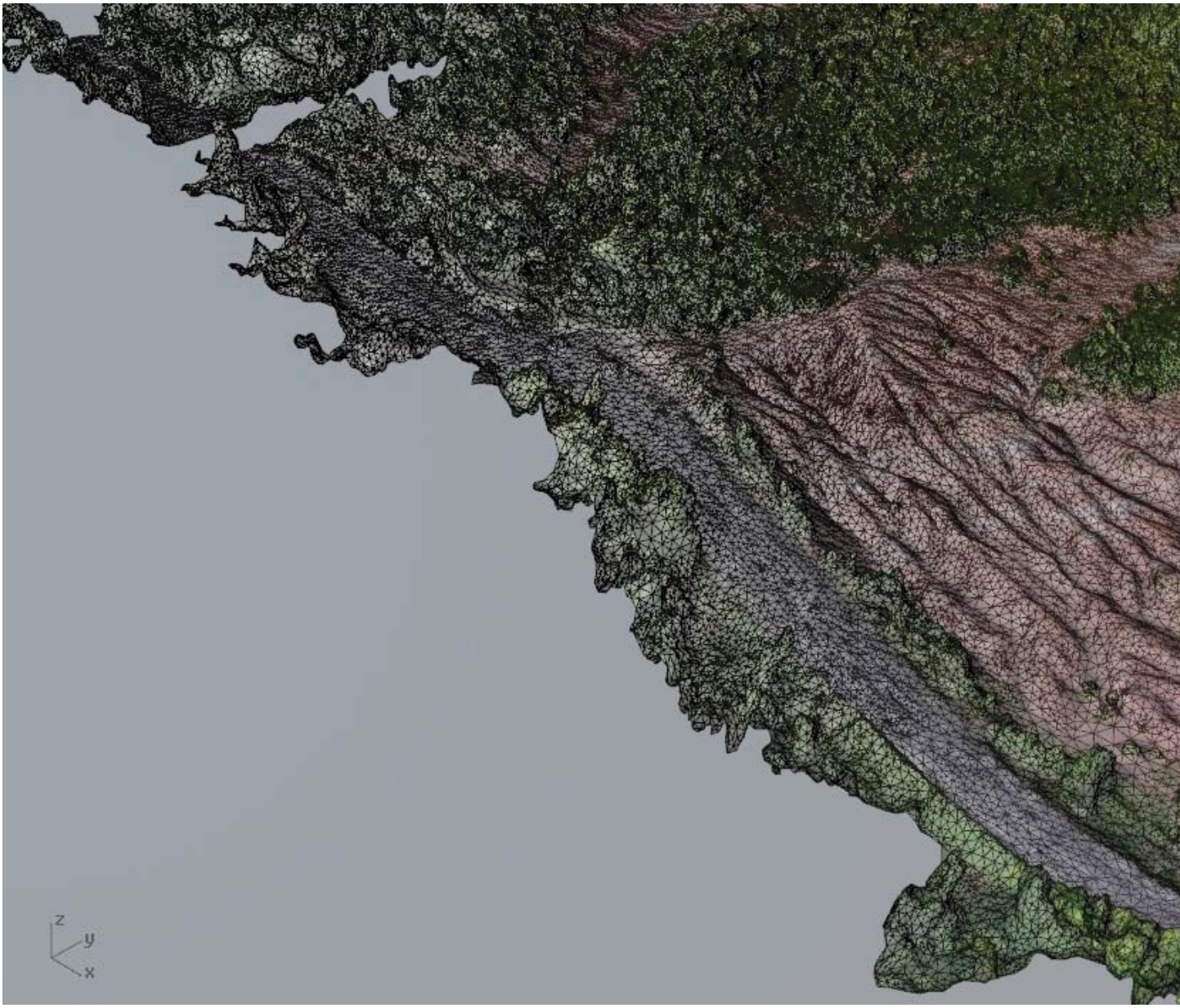
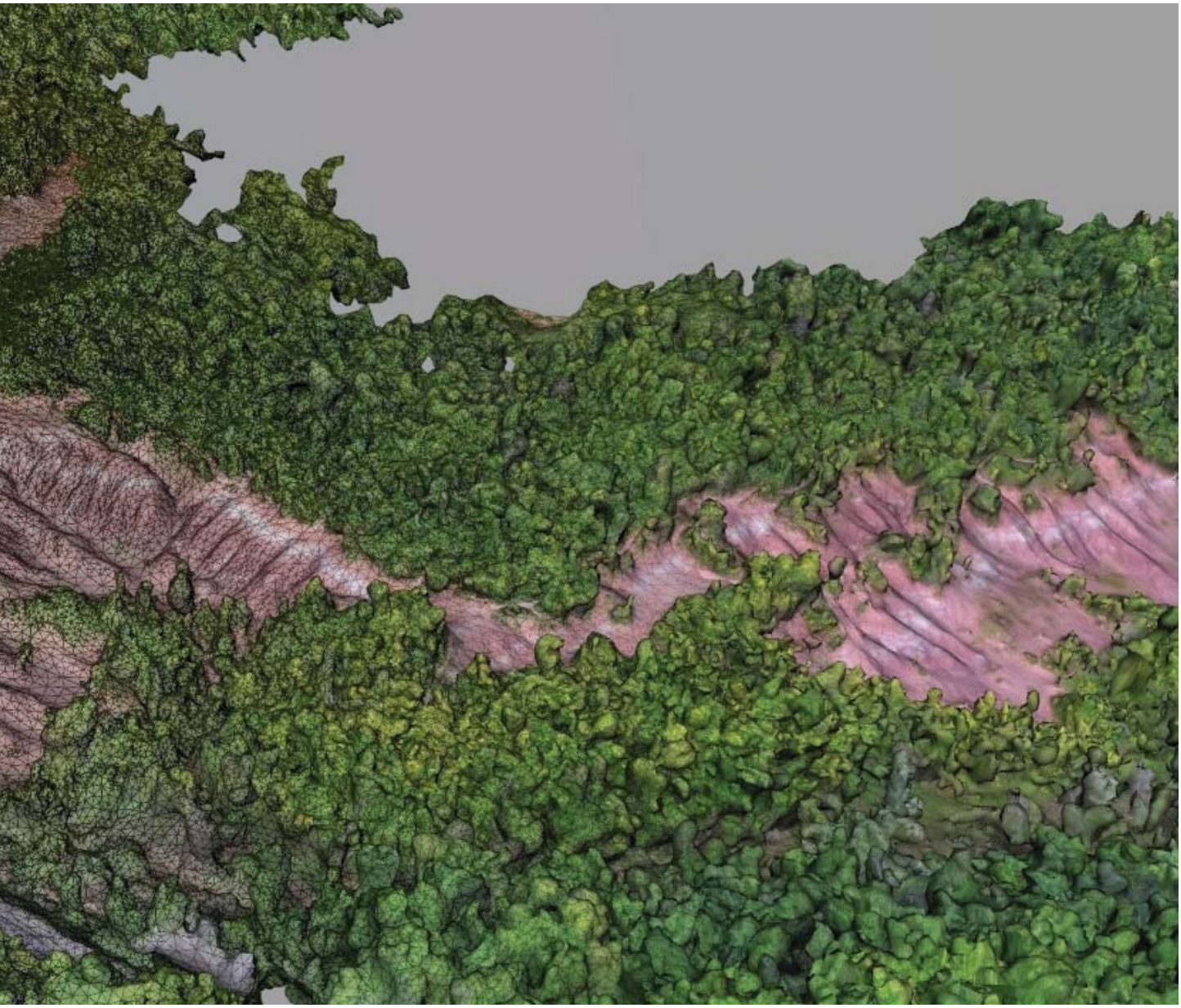


fig 3.67 *3D Mesh*



This is a textured 3D mesh model, generated through the same photogrammetry software. Its depth has been triangulated from photographs. It is a 3D moment in the erosion of the badlands.

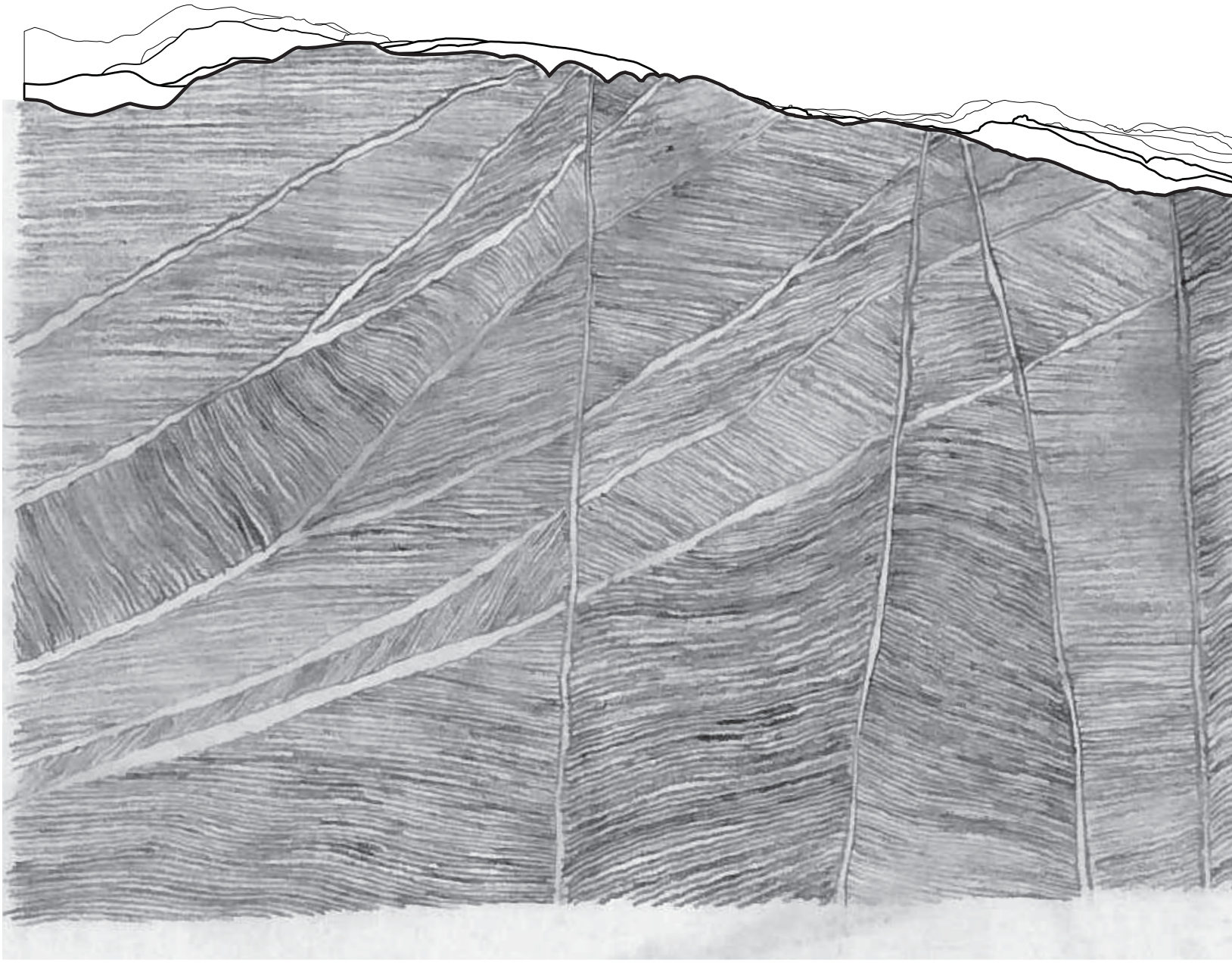
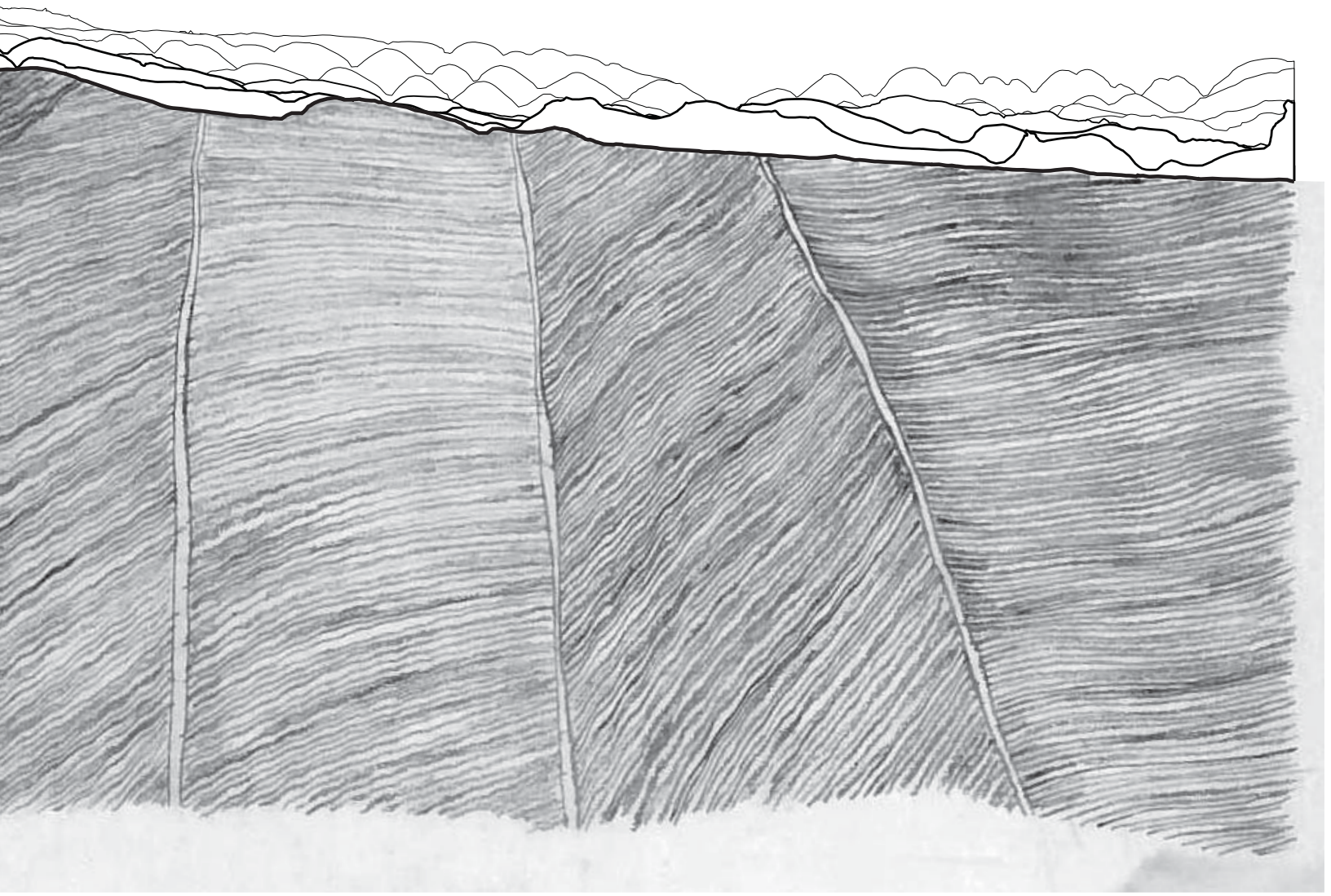


fig 4.01 *Imagined Site Section*

Building on an Eroding Landscape



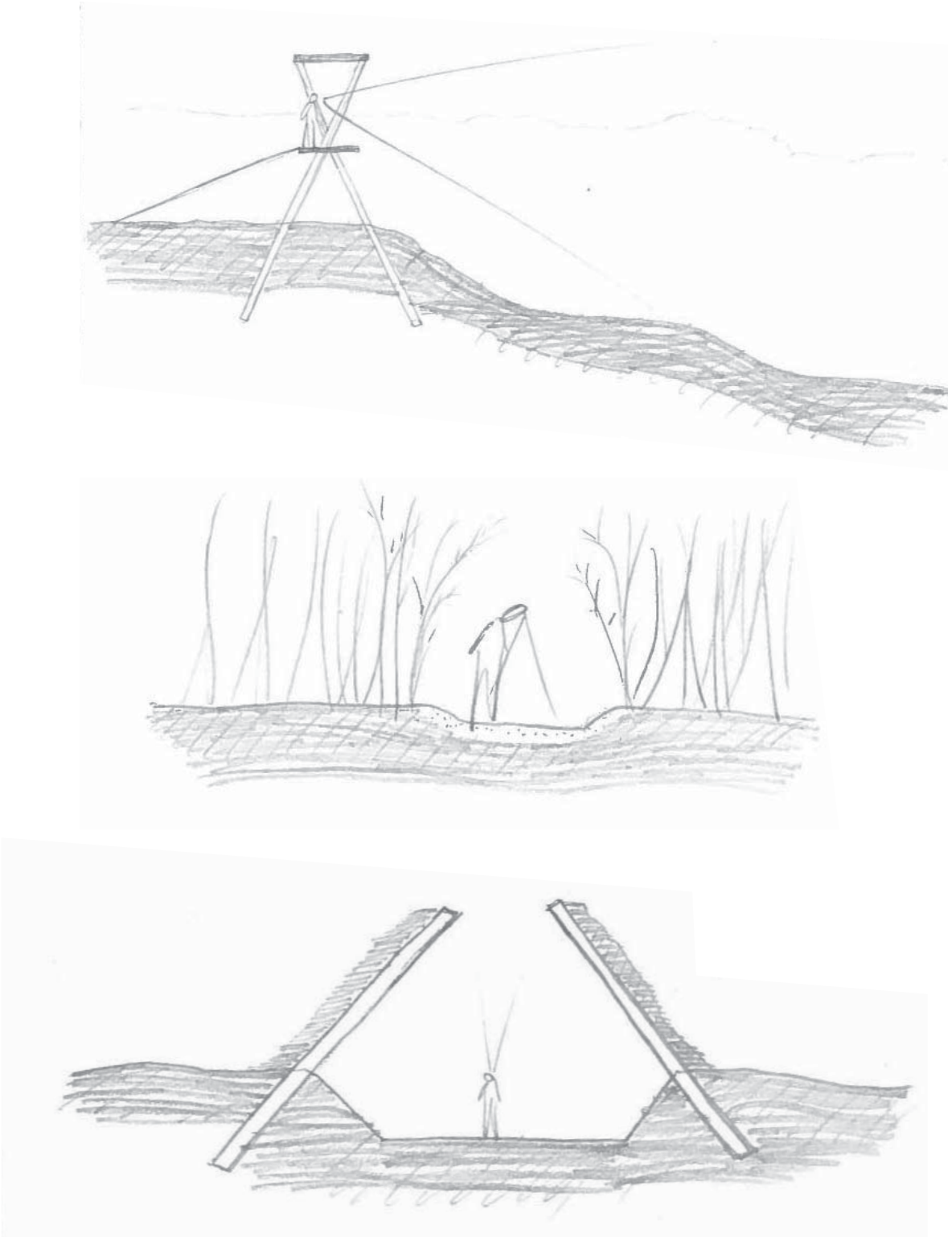


fig 4.02 *Three Senses*

STARTING WITH THE GROUND

My design approach is to find creativity and develop designs through the dialogue between idea (moment of inspiration) and making (process of creation). The deeper craft in this process is knowing when to let go of control; when one ascends, when one surrenders.

The making of ideas is a crucial way of learning. It re-engages us with material, and includes their character into the design process. Making also approximates some of the uncertain elements of physical reality by setting up a situation and encouraging material agency to provide feedback.

There is soul in a process. Something comes to life.

IDEA ——————————— MAKING

How do we understand a place as a living material, as something interconnected to all places, as a momentary thing constantly becoming other than it is? The program for the badlands is simply an erosion education path. Along this path, there will be parking, sitting, viewing and shelter. I wish to encourage a slower pace, so people can look at the badlands in a purposeful way. The badlands is rare, beautiful, and vulnerable. It has a time, and will be lost. I think of every construction as an opportunity to stir this thought.

Eventually, when the hummocks and gullies even out, these architectural interventions will stand as ruins recalling a lost beauty. Here, the architecture must stand the test of time.

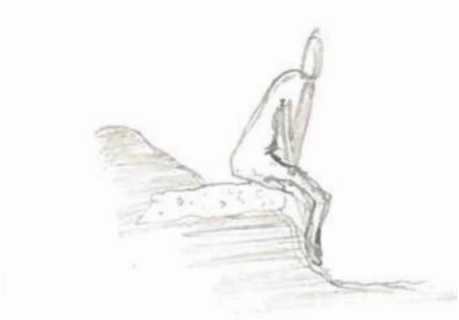


fig 4.03

fig 4.04 *Mapping a Path* A path from a fitness app, tracking my walk through the trails (main trails, side trails, and rogue trails). There is a lot of data here (lines between GPS points) but the accuracy is questionable.

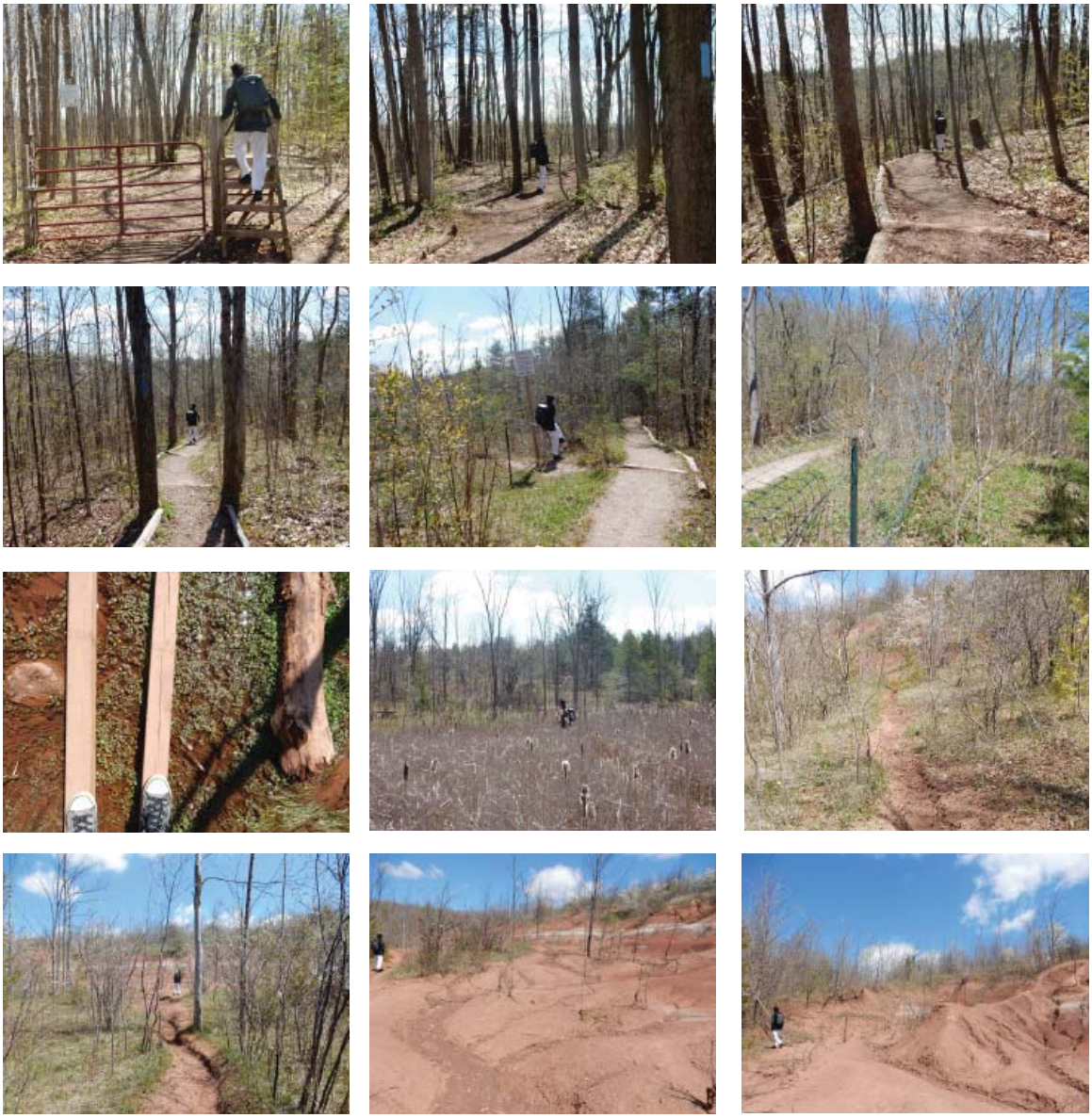


fig 4.05 *Mapping a Path*

Having walked the paths, I know, just by looking at it, that the map (fig 4.04) is off. Something isn't right with the lines that it drew. This is the agency of human knowing and first hand experience. The images above show how varied the experience of walking along a path can be. Experience is difficult to represent because it is rooted in all of the senses (the temperature, the sound of the wind through the trees, the softness of the ground under each step).

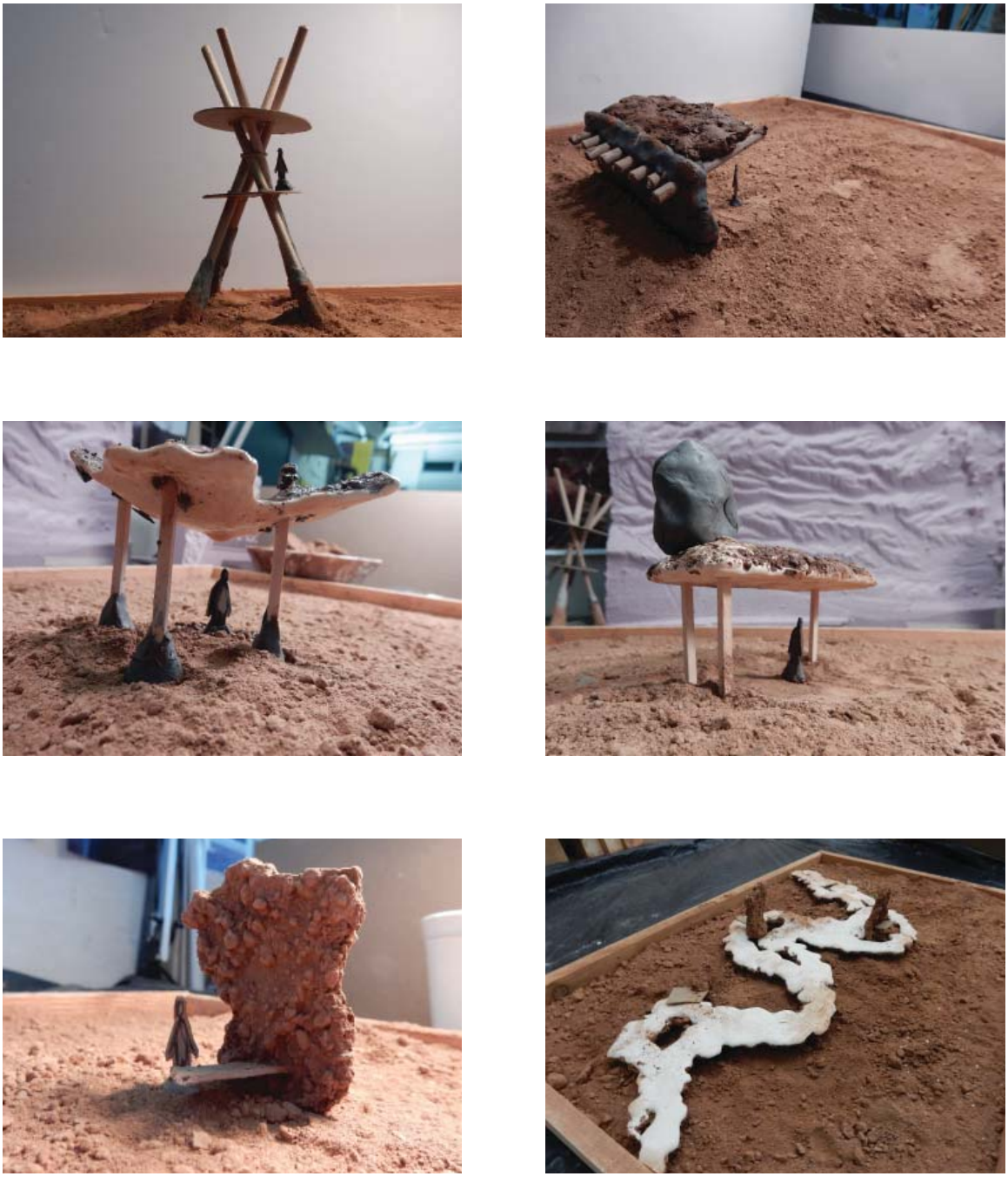


fig 4.06 *Material Ideas*

MATERIALITY, SPACE, AND TIME

This first set of models were an attempt to think about design in the badlands, and to move from material exploration into the space and time of architecture. The process varied for each, but they all originated from a spark, a moment of inspiration. I sat at my desk with dry earth, clay, plaster, and wood dowels. Intuition would slowly start to set in, and I would try something. Then I would reflect on the initial impulse and the result. In short, the methodology was simple; any image, or sketch that I had, would have to be made into a model to simulate its construction process and perceive its reality.

The ideas were there (some more poignant than others) but they were situated in a martian landscape. Their tie to the badlands was not strong enough. After documenting and reflecting on each model, I had to find a different methodology.

fig 4.07-4.08 *Lookout*

From the height of a tower, people can see the figure of the badlands (it's overall shape). The diagonal columns were partially inspired by how the dead trees stand, with their roots stuck in the clay. The columns hold up a viewing platform and a roof. The roof would be a great resting spot for migrating birds.

fig 4.09-4.10 *Viewing Shelter II*

The bowl shaped roof would hold up water, keeping some of it from washing over and further eroding the badlands (is this desirable? Perhaps the washing and eroding keeps it a 'badlands', preventing plants from taking root). The roof would be cast off-site, on a hill of earth.

fig 4.11-4.12 *Viewing Shelter I*

From a sheltered area, people can view out over the badlands at eye level. The earth would be beneath them, and, in this model, the earth would be held above them. The idea of a clay roof, held by beams cast in a concrete wall, is that over time it will erode, maybe rain will slowly create holes, much like it does when it is absorbed into the ground.

fig 4.13-4.14 *Viewing Shelter III*

An unstable, three legged form, with a wide unobstructed view. On one corner, a weight (perhaps a boulder or a cast block) keeps the structure from falling over. This gives structure, the balance of weight, an aesthetic presence.

fig 4.15 *Eroding Earth Bench*

This model started as an accident from a simple experiment (pouring water over a mound of dry, ground up clay). I stuck pieces of millboard in the slopes to interrupt and divert the water flowing downhill. When the water evaporated, what remained were chunks of clay, with these board pieces stuck in them. I thought these could be a kind of earth cast bench.

I took pieces out of the dried clay wall, simulating the lateral forces of wind, rain, and people. My intention wasn't to free the board, though it did look relieved to have the weight of earth off its back. I simply wanted to destroy the model slowly, as a creative exercise in unmaking. With each piece, broken off and dropped to the ground, the wall took a new shape. As the wall shrinks, the rubble around it grows. Does the bench fall over eventually, or remain level as a kind of datum in the landscape?

fig 4.16-4.17

September 22
Earth cast
Wandering lines
Following topography

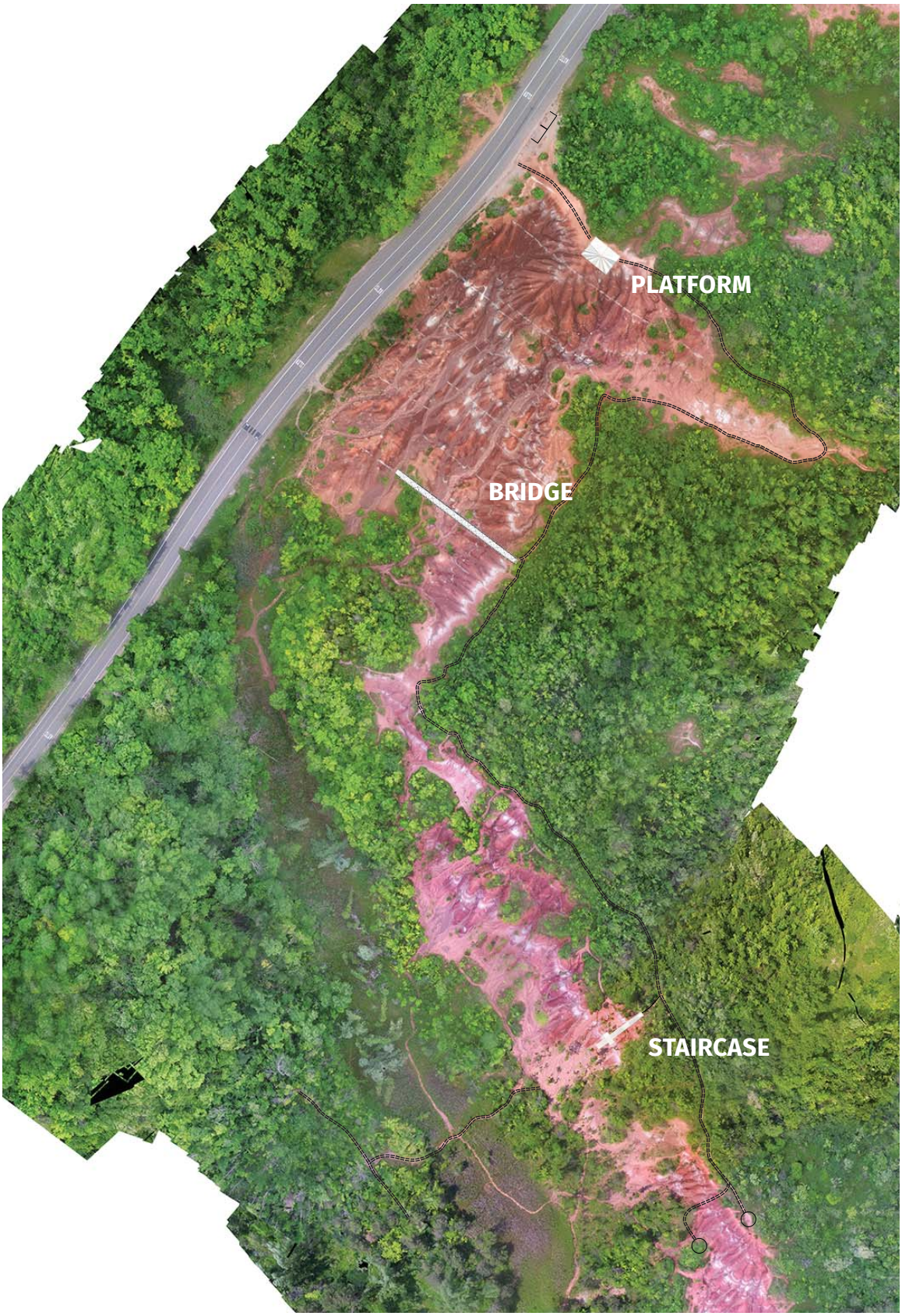
This model started with a sketch/an idea of two lines, wandering like a river. They expand and separate, creating space between them, spill-out zones. They contract and combine, guiding movement and accelerating people toward the next expansion.

The process was a sandbox approach where I created a topography of fine and coarse dry clay. I simply poured plaster onto this earth bed, drawing one line, and then another following the first. The result is fragile, but inspiring. The even line of my sketch became a rough/uneven line as it spread out over the topography and around the coarse rocks.

Sketch

Model

fig 4.18


PLATFORM
BRIDGE
STAIRCASE

FOLLOWING MATERIAL PROCESSES

After meeting with my committee, I began working on a second set of design interventions. In this set, I expanded my thinking beyond objects in the landscapes and focused on how visitors would move with the ground. These designs site much more specifically within the badlands.

I continued to look for inspiration through the materials that I worked with (plaster, clay, and earth). Thinking that the interventions needed to be built through a material process rather than a fixed form, I experimented with fabric formwork and earth casting to an extent. The fluid nature of casting could lend itself to the desire for site specificity by conforming to the topography or by filling voids in the earth.

Eventually, the designs shift away from casting, and focus more on how people will experience this impermanent landscape. There are many processes of ongoing change that I then attempt to intervene in, stand beside, and highlight. The thinking here is to bring people closer to the disappearing forms of this eroding site.

fig 4.19 *Site Strategy* Three interventions on the badlands highlight three process of erosion: rain water impact, surface water runoff, and ground water discharge.

fig 4.20 *Platform Iterations*

RETREATING EARTH, RAIN WATER IMPACT

fig 4.21
Platform

The Cheltenham Badlands is reported to be eroding at a rate of 2.8cm/year,[1] measured from the highest elevation of the feature area, which is located underneath the proposed location of this platform. The retreat of earth over a decade has been quite noticeable, according to a visitor whom I spoke with.

The platform interacts with this slow decrease in elevation by remaining static at its own level, as the earth retreats beneath it. The ground underneath the platform surface would be protected from impact erosion caused by rain, but not from erosion cause by surface water. The columns which hold the platform up, or become the platform itself, are cast into bore holes. The above ground portion of the columns would be cast into formwork. This would create a line were the earth-cast foundations end, where the earth once was.

1 Bruce Trail Conservancy Cheltenham Badlands Management Planning Background Information, Updated October 2012, p.11

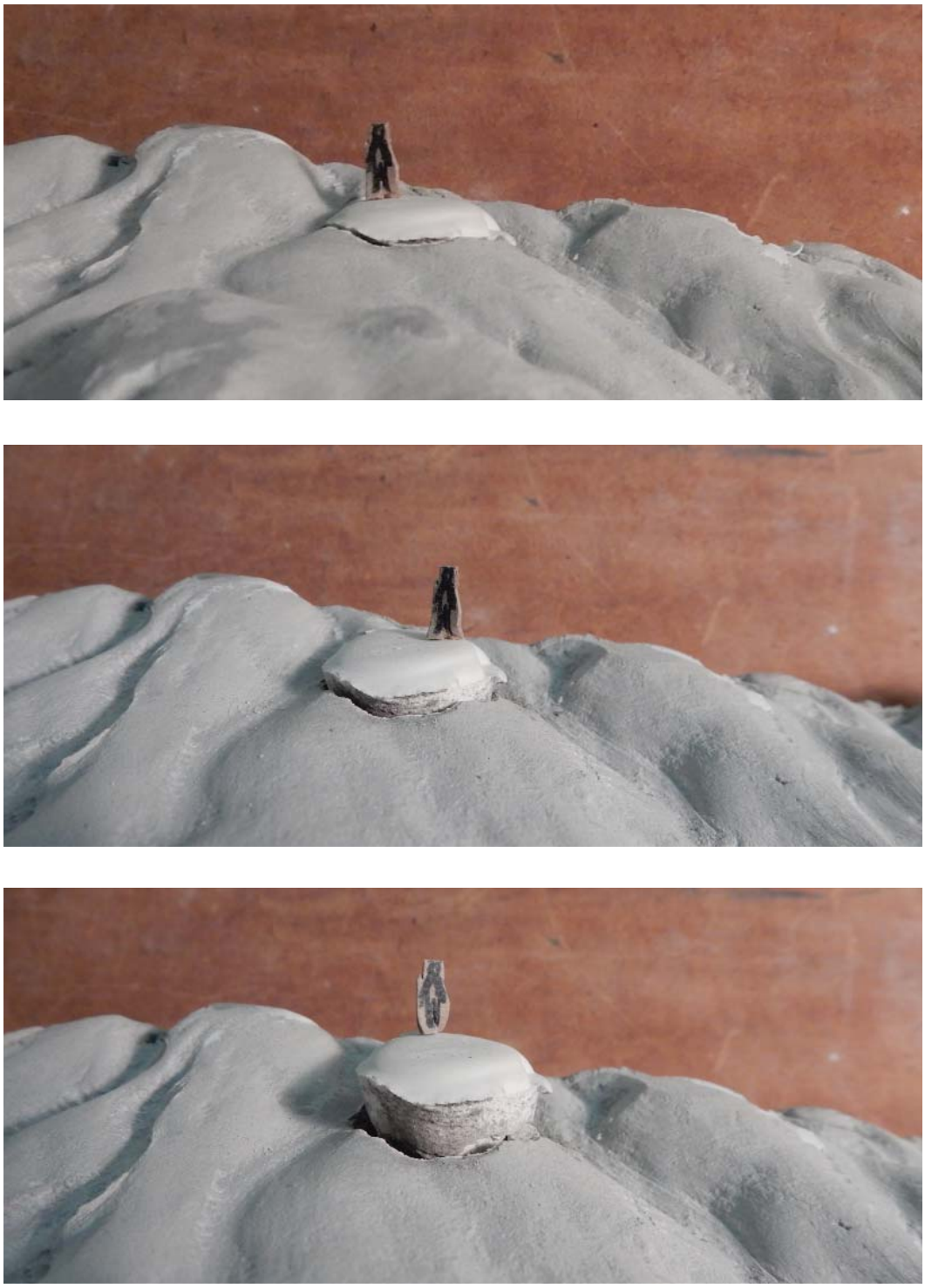


fig 4.22 *Viewing Platform I*

This platform is the top of a large column, cast into a bore hole in the ground. As the earth retreats, the column stays at its initial level, and the body of it is slowly revealed. The unearthing of the column acts as a measure of erosion.

fig 4.23-4.24 *Viewing Platform II*

A second iteration of the platform. Here I test the affect of many small pillars holding a glass floor. The pointed edges are spouts, directing water into the gullies, perhaps deepening them.

fig 4.25-4.26 *Viewing Platform III*

Thinking about foundations, I thought to cast the columns in a way that draws a line, above and below. As the earth retreats, visitors will be able to see how high the land once was.

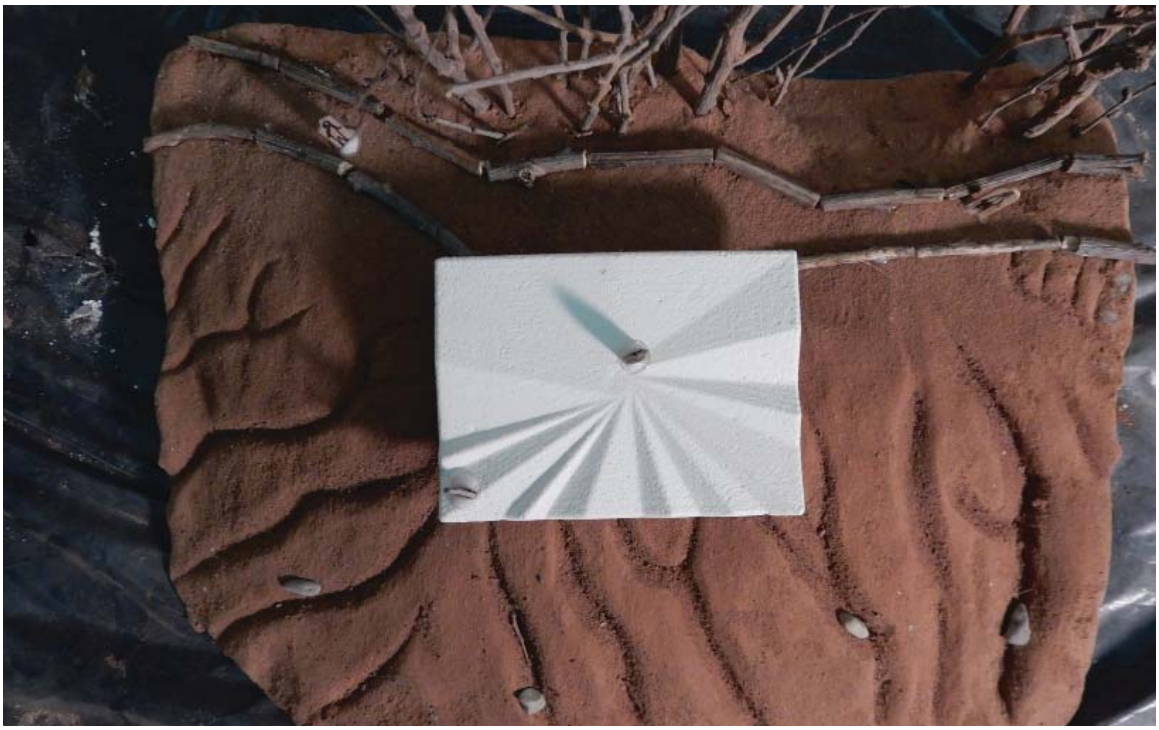


fig 4.27-4.28 *Viewing Platform IV*

Thinking about rain water and spouts, I modelled a fan shaped surface to guide water into the gullies.

fig 4.29 *Bridge Iterations*

HUMMOCKS AND GULLIES, SURFACE WATER RUNOFF

fig 4.30

Bridge

At the southwest end of the feature area, visible from the platform, is a bridge. This long walkway doesn't take you back across the badlands to the street, but out to a point in the center of the feature area.

The thinking behind this bridge is to interact with the undulating topography. I initially thought to use fabric formwork so the forms flexibility and the fluid plaster would rest on the ground and follow the topography. After several iterations with fabric forms, the idea that actually stuck was a straight line, drawn out from the height of the trail over the hummocks and gullies. This line acts as a datum to measure the ground against. As you walk along the line, the earth below rises up and falls away in waves.

fig 4.31-4.33 *Bridge/Datum I* Using a simple fabric form, I wanted to create a path which was level on the top, but conformed to the topography at the bottom.

fig 4.34-436 *Bridge/Datum II*

A second attempt, this time trying to alter the shape in plan from a straight path to one that expands in the middle to create a rest area for looking out.

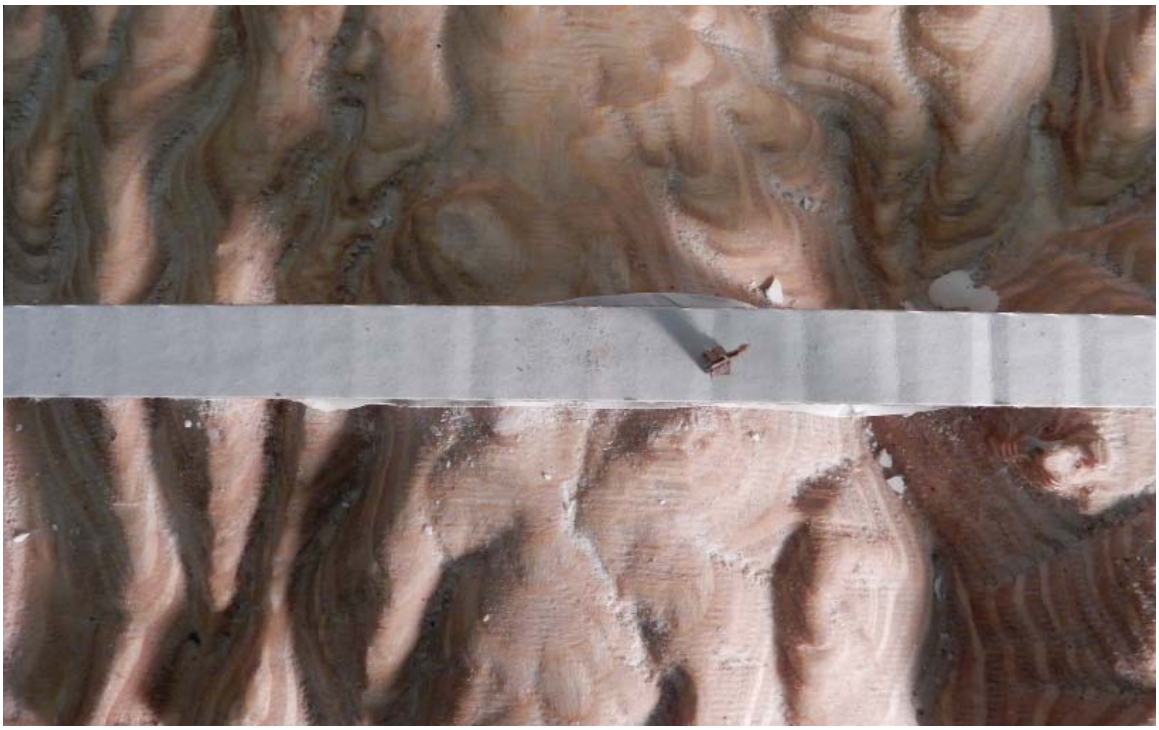


fig 4.37-438 *Bridge/Datum III*

I dipped a strip of paper in plaster and laid it on the terrain model. The path, being a straight datum line, creates a void space between the two lines, measuring the topography.

fig 4.39-4.40 *Bridge/Datum IV* Using the digital model, I tailored the fabric form to follow a section line. The result follows the topography with two-fold accuracy from the digitally tailored fabric form and from the fluidity of the casting process.

fig 4.41-4.42 *Bridge/Datum V*

I created a rigid form using several vertical members (in this case, plastic straws). The unexpected shards at the top inspire an approach to a railing.

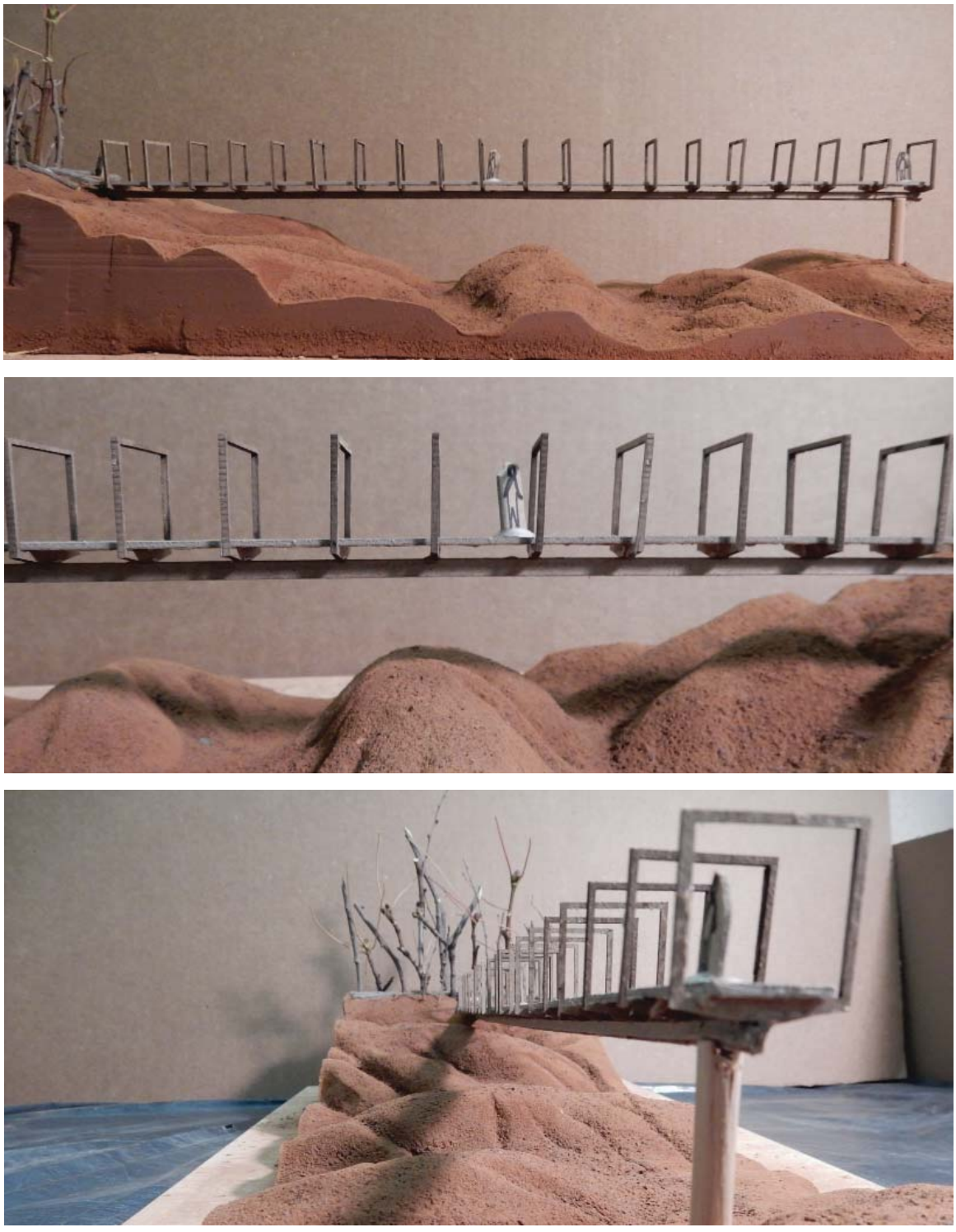


fig 4.43-4.45 *Bridge/Datum VI*

Here I departed completely from fabric formwork. Rather than drawing an undulating line which follows the topography, a straight bridge seemed like a more appropriate way to measure the shifting ground.

fig 4.46 *Staircase Iterations*

WHITE BANDS OF GREEN IRON, GROUND WATER DISCHARGE

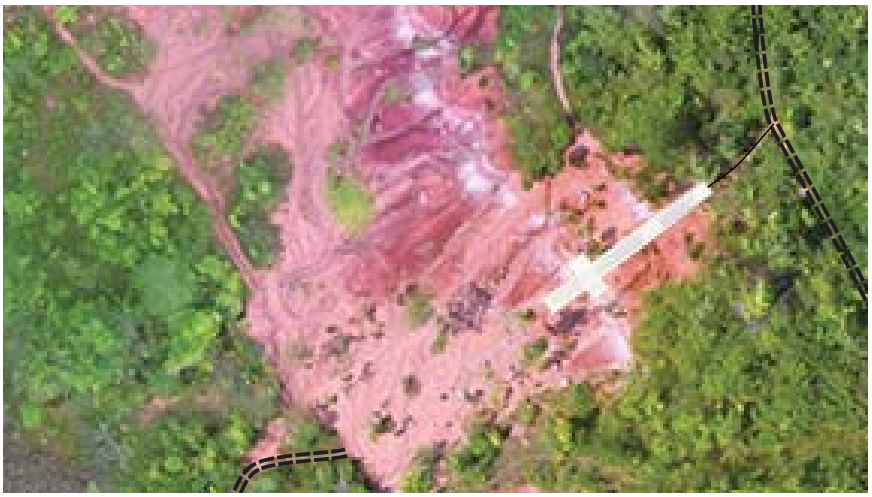


fig 4.47

Staircase

Aside from the hummocks and gullies, the most striking parts of the badlands are the bands of green iron oxide that track horizontally and vertically through the body of shale.

This intervention, in addition to bridging the 11 meter vertical distance between the upper trail and lower rogue area, brings people as close as possible to these lines. This close contact may stir up the question, "what are these lines and how were they formed?"

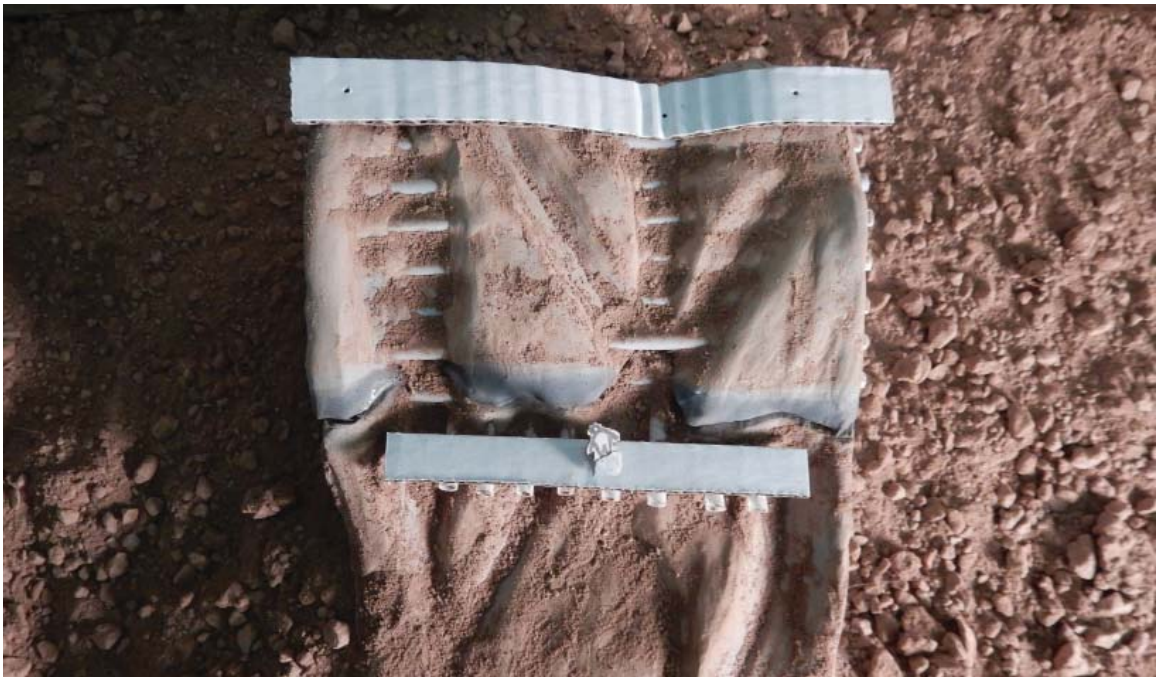


fig 4.48-4.49 *Staircase I*

Located in the back area of the badlands, this intervention brings people into contact with the process behind the green-white bands that run through the badlands. The upper path follows the ground, the stairs embed themselves into the gullies, and a path sits level with a white band.

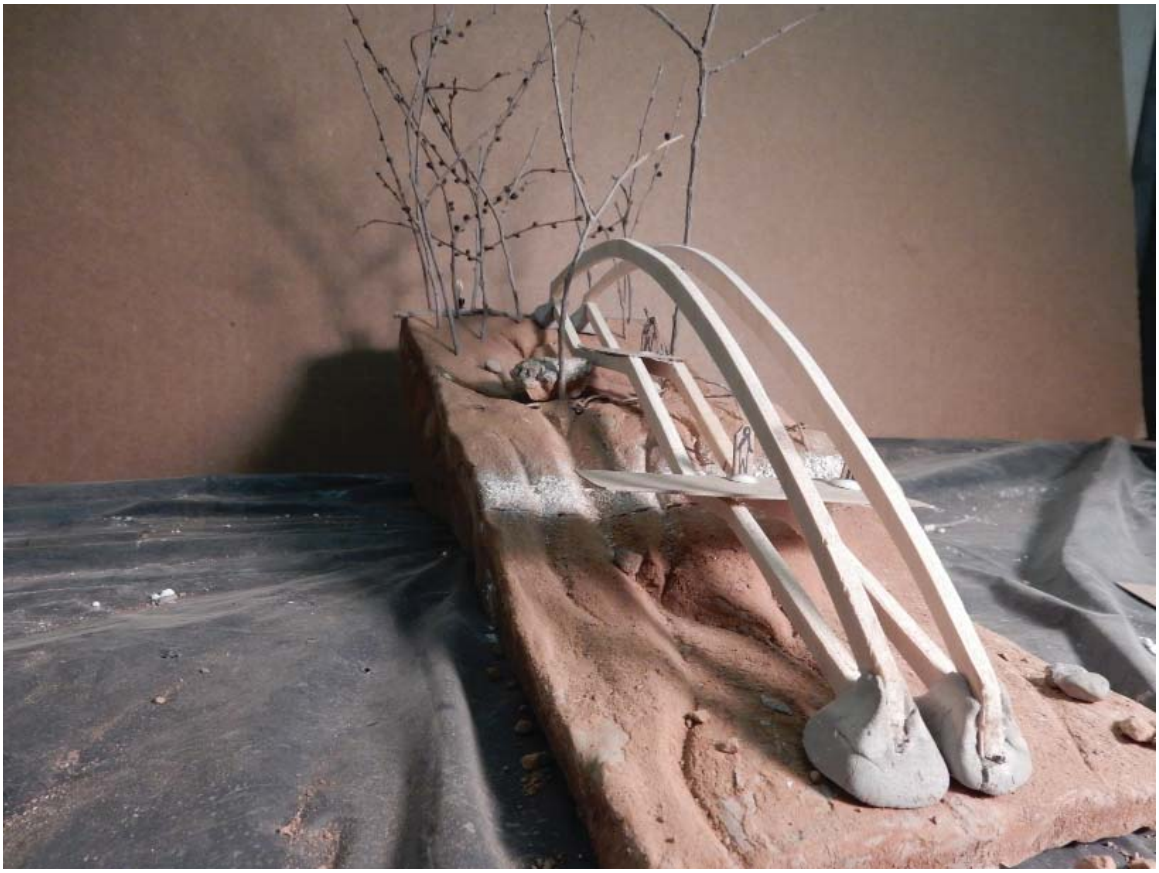


fig 4.50-4.51 *Staircase II*

Attempting to be as light on the ground as possible, this stair hovers above the ground, resting on two points. An arch supports the unsupported length of the stringer with suspension cables.

THE EXPERIENCE OF EROSION

The architecture necessary for an engaged experience with the land cannot be a self-contained symbol of erosion, atemporal to the erosion of the site. What I have designed here follows the land very closely and burrows into the ground with great care and intention. Though this is not in line with conservationist thinking, I thought it necessary to interact with, and even influence, the ongoing process of erosion. By being purposeful about an intervention in the land, I hope to reframe the human-nature relationship. I do not think it wise to alienate ourselves from nature and perpetuate the self-hate of humans as unnatural or destructive creatures on this earth. I want to encourage people to take ownership of their occupation of this earth, and so I chose to exercise my agency as an architect in this beautiful and fragile place.

The design, as whole experience, offers lookout points that draw lines out into the badlands, directing people's attention towards different processes of erosion.

The path to these lookout points offers no shortcuts, and at times, delays the visitor on their way. For many, the experience of the badlands is from their car window or for 10 minutes and a few photos.

By drawing out the path, between the interventions, I aim to suspend the moments of satisfaction (the camera worthy vistas). In the time between these points, I hope a deeper sense of wonder and appreciation can grow. These experiences take time after all.

fig 4.52 *Final Iterations*

fig 4.53-4.44 *Platform and Canopy*

fig 4.55 *Platform and Canopy*

The geometry of the platform was created by reducing a piece of the 3D mesh model to 15 polygons. This way it can sit directly on the ground. Every section of the platform then angles down toward the earth.

Above the platform is a folded canopy. The lines of water that fall off this canopy, would hit the earth and carve into it. Using the digital model for reference, I formed the surface of the canopy to line up with the gullies. The intention here is to concentrate rain into the existing waterways, deepening them, and away from the hummocks, in order to help maintain their height.

A wall supports the canopy. In order to resist the forward rotation of the cantilever, the wall is as deep as it is tall. The section that is below ground, is cast into an excavated trench in the earth, conforming to the rough walls of shale. Above ground, it is cast into rigid formwork. The lines between above and below marks the height of the earth at that moment in time.

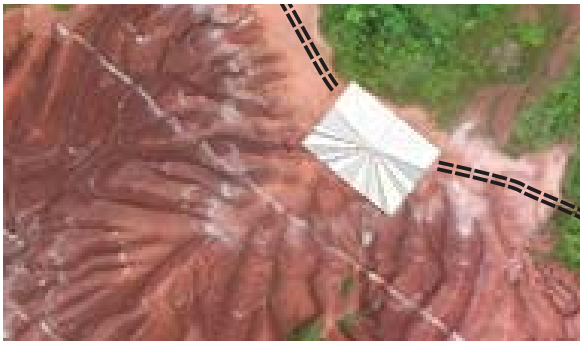


fig 4.56

fig 4.56-4.58 *Bridge/Datum*

fig 4.59 *Bridge/Datum*

This bridge is made up of seventeen 3m tall by 2m wide frames, spaced 3m apart. They are joined by horizontal beams and rest on two 50m long beams. The structure is intended to be as simple as possible for a 50m long pedestrian bridge. The cross bracing is kept to the top to keep the view open out towards the feature area.

The walkway narrows from 2m at the start to 1m at the end. This narrowing reveals the horizontal supports underneath the path, and encourages visitors to look down. Two balconies extend out to the east at the halfway point and at the end. These offer points to pause and step off the walkway.

The 100m return journey, described musically, is composed of the rhythm of equidistant structural frames, the narrowing crescendo of the walkway, and two spaces of rest. The intended experience is for visitors to walk out above the ground, and return to the downtrodden trail with a renewed awareness of the earth beneath their feet.

fig 4.60

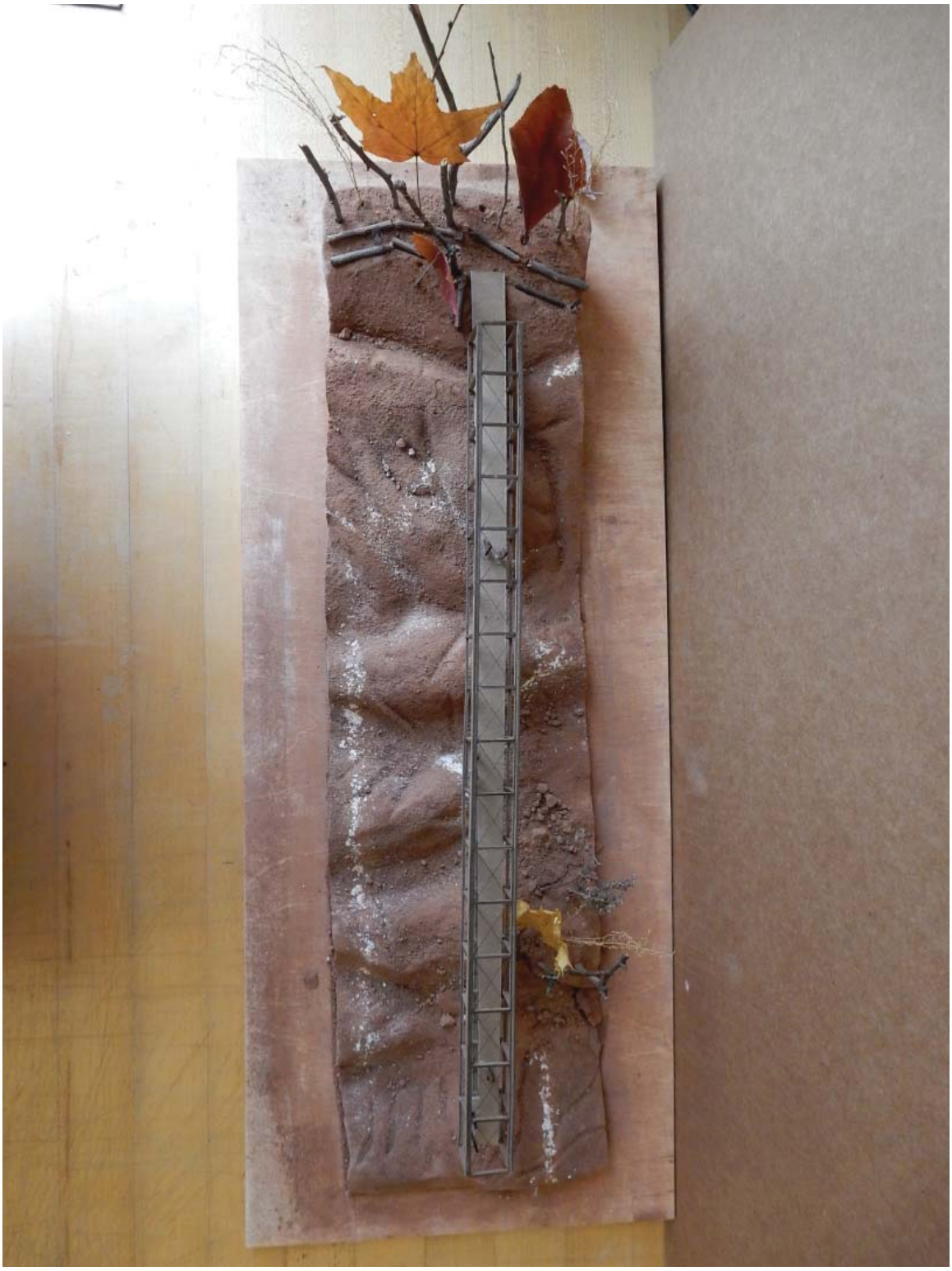


fig 4.61 *Bridge/Datum*

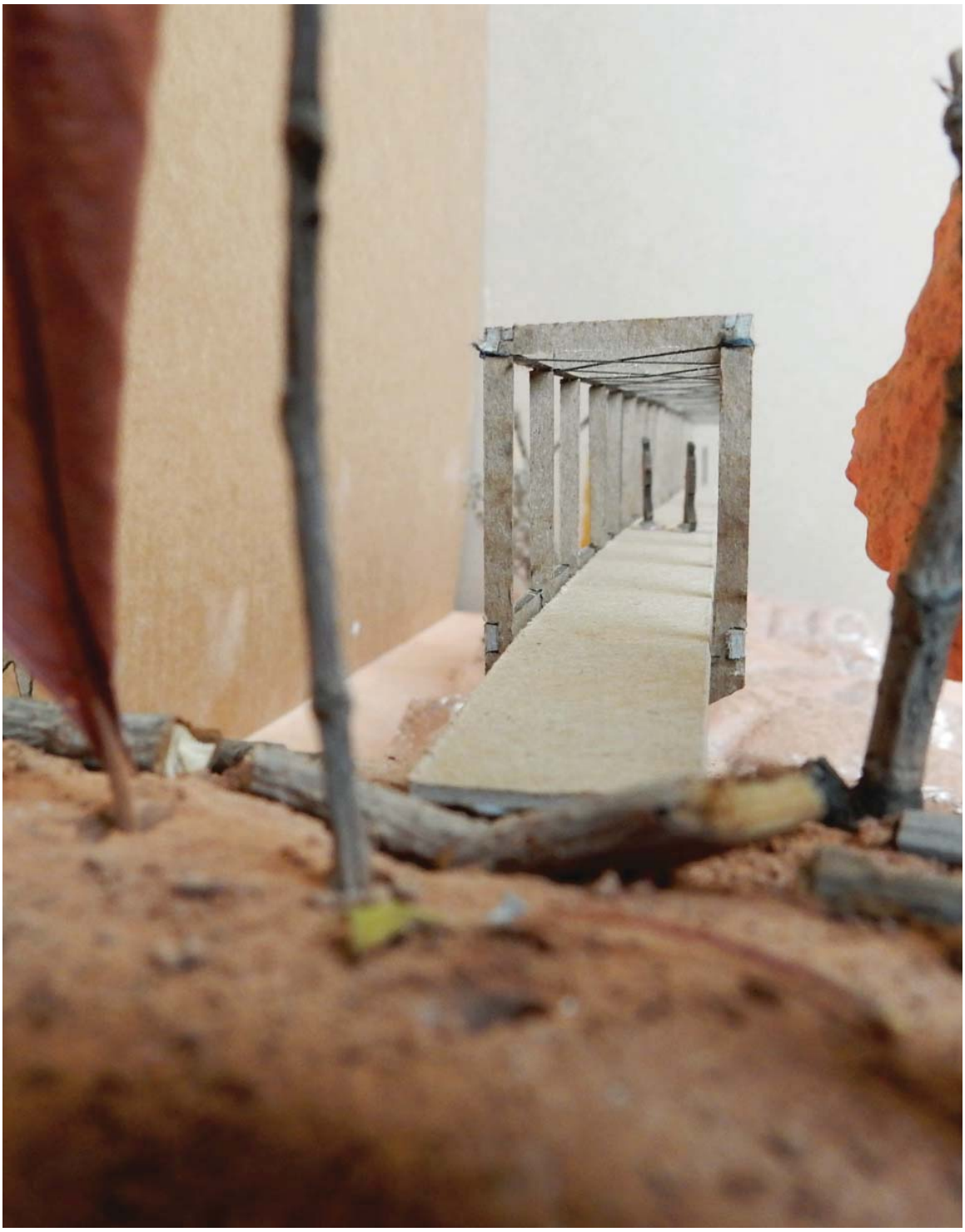


fig 4.62 *Bridge/Datum*

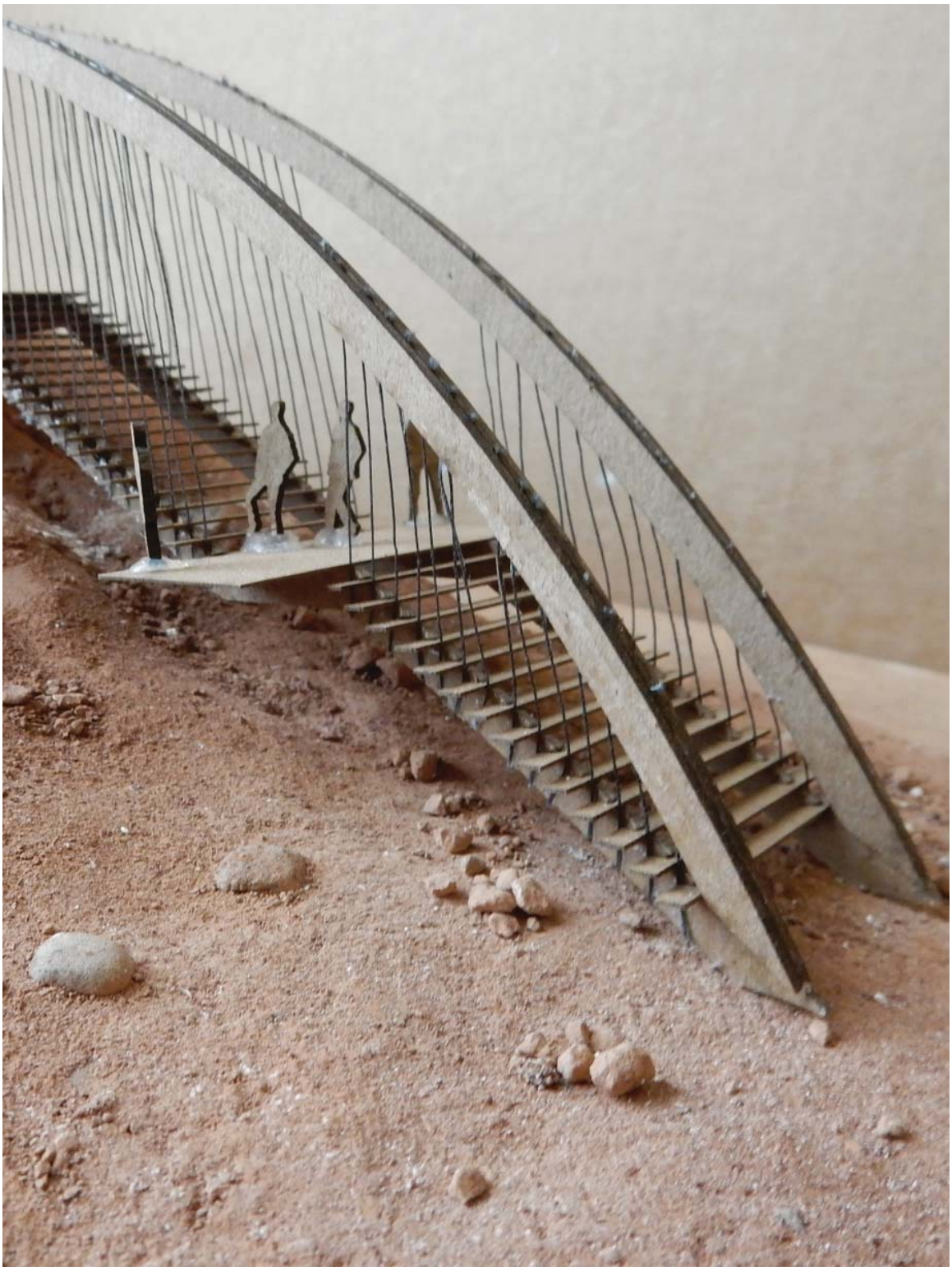


fig 4.63 *Stair Case*

fig 4.64 *Staircase*

The staircase is located in the back area of the badlands, away from Old Baseline Road, surrounded by the trees and the creek bed. It is a rogue area, out of sight, for those who still wish to walk the earth and build fires. This staircase takes visitors from this open lower ground, to the guided upper path, and vice versa.

In keeping with the language of touching the ground with care and intention, the stair spans between two foundation points. It rises 2.7m, then levels out 2m towards the hummocks, rises 3.7m, then levels out for 2.8m over the ground and between the trees, rises 2.9m, and then levels out toward the upper path. The first level, 2.7m off the ground has an extended landing, bringing visitors as close as possible to the horizontal white bands that cut across the red shale body.

Two arches support the length of the stair, picking it up with suspension cables. They draw a constructed curve similar to the eroded slopes of the badlands.

fig 4.65

fig 4.66 *Staircase*

fig 4.67-4.68 *Staircase*

fig 5.01

Returning to the Start

fig 5.02 *Leaving/Arriving* View of the back area from the creek valley.

SELF-REFLECTIONS

There is something enchanting about the badlands. As an image, and as an experience, it amazes people and draws them in. Is it because of the deep, earthy red, and the bands of pale green? Is it the undulating shape of it? Is it the remote, other-worldiness of it? It must be all of these things, plus the feeling that it is constantly changing.

From the beginning, my position has been that matter is alive, and therefore it will change (strengthen, weaken). This is an important life lesson: all things change, impermanence is the way life continues, growth needs decay, and we need to respect the internal force of non-human life.

Aliveness is felt through every sense. In order to engage with this vital reality, we must go beyond images when looking at site, and beyond form when designing a space.

As I began to design architectural interventions for this eroding place, carrying the concepts of impermanence, growth, engagement, and erosion, there were many times when I was at a loss. I wanted people to slow down and contemplate time-passing, but how do I design this? At best, I could only hope that if I practiced what I preached, then there would be a chance that the feeling would come through.

Reflecting on what I did end up designing, I have come to realize a misconception that I had about what it meant to design thinking through materiality. Initially I thought it meant to place the utmost importance on what the architecture was made of, encouraging self-formation, happy accidents, and differentiated surfaces. There is an exciting innocence to the idea of 'letting go of control,' and during the early stages of design, it was an excellent way to break out of habit and generate new ideas. In order to arrive at an architectural design, I had to switch from 'seeing what would happen' to 'understanding what is happening in this place.' It was through this engagement with the materiality of the site, that I was able to reach a level of specificity that is characteristic of architectural interventions. I believe that engagement with that which architecture is made of, and that which makes up the site of architecture, is the deeper craft of designing with materiality in mind.

The final designs are the results of a material based process. Though they look quite rigid when compared to the fluid forms of my early work with casting, materiality still remains at the heart of their design.

The methodology that I developed is based on making and an openness to inspiration that spontaneously arises out of that process. I turned to materials for inspiration and thought through pen, paper, dry earth, mud, plaster, and clay.

For the final designs, I turned to the material of the badlands. In acknowledging the fact that the badlands is a living body of soft, sticky shale, I tended toward designing lookouts and spaces to come in close to the earth.

The beauty of life is in its impermanence. The badlands will shrink and wash away with time. The interventions are meant to stand over this shifting ground as it moves beneath us.

fig 5.03-5.05 *Three Interventions*

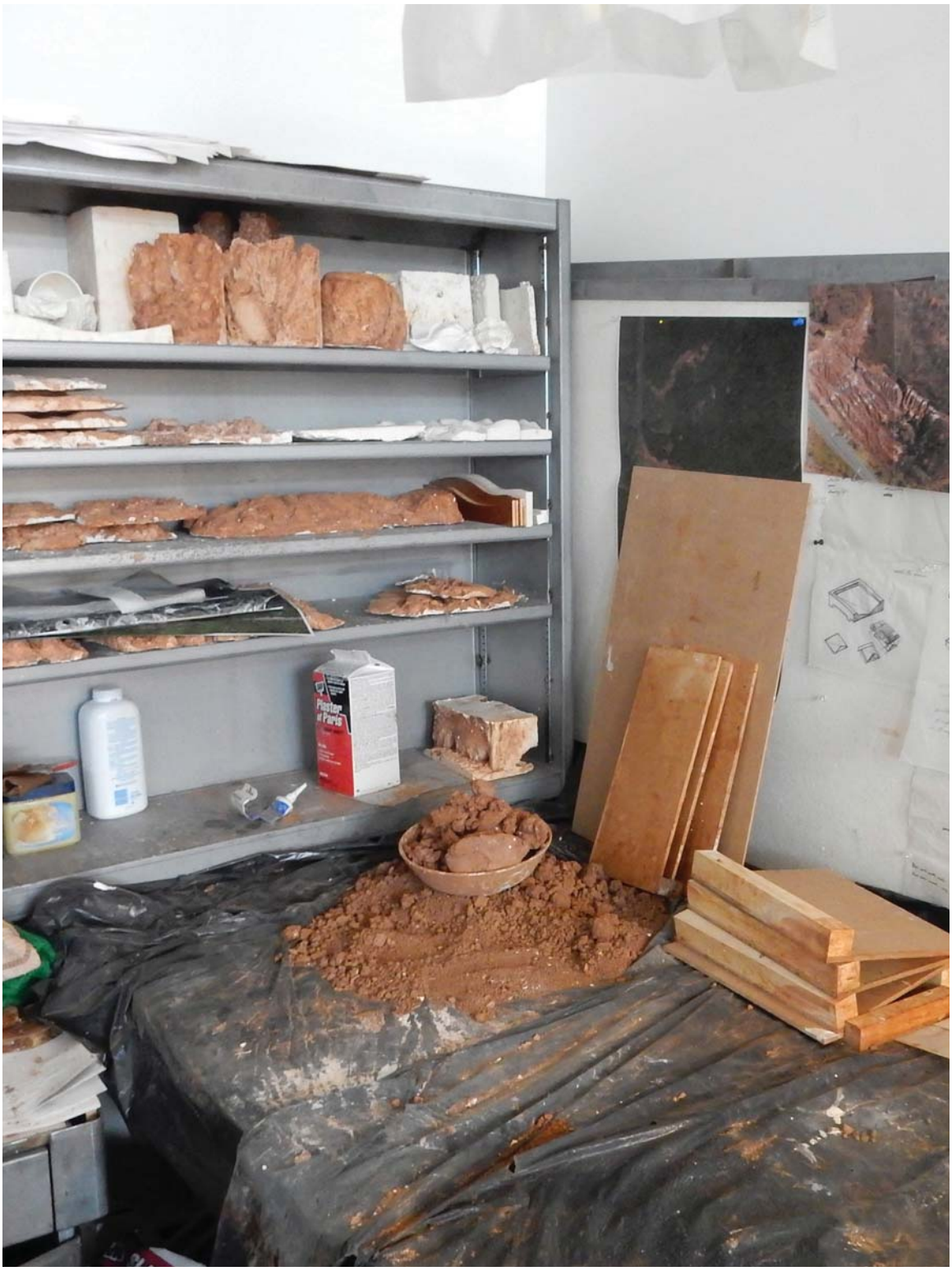


fig 5.06 *Always Making*

LESSONS FROM MATERIALS

One ambition of this thesis was to develop an interface between physical and digital model making. This interface was primarily held in my own head as I looked for the strengths in the two mediums. However, there is a key difference between the two. The power of computer programs is quite easily understood, as it appeals to our logical thinking patterns. Computer programs promise control, objectivity, and efficiency. They enable our designs to reach a high level of accuracy. The power of physical model making is not nearly as easy to explain, as it does not appeal to logical language. Materials do not present themselves as convenient or streamlined tools. Their value is not predetermined, but is rather determined by us as we spend the time and energy to understand how they behave. In other words, there is no user manual for clay like there is for Rhino 5.

Working with physical media has been a test of presence, patience, and confidence. These virtues are tried by computer programs as well, but the expectation is much different. The computer is meant to be efficient, that is its trajectory. When our patience is tested by a computer, it's the computers fault for not living up to its promised speed. When we are asked to be patient by materials, they have not broken any promise to us. I have found that working with materials does teach us lessons as they challenge us to understand how to work with them, and respond to what they want, rather than what we want.

Clay has taught me to be present in the process of making. When you buy clay, it is soft and ready to be manipulated, but once removed from the bag it begins to dry out and harden. There is a time limit here, a window of opportunity, in which I had to stay focused and continuously ask myself "what can I do now that I cannot do later?"

Plaster taught me patience. There is a time to plaster's transformation from liquid to solid, and once solid it continues to dry out and harden more. Casting with plaster had a rhythm of preparation, mixing, pouring, and then waiting. There were times when I could not leave the cast alone as I was holding it together with my own hands. I had to wait, but it wasn't the plaster's fault.

Earth taught me to be confident in the way I make things. As a material it is quite versatile, useful as a dry powder or a thick mud. However working with it was quite a messy process. It got everywhere, and I had to embrace that in order to work with it. There were many models that looked like nothing but a clump of dirt. Embracing the unrefined nature of earth, required me to be confident in what I made, regardless of how impressive it looked to the imaginary outside observer.

The value of working with physical models has been in material resistance. Though it may sound unwelcome in a creative process, to be restricted by the needs and wants of others, I have found that the limitations of materials have challenged me to be truly creative, to find freedom within constraints. The materials that I worked with have been grounding design partners. I hope to continue to learn life lessons through model making and in doing so, practice the virtues necessary for collaborating with other living things.

Earth teach me quiet ~ as the grasses are still with new light.
Earth teach me suffering ~ as old stones suffer with memory.
Earth teach me humility ~ as blossoms are humble with beginning.
Earth teach me caring ~ as mothers nurture their young.
Earth teach me courage ~ as the tree that stands alone.
Earth teach me limitation ~ as the ant that crawls on the ground.
Earth teach me freedom ~ as the eagle that soars in the sky.
Earth teach me acceptance ~ as the leaves that die each fall.
Earth teach me renewal ~ as the seed that rises in the spring.
Earth teach me to forget myself ~ as melted snow forgets its life.
Earth teach me to remember kindness ~ as dry fields weep with rain.

- An Ute Prayer

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