LITHIC VITALITY
CONCEIVING ROCK AS ACTIVE WITHIN DESIGNED LANDSCAPES

A non-degree-required thesis submitted to the
Master of Landscape Architecture Program
Department of Landscape Architecture

by

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May, 2024

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Lithic Vitality argues for methods of design that reposition the perceived role of rock in landscapes; from practical aesthetic elements to vital lithic entities– vital in that they are kinetically active, chemically altering, and intrinsically important to the physical and ideological conception of place. Through an exploration of the everyday vibrancy of the Catoctin Metabasalt within the Blue Ridge, this thesis foregrounds rock as a profound and active agent– constantly coming into new relations at compounding scales that reveal the ever-evolving interplay between the lithic and its surroundings.

Design is used as a tool to unravel rock as a force through five aspects of lithic vitality– physical, chemical, aesthetic, geologic, and narrative. Observing the minerals, affinities, fabrics, and chronicles within rock reveals that lithic bodies have no mundane application. From gravel paths and retaining walls to roadcuts and mountains, rock is acknowledged as an actant that is not restrained to traditional conceptions of geologic time, but instead works along with animal, vegetal, environmental, and cultural forces to constantly create new worlds.

One rock formation, the Catoctin, has been closely studied in this project. Its story is presented in the context of landscape architecture to elaborate on the conversation about rock. Seeing it as vital to the cultural and physical conception and everyday happenings of the places in which it is found. Within this, design is seen as an exciting opportunity to acknowledge the entanglement of lithic matter and surficial forces, acknowledging rock as a powerful and important agent, not immobile, and not prisoner to conceptions of geologic time.

I define Lithic vitality as the enduring narrative and physical force uniquely inherent in lithic matter, that persists across time and space, affecting diverse contexts and assemblages at scales both too small and too large to really ever grasp. It is both cosmic and atomic interaction, an everyday and lost-to-time process.

I have my advisor, Erin Putalik, to thank for her intelligence and care in working alongside me. Thank you to my thesis studio instructors, Leena Cho and Nana Last for their guidance. Thank you to Bradley Cantrell and Brian Davis who have continually supported my interests in all things lithic. Thank you, my dear cohort, for three years of love and support.

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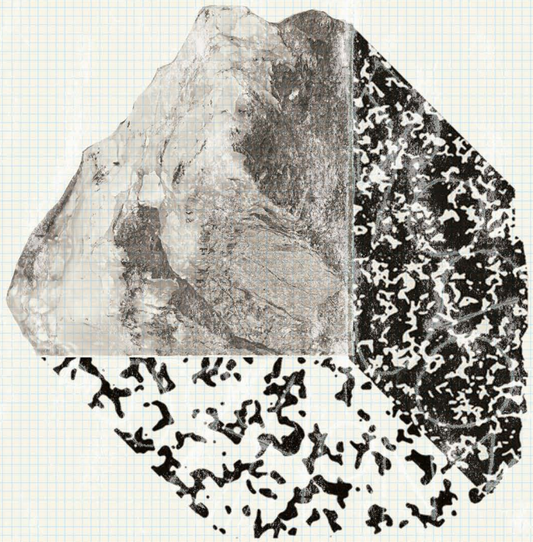

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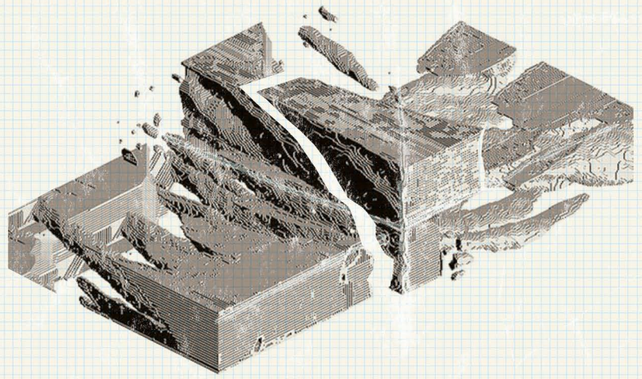

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collaged imagery from
vikautofocus, Jaron Popko, Dwayne Oyler

The concept of lithic vitality is borrowed from material culture studies, environmental humanities, and new materialism. It considers rocks as active agents that engage with and influence human practices and the everyday makeup of the planet. This perspective challenges traditional views that see materials as passive and instead highlights their dynamic roles in cultural and environmental processes.

MONUMENTAL GEOLOGIC

UNTOUCHABLE/UNMOVEABLE

ACTIVE GEOLOGIC

FORCE, ASSEMBLAGE, EROSION

FROZEN CHAOS

STRUCTURE, FORM, STORY

THE ANONYMOUS

SCALE, KINETIC ENERGY, CRUMBLE

MONUMENTAL BOULDERS

STORY, PLAY, IMAGINARY

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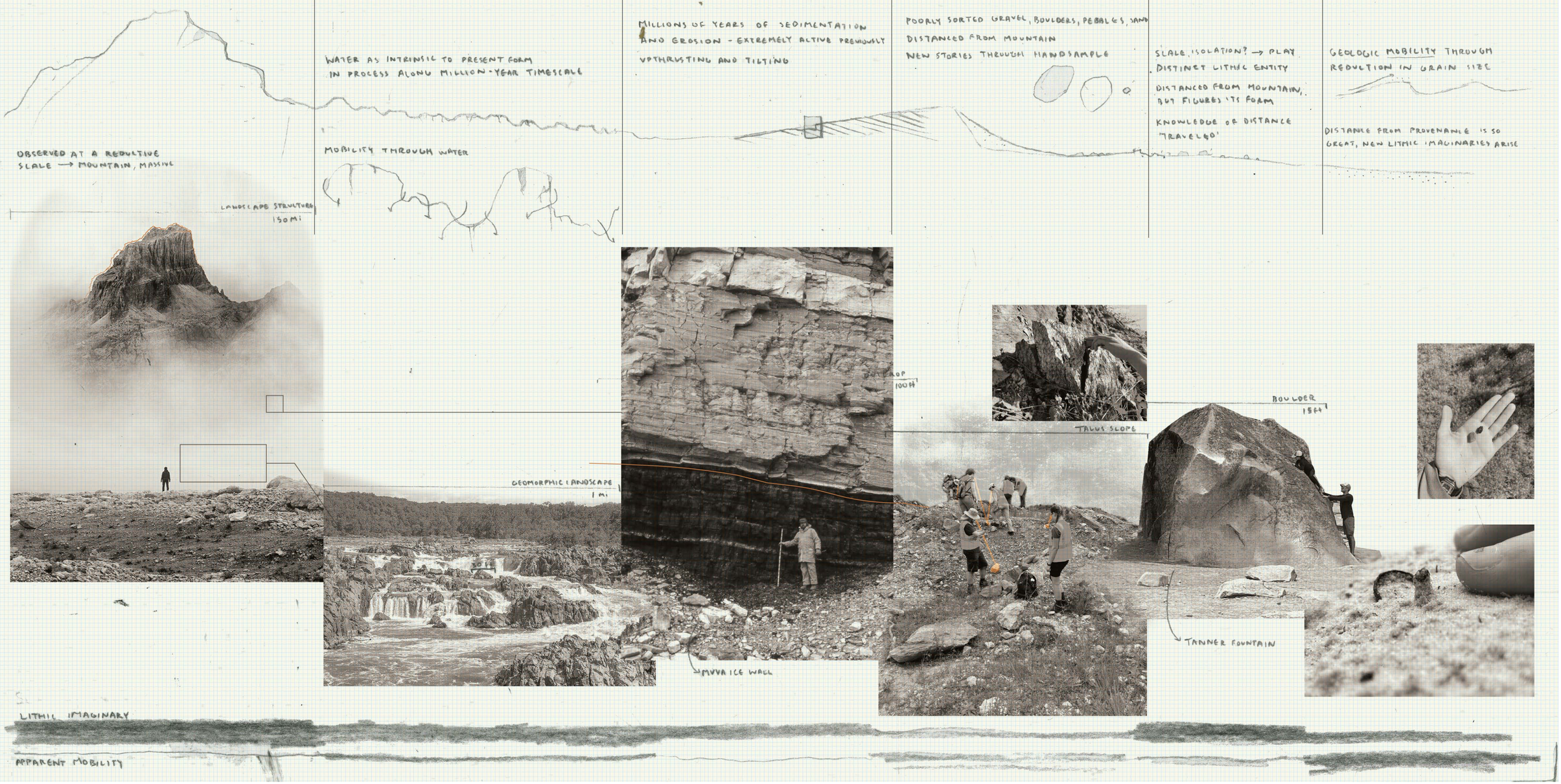
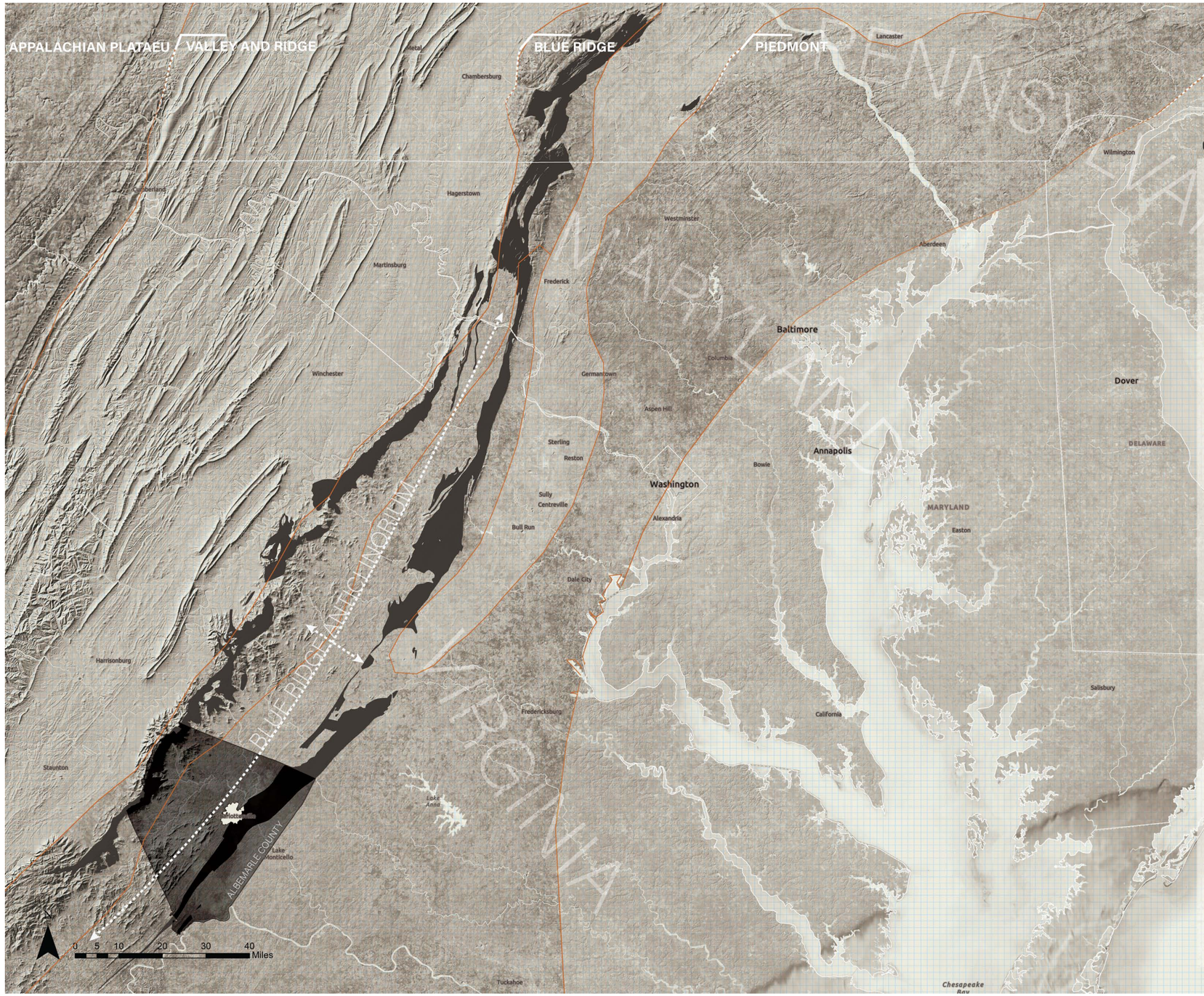
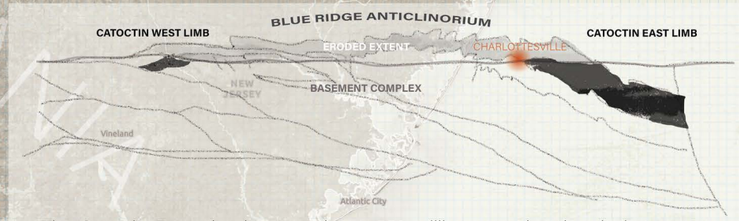


Though the unimaginable geologic pasts of rock take us as designers to a lot of interesting places, I am arguing that we cannot ignore their geologic futures nor their geologic now(s). We can't render them "inert" within the landscapes we create, because they simply are not. They're engaging in chemical and physical relationships with atmosphere, life, and water, at observable scales.



GEOLOGIC SUMMARY OF THE CATOCTIN FORMATION



The Catoctin Formation is a prominent, 550 million year ol rock unit that spans Virginia into Pennsylvania. Reflecting the compressional stress regime and subsequent differential weathering of rock, the unit appears to split into two arms, separated by the axis of the Blue Ridge anticlinorium. The two arms frame Albemarle county, with the eastern arm passing through Charlottesville.

At the core of this beloved anticlinorium, Mesoproterozoic basement rocks (1.0 to 1.2 billion years old) emerge, making them among the oldest rocks in the Appalachians. The basement complex is covered by a sequence of Neoproterozoic to Cambrian (500 to 735 million years old) metasedimentary and metavolcanic rocks, of which the Catoctin is included, forming northeast-southwest trending belts on the anticlinorium's limbs

The Catoctin unit is a prominent feature of the Blue Ridge Mountains, playing a significant role in the enduring presence of the range. The soils that form from this rock are rich, due to the presence of metamorphic minerals and their differential weathering into clays. While primary structures are infrequent in the Catoctin Formation greenstones, hyaloclastic pillows are found in the upper part of the unit at various locations-- exciting remnants of a chaotic igneous past..

Catoctin basalts were primarily extruded as subaerial flows during the rifting of Rodinia, evident from the abundance of columnar joints and flow-top breccias. At one point, the basalts covered an area over 30,000 km^2. The collision and subsequent rifting of Pangaea metamorphosed the entire unit and positioned it at high kinetic energy zones to weather away, reducing its surface extent to what we see today. The crustal architecture of the Albemarle region and presence of Mesozoic basins and Jurassic dikes bear witness to the assembly and subsequent breakup of two supercontinents (Rodinia and Pangaea) over the past billion years.

The present landscape of Albemarle reflects its bedrock foundations, shaped and rounded by geologic response to Virginia's humid temperate climate. These everyday processes give way to a liveliness seen on the surface today-- The rock takes on many different appearances depending on the combination of its mineralogy, geologic experience, and physical environment.

Notes from THE GEOLOGY OF JEFFERSON'S COUNTRY: A BLUE RIDGE TRAVERSE ACROSS ALBEMARLE COUNTY, VIRGINIA

This project follows one rock, though the ideas extend to all rocks and places. The Catoctin is an omnipresent character within Charlottesville, Virginia. Here, you see it in the roads, cemented in the walls, filling the ditches, armoring hillsides, crumbling in the paths. Leave the city, and head to the mountains and you'll see it upholding the slopes of Shenandoah. This thesis is a dedication to, and a story of, this rock.

CONCEPTUALIZING LITHIC VITALITY

USING ASPECTS OF ROCK AS LENSES FOR DISCERNING
LITHIC VITALITY

PHYSICAL (TRANSFORMATIONAL) VITALITY

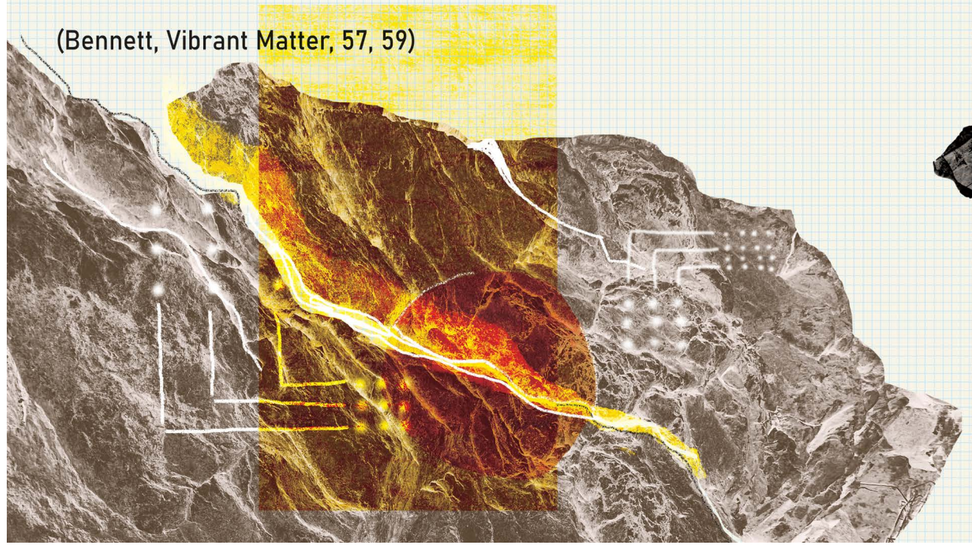
RISK TO EXIST, ORGANIZING CAPACITY, ENDURANCE, CHANGE, MOTION/MOVEMENT, SCALE, EVOLUTION, CARPENTRY

THE ABILITY TO ORGANIZE SELF AND SURROUNDINGS

The aim is to articulate the elusive idea of a materiality that is itself heterogeneous, itself a differential of intensities, itself a life. In this strange, vital materialism, there is no point of pure stillness, no indivisible atom that is not itself aquiver with virtual force.

The dynamics of spreading cracks may be an example of what Deleuze and Guattari call the "nomadism" of matter. Playing on the notion of metal as a conductor of electricity, they say that metal "conducts" (ushers) itself through a series of self-transformations, which is not a sequential movement from one fixed point to another, but a tumbling of continuous variations with fuzzy borders. What is more, this tumbling is a function not only of the actions applied to metal by metallurgists but of the protean activeness of the metal itself.

(Bennett, Vibrant Matter, 57, 59)

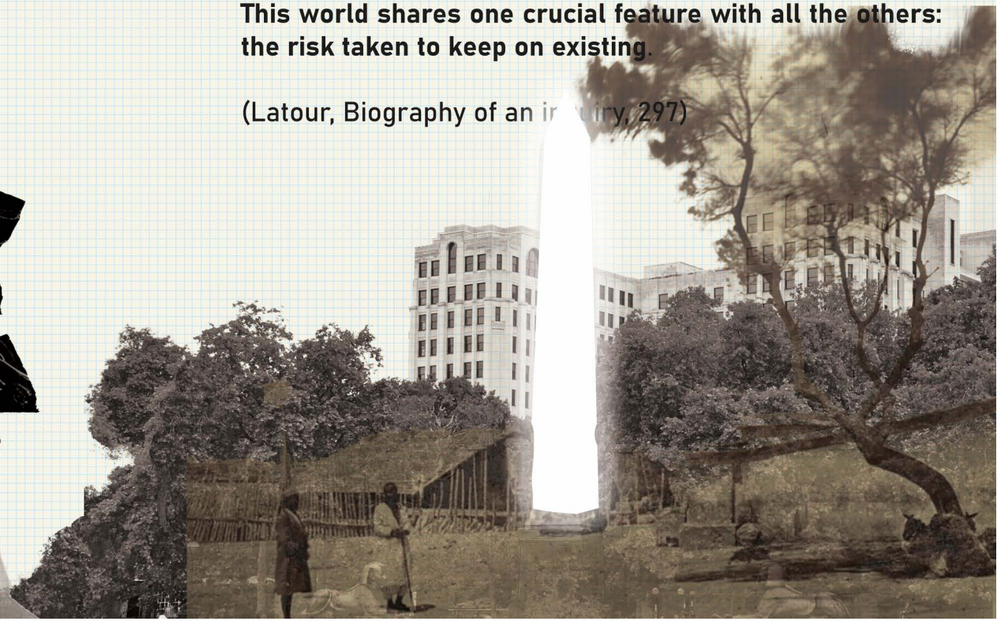


Not only can stone be carved, worn down, and pulverized; stone surfaces weather, crack, and crumble, inscriptions become illegible and even disappear, vertical stones fall and sculptures break... Its surfaces may be hidden by moss, lichen, or soil, and buried by shifting earth surfaces and under profuse vegetation... Stone possesses many possibilities for transformation: into jewelry, into sculpture, and into light and shadow in photographic art. Usually solid in the form of boulders, rocks, and small stones, gravel, sand, and soil, it emerges molten from the earth's core during volcanic eruptions and becomes gaseous in the intense temperature of stars.

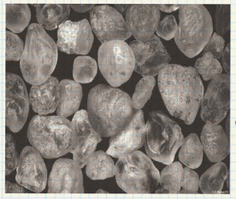
(Arnold Berleant, The Soft Side of Stone, 52)

Stengers shared with me an astonishing quotation from Whitehead, about the risk taken by rocks - yes, rocks - in order to keep on existing; it must have been the famous passage about Cleopatra's needle on the Charing Cross Embankment in The Concept of Nature (Whitehead, 1920: 165-166). (I) could not stop running my fingers over the rough red surface of the rocks as if to find out whether Whitehead could have been right! At that moment, everything - what I had discovered in Kenya and what the principle of irreduction had hinted at obscurely - became clear. There exists a completely autonomous mode of existence that is very inadequately encompassed by the notions of nature, material world, exteriority, and object. **This world shares one crucial feature with all the others: the risk taken to keep on existing.**

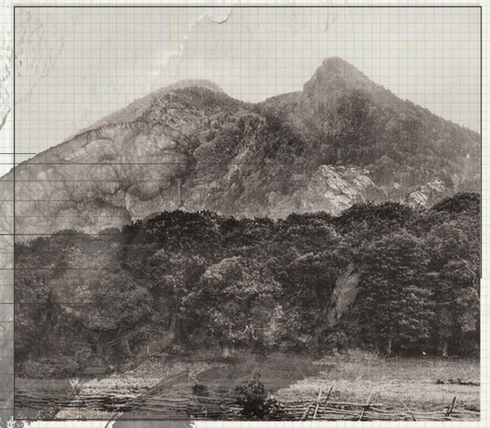
(Latour, Biography of an in[illegible]iry, 297)

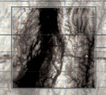


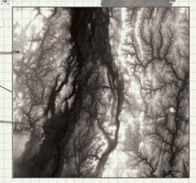
PHYSICAL VITALITY: The risk taken to exist and change, an endurance, from mountains to sand. An ability to organize self and the surroundings, becoming and creating the world around it. I think of the Proto-Appalachian mountains turning into the beaches of Florida.

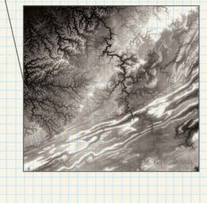


38.4755° N, 78.4535° W









27.4989° N, 82.5748° W

OLD MOUNTAINS WANT TO TURN TO SAND

I heard it was 550 million years ago

When I emerged up out of the earth

I became its surface and its depth

I yawned out its gasses and contracted

Into rock

I became new

Time and time again

Multiplying myself

I became and created

Outward and inward

Force

Inward and outward

Force

Esri, USGS

Physical vitality in rocks manifests in many different ways. The concept intertwines with the physical weathering of rock-- a change in state through its traveling or participation with other environmental forces. While moving, it is becoming, multiplying, and enabling at myriad scales.

CHEMICAL VITALITY

METAMORPHISM (CHANGE), GENERATIVE RELATIONSHIPS, NEWNESS, CREATION, DESTRUCTION, SUBTLE, EXPLOSIVE

THE ABILITY TO CHEMICALLY INFLUENCE SELF AND SURROUNDINGS

"however solid things appear . . . even these are porous":
In a cave of rocks the seep of moisture trickles
And the whole place weeps its fat blobs of tears.
Food is dispersed all through a creature's body;
Young trees grow tall and yield their fruit in season,
Drawing their sustenance from the lowest roots
Through trunks and branches; voices penetrate
Walls and closed doors; the seep of stiffening cold
Permeates bone. Phenomena like these
Would be impossible but for empty spaces
Where particles can pass.

(Lucretius, The Nature of Things, 30)

We may be living creatures, but our aliveness is composed of geologic materials such as calcium, iron, and phosphorous. And the comparatively tiny living organisms that inhabit the earth's surface, be they humans, lichen or bacteria, are now seen to be key players in setting up and precipitating monumental geologic processes and planetary-scale chemical transformations in geologic materials. The earth would have a completely different geologic self if there were no life on it.

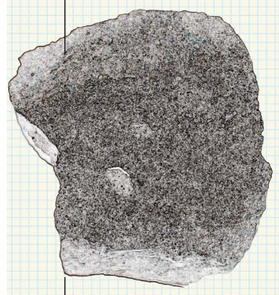
(Ellsworth and Kruse, Making the Geologic Now, 17)

All these years I overlooked them in the
racket of the rest, this
symbiotic splash of plant and fungus feeding
on rock, on sun, a little moisture, air —
tiny acid-factories dissolving
salt from living rocks and
eating them.

(Lew Welch, Springtime in the Rockies, Lichen)

CHEMICAL VITALITY: Coming into atomic generative relationships, in both creation and destruction, this ability to chemically alter self and the surroundings. I think of silicate rock weathering and carbon sequestration through interaction with the atmosphere. **Subtle, atomic, compounding entanglement.**

CATOCTIN BASALT



LABRADORITE
$(Ca,Na)(Al,Si)_4O_8$

AUGITE
$(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al)_2O_6$

MAGNETITE
Fe_3O_4

ILMENITE
$FeTiO_3$

ENSTATITE
$Mg_2Si_2O_6$

PRECAMBRIAN: APPROX 550 MYA
ASSOCIATED WITH RIFTING OF RODINIA

ALLEGHENIAN OROGENY

METAMORPHISM

CATOCTIN METABASALT

CHLORITE
$(Mg,Fe)_3(Si,Al)_4O_{10}(OH)_2$

EPIDOTE
$Ca_2(Al,Fe)_3(SiO4)_3(OH)$

AUGITE
$(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al)_2O_6$

QUARTZ
SiO_2

CALCITE
$CaCO3$

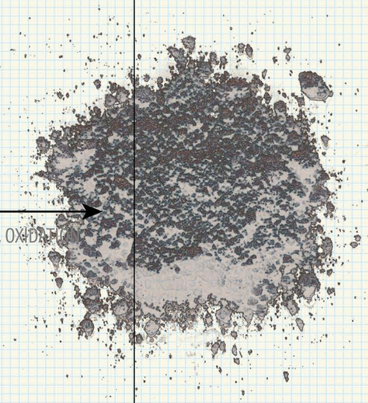
ACTINOLITE
$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$

CARBONIFEROUS: APPROX 350 MYA
ASSOCIATED WITH BURIAL AND UPLIFT

SURFICIAL WEATHERING

HYDROLYSIS, HYDRATION, OXIDATION

CATOCTIN SOIL



KAOLINITE
$Al_2Si_2O_5(OH)_4$

ILLITE
$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$

IRON
Fe_2O_3

QUARTZ
SiO_2

MODERATELY DEEP, WELL DRAINED, RED
SUITABLE FOR AGRICULTURE

The Catoctin greenstone has seen several distinct chemical phases that are logged within the geologic record. The minerals emerging from its volcanic origins were transformed with orogenic heat and pressure. In time, those new metamorphic minerals are weathered into iron and clays, working in tandem with life to form soil.

AESTHETIC (LOVE) VITALITY

CULTURE, CONNECTION, ANONYMITY, AESTHETICS, PHYSICALITY, MAGNETISM, MATERIALITY

THE ACT OF BEING PERCEIVED AND BEING CARED FOR

We inhabit an ephemeral landscape. We love stone, and the marks we make upon stone, and the marks stone makes upon us. Stone insists not because it is so different from we who build families of whatever kind against cataclysm, but because of its deep affinity, its enduring tectonicity (movement, carpentry, making), its strangely inhuman (I don't know what else to call it) love.

(Cohen, Stone, 73)

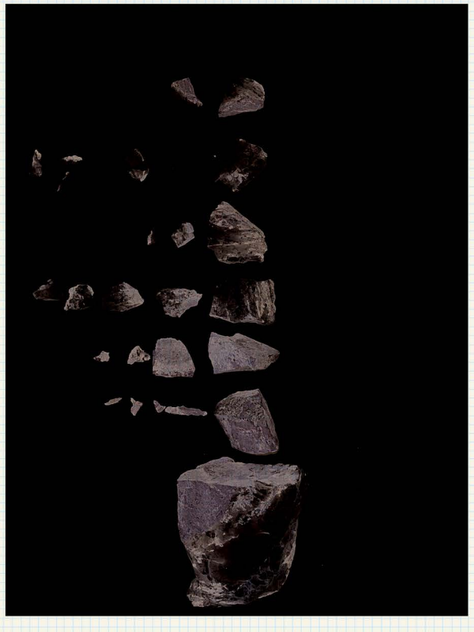
Stone can endure, it can change, it can harm, it can heal. It can make you rich, it can make you poor, it can become an enemy, a friend, and a teacher. It can carry your memories and your dreams. It can build empires and bury cities. It can reveal the history of the universe. It can open and close the gates of philosophy. It can open and close the doors of Hell. It can change the course of nature. It can change its own nature. It can empty the world of time.

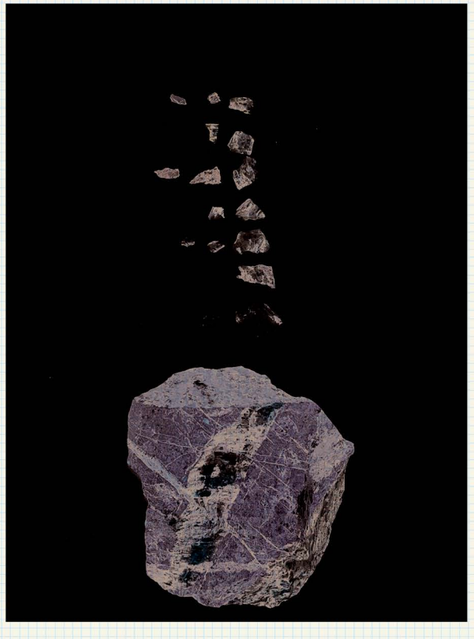
(Raffles, A Lapidary Itinerary, 527)

He handed me this big lump of dark smooth stone. There was not much to show that it was anything more than a stone. I held it in my hand. He showed me where there was a groove, just where the thumb closes to hold it. So there was: I closed my hand to hold the stone and my thumb rested in the worn-smooth place and the stone sat snug and close and it felt like a tool, something to work with. We both remarked that it is a strange and wonderful thing to feel, in the cold contour of stone, the shadow of a thumb that had made this place for itself hundreds, maybe thousands of years ago, so fashioning a stone that still, once and for all, fits close in the hand.

(Harries, A stone that feels right in the hand, 124)

AESTHETIC VITALITY: The ability to be perceived and cared for. This is something like love. Here, rock becomes intertwined with culture and humanity. It is forming connections with people through its magnetism, physicality and material potency. I think about the feeling of a special rock in the hand.





Humans have a strange affinity to rock. Even if of little economic value, a stone can hold significant emotional or physical value. A smooth cobble from a beach, pink flecks in a granitoid. There is something seen, something to love, in every rock. This love can generate new life for the rock and human, becoming a companion or a comfort.

GEOLOGIC VITALITY

BEING KNOWN, EXAMINATION, NAMING, STORYTELLING, PETROGENESIS, CYCLES

THE ACT OF SHARING SECRETS

[Geology] is about understanding "wyrd"-- the ways the secret stories of the past hold up the world, envelop us in the present and set out path into the future. The past is not lost; in fact, it is palpably present in rocks, landscapes, groundwater, glaciers, and ecosystems. Just as one's experience of a great city is enriched by an understanding of the historical context of its architecture, there is deep satisfaction in recognizing the distinctive "styles" of past geologic periods. And we, too, dwell in geologic time.

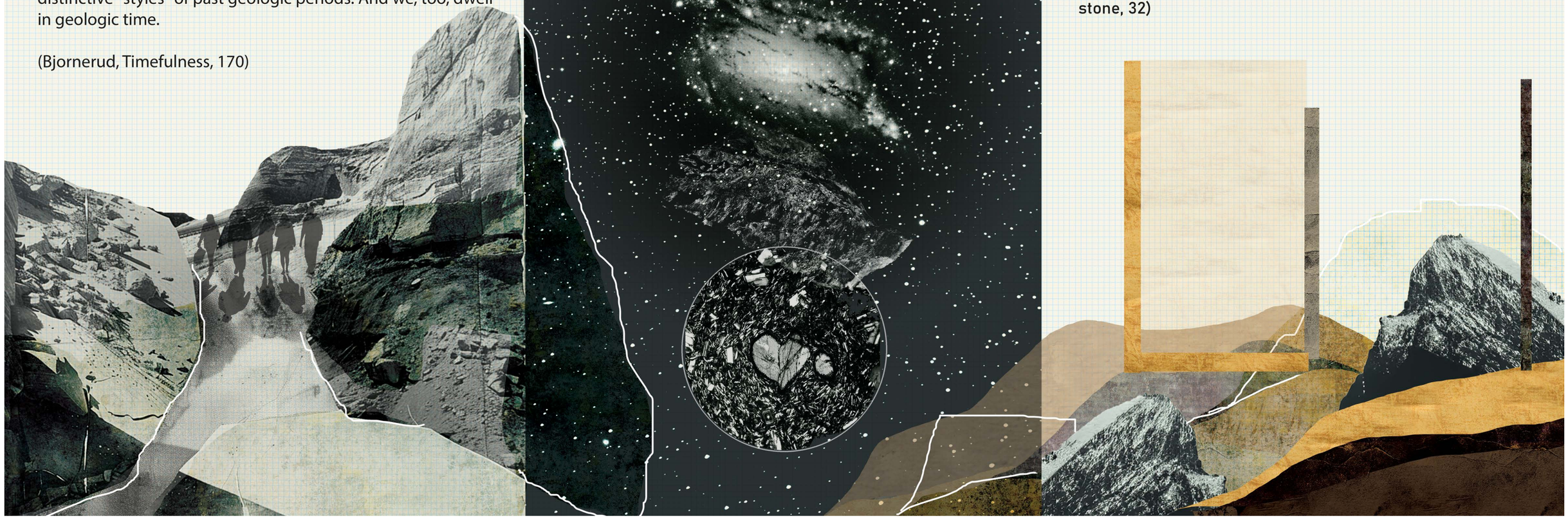
(Bjornerud, Timefulness, 170)

Stone is never a lone element but a partner with water, fire, air, organic life. In stone a sense of place joins a sense of planet, but even that scale is not enough. Stone emphasizes the cosmos in cosmopolitan, the universe of inhuman forces and materialities that stretches to the distant arms of the galaxy.

(Stone, Cohen, 31)

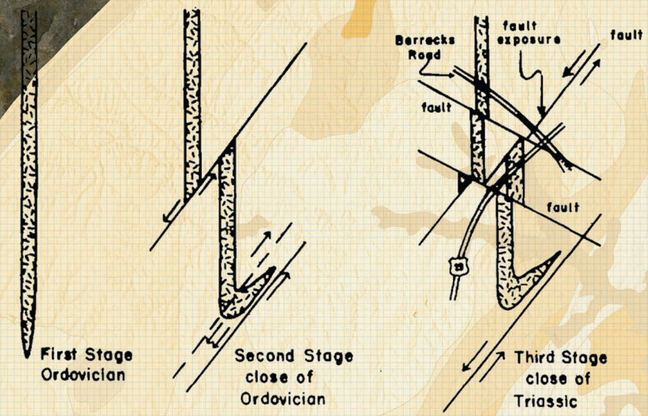
“Landscapes include a geologic memory of the tectonic, volcanic, sedimentary and erosive forces that have continuously forged topography. The urban landscape too is haunted by these nonhuman elements in the stone that is supplied to build it, disclosing the realms that existed before human life emerged.”

(Edensor, The affective and sensory potencies of urban stone, 32)

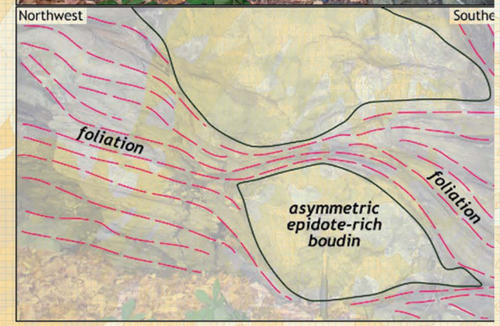


GEOLOGICAL VITALITY: The ability to share secrets coupled with the human desire to uncover them. Being known quantifiably at multiple levels of material inquiry, yet still remaining utterly unknown in extent and duration.

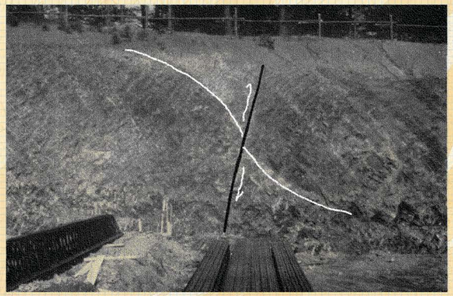
THE CATOCTIN FORMATION AND ASSOCIATED IGNEOUS COMPLEXES WITHIN ALBEMARLE COUNTY



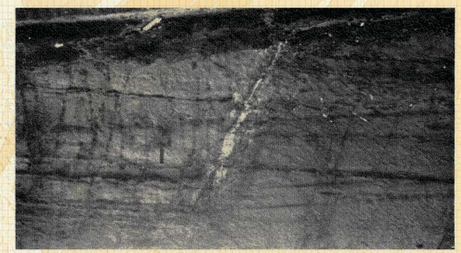
DEVELOPMENT OF COMPLEX FAULTS IN BARRACKS ROAD SHOPPING CENTER



STRONGLY FOLIATED CATOCTIN GREENSTONE WITH BOUDIN (BAILEY).

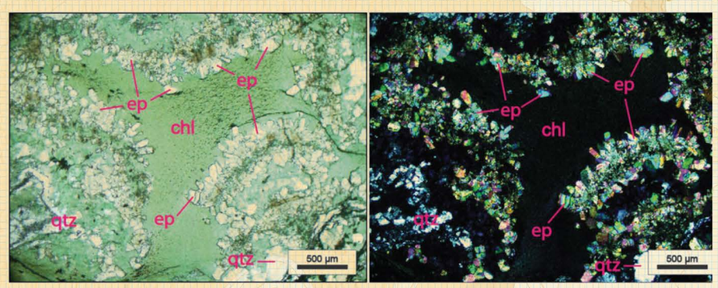


FAULT EXPOSURE AT NORTH END OF BARRACKS ROAD SHOPPING CENTER. R.S. YOUNG.



ONE OF A SERIES OF FAULTS IN SHEAR ZONE AT INTERSECTION OF US HIGHWAY 29 AND US HW BYPASS, CHARLOTTESVILLE

GREEN EPIDOTE-CHLORITE AMYGDULES IN METABASALT.



PLANE-POLARIZED (LEFT) AND CROSSED-POLARIZED (RIGHT) VIEW OF AMYGDULE IN HYALOCLASTIC GREENSTONE FROM THE CATOCTIN FORMATION, EASTERN BLUE RIDGE, VIRGINIA, NEAR MORVEN FARM. THIS AMYGDULE CONTAINS CHLORITE (CHL) AND EPIDOTE (EP) WITH SOME QUARTZ GRAINS (QTZ) SCATTERED THROUGHOUT (ALEX JOHNSON & CHUCK BAILEY).

Collaboration with the formation and associated rock bodies has produced geologic maps and field studies, relating the geologic realities of a formation to the stories of a region. The study of rock, its fabrics and relationships, compounds into the stories of places. It is a quest to know more, to slowly reveal secrets held in time and in minerals.

NARRATIVE VITALITIY

CULTURE, SOCIETY, STORYTELLING, AESTHETICS, PHYSICALITY, RELATIONSHIPS, LIKENESS, SACREDNESS

THE STORYTELLING FORCE WITHIN AN ASSEMBLAGE

In a medieval world where rocks were not merely passive objects of the human gaze, but active participants in shaping the mental reality of percipients, rocks have the capacity to organize the humans who look at them, based on what they see, rather than being simply subject to human desire.

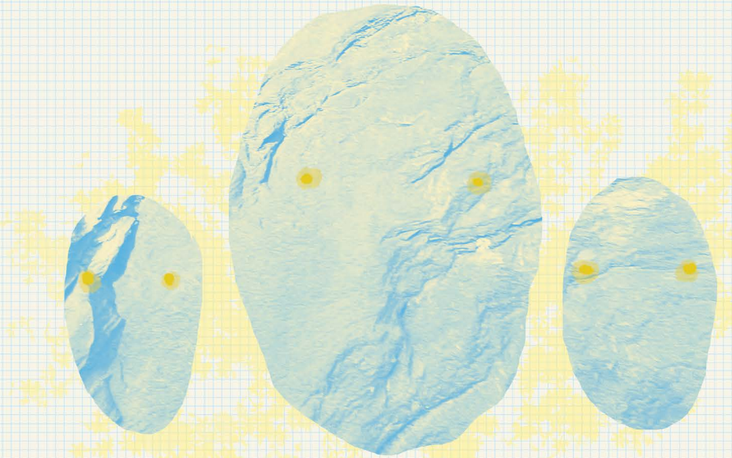
(Kellie Robertson, Exemplary Rocks, 108)

These are bodies of humans and nonhumans, hybrid bodies that coalesce with the materiality of places and natural forces, intra-acting with flows of substances, imagination, and discourses. Via these reciprocal transformations, the lively matter of these bodies becomes a template for the stories of this region, a narrative agency, a "storied matter."

(Iovino, Material Ecocriticism, 98)

Mount Alexander, or Leanganook – roughly translated as 'His Teeth' – is scattered with rows of sharp granite stones that resemble teeth. As an important initiation site for young men on the cusp of puberty, ritual and the place's symbolic appearance mesh to reinforce a longstanding memory of its significance. Other places in the landscape also evoke ancestral events, their material appearance similarly prompting specific ritual... Nari, or Mount Egbert, is regarded as synonymous with eggs on account of the ovoid granite formations that are scattered across its slopes. Resonating with the associations of eggs with fertility, birthing trees in the vicinity of the stones provide venues at which women give birth.

(Edensor, The affective and sensory potencies of urban stone, 29)



NARRATIVE VITALITY: The storytelling force within an assemblage. This is about likeness and sacredness. Being anonymous yet powerful enough to project and uphold beliefs. I think about Virginia's Stony Man Mountain, projecting an image of ourselves onto forms and places, stories and creation.

8:07 8:08 8:10 8:10 8:12 8:13 8:16 8:17 8:18

THIS PART CONTAINS MOST OF THE QUARTZ

DELICATE FRACTURES OF PYROXENE, BEAUTIFUL

YOU CAN SEE THE FINE PARTICLES, PINK, WHITE, GREEN

ALL OF THE PIECES ARE IMPORTANT TO ME. I PUT THEM IN MY POCKET

I'M POLISHING THE ROCK UNDERNEATH

EACH HIT SMELLS LIKE STRIKING FLINT AND STEAL

HEAT GENERATION

FOUR ROCKS

IT LOOKS LIKE MANY DIFFERENT ROCKS AND A MASSACRE.

THIS IS MY ROCK. I FOUND IT IN A DITCH 2.5 YEARS AGO. I LOVE IT BECAUSE IT IS A BEAUTIFUL EXAMPLE OF METABASALT. IT HAS PYROXENE, QUARTZ, IT'S GREEN FROM ALL OF ITS CHLORITE AND EPIDOTE. IT ATTRACTS MAGNETS BECAUSE OF ITS MAGNETITE IT HAS BEAUTIFUL PINK ORTHOCLASE FELDSPAR.

I'VE USED IT AS A BOOK END FOR 2.5 YEARS.

THIS PART RETAINS THE PINK ORTHOCLASE. PHEW!

THAT HIT BROUGHT OUT AN EXISTING FRACTURE

I WILL BREAK UP THE QUARTZ PIECE

ONE HIT-IT BREAKS INTO MANY PIECES

I PICK UP THE SHARP FLAKES

I CAN KEEP BREAKING ONE HALF, THE QUARTZ IS SO WEAK. I LOSE MANY SHARDS WHEN I HIT IT, BUT THEY ARE ALL IMPORTANT TO ME

A MESS, SHARP FRAGMENTS

ONE HIT WITH MY SLEDGE, IT BROKE INTO TWO BIG PIECES.

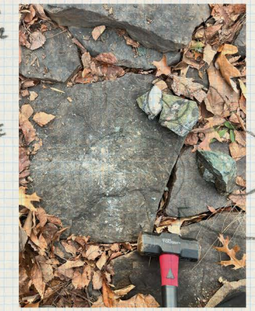
I'M SHOCKED AT HOW EASY THIS WAS

ONE HIT AND IT SPLIT AGAIN. THE ORTHOCLASE IS SEPARATED FROM THE FRACTURE-INFILLED PYROX SIDE

I FEEL COMPELLED TO SLEDGE THE ORTHOCLASE ROCK BECAUSE I LOVE IT MORE.

IT DOESN'T WANT TO BREAK. I MOVE ON.

THE TWO OTHER PIECES



NEW ROCKS

NEW POLISHED SLAB

Documenting the process of interaction with my favorite sample of greenstone. In a matter of 7 minutes, one rock is smashed into dozens of shards, fracturing along mineral veins and weaknesses.

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...ROCKS

...NEW POLISHED SLAB

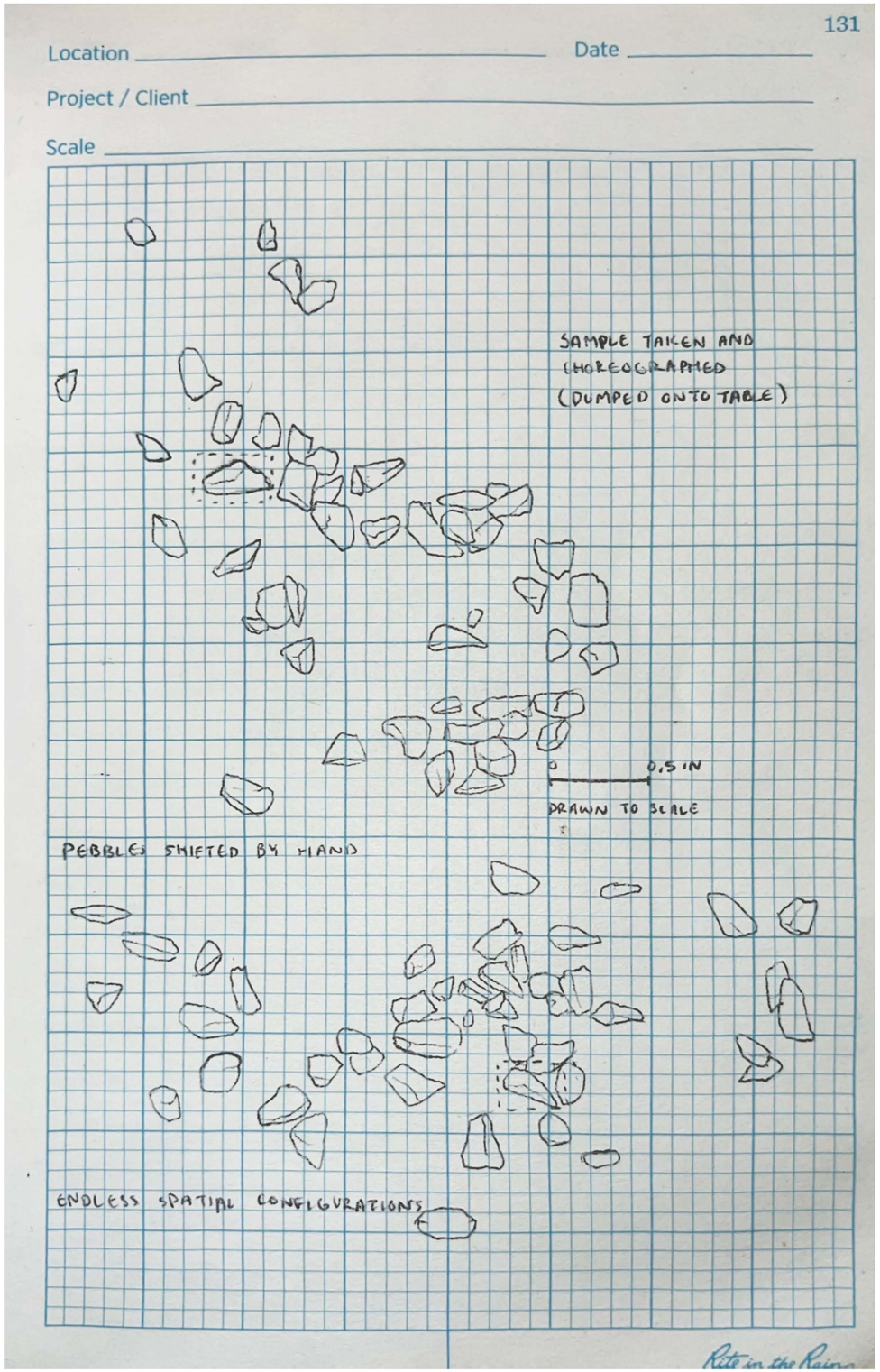
FIELD NOTES

WHAT IS THE CATOCTIN METABASALT DOING?

PHYSICAL VITALITY IN THE PATH

CHOREOGRAPH | MOVE | SHIFT | CONFIGURE | FLUX

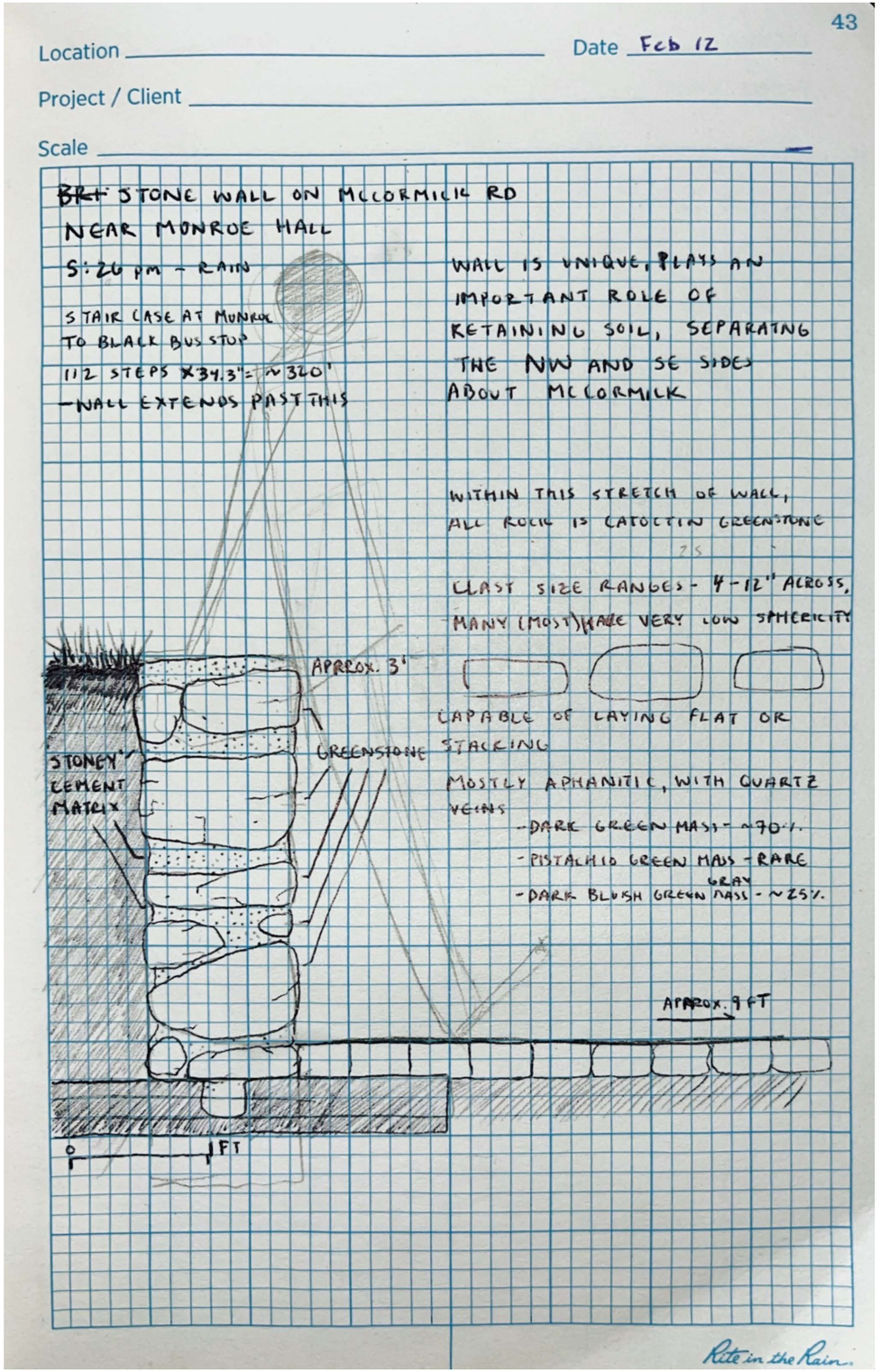
A path I walk every day fluxes with each raindrop, press of the foot, gust of wind. The small flecks of Catoctin shift about into new configurations, grinding each other down with foreign force. The discreet grains, from pebbles to silt, are energetically mobile, their gravity not restricted by the weight of their geologic formation. No day will pass in which the rocks will appear to have remained still. The pebbles will give to the will of feet, the sediment will dance with the wind.



PHYSICAL VITALITY IN THE RETAINING WALL

SUPPORT | STICK TOGETHER | RETAIN | SEPARATE | LIE | STACK

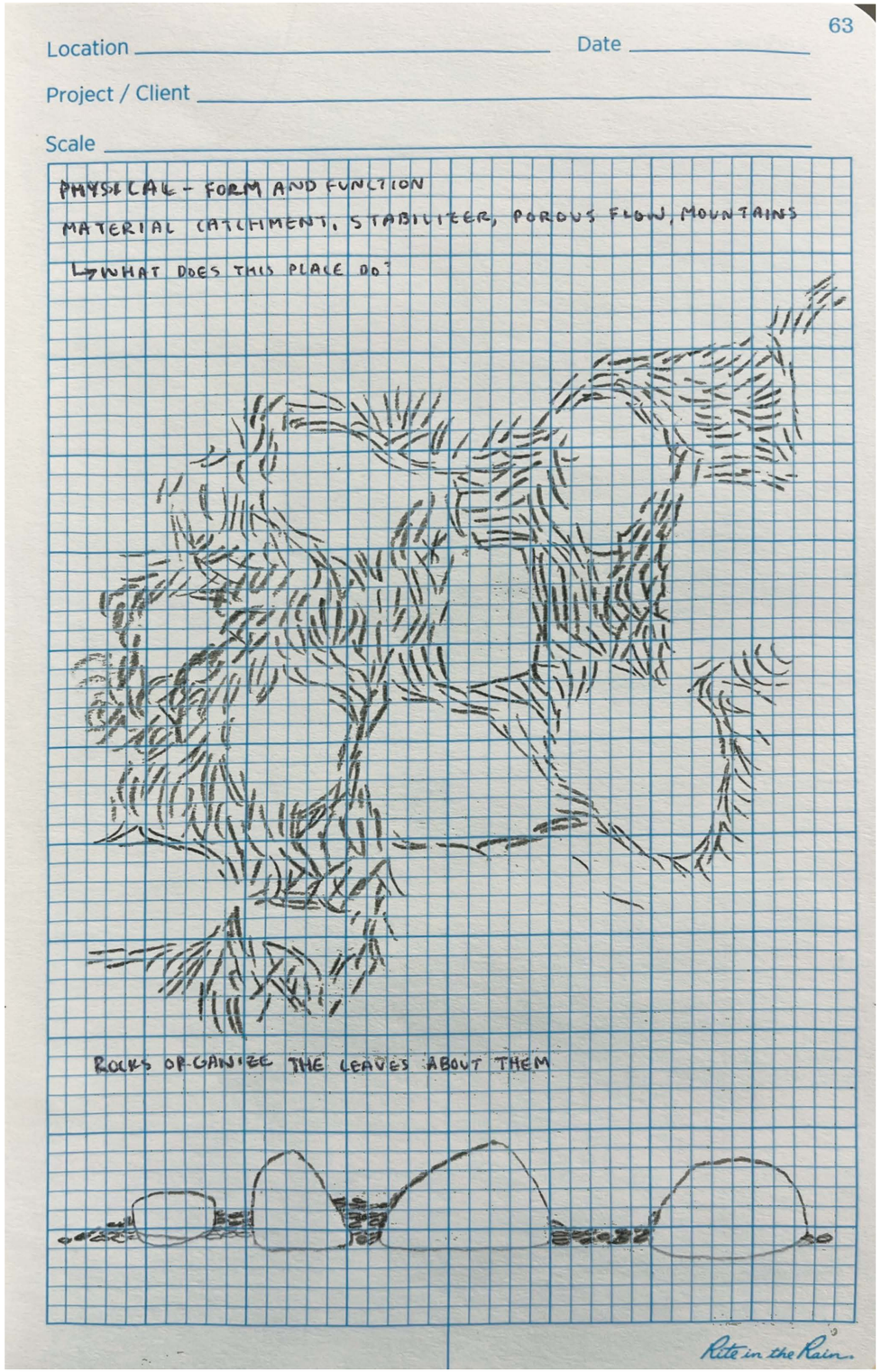
The University of Virginia's McCormick Road becomes lined with Catoctin stone walls near Monroe Hall. These walls uphold and support the high ground on their outskirts; the road and sidewalk pushed some three feet below the academic buildings. The rock is stacked and cemented in layers, physically holding back the soils from outpouring.



PHYSICAL VITALITY IN THE DRAINAGE DITCH

BLOCK | SQUEEZE | PUSH | CATCH | STABILIZE | ORGANIZE

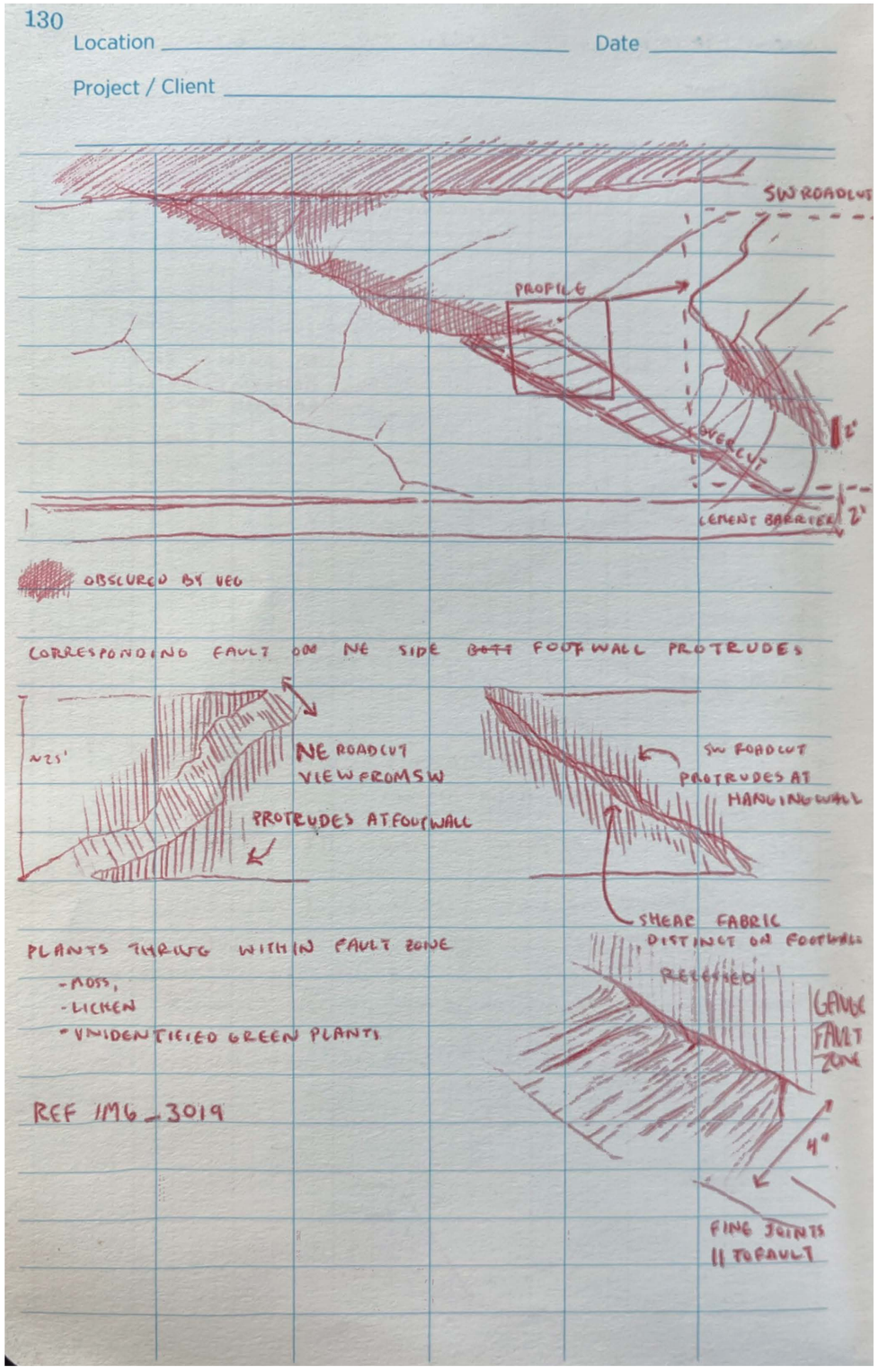
Within a drainage ditch, the Catoctin rocks have become organizing obstacles to the life, leaf litter, and sediment. The rocks are in a relationship with water, obstinate in their placements. The world bends and flows around them, the assemblage of their pore space producing the patterning of ground.

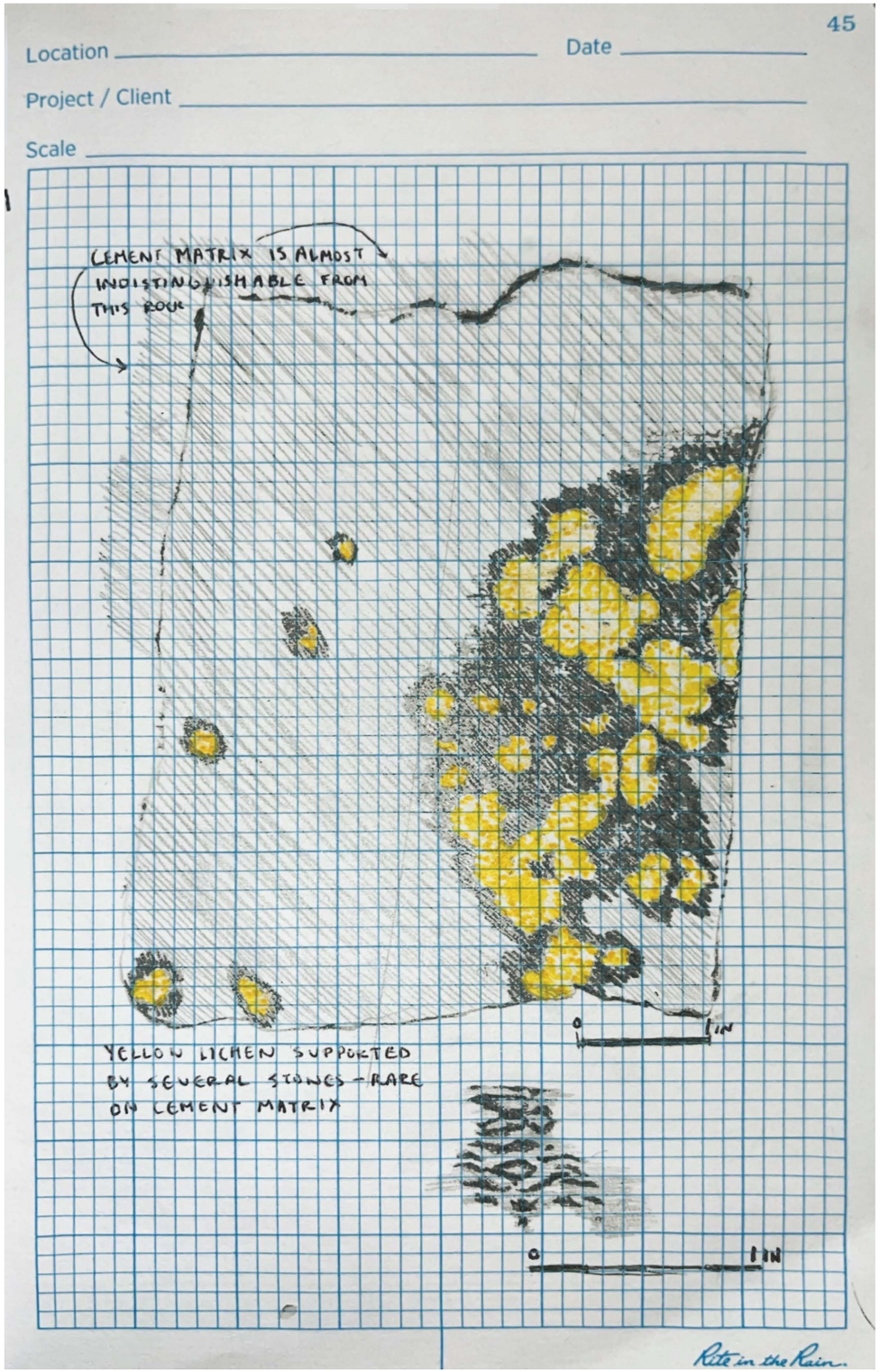


PHYSICAL VITALITY IN THE ROADCUT

PROTRUDE | CORRESPOND | OBSCURE | RECESS

The fracture planes running from one side of the roadcut to the other reveal an extensive physical vitality of a rock unit through space. Peer into the fracture and there exists this weathered rock, disturbed by ancient friction and new exposure to the elements. Plants thrive within this zone.

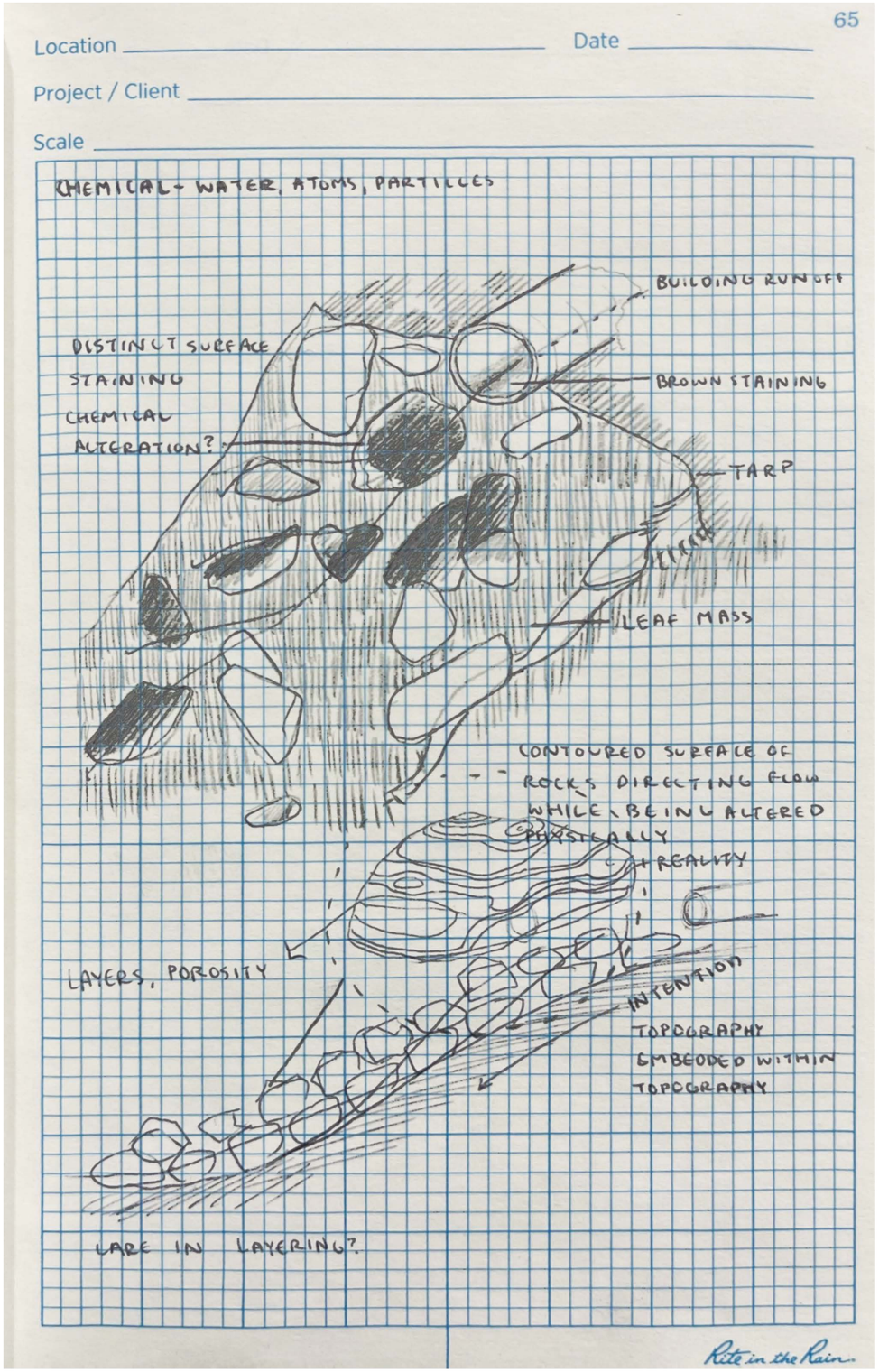




CHEMICAL VITALITY IN THE RETAINING WALL

SUPPORT | DISPLAY | BLEND | CONTRAST | BRIGHTEN | GIVE | HOST

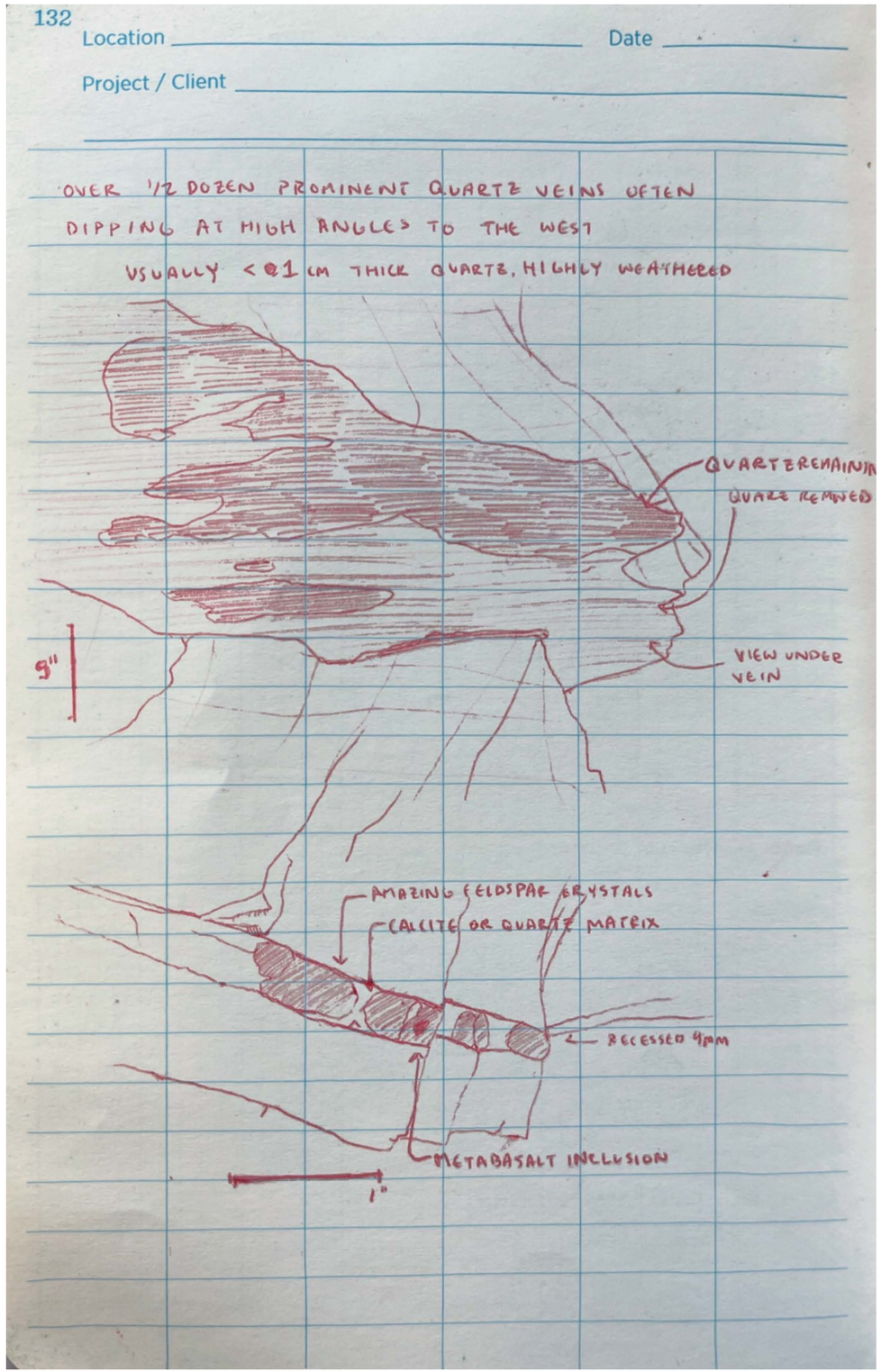
Sometimes a bright yellow lichen is seen on the rocks of McCormick Road's retaining wall. The rock proudly hosts this entity. It is rarely seen on the cement matrix, the edges of the lichen running along the edges of the stones. Maybe it is a textural or chemical affinity. The surface that the lichen touches is in perpetual activation as it slowly breaks down the rock.



CHEMICAL VITALITY IN THE DRAINAGE DITCH

ALTER | LAYER | CONTOUR | DIRECT | DISCOLOR | REMOVE

In the drainage ditch, the rocks that are in perpetual contact with outflowing water take on distinct appearances. The flow of water becomes something that is traceable; the discoloring, contour, and textures speaking to this environmental interaction. The topography of the rocks as a system creates a surface for water to move about. Each individual rock has its own micro-topography that determines flow on a different scale. Observing water and rock even more closely might bring us closer to the mineral scale, hydrolysis and chemical change.



CHEMICAL VITALITY IN THE ROADCUT

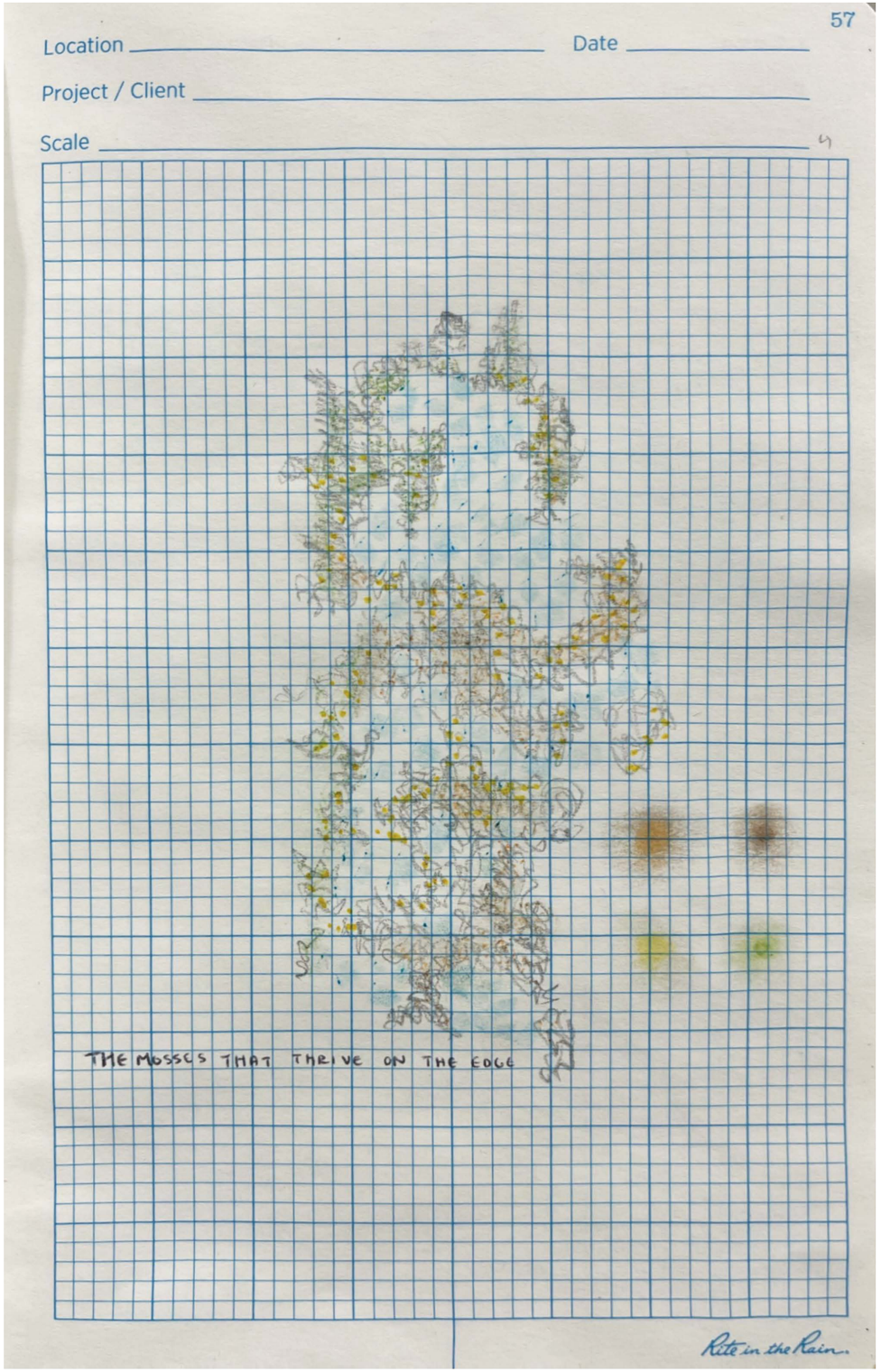
INCLUDE | WEATHER | CONTRAST | STRIKE | SEPARATE | DIP

At the roadcut, physical and chemical variations throughout the formation lead to differential weathering. The quartz veins, though physically strong, present points of weakness between it and the surrounding metabasalt.

AESTHETIC VITALITY IN THE PATH

THRIVE | SUPPORT | CONTRAST | CAPTURE | TIGHTEN

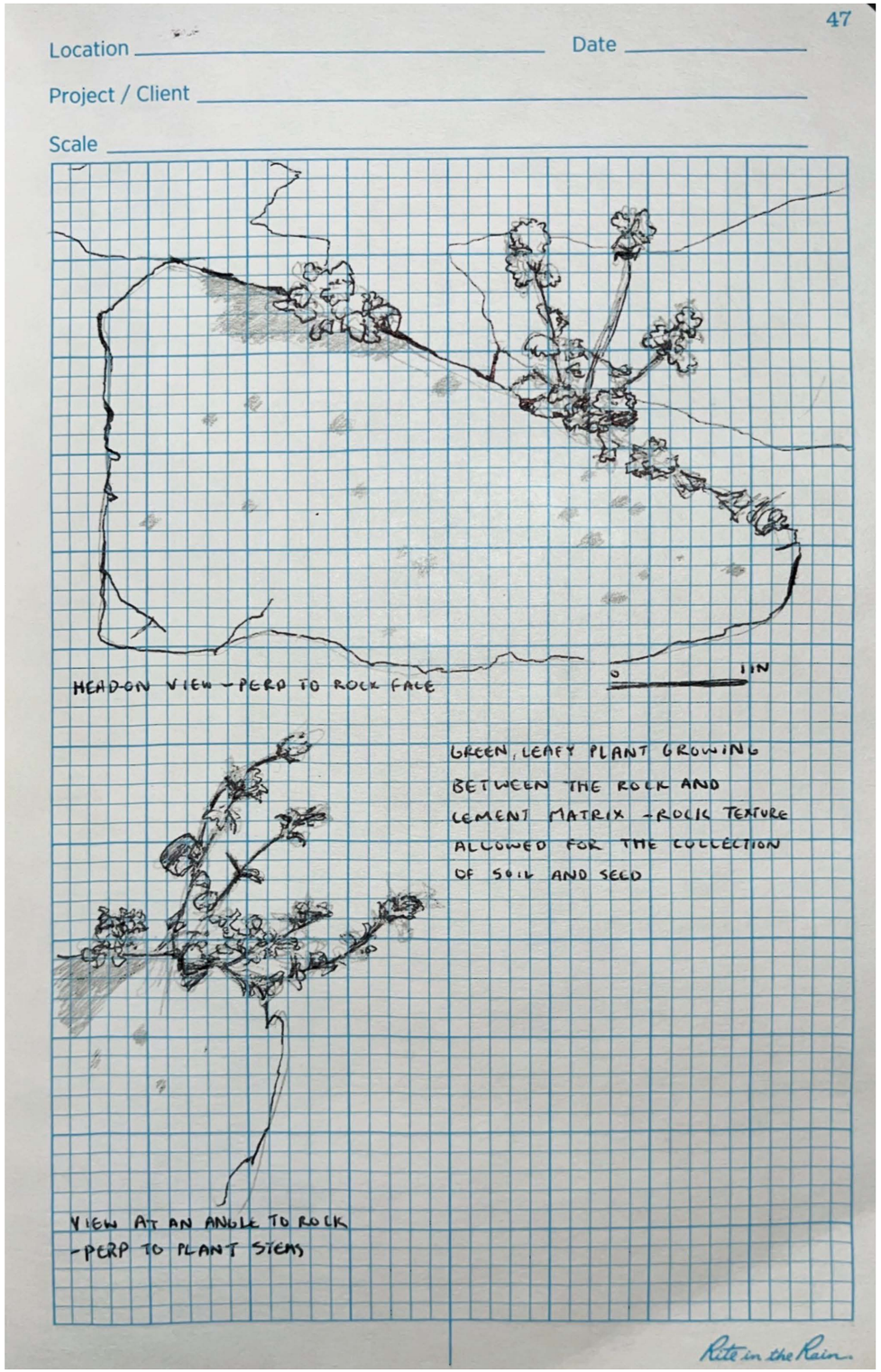
Like a painting, blossoming from an assemblage of life and lithics. Along the edges of the path, the fine blue sediment gives way to intricately colored mosses.



AESTHETIC VITALITY IN THE RETAINING WALL

ALLOW | COLLECT | CRUMBLE | WEAR | CRACK | HELP

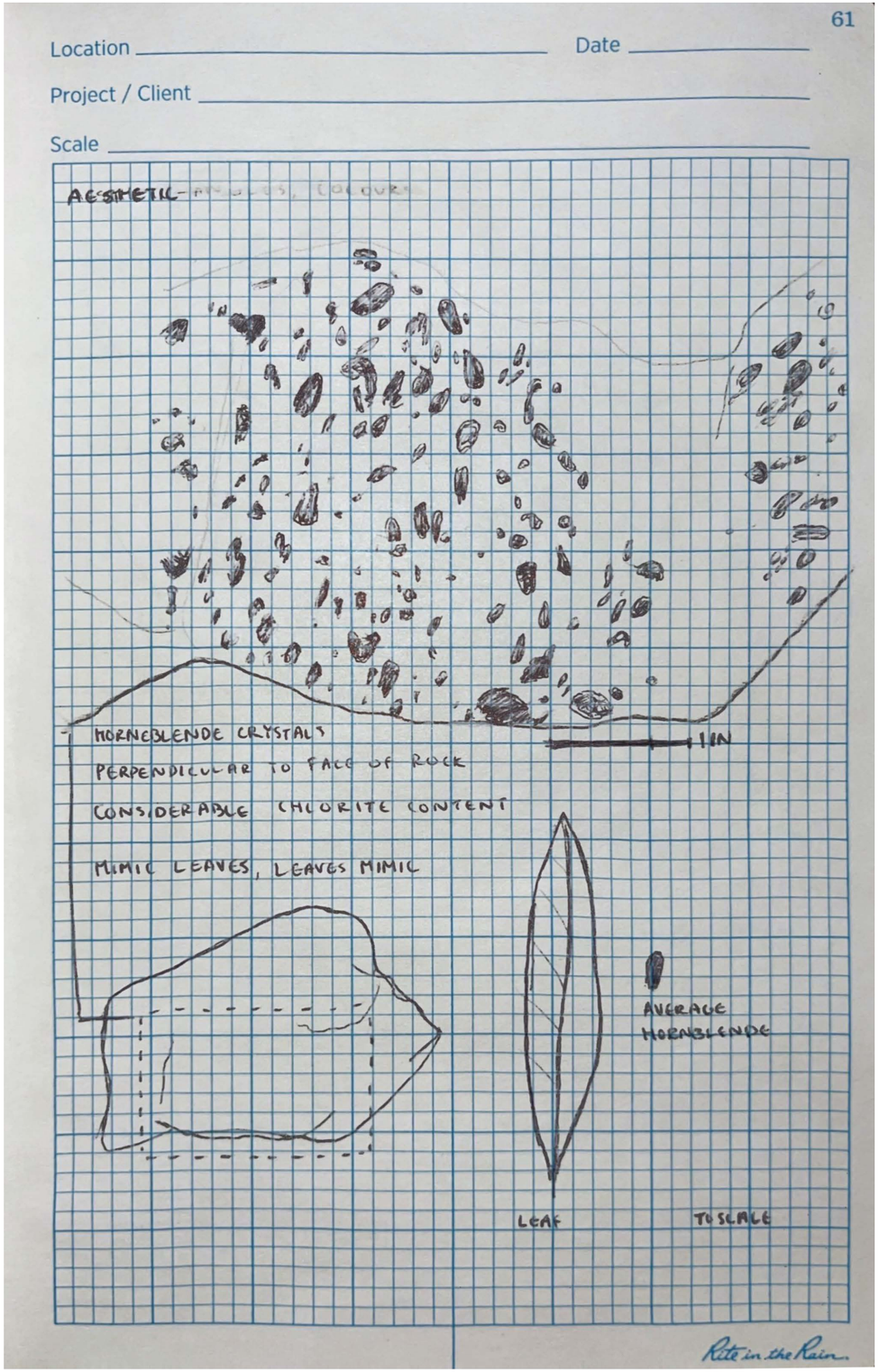
Spontaneous vegetation at the retaining wall creeps out from the edges of the stones. Though not intentional, human hands have organized the rocks in the cement to allow the protrusion of millimeters of flat surfaces. These lithic surfaces collect debris, seeds, soil, water. Soon, vegetal life obstinately butts out from the cracks and reaches out into the air. Yellow and green, almost horizontal. It is as if the rock is wearing hats.



AESTHETIC VITALITY IN THE DRAINAGE DITCH

MIMIC | ALIGN | SUGGEST | CONTAIN | CONTRAST | OVERLAP

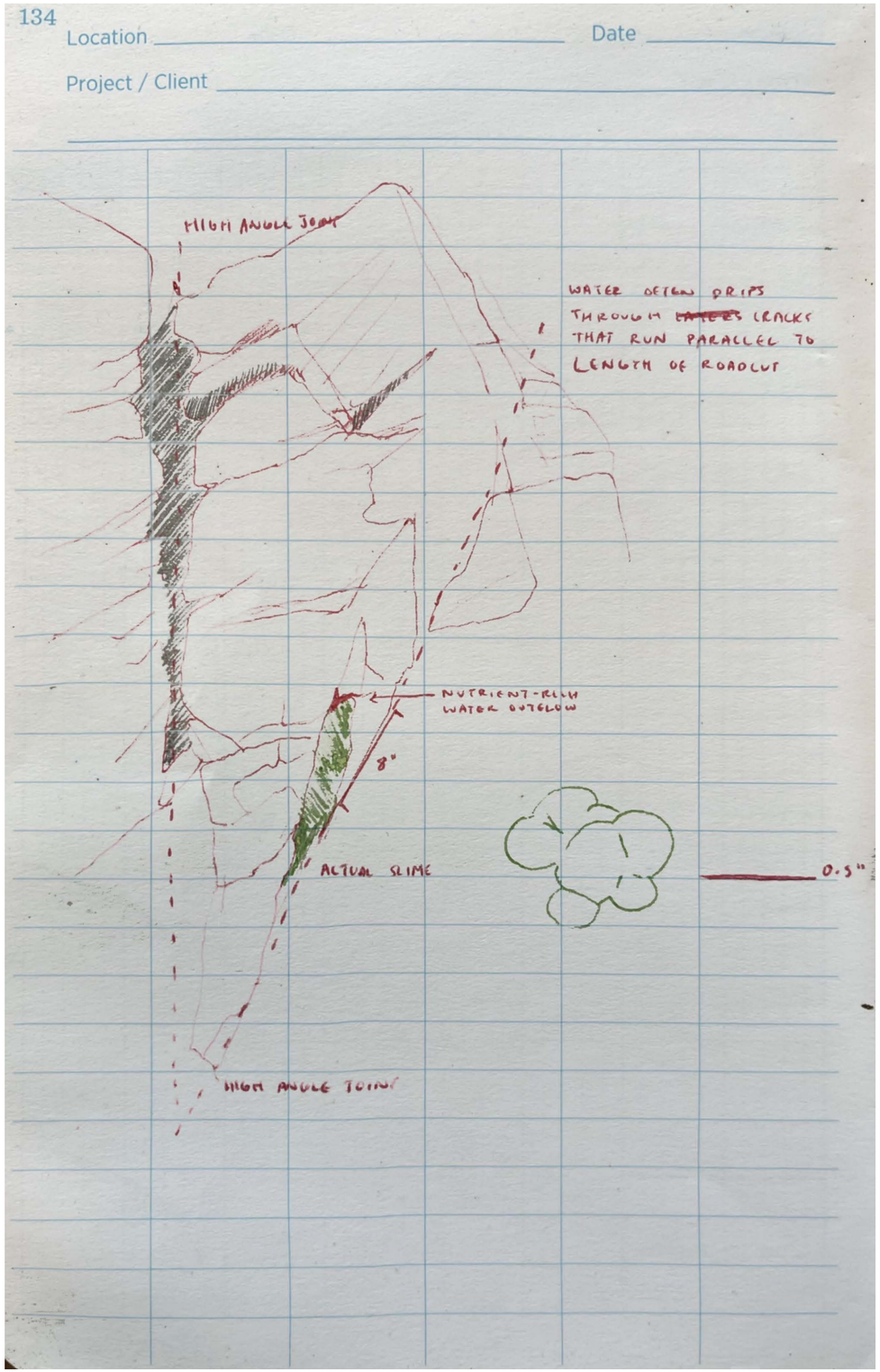
Within the matrix of litter, life, and lithics it almost appears that the leaves are mimicking the minerals. This flow perceived at so many levels of the drainage ditch extends into the mineral fabric of the rock itself.

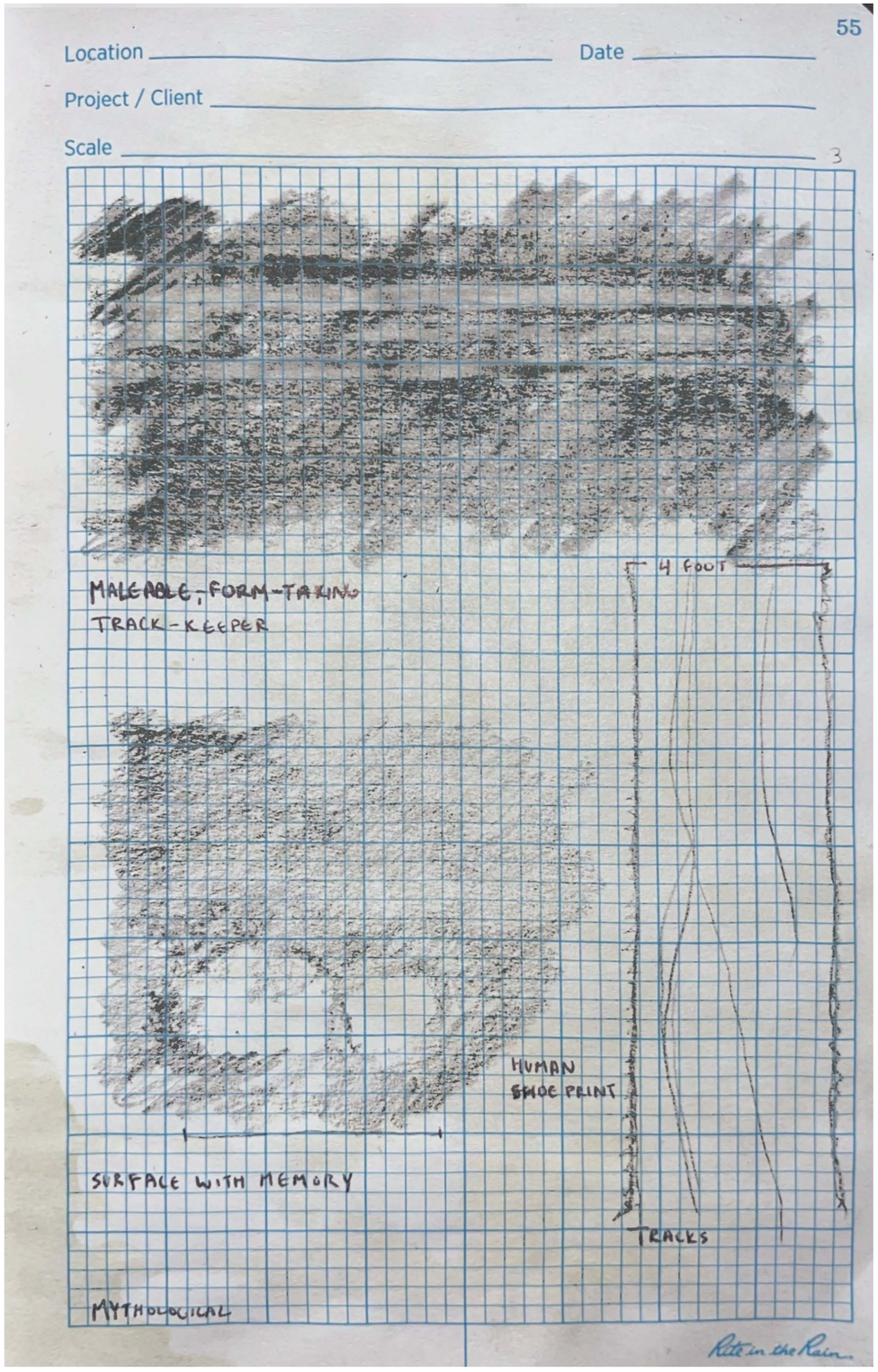


AESTHETIC VITALITY IN THE ROADCUT

OUTFLOW | SHINE | RUN | DRIP | FRACTURE | ABSTRACT

At the roadcut, the rock gives way to life. Thick green algae grows from the perpetually wet cracks. Working with water and the stark vertical rock surface, these slimy vibrant living things stand out, shine, run, and drip. The rock becomes a vessel for flowing things; life, water, rock.

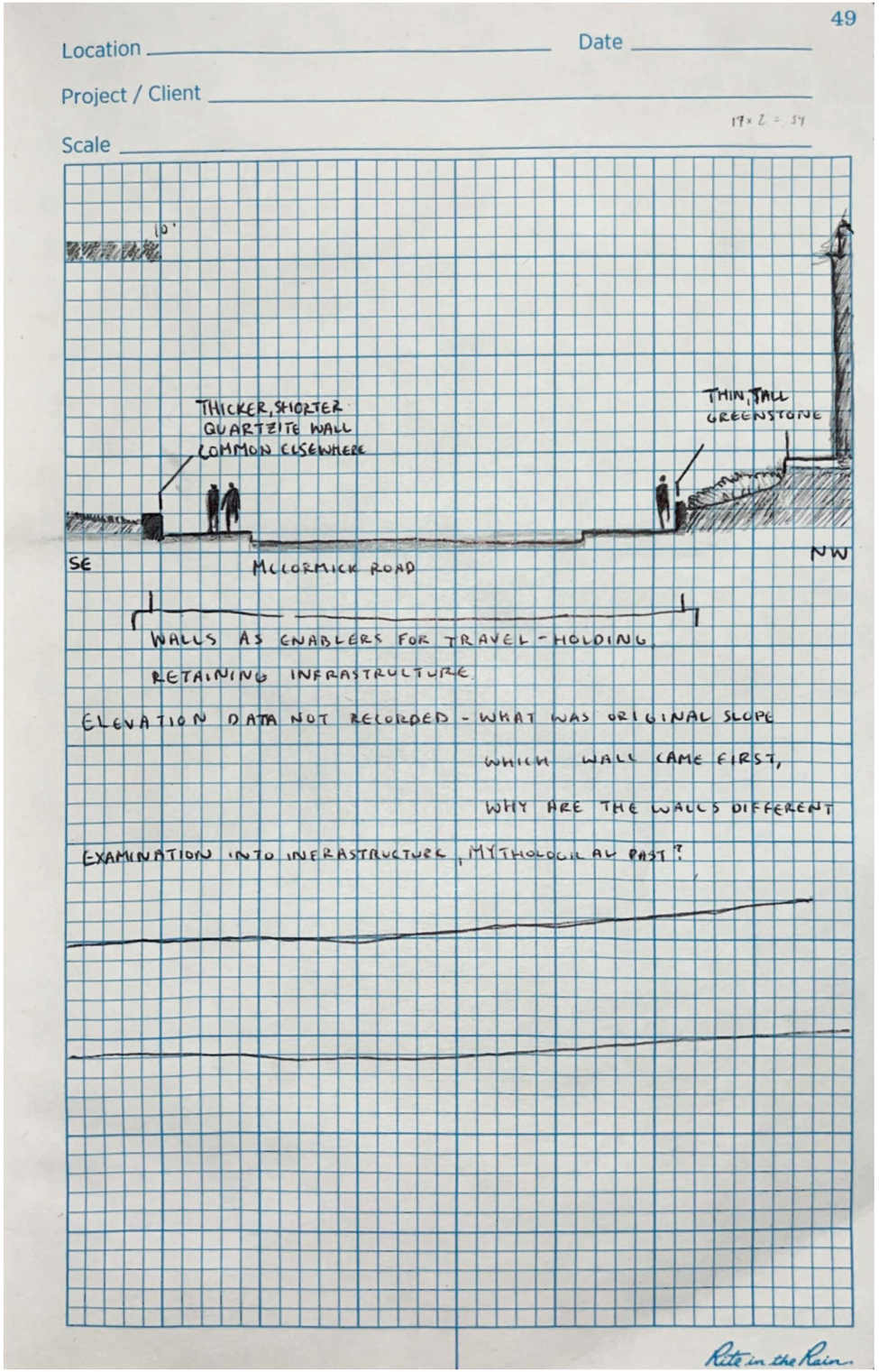




NARRATIVE VITALITY IN THE PATH

REVEAL | TAKE FORM | MEMORIZE | FORGET | RETAIN | SHAPE | TRACE

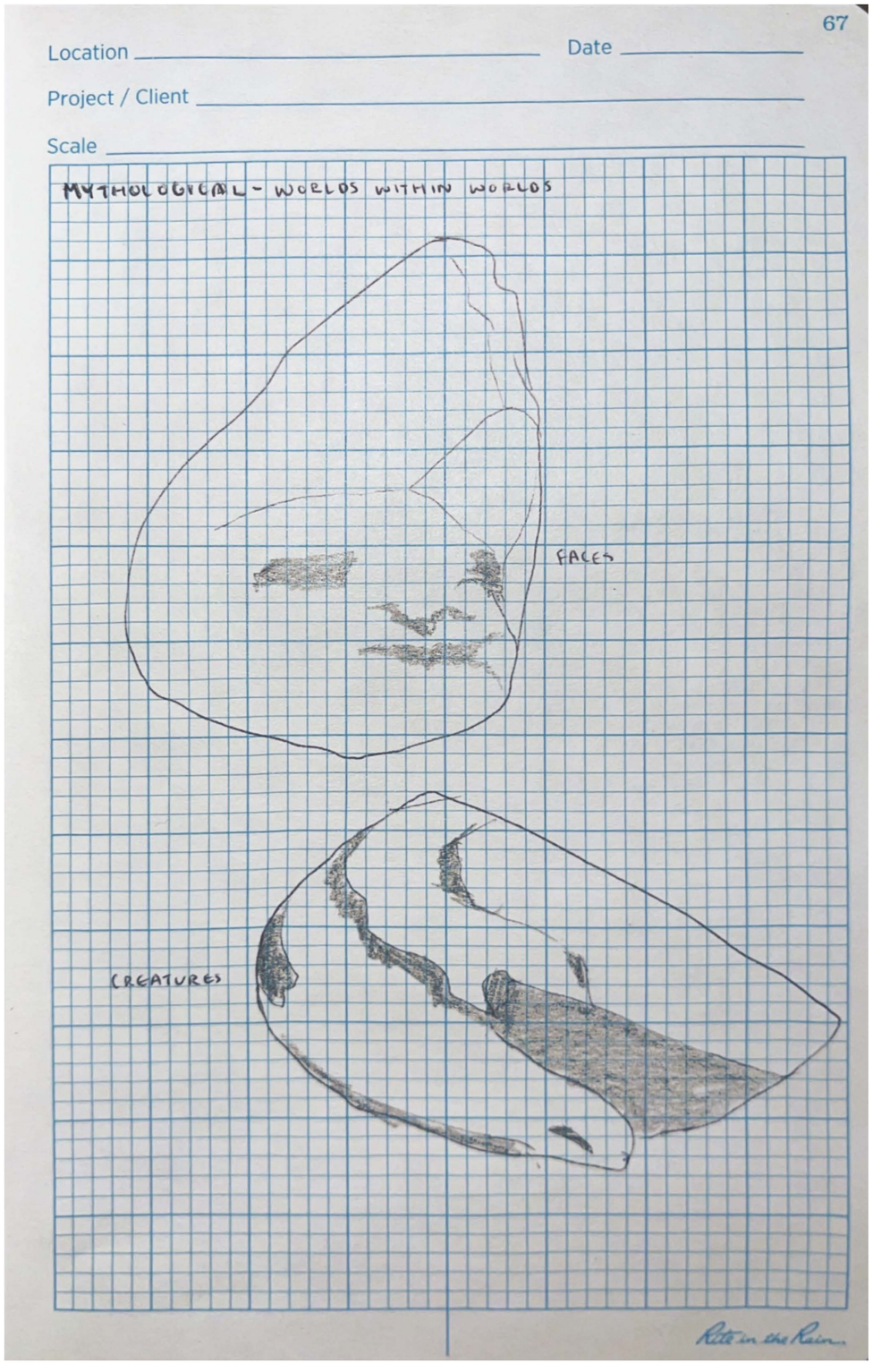
The path is maleable, thanks to the rocks. It takes on unique forms through interactions with other entities. It retains the form for a time and then forgets it. It might memorize it for some time, and slowly fade into a trace. The path is recording a fleeting story of interactions.



NARRATIVE VITALITY IN THE RETAINING WALL

SUGGEST | RECORD | DIFFERENTIATE | REVEAL | ENABLE

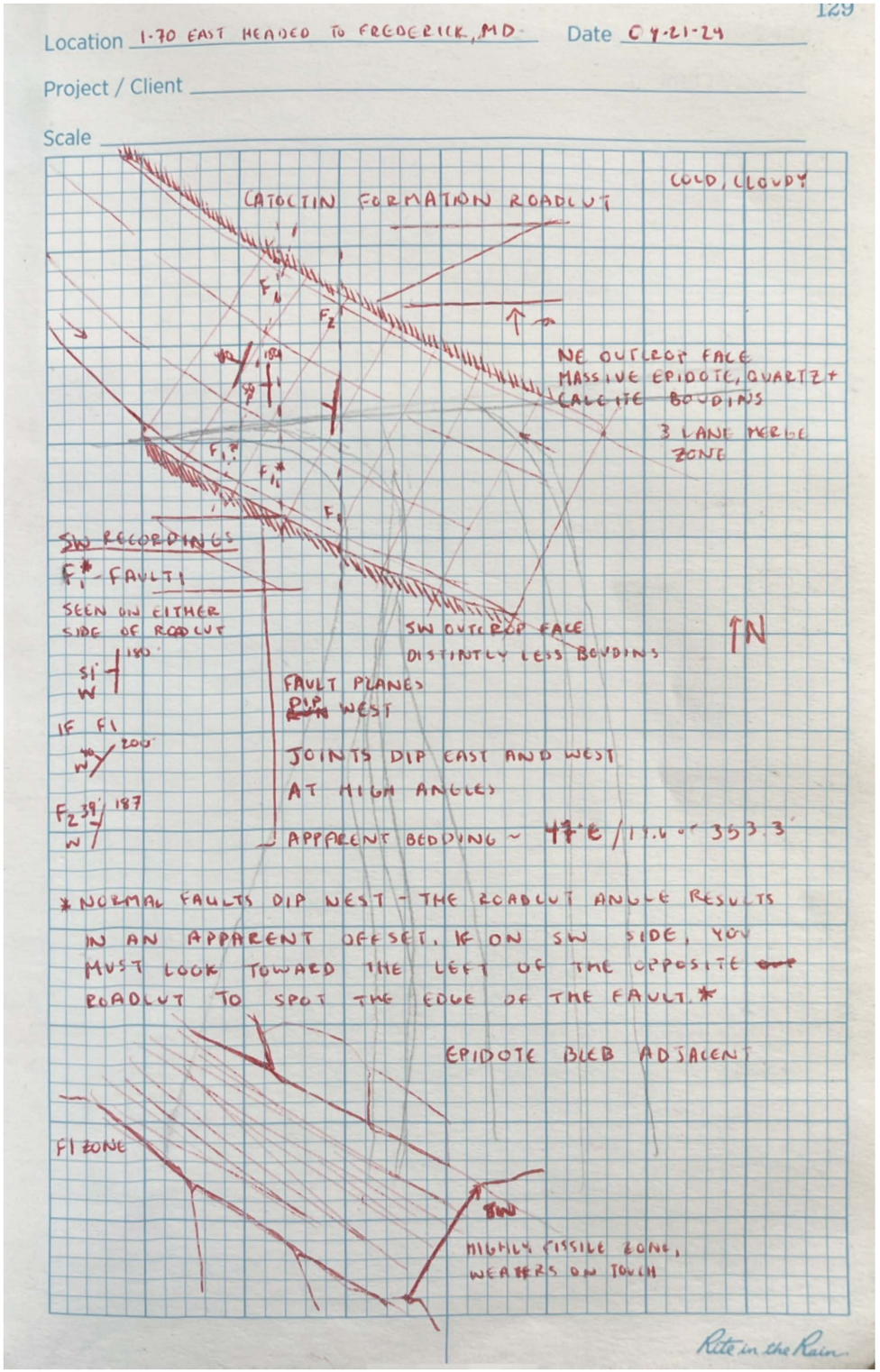
The greenstone retaining wall that enables McCormick Road is paired with a quartz retaining wall on the opposite side. Certainly built at different times, the walls are separate anthropological lithic entities. Perhaps there is a story in the division between the Lawn and the academic buildings housed on the northwest side. These walls hint at discreet construction events, discreet moments of becoming for the university. Differentiating the road from grounds, rock becomes a record of inquiry into the narrative of the place.



NARRATIVE VITALITY IN THE DRAINAGE DITCH

MIMIC | PROJECT | RENDER | SUGGEST | MULTIFORM | POLYSEMOUS

The tendency to see familiar patterns, such as human features, in rocks is a reflection of narrative vitality—the projection of our thoughts, emotions, and narratives onto anonymous materials. By attributing human-like qualities to rocks, we imbue them with meaning and stories, making them active participants in our cultural and personal landscapes. Rocks then become multiform or polysemous, escaping their materiality and becoming something new.



NARRATIVE VITALITY IN THE ROADCUT

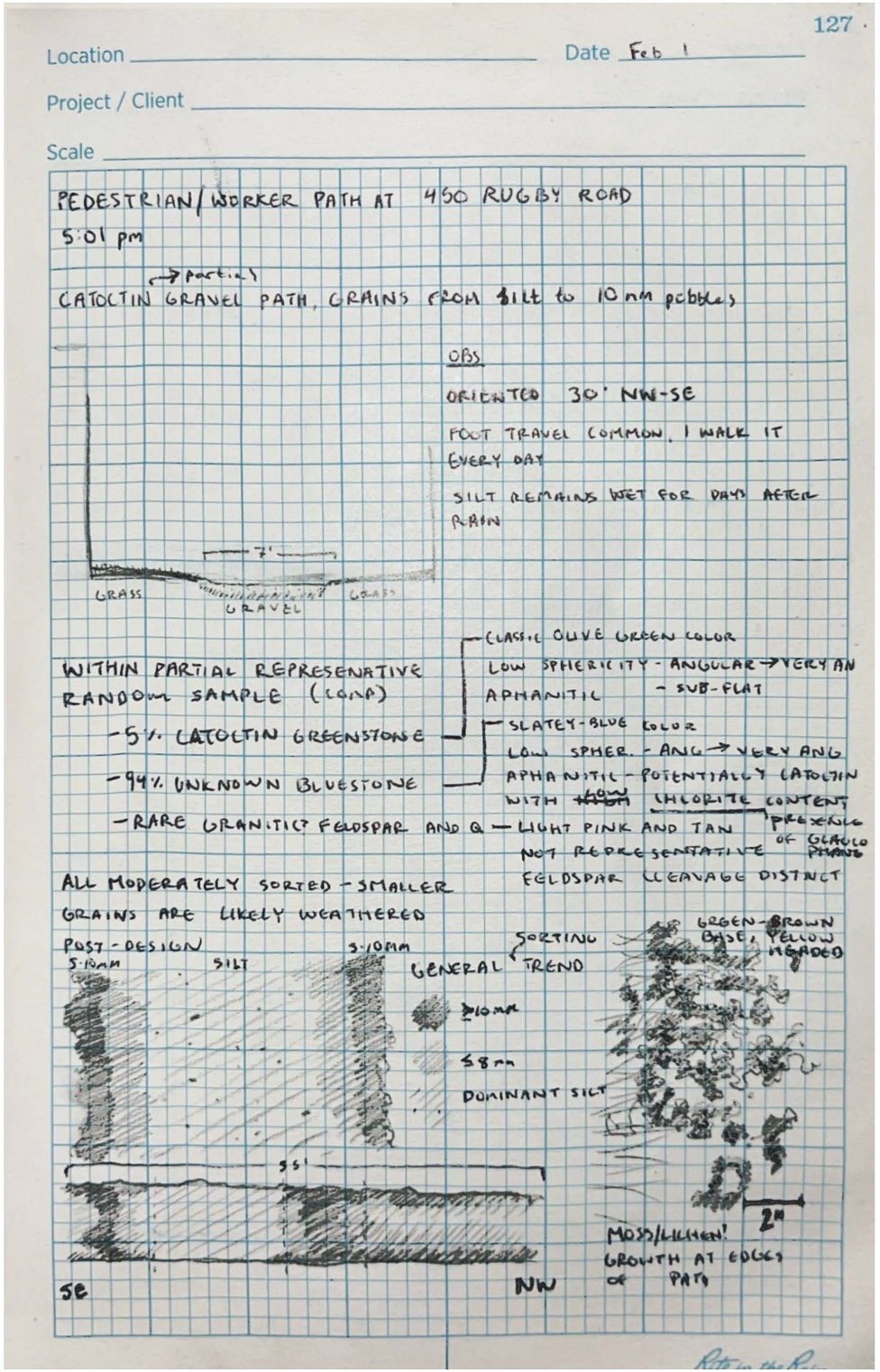
TELL | REMOVE | INTRIGUE | OFFSET | HINT | ABSTRACT

At the roadcut, there's an amazing story between the two sides of the road. Fracture planes can be traced through space to opposite sides, appearing offset due to the human incision at an angle to the planes. On either side of the road too, there exists a story between environment and facing direction. The south-facing side receives more sun, remaining drier and less fractured relative to the north-facing side. The north-facing side perpetually outflows with water, its cracks and fractures filled with vegetation. Just within the decades of exposure, the two sides of the same formation have experienced drastically different interactions with surficial forces. This is a narrative vitality brought on through human interaction, though determined by the physical and chemical characteristics of the rock itself. No one knew there were few boudins on the north-facing side, or that the fractures were at an angle to the incision. But the collaboration between rock and hands created an abundantly interesting and beautiful place.

GEOLOGIC VITALITY IN THE PATH

SORT | REPRESENT | DOMINATE | VARY

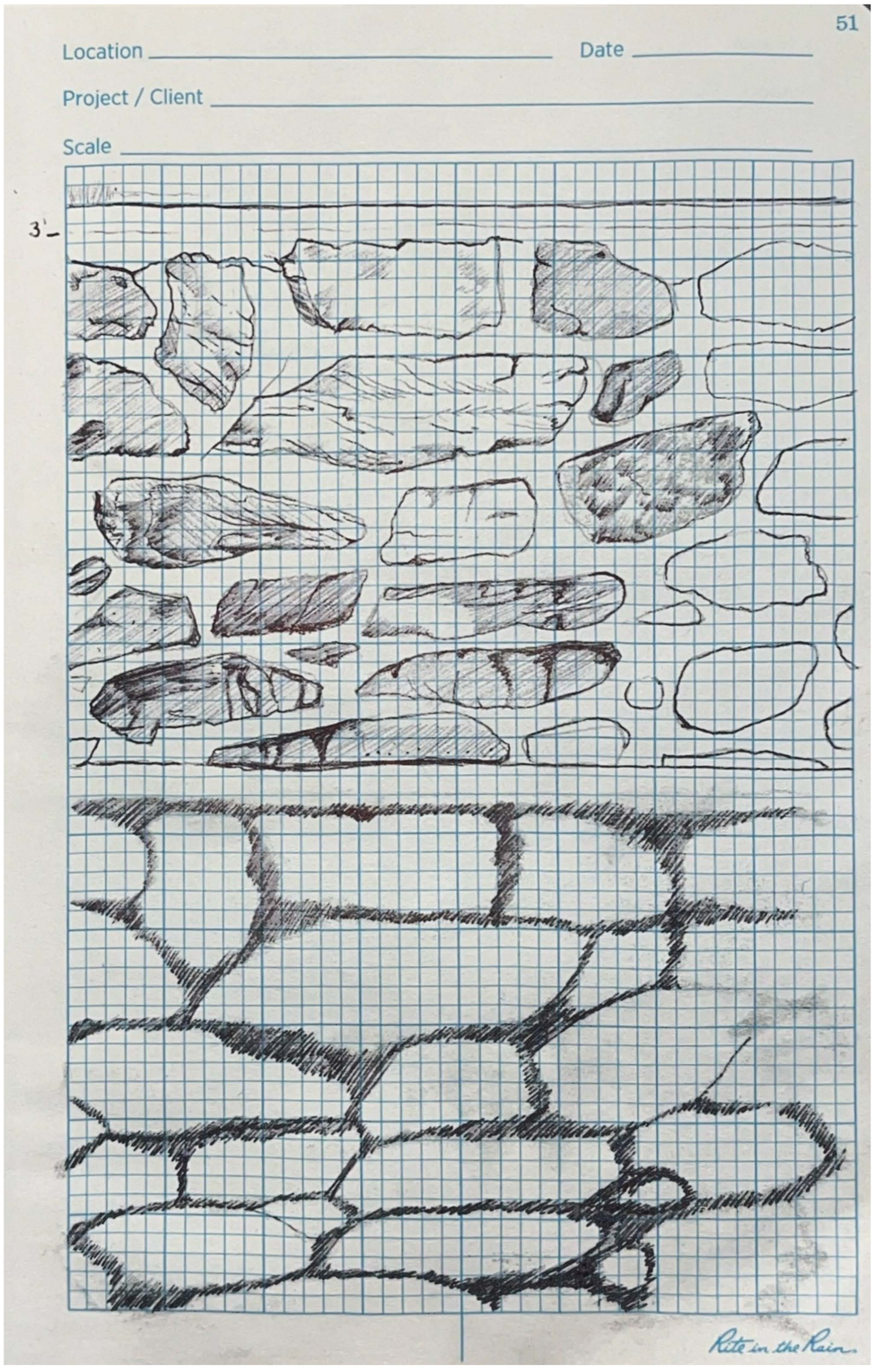
Each pebble in the path has a unique geologic character that is difficult to read with the eye. However, as an assemblage of sediment, there is a larger geologic story that is more easily perceived. The pebble mix varies compositionally, with epidote-rich greenstone forming approximately 5%, blueish Catoctin metabasalt makes up the mass, maybe 94%, and granitic feldspar and quartz make up a very small percentage. It makes one wonder about the origins of this mix; its quarrying and sorting process. Now it is here, in this path, and it is being sorted still. Sometimes subtley, sometimes with clear grain distinctions, the path ebbs and flows with the geologic character of its makeup.



GEOLOGIC VITALITY IN THE RETAINING WALL

CONGLOMERATE | HOLD | CONTRAST | ABSORB | REFLECT | PATTERN

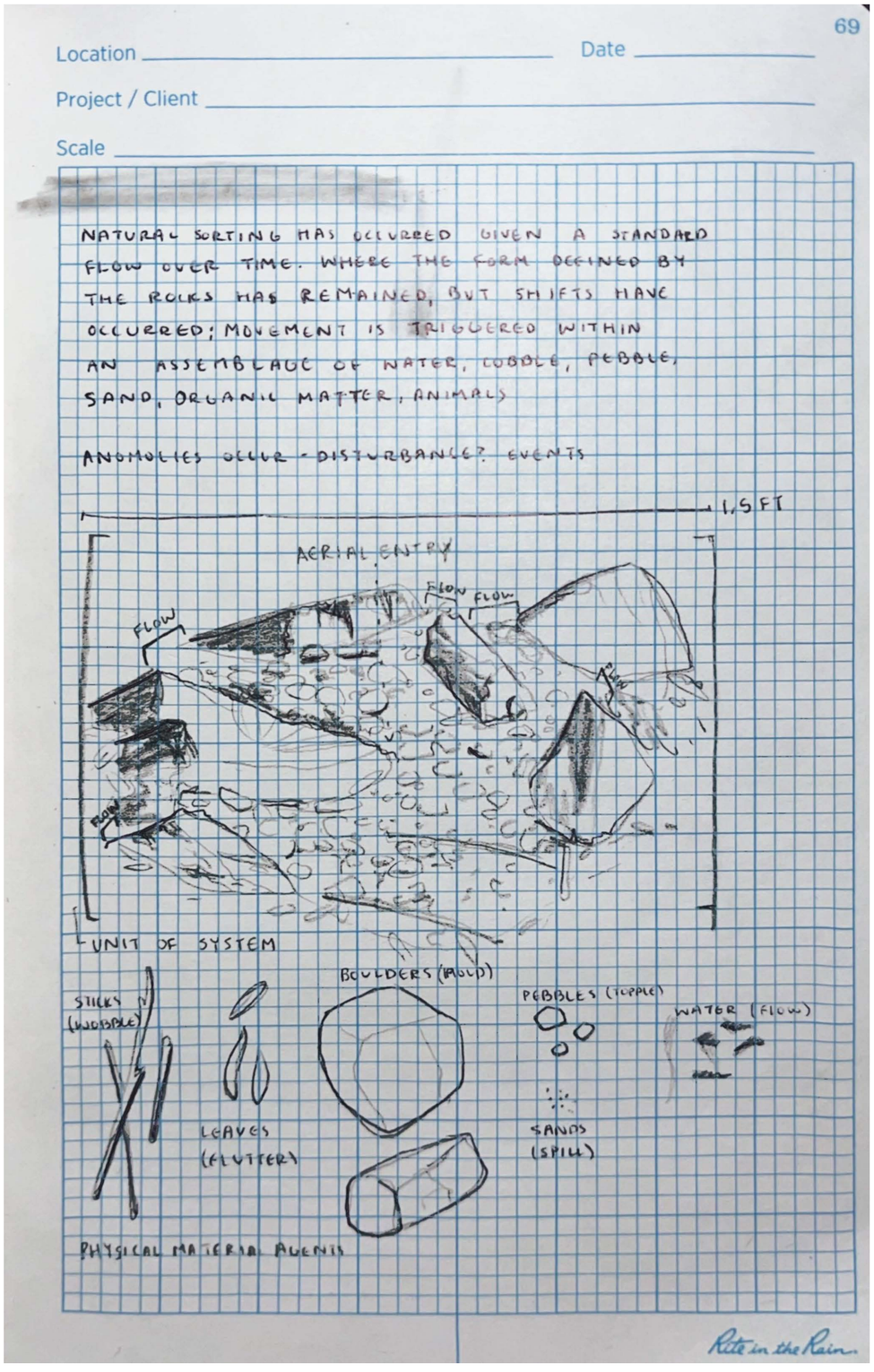
Set in a cement matrix, the retaining wall takes on a new geologic character, some kind of anthropological conglomerate. The angular rock fragments contrast against the fine-grained, geologically unique cement. Each individual rock can be studied through its outward face, weathered over time by the fumes of vehicles and all that comes with being cemented in place.



GEOLOGIC VITALITY IN THE DRAINAGE DITCH

DEFINE | SORT | SIFT | TRIGGER | DISTURB | REMAIN

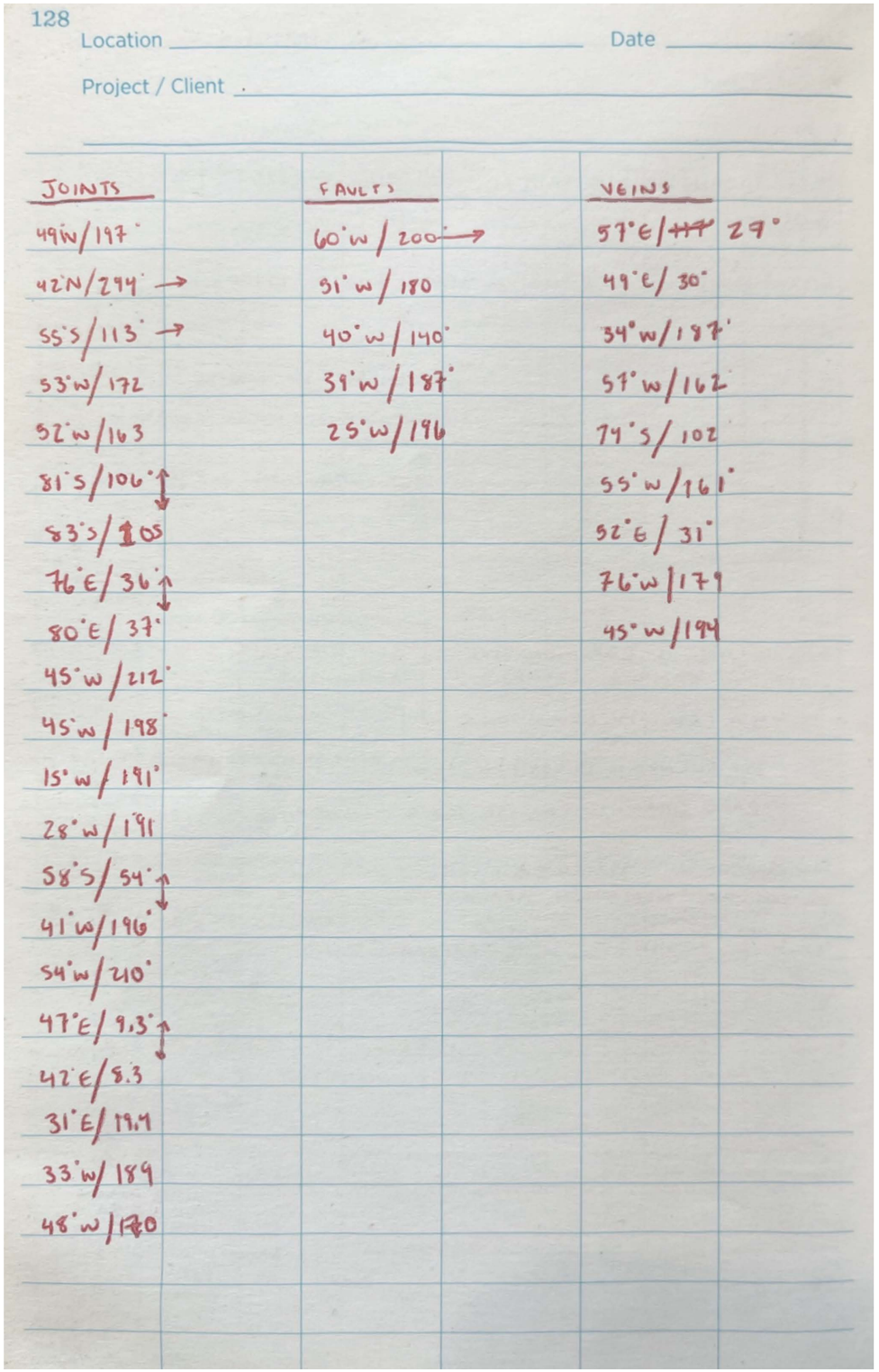
Within the drainage ditch, the process of sorting brought on by the interaction with fluid and rock creates an assemblage of material that can be examined as a system. Organization, sorting, and sifting are triggered by rain events. The large rocks remain in place, defining routes and orientations of leaves and sticks. Each material has a role, density, and tendency. Though nothing is determined. Even within this, rock is sporadic, far too dynamic. Even if you think to set it a course it won't follow it through. It will come into new, discreet assemblies at scales that slowly compound. Its future is still influenced by its ancient, unknowable past. This is a matter of looking and loving.



GEOLOGIC VITALITY IN THE ROADCUT

ORIENT | INDICATE | REVEAL | CONFUSE | POINT

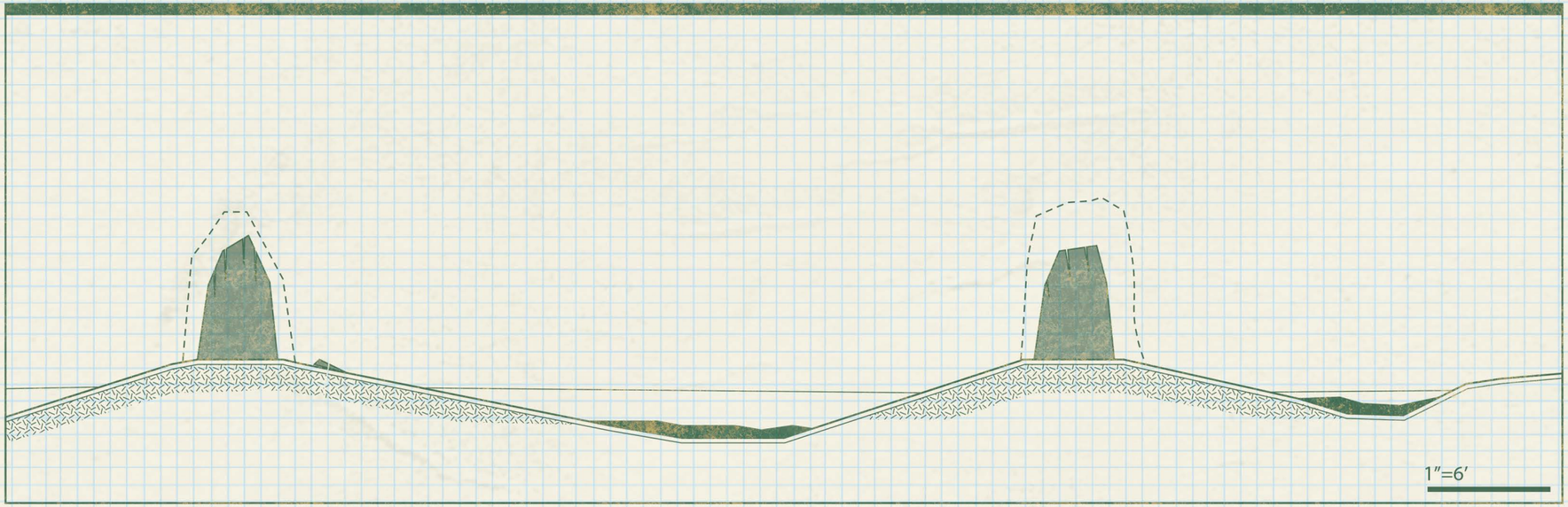
At the roadcut, the planar features are measurable. The strike and dip can be recorded using a brunton or just a phone. Human error in taking the measurement leads to confusion and annoyance.

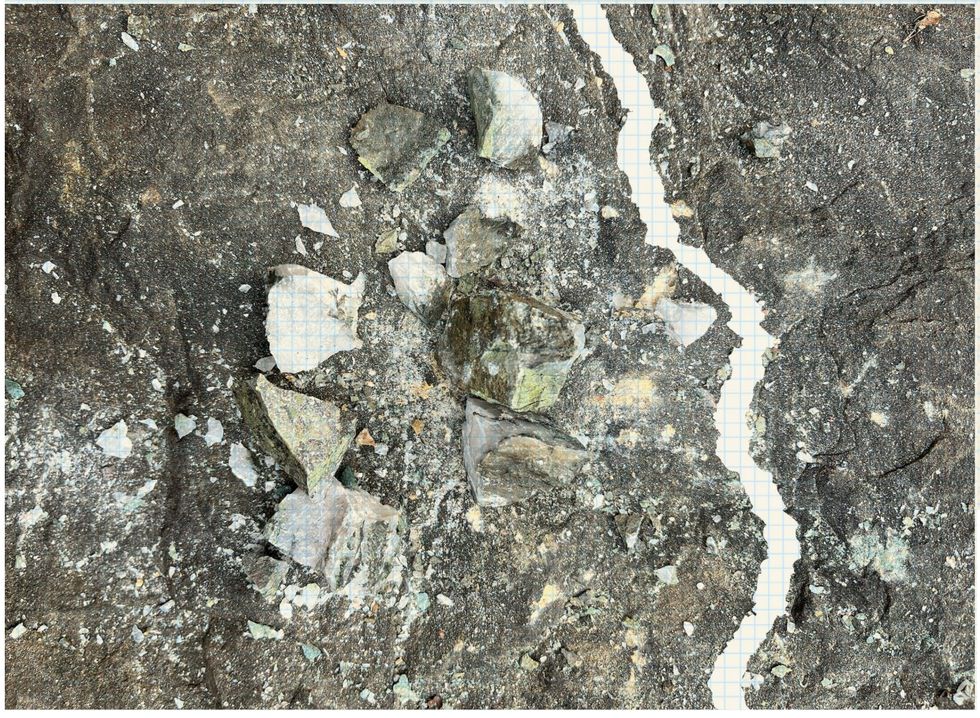


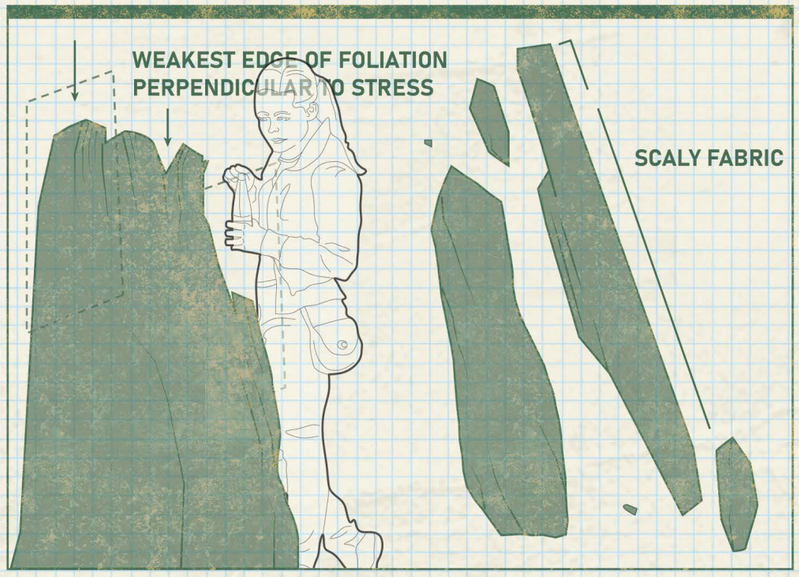
HANDLING THE CATOCTIN

LEARNING THROUGH EXPERIMENTATION

PREPARE FOR THE MOVEMENT OF AND BUILDING OF ROCK

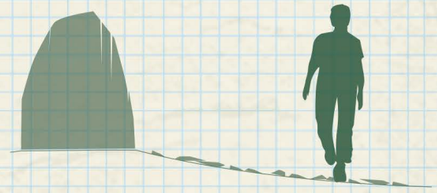


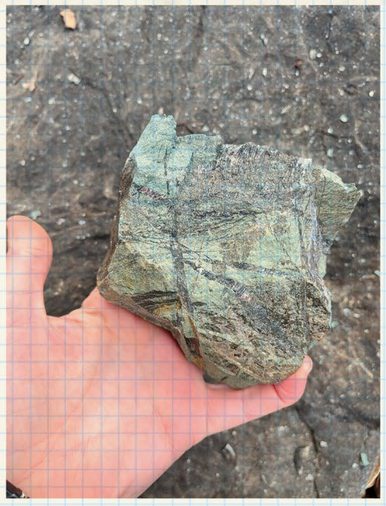




ROCKS WITHIN THE CATOCTIN FORMATION LIKE SCHIST AND PHYLLITE HAVE FOLIATION PLANES THAT RESULT IN UNIQUE NATURAL FLAKES OF MATERIAL. WITHIN A LANDSCAPE, THIS FOLIATION PLANE CAN BE ORIENTED PERPENDICULAR TO ITS MAIN STRESSORS: GRAVITY AND WATER.

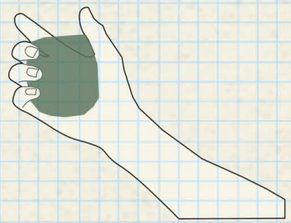
BY CONSIDERING THE ROCK'S TENDENCY TO CLEAVE AND ITS RELATIONSHIP TO TOPOGRAPHY AND RELATIVE ELEVATION, A DESIGNER CAN PREPARE FOR THE MOVEMENT OF ROCK. LITHIC MATTER BUILDS UP WITHIN THE LOW POINTS, EVENTUALLY BECOMING THE HIGH POINTS. THE ROCK THAT STABILIZES THE BOTTOM IS PROTECTED BY THE ROCK ABOVE IT.

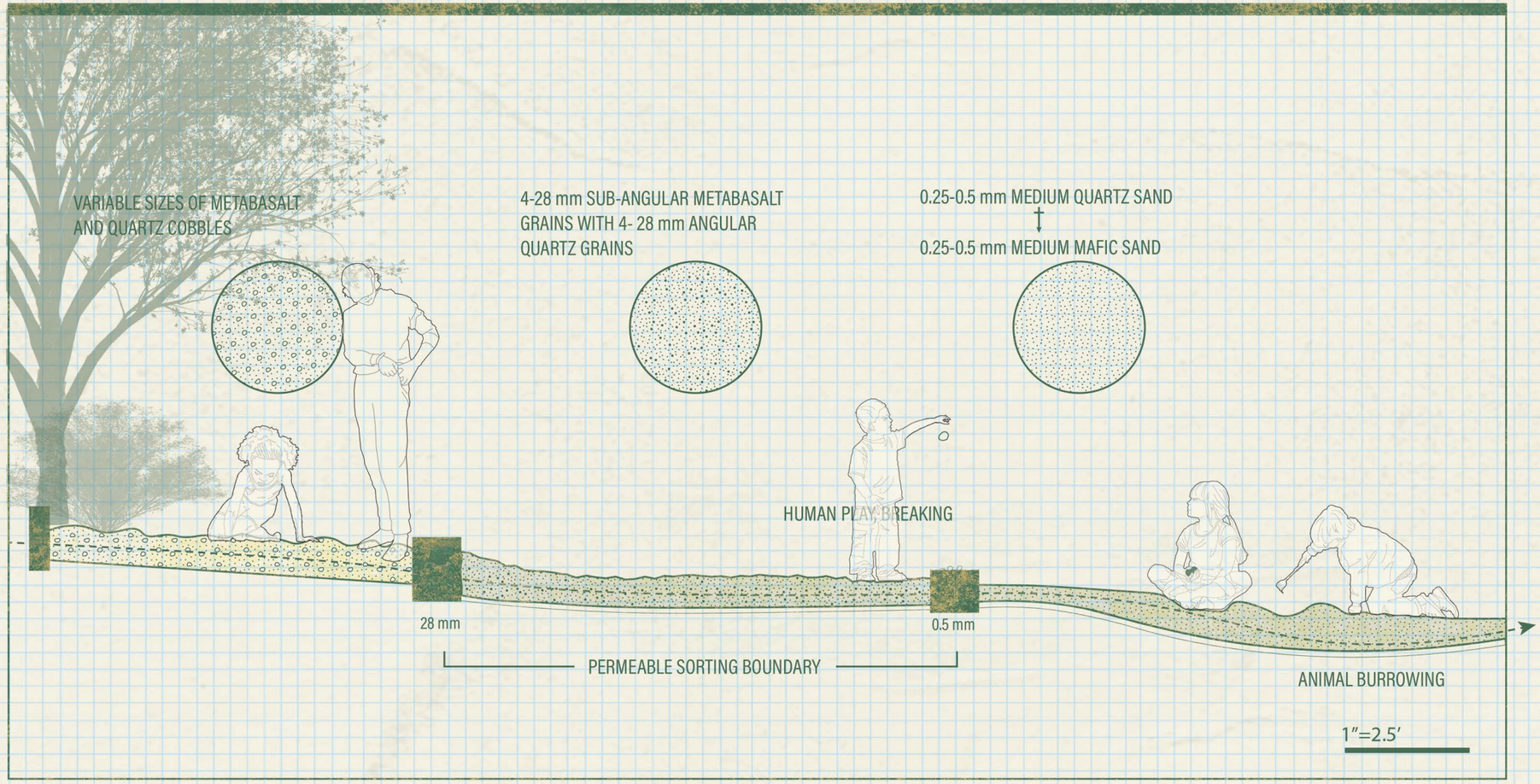


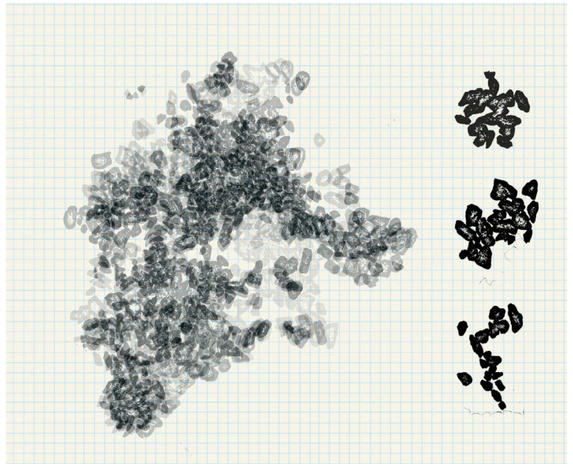

ALLOW ANIMALS TO INTERACT WITH, MODIFY, REMOVE AND ADD

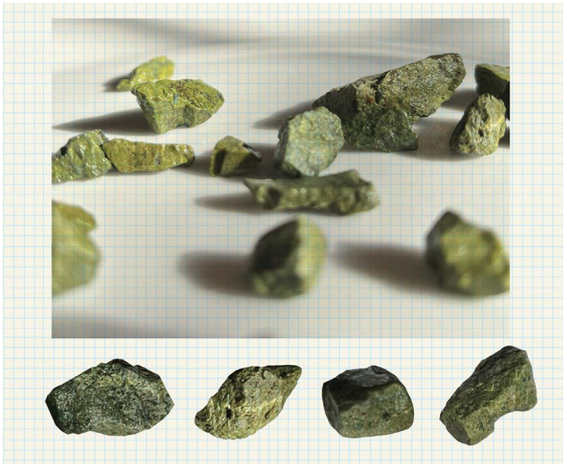
DESIGNED LANDSCAPES HAVE A GREAT CAPACITY TO ENGAGE WITH TRAVELING, EVOLVING ROCK. WHAT ARE THE DESIGN MOVES THAT CAN ENCOURAGE ANIMAL- OR FLUID-INDUCED TRAVEL OF ROCK?



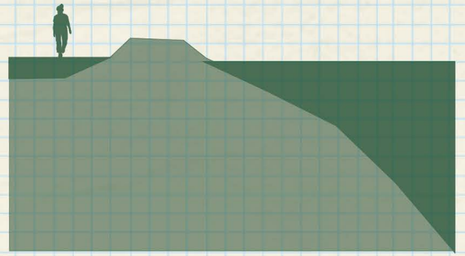


UNIQUENESS OF INDIVIDUAL GRAINS

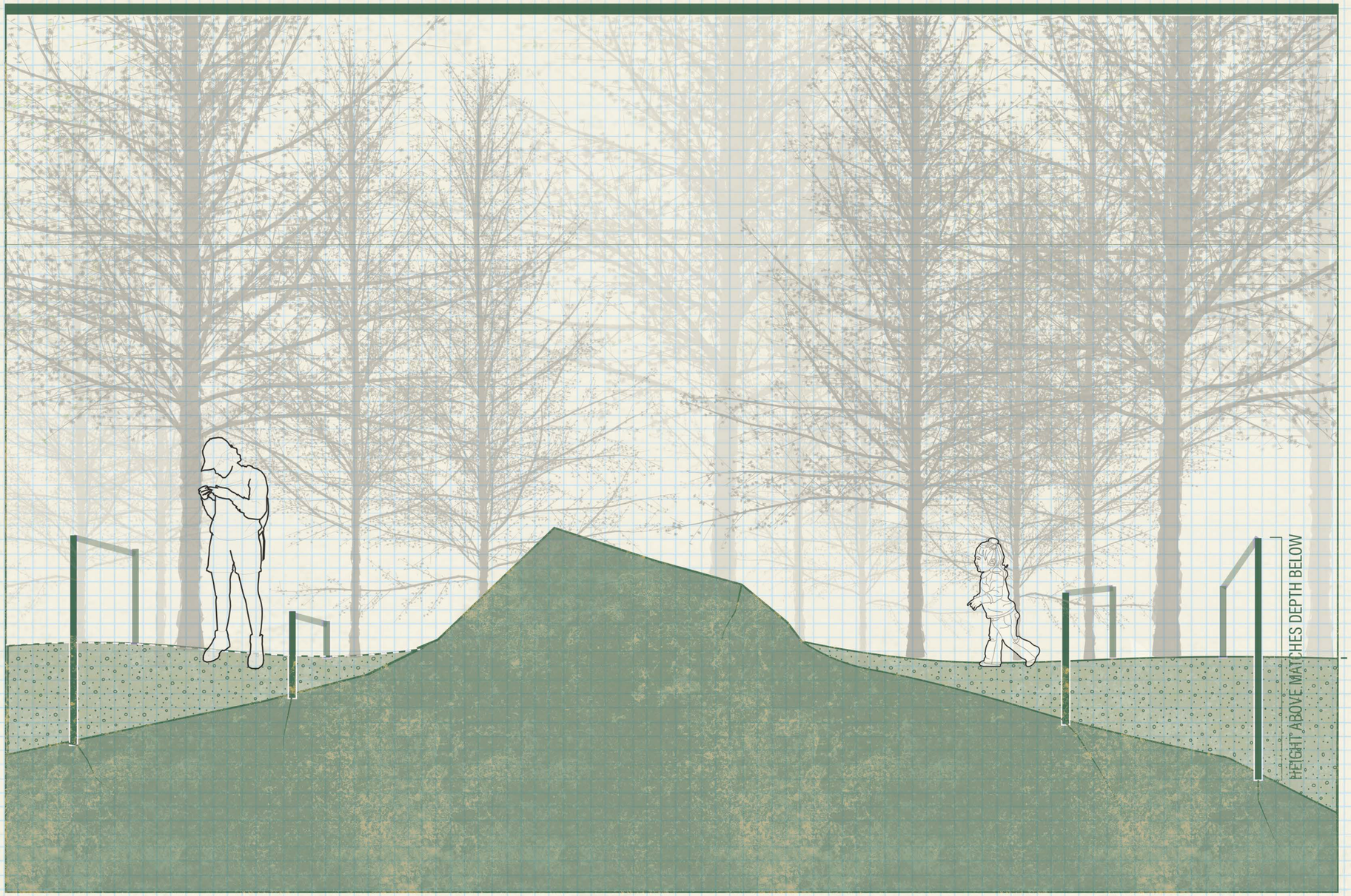




BEDROCK MAY APPEAR IN MOMENTS ABOVE EARTH'S SURFACE NATURALLY. USING GROUND PENETRATING RADAR, THE FULL EXTENT OF THE ROCK BODY CAN BE KNOWN AND TRACKED ON EARTH'S SURFACE. A NEW TOPOGRAPHY.



REVEALING THE ICEBERG



DATUM MARKING A MOMENT OF INTERACTION

WITHIN THE CATOCTIN FORMATION ALONE THERE ARE NUMEROUS DIFFERENT ROCKS THAT WERE FORGED IN DIFFERENT TECTONIC AND VOLCANIC OR SEDIMENTARY CONDITIONS. ALL OF THESE ROCKS APPEAR DIFFERENTLY ON THE SURFACE OF THE EARTH, REACTING WITH WATER, ATMOSPHERE, ANIMAL FORCES, AND TECTONIC FORCES ALL UNIQUELY. THE VARIETY OF LITHIC MATTER EXISTS AT ENDLESS SCALES OF OBSERVATION.

EMBRACING THE UNIQUE

METABASALT

IRREGULAR TEXTURE, VESICLES, QUARTZ

AMPHIBOLITE

HEAT ABSORPTION

PHYLLITE

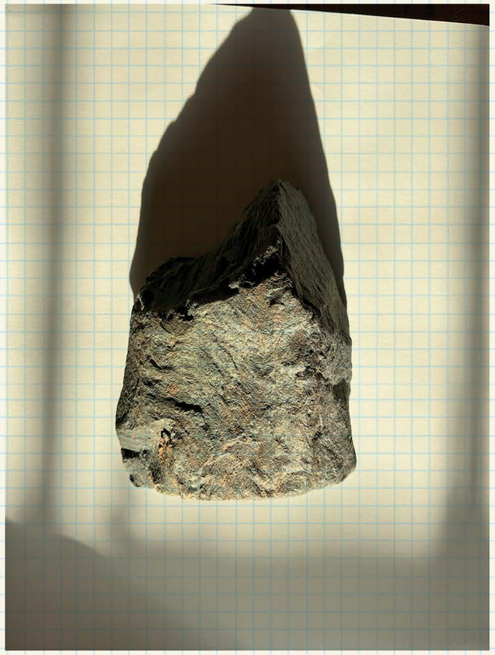
FOLIATION

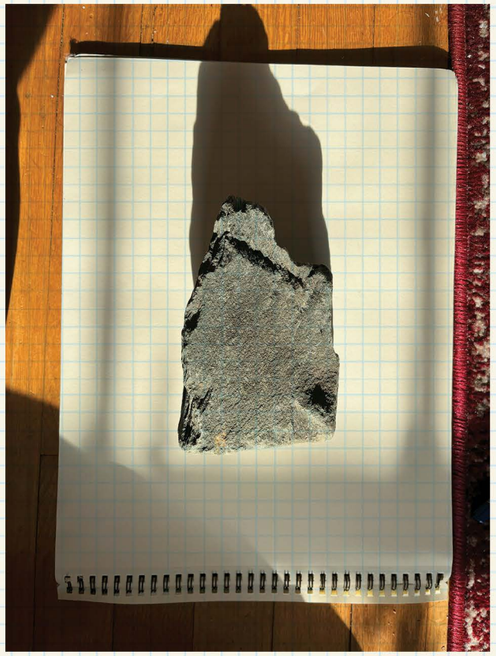
QUARTZITE

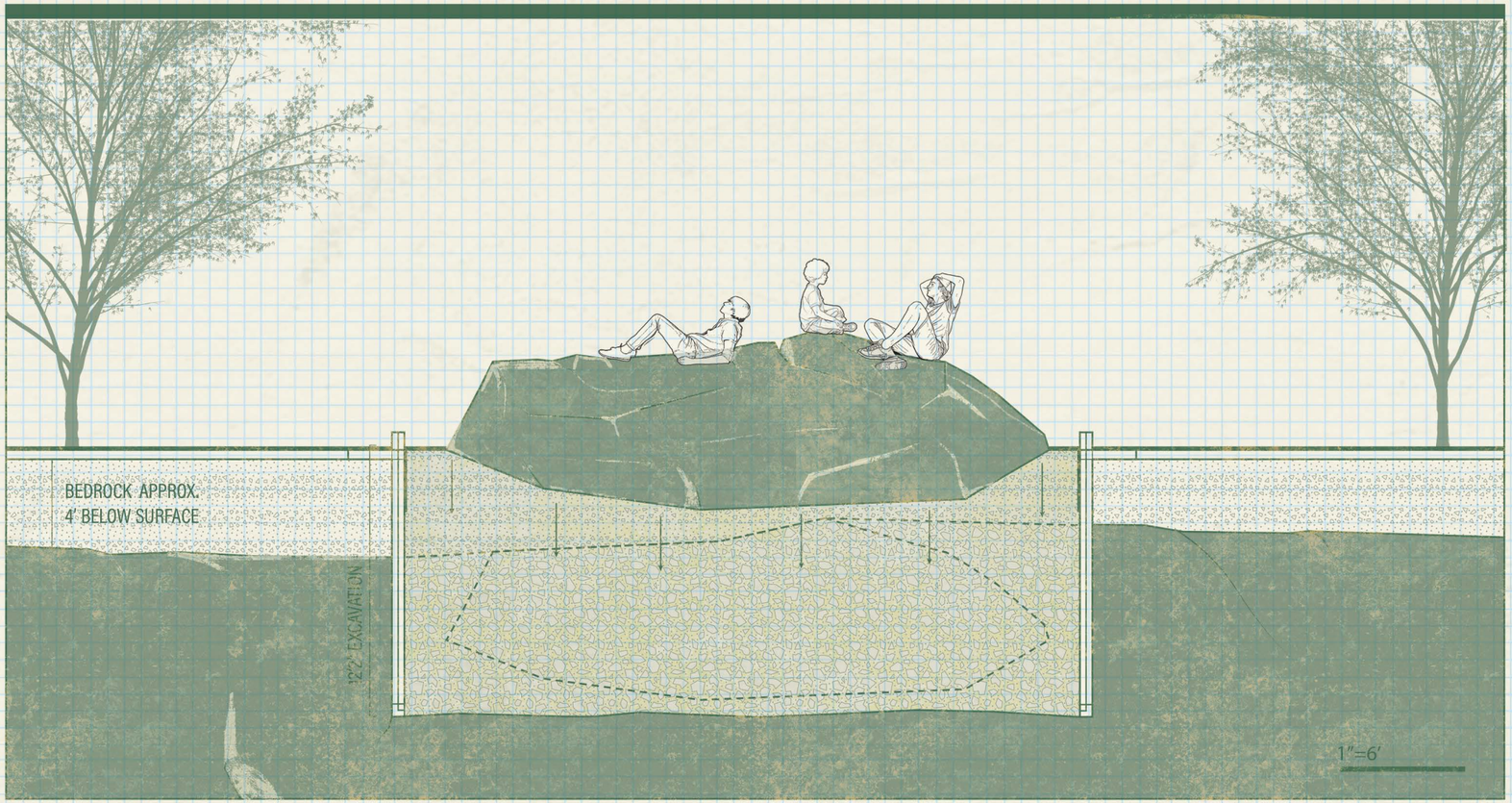
MASSIVE TEXTURE, CONCHOIDAL FRACTURE

IMMEDIATE MATERIAL DIFFERENCE BETWEEN A VARIETY OF LOCAL ROCKS, EACH IDENTIFIED

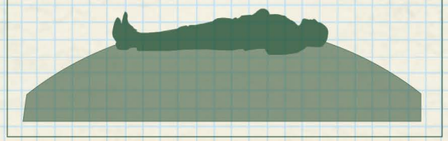
BOULDERS UPRIGHT, TALL, SUBSTANTIAL CHARACTERS, CUT TO EMPHASIZE CHARACTERISTIC QUALITY

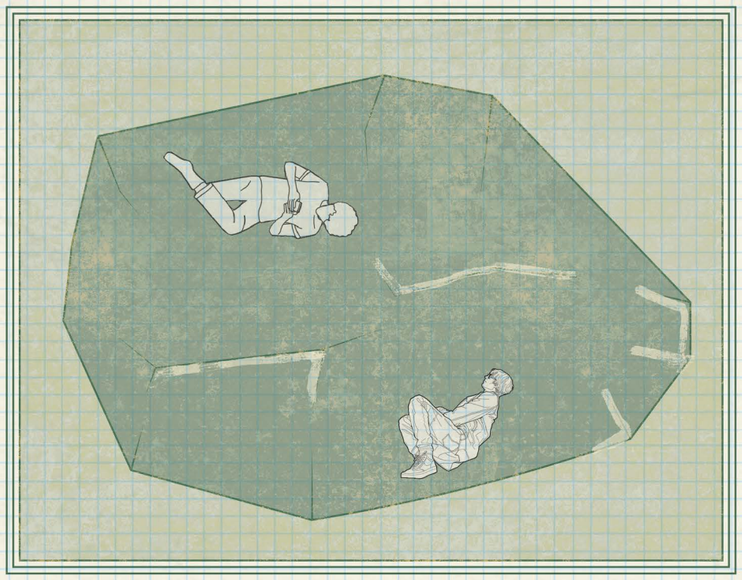


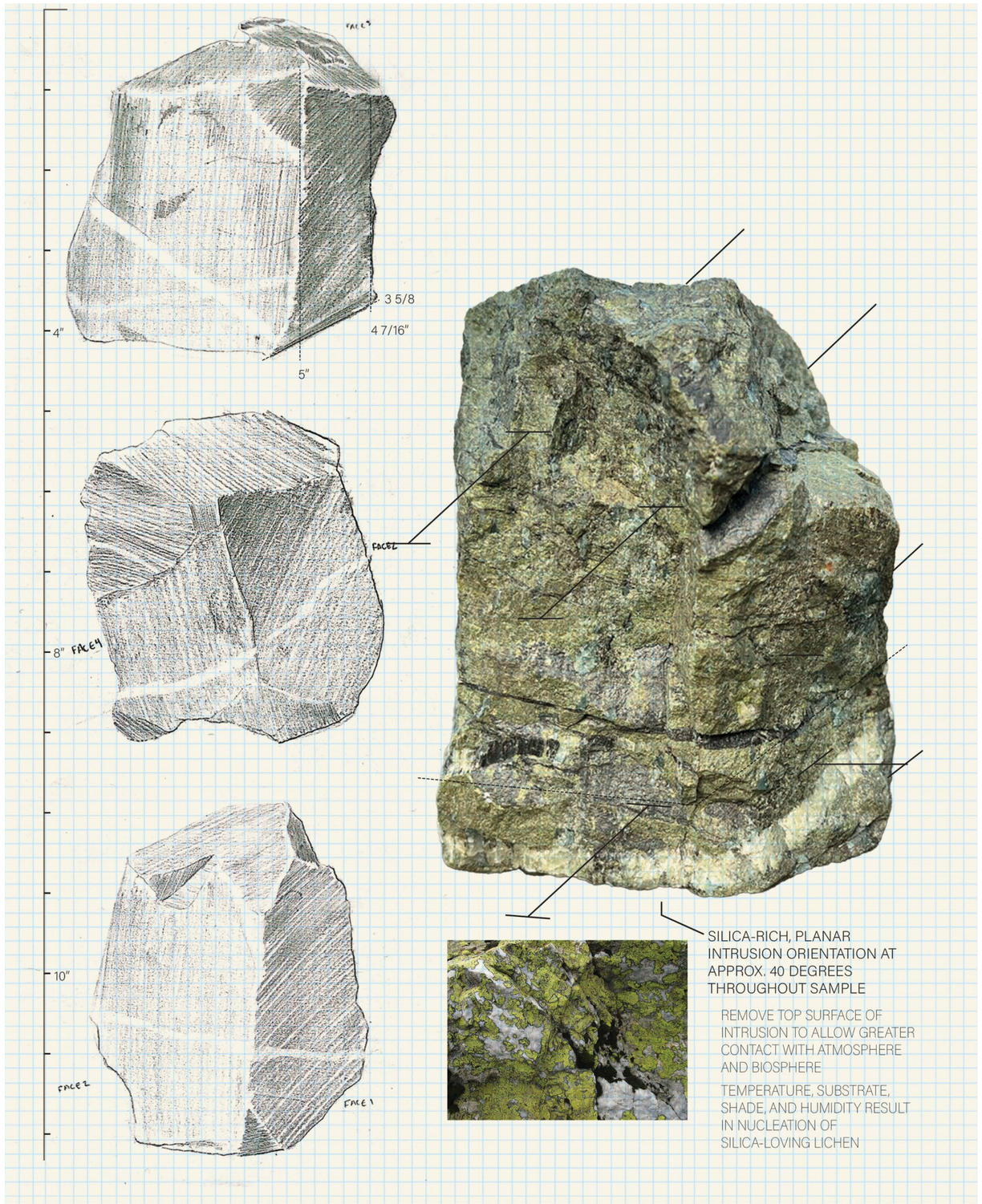




A PORTION OF THE BEDROCK IS EXCAVATED AND BROUGHT TO THE SURFACE. AFTER DECADES, IT NATURALLY SUBSIDES BACK INTO THE EARTH WITH THE AID OF ITS OWN WEIGHT, WATER, THE DAILY FORCES OF ANIMAL BODIES. IT BECOMES A CHARACTER OF PLACE, KNOWN TO MOVE, CHANGE, AND SPEAK TO A MUCH LARGER CONDITION. A TEMPORARY BELOVED PLACE OF GATHERING, ITS SIZE, ITS INTRUSION INTO/OUT OF AN URBAN SPACE, FOLLOWED BY ITS RECESSION BACK INTO THE GROUND REPRESENT HOW BRIEF OUR RELATIONSHIPS WITH LITHIC BODIES ARE WITHIN THEIR FRAMES OF EXISTENCE.

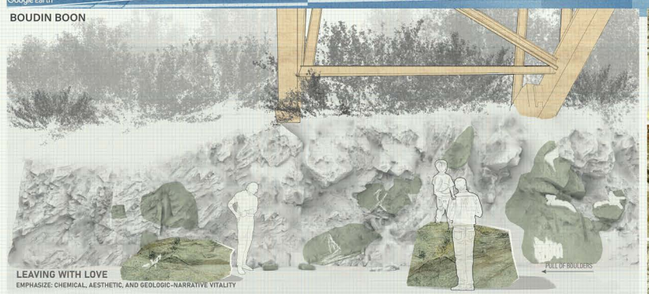


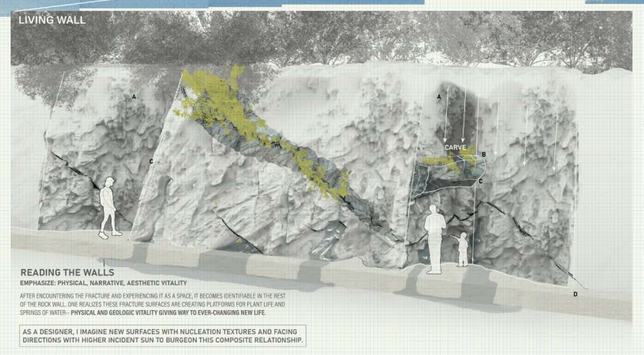


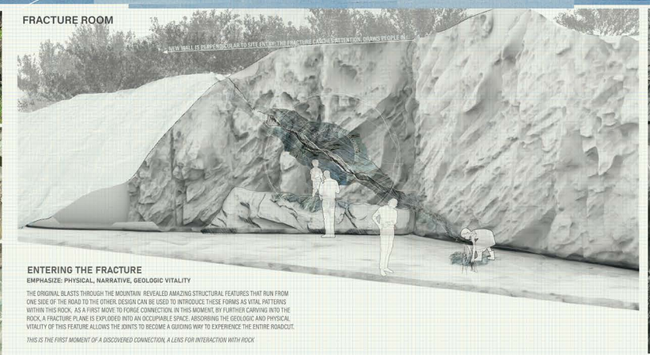

FACE 3
3 5/8
4 7/16"
4"
5"
8" FACE 4
FACET
10"
FACE 2
FACE 1
SILICA-RICH, PLANAR INTRUSION ORIENTATION AT APPROX. 40 DEGREES THROUGHOUT SAMPLE
REMOVE TOP SURFACE OF INTRUSION TO ALLOW GREATER CONTACT WITH ATMOSPHERE AND BIOSPHERE
TEMPERATURE, SUBSTRATE, SHADE, AND HUMIDITY RESULT IN NUCLEATION OF SILICA-LOVING LICHEN

DESIGNING AN EXPERIENCE OF ROCK

EMPHASIZING LITHIC VITALITY THROUGH DESIGN



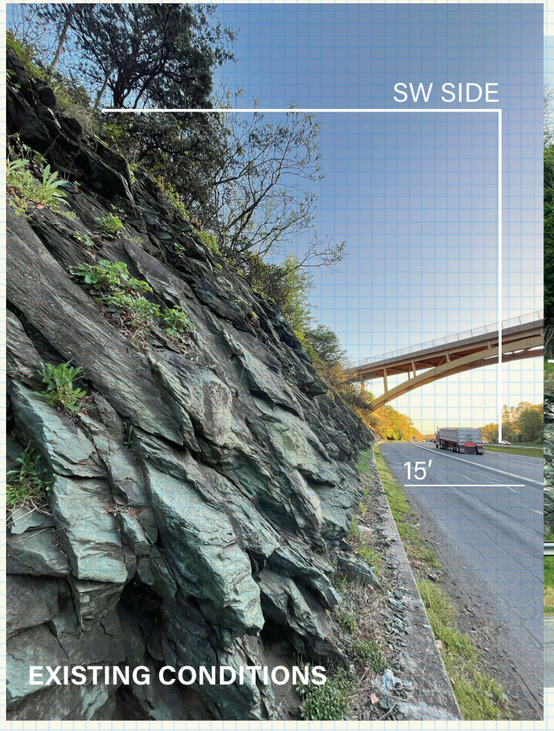


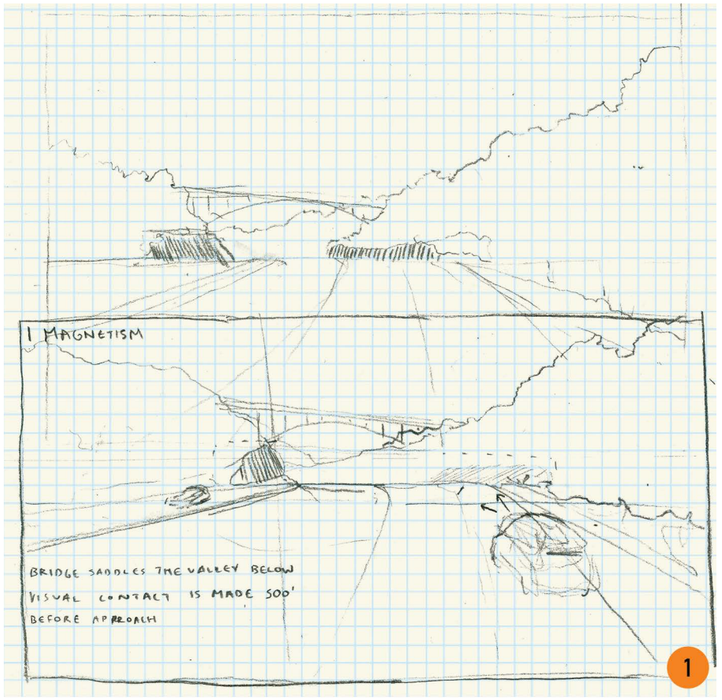


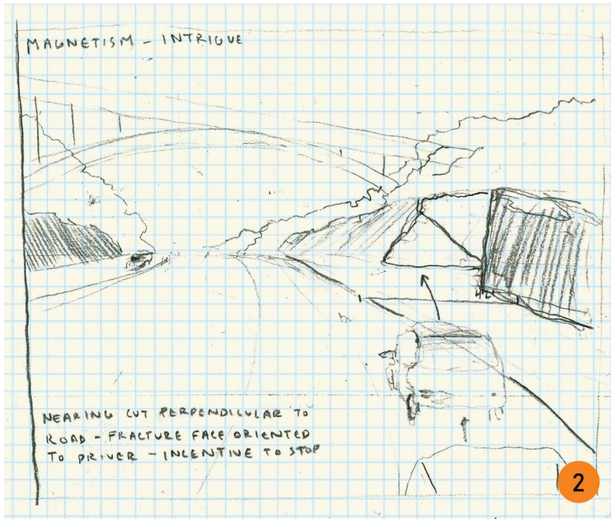
The roadcut I studied is in Frederick, Maryland. Within this study, I focus on the approach and interaction with the rock brought on by simple moves of cutting away and reorganizing on different scales. As I did before at other sites in the field notes section, I studied this form as a site in person and collected a narrative for it, guided by my intuition and its magnetism.

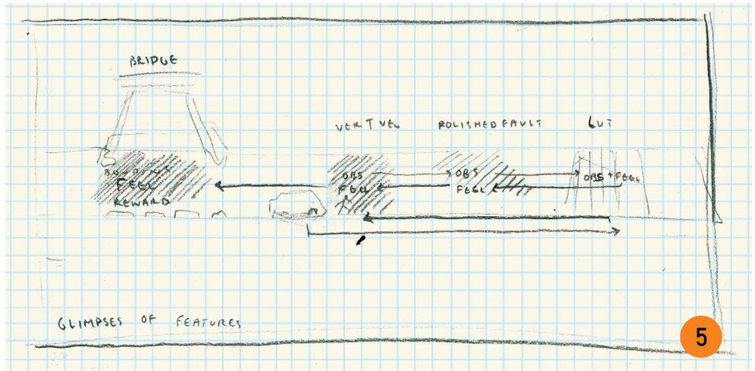
Today, this roadcut is a dangerous place to spend a lot of time. It is not safe at all to be on the NE portion of it, so I focused my study to the SW portion of it.

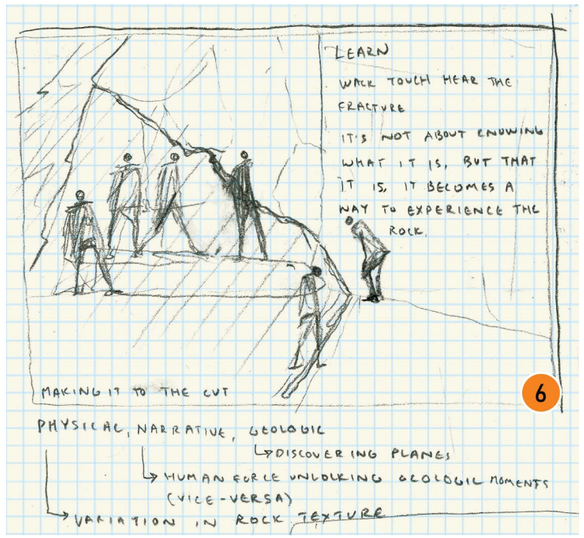
The first move was to really just provide the opportunity for people to have a moment here by reducing the speed limit and widening the offset between the road and the wall.

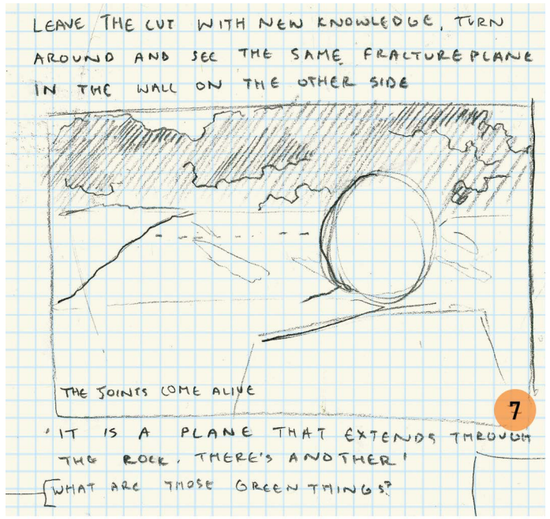




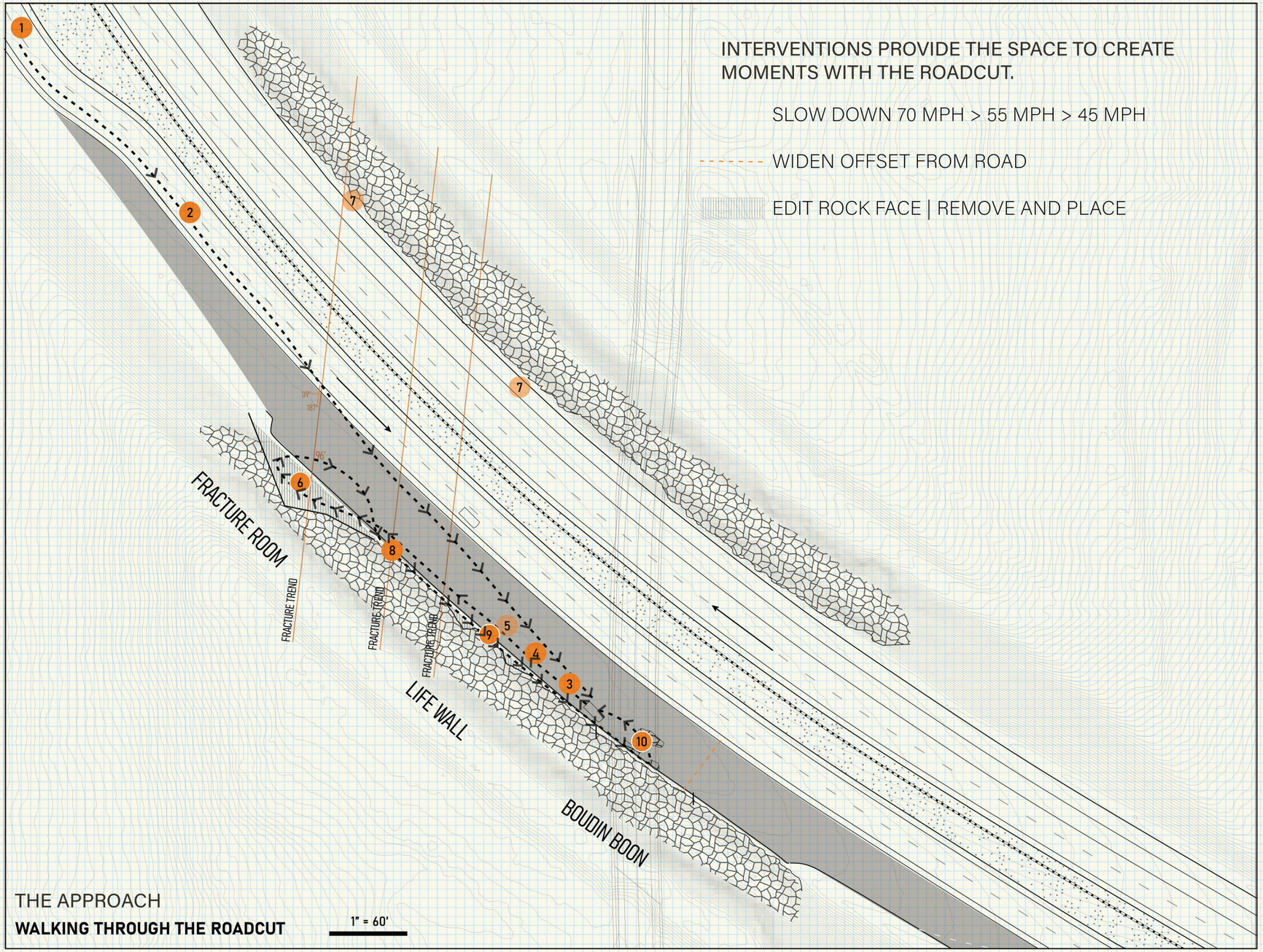


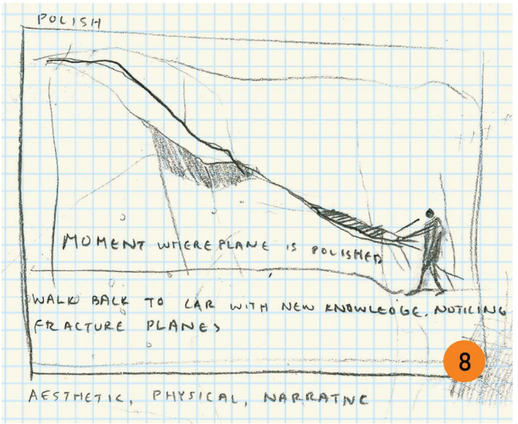




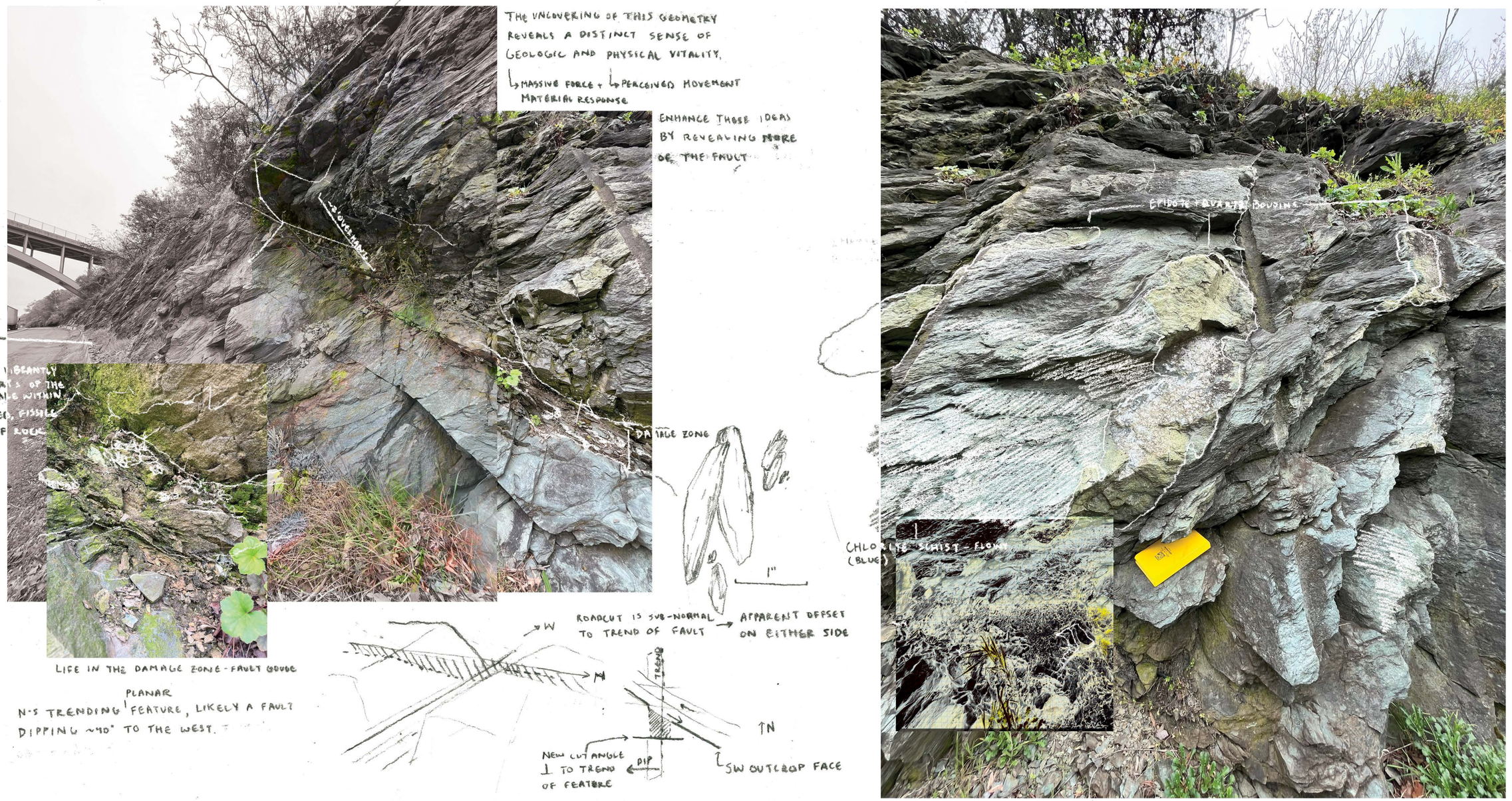


As you approach the outcrop, it's this very scenic view, a bright yellow bridge saddles a gap walled in by this amazing rock. I've cut into the southbound portion, a new face, perpendicular to the dip of the fracture plane. This also happens to be nearly perpendicular to the view of oncoming drivers.

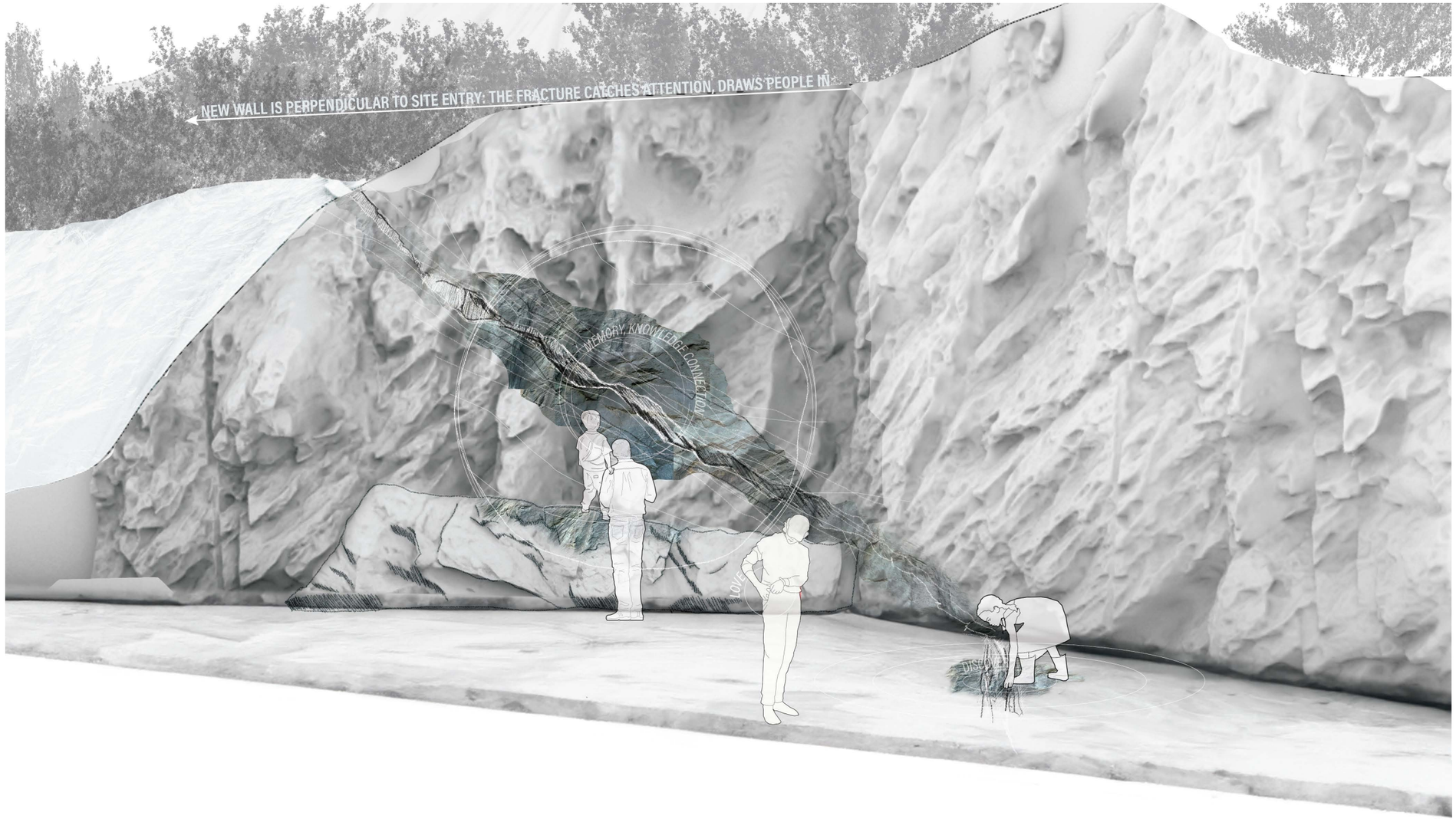




The approach or experience of the outcrop can be designed using editing moves: both extraction and translation of the rock. Though abundantly active in character, revealing one lens through which to experience the rock allows it to form intimate and lasting relationships with visitors that extend into the everyday.



In applying the work I developed, this has become in some ways a methodology into designing a relationship between rock and something else, whether it be rock and people, rock and plants, rock and bugs. In any case, it begins by closely observing and giving to the rock a kind of patient curiosity.



ILLUMINATING
GEOLOGIC, NARRATIVE, AND PHYSICAL VITALITY

CUT INTO ROCK INTO IDENTIFIABLE “ROOM” TO REVEAL STRUCTURAL FEATURE
ORGANIZES HUMANS ABOUT A PLANE IN SPACE

CREATE NEW SURFACES TO POSITION PEOPLE AT HEIGHTS RELATIVE TO FEATURES
MAGNETIZING BODY (BOULDER SURFACE) AND EYE (FRACTURE JOINT)

ROCK “FACING” DIRECTION TOWARD DRIVERS
SLOWS DOWN AND INVITES PEOPLE TO ENGAGE, ASKS THE QUESTION: WHY AM I LIKE THIS?

“DISPLAY” FAULT AS CENTRAL FEATURE IN THE MIDDLE OF THE CARVED FACE
KNOWLEDGE AND MEMORY ARE BUILT BY ACKNOWLEDGING THE FRACTURE. THIS BECOMES RECOGNIZABLE THROUGHOUT THE FORMATION.

ENTERING THE FRACTURE
EMPHASIZE: PHYSICAL, NARRATIVE, GEOLOGIC VITALITY

The original blasts through the mountain revealed amazing structural features that run from one side of the road to the other. As a geologist, the roadcut presents endless information and discovers. Design can be used to introduce these forms as vital patterns within this rock, as a first move to forge connection. In this moment, by further carving into the rock, a fracture plane is exploded into an occupiable space. Becoming at once, the ground and surrounding walls, and extending out into the adjacent wall across the roads. Absorbing the geologic and physical vitality of this feature allows these joints to become a guiding way to experience the entire roadcut.

BIO-LITH INTERACTIONS

OUTCROP'S MICROTOPOGRAPHY SUPPORTS TREES, MOSS, PLANTS, BUGS, LIZARDS, BIRDS

COOL, WET SURFACE

SECRET LIFE

APPEARS TO POUR OUT

SURFACE - DISSOLUTION

SECTIONAL VIEW

WATER TAKES ADVANTAGE OF FRACTURES

SLOPE OF

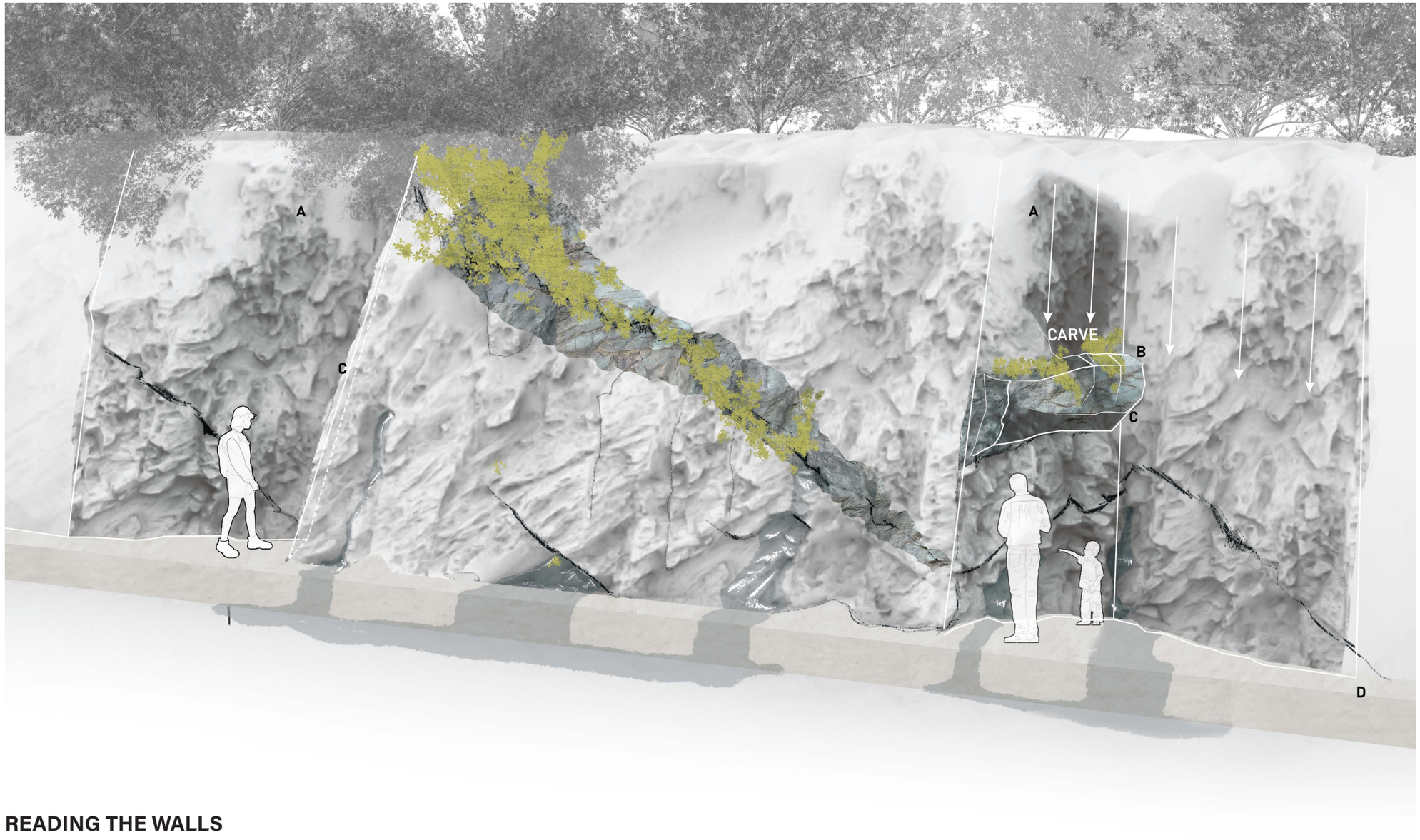
PROTRUSION

CREEPING VEGETATION

WATER OUTPOURS

HYDROLOGICALLY ACTIVE - LIKE A SLOW RELEASE FLOW OF WATER

APPEARS TO POUR OUT FROM THE WALL



ILLUMINATING
PHYSICAL, NARRATIVE, AND AESTHETIC VITALITY

A CUT NEW FACES INTO ROCK TO PRODUCE RADIENT CONTRAST AND MICROCLIMATES
BRIGHTENS, EMPHASIZES THE DIMENSION AND DEPTH OF THE ROCK'S NATURAL FORM

B TEXTURIZE ROCK SURFACE TO ALLOW POCKETS OF WATER, SOIL, PLANT MATERIAL TO COLLECT
SURFACE BECOMES HOME

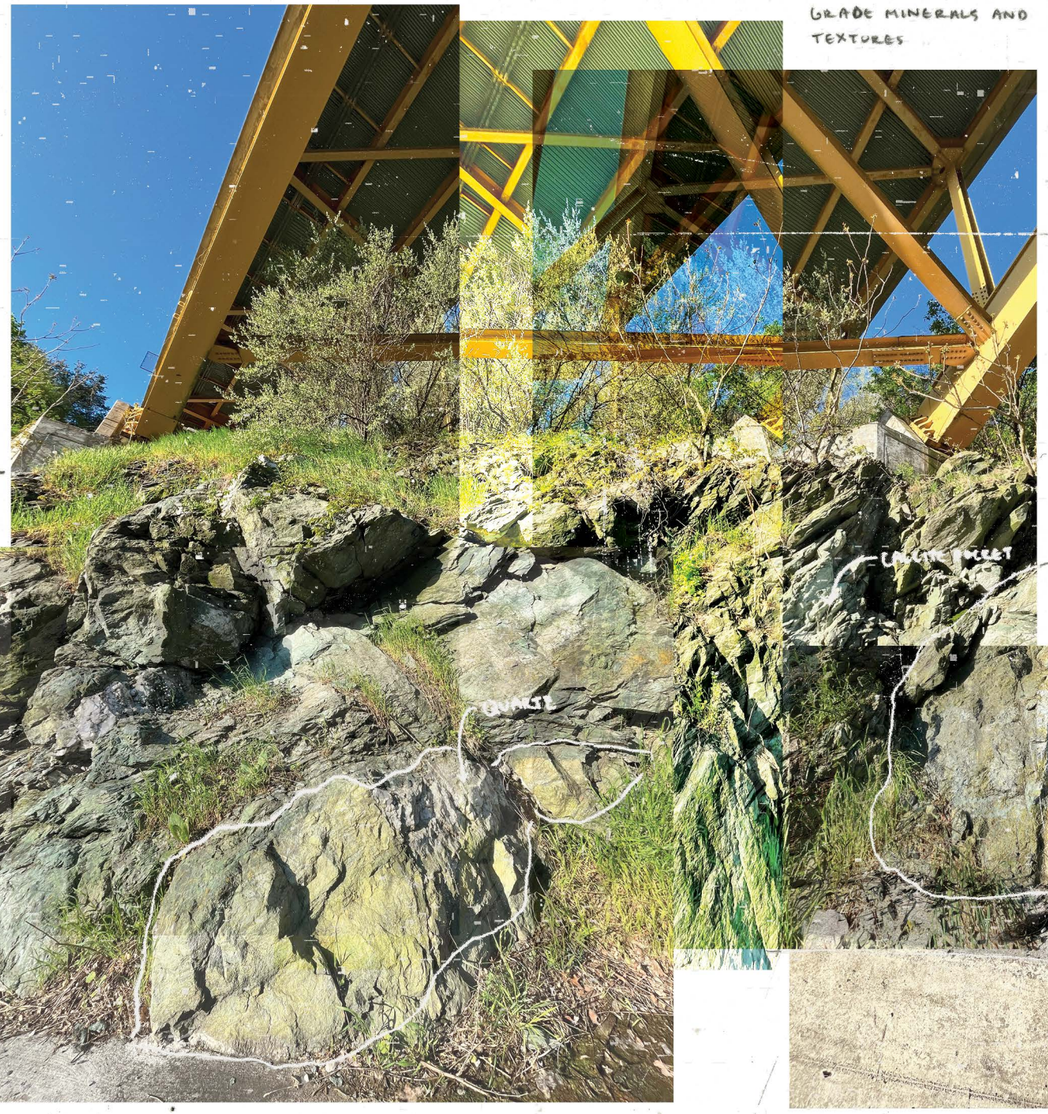
C WORK WITH NATURAL CLEAVAGE TO PRODUCE HORIZONTAL SURFACES FOR NUCLEATION
SURFACE BECOMES HOME

D CREATE PLANES FOR WATER SPREAD
DISPLAYS THE POROSITY AND HYDROLIC CHARACTER OF THE FORMATION, FROM DRIPS TO OUTPOURS

READING THE WALLS
EMPHASIZE: PHYSICAL, NARRATIVE, AESTHETIC VITALITY

After encountering the fracture and experiencing it as a space, it becomes identifiable in the rest of the rock wall. By introducing this structural feature, it becomes a lens through which to understand the rest of the formation. Suddenly, as they head back to their car, they notice these fracture planes are giving way to other amazing things: They're providing surfaces for plants to thrive, they're creating sheet-like pore-space for water to flow and drip out from it. This is physical, aesthetic, almost poetic vitality. The designer can come read this natural cleavage and work with the rock to expose more of these surfaces. The designer can texturize the surface to increase the possibility of nucleation and litho-biotic engagement.

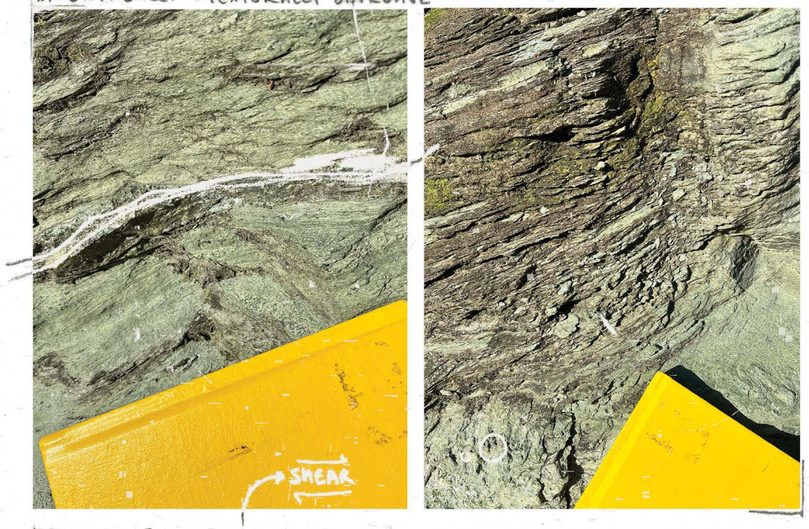
THE BOUDINS CATCH THE EYE LIKE NO OTHER - LOOKING CLOSER REVEALS A SUITE OF HIGHER GRADE MINERALS AND TEXTURES



BRIGHT GREEN - TEXTURALLY OBTRUSIVE

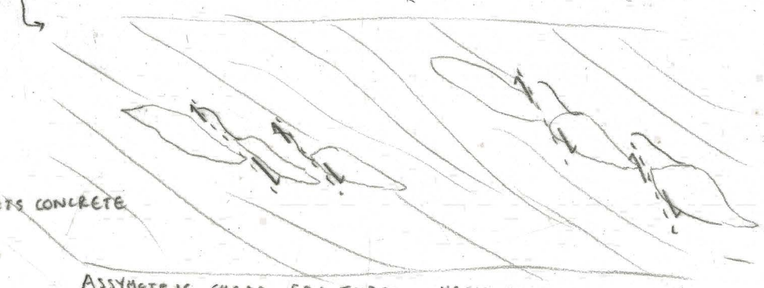
BAND OF CALCITE

4mm POTENTIALLY ANDALUSITE IN EPIDOTE MATRIX



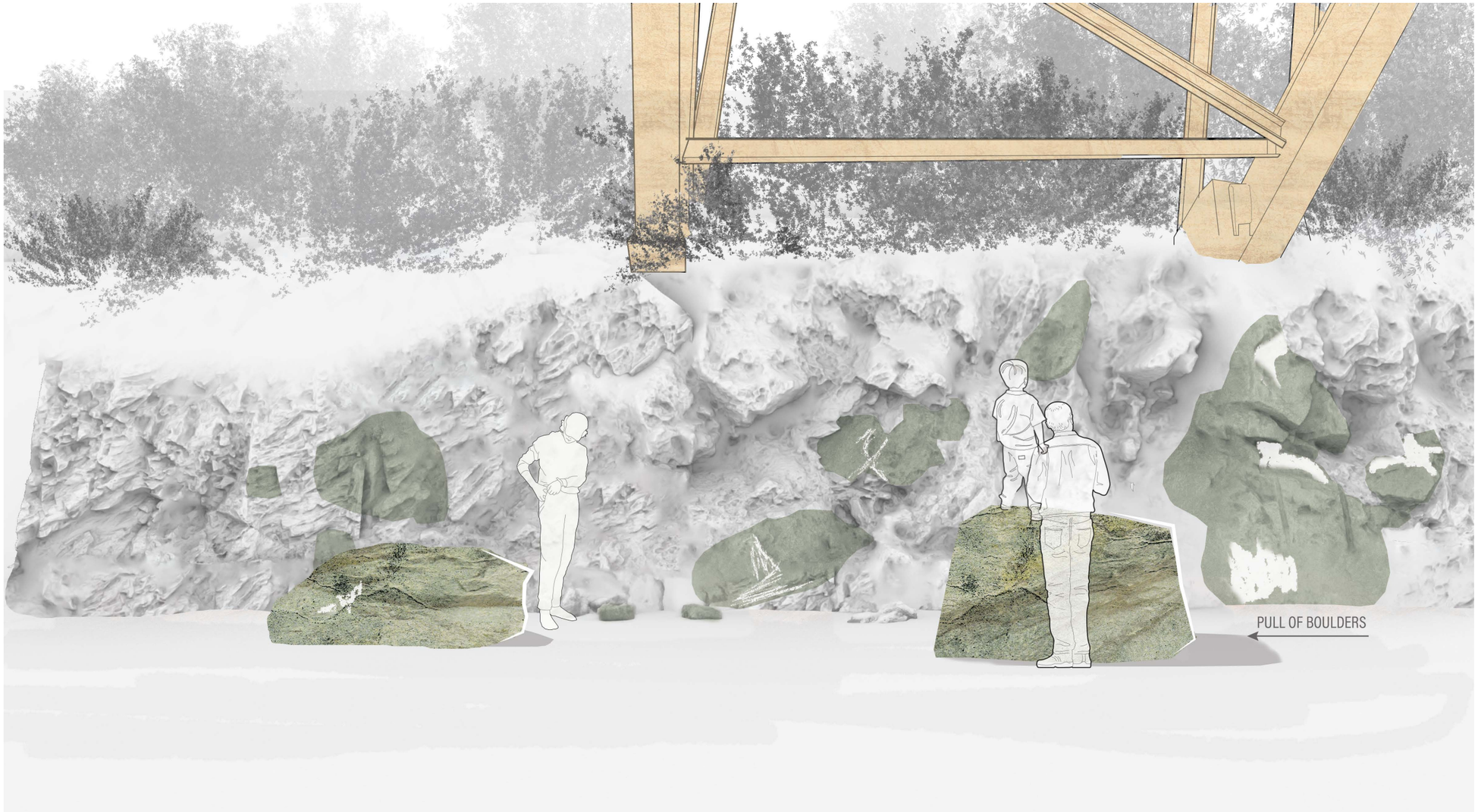
INTENSE FOLIATION FABRIC BOUDIN EDGES

FACING NE SIDE



ETS CONCRETE

ASSYMETRIC SHEAR FRACTURES - VERY DUCTILE



ILLUMINATING
CHEMICAL, AESTHETIC, AND NARRATIVE VITALITY

ORGANIZE BOULDERS ADJACENT TO FEATURES
ROCK **ATTRACTS** PEOPLE TO SPEND TIME HERE

POSITION BOULDERS AT HEIGHTS AND ADJACENCIES TO DIRECT ATTENTION
DIRECTS ATTENTION TO FEATURES

LEAVING WITH LOVE
EMPHASIZE: CHEMICAL, AESTHETIC, AND GEOLOGIC-NARRATIVE VITALITY

The final designed moment with this rock is one of longing. By this point, visitors have peered to the other side of the road and have seen the bright green blebs of epidote that dip across the surface of the outcrop. Strangely, though they search the wall adjacent to them, they are not seen. However, if they spend enough time with the rock, giving it their full attention and curiosity, they may notice the designer's strategic boulders placed under the bridge. All the way at the end of the outcrop, there exists their reward. Pulled in by the magnetism of boulders and their desire to see more, the final moments with this outcrop are spent observing the mineral intrigue of metamorphism, though they may not know what to call it.

CONCLUDING REMARKS

By virtue of using lithic material in design, you are accessing these ancient vitalities. I don't think it's something you can escape. It really becomes a matter of recognizing them, and venerating the material enough to understand that is not 'done'– that the "geologic" is an everyday process, and that the [relationship rock has with everything else] upholds the world. This is an argument to engage with rock with a fullness, with a recognition of its epic and ancient past, and its potential futures— an invitation to learn about and love the rock you use in design.

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DESIGNING WITH GEOLOGY | FORM AND KNOWLEDGE

Al Basha, Nawarah, Anna Eplényi, and Gábor Sándor. “Inspirative Geology -The Influence of Natural Geological Formations and Patterns on Contemporary Landscape Design.” Landscape Architecture and Art 17 (March 2021). https://doi.org/10.22616/j.landarchart.2020.17.05.
Methods for case study approach and/or critique. This is a paper that is beneficial to me in how the author distilled the area of interest into “inspirative geology”-- how geologic structure and place influenced certain landscape designs. They also present methods for case study approach and/or critique that are comparative. I see a lot that might be enhanced by taking a stance on where landscape architecture might be headed/how these applications of geology are important to the field.

Berleant, Arnold. “The Soft Side of Stone.” Environmental Philosophy 4, no. 1-2 (2007): 49-58. https://doi.org/10.5840/envirophil200741/25.

Berrizbeitia, Anita. “Between Deep and Ephemeral Time: Representations of Geology and Temporality in Charles Eliot’s Metropolitan Park System, Boston (1892–1893).” Studies in the History of Gardens & Designed Landscapes 34, no. 1 (2014): 38–51. https://doi.org/10.1080/14601176.2013.850295.
This work includes several important methods of designing with geology, particularly the organizing capacity of a geologically distinct place like Boston’s metropolitan district. Geologic form as the basis for a novel urbanization of Boston. Both scientific and phenomenological understandings of geology. “Geology allowed Eliot and Sylvester Baxter to re-imagine the city as the federalized metropolis: a city defined by its geographic limits, rather than political ones. Geology, thus, formed the basis for a new form of urbanization.”

Gillin, Edward John. “Stones of Science: Charles Harriot Smith and the Importance of Geology in Architecture, 1834–64.” Architectural History 59 (2016): 281–310.
Early studies of 19th geology that speak to the inseparable relationship between architecture and geology as geologic knowledge began to expand. Method of touring buildings and quarries to discover what rocks are important to British society.

Heizer, Michael. Double Negative. Designed Landscape/Earthwork, 1970.
Methods for constructing with geology, often an effort of taking away in order to reveal. A project loved for its apparent simplicity. It explores the concepts of scale, perception, time, and space and is an example of in-situ work.

Löwner, Ralf. “The Importance of Geology in Landscape Architecture Education.” In The Routledge Handbook of Teaching Landscape. Routledge, 2019.
Geology’s role as a datum for anthropogenic development of places. Teaching structural geology, landscape evolution, and global lithology as the valuable tools for landscape architects. It is practical knowledge. Possible resource for articulating an argument for practical geologic understanding of places in landscape architecture that begins with the education of students.

Michael Van Valkenburgh and Associates. Landscape Architecture Firm.
MVVA works on several other projects that rely on rock as a form packed with meaning. The work gets into the concept of geology as metaphor, as well as framing rock as a major element of design. Really focuses on rock.

SCAPE. Be’er Sheva Quarry Park. Be’er Sheva, Israel. Designed Landscape.
Case study example of use of existing geology and forms to amplify the experience. Described by Jane Hutton as “[rocks made public] by bringing people into a sublime rock landscape produced entirely through human labor, by foregrounding the quarry as a site of work and cultural activity, and by drawing attention to rock extraction happening squarely within the city’s center.”

THUPDI. Quarry Garden. Shanghai, China. Designed Landscape, 2010.
Honest and beautiful example of designing intentionally with rock post-quarrying.

Van Valkenburgh, Michael. Teardrop Park. Designed Landscape, 2009.
Geologic form of region as major influence on design. Rock quarried from Alcove New York and described only as “bluestone.” Geology used as metaphor? Monoliths used as representation of culture?

EARTH MATERIAL CONSIDERATIONS IN DESIGN | AESTHETICS, TEXTURE, METAPHOR

Bargmann, Julie. D.I.R.T. Landscape Architect.
Interested in the raw ingredients of design, focused on facing toxic sites head-on. Value in site as is and as it was. Coupling materials with culture and history and being loud about breaking design norms.

Dee, Catherine. “Form, Utility, and the Aesthetics of Thrift in Design Education.” Landscape Journal 29, no. 1 (2010): 21–35. http://www.jstor.org/stable/43323862.
More general assessment on aesthetics, humility, true beauty in design tangentially related to rock but can be applied to case study assessments on form.

Edensor, Tim. "The Affective and Sensory Potencies of Urban Stone: Textures and Colours, Commemoration and Geologic Convivialities." Thesis Eleven 172, no. 1 (2022): 16–35. https://doi.org/10.1177/07255136221133177.
Begins to speak about rock as an actant on people and culture through its sonic, tactile, and visual qualities that are built into designed places. Could be organized in the below category as well. Strong inclusion of culture. Amazing term: geologic conviviality.

Ellsworth, Elizabeth, and Jamie Kruse, eds. Making the Geologic Now: Responses to Material Conditions of Contemporary Life. Brooklyn, NY: Punctum Books, 2013.
Ideas on how geology is affecting culture in real time. Strong reading about earth materials as actants through the geologic imaginary. Rock as metaphor and material are explored through human relationship.

Gosden, Chris. "What Do Objects Want?" Journal of Archaeological Method and Theory 12, no. 3 (2005): 193–211.
Agency of objects. Concept of sensory and emotional impact of culturally significant objects. Theoretical associations applicable to human x rock associations.

Halprin, Lawrence. Landscape Architect.
Aesthetic, metaphorical, and practical (erosion control) uses of rock in design.

Hutton, Jane, ed. Material Culture: Assembling and Disassembling Landscapes. Landscript 5. Berlin: Jovis Verlag GmbH, 2017.
Built landscapes assessed as way of understanding the relationship between human and some aspect of nature.

Hutton, Jane Elizabeth. Reciprocal Landscapes: Stories in Material Movement. Milton Park, Abingdon, Oxon; New York, NY: Routledge, 2020.
Earth material understood between the quarry to the built landscape. Fundamental in critiquing landscape architecture's trend to brush aside where materials come from.

Burle Marx, Roberto. Landscape Architect.
Soil as an actant on plant biology, an idea that can be expanded upon to rock and today's major issue of climate change. He considers the mingling of biologic and lithic timescales through soil. Soil as a lithic and organic quasi-object, an interface between "life" and "lithic"?

Leveson, David. "Geologic Clarity: A Geologist's Perspective on Landscape Aesthetics." Landscape Journal 7, no. 2 (1988): 85–94. https://doi.org/10.3368/lj.7.2.85.
Kind of a weird paper on aesthetics that is revealing my own biases and values based on my background. Landscapes are most pleasing to geologists when there is geologic clarity and articulation of process and time. Should we design landscapes that are packed with scientific articulation? No, that is superfluous.

Walker, Peter. Tanner Fountain. Designed Landscape, 1989.
Rocks used as metaphor, genuinely jam-packed with different meanings discerned by different people. An example of the extremely variable human-rock interface that is dependent on multiple timescales– human (play, imagination, accessibility), seasonal (shifts in function and even form), bio-geologic (lichen, rock weathering). Very interesting case study to use for experimentation with simple elements (rock spacing, rock composition, water placement and form) as well as discerning change through time (34 year old project).

THINKING AND FEELING | EMOTIONS, EXPERIENCE, CULTURE

Bennett, Jane. Vibrant Matter: A Political Ecology of Things. Duke University Press, 2010. https://doi.org/10.2307/j.ctv11jh6w.
Affectivity of everyday materials, often overlooked, rippling impacts of things. A post-humanist perspective that both immediately challenges and inspires my thinking of rock and earth as important in and of itself without human involvement. Where I position rock as something misunderstood (having at once an apparent stagnant materiality but being active chemically and physically, you just must look for it). Particularly chapter 4 expands a lot on what can be described as physical vitality.

Cohen, Jeffrey Jerome. Stone: An Ecology of the Inhuman University of Minnesota Press, 2015. https://doi.org/10.5749/minnesota/9780816692576.003.0002.
Emotional relationship between rock and people. An amazing book that I love so much. Poetically dances with the magic of rock from medieval conceptions into present-day thought.

Gordon, John E., and Matt Baker. "Appreciating Geology and the Physical Landscape in Scotland: From Tourism of Awe to Experiential Re-Engagement." Geological Society, London, Special Publications 417, no. 1 (2016): 25–40. https://doi.org/10.1144/SP417.1.
Exploration of experience in Scotland's geologic landscapes beginning with historical appreciation of Roman tourism into present conditions of stressing public awareness for these landscapes once thought of with great wonder. Idea of rediscovering wonder of landscapes, not becoming immune.

Harries, John. “A Stone That Feels Right in the Hand: Tactile Memory, the Abduction of Agency and Presence of the Past.” Journal of Material Culture 22, no. 1 (2017): 110–30. https://doi.org/10.1177/1359183516679187.
Memory embedded in rocks through textures and experience and a little bit of geologic knowledge, though not necessary. Cities can be read through their rocks in the built envrionment.

Huber, Matt. “Resource Geographies I: Valuing Nature (or Not).” Progress in Human Geography 42, no. 1 (2018): 148–59. https://doi.org/10.
How we assess environmental systems based on capitalist values. Marxist critique on valuing nature and the violence connected to the relationship between the human and nonhuman– extended to earth. What is the physical cost of designing with rock?

Iovino, Serenella, and Serpil Oppermann, eds. Material Ecocriticism. Bloomington: Indiana University Press, 2014.

Macfarlane, Robert. Underland: A Deep Time Journey. UK; USA: Hamish Hamilton an imprint of Penguin Books, 2019.

Miller, Hugh. “Landscape Geology: A Plea for the Study of Geology by Landscape Painters.” Transactions of the Edinburgh Geological Society 6, no. 2 (1890): 129–54. https://doi.org/10.1144/transed.6.2.129.
Historical value to know geological concepts in landscape paintings. The necessity to understand geology to reproduce its affects. Useful in articulating an argument for new ways of working.

Raffles, Hugh. “A Lapidary Itinerary.” Rocks, Stones, and Dust. https://hughraffles.com/short-writings/ 2012.

Rahm-Skågeby, Jörgen, and Lina Rahm. “HCI and Deep Time: Toward Deep Time Design Thinking.” Human–Computer Interaction 37, no. 1 (2022): 15–28. https://doi.org/10.1080/07370024.2021.1902328.

Robertson, Kellie. “Exemplary Rocks.” In Animal, Vegetable, Mineral: Ethics and Objects, edited by Jeffrey Jerome Cohen, 91–122. Punctum Books, 2012. http://www.jstor.org/stable/j.ctv19cwdks.7.

Schwartz Smith Meyer Landscape Architects. Village of Yorkville Park. Toronto, 1992.
Precedent study on how landscape architects are thinking about geologic formations and what they can mean to people when displayed in landscape in a bold/bizarre way. This particular landscape is fascinating for the juxtaposition of billions of years against moments.

“Smudge Studio.” Smudge Studio. https://www.smudgestudio.
Founded by Elizabeth Ellsworth and Jamie Kruse, the same people who wrote The Geologic Now. The website is a collection of geologic concepts of time, rocks, and matter materially represented in art, expressed to the public as intrinsically valuable and epic. A great stylistic and inspirative resource.

Tilley, Christopher Y. Interpreting Landscapes: Geologies, Topographies, Identities. Explorations in Landscape Phenomenology 3. Walnut Creek, Calif: Left Coast Press, 2010.
Tilley argues that geologic features create their own potentialities and are symbolic resources. Understanding geology requires forms of social engagement and phenomenology. An interesting set of studies into places and how people have historically related to stone. I imagine this source and others like it to reinsert into the project later on.

Tilley, Christopher Y., and Wayne Bennett. The Materiality of Stone. Explorations in Landscape Phenomenology 1. Oxford; New York: Berg, 2004.

ROCK AS CHEMICAL/PHYSICAL ACTANT IN LANDSCAPES

Bjornerud, Marcia. Timefulness: How Thinking like a Geologist Can Help Save the World. Princeton: Princeton University Press, 2018.
Necessary ideas about the understanding of the intermingling of humans and geologic time in actually making headway in climatic issues. Things are changing and we are witnessing it just as we witness the stories of strata. Earth is alive.

Cohen, Jeffrey Jerome. Stone: An Ecology of the Inhuman University of Minnesota Press, 2015. https://doi.org/10.5749/minnesota/9780816692576.003.0002.
Philosophical backing for the thesis. Contributes ideas of “ethics of scale,” the generative relationships lithic and neolithic elements enter into, articulates the affective force of rocks: “where enchantment functions (in Jane Bennett’s smart gloss) as an “affective force” that might “propel ethical generosity,’ a way of thinking that contests dreary and destructive modes of reducing matter to raw material, diminishing objects to uses. Enchantment is estrangement and secular enmeshment, sudden sighting of the world’s dynamism and autonomy, the advent of queered relation.”

Hutton, Jane. “Making Rocks Public.” In Toward an Urban Ecology, 71-78. New York: Monacelli Press, 2016.
Hutton articulates SCAPE’s ability to foreground mineral and

geologic processes as Active. Working to register processes that play out along different timescales; the physical mingling of human and lithic activities. “As a field, landscape architecture is founded on an intricate understanding of geological context– for purposes of aesthetic effect, construction technology, and notions of ecological fit. [SCAPE’s] practice certainly builds upon this tradition, their approach extends far beyond responsible contextualization and compelling tectonics. Instead, SCAPE’s work offers a thought-provoking and ecstatic engagement with rocks and minerals in ways that engage the public.”

Gabet, Emmanuel J., and Simon M. Mudd. “A Theoretical Model Coupling Chemical Weathering Rates with Denudation Rates.” Geology 37, no. 2 (2009): 151–54. https://doi.org/10.1130/G25270A.1.

Kelemen, Peter, Sally M. Benson, Hélène Pilorgé, Peter Psarras, and Jennifer Wilcox. “An Overview of the Status and Challenges of CO2 Storage in Minerals and Geological Formations.” Frontiers in Climate 1 (2019). https://www.frontiersin.org/articles/10.3389/fclim.2019.00009.

Kelemen is leading in research on carbon sequestration through rock. Relates the necessary requirements to meet climate goals and the need to maximize global sequestration potential. Has several pieces on the state of the fields of geology and geoengineering as progress is made.

Oman Ophiolite. Place.

Where much of the science on the sequestration ability of ultramafic rocks has been explored. A massive massive massive part of the global carbon cycle through atmospheric interaction of rock and water

SCAPE. Landscape Firm.

SCAPE argues for a rethinking of rocks past “archaic material stocks or inert sitecontexts,”--seeing our interactions with rock as political and foundational to public discourse via landscape architecture. It is not just about teaching geology, it is about human and geologic activity. “[Rocks] are the very contemporary matter that we feed on, build with, fight over, and survive by.” (Jane Hutton on SCAPE in Toward an Urban Ecology).

Welch, Lew. “Springtime in the Rockies, Lichen.” In Ring of Bone: Collected Poems. San Francisco: Grey Fox Press, 1973. Poem.

White, Arthur F., and Susan L. Brantley, eds. Chemical Weathering Rates of Silicate Minerals. Vol. 31. Walter de Gruyter GmbH & Co KG, 2018.

Great reference for chemical qualities and weathering rates of minerals.

Wilcox, J., Kolosz, B. and Freeman, J., 2021. CDR primer. https://cdrprimer.org/read. Book.

An incredible resource on the technology and science behind carbon sequestration. Section 2.1 and chapter 3 are particularly helpful, framing the specific rocks I am interested in exploring within a global and practical context. Illuminates how few studies there are in in-situ enhanced weathering carbon sequestration.