HIGH PLACES

DOCUMENTING LOSS AND PROPOSING MEMORIALIZATION FOR THE WILLAMETTE VALLEY BUTTES



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Thank you to: my academic and professional thesis advisors, landscape architecture professors past and present, cohort, friends, and family.

Cover: Parvin Butte. Photo by John Bauguess.[1]



Krautman Hill. Photo by Jeff Krueger.[2]

ABSTRACT

Aggregate mining in the Willamette Valley deforms charismatic butte landforms and, by extension, their ecological, social, and cultural values. Despite the prevalence of extraction, there is no comprehensive spatial documentation tracking this transformation, and prevailing reclamation practices often overlook the human experience of loss.

This project, *High Places*, proposes integrating memorial tactics into landscape design as part of a more holistic approach to mine reclamation. Focusing on the valley's buttes, it addresses this gap through a two-phase process of research and design.

The first phase employs GIS mapping and data filtering to identify buttes and assess mining-related deformation, resulting in the selection of sites with high deformation and therefore reclamation potential. A precedent study—examining projects engaged in mining, memory, or both—uses a Cartesian framework to develop generalizable design guidelines. The second phase applies these guidelines to a selected site, demonstrating how post-extraction landscapes can integrate landscape memorial tactics.

Recognizing the continued necessity of aggregate mining, this project positions memorialization as a culturally significant and underutilized reclamation strategy, offering a framework for landscapes to acknowledge and remember what has been lost.



Peterson Butte, Photo by Jeff Krueger.[3]



Spencer Butte as viewed from Skinner Butte Trail. Accessed via Eugene, Cascades, and Coast.[4]

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I. INTRODUCTION

WHAT / WHY





A view of Springfield Butte from Mount Pisgah.

TRADITIONAL BUTTE

an isolated steep-sided, flat-topped hill; often unvegetated and formed by erosive processes



The Mittens, Monument Valley, Utah. Accessed via Antelope Canyon.[2]

WILLAMETTE VALLEY BUTTE

a steep-sided hill-like landform that is topographically prominent; often vegetated



Ward Butte, outside Brownsville, Oregon.[3]

WILLAMETTE VALLEY BUTTE BASICS

ECOREGION

The Willamette Valley is a distinct ecoregion in Oregon characterized by fluvial terraces and riparian floodplains of the Willamette River system ("Willamette Valley – Oregon Conservation Strategy," n.d.). The low-lying valley is flanked by mountain ranges on either side: the Coast Range to the west, and the Cascade Range to the east. Due to its flatness, the occasional punctuation of the valley by buttes is highly visible. These relatively high places stick out as charismatic landmarks that are rich with ecological, social, and cultural value.

DEFINING "BUTTE"

While butte is a familiar term across disciplines and landscapes, the colloquial use of the word in the state of Oregon, and specifically the Willamette Valley Ecoregion, does not correlate with the prototypical geomorphological definition of a butte, which, like the Mittens in Monument Valley, Utah, is a steep-sided, flat-topped, unvegetated landform ("Butte," n.d.). Typical buttes are commonly located in arid regions and formed by erosive processes. In the Willamette Valley, a moist, mild region, buttes are steep-sided landforms but more closely resemble vegetated hills. *High Places* defines buttes as steep-sided, hill-like landforms that are topographically significant (see Chapter 2).

FORMATION

Contrasting with traditional buttes, Willamette Valley Buttes are typically formed by volcanic processes: when molten, mafic magma is injected into pre-existing rock layers underground. The magma cools, forming coarse-grained rock known as basalt. This relatively hard rock is slowly exposed by long-term erosion that degrades the softer surrounding rock. The resulting landform protrudes from the nearby topography.

While a lot of buttes in the mid and south valley are formed this way, other landforms with non-igneous parent material are equally topographically significant and visually prominent, and therefore are also defined as buttes within this project. This project investigates buttes as they pertain to mining and memorialization, so geology is not considered here in defining butte landforms.

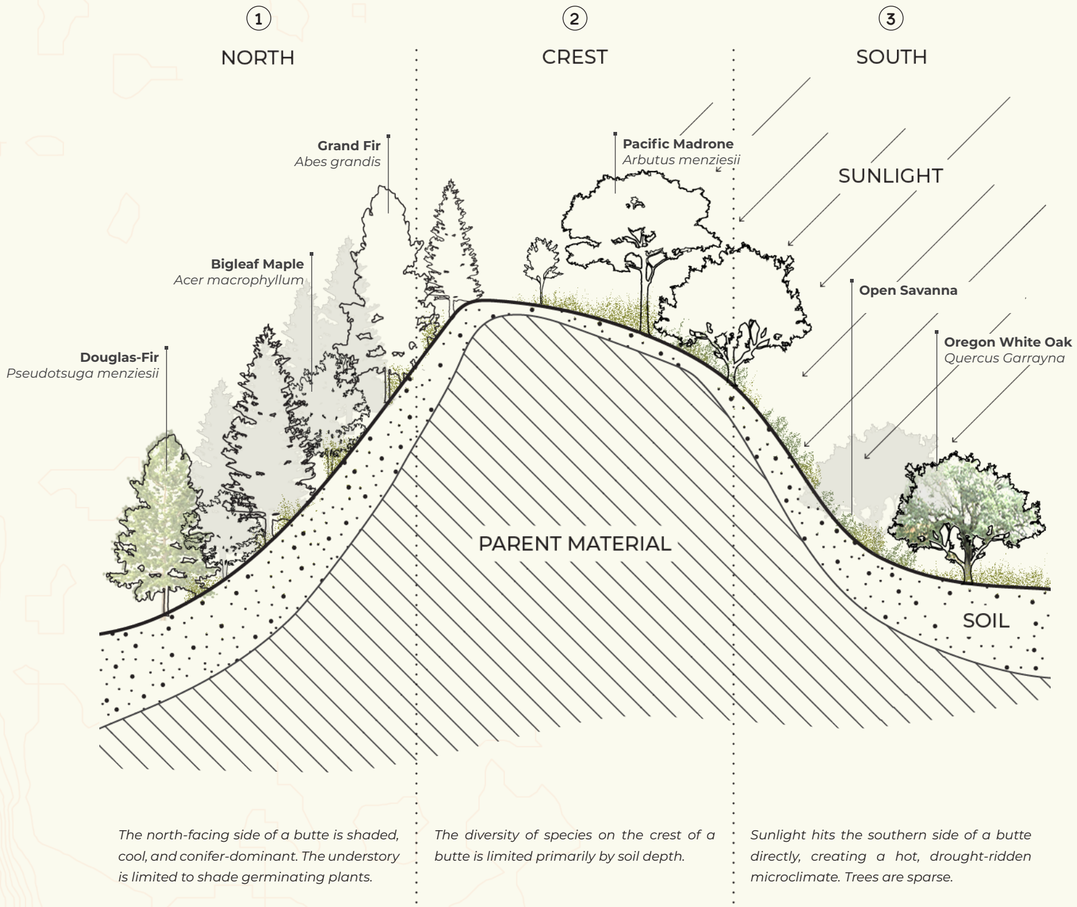
STRUCTURE

Because of their hill-like shape, buttes tend to have uneven soil distribution, with thin soil at the crest and a thicker soil profile at the bottom, due to progressive, compounded slumping. Sunlight also hits the sides of a protruding butte differently, creating aspect-dependent microclimates.

On the northern side of the butte, sun rays are indirect. As a result, conifers dominate this side, casting large shadows and creating a cool, moist microclimate. Underbrush consists of small trees and shrubs that can germinate in shade.

The top of the butte is slightly crested and typically dominated by brush and drought-tolerant species. Here, lack of soil predominantly influences plant growth; species with deeper roots do not flourish.

Sunlight hits the southern side of the butte directly for most of the year, making this side hot and drought-prone. As a result, saplings and underbrush dominate, with some larger drought-tolerant trees dotting the slope.



The north-facing side of a butte is shaded, cool, and conifer-dominant. The understory is limited to shade germinating plants.

The diversity of species on the crest of a butte is limited primarily by soil depth.

Sunlight hits the southern side of a butte directly, creating a hot, drought-ridden microclimate. Trees are sparse.

HIGH PLACES IN THE WILLAMETTE VALLEY

ECOLOGICAL VALUE

Buttes act as ecological refuges in the human-dominated valley landscape because their steep terrain deters development. The urban and agricultural quilt of the valley floor has forced species to retreat uphill onto buttes that support native flora and fauna. As biodiverse islands, they hold potential as a mechanism to safeguard rare species and ecological structures. Some buttes echo native land management, retaining an ecology closer to indigenous fire stewardship conditions, growing healthy patches of prairie and oak savanna that once dominated the valley (“Willamette Valley Oak And Prairie Cooperative,” n.d.). Their topography allows buttes to be ecological stewards and gateways.

SOCIOCULTURAL VALUE

Buttes are imbued with sociocultural value. Skinner, Spencer, and Twin Buttes in the Willamette Valley are probable vision quest sites for the native Kalapuya. Buttes considered sacred skyward places for spiritual ceremony and ancestral connection (Quartux J. 2018; “Kalapuya People - Spencer Butte,” n.d.). Buttes are also valued for being safe from valley flooding (Sullivan 2023). Communities across the Willamette Valley have long used buttes as navigational landmarks and continue to do so.

Many buttes serve as tourism draws, gracing the covers of local magazines and postcards as champions of the regional landscape. Contemporary recreators enjoy climbing, walking, and hiking trails on accessible buttes, drawn by sweeping vistas of the valley below. People are motivated to hike these hills for relaxation, discovery, social connection, achievement, and a profound connection to nature (Bichler and Peters 2020; Bratton et al. 1979). Their topography allows buttes to link communities to the past and to each other by offering the same views despite large-scale change.

LOCAL IMPORTANCE

Buttes are integral to the Willamette Valley’s identity. Before and after colonization, these landforms have endured as distinctive landmarks serving both ecological and sociocultural roles. Despite their significance, human activities—housing, infrastructure, logging, grazing, and aggregate mining—increasingly apply pressure to buttes.

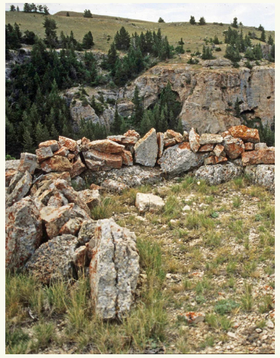
Currently, numerous community groups organize to protect and advocate for these vulnerable landforms. Residents in Oakridge, Oregon, actively oppose a proposed gravel mine on TV Butte. A similar determination is seen in Dexter, where the community laments the disfigurement of Parvin Butte. Clearly, these landforms are connected to the inhabitants of the valley who face off against private landowners and developers with deep pockets and large machinery in an attempt to protect them (Mortensen 2019).



Baskett Slough is a butte and National Wildlife Refuge located in Polk County, OR.[4]



Vista from Peterson Butte. The Kalapuya often use buttes as landmarks and lookouts..[5]



Vision Quest sites similar to this one in the Pryor Mountains exist on now-privatized buttes.[6]



A postcard of Skinner Butte from the 1910s exemplifies how buttes contribute to the Willamette Valley’s sense of place.[7]



Community members in Oakridge protest the permitting of an aggregate quarry on nearby TV Butte.[8]

AGGREGATE

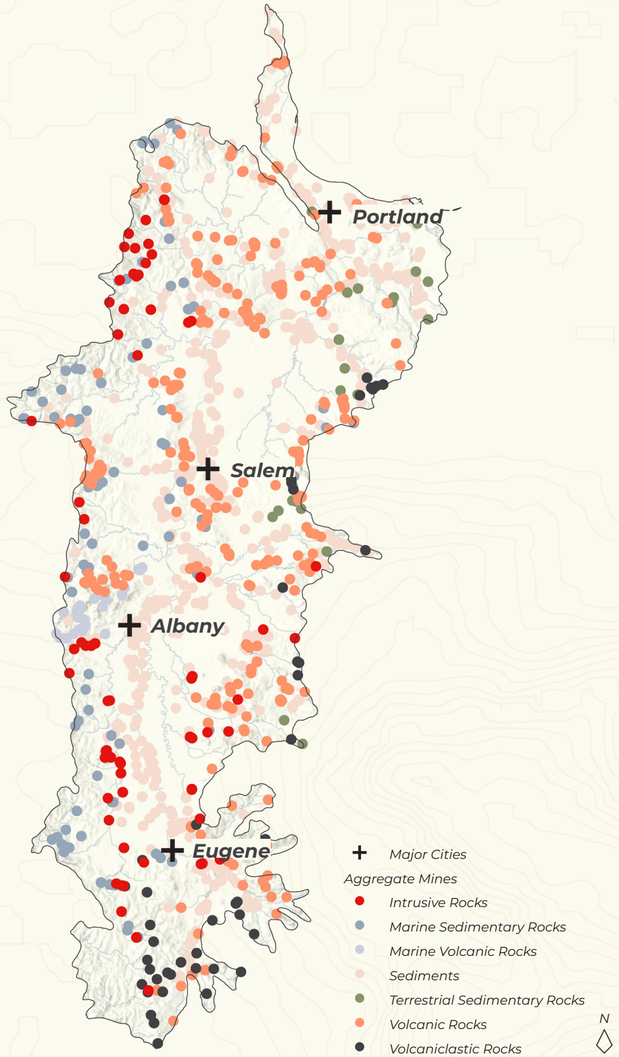
any of several hard inert materials (such as sand, gravel, or slag) typically used for mixing with a cementing material.

AGGREGATE MINING

Aggregate mining is a massive, necessary force that shapes Oregon's economy and landscapes. In 2018, Oregon produced nearly 40 million tons of aggregate annually – more than 10 tons per Oregonian (Oregon 2023). Aggregate mines are a type of surface mine where, historically, people and now large machines scrape rock off the landscape. The large rock chunks are processed through a series of rock crushers and mesh sieve screens, sorting the stone into different size classes, from coarse angular rock to small-grained sand. These varying aggregates are used predominantly in the construction industry.

Aggregate is mined from a variety of landforms ranging from mountains to rivers, each type with its own rules and regulations. Uphill sources of aggregate are increasingly targeted in Oregon as riparian mining regulations become stricter to protect riparian habitat and bank stability. In the Willamette Valley, this shift is affecting privately owned buttes, where short-term mining contracts allow swift, near-total destruction. Buttes can be slightly carved or totally flattened.

In the valley, there is no spatial pattern to the location of current aggregate mines, and mine locations do not correlate with specific rock types.

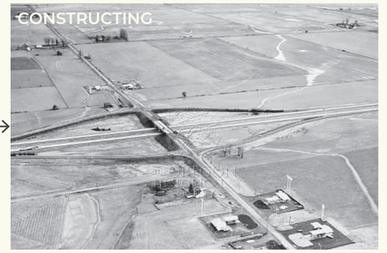




Miners in front of Skinner Butte Basalt Quarry.[9]



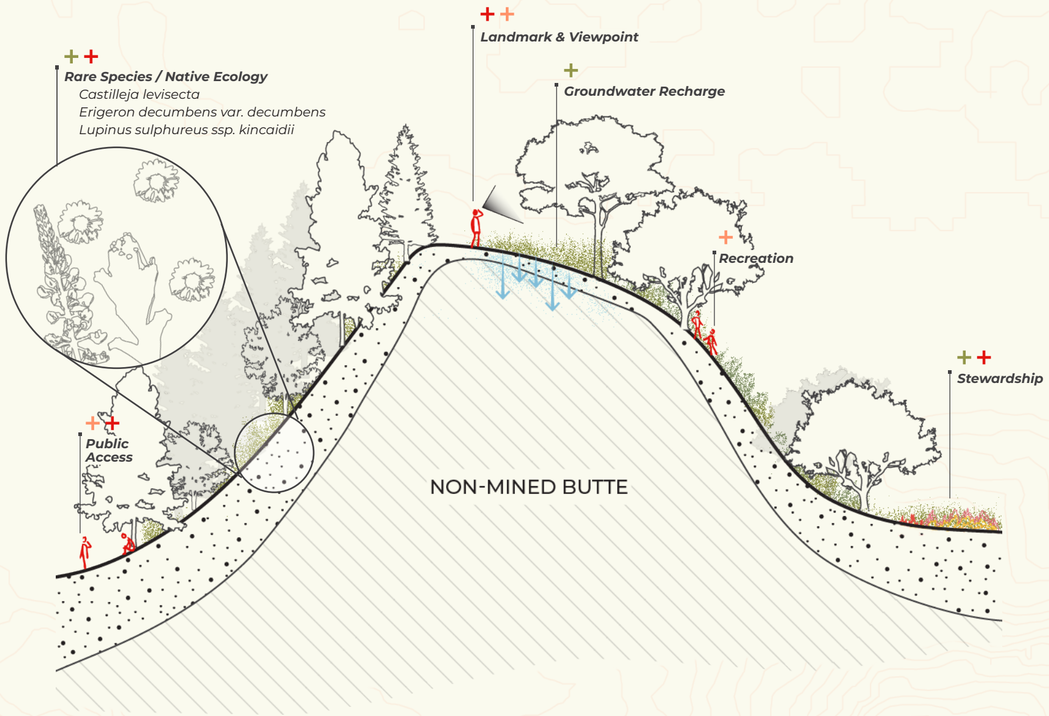
Raw material getting processed into crushed rock.[10]

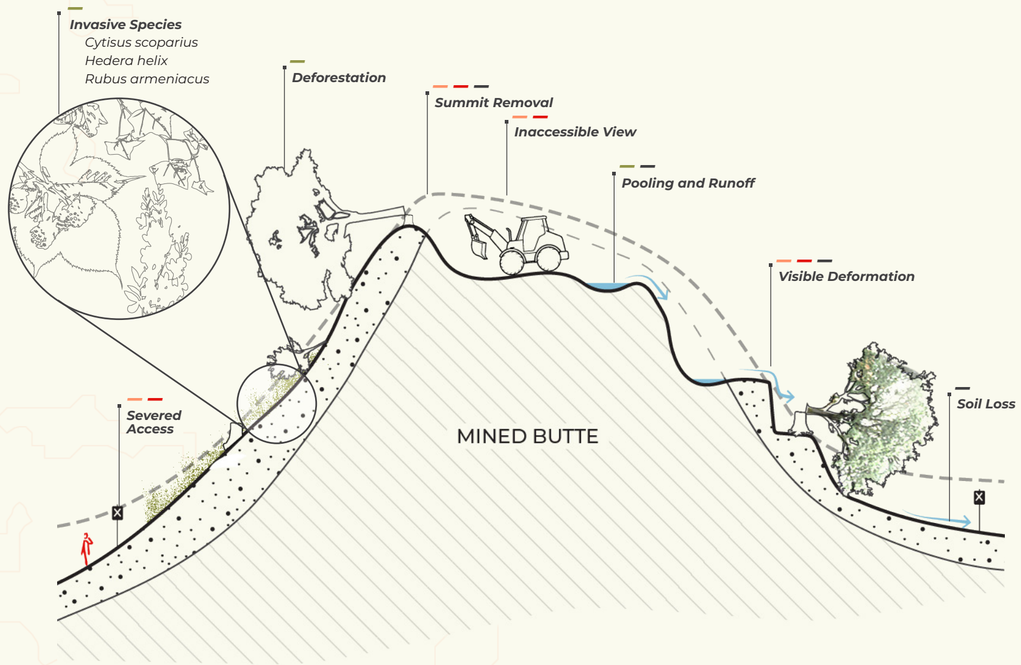


i5 is constructed using locally mined aggregate.[11]



Mining begins on Parvin Butte. Photo by John Bauguess.[12]





CHANGING VALUE

When spatialized, it's clear that their topography is the source of the typical geomorphological, ecological, social, and cultural benefits buttes provide. Unfortunately, their common privatized status allows mining and other anthropogenic pressures to deform buttes, which has severe consequences for these values. Deforestation usually begets surface mining on buttes. The heavily disturbed site that remains can harbor a smattering of invasive species. The pre-extraction ecological structure and function are almost erased (Miao and Marrs 2000; Wu et al. 2022). Mining also typically prevents public access to the land, thereby ceasing any prior recreational or cultural land-use practices (Leyton-Flor and Sangha 2024). The once-notable landmark can become marred, decreasing aesthetic value (Menegaki 2020). A historic summit may be reduced to a lowly pit.

In the Anthropocene, it's imperative that these ecologically and socioculturally valuable landscapes be preserved and reclaimed when possible, to help maintain the connection between humans and land.

+ – *Geomorphological*
+ – *Ecological*
+ – *Social*
+ – *Cultural*

RECLAMATION
the process of modifying land that has been mined to restore it to an ecologically functional or economically usable state.

MINE RECLAMATION APPROACHES

When a mine is retired from active extraction, national and state laws such as the Surface Mining Control and Reclamation Act (SMCRA) of 1977 typically stipulate reclamation, during which the landform is modified to support previous functions or new uses ("Reclamation of Degraded Landscapes Due to Opencast Mining | IntechOpen," n.d.). There are many types of reclamation. Traditionally, mining companies did only what was regulatorily necessary, simply sculpting a landform's morphology (Plass 2000). Contemporary projects continue traditional reclamation tactics while incorporating ecological and social factors into their approach, which is considered more holistic (Burger 2011; Yonk et al. 2019). While a step in the right direction, holistic reclamation still typically omits cultural factors in reclamation, and a lack of governmental policy and fiscal incentives consistently prevents informed, holistic post-mining land use (PMLU) approaches.

Thus, there remains an opportunity for lawmakers to catch up to holistic thinking, and for companies to adopt the perspective held by academics, environmentalists, and community members, under which holistic reclamation is not optional, and considering cultural factors is necessary for mining to continue.

TRADITIONAL

GEOMORPHOLOGICAL

Match Approximate Original Contours (AOC)

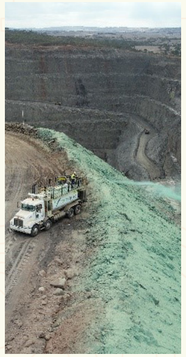


Backfill dirt as needed



Mine reclamation before 1970s in the United States was minimal and typically limited to slope stabilization or form reconstruction. Matching previous contours is still a technique used today.

Seed reintroduction



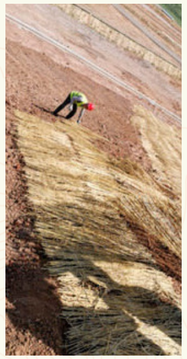
Post-extraction landforms typically lack soil. Often, new topsoil is transported to the site for traditional backfilling. Hydroseeding or broadcast seeding are typical methods to revegetate.

HOLISTIC

ECOLOGICAL

Soil building and phytoremediation





More holistic approaches that rebuild the soil profile help secure the integrity of a revegetated slope. Adding phytoremediation methods helps to remove contaminants.

Natural Channel Design



Riparian channels and floodplains may need re-sculpting after mining to rebuild the form and function of the landscape. This approach requires an understanding of fluvial geomorphology.

SOCIAL

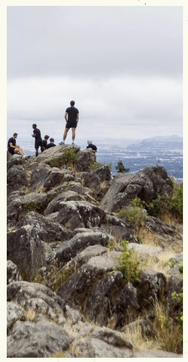
Community input on land use change





When a mined landscape that is known or loved by a community is ready for reclamation, socially-forward approaches to reclamation include public idea generation, site tours, and visioning work. This approach is typically expensive and occasionally tedious to execute.

Re-enstated public access

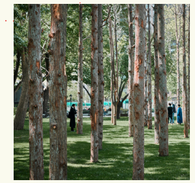


If mined land switches from private to public ownership, expanding local access will increase understanding of and connection to the place. This approach considers pedestrian networks and community desires.

HOLISTIC +

CULTURAL

Memorialization of loss







Memorializing lost landforms and their functions is not yet commonplace, but it is the beginning of cultural reclamation and honoring the burden of losing land.

Resumed cultural practice





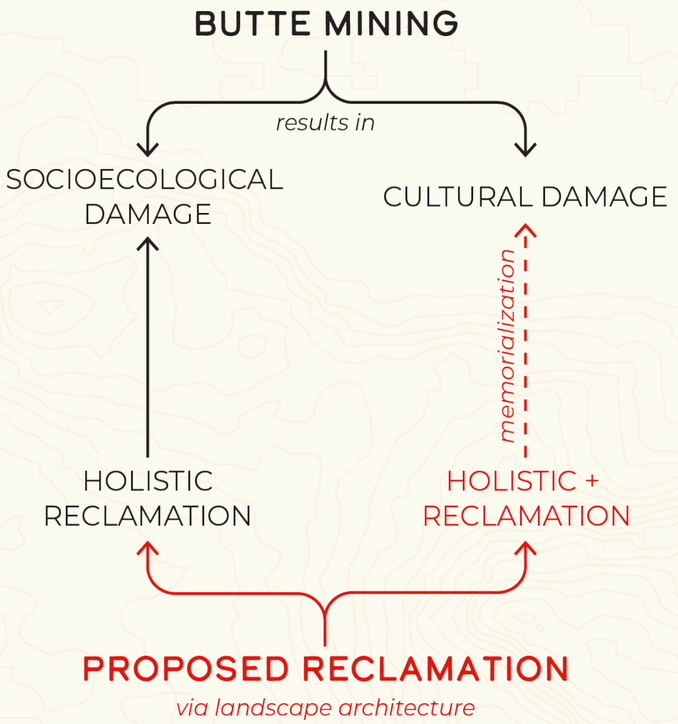
When a landscape is fully reclaimed from the mining industry, traditional land use, such as controlled burning, can recommence. The definition of cultural practice is broad; this type of reclamation is place-dependent.

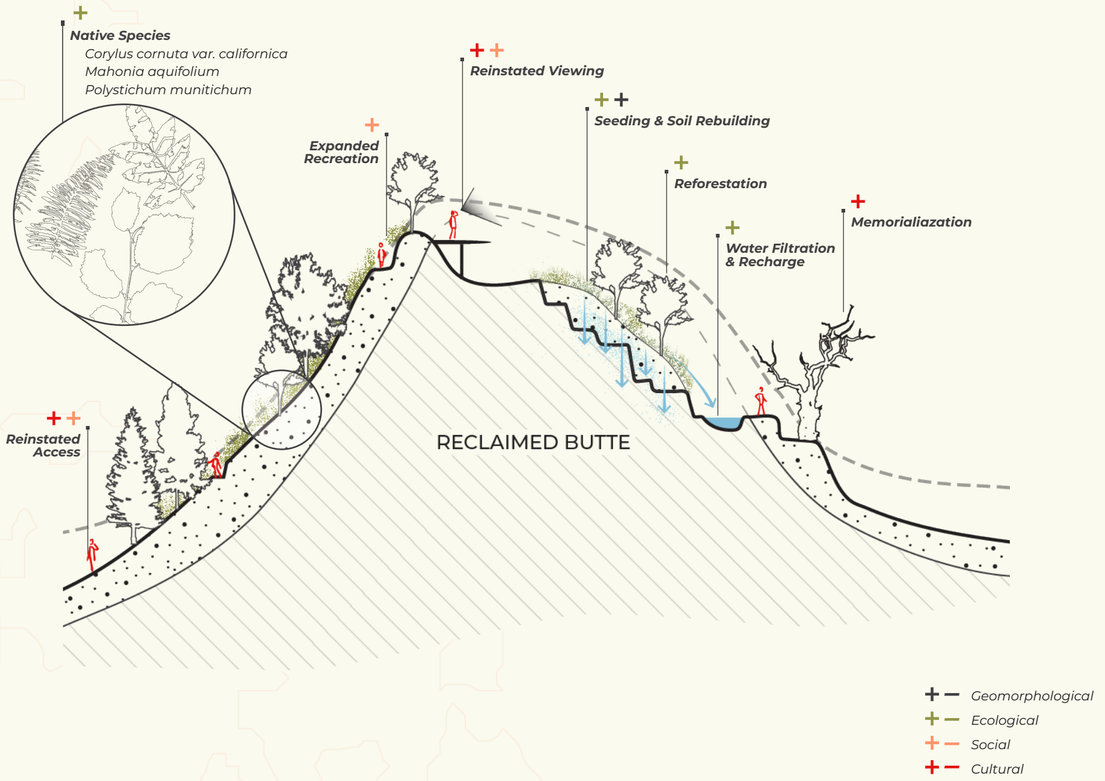
THE NEED FOR MEMORIALIZATION

Even in an era of hybrid reclamation, where approaches consider ecological and social factors in addition to landscape form, current reclamation approaches largely ignore the human burden of losing land. The most basic human response to topographic loss is grief or frustration (Krüger et al. 2022; Holtermann et al. 2025). Holistic mine reclamation still stops short of acknowledging this emotional terrain, and occasionally, reclamation attempts partially or fully erase evidence of land loss; doing so can signal that the loss a community is experiencing is trivial or imaginary.

To validate the pain of loss, holistic reclamation should not rebuild landforms to pre-extraction form (Mihai and Thaler 2024). An elevated “holistic plus” approach should incorporate memorial tactics that allude to a previous landform, environmental conditions, and uses, allowing people to trace the site’s history.

In this way, memorialization can transform sites of loss into spaces of meaning, fostering understanding of human–nature relationships and encouraging stewardship (Storm and Olsson 2013).





PROJECT OVERVIEW

High Places unfolds in two phases—research and design—that collectively address three multi-scale research questions. The research phase begins at the scale of the Willamette Valley, identifying which landforms within the boundary qualify as buttes, as this data is not readily available. The goal of this mapping exercise is to compile a comprehensive dataset of these features within the ecoregion. After, a subset of buttes with evidence of mining activity is extracted. These mined buttes are then categorized by degrees of deformation, allowing loss to be spatialized by location and intensity across the valley. From this analysis, one significantly deformed butte is selected as the focus for the design phase.

The final research question examines how memorial practices can be integrated into mine reclamation through studying landscape architecture and art precedents that engage both memory and mining. This precedent study employs a novel framework adapted from the Cartesian plane, resulting in design guidelines for integrating memorial tactics into quarry site design. Together, these investigations conclude the research phase.

The design phase is a culmination of the preceding research components. The mapping process identifies a site for intervention, while the precedent study informs the integration of memorialization into site design. The result is a site-specific proposal that highlights a series of designed memorial moments commemorating loss due to extraction.

High Places imagines landscape architecture as a mechanism for physical reclamation strategies that help people experience and remember loss rather than ignore its existence.

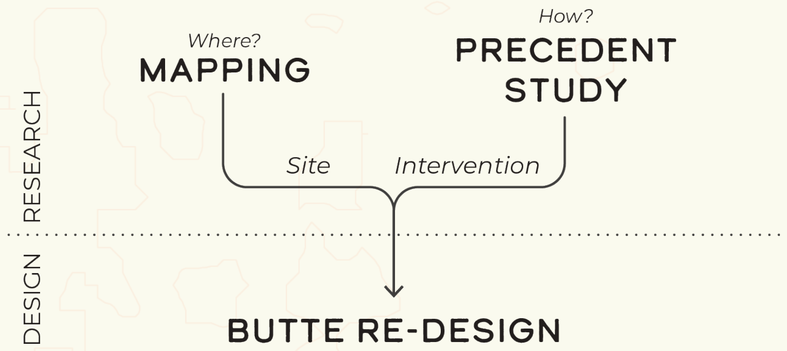
RESEARCH QUESTIONS

WHERE

- *What is the definition of "**butte**"?*
- *Which Willamette Valley buttes are **mined** and to what extent?*
- *What criteria **prioritize** buttes for memorialization?*

HOW

- *In what ways can landscape design **memorialize** quarried landscapes?*



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[3] Krueger, Jeff. *Ward Butte.* Photograph.

[4] Krueger, Jeff. *Basket Slough.* Photograph.

[5] Lewis, David. *View from Peterson Butte.* Photograph.

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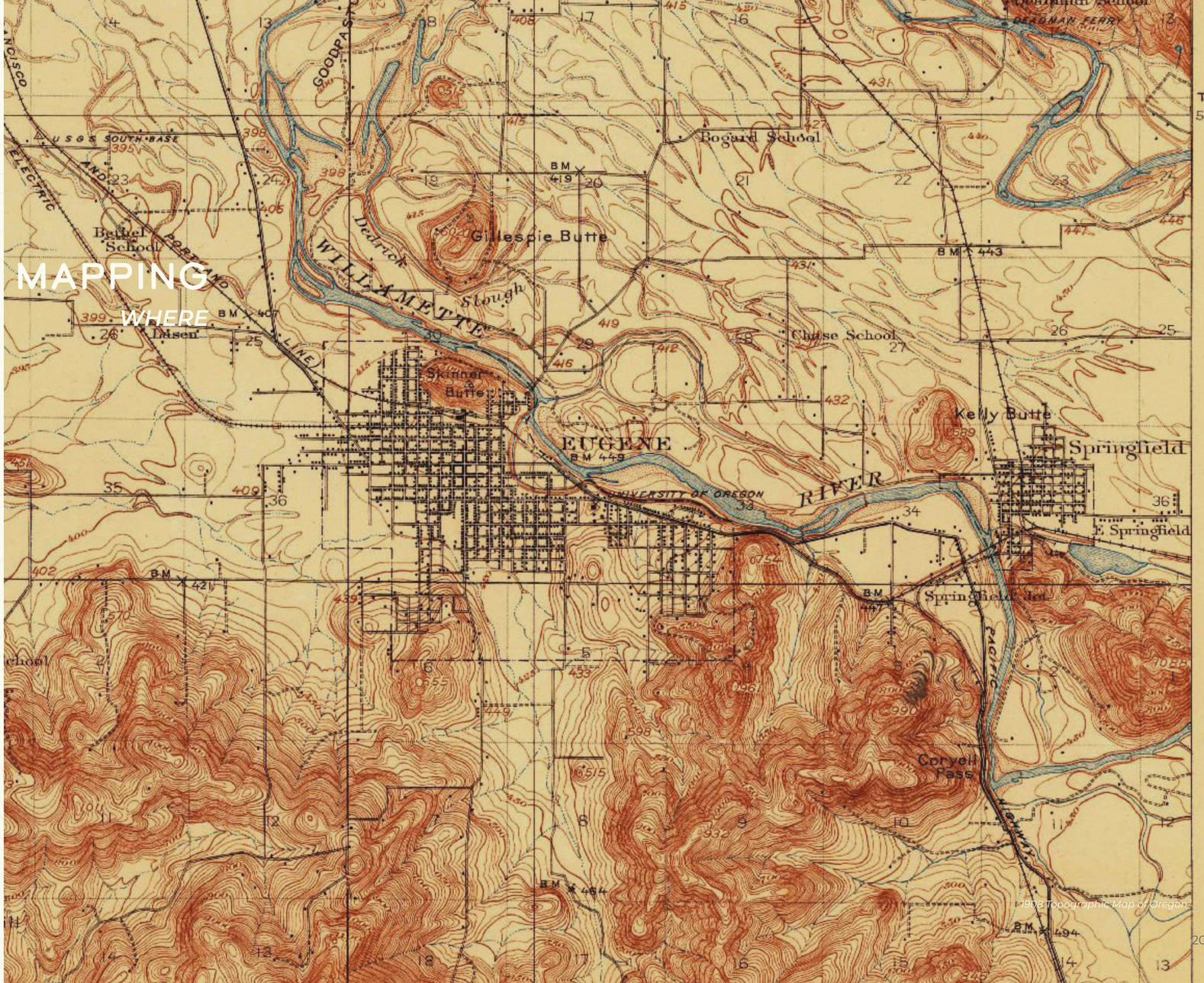
II. MAPPING

WHERE



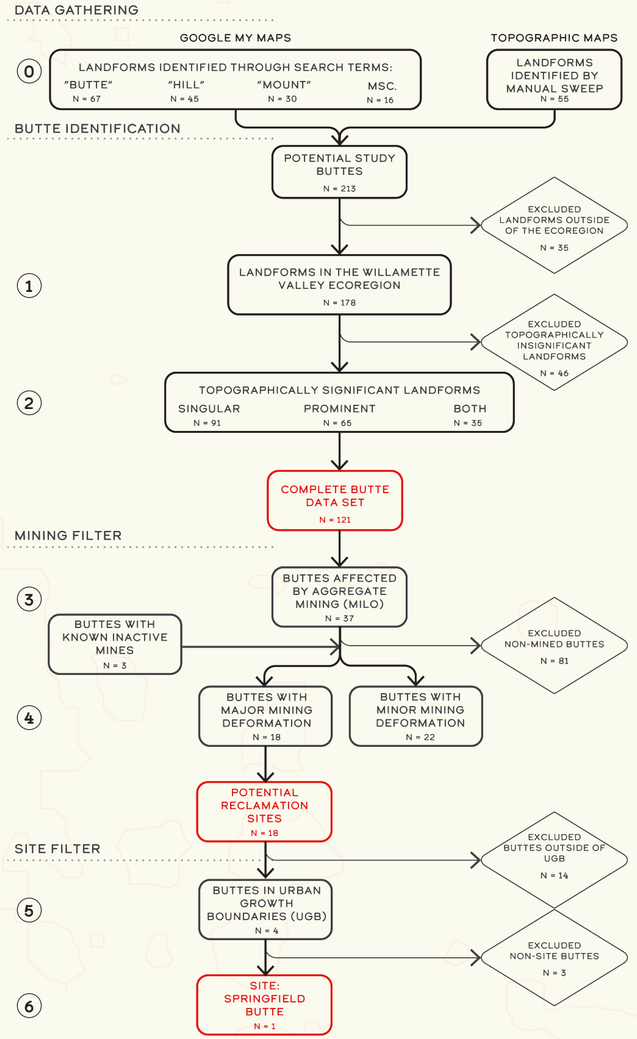
1908 Topographic Map of Oregon

MAPPING OVERVIEW

As mentioned in Chapter 1, there is no complete dataset documenting the buttes of the Willamette Valley. The goal of this mapping project phase was to fill this gap by developing the butte dataset, using the predetermined definition of a butte discussed in Chapter 1: steep-sided, hill-like landforms that are topographically significant.

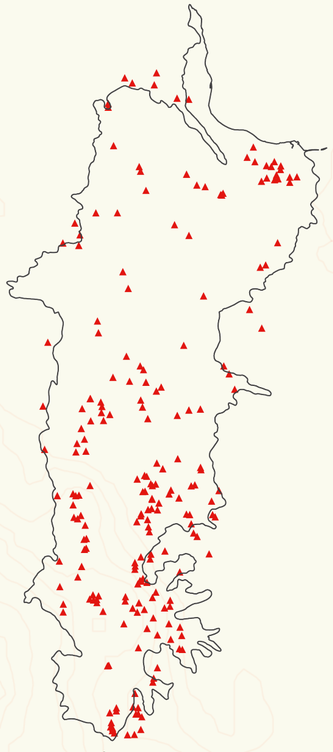
The second goal of this mapping phase was to produce a sub-dataset documenting which buttes have evidence of mining. Through a series of filters, the dataset was refined into a small set of candidate sites for the design phase, from which a single butte is selected for final intervention.

This filtration method was modeled after article-filtering methods used in journal-grade literature reviews (Delgado-Chaves et al. 2025).



DATA GATHERING

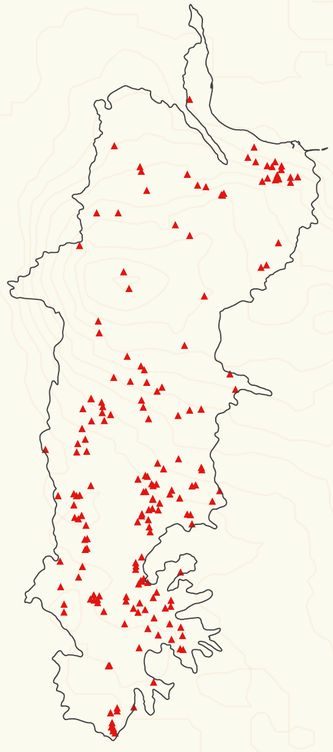
0
ALL POINTS
213



LANDFORMS THAT ARE WITHIN THE WILLAMETTE VALLEY ECOREGION

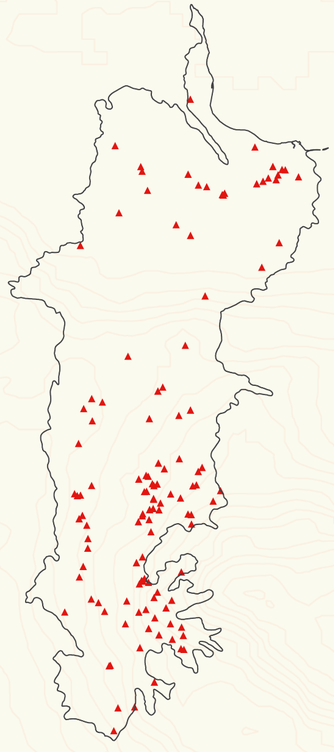
BUTTE IDENTIFICATION

1
WILLAMETTE VALLEY
178



LANDFORMS THAT ARE TOPOGRAPHICALLY SINGULAR OR PROMINENT

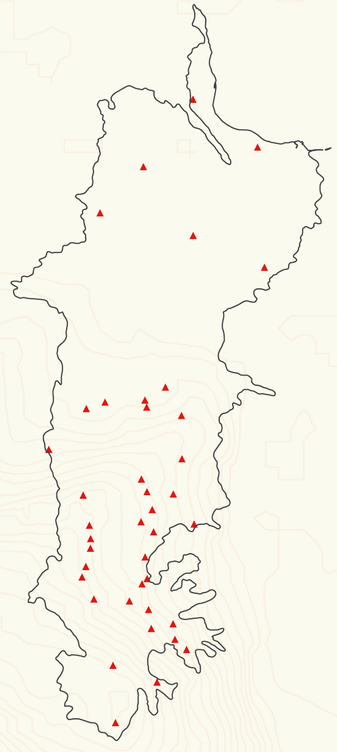
2
SIGNIFICANT LANDFORMS
121



LANDFORMS THAT CORRELATE WITH DOGAMI MILO AGGREGATE MINE LOCATIONS

MINING FILTER

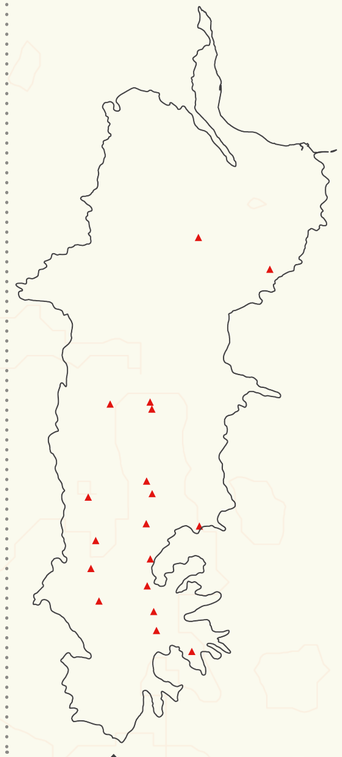
3
MINED BUTTES
40



BUTTES WITH MINING SCARS AT THEIR SUMMIT, OR OVER 30% OF THEIR VOLUME

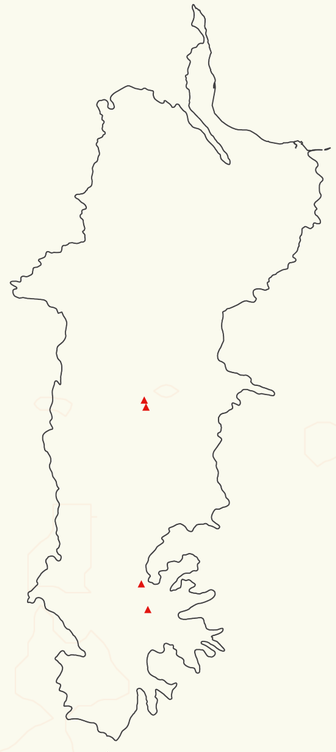
SITE FILTER

4
MAJOR DEFORMATION
18



BUTTES WITHIN OR ADJACENT TO AN URBAN GROWTH BOUNDARY

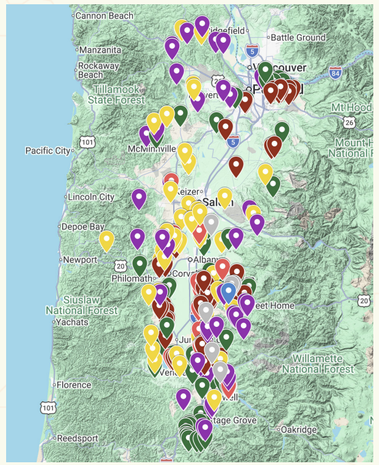
5
URBAN GROWTH BOUNDARY
4



THE MOST TOPOGRAPHICALLY SIGNIFICANT REMAINING BUTTE

6
SITE
1



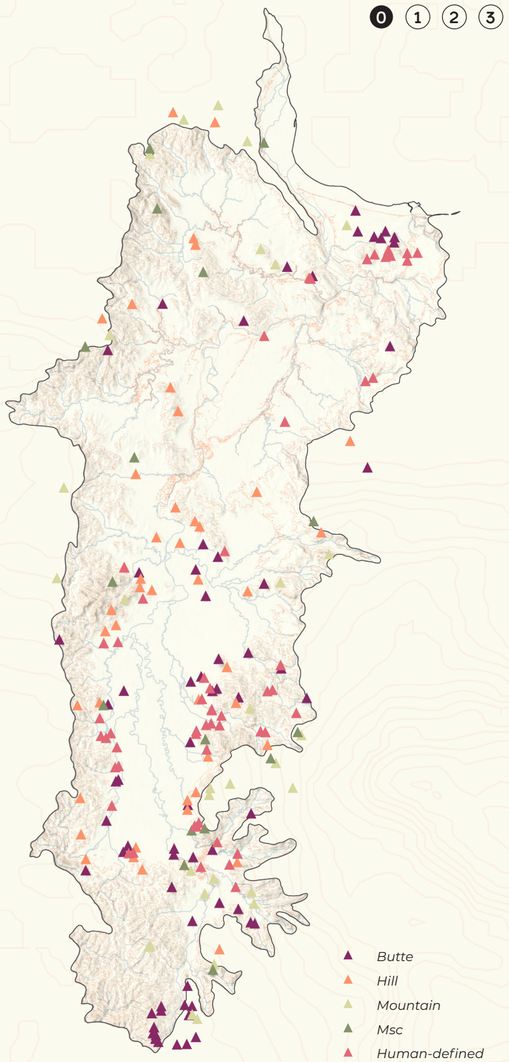


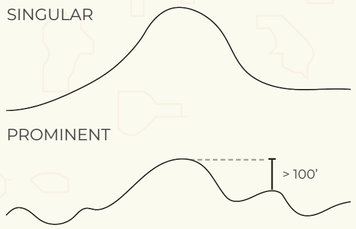
The original landform data pool in Google My Maps.

DATA COLLECTION

Prior to butte identification, a dataset of potential landforms was compiled using Google My Maps. Initial points were added from searches using keywords such as butte, hill, and mountain. Because landform terms are colloquial and used inconsistently, expanding beyond just the word “butte” is necessary to capture all potential butte landforms. These search terms yielded 158 potential buttes, with no clear valley-wide naming patterns.

To further address inconsistencies in landform naming, additional potential buttes were identified through visual review of topographic maps. Using the native topographic base map in Google My Maps, 55 more potential buttes were added based on their closed, concentric contour signatures. Each data point was coded 1-5 based on its identification method, with 1-4 correlating to different search terms, and 5 correlating with the visual topographic scan. In total, this process produced a dataset of 213 potential butte landforms.





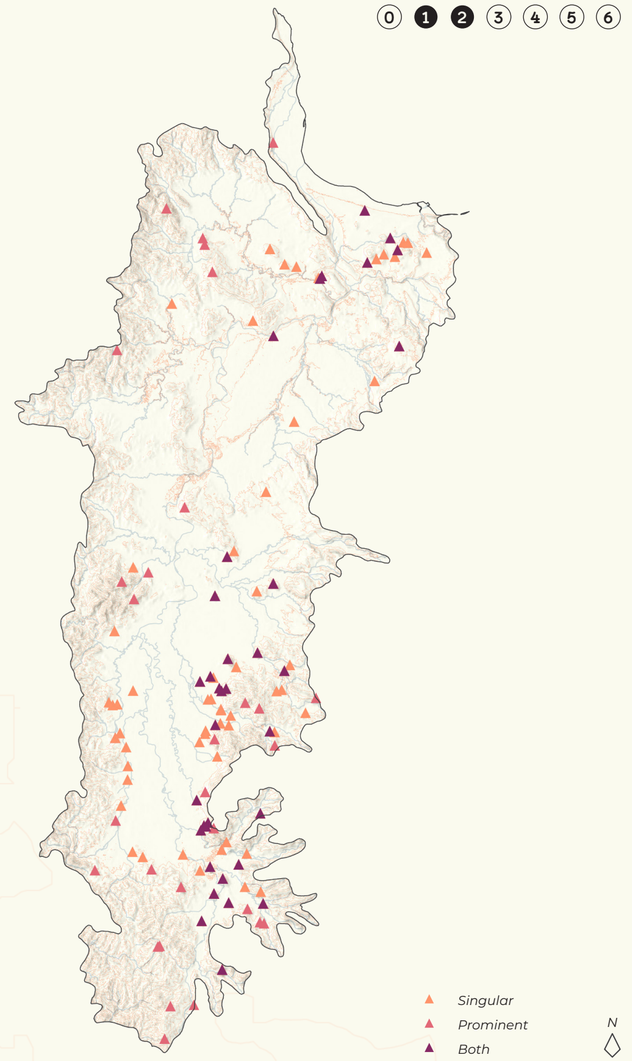
TOPOGRAPHIC SINGULARITY AND PROMINENCE

In this study, visual distinction from surrounding landforms is the primary factor used to identify buttes. Landforms deemed topographically significant are more visible, and any evidence of mining on such a landform will be more obvious, making those landscapes better suited for memorialization. *High Places* defines topographic significance as either singularity or prominence.

Topographic singularity describes a protruding landform surrounded by relatively flat terrain, creating a clear boundary between plane and hill-like form. A digital elevation model (DEM) was used to generate 10-foot contours representing valley topography. Isolated, concentric contours were visually analyzed and coded as “singular” using a binary system (1 for singular, 0 for non-singular); 91 potential buttes met this criterion.

Topographic prominence refers to a landforms relative height compared to surrounding terrain. A DEM was used to create a Local Relief Raster (LRR) based on the lowest elevation values from a 12-neighbor sampling. Subtracting the LRR from the DEM produced a raster of relative height, which was filtered for thresholds of 100, 125, and 150 feet. Buttes were coded 1–3 based on these levels, with 0 indicating no prominence, 1 indicating 100, and so on; 65 potential buttes met this criterion.

In total, 121 landforms met one or both criteria, forming the final butte dataset.




Peterson Butte. Photo by Jeff Krueger.

SINGULAR

a protruding landform surrounded by flat topography. The landform boundary is clearly delineated.

SINGULARITY ALGORITHM



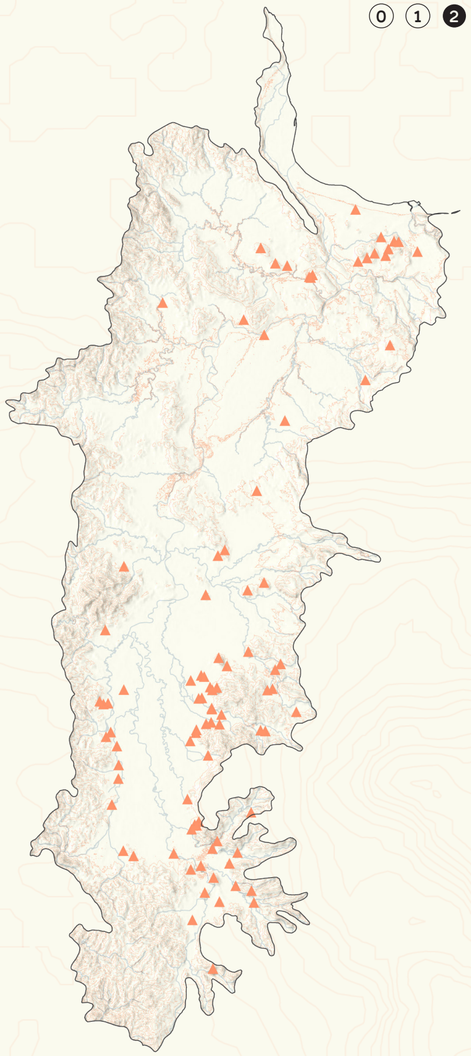
DIGITAL ELEVATION MODEL (DEM)
Shows elevation data per pixel.
Downloaded via Earth Explorer.



10 FOOT CONTOURS
Proxy for elevation change, calculated with native tool in GIS.



BUTTE CLASSIFICATION
Shows final buttes.




Spencer Butte

PROMINENT

a protruding landform that is highly visible; at least 100 feet taller than surrounding topography.

PROMINENCE ALGORITHM



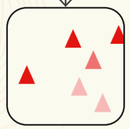
DIGITAL ELEVATION MODEL (DEM)
Shows elevation data per pixel.
Downloaded via Earth Explorer.



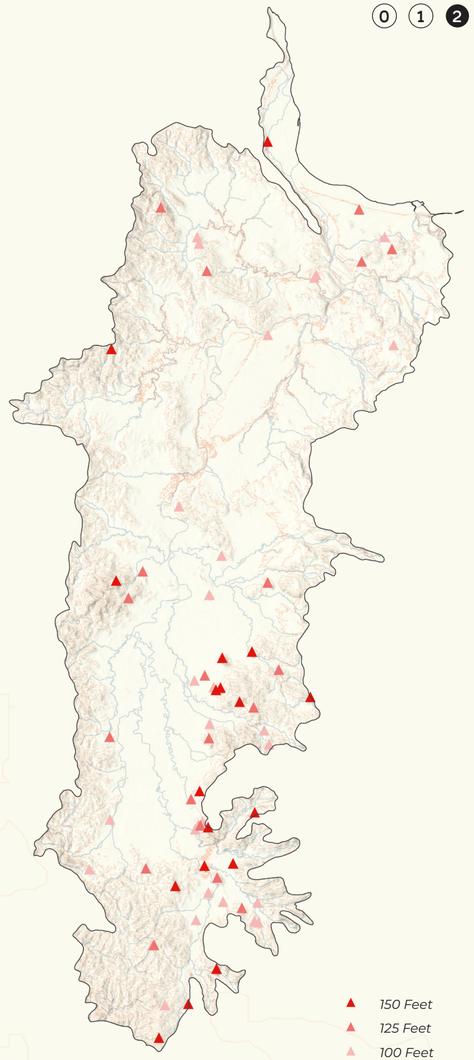
LOCAL RELIEF RASTER
Shows relative prominence per pixel; Calculated using 12 neighbors.



BINARY RASTER FILTER
Shows relative prominence in 100, 125, and 150 foot steps.



BUTTE CLASSIFICATION
Shows final classifications corresponding to butte points.



MAJOR DEFORMATION

extraction on the landform summit, or extraction greater than 30% of the total landform surface area.



MINOR DEFORMATION

non-summit extraction, or extraction that is less than 30% of the total landform surface area.



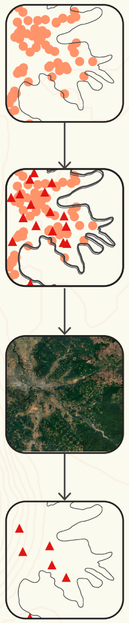
MINED BUTTES

To create the mining subset, buttes from the finalized dataset were compared with the DOGAMI Mineral Information Layer for Oregon (MILO) dataset, which catalogs currently permitted mines in Oregon (Oregon Department of Geology and Mineral Industries 2026). Buttes corresponding to MILO points were flagged as potentially mined and then verified through topographic and aerial analysis for evidence of surface extraction. Additional buttes with known retired mines—absent from MILO but exhibiting visible extraction scars—were also included.

Mined buttes were classified by visual analysis into two categories: Major Deformation and Minor Deformation. Major deformation denotes summit extraction or a loss over 30% of the estimated butte surface area. Minor deformation refers to less visible scars that are distant from the summit or proportionally small relative to the butte volume. Proportional loss was estimated using Google Earth.

0 1 2 3 4 5 6

MINING IDENTIFICATION PROCESS



AGGREGATE MINE LOCATIONS

Shows aggregate mine locations. MILO DOGAMI dataset.

BUTTE POINT OVERLAP

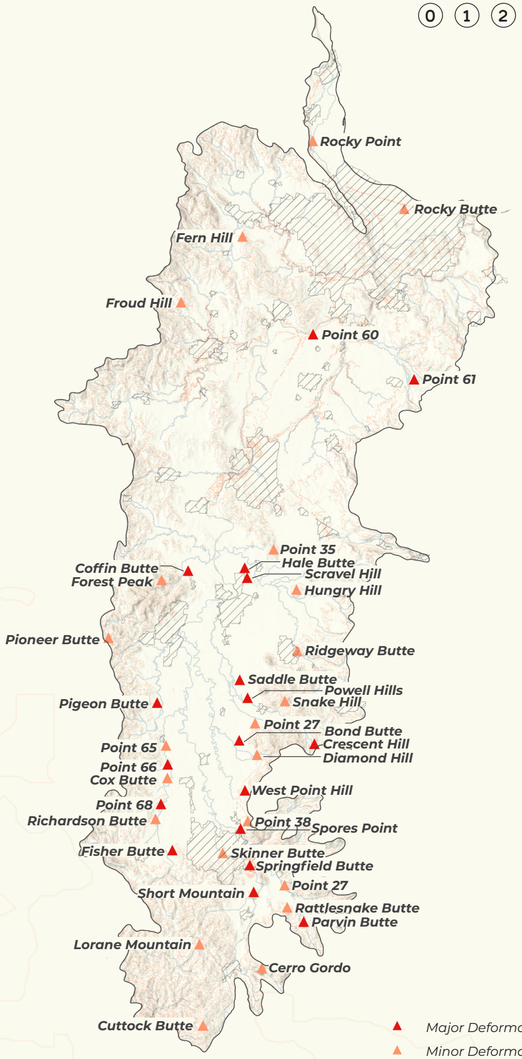
Correlates significant landform locations with aggregate mine points.

AERIAL CONFIRMATION

Shows visible mining scars to confirm physical deformation.

BUTTE CLASSIFICATION

Shows final buttes with confirmed mining.



POTENTIAL SITES

While memorialization can occur on any mined butte, the negative results of extraction are more obvious—and the burden of loss is more keenly felt—if the butte is highly marred. This burden of loss is exacerbated if a butte is considered iconic or a local landmark. Therefore, when a butte is closer to human settlement and mined more extensively, the need for and potential impact of memorialization increases.

In addition, auxiliary components of holistic reclamation (geomorphological, ecological, and social tactics) are more likely to be successful on a landform that is easily accessible to practitioners and the public.

Considering these key criteria, the buttes categorized in the preceding step as majorly deformed need only be classified by their distance to an urban growth boundary (UGB) to filter potential site options for memorial intervention. The adjacent map highlights the buttes that are most suitable as pilot sites for the design phase. Springfield Butte was chosen as the application site due to its deformation extent, location within a UGB, and role as a local landmark.

SITE SELECTION CRITERIA

- The butte is mined.
- The mined butte is majorly deformed.
- The mined butte is within an Urban Growth Boundary.





Majorly deformed Springfield Butte.

MAPPING REFERENCES

"Butte." n.d. Accessed November 28, 2025. https://education.nationalgeographic.org/resource/butte.

Delgado-Chaves, Fernando M., Matthew J. Jennings, Antonio Atalaia, et al. 2025. "Transforming Literature Screening: The Emerging Role of Large Language Models in Systematic Reviews." Proceedings of the National Academy of Sciences of the United States of America 122 (2): e2411962122. https://doi.org/10.1073/pnas.2411962122.

Oregon Department of Geology and Mineral Industries (DOGAMI). 2026. Mineral Information Layer MILO-3. https://www.oregon.gov/dogami/milo/pages/index.aspx.

PHOTOGRAPH SOURCES

[1]"Historic Oregon Topographic Maps, 1898-1993." n.d. Accessed May 16, 2026. https://scarc.library.oregonstate.edu/findingaids/?p=collections/findingaid&id=2120.

[2]Krueger, Jeff. *Peterson Butte.* Photograph.

[3]"Skinner Butte Trail - Outdoor Adventures - Hiking (2293) | Eugene, Cascades & Coast." n.d. Accessed May 16, 2026. https://www.eugenecascadescoast.org/listing/skinner-butte-trail/2293/.

[4]Lanson, Cassandra. *Mi.* Photograph.

III. PRECEDENT STUDY

HOW



Johnson Pit #30



Palmisano Park / Stearns Quarry.[2]

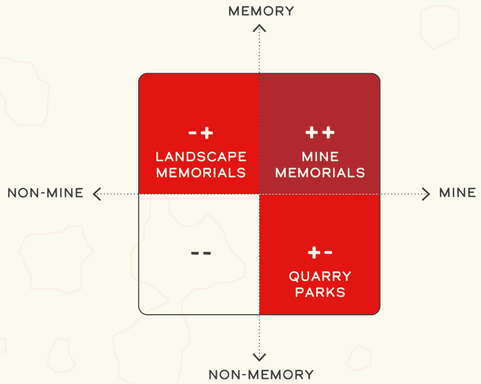
THEORY OVERVIEW

To understand how landscape designers can memorialize quarried landscapes through physical intervention, *High Places* looks to precedent analysis. Typical precedent studies are organized into one of four types: 1) type of project, 2) type of problem, 3) geographical region, and 4) designer (Francis 2001). *High Places* is concerned with themes of mining and memorialization, so this study is organized by project type. Since both themes are essential to the project's outcome, *High Places* investigates two project types simultaneously: landscape memorials and quarry parks. The most relevant precedents would engage both themes in a single project. However, projects that exist in this overlap are rare. To address this, the study uses a novel framework to analyze both isolated themes and thematic overlap across a wider range of precedents.

Borrowing from the logic of the Cartesian plane, this framework organizes precedents along two perpendicular axes representing the study's two main project themes. The vertical axis measures the presence or absence of memorialization, while the horizontal axis distinguishes between mined and non-mined designed landscapes. Precedents located above the horizontal axis incorporate memorial tactics (landscape memorials). Precedents to the right of the vertical axis occupy mined land (quarry parks).

This structure creates a conceptual field in which rare dual-theme projects can be evaluated alongside precedents that engage with one theme. By organizing precedents in this way, the study can draw insights from both scarce hybrid examples and more abundant single-theme projects, expanding the range of applicability for the resulting design guidelines.





LANDEZINE
LANDSCAPE ARCHITECTURE PLATFORM

LANDSCAPE PERFORMANCE SERIES by the Landscape Architecture Foundation

4 CULTURE

+

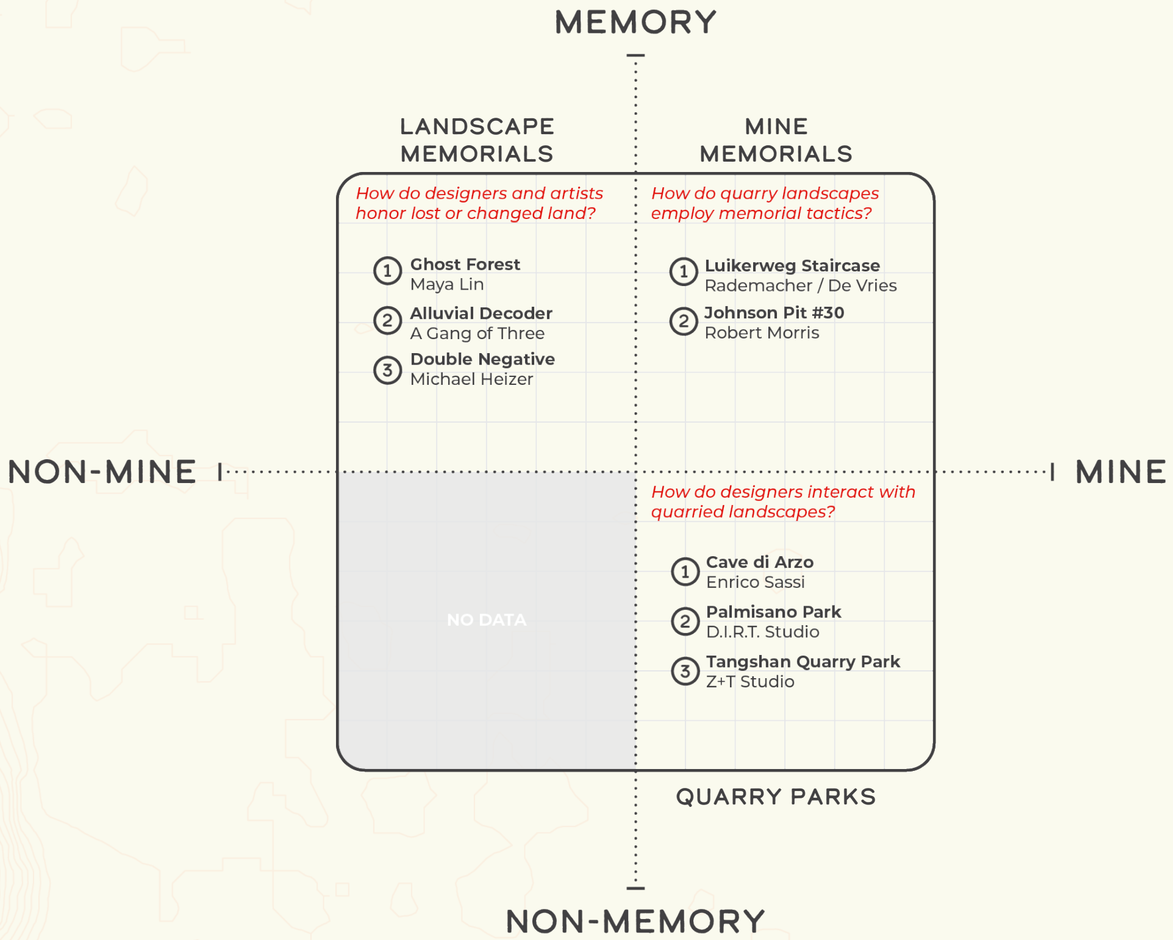
PRECEDENT OVERVIEW

Once the basic Cartesian framework is established, precedents are identified and organized into quadrants. Each quadrant is guided by a question that defines the analytical focus.

Because this study centers on mining and memorialization, the quadrant representing projects that engage neither is excluded and left empty.

Relevant precedents span a wide range of formats, from built landscapes to art installations. To reflect this breadth, project sourcing was not limited to a specific archive. Landscape architecture databases, including the Landscape Architecture Foundation Performance Series and Landezine, were used to identify mined landscape projects. Memorial precedents, which cross disciplinary boundaries, were gathered through broader search queries using terms such as “ecological loss,” “memorialization,” “public art,” and “landscape change.” This approach ensured inclusion of projects that more restrictive sourcing might overlook.

To match the conditions of the final design proposed by *High Places*, all precedents are publicly accessible, and quarry designs must be permanent. Because the two project types differ in scope and intent, they are evaluated using distinct criteria, outlined in the following sections.



6 MEMORIAL PRINCIPLES

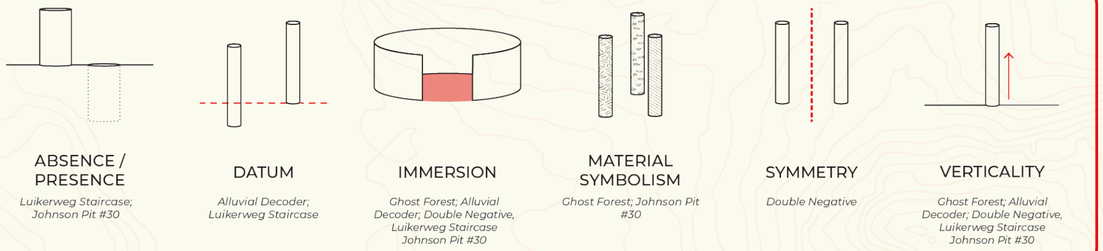
MEMORY

PRINCIPLES FROM LITERATURE REVIEW

ABSENCE / PRESENCE	AMBIGUITY / ABSTRACTION	IMMERSION	MATERIAL SYMBOLISM	MINIMALISM	SYMMETRY	VERTICALITY
Zhou and Ren 2024; Broudehoux and Cheli 2022; Wag 2021	*Carney 1993; Broudehoux and Cheli 2022*	*Zhou and Ren 2024; Broudehoux and Cheli 2022*	*Wagoner et al. 2019; Petersson and Wingren 2011; Attwa et al. 2022*	*Broudehoux and Cheli 2022*	*Broudehoux and Cheli 2022; Wag 2021*	*Broudehoux and Cheli 2022; Chen and Suneta 2024*
	X			X		

PRECEDENT FILTER

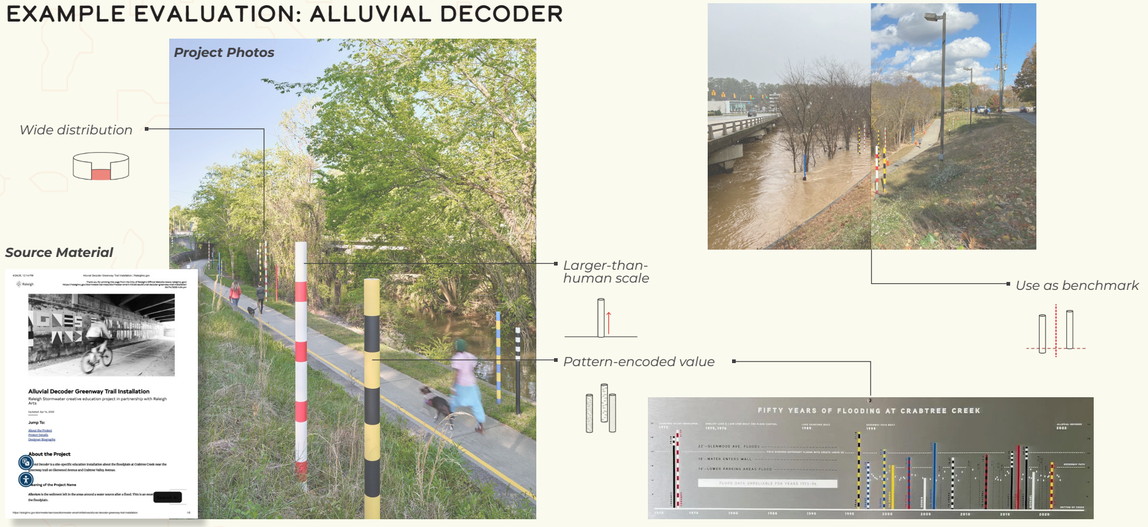
DATUM
Alluvial Decoder; Luikerweg Staircase



ABSENCE / PRESENCE	DATUM	IMMERSION	MATERIAL SYMBOLISM	SYMMETRY	VERTICALITY
Luikerweg Staircase; Johnson Pit #30	*Alluvial Decoder; Luikerweg Staircase*	*Ghost Forest; Alluvial Decoder; Double Negative, Luikerweg Staircase Johnson Pit #30*	*Ghost Forest; Johnson Pit #30*	*Double Negative*	*Ghost Forest; Alluvial Decoder; Double Negative, Luikerweg Staircase Johnson Pit #30*

6 MEMORIAL PRINCIPLES

EXAMPLE EVALUATION: ALLUVIAL DECODER



MEMORY LANDSCAPES

The memorial projects in this precedent study span various fields. These projects share the use of distinct media to commemorate *losing landscapes*, landscapes altered in structure or function due to human influence. Honoring these losing landscapes creates a *landscape memorial*, a physical installation on or off-site that marks loss or change.

PRECEDENT CHOICES

The following five precedents are included in the memorial section of the study: Ghost Forest, Alluvial Decoder, Double Negative, Luikerweg Staircase, and Johnson Pit #30. The memorial landscapes included in this precedent study must be publicly accessible built works that commemorate landscape loss or change, rather than loss of human life. There are no location, permanence, or discipline criteria for this project type. The primary goal of the analysis is to determine which memorial design principles manifest into artworks or physical landscapes that create a sense of reverence and memory to honor lost or changed land.

ANALYSIS FRAMEWORK

The body of literature documenting the design of traditional memorials is extensive. A brief literature review of this work resulted in the following list of principles used in memorial design:

- **Absence / Presence (Voids)**
- **Ambiguity / Abstraction**
- **Immersion**
- **Material Symbolism**
- **Minimalism**
- **Symmetry**
- **Verticality**

With this generalized list in mind, the memorial precedents were analyzed by their source material (webpages, precedent reports, museum entries, project photographs, etc.). After investigating which principles were present in each project, five from the original list were found to apply to landscape memorials: absence / presence, immersion, material symbolism, symmetry, and verticality. A sixth principle, datum, was added to the final list because it was identified in two memorial precedents.

After identifying which principles are present in each project, an accompanying qualitative analysis explains the implications of each principle in the corresponding project.

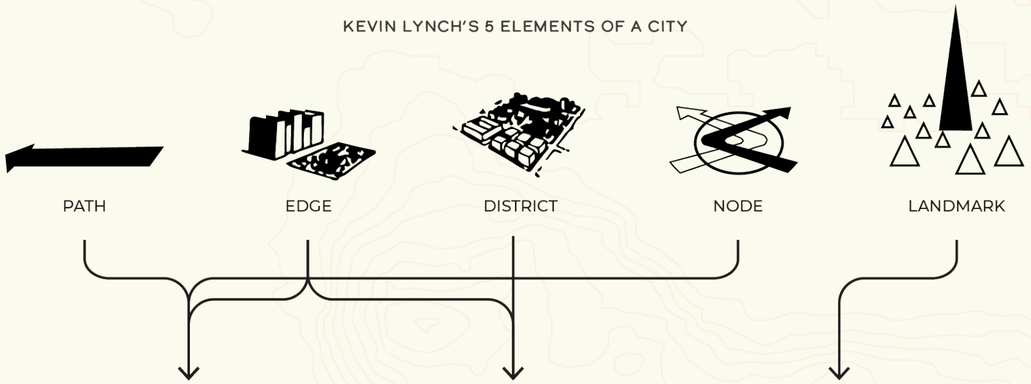
MEMORY SELECTION CRITERIA

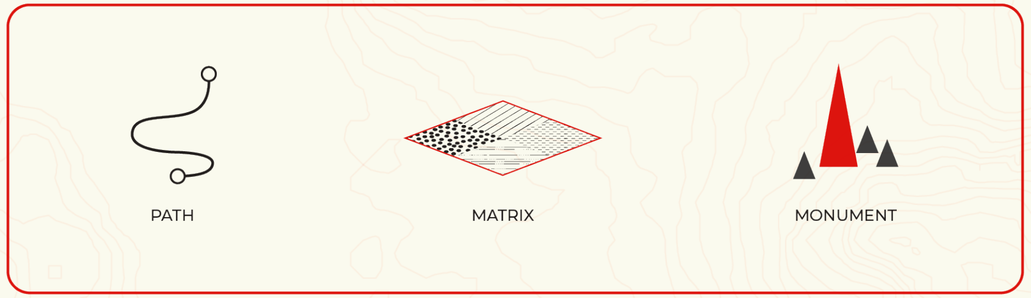
- The project is physical and is publicly accessible.
- The project is not about human loss of life. The project responds to loss of landscape structure or function.

3 LANDSCAPE ELEMENTS

MINE

KEVIN LYNCH'S 5 ELEMENTS OF A CITY





3 ELEMENTS OF A LANDSCAPE

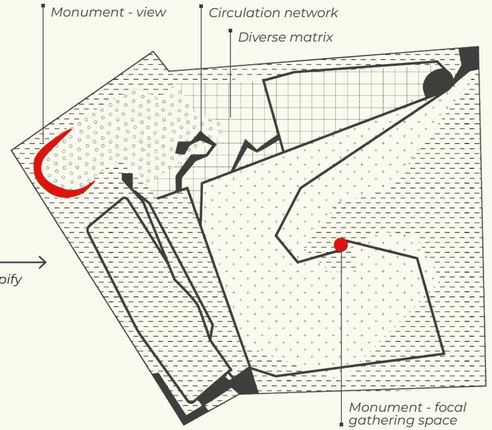
EXAMPLE EVALUATION: PALMISANO PARK

Project Graphics



Source Material

Typify



MINED LANDSCAPES

The mined projects in this precedent study are all built by landscape and architecture firms, barring one by artist Robert Morris. All of these projects are built on previously mined land and interact with quarry remains differently.

PRECEDENT CHOICES

The following five precedents are included in the mining section of the study: Cave di Arzo, Palmisano Park, Tangshan Quarry Park, Luikerweg Staircase, and Johnson Pit #30. The mined landscapes included in this precedent study must be built works of landscape architecture on previously mined land. The primary goal of the analysis is to determine how landscape elements are being used in quarry park design.

ANALYSIS FRAMEWORK

To analyze the landscape in a qualitative yet standardized way, this study adapts Kevin Lynch's famous framework 5 Elements of a City. Part of his 1960 publication *The Image of the City*, the framework, used in urban planning and design, condenses urban areas into five components: 1) path, 2) edge, 3) district, 4) node, and 5) landmark. Each component has its own purpose in forming urban environments, and the system is used to typify complex urbanity into legible parts that help individuals understand the landscape (Lynch, 1962). *High Places* seeks to typify designs on mined landscapes, splitting a complex landscape into pieces that allow for granular analysis of how designers interact with quarried land. Adapting Lynch's principles, then, is a starting point for analyzing and reporting on larger patterns unnoticed across quarry landscapes.

High Places adapts this borrowed framework structure to better fit the smaller scale of the landscape architecture precedents, comprised of three physical elements: 1) path, 2) matrix, and 3) monument. Paths represent the circulation system inherent in landscape design. The matrix represents the "fill" of the land, including ecotypes, open spaces, programming, and even paved areas that are not motive spaces. Monuments are either physical or perceived salient landscape moments. Examples of a monument include a specimen plant, a framed view, or a historic remnant of site construction.

MINE SELECTION CRITERIA

- The project is publicly accessible.
- The project has been built and is permanent.
- The project is on a previously operating quarry.

How do designers and artists honor lost or changed land?

GHOST FOREST
Maya Lin
New York, New York



Andy Romer, courtesy of MSPC[3]

DESCRIPTION
Commissioned by Madison Square Park Conservancy, *Ghost Forest* comprises 49 dead Atlantic White Cedar trees. The trees were harvested and installed as symbols of mass die-off in forests, in this case due to saltwater inundation. The trees were installed in the park for six months, turning increasingly gray - a haunting symbol of climate change devastation.

PRINCIPLES
- [x] Absence / Presence
- [ ] Datum
- [x] Immersion
- [x] Material Symbolism
- [ ] Symmetry
- [x] Verticality

IMPLICATIONS
IMMERSION
The cedar trees are laid out in a stand, as in nature, with generous spacing to allow people to wander through the monument. They become columns that infer a room. Their positioning can create a cathedral-like atmosphere.

MATERIAL SYMBOLISM
Choosing to erect real, dead trees rather than tree sculptures made from different materials makes the narrative of forest die-off unambiguous and easier to connect with. This material choice is heightened in potency when the memorial is placed among living trees of the same "material," in a dense urban setting that contributes to climate change.

VERTICALITY
The tree's natural height draws your eye upward. Placed among living trees, their lack of canopy emphasizes their toothpick-like appearance and the larger narrative of forest death. A sense of awe comes with a bigger-than-human installation.

ALLUVIAL DECODER
A Gang of Three
Raleigh, North Carolina



People walk through the flooded installation. Photo by Jordan Gray.[4]

DESCRIPTION
Alluvial Decoder by A Gang of Three commemorates historic flooding along Crabtree Creek. 25 steel poles dot the banks of the creek, their color and pattern corresponding to one of the 13 historic flood events. The project's goal is to make history legible in physical space, to highlight the floodplain. As such, it acts as a collective memorial to the river's past.

PRINCIPLES
- [ ] Absence / Presence
- [x] Datum
- [x] Immersion
- [ ] Material Symbolism
- [ ] Symmetry
- [x] Verticality

IMPLICATIONS
DATUM
The current river level acts as a datum that people can correspond with the contrasting heights of the poles around them, highlighting river change. Without a base level, the project has no impact because change is not quantified.

IMMERSION
Instead of having one pole per historic flood, this installation uses a color system to add visual interest and code multiple poles to indicate that they belong to the same flood. People can triangulate between poles to infer river volumes, some of which they may be inside.

VERTICALITY
While river flooding can obviously lead to a vertical change in river height, the natural human perspective is top-down, which prevents us from understanding elevation change in proportion to our scale. The poles are proxies that allow passersby to measure up against landscape change, comparing the current water level to the past and themselves.

DOUBLE NEGATIVE
Michael Heizer
Moapa Valley, Nevada



Double Negative *from above.*[5]

DESCRIPTION
Two trenches, 30 feet wide, 50 feet deep, and 1500 feet long, straddle a natural canyon. While not created as a memorial, *Double Negative* is a landwork constructed entirely by subtraction and thus environmental destruction, sparking discourse around the anthropogenic loss of land. According to Heizer, *Double Negative* can only be experienced and understood in person.

PRINCIPLES
- [x] Absence / Presence
- [ ] Datum
- [x] Immersion
- [ ] Material Symbolism
- [x] Symmetry
- [x] Verticality

IMPLICATIONS
ABSENCE / PRESENCE
This project is a quintessential example of the power of absence. The art is totally comprised of a void. Carved into solid rock, the void accentuates the weight and pressure of the adjacent earth. There is no project without this earth removal, and the discourse about human impact.

IMMERSION
To understand the magnitude of earth that was moved, and by extension the magnitude of earth beyond human scale, one must be in the land art. The walls are taller than an average human, so when walking through the trenches, there is no other view. Visitors' focus on sight lessens, heightening the corporeal experience of the space.

VERTICALITY
The trench walls are cut to be much larger than human scale. This cut tightens the view and creates a feeling of enclosure.

SYMMETRY
Two symmetrical voids imply a connection, as if reaching out to each other. Visitors see their linear path as having two parts.

How do designers interact with quarried landscapes?

CAVE DI ARZO
Enrico Sassi
Arzo, Switzerland



The amphitheater sits surrounded by old quarry walls.[6]

DESCRIPTION

Cave di Arzo is a half-landscape, half-historical restoration project on the site of the Arzo marble quarry that operated for six generations. In addition to restoring the historic workshops from the original quarry, Sassi and team created understated outdoor spaces, including a natural amphitheater and education trail.

ELEMENTS

PATH

There is a Nature Path and Education trail that unveils types of rock quarried on-site, as well as the different extraction techniques used by miners.

MATRIX

The matrix is used to create multiple ecotypes: small pond, mounds of piled marble, and open rock. These ecotypes provide visual richness and create an animal habitat.

MONUMENT

The only monument consists of four rows of quarried marble arranged for seating or public events. While it could be considered part of the matrix, this element is a monument because of its purpose: to draw attention and gather people.

IMPLICATIONS

The project works carefully to keep the quarry history visible in the landscape. Sassi uses the path as a conveyor of relevant information and as the through line between changing ecotypes that add visual intrigue and support ecological diversity. The path leads to the major focal point, the amphitheater, from eye level and above. Interestingly, while the history of quarrying and the materiality choices spotlight human industry and influence, there is no emphasis on loss. The project emphasizes the amphitheater over the extraction scars, prioritizing the program.

PALMISANO PARK
site design group;
D.I.R.T. Studio
Chicago, Illinois



Outlook over the Stearns Pond.

DESCRIPTION

Palmisano Park, aka Stearns Quarry, used to be a 380-foot-deep pit in Chicago's urban fabric. The site became a landfill, and the void was slowly filled. After the landfill was capped, park construction began. The history of the quarry is remembered by the rock face in the north-west corner of the park. The rest of the design emphasizes water filtration and diverse programming.

ELEMENTS

PATH

There is an accessible walkway to the top of the mounded landform. Another angular path completes the circulation.

MATRIX

The matrix consists of multiple program typologies: sports fields, lawn, wetland cells, prairie, etc. There is a large mound in the middle of the site. The northwest corner is flooded, becoming a fishing pond.

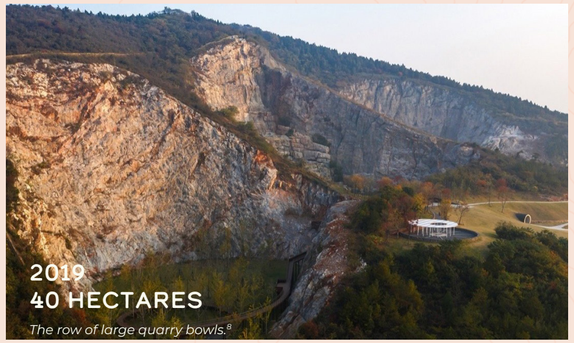
MONUMENT

There are two monuments: a gathering space at the highest point of the site (Mount Bridgeport), and a mining scar in the northwest corner.

IMPLICATIONS

On the surface, this project seems to bury the site's past as a quarry by filling in the void. However, this landform building actually heightens the sublime effect of the quarry walls that remain uncovered in the northwestern corner - the only place in the park you can see the human-made scars. There is a general narrative of human-made landform change underlying the original quarry and the landfill. The project uses the matrix to build new topography taller than the original landscape, creating a vertical difference between past and present. The walkways do not call noticeable attention to the grade change. The matrix is filled in with practical programming, some of which reflects regional ecologies. The landscape's purpose is to provide green space, not to highlight the quarry.

TANGSHAN QUARRY
Z + T Studio
Nanjing, China



The row of large quarry bowls.[8]

DESCRIPTION

The aim of Tangshan Quarry Park is to turn three gigantic craters into a dynamic, experiential public space. After a decade of intense mining, the Tangshan government collaborated with designers and engineers to construct the park. The third crater was purposefully barred from programming due to ecological value and safety concerns.

ELEMENTS

PATH

Paths ascend, descend, and round the accessible craters. There is a mix of angular and smooth forms. Switchbacks are used generously to accommodate grade change.

MATRIX

The matrix is filled with programming to engage visitors, including pavilions, playgrounds, and a series of gardens. There are many ecotypes: grasslands, rain gardens, native forests, and retention ponds.

MONUMENT

Focal points include: a pavilion, amphitheater, crater walls (via outlooks and cliff walks), and views of distant Tangshan.

IMPLICATIONS

The site circulation is presented as a one-way, subtly directing visitors and allowing for dramatic reveals. Materiality was determined by locality and maintenance demands. Often, the materials are within the quarry color palette, but contrast in value to create striking visuals. The craters are considered the major monuments of the site, as most of the circulation and matrix services their volumes and conduct people toward them. These voids are ministers of the sublime. Altogether, the park creates a feeling of grandeur, but does not deliberately tell stories about landscape change.

How do quarry landscapes employ memorial tactics?

LUIKERWEG STAIRCASE
Rademacher / De Vries
Luikerweg, Netherlands



An aerial of the lookout over the Luikerweg mine.[9]

DESCRIPTION

Luikerweg Staircase is the first part of a long-term restoration of the Luikerweg cement mine. The project, consisting almost entirely of a staircase, focuses heavily on obscuring and revealing views, the quarry's geologic history, and the historical connection between Belgium and the Netherlands.

PRINCIPLES

- [x] Absence / Presence
- [x] Datum
- [x] Immersion
- [ ] Material Symbolism
- [ ] Symmetry
- [x] Verticality

ELEMENTS

PATH

The circulation system emphasizes vertical change. Stair landing elevations are lined up with geological strata. The lookout is cantilevered over the void, pointing along the historic road connecting the Netherlands and Belgium.

MATRIX

The horizontal matrix is almost untouched, left in its current condition. The vertical matrix (rock face) has "windows" carved out of it.

MONUMENT

The view outward is meant to be the focal point. There is no other monument.

IMPLICATIONS

ABSENCE / PRESENCE

No attempt was made to change the void. The project allows humans to compare the void to their scale by climbing down the stairs, or to preserve its unrelatability by looking out in awe.

DATUM

The staircase traces geological change by bringing people down from the current geologic period to later ones, coordinating major events with the landings. The rapid excavation of the slowly created earth is emphasized.

IMMERSION

When at the end of the cantilevered outlook, the immediate ground and the sides of the cliff are no longer visible. All one sees is the void. People float in awe.

VERTICALITY

The staircase is a design solution born from unequal elevations. It emphasizes the change in topography, in the Z direction, by allowing people to walk along the cliff face.

LANDSCAPE ELEMENTS

This intervention is incredibly simplistic, relying almost entirely on circulation to communicate the project's intent. The staircase moves you vertically through geologic time, emphasizing the erasure of mining and the scale of extraction. This project is a quintessential example of using the void as the monument and leaving the matrix untouched.

JOHNSON PIT #30
Robert Morris
SeaTac, Washington



An eerie view of the ghost forest at Johnson Pit #30.[10]

First constructed in 1979, Johnson Pit #30 is one of many King County earthworks exploring the theme of sculpture as land reclamation. The existing gravel quarry is re-sculpted in a series of earthen benches that form a deep pit. The benches double as paths. The landform has undergone multiple restorations over time, but remains a symbol of extraction.

- [x] Absence / Presence
- [ ] Datum
- [x] Immersion
- [x] Material Symbolism
- [ ] Symmetry
- [x] Verticality

PATH

The original paths trace the reinforced landform contours in the same material as the matrix. The newer stone staircases are perpendicular to the benches, adding lateral access down to the pit bottom.

MATRIX

The matrix is made of rye grasses, with no variation. There is no formal programming.

MONUMENT

Wooden trunks at the top of the pit depict a "ghost forest" representing the trees that grew on site prior to extraction. There are no other monuments.

ABSENCE / PRESENCE

The mine void is emphasized by terraforming, but is otherwise left alone. People can envision what the unbroken landscape would have looked like without extraction.

IMMERSION

When at the bottom of the pit, which is intended to be occupied, people cannot see out of or beyond it; they are completely shielded. In a true sense, they are immersed in the void.

MATERIAL SYMBOLISM

The short, dead trunks lining the pit edge symbolize the on-site deforestation before mining. This loss is made more potent when juxtaposed against the dense, healthy forests on the site edge.

VERTICALITY

The pathways left from mining are cut into sharp benches that form a staircase down to the pit bottom. These drop-downs are far beyond human scale, emphasizing the void's scale by exaggerating a stair tread.

LANDSCAPE ELEMENTS

This project is a prime example of memorializing extraction. It calls attention to extraction by emphasizing the void with circulatory paths. The resulting ecological damage of extraction is also memorialized by placing vestiges of a forest on the perimeter of the pit. By keeping the matrix understated, the design communicates loss and change simplistically and clearly.

PRECEDENT STUDY OUTCOMES

The following findings are understood within the limits of the small, uneven sample size in this precedent study. A more extensive and balanced set of precedents would help test and refine the subsequent observations. Still, the patterns identified here point to larger trends that inform the final design guidelines at the end of this chapter.

MEMORY LANDSCAPES

This study found that all memory precedents engage immersion and verticality, suggesting that moving through spaces larger than human scale and encountering shifts in position and atmosphere is fundamental to evoking remembrance and reverence. The remaining four principles (absence / presence, datum, material symbolism, and symmetry) are each present in only one other memorial precedent, not suggesting clear favor or lack of importance in landscape memorials. The minimum number of principles used in one project is 3, the maximum is 4.

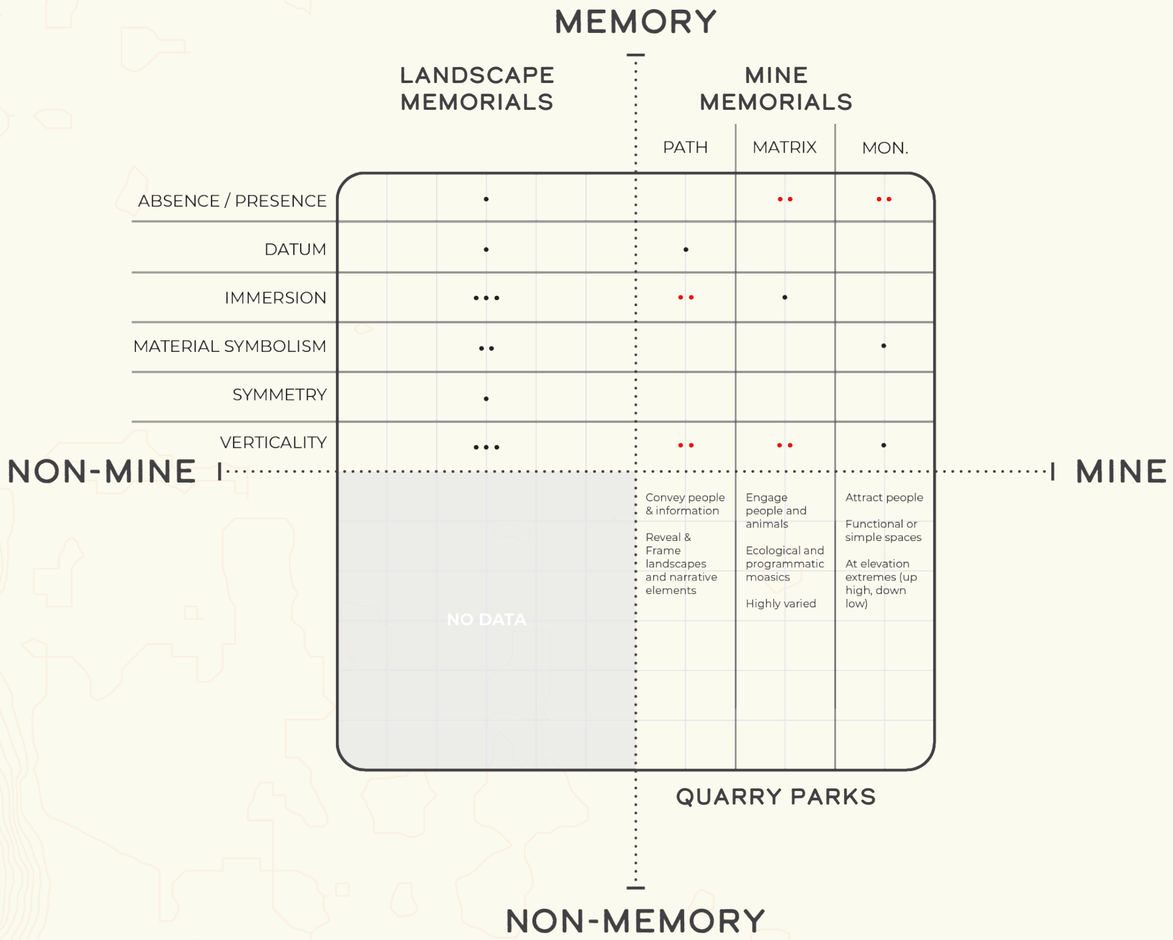
MINE LANDSCAPES

Circulation plays a critical role in mined landscapes. Paths are consistently used to convey people through a site. The circulation also hides and frames views, directing attention. It orchestrates sequences of movement and the experiences from that process. Mined landscapes tend to support complex, programmatically rich matrices that engage people through high variation. These matrices also vary to create habitats. Monuments are people-attractors. These areas tend to be simplistic and located at elevation extremes.

MINE / MEMORY LANDSCAPES

Analysis of the two mined memorial precedents suggests a relationship between specific landscape elements and memorial principles. In both precedents, the path was used to convey immersion and verticality. The matrix predominantly conveys absence/ presence and verticality. In both precedents, monuments convey absence / presence. The other memorial principles are unused in each precedent, or their uses differ between the two projects, not suggesting a strong trend.

Symmetry is the only memorial principle not in either precedent and therefore not associated with any landscape element, pointing to untapped potential in its use as a mine memorial device.





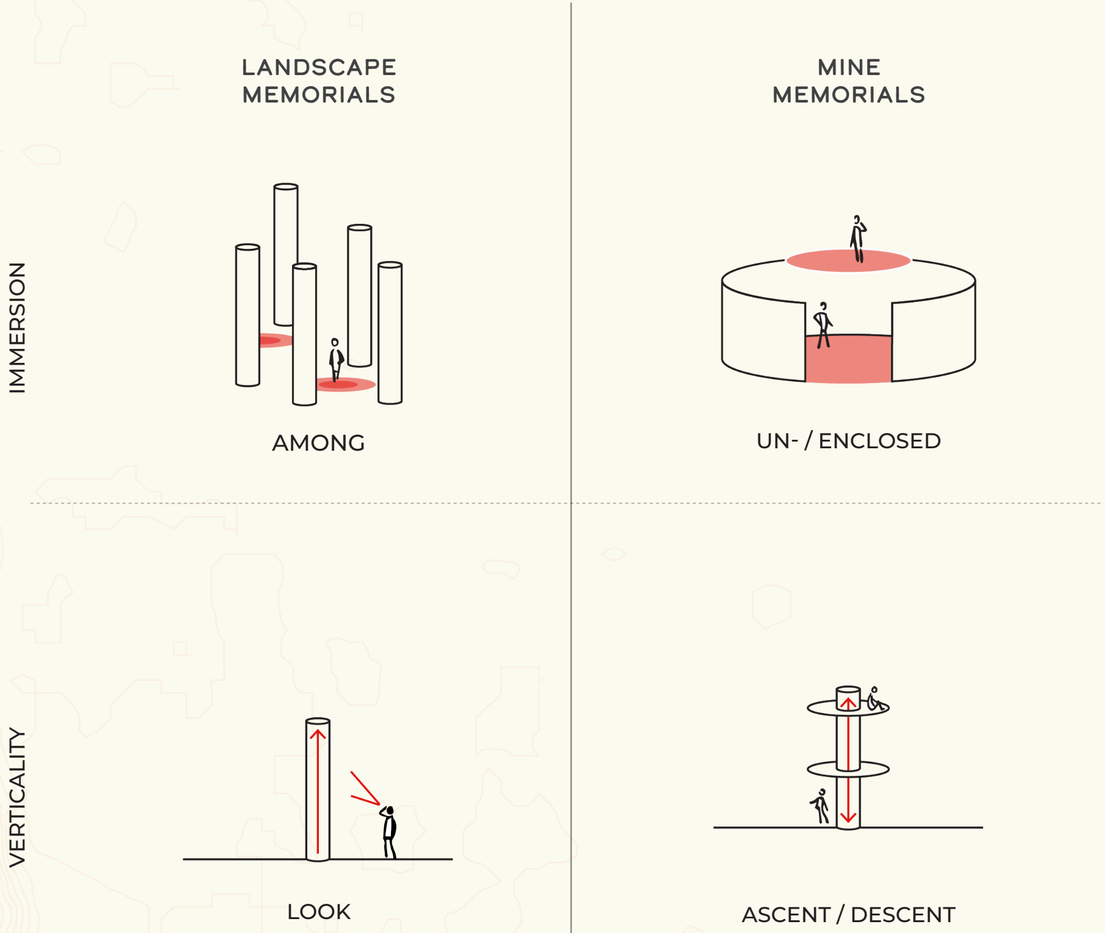
MEMORY LANDSCAPES COMPARISON

Absence / presence is not employed equally between landscape memorials and mined memorials: all precedents in the latter category use absence / presence innately by existing on mined land, underscoring how integral voids are in representing extraction and loss. This pattern reemphasizes that preserving evidence of loss is integral to the legitimization of grief and respectful memorialization (Mihai and Thaler 2024). In these contexts, absence caused by extraction is not incidental or covered up but central to the construction of the memorial.

The datum, material symbolism, and symmetry principles are used unevenly by both types of memorial landscapes, and these results don't reflect consistent trends. This points to the untapped potential of employing datum in mined memorials as a quantitative manifestation of loss. The underutilization of material symbolism may indicate a greater reliance on spatial and form-based expressions of loss instead of using representational materials. Symmetry is the least-used memorial principle overall, appearing only in the landscape memorial project Double Negative.

Interestingly, all memory precedents employ immersion and verticality, but do so in different ways. In landscape memorials, viewers are meant to observe verticality. In all three memorial precedents, visitors look up at the memorial design components to feel the power of loss or change. In both mined memorial precedents, staircases are used to actively move the visitor up and down in the Z direction. This choice directly involves people in the elevation change, progressing their understanding of the scale of change and loss.

In landscape memorials, immersion is conveyed by being among the memorial components. For instance, in Maya Lin's Ghost Forest, the 49 Atlantic White Cedar Trees are placed so that gaps between each tree allow people to walk through the grove. Visitors can be within the memorial. Alternatively, mined memorials create immersion by deliberately surrounding or freeing the visitor. For instance, visitors who walk to the bottom of Johnson Pit #30 are in a fishbowl, encircled by green walls on all sides, with no outward view. The lookout in Luikerweg Staircase, on the other hand, positions visitors well past the comfort of the ground plane. They stand looking out, feeling as if they are floating above, able to view the void before them. In this case, the lack of boundaries creates an immersive feeling. In both mined memorial projects, visitors feel either side of being surrounded, feeling immersed.





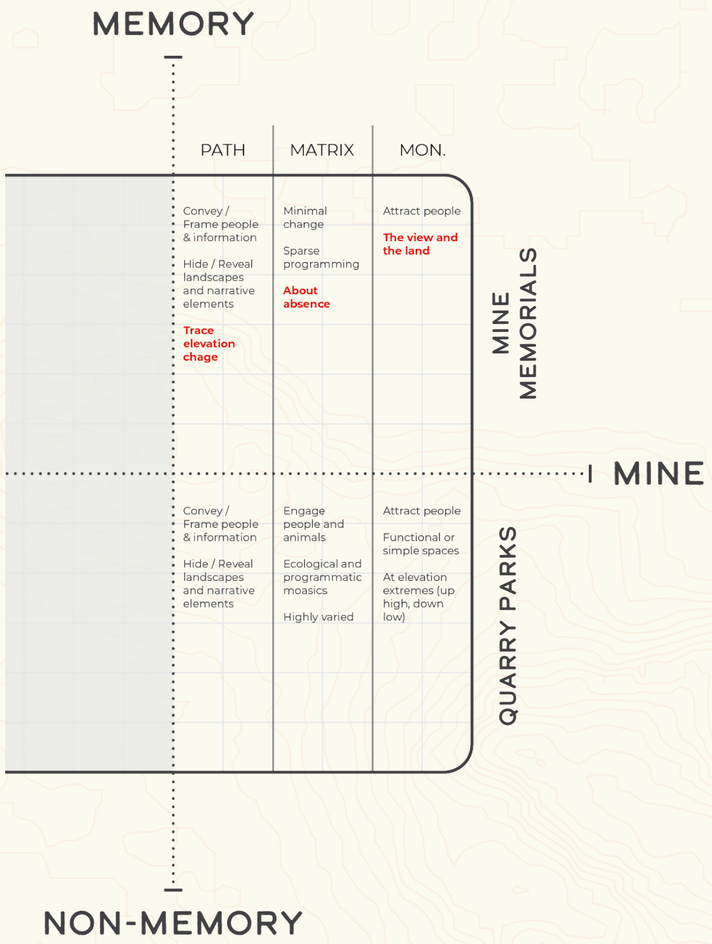
MINED LANDSCAPES COMPARISON

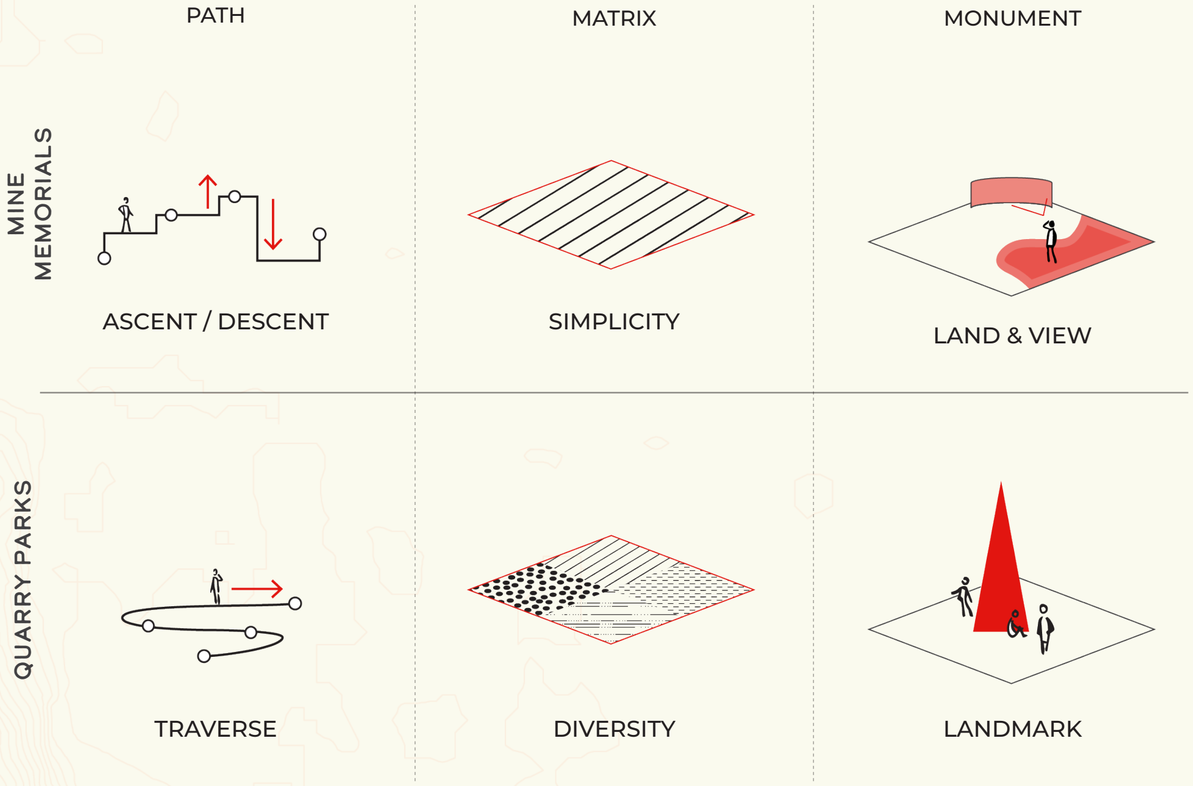
There are differences in the purposes of each landscape element when comparing the two types of mining precedents (quarry parks, mined memorials).

In a typical quarry park, paths are used to navigate the site, framing, hiding, and revealing views. While this is true in mined memorials, these precedents also use the path to trace elevation changes, moving up and down cliff walls. This compulsory movement in the Z direction reinforces the embodied experience of the scale of destruction mining causes. Paths in mined landscapes still navigate uneven terrain, but this is a pragmatic solution to moving through the site's topography, not an emphasis on the damage mining has caused.

The landscape matrix differs significantly between mined landscape types. While the matrices of mined landscapes are complex and programmatically rich, mined memorials are markedly minimal. Both mined memorial precedents have no traditional programming elements, and seem to intentionally lack this to emphasize the extraction-caused absence. Without routine programming, visitors can't help but feel the scale of loss and change.

In typical quarry parks, monuments attract and gather people. They are represented by furniture or another built landmark. In mined memorials, the monuments are consistently the extraction scar, and the views into and across it. There are often no other built markers that act as monuments. While both types of precedents are situated in a quarry, mined memorials projects intentionally direct attention to the scar.





DESIGN GUIDELINES

NOTES

These guidelines are distilled design recommendations informed by the preceding precedent analysis. Following these guidelines fits a project into the patterns observed in this study, but they are not obligatory. Because of the structure of the Cartesian Plane, guidelines gleaned from precedents can be sorted back into their corresponding quadrants.

The guidelines in the single-theme quadrants (memorial, mine) apply to the projects in that quadrant, as well as other single-theme projects of that respective type. Since integrating memorial tactics into quarry landscape design overlaps thematically, all guidelines outside the top-right quadrant can apply to their design. The guidelines from this dual-theme quadrant are not applicable to the single-theme quadrants.

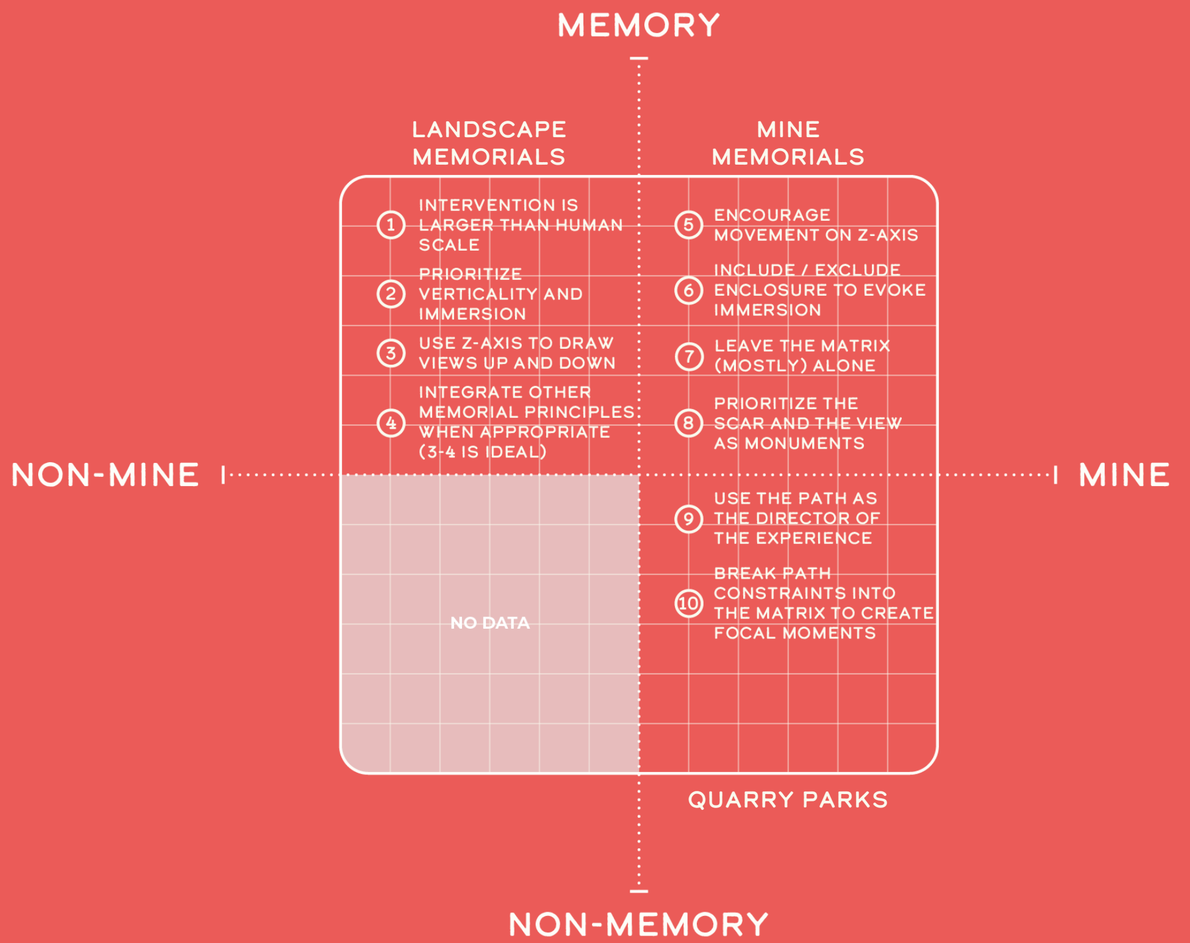
GUIDELINES

As found through the precedent study, landscape memorials operate at a larger-than-human scale, prioritize verticality and immersion, utilize the Z-axis to draw views up and down, and integrate other memorial principles as appropriate, aiming for 3 to 4 per installation.

Mined landscapes should use the path as the director of human experience, breaking the path into the matrix at specific points in the circulation system to create focal moments.

Mine memorials encourage movement along the Z-axis, create and exclude feelings of enclosure to evoke immersion, leave the matrix free from programming, and prioritize the scar and view as the monuments.

DESIGN GUIDELINES



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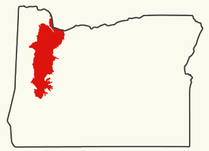
IV. SITE DESIGN

APPLICATION



Springfield Butte, 2000.[1]



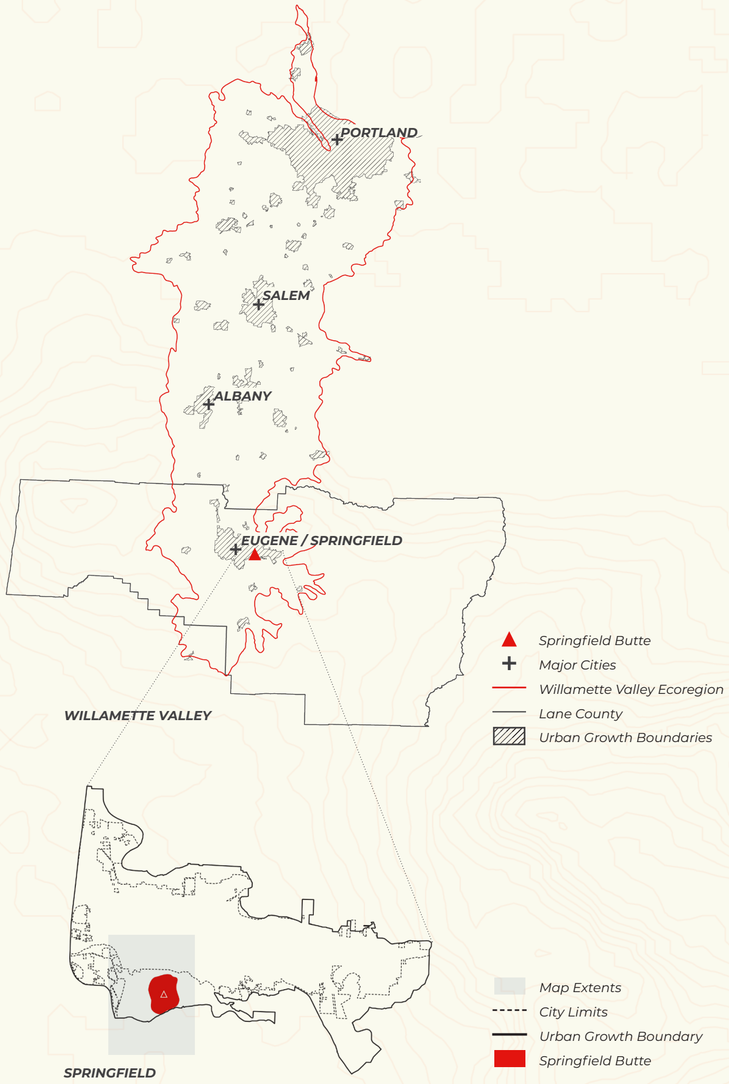
OREGON

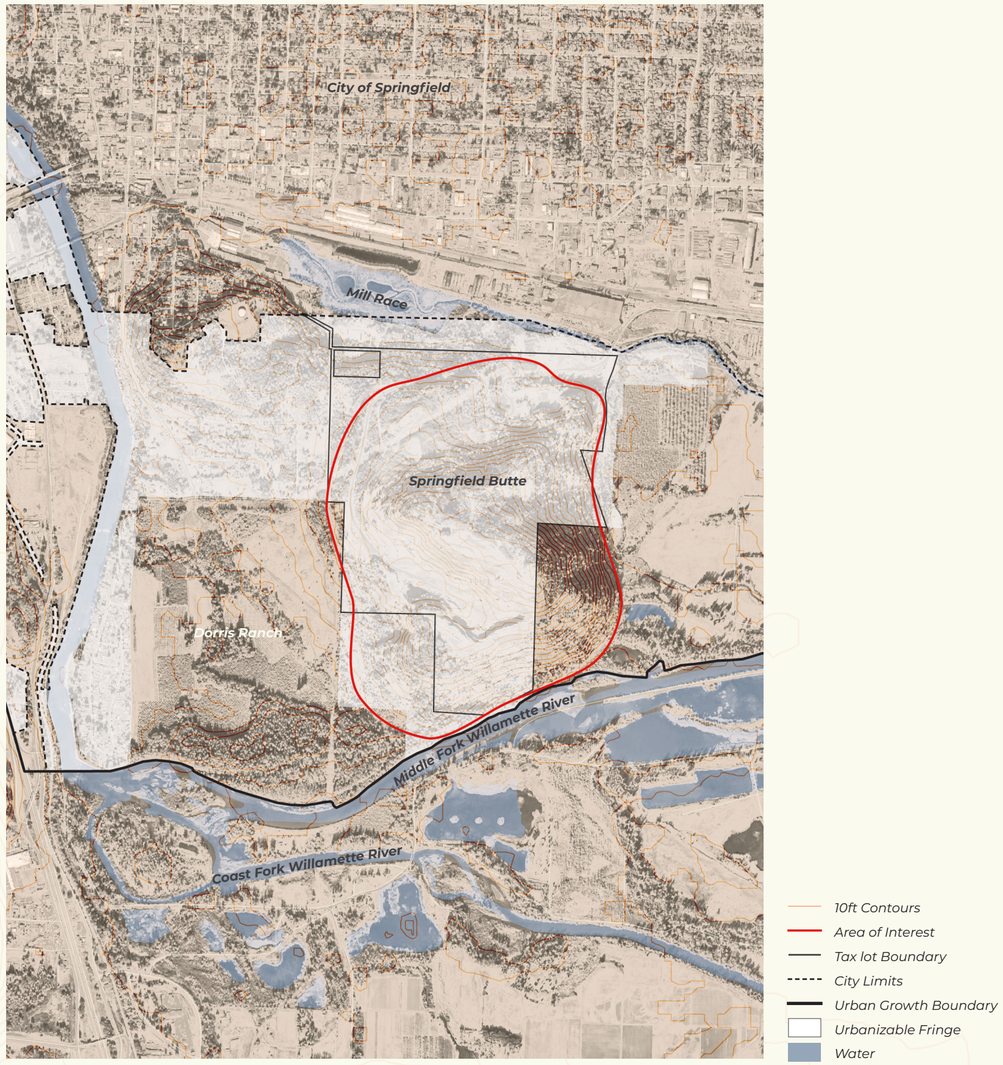
SITE CONTEXT

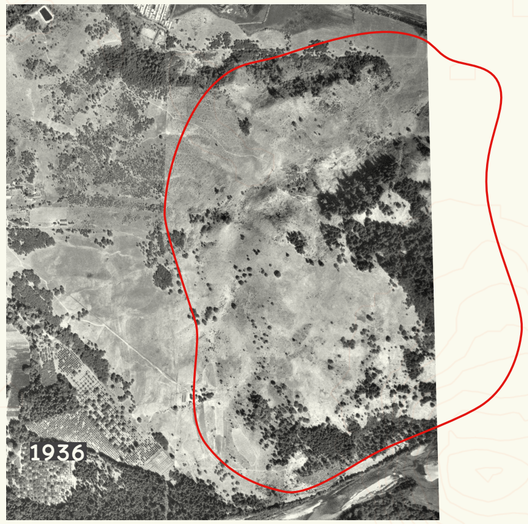
The mapping phase of the analysis identified Springfield Butte as a landform with extensive mining deformation. The butte is located in the city of Springfield, at the edge of the Willamette Valley Ecoregion, and is within Lane County.

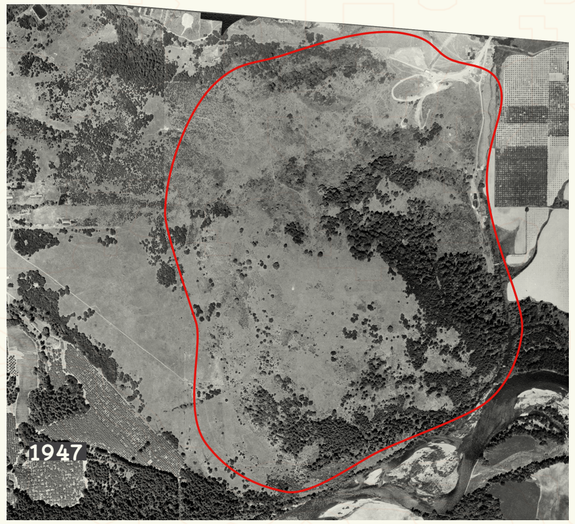
The butte sits between the city limits and the urban growth boundary, making it highly visible from downtown. Springfield Butte is considered land fit for future urban development. Currently, the site is mostly zoned as mining, with its bottom right and left corners zoned for open space. The south side of the butte abuts the Coast Fork of the Willamette River.

The butte outline used in the successive site design is the project's area of interest. It does not follow a single contour but instead is based on the perceived start and stop of the landform from topographic maps and 3D models.









1968



1977



MINE EVOLUTION

Prior to mining, Springfield Butte was likely burned by local indigenous communities. After colonial settlement, livestock grazing maintained the grassy savanna ecology. Over time, the switch from agricultural land use to extraction allowed woody plant encroachment.

Knife River, a national mining company, permitted the Springfield Butte mine via the Oregon Department of Geology and Mineral Industries (DOGAMI) on June 12th, 1974. Prior to official permitting, aerial photographs hint at small-scale extraction on the southwestern edge of the butte. After the permit date, the disturbance pattern shifts toward the butte center, adjacent to the historic high point.

The scar grew consistently until the late 2000s. Today, the mine is still active and in good standing with DOGAMI. The mining scar has not meaningfully changed size in the past two decades, potentially reflecting a decreased rate of extraction on the butte.

1987



1990



2000



Springfield Butte.[1]

TOPOGRAPHIC LOSS

To understand the use and importance of memorialization on Springfield Butte, one must examine the extent of extraction-induced topographic change on the butte and consider the resulting losses. High Places uses a topographic reconstruction to compare the past and present forms of Springfield Butte.

HISTORIC RECONSTRUCTION

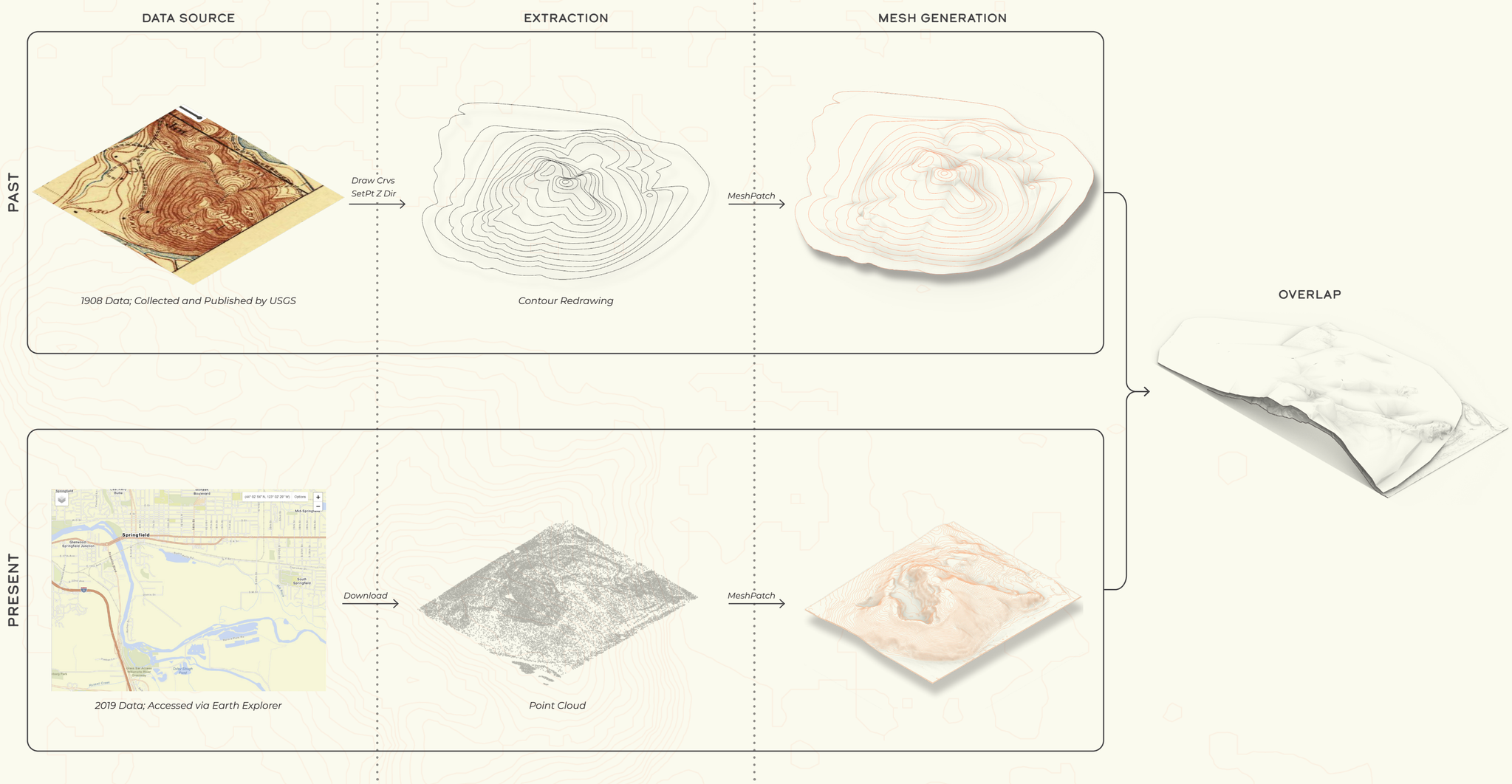
Constructing a working model of pre-mining topography on Springfield Butte required a multi-step process. Firstly, a historic topographic map published in 1908 by the USGS was downloaded and scaled in Rhino. Next, major contours were traced and positioned in the Z direction according to their historical labels. Lastly, the mesh was derived from the contours. The resulting mesh is low resolution due to the coarseness of the data. Lack of access to pre-mining DEMs makes contour redrawing the most attainable way to reconstruct the past topography.

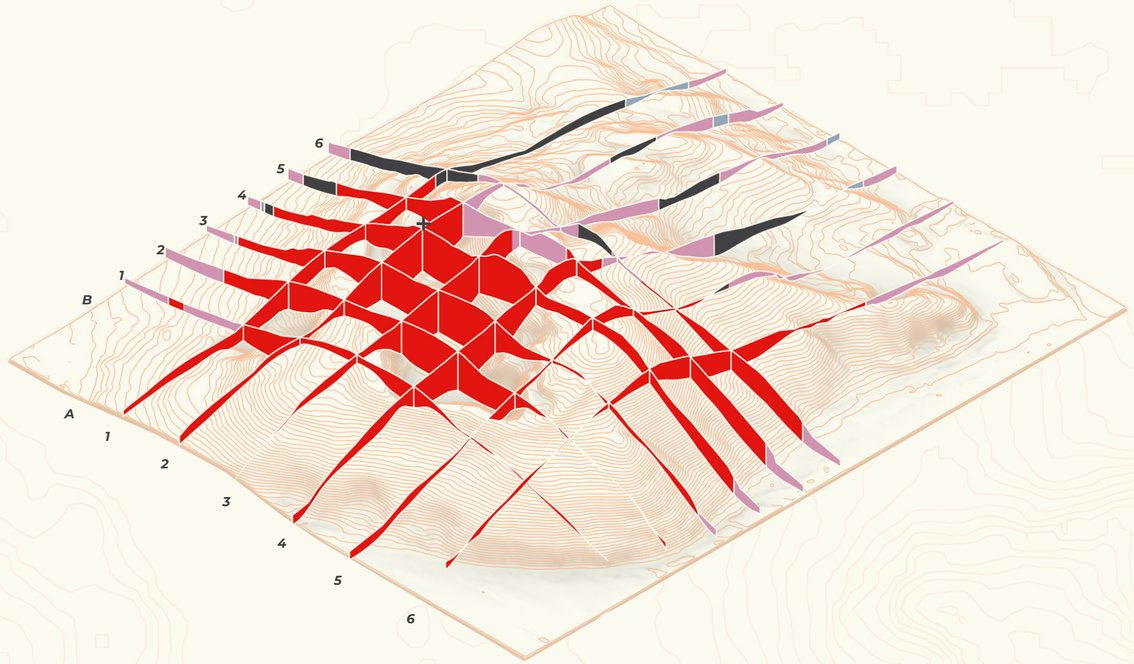
CURRENT TOPOGRAPHY

A detailed mesh of the current site was constructed using the most up-to-date point cloud data from the NOAA website. MeshPatch was used to turn the points into a mesh. The large volume of points in the cloud generates a very detailed base mesh with a far higher degree of accuracy than the historical reconstruction method.

RELATED LOSS

Once overlaid, the meshes were compared via study sections to better understand the extent of topographic loss on the butte. More detailed pre-extraction elevation data would increase the accuracy of the analysis. Still, the comparative sections allude to over 620,000,000 cubic feet of rock displaced from mining on Springfield Butte. This extraction has majorly deformed the butte, decreasing both access to and height of the high point. Pre-extraction aerial photographs of the site reveal that the landform supported a variety of ecotypes over time. It is clear that the loss of rock and soil volume through mining has also contributed to ecological loss.





+ *Historic High Point*
Intrusive Rock
Sediments
Marine Sediments
Volcaniclastic Rock

North-South Profiles

A

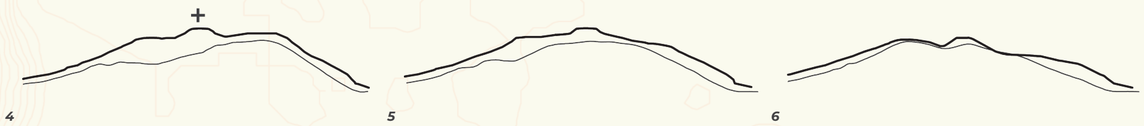




East-West Profiles

B





Historic Topography
Existing Topography



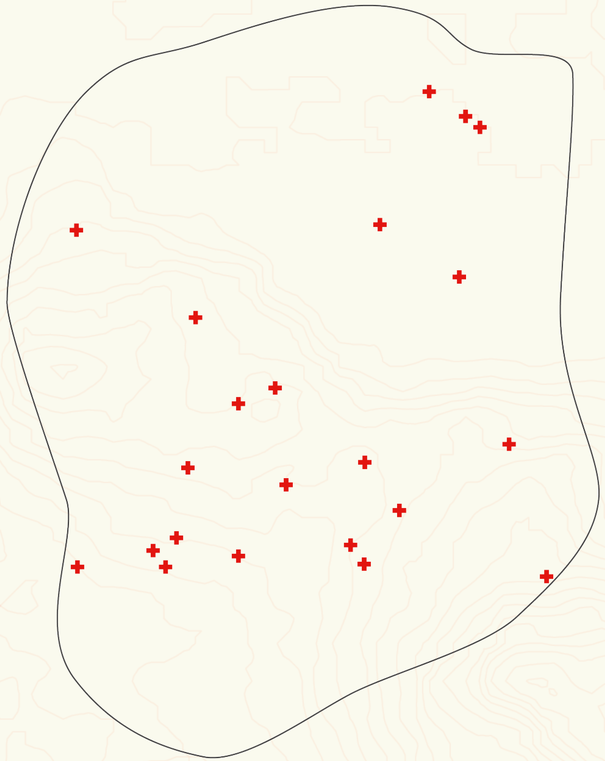
Entrance to Springfield Butte.[2]

ANALYSIS TO DESIGN

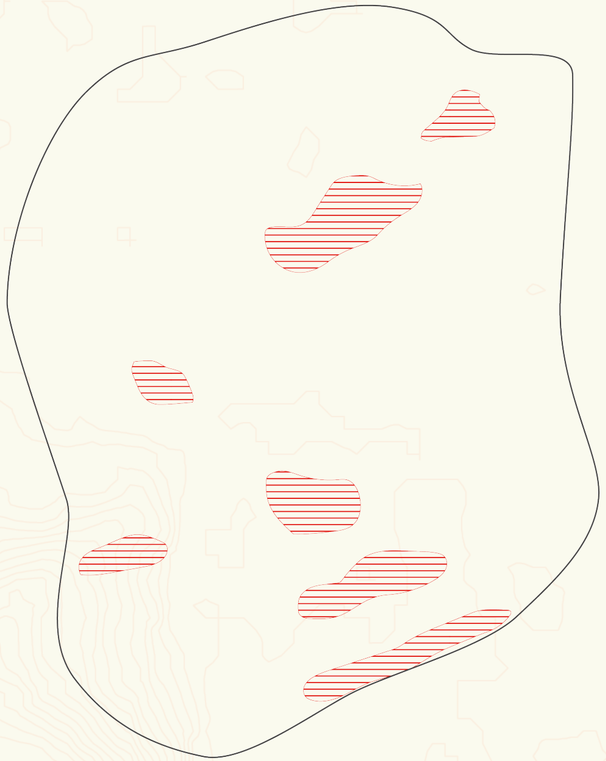
Springfield Butte is an active, privatized mine operated by the national corporation Knife River. Springfield Butte, while visually significant, is restricted from the local community. As such, any site analysis preceding design needed to rely on approximate information collection methods.

The goal was to identify key points and areas of interest on site and link these places through either physical design or a memorialization narrative.

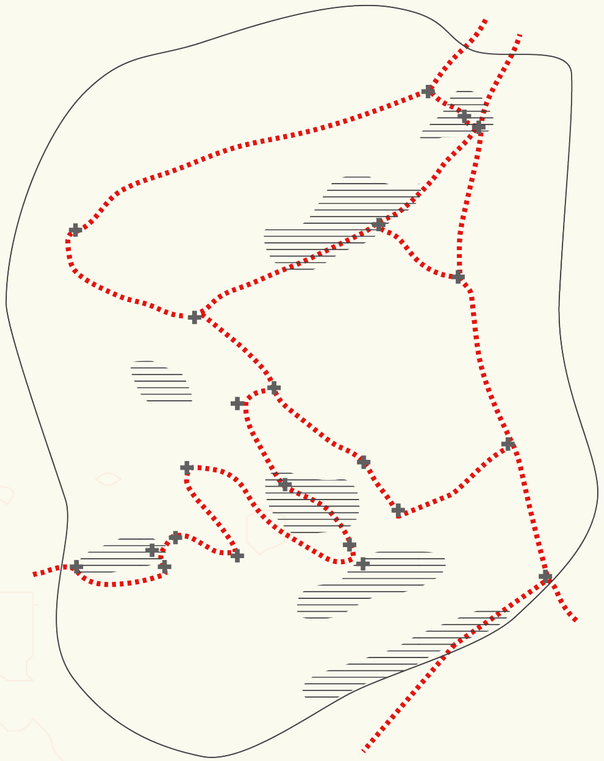
To do this, *High Places* engages in three types of analysis: 1) site visits around the perimeter of the butte, 2) GIS mapping, and 3) non-traditional methods that explore site narratives.



Points of Interest



Areas of Interest



Connections

Site Visit Photos


Photos by Cassandra Lanson











Butte Mine Reference Photos


Photos by Kevin Shanley.




Photos by Jeff Krueger









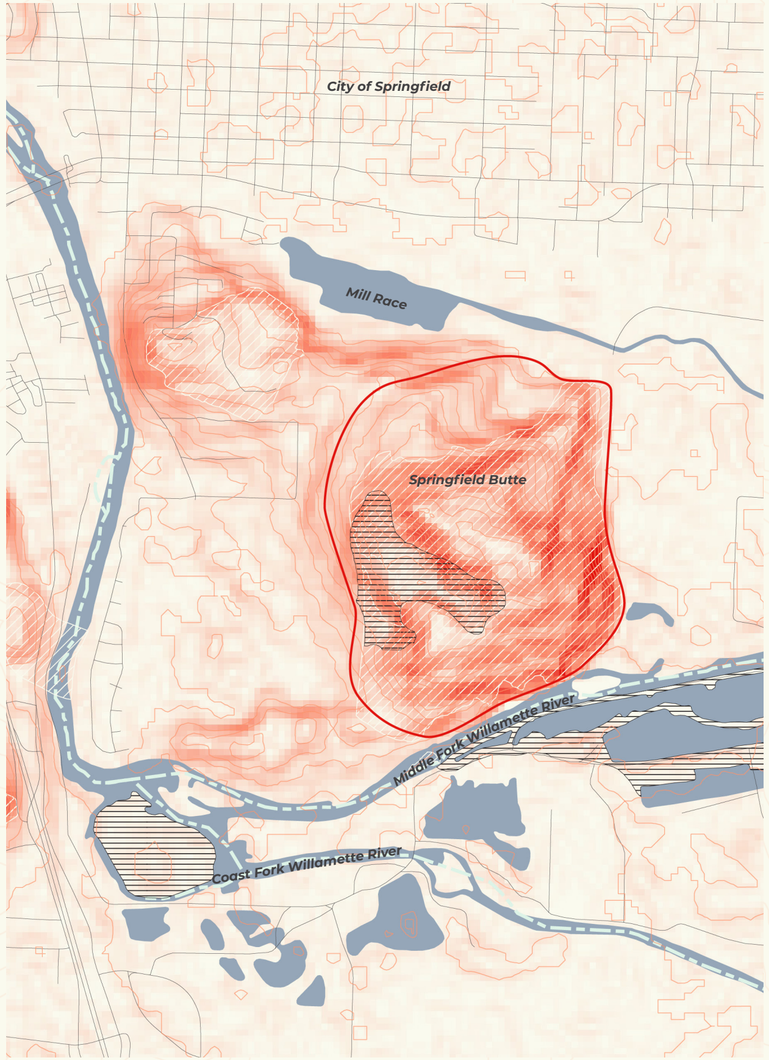
This observational mind map was drawn during the first visit around the site in December of 2026.

SITE VISITS

Three site visits were completed in December 2025, February, and May 2026. These visits were spread out to observe the butte over multiple seasonal stages. While traveling by bike or by foot on the surrounding public paths, photographs, sketches, maps, and plant inventories were collected.

While the butte is not accessible, a few rare photos from inside or on top of the mine were also located and studied.

These visits added to the understanding of how Springfield Butte interacts with its surroundings, and revealed ecological and geomorphological interest points.



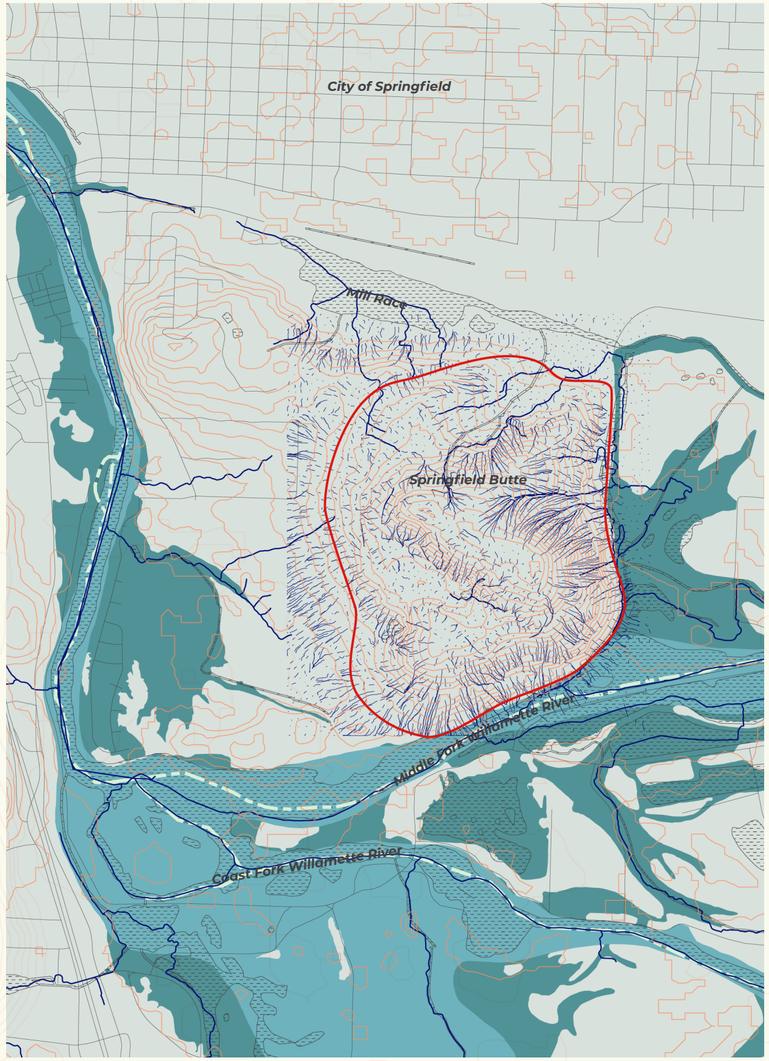
MAPPING ANALYSIS

GEOMORPHOLOGICAL

Based on geological data, the majority of Springfield Butte consists of intrusive basalt, a hard rock that is abundant in the valley. This feature makes the site ideal for an aggregate mine. Studying slope data of the area, the butte's steep sides get up to 29%. The steepest areas of the site are on the southeast edge and the northernmost cliff, made from extraction activities. There are very few areas of flat land within the area of interest, barring the extraction pit bottom and the roads leading up to the mine. The site's slope data also clearly highlights the importance of the butte as a high place surrounded by flatness.

Keeping the design guidelines in mind, site design strategies should move people through this varied landscape, so they experience both topographic extremes.

- *Intrusive Basalt*
- *Pit*
- *Slope* (29% – 0%)
- *10ft Contours*
- *Area of Interest*
- *River Centerline*
- *Water*



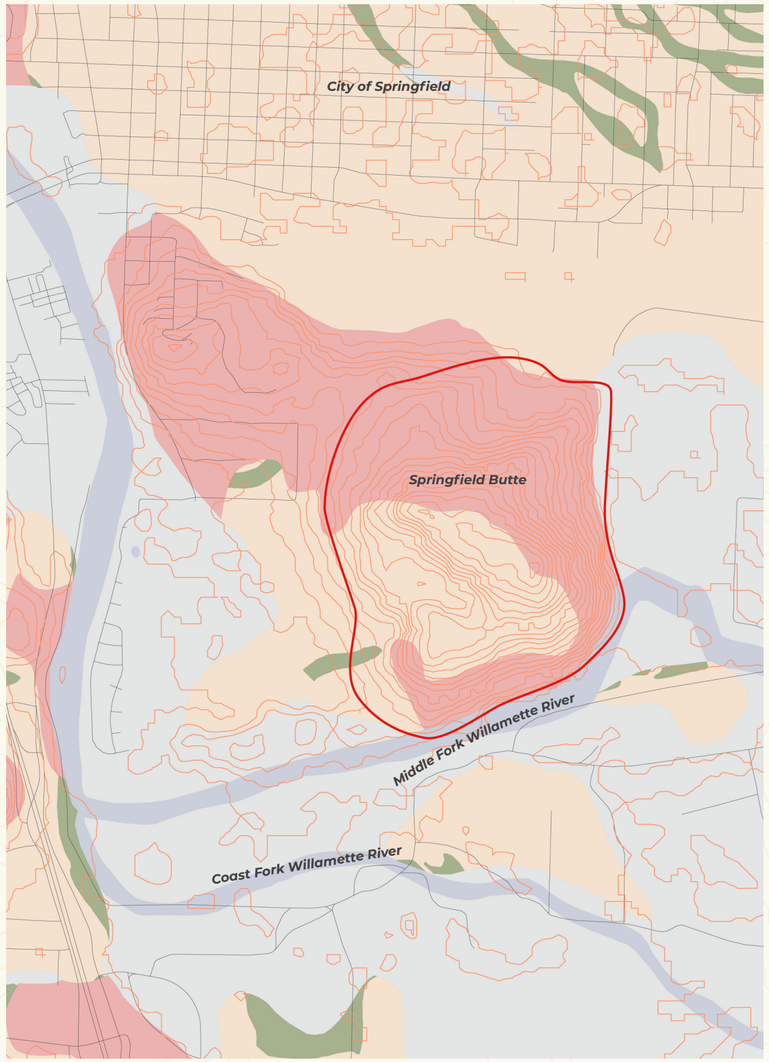
ECOLOGICAL - WATER

Due to the butte's relatively extreme topography, the approximately 46 inches of annual rainfall in Springfield run directly off the summit on all sides. Most of this water is directed into the main channel of the Middle Fork of the Willamette River, or one of its many offshoots. Most of the water flows through vegetated land, so the flow is somewhat slowed. However, in areas with bare rock due to extraction, the water is likely to contribute to erosion and flash runoff and is not filtered by plants before running downstream.

The butte is well outside the more dire flood zones, so water strategies on site should focus on allowing water to pool in specific depressions, collecting and filtering.

Flood Hazard Zones
- *A*
- *AE*
- *X*
- *Wetlands*
- *Flow Lines*
- *10ft Contours*
- *Area of Interest*
- *River Centerline*

N

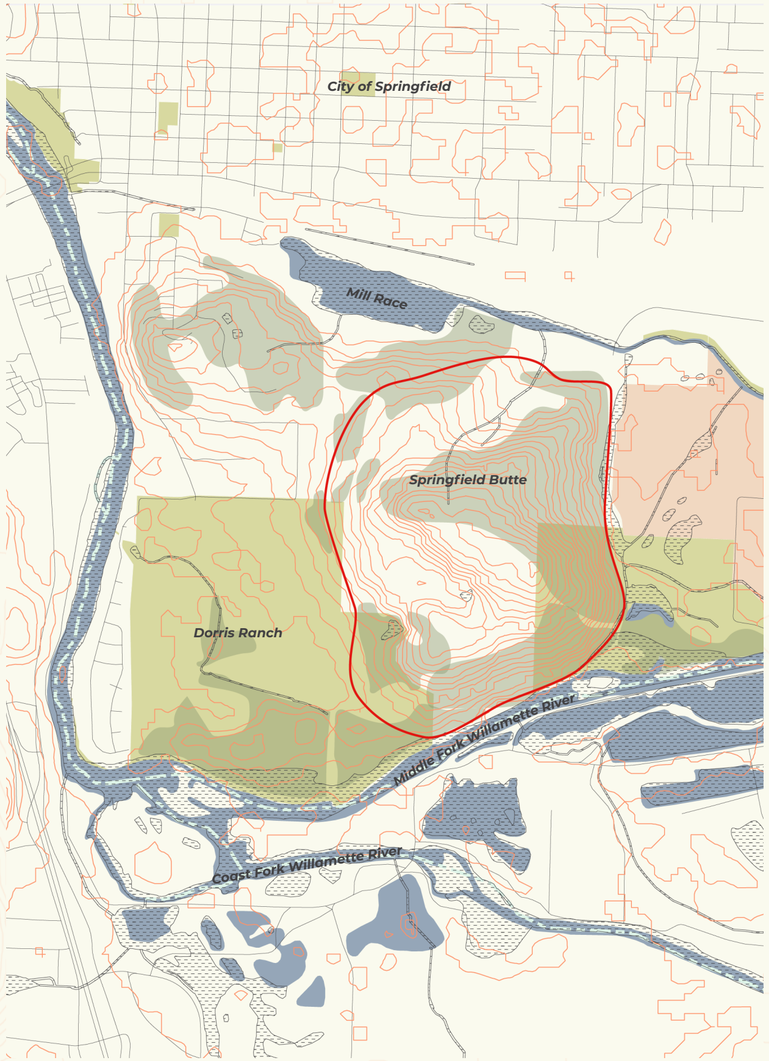


ECOLOGICAL - PAST & PRESENT ECOTYPES

The historic ecology of the butte was savanna and prairie. Oregon White Oak (*Quercus garryana*) is still numerous on the hillside, but typical riparian woodland species and Douglas Fir (*Pseudotsuga menziesii*) now cover what was open prairie. A plant inventory conducted from the Middle Fork Path on the southern side of the butte revealed invasive species such as Shiny Geranium, Mazzard Cherry, and Huckleberry have taken hold at low elevations. Holistic design interventions should consider the removal of these invasive species.

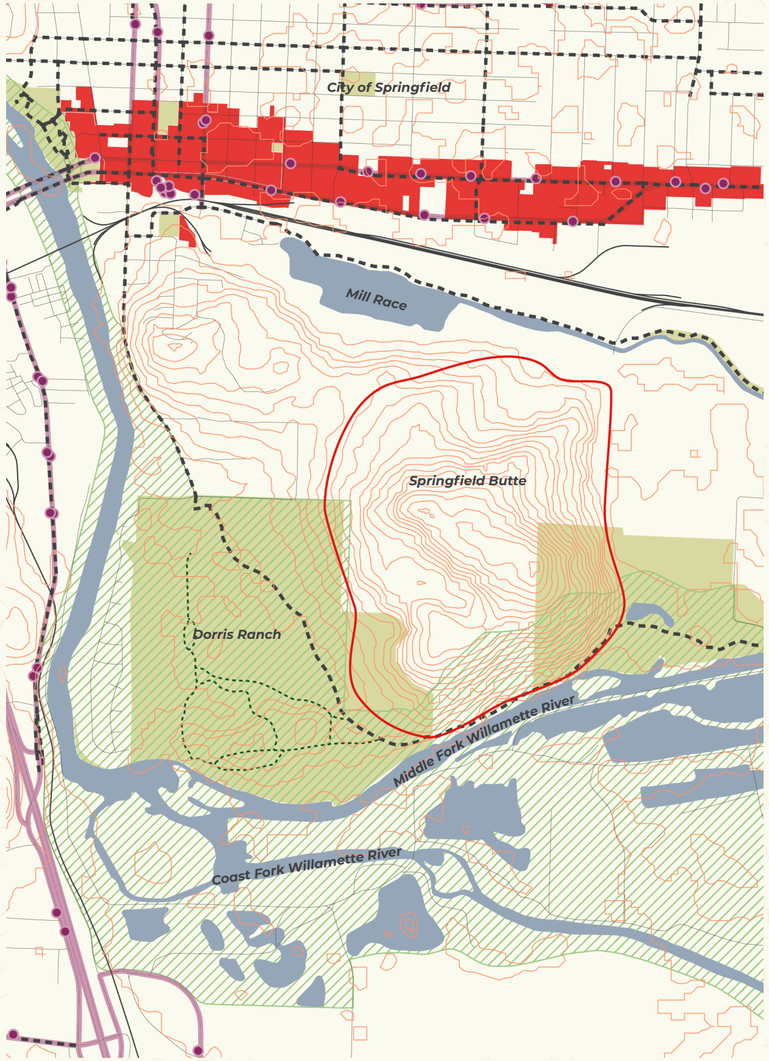
Site design should not seek to revert the butte ecology to oak savanna or prairie. Instead, landscape design interventions should highlight the site's ecological history, preserving intact traces of prairie and savanna that juxtapose current conditions.

- *Garry Oak Savanna*
- *Wet Prairie*
- *Xeric Prairie*
- *Riparian Forest*
- *Historic River*
- *10ft Contours*
- *Area of Interest*



- *Open Space*
- *Mixed Forest*
- *Agriculture*
- *Wetlands*
- *10ft Contours*
- *Area of Interest*
- *River Centerline*
- *Water*

N



SOCIAL

Springfield Butte is just south of the major commercial corridor in Springfield. Bus and bike routes shuttle people from Eugene and East Springfield to this area. The Mill Race bike path conveys people from this urban area through a mixture of industrial, residential, and open land, cutting through Dorris Ranch - a beloved local green space. The other major bike artery, the Middle Fork Path, squeezes between the Middle Fork of the Willamette River and the southern edge of Springfield Butte. Hiking trails connect to this pathway.

Springfield Butte is well-positioned to connect to existing recreation. In an assumed future of public access, people riding or walking the Mill and Middle Fork Paths or downtown can make the climb to the Springfield Butte summit, enjoying expansive views. Site interventions should consider the butte as an asset to expand waterfront recreation and the public greenway, and feed into transit connections.

NON-TRADITIONAL ANALYSIS

Because this project involves historical, cultural, and narrative complexities that cannot be captured fully through conventional GIS analysis, High Places includes non-traditional site analysis through collages and an overdrawing.

COLLAGES

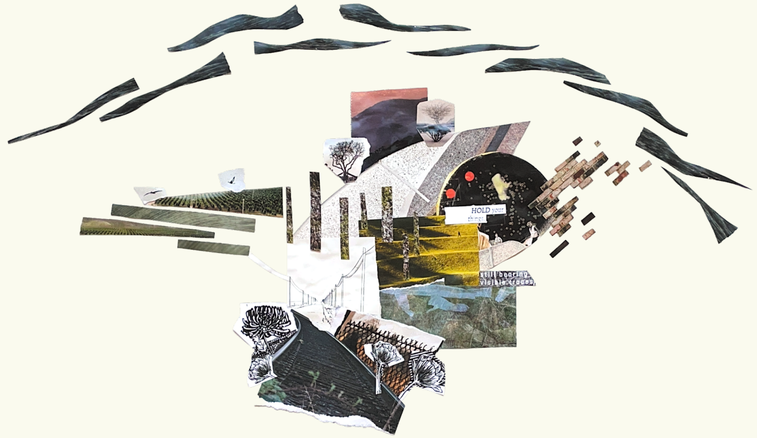
The collages were made using images from magazines, done so purposefully to abstract the site and its elements, allowing for two parallel narratives to emerge. *Collage A: Extraction* explores the human-powered side of resource extraction on the butte. *Collage B: Attraction* explores the bright side of high places as opportunities for connection between humans and nature, past and present.

OVERDRAWING

After collaging, overdrawing was used to explore the two emerging site narratives. *Duality* attempts to reconcile these narratives by sketching over site photos and the collages. Through tracing and layering, the two themes, one of extraction and one of beneficial human experience, are split on the page, intertwining in the center. Duality allows the tension between the site as a natural resource and a cultural landscape to coexist.

These non-traditional methods helped me identify the narratives relevant to memorialization, and cultural and social points of interest associated with the mining scar and the view.

Collage A : **Extraction**



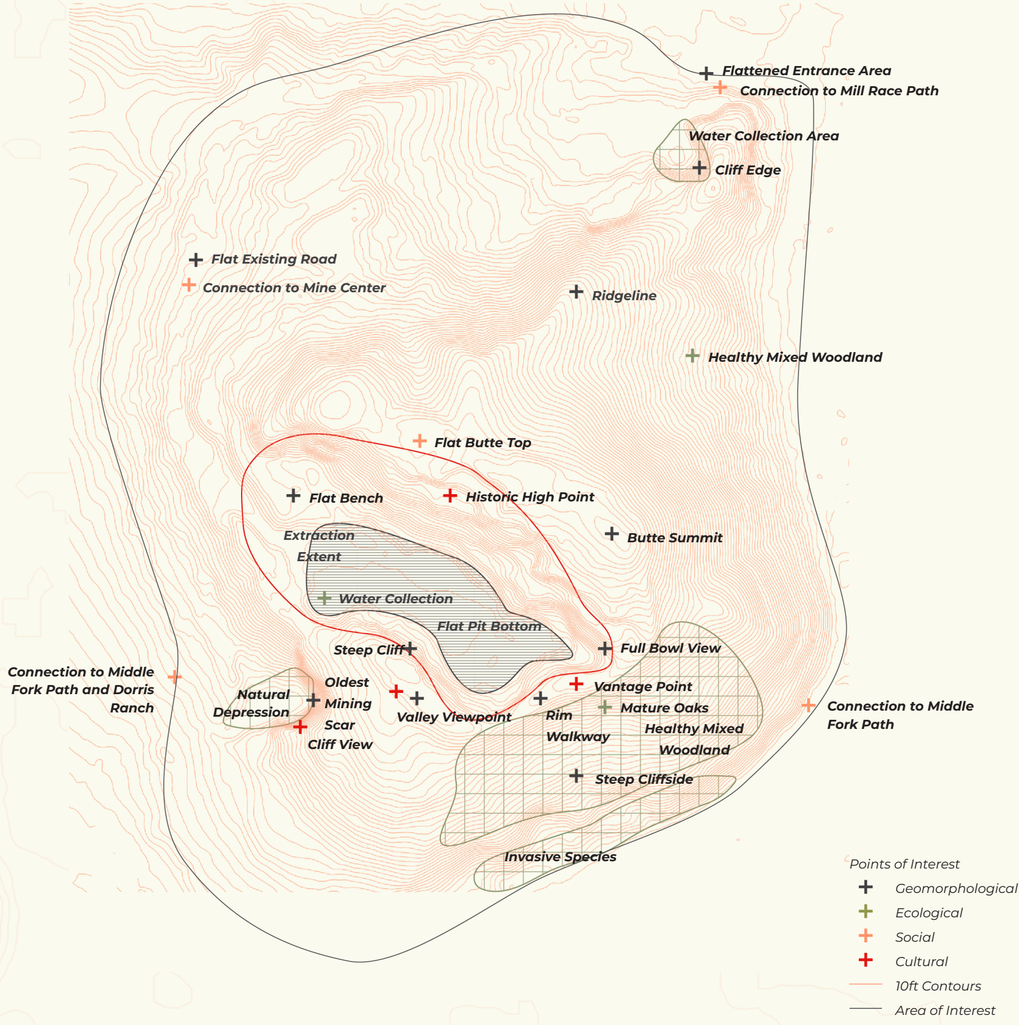
Collage B : **Attraction**

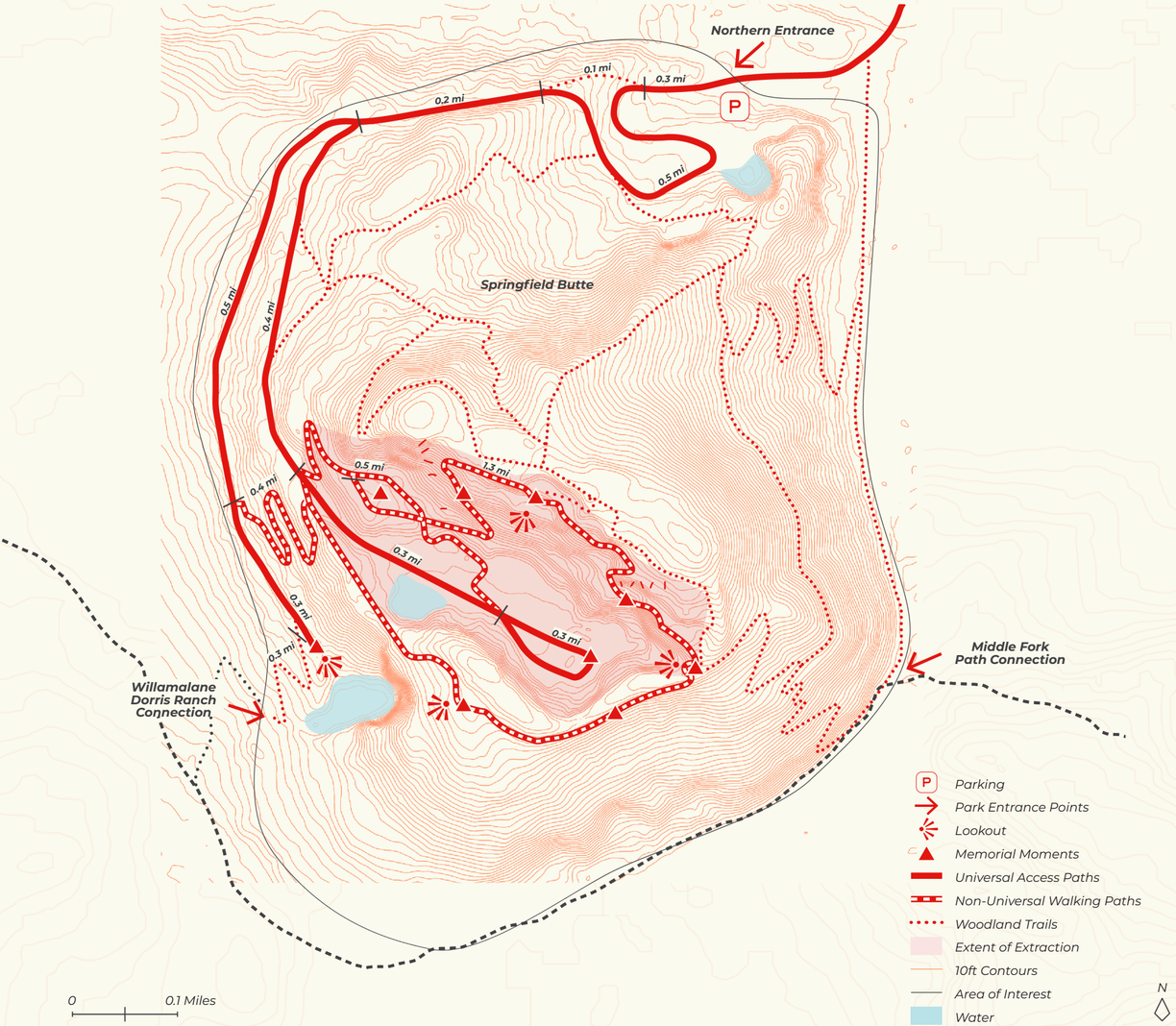


***Overdrawing* - Duality**



Duality *attempts to reconcile the two main site narratives that emerged from site visits and collaging.*





UNIVERSAL ACCESS



Mill Creek Universal Access Path (Avery Van Etten).[3]



Big A Universal Access Trail (Silvia Cassano).[4]

WOODLAND



Spencer Butte Trail.[5]



Skinner Butte Trail.[6]

MEMORIAL



Luikerweg staircase.[7]



Arkis viewing platform.[8]

SITE DESIGN

The previous precedent study emphasizes the importance of manipulating paths to reveal, frame, and hide views. Path can also be used to memorialize. Given the scale of the site and how spread out the points of interest are on the butte, the site intervention consists primarily of a path system that connects interesting features and memorialization interventions. Existing paths made for mining machinery are reused.

In addition to the path network, this design proposes new water filtration ponds that provide varied habitats. The design also proposes invasive control and the reestablishment of other native species within the cliff-side ecology. The design does not aim to rebuild the butte but holistically proposes ways of interacting with and exploring its history of loss.

PATH TYPES

The proposed design on Springfield Butte consists of a large path network with three general path categories: universal access, woodland, and memorial.

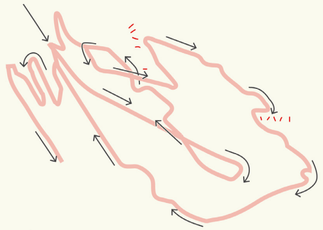
The path begins at the northern parking lot. These universal access paths are gently sloped, barrier-free walkways. They are made mostly of smooth asphalt and do not exceed 10% slope. The main path winds up the butte topography, mostly following the old access road. It splits a mile in, with the left fork embarking toward the mining scar and the right fork descending toward the oldest part of the mine, down to the reflection pond and Dorris Ranch connection. This left fork transitions to 3/8" minus crushed basalt, deep into the min center, which is intentionally compacted to remain accessible.

The woodland paths crisscross the butte, connecting back to the universal access paths and memorial loop. They range in slope from 5% to 20%. These dirt paths create a hiking network for park users to explore, including ridge, edge, and side face routes. These routes increase the recreational possibilities of the proposed landscape by connecting down to the multi-use Middle Fork Path on the south side of the butte.

The Memorial Loop is situated in and around the extraction scar. It is a combination of flat paths and stairs that cut through and wrap around the butte. Most of the on-site memorial interventions are connected along this loop, which allows users to scale the cliff face. The paths are a mix of crushed basalt, steel, and glass.



Key Plan

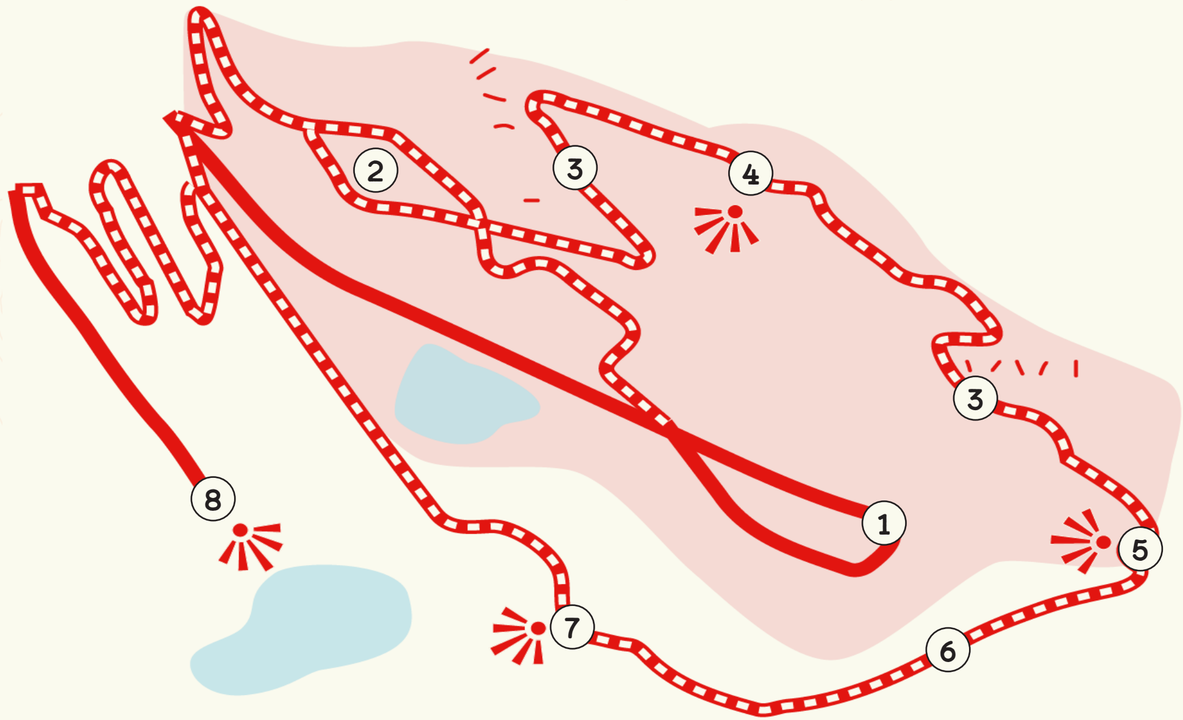


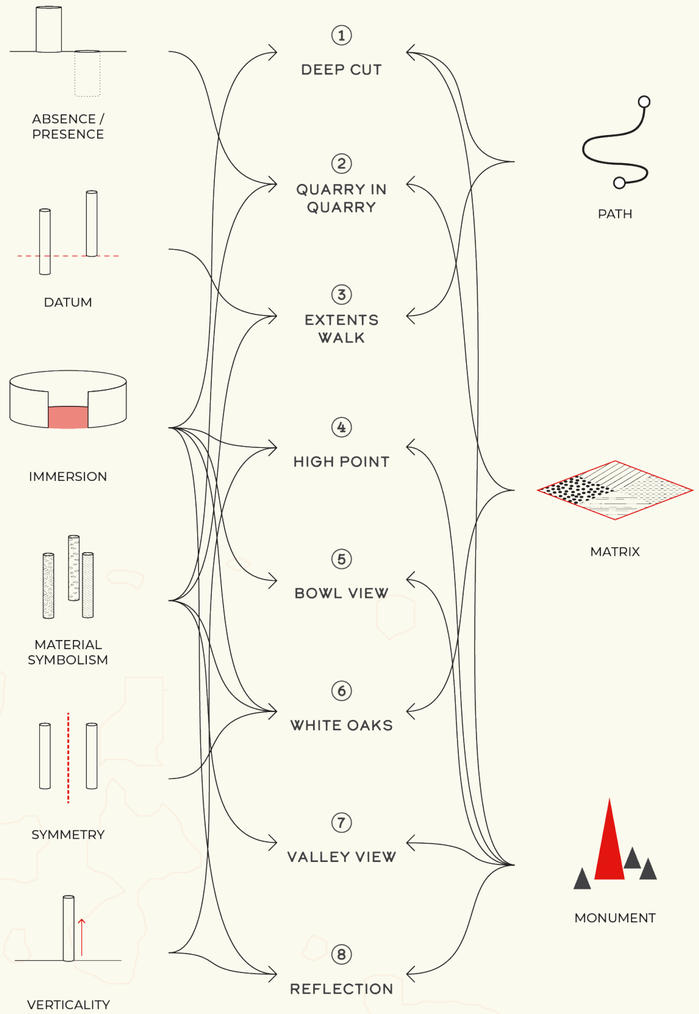
Directional Plan

MEMORIAL LOOP

At the heart of the new trail network is the Memorial Loop, which connects eight memorial moments along a winding and varied path that carves into the earth, scales cliff walls, and reveals stunning views. The loop begins at the center of the bowl and climbs the northern cliff face, slowly tracing the rim of the extraction scar. The path crescendos at moment 7, the southern outlook, where visitors see the valley view extend beyond them.

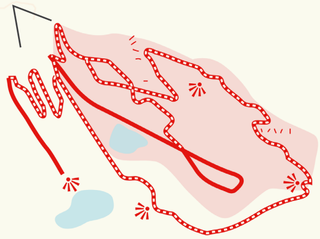
The loop is highly encouraged to be one-way, moving first toward the inner-bowl loop, then clockwise up the stairs and around the rim. While the path is reversible, the memorial moments have been positioned along the way to build an optimal user experience, which will depend on the path in one direction. The loop is 2.4 miles long, and it takes approximately 45 minutes to walk comfortably. Visitors can take additional time to stop and enjoy each memorial moment.





SITE DESIGN
DESIGN

HIGH PLACES
LANSON



SITE DESIGN
DESIGN

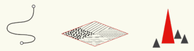
1 DEEP CUT

As visitors start their journey on the Memorial Loop, they approach the center of the extraction pit. The path changes materials below their feet, from smooth stone to decomposed granite. As their footsteps begin to crunch, their path sinks slowly into the ground, forming a trench. The view of the eastern cliff faces seems to elongate as they approach the trench's deepest part. The aluminum-clad edges on either side act as barriers to their view, leaving only the adjacent rock at eye level. Quickly, visitors sense the rock's cooling power, hear echoes of others they cannot see, and focus on the waves of rock towering over them on either side.

PRINCIPLES:



ELEMENTS:



DESIGN GUIDELINES:

2. Prioritize verticality and immersion
3. Use Z-axis to draw views up and down
5. Encourage movement on the Z-axis
6. Include / exclude enclosure to evoke immersion
7. Leave the matrix alone
8. Prioritize the scar and the view as monuments
9. Use the path as the director of the experience

MINING SCAR VIEW-CONE

FULL-BODY IMMERSION

MAINTAINED QUARRY MATRIX

BASALT TRENCH WALLS

CRUSHED ROCK UNIVERSAL ACCESS PATH

SITE DESIGN
DESIGN

2 QUARRY IN QUARRY

As visitors ascend the path, they are greeted by a miniature quarry with human-scale cut benches that tier into a deep pit. Along each bench, different rocky species grow. The plant variety and number dwindle on each successive step down, until nothing colonizes the bottom. This installation reflects the height loss intrinsic to mining on Springfield Butte and the resulting loss of plant life. Careful visitors may also perceive the steady loss of soil on each tier, which terminates in hard rock, inhospitable for new plant growth. This installation helps to humanize the large scale destruction visitors will see throughout their walk.

PRINCIPLES:



ELEMENTS:



DESIGN GUIDELINES:

1. Intervention is larger than human scale
3. Use Z-axis to draw views up and down
4. Integrate other memorial principles when appropriate
10. Break path constraints into the matrix to create focal moments

HUMAN-SCALE QUARRY INSTALLATION

HEALTHY TYPICAL BUTTE ECOLOGY

UNIVERSAL ACCESS PATH

ECOLOGICAL DECAY INTERPRETATION

BARE-ROCK BOTTOM

3 EXTENTS WALK

Vertically traversing the northern cliff face, visitors spy large corten sculptures that seem to rise from the quarry scar, bending and twisting like ribbons in the wind. These markers carry meaning, delineating the extent of the extraction scar from 1972 to the present. Visitors can use the corresponding signs to correlate time with sculpture, gaining a better understanding of the rate of destruction on the butte. They can compare the past and present extent with the datum in the landscape.

PRINCIPLES:



ELEMENTS:



DESIGN GUIDELINES:

1. Intervention is larger than human scale
3. Use z-axis to draw views up and down
4. Integrate other memorial principles when appropriate
5. Encourage movement on the Z-axis
9. Use the path as the director of the experience

1968
1977
1983
1987
1990

HISTORIC MINING EXTENT MARKERS

INTERPRETATION OF PAST MINE BOUNDARIES

ELEVATED WALKWAY

GLASS PANELS

4 HIGH POINT

After emerging from the cliff stairs, the memorial path opens onto a large viewing platform at the historic high point location. From this platform, visitors see the southern quarry benches and a catchment and habitat pond. The expanse of the southern Willamette Valley unfolds beyond. At the center of this lookout is a ramp tilted upward, with plantings at its center. This slight rise in elevation nods to the loss of height mining has caused. Visitors may walk upward, enjoying slightly better views, wondering what it might have looked like before mining.

PRINCIPLES:



ELEMENTS:



DESIGN GUIDELINES:

2 Prioritize verticality and immersion

5 Encourage movement on the Z-axis

6 Include / Exclude enclosure to evoke immersion

8 Prioritize the scar and the view as monuments

10 Break path constraints into the matrix to create focal moments

WILLAMETTE VALLEY VIEW

HIGH POINT MEMORIAL RAMP LOOKOUT

ROCK-CARVED PATH

GLASS-EDGE LOOKOUT TO BOWL SCAR

5 BOWL VIEW

Emerging from the cliff walk, visitors are met with an immersive view of the entire extraction scar, which forms a bowl. At this height, aided by glass panels both around and under them, visitors are able to view other paths as part of the memorial loop. When standing at the edge of the lookout, only the scar is visible, creating a floating feeling. Glancing below their feet, visitors can examine the rock patterns on the cliff.

PRINCIPLES:



ELEMENTS:



DESIGN GUIDELINES:

2. Prioritize verticality and immersion
3. Use z-axis to draw views up
6. Include / Exclude enclosure to evoke immersion
7. Leave the matrix alone
8. Prioritize the scar and the view as monuments
10. Break path constraints into the matrix to create focal moments

6 WHITE OAKS

As visitors round the bend on the rim, they are met with three large Oregon White Oak trees to their left. These mighty original trees are growing on the southern edge of the butte, surrounded by lush understory. On the right side of the trail, the extraction scar is visible, with bare rock and loose sandy soil blowing away in the wind. Three dead White Oak snags mirror the healthy specimens on the other side. The visitors visually compare the two sides and imagine the entire butte forested as on the left. The snags are a solemn monument to the other original oaks that did not survive extraction. Over time, the snags weather and disintegrate. Loss can compound; loss can also usher in anew.

PRINCIPLES:



ELEMENTS:



DESIGN GUIDELINES:

1. Intervention is larger than human scale
2. Use z-axis to draw views up
9. Use the path as the director of the experience

7 VALLEY VIEW

Once beyond the southern rim of the bowl, past the towering oaks, visitors are met with an expansive view of greater Eugene, the Willamette River meandering past, Mount Pisgah rising from the ground, and the flat valley giving way to foothills and mountains. This is the view people, since time immemorial, have seen from the top of Springfield Butte. The rim path spills out onto a simple outlook structure anchored into the rock, allowing the sweeping vista to take center stage.

PRINCIPLES:

ELEMENTS:

DESIGN GUIDELINES:

6 Include / Exclude enclosure to evoke immersion

8 Prioritize the scar and the view as monuments

10 Break path constraints into the matrix to create focal moments



8 REFLECTION

The cliff face in the southwestern corner of the site is the oldest mining scar on the butte, seen on aerial imagery from 1960. Today, the rock face is framed by large Douglas Fir trees, and the localized depression is a catchment for rainwater and runoff. This location is perfectly nestled for an intimate, tranquil moment in nature, where visitors end their loop around the butte. They can choose two different paths: walk up the stairs to see the rock face head-on and the pond from above, or follow the path straight to see the pond below their feet. Visitors connect with their surroundings from non-traditional vantage points and appreciate the regeneration seen before their eyes.

PRINCIPLES:

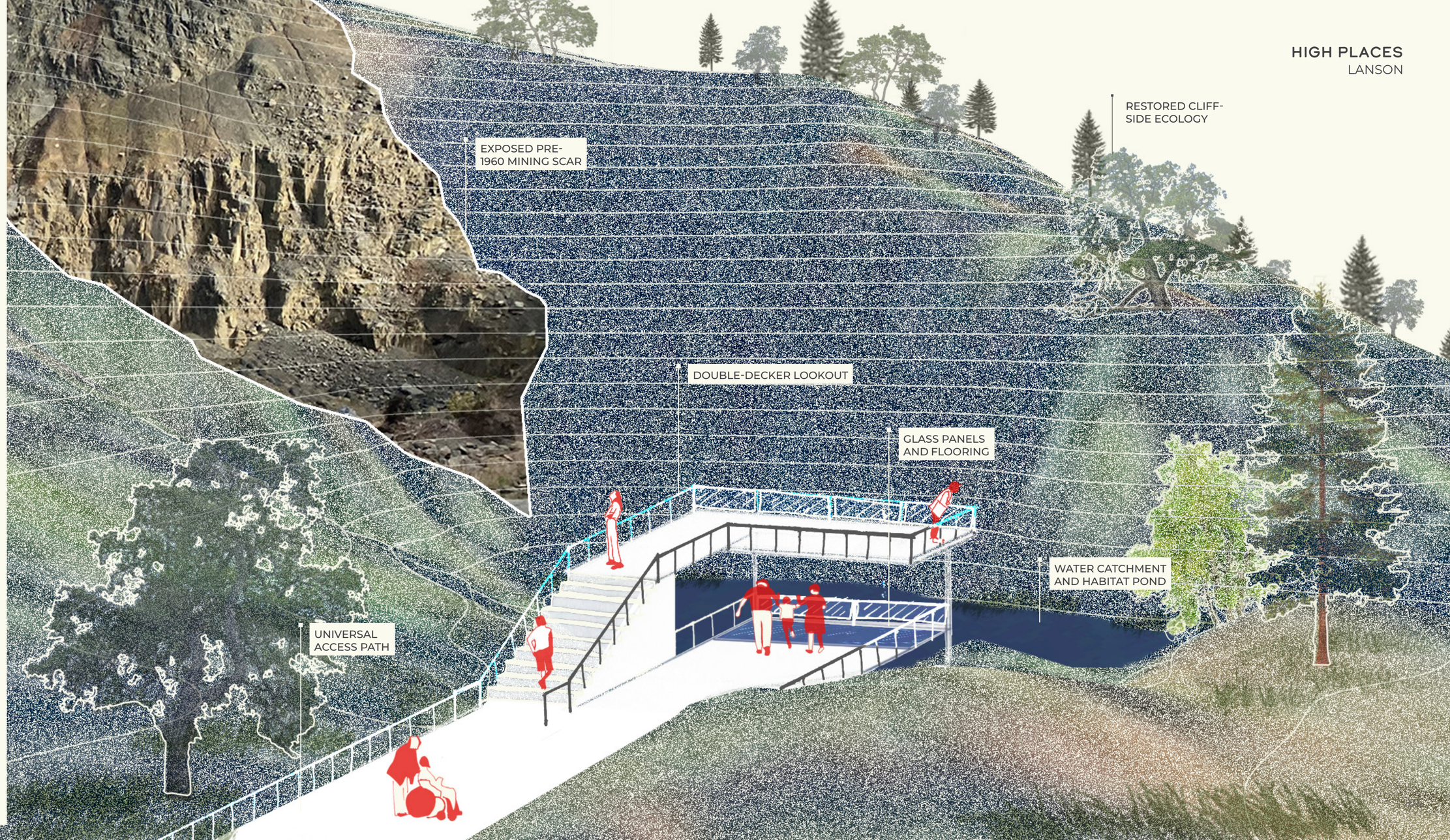


ELEMENTS:



DESIGN GUIDELINES:

1. Prioritize verticality and immersion
3. Use z-axis to draw views up
5. Encourage movement on the Z-axis
7. Leave the matrix alone
8. Prioritize the scar and the view as monuments
9. Use the path as the director of the experience
10. Break path constraints into the matrix to create focal moments



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[6]AllTrails.Com. n.d. “Photos of Skinner Butte and South Bank - Oregon | AllTrails.” Accessed May 16, 2026. https://www.alltrails.com/trail/us/oregon/skinner-butte-and-south-bank-loop/photos.

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[8]Divisare. n.d. “Arkís · Viewing Platform.” Accessed May 16, 2026. https://divisare.com/projects/334795-arkis-viewing-platform.

V. CONCLUSION

NOW WHAT



Photo of Springfield Butte by Kevin Shanley.[1]

CONCLUSION

In the Willamette Valley, charismatic landforms are disappearing without any meaningful way to remember what has been lost. Aggregate extraction continues at an accelerating rate; buttes are being marred and flattened, yet memorialization is not yet standard practice in mine reclamation. Altered landscapes become disconnected from public memory.

High Places emerges from the belief that these landscapes deserve acknowledgment not only as material resources but also as places of identity and value. This project provides preliminary answers to where mining is occurring in the Willamette Valley and to what extent. Based on established techniques used in landscape memorials and quarry parks, landscape architects can begin to imagine physical reclamation strategies that help people experience and remember loss rather than erase its traces.



Jenna Krueger on Mount Pisgah with Springfield Butte in distance.

GENERAL REFERENCES

INTRODUCTION PHOTOGRAPH SOURCES

[1]Bauguess, John. *Mining Parvin Butte.* Photograph. 2011.

[2]Krueger, Jeff. *Krautman Hill*. Photograph.

[3]Krueger, Jeff. *Peterson Butte*. Photograph.

4"Skinner Butte Trail - Outdoor Adventures - Hiking (2293) | Eugene, Cascades & Coast." n.d. Accessed May 16, 2026. https://www.eugenecascadescoast.org/listing/skinner-butte-trail/2293/.

CONCLUSION PHOTOGRAPH SOURCES

[1]Krueger, Jeff. *The Valley from Springfield Butte*. Photograph.

[2]Krueger, Jeff. *Jenna on Pisgah*. Photograph.



In the altered buttes of the Willamette Valley, *High Places* finds an opportunity to remember, proposing mine reclamation as memorial—designing landscapes that recognize what has been lost.