The Urban Floodscape: Revealing, Carving, and Placing the Historic Klingle Ford Road

Lama Hasan
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Abstract

When we think of floods in the urban environment we also think of damage. We continuously rebuild our infrastructure to alleviate any damage. Although erosion and flooding can be detrimental to our environment, a by-product of the damage is wild nature, offering health and mental benefits and possibly the key to understanding resiliency. Consequently, our perception of nature changes when it pervades our urban environment, becoming a nuisance. As we face rising water levels and urbanization our infrastructure is falling apart more frequently and the role of the landscape architect in designing infrastructure is crucial.

How should we design our infrastructure knowing that it will be reworked by water and reclaimed by nature? The thesis proposes the re-design of a road that has been closed several times due to severe flooding and erosion. The road sits within a steep valley in Washington D.C. and acts as the Southern boundary for Rock Creek Park. A creek runs alongside of the path, and the moments of collision are the least accessible to both people and water. The thesis explores the processes of material erosion and deposition, and the movement and power of water and asks: can the process of damage be used to create a more durable path that will enhance connectivity for both water and people? With the goal of enriching the experiential quality of nature in the city, the proposed design exposes the underground processes of water and translates its pattern of movement into a design that reveals, carves, and places a new pedestrian path/dam system that emphasizes the tremendous wildness of stormwater.

Keywords: Flood, Erosion, Reclaim, Path, Landscape
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Dedication

To the many strange and passionate trespassers I met while visiting the abandoned Klingle Road, your opinions really helped shape my thesis. I hope some rendition of your visions become a reality.

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INTRODUCTION:  THE THESIS

To address these challenges, the goal of the thesis is to preserve and enhance pedestrian and water passage from the National Cathedral to Rock Creek Park through creation of a pedestrian ford, comprised of a path-dam system—a series of traversable dams based on the natural processes of the site and how it has and will change over time.

Based on intensity of damage to materials, four distinct moments of collision between the road and water are found, challenging the existing road alignment. The four moments become opportunities to discover the power of water and the natural processes of erosion. The criteria are based on study of dominant patterns of material erosion revealing strengths and weaknesses of both natural and built materials, and the patterns of water. By predicting patterns of water movement—riffle, scour, deposit, and the dominant erosion types—rills, deposition, gully’s, sheet flow, occurring from the upper more urban reaches of the road, to the wet and wild lower reaches, the design emerges by mimicking these processes and simply revealing, carving, and placing existing materials on site.

The thesis project challenges Washington D.C.’s tradition of diverting water into culverts and pipes. It exposes the underground processes of water and the erodible qualities of existing materials in a way that is accessible and engaging through a set of parts based on study of materials, water, and the process of material erosion over time.

The thesis also challenges the methods of research by the civil engineers at the Department of Transportation in Washington D.C. and the horticulturists at the National Park Service, seeking to find a place for landscape architects to intervene in developing infrastructure that preserves and enhances both human and water passages.

A simple walk in Washington D.C. and Alexandria reveals how nature interacts with our built materials. We consider this a nuisance, a mark of abandonment on our otherwise meticu- lous hard surfaces, so we continuously rebuild and collect water underground as quickly as possible as to not dam-age the paving. Rapid urbanization and increasing 100-year storms are causing our materials to fall apart more frequently and nature claims our urban surfaces. Through daily ad- ventures, case studies, and studying the relationship of the wild and the city and its evolution over centuries amongst scholars, it is evident that weeds and the process of dam-age in our paving are representative of nature. The constant demolition and reconstruction of infrastructure is viewed as a nuisance but what emerges are micro-ecosystems that are dependent on movement and eroded material that are essential for our devel- opment, offering infrastructural and engagement opportuni- ties. What should we do when a place is reworked by water and reclaimed by water, essentially falling apart?

In studying the history of the watershed and the road, and documenting soil and vegetation types, it is evident there is a division between more Coastal and urban conditions in the upper reaches, and the rocky Piedmont and forest conditions encroaching the Rock Creek, presenting challenges in main- taining a road. A majority of the road also sits in the 100-year flood zone and has been rebuilt several times collecting a pallet of materials that are sedimenting the stream.

The thesis explores the abandoned Klingle Ford Road in Washington D.C., an official city road that is also a threshold and historic boundary for Rock Creek Park, and the only re- maining Ford road. Out of commission for 30 years because of severe flooding, over half of the road acts as a stream bed for the storm-water creek that is adjacent, and the city has long debated whether to rebuild a vehicular road belonging to the city or a wilderness trail belonging to the National Park Service. The project explores the potential of a pedestrian ford road, a road that allows accessibility and flooding, and captures the processes of erosion and deposition as both design tools and interactive moments for people to witness.

In studying the history of the watershed and the road, and documenting soil and vegetation types, it is evident there is a division between more Coastal and urban conditions in the upper reaches, and the rocky Piedmont and forest conditions encroaching the Rock Creek, presenting challenges in main- taining a road. A majority of the road also sits in the 100-year flood zone and has been rebuilt several times collecting a pallet of materials that are sedimenting the stream.
A City Wild

Natural forces such as wind and rain have caused the built materials composing our cities to erode. The process of wearing away, transporting, and placing the earth’s surface results in spectacular land formations, such as river valleys and mountains, as seen in our National Parks. While erosion, weathering, and moves material, the deposition creates new places, and a new process of natural reclamation begins.

Within the urban context, erosion is responsible for damaging our infrastructure. Weeds claim cracks of concrete and host rodents and bugs when left alone, and we continuously replace infrastructure to keep our built environment pristine. Natural processes take form as patches of neglect and are considered a nuisance (Spirn).

Nature can be a powerful resource for shaping a beneficial urban habitat, but if ignored it can magnify problems such as floods and landslides, and poison air and water. Cities have mostly neglected and rarely exploited the natural forces within them (Spirn), and with rapid urbanization and increasing climate change our cities are falling apart more frequently. Notable Landscape Architect, Ian McHarg viewed human life as being “bound up with the forces of nature, and that nature, so far from being opposed and conquered, must rather be treated as an ally and friend, whose ways must be understood, and whose counsel must be respected.” He critiques modern technology through its rash and unthinking applications of scientific knowledge, as having ruined the environment, lowering its habitability (McHarg).

Processes of nature, particularly through erosion and deposition, show the ability of ecosystems to recover, reorganize, and adapt in the face of regular change. It is critical to their survival. The essence of this primordial ability is resilience. (Lister) How can we use the process of erosion and deposition to rebuild places so that it becomes more dynamic and resilient when they inevitably fall apart.

EPILOGUE:

TO BE OR NOT TO BE

As a kid, the hot Middle-Eastern desert was my favorite playground. Seeking to find the biggest hills, and marking paths with rocks and sticks, I instinctively searched for souvenirs (fossils and crystals) to take home from my adventures. Simple waywardness caused a sense of discovery and fulfillment, igniting a questioning of my odd surroundings and the colliding cultures of the American Compound and the Saudi Arabian land. As I would step back onto the sidewalk after completing my hikes, I felt a clear disconnection from this wild. In the broadest sense, I am passionate about the transcendental qualities revealed through the interactive nature of our histories, cultures, built materials, and nature.

We gravitate towards extraordinary experiences, such as hiking vast forests, sitting on top of fog enveloped mountains, watching waves crash on sandy shores, or walking through deserts with infinite views and apocalyptic sunsets. Adventures provide metaphysical, aesthetic, physical, and spiritual meaning to our lives.
Issues Defining ‘The Wild’

Landscape architects have the skill to craft infrastructure that allows us to access and experience nature. In national parks, trails are designed with inherent site-specificity and connect us to nature as they strategically wind and carry us through ecosystems. Why isn’t this sentiment and care for natural processes being carried into the urban environment? Time and time again, ecologists have stated that our perception of nature is the root of the problem.

Ecologist, Joan Nassauer says that “we live with the very real artifacts of cultural conceptions in the landscapes that make up our everyday experience. Every park, shopping center, field or highway connotes our cultural conception of nature.” She further states that “the landscape patterns that now are familiar to us in North America tend to isolate nature from settlement (Spirn).” This dualistic view of the wilderness and city has existed for centuries, and it is evident by the nature we choose to have in our cities.

Green Area Ratio (GAR)

Ann Whiston describes in her book Granite Garden that our cities “merely incorporate the trappings of nature, like trees, lawns, gardens, and lakes, but are built with as little regard for the processes of nature as the old cities (Spirn).” Although ecological thinking has become more holistic, the perception of artifice in nature as an invisible guide, and nature disrupting infrastructure in the city is dualistic, as shown by the gaps in our infrastructure typologies and green policies. According to Local Governments for Sustainability (ICLEI): Sustainability is “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” Although green policies are being put in place such as the Green Area Ratio (GAR) to embrace sustainable practice in Washington D.C., it neglects to focus on the future through little understanding of ecological process. The GAR in Washington D.C. is a zoning regulation that assigns an environmental value to landscape elements. This value allows landscape elements to gain a higher score per associated square foot with greater environmental value. Each landscape element multiplier is assigned its value against a range of benefits such as climate adaptation, urban heat island mitigation, air quality improvement, and storm water mitigation. The point-system caters to instant gratification however, higher caliber = more points. A higher caliber tree has a less certain future.

Reclaiming reclaimed land

In reclaiming and reoccupying lands laid waste by human improvidence or malice ... the task is to become a co-worker with nature in the reconstruction of the damaged fabric” said George Perkins Marsh, Man and Nature (1864). Our role as landscape architects is to incorporate ecological function into designing our cities.

The thesis explores the infrastructural design possibilities that arise from the process of nature reclaiming our urban infrastructure and encourages the process of reclamation, while offering us a deeper connection to nature and its extraordinary qualities.

Benefits of nature reclaiming urban materials are...

- Habitat formation
- Discovery
- Place Making
- Health for people, both mental and physical
- Engagement
- Accessibility
- Material adaptability, less maintenance

Project Development Approaches...

1. LOOK - foster engagement and discovery of wild processes on a daily basis
2. LOOK BACK - address evolving definition and design practice for “wild”
3. CASE STUDIES - understand the essence of the wilder ness experience in an urban environment.
4. DESIGN APPROACH - design goals and criteria.

“If we acknowledge the distinction between ecological function and natural appearance, we can begin to critically analyze the cultural language of naturalness and use it as a language to intentionally communicate ecological function.” - Joan Nassauer (Nassauer)
Time: Initially, 30 minutes was chosen as the extent of travel time because it was a duration that could be easily adapted into a daily routine, walk 30 minutes then snap a picture of natural processes occurring in urban places. After several weeks the method evolved into hour long walks and series of images documenting adventure, exploring and taking pictures became a process of looking and discovering.

Discovery: At first, the majority of images were installations, sacred spaces, urban parks, waterfronts, and entrances. Because of the 30 minute limit I focused on reaching a destination to highlight the diversity of destinations within a 30 minute radius. Later, and without a strict 30 minute limit, the pictures became a documentary on natural processes. Although they seem less thrilling, the photos still document extraordinary behaviors: a thriving ecosystem growing within the cracks of concrete, leaf prints along the sidewalks of Prince Street, juxtapositions of explosive seasonal color palettes and pedestrian hardscapes. The series documents a variety of relationships between nature and built materials.

The take away from the adventures is that the experiential qualities of a dense forest and hilly desert share the same processes and experiential elements to cracks in sidewalks. They both undergo erosion through wind and water. Within the cracks there are micro-ecosystems. We just have to notice.

"In understanding the nature of cities it is necessary to think beyond our usual approach to visualising or imagining space and place, and to understand that nature is everywhere in cities if we look: it is above us, flying or floating by, it is below our feet in cracks in the pavement, or in the diverse micro-organic life of soil and leaf litter." - Tim Beatley, Biophilic Cities

Diagram of Olmsted’s Principles Applied to Looking at Urban Landscape

Biophilic Cities Project, led by Tim Beatley at University of Virginia, proposes that people would benefit from consuming a “minimum daily requirement of nature (Biophilic).” To discover and capture the essence of the wilderness experience in the urban environment of Old Town Alexandria and Washington D.C, and parts of Baltimore, a series of daily walks, runs, or drives was conducted.
My research of the wild and its relationship to the city begins with an infamous quote “In the wilderness lies the preservation of the world,” written by Henry David Thoreau. In attempting to answer the question “what is wilderness?” the duality of city and wilderness comes to light, repeatedly presenting a paradox: The sacredness of wilderness and the need to preserve it has been expressed by humans over centuries, separating it from us. (Cronon)

For centuries notable figures in the field of ecology have stressed the importance of the wild for our development. However, there has been an evolution of thought about what the wild is, and what the relationship is with humans. To better understand the meaning of wilderness, the tour highlights how notable figures defined the interface of the wild and city, natural processes, artificial materials such as infrastructure, and our role as transformers of nature. (My exploration of the past used several key words to better understand the meaning of wilderness, the tour highlights).

The tour awoke my curiosity: “In the wilderness lies the preservation of the world.” (Cronon).

For centuries notable figures in the field of ecology have stressed the importance of the wild for our development. However, there has been an evolution of thought about what the wild is, and what the relationship is with humans. To better understand the meaning of wilderness, the tour highlights how notable figures defined the interface of the wild and city, natural processes, artificial materials such as infrastructure, and our role as transformers of nature. (My exploration of the past used several key words to better understand the meaning of wilderness, the tour highlights).

Inherent balance between social-cultural, economic, and ecological domains that is necessary for sustainability. The environment is described as an elaborate system in which human activities within the environment, rather than economic, cultural, learning processes, basically does not discuss a material approach to design, but demands a different approach to design, planning, and management. It provides capacity to refocus our energies on those human activities that significantly altered through habitat fragmentation, ecological structures and functions are often unpredictable, dynamic, and adaptive, and are significantly altered through habitat fragmentation, ecological structures and functions are often unpredictable, dynamic, and adaptive, and are predictable and simplification. It requires intensive management, for designers in the field, it is entirely outside the natural.

A paradox: The sacredness of wilderness and the need to preserve it has been expressed by humans over centuries, separating it from us. (Cronon)

The ability of ecosystem to recover, reorganize, and become a co-worker with nature in the reconstruction of the damaged fabric. In employing the central concept of resilience, I am employing a dualistic system in which the human and natural environment is described in a dualistic system in which the human and natural environment is described.
Henry David Thoreau, American poet, philosopher, and naturalist viewed wild and the city as two separate but equally beneficial influences. For Thoreau wilderness was a reservoir of wildness, which is “essential in keeping the spark of the wild alive in humanity.” (Wilderness) He states that the wilderness is beneficial “chiefly for its intellectual value.” He also recognized its necessity to our physical health and creativity. “For beauty, the poet must, from time to time, travel the logger’s path and the Indian’s trail, to drink at some new and more bracing fountain of the Muses, far in the recesses of the wilderness.” (Walden)

Thresholds:
Thoreau neither rejected civilization nor fully embraced wilderness. His appreciation was primarily for meadows and pastoral lands because of their natural history, beauty, and the human activity involved in their creation. An “optimum existence” is one that should alternate between wilderness and civilization, “or if necessary for permanency to choose partially cultivated country.” (Thoreau)

Approach:
“Perhaps these great pine roots which grew in a swamp were provided with some peculiar quality by which to resist the influence of moisture and so endure the changes of the weather (Thoreau’s).” He developed long-term preservation plans for each woodland, based on understanding the environment and history of the individual site, the composition of tree species, and close observation of the current abundance of regeneration by seedlings and saplings.

Materials:
Parameters enhance the cultivated meadows both visually and diversify plants. Stonewalls added structure to the countryside. From valley bottom to hillcrest, fences of various kinds break the undulating landscape, harboring the diversity of plants and acting as habitat for seeds and prey. “It is only necessary that man should start a fence that Nature should carry it on and complete it (Foster).” Thoreau recognizes how a built structure can contribute to the natural process and also emphasizes nature, recognizing the material makeup of fences as being the same wood as the surrounding trees.

Role:
Thoreau studied our influence on the wild as being the most transformative. “I have no doubt that a good farmer, who, of course, loves his work, takes exactly the same kind of pleasure in draining a swamp, seeing the water flow out in his newly cut ditch, that a child does in its mud dikes and water-wheels. Both alike love to play with the natural forces (Foster).” In studying humanity’s role in nature, Thoreau idolized the farmer because they transform and maintain land routinely. “The farmer increases the extent of the habitable earth. He makes soil. That is an honorable occupation.” (Foster).

Humanity’s interaction with nature as being a “Farmer.” Thoreau on best optimal interaction with nature as being daily, and working with land. (Walden)

An “optimum existence” is one that should alternate between wilderness and civilization. Thoreau on optimal living conditions. (Walden)

“It is only necessary that man should start a fence that Nature should carry it on and complete it.” - Thoreau on materials. (Walden)
Frederick Law Olmsted shared Thoreau’s value of the wilderness as an uninhabited retreat necessary for the mind, body, and soul to flourish. In commissioning Yosemite, he emphasized its preservation because he felt it was essential for people to feel a connection with wild natural landscapes; “to be in a place surrounded by "natural scenery" promoted human health and welfare.” (Cronon)

Threshold:
The idea of planning became more important as he realized the inorganic form of the city and its juxtaposition with nature. Olmsted stressed the importance of contrast, from inside of the park to the outside, by having topographic thresholds and enclosed spaces.

Approach:
Olmsted shared Thoreau’s appreciation for the pastoral, but he used the pastoral as a tool of design in the city. “Olmsted successfully matched the form of the landscapes he designed to the rhythms of nonhuman processes and the spatial structure they created, and he planned within a frame of time and space appropriate to the processes involved.” (Spirn) This required some sense of city planning; he defined every project as comprehensively as possible. He envisioned how “trees, shrubs, grasses, and flowers that he caused to be planted would grow, produce and nurture other plants, live, and die, and how water, flowing through the channels he molded, would modify further the shorelines he shaped.” In Uncommon Ground Spirn writes an article about reclaiming Olmsted’s designs, and critiques Olmsted’s use of artifice, “He disguised the artifice so that ultimately the built landscapes were not recognized and valued as human constructs.” (Cronon)

Materials:
Olmsted used paths and rolling topography to capture the scenery of the wild. In Yosemite, he used a 40-mile long poor dirt path to frame views (Cronon). “There was recognition of human and nonhuman processes working together on a biological and physical level in Olmsted designs - Dredging, grading, planting, pruning, tending (Cronon). “ He would take large areas as public parklands and weave them, by street systems and public transport, into the city fabric. Olmsted sought to reconcile reverence and use; he did this through the art of design. Olmsted also discusses biodiversity in considering elements of the wild. Olmsted says that the character of land to support animals would be “pastoral, with trees sparsely distributed, and having broad stretches of rich greensward” (Cronon).”

Role:
The Boston park system features elaborate schemes of parks and boulevards which remain intact on a large scale, but subtle changes in infrastructure and artifice, such as overpasses, wider highways, vandalism, mismanagement due to changing scale- have been effective in breaking the continuity. The aspect of sustainability and management, particularly of infrastructure, becomes a much bigger deal with less emphasis on design.

Humans are Co-workers with nature (Cronon)

“ ‘To be in a place surrounded by “natural scenery” promoted human health and welfare.’” (Cronon)

“He disguised the artifice so that ultimately the built landscapes were not recognized and valued as human constructs.” (Cronon)
She suggests that incremental change through small projects is often more manageable and adaptable to local needs and values. When coordinated, incremental changes can have a far-reaching effect. As concurrent with her thoughts about links and connections created from the nature city overlap, her design approach is that everything should be designed both as a system in itself, as part of a larger district, and as a tiny piece of the overall metropolitan ecosystem.

Biodiversity is brought up as a result of these links, the introduction and encouragement of "desirable" wildlife is largely dependent upon the preservation and creation of habitat. Stream valleys and railroad rights of ways link the city with its surroundings and permit penetration of wildlife into the city, such as Rock Creek Parkway winds itself through Washington D.C. (Spirn).

**Threshold:**
In her book, Granite Garden, Ann Whiston Spirn describes the "wild" as the nature that pervades the city, "forging bonds between the city and the air, earth, water, and living organisms within and around it." She recognizes the function of the wild vegetation in the city as she goes on to describe how it can magnify problems such as floods and landslides, poisoned air and water. She criticizes cities for having mostly neglected and rarely exploited the natural forces within them and explores the potential of regenerative design. According to Spirn, cities view the wild emergent nature as a nuisance that attracts rodents; it represents places of neglect and abandonment.

**Approach:**
"It is a system sustained by massive importation of energy and materials, a system in which human cultural processes create a place quite different from undisturbed nature, yet united to it through the common flow of natural processes." (Spirn)

**Materials:**
In terms of a city’s form, the composition and extents are created and determined by natural forces, all the material that built the city make up the surrounding mountains and trees. Spirn notes the interactions between human activities and the natural environment as producing an ecosystem very different from the one that existed prior to the city.

**Our Role:**
Spirn speaks about the cultivated nature in the city as small urban parks with formal gardens and large urban parks with clipped lawns and scattered trees that offer little security from predators and a narrow range of plants as a food source. "Nature in the city must be cultivated and integrated with the varied pursuits and purposes of human beings; but first it must be recognized for its power to shape human enterprises appreciated (Spirn)." Spirn emphasizes the importance of understanding the potential of the wild vegetation in the city in order to use it for our benefit.

Humanity’s interaction with Nature as Mechanics (Spirn)
Incremental change through small projects (Spirn)
“Everything should be designed both as a system in itself, as part of a larger district, and as a tiny piece of the overall metropolitan ecosystem.” (Spirn)
Threshold: According to Large Parks, Nina Lister recognizes the complexity of the wild and civilization; they are not separate but part of one complex ecosystem. Ecology is seen now as dynamic systemic change with phenomena’s of adaptability, resilience, and flexibility, these are all factors that are emerging in contemporary design - adaptive design, as shown by James Corner’s approach to Fresh Kills. “Adaptive design recognizes that ecosystems are subject to sudden but regular periods of dynamic change that are unpredictable to a certain degree. The complexity of the wild has created a complexity in approaches (Czerniak).

Approach: Biodiversity could be considered analogous to a library of information (some recorded long ago, and some only now being written) that provides a wide range of possible pathways for the future development of life and also learned responses to environmental change and disturbance (Czerniak).

Materials: There is not much discussion about a material approach to design, but rather economic, cultural, learning process, basically a diversity approach. Design continues to emulate an ecologically deterministic model of nature. Ecological design on the other hand is usually approached as a means to mimic, model, and replicate nature’s processes and functions. The problem with this is that it implies little room for a more creative design practice allowing for synthesis with human culture, aesthetics, and ingenuity; essential when considering integration into urban space (Czerniak).

Our Role: Because of the spontaneity of wilderness, our interaction with it is more managerial, the scale of the natural experience becomes even larger with an emphasis on creating habitats and connection of habitats. The individual becomes a link of many. The categories get more complex and overlapping in the understanding of wilderness over time, the sites have become larger and are on abandoned sites, which ties into sites that have a lot of developmental history, such as Brownfield’s.
As shown by the literary review, not only does the wilderness evolve from a place to a phenomenon, the meaning of threshold, methods, materials, and the human role in nature also develop, reflecting more complexity and process. Through careful study of past literary characters, it is clear that the perception of wilderness has evolved from a place, to areas that need to be preserved, to a pervading element, and now a phenomenon. The cultural importance of the wilderness has changed with time, from a necessity to our health to a need to be managed to keep from causing destruction. Olmsted and Thoreau stress the aesthetic beauty and metaphysical quality of wilderness by attempting to capture it through the “picturesque.” Both figures stress that the wilderness is significant for our psyche, intellect, and development and need to be preserved. As the conversation about wilderness reaches the 20th century, the idea of preservation shifts to the wild becoming harmful to our cities if left abandoned and unmanaged. These elements offer untapped potential for resiliency to preserve ourselves allowing for more growth. The discussion of materials becomes more ecological and economic as Lister and Spirn discuss replication of nature’s processes and functions, and mimicking to tap into resiliency. This discussion overall has emphasized that wilderness was a place and it is now a catalytic, in terms of threshold, materials, design, and our roles.

Thoughts on wilderness have evolved from being a place that needs preservation and a refuge from the city, to a process that attacks and pervades our urban surfaces, to most recently an integral part of an all-encompassing eco-system. Designing nature within the city, for the most part, does not need preservation and a refuge from the city, to a process that attacks and pervades our urban surfaces, to most recently an integral part of an all-encompassing eco-system. It should also include natural and built materials, as did Olmsted. Finally, best practice should incorporate the daily working of the land as a mechanical entity and holistic approaches (integrative), between reductionist (nature can be counted and measured, largely an integral part of an all-encompassing eco-system. Designing nature within the city, for the most part, does not embrace the changing definition of wilderness from a place to a process and remains dualistic. The search for “thresholds” through the literary works was a process as a way of design and management. Not only does the meaning of preservation become more encompassing and complex, but so does the threshold of nature and cities. The search for “thresholds” through the literary works was a process as a way of design and management. Not only does the meaning of preservation become more encompassing and complex, but so does the threshold of nature and cities. A figure shows the different green zoning policies, and large-scale design v. small urban parks, as discussed in large parks.

The chart below demonstrates how each notable character thought, designed, and discussed our role with nature. Best practice should incorporate the detailed analytical thinking of Thoreau and Lister, which include the benefits of the wild mentally and developmentally as well as recognizing its dynamism and potential for resiliency. It should also include designing with the site and recognizing the importance of natural and built materials, as did Olmsted. Finally, best practice should incorporate the daily working of the land as stressed by Thoreau, and managing from a far and setting up conditions to allow for habitation, as Lister stresses.

Conclusion:
Thoughts on wilderness have evolved from being a place that needs preservation and a refuge from the city, to a process that attacks and pervades our urban surfaces, to most recently an integral part of an all-encompassing eco-system. Designing nature within the city, for the most part, does not embrace the changing definition of wilderness from a place to a process and remains dualistic. On the small-scale it’s determinist, incorporating only the “trappings of nature,” as demonstrated by the Green Area Ratio, and holistic on a large scale. How can we apply the main goals of these notable figures to create an approach for nature of all-scales in the city? What do present day nature and city relationships look like?
The case studies are a combined exploration of both the questions derived from the literature review and my daily adventures. Where are the juxtapositions of nature and city? What do these relationships look like?

I have explored four past case studies, in each city I walked along one path and discovered different conditions. In Irvine, the interface between the wild and urbanized, nature in both realms is treated entirely different. The threshold between these dualities is represented by paths and our movement through them. My next case study was Georgetown Waterfront Park, where I zoomed into a threshold and studied an abandoned and underutilized area under the Key bridge and discovered weeds and aged materials. With an interest in the weathering process of materials, I visited the Alexandria Waterfront to analyze the interface between materials and water. Finally, I ended up at Rock Creek Park to understand jurisdictions and management conflicts within the wilderness and urban threshold.

Through the writing of these studies I have discovered an interest in hybrid landscapes created and enhanced through the interaction of wilderness and the urban world, or the built and unbuilt, and the desire to stage, preserve, and enhance these processes within an urban city.

CASE STUDIES OF NATURE IN THE CITY:
THRESHOLD, DESIGN, MATERIALS, MANAGEMENT

IRVINE, CALIFORNIA

Irvine is promoted as the largest planned community in the nation. It’s a fast growing rural suburb turned edge-city in Southern California. Lying between Loma Ridge in the north and San Joaquin Hills in the south, Irvine’s landscape is comprised of several hills, plateaus and canyons and stands out among other cities because of its preservation of these landscapes. Many people move to Irvine for the simple reason that they want to be close to nature. (Cronon)

The zoning map shows two distinct categories: city and wild. As a client to the high-end Irvine Company, Irvine is reputable for its pristine paths, perfectly manicured lawns, and grass-heavy parks. William Cronon states that “Orange County is a place so constructed that it verges on becoming still another form of nature.” Contrasting from the large dry patches of natural riparian sites, preservations host a wide variety of wildlife, “snails are an example of one element that escape that automation and control, and is essentially nature doing its own thing instead of what planners had planned…because they didn’t fit the plan, they somehow seemed more natural (Cronon).” There is very little overlap between the two groups, “preserving” has created a duality in designing nature and the city separately. However, in several areas of overlap, the most industrial areas also become wildest offering a middle ground for both wildlife and humans and sanctuary to several species.

The first image shows the Turtle Rock wilderness trail overlooking a neighborhood reservoir, and the next image is a waste-water treatment plant and wildlife sanctuary. The Irvine Ranch Water District provides domestic water service, sewage collection and water reclamation to the city of Irvine and surrounding areas, it’s also known as the San Joaquin Marsh & Wildlife Sanctuary, the marsh encompasses over 300 acres of coastal freshwater wetlands, half of which have been restored to a natural state within bustling Irvine, it attracts over 200 species of birds. The discovery is that nature will reclaim any area, so rather than preserve or protect ourselves from the wild, we should allow the overlap in use so we can how different sites become reclaimed begin to recognize the benefits of complex and layered landscape experiences.

+ Overlapping USEs can create layered experiences that are more productive.
Building New Places

What hybrid ecosystems are being created through interaction of city material with the Potomac River? Through a variety of diverse interactions along the trail due to material use and design techniques, the question of what is possible and optimal is now being explored in my thesis. Image 1 highlights water and concrete interaction. The concrete is highly maintained, yet signs of weathering are present in the Potomac River. Through a variety of interactions along the trail due to material use and design techniques, the question of what is possible and optimal is now being explored in my thesis.

The conditions begin to get wilder in front of Windmill Hill Park in image 2. Soil and water meet and roots begin to form along the trail. The conditions begin to get wilder in front of Windmill Hill Park in image 2. Soil and water meet and roots begin to form along the trail. The conditions begin to get wilder in front of Windmill Hill Park in image 2. Soil and water meet and roots begin to form along the trail.

Following the trail into a boardwalk, which is a dead end and not part of the trail, you are taken to a waste-management site in the water. The boardwalk is rundown, but it seems the presence of waste at this illegal part of the site has created beautiful and abundant amounts of one species of tall grass in the water, where this vegetation has not yet been seen along the run and is creation of waste and water.

The final stop along my run is James Point Lighthouse. Because of the receding land over the centuries, a series of riprap has been placed to preserve the history. The riprap (boundary stone, as designated by the signs) in front has aged significantly and the materials in the water have become muddier. Grasses are growing closer to the house, behind newer additions of riprap. The picnic table has become a constant, during high tide the land disappears but the table is still visible. By seeing so many diverse interactions occurring between the built and the unbuilt, I am questioning what context is optimal for both existences and how to build new land.

+ Water will build or destroy land in a variety of ways, depending on material and alignment. The tide creates temporary spaces.
In terms of managing the park experience, different priorities affect national park management than they did historically. "One reason for this is that many of the parks are completed in the sense that the planned extent of roads, villages, and other facilities has been reached (Carr)." With the introduction of planning and master plans, future generations of landscape architects, and the increasing scale of parks, the parkland inclusive of its circulation, is not designed as much as managed.

In designing Rock Creek Park, Frederick Law Olmsted said "the dominant consideration...in dealing with Rock Creek Park, is the permanent preservation of its wonderful natural beauty, and the making of that beauty accessible to the people without spoiling the scenery in the process." (Splisbury). The paths are second in consideration to the scenery and beauty of the park, they are just as essential in enhancing our experience as they are in preserving it (Spilsbury).

In considering the history of the roads, we must look at their original design. For Olmsted, preserving a place through its development as a park required well-designed roads, marked trails, sanitary facilities, and permanent campgrounds – otherwise the damage caused by tourists was greater. Some of the present issues Rock Creek Park is dealing with are border encroachment as the park is growing, storm water runoff contamination and road flooding, closing down some thresholds into the park that are heavily used by cars. Roads are becoming more congested leading to the issue of traffic becoming the biggest issue and debate. This is a very complex issue to deal with, particularly because there is a polarity in management approaches that has evolved from the establishment of the park in 1918.

“There was no effective national park policy (Carr),” management approaches were heavily argued. The main positions were whether the site should be used for cultivation, in the form of logging, grazing, and damming. The opposition argued that these activities should not occur in the national parks and that tourism would create economic activity and a sense of national pride. Both sides created a “dual” or “contradictory” mandate that established the National Park Service within the Department of the Interior, “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for future generations (Carr).” This dual philosophy, that represents the holistic or reductionist approach still exists within the department and creates many debates on what to do with future parts of Rock Creek Parkway.

The case studies started as an exploration of juxtapositions of nature and the urban environment, but the discovery came from exploring the role of infrastructure in nature and opportunities of damage. Although this constant deconstruction of infrastructure is viewed as a nuisance what emerges are micro-ecosystems that are dependent on moisture and eroded material that are essential for our development, offering infrastructural and engagement opportunities.

The juxtapositions of nature and the urban environment are demonstrated by overlapping uses in Irvine, revealing the potential for richer experiences. Leaving the under utilized lot under Key Bridge allowed for new species to form. Several materials have interacted with the Potomac River to create unique places along the Mt. Vernon trail. Finally, the dual nature of designing roads in National Parks, such as Rock Creek Park, plays a major role in both preserving or destructing nature. The transformation of infrastructure over time also plays a role in attracting greater populations, however resisting natural topography as they widen to accept cars.

The adventures, literary tour, and case studies aimed to reveal the dualistic tendencies of designing nature, and challenge them by revealing the benefits of their juxtapositions. While nature exemplifies existence in its long-complex process with cause and effect, we are spontaneous and live and experience life in series of moments. Areas that are abandoned, neglected, and unzoned surrender to nature’s timeline; the juxtaposition of our processes could create hybrid landscapes.

How should we design our infrastructure, knowing that it will fall apart when a place is left alone and becomes reworked by water and reclaimed by nature?
FINDING THE SITE: A SEARCH FOR COLLISION

The Project:
In a recent blue urbanism conference, firms from Copenhagen, NY, and D.C proposed revealing underground infrastructure as storm water management. I asked how they “expect people to react to what is essentially an open gutter,” and one speaker answered “but it’s a sexy gutter…” and that’s what the thesis project is about; exposing the underground processes of water in a way that is accessible and engaging.

Klingle road was an important access road and border for Rock Creek Park, but also belonged to the city. The road has been washed away and out of use for 30 years. It best demonstrates the complexity of managing Rock Creek Park, but also represents an opportunity for an interactive and resilient city and wilderness space through infrastructure. It has been the focus of a long dispute between District residents who wanted the road repaired and residents who wanted to keep this portion of the Rock Creek Parkway free of traffic. Plans to convert the corridor into a hiker-biker trail, however, are at least three years from completion; the cost has ballooned tremendously in the last few years.

The exploration of the Historic Klingle Road highlights erosive patterns occurring in urban places that are falling apart. Deconstructing landscapes can bring an understanding of the value and ecological processes of the wild in the form of design guidelines, allowing us to utilize the healthful benefits of the wild and become more resilient in the face of climate change.

My interest in this project is to:
+ Allow people to have more exposure to wild processes on a daily basis
+ Enhance vegetation and habitat and water connectivity
+ Create deeper connection between people and nature in an urban environment by overlapping uses/discovering multiple functions.
+ Engage and reveal the power of water as a design tool, and its tremendous quantity in mere seconds, diversity of movement, and ability to build or diminish places
+ Create a beneficial relationship between flooding and roads
Historically, Klingle Ford Road was used by farmers who looked for the shallowest points of Rock Creek to cross with wagons. At those points they forded the stream—early in the history of Rock Creek Park, some of these locations were improved into more formal fords. One by one, the three fords were replaced. Today you can look, but not cross. (Carr)

D.C. wasn’t always a city. The district was once farmland, drained by marshy streams and rushing creeks. As DC has grown the city buried the streams as they interfered with growth, diverting their waters in sewers. Those watercourses still flow, mostly underground. With significant rainfall, underground waterways wreak havoc on foundations and cause sewer backups, sedimentation, and flooding. Only few surface streams remain feeding into Rock Creek, the Anacostia, and the Potomac Rivers, the impact of increasing storm water from the urban environment has caused sedimentation problems, polluting the streams. Nature, People, and Water are fighting to take priority of the landscape.
Klingle Road has played many roles in the development of the city and Rock Creek parkway and is currently out of use. Mostly stormwater, Klingle valley collects its water from the urbanizing Cleveland and Woodley Parks. The water surfaces in the valley under Connecticut Bridge. The road sits within a valley, which sits within a highly urbanized site. As the road travels down the threshold the urban site valley transforms into Rock Creek Park. (DDOT)

The upper reaches of Klingle Valley are closest to an urban environment consistent of the Woodley and Cleveland Park residences, the Washington International school, and the National Cathedral. The valley dips revealing steep eroded slopes as water starts to carve out the Klingle creek next to a carved out Klingle Road.

Moving further into the valley, this section shows two creeks merging, the Tregaron and Klingle. The slopes are more shallow and park-like. The road is covered in dirt as more land is being created by deposition.

This moment of deposition along the Klingle Road is nearing the Rock Creek, the existing path sits in a swale and completely disappears during storms.

Klingle Valley becomes a part of Rock Creek Park, the valley is the most defined at this point and the terrain is very rocky.
A large portion of Klingle Road was closed to traffic in 1991 due to erosion damage. It has been the focus of a long dispute between District residents who wanted the road repaired and residents who wanted to keep this portion of the Rock Creek Parkway free of traffic. Plans to convert the corridor into a hiker-biker trail, however, are at least three years from completion; the cost has ballooned tremendously in the last few years.

The exploration of the Historic Klingle Road highlights erosive patterns occurring in urban places that are falling apart. Deconstructing landscapes can bring an understanding of the value and ecological processes of the wild in the form of design guidelines, allowing us to utilize the healthful benefits of the wild and become more resilient in the face of climate change.
Continuous site visits, photography, on-site sketching, and exploring multi-media materials was the documentation process for critically thinking about the site. The survey revealed that the strongest materials are granite, concrete, and stone, a mix of natural and built materials, while the most erodible are, soil, trees, and asphalt. In some areas materials fared better than others, or had transformed in use. This led to examining how the existing materials fall apart, their erodibility level, and how they can be repurposed to create accessible spaces using their full potential.

Each material was studied in-depth through a series of diagrams, and then compiled to see how each moment of collision between streambed and road transforms over a 50 year time period. This led to discovering what materials are most accessible in particular flood conditions and road alignment. The thesis focuses on four particular moments of severe collision and incorporates only existing materials into the design. Bricolage, or constructing from a diverse range of available materials can enhance the connection of materials, people, and water, allowing for erosion and deposition to continue in monumental and non-polluting way.

“He built of materials that were both given and worked: earth, rock, water, and plants of the place; dredged mud, quarried stone, channeled water, and bred plants.” George Marsh Perkins about Frederick Law Olmsted (Uncommon Ground.)
ON-SITE MATERIALS

Natural Materials:
Trees, Granite, and Slopes are the natural materials on site. The Tree Diagram shows quality, type, and size of trees, the granite also shows scale and amount of granite throughout the road. The soil/slope diagram shows steepness and type.

Built Materials:
Asphalt, Concrete, Stone and Brick Retaining Walls are the built materials on site. The first diagram shows concrete and asphalt, where whole road is paved in asphalt, where it’s damaged, concrete is revealed.
Erosion and Deposition Diagram:
After studying the severity of damage on the site by looking at all the materials, four distinct moments stand out as being the least accessible to people and water; these moments are damaged in terms of materials. The diagram reflects what parts of the site have eroded and what is collecting deposition. The whole road is affected, however these parts are the most obvious, reflecting four dominant erosion. The alignment of the road is resisting the natural topography of the site for the most part. From looking at the alignment it is also apparent that a convex shape is more likely to erode, while the concave is more likely to collect deposition.

MATERIAL ERODIBILITY

<table>
<thead>
<tr>
<th>Highest Erodibility</th>
<th>Lowest Erodibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Image" /></td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
</tbody>
</table>

- a. Rill Erosion
- b. Deposition
- c. Gully Erosion
- d. Sheet Erosion

Riffle, Scour, Deposit Decay, Crack, Crumble, Move, Erosion Severity

Scale 1" = 40'
DOMINANT EROSION TYPES

Erosion Types:
The exploration of the Historic Klngle Road highlights erosive patterns occurring in urban places that are falling apart. Deconstructing landscapes can bring an understanding of the adaptability and ecological processes of the wild in the form of design guidelines. The Section and plans below categorize damage based on four dominant erosion types, and seek to find benefits to the less accessible moments. The four dominant types of erosion on site are Rill, Deposition, Gully, and Sheet, they were determined based on the how much road remains, the shape of the slopes, and how water moves across that particular part of the path.
**POSSIBILITIES AND HAZARDS**

Details:

Zooming in to each moment shows how eroded materials are interacting. Moment 3 above shows poison ivy infested trees, trees fallen into the road, and the road as mostly a stream bed. The benefits here are the abundance of trees while the negatives are the health of the trees. This part of the site is the softest in terms of materials, the majority of hard materials have decayed or no longer exist in this part of the site.

Details:

This section shows mostly the hard materials on site, mixing together, the natural materials are also the hardest here because this area is in the Piedmont region. The moment hints at an overlook, however the road is also breaking and joining a mess of other hard materials.
TOUR OF THE WATER:
RIFFLE, SCOUR, DEPOSIT

Riffle, Scour, Deposit Diagram

a. b. c. d.

- Riffle
- Scour
- Deposition Pool

b.
IDENTIFYING WATER INTENSITY AND MOVEMENT

The Floodscape:
Viewing storm water as a pattern of movement and variety of events is essential to designing a long-lasting path. Storm conditions create performances that begin to reveal, carve, and create places, the most significant moments are at the points of water/road collision. The stream bed is a path for water. The road is a path for people. Figuring out the locations of where water moves, meets, undulates, collects, slows down can inform people’s experiences of the same moments.

Water Movement Processes on-site
Scale 1" = 30’

Water and Path Interaction During Different Storm Intensities

KLINGLE VALLEY FLOODSCAPE
EXPLORATION OF SUBWATERSHEDS IN SEASONAL EVENTS

LOCATION
QUANTITY

A: 32 cfs 155 cfs
373 cfs 306 cfs 180 cfs
70 cfs 121 cfs

B: 106 cfs

C: 116 cfs 197 cfs 236.4 cfs 283.4 cfs

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Water Movement Processes on-site
Scale 1" = 30’

Water and Path Interaction During Different Storm Intensities
Water Movement:
Water has three distinct movements: riffling, scouring, and depositing. the road is playing a role in being a rifflle in some places - concrete gutter, concrete sloped surface, and it is a scour and deposition pool in other's because of it's placement in a swale.

Mimicking water patterns by implementing design moves of revealing, carving, and placing. Creating places on a user level based on what the water is already doing, letting it do it's thing but making it accessible and enjoyable.
The goal of the Path-Dam system is to allow water to move through the path without the use of pipes. The water and people both use and inhabit the path, avoiding the existing collision. The system is built from existing materials that can withstand the power type of erosion occurring at each moment.

Diagram of Design Moves

**Path - Dam System**

Transforming natural granite into a pathways and steps to resolve scouring

*Revealing, Carving, and Placing the Path-Dam*

**‘Dispersal Dam’** - Carved out of existing concrete, used to slow down water and offset the condensed rills

**‘Vortex Weirs’** - Placed from existing retaining walls, angle changed, used to collect sediment and mitigate scouring

**‘Lumber Weirs’** - Dead trees placed and tied down to collect sediment, allow for decay of organic material, and accelerate water to build a stream bed

**‘Granite Weir’** - Granite from stream bed carved to create weir that will designate a space for scour and deposition to mitigate affects of gully erosion on path.

**‘Wooden Boardwalk’** - to allow accessibility without disrupting sheetflow
The URBAN-FLOODSCAPE PLAN

The Dry Trail
Constructed out of Granite blocks, the proposed dry trail sits just outside the 100 year flood zone allowing for dry passage and viewshed opportunities.

Deconstruction of Walking Path From Coastal to Piedmont
Materials of path become more natural as you transition through the threshold into Rock Creek Park, starting with concrete, and ending with granite and wood.
TOUR OF THE DESIGN: GROTTO, FAN, POOL, OVERLOOK

a. b. c. d.

a. b. c. d.
On the walk home from the Washington International School, the valley starts to flood and the surrounding slopes become steeper as the rain funnels down hill. The existing concrete gutter guides the water into a rocky pebble bed that is slowly revealing the ancient granite walls lining the slope. The granite walls are inviting, they provide a little shelter from the rain creating a cave-like experience. Beneath your feet water starts skimming towards the creek. As the water begins to overflow it disperses through a series of carved concrete planks and the granite steps against the path start to become a waterfall.

The Grotto slows people down and allows them to scour the edges of the site, replicating the experiential quality of water that has eroded the site, exposing the granite sides. The perspective illustrates the discovery of rill erosion along the path as well as a proposed “dispersal dam,” created through simply revealing a historic concrete path, carving 3 inches deep into the concrete along the curved edge of the path that is currently a moment of collision because of the severity of scouring. Because of the convex shape of the path naturally the water starts condensed as it leaves the slopes and fans out to create waterfalls along natural granite steps.
The strategy is to dissipate the velocity of water caused by the condensed but fast movement of water causing rill erosion - one strategy here is to disperse water through a staggered walk of carved concrete and widen the existing concrete gutter that water currently runs down. Another strategy is revealing the natural stream bed underneath the concrete shoulder and allowing the water to create a stream bed alongside the path that will carve out the granite walls. By creating a granite path/retaining wall across from the main path, the other side of the slope is also preserved allowing for accessibility through the site, but maintaining the character of this moment.
MATERIAL EROSION PATTERNS:

EXPOSING OF ROOTS

Erosion

Deposition

EXPOSING OF CLAY

CUTTING OF GRANITE

CRUMBLING OF ASPHALT

DISASSEMBLY OF BRICK

CRACKING OF CONCRETE

"Undercutting" of roots has led to severe lateral erosion, slopes and hard materials expose soil, soil and create overhanging conditions in the form of caves and gorges, steep cuts reveal terraced condition. Bank erosion allows water to begin to meander along its course.

The Grotto Sections Over Time

The Grotto Sections Over Time

The Grotto Sections Over Time
The design of the grotto was inspired by three moves - reveal, carve, and place. Particularly revealing. The dashed line shows the existing section and the cave like conditions caused by scouring. The goal was to preserve the experience of the Grotto by allowing water to continue moving across the path and continue to scour the site, but in a way that will create more accessibility to the slopes for people and water and be less destructive to the trees, which are the most eroded material in this moment.

Reveal:
The concrete beneath the Asphalt Road
The stream bed below all the rubble
A pebble bed below the concrete gutter

Carve:
Rills into the concrete path. 3" deep every 2'.

Place:
Granite retaining wall next to the concrete path to protect it scouring under path
Granite retaining wall next to eroded slope to protect trees and create elevated dry path
Concrete Weirs
On a beautiful spring day, the Tregaron Conservancy is packed with people trying to find the perfect picnic spot. The main entrance is located where the Klingle Creek and Tregaron Stream Converge, and so does the lush green of the Tregaron and the wild piedmont terrain of Rock Creek. Water from the Tregaron flows underneath the bridge and the two water bodies meet against the paths elbow, resulting in deposition along the sides of the road. The picnic spot is found along this wavy shore line.

The Fan collects sediment and people in its concave alignment. In the perspective, the fan-like movement of water evokes a design response that both collects sediment and people along the road through a series of vortex weirs, allowing the water to still meet and continue along without destruction of the path. By rotating the existing stone retaining walls that are being moved and destroyed along the path, places for soil to collect are created. The vortex weirs momentarily keep water as it passes through each gate, also allowing people to enjoy the edy’s in an urban context.
The strategy is to dissipate the velocity of water caused by deposition - The curving water path is causing deposition against the elbow of the Klingle Road. The 3’ undersized culvert is causing more deposition by prohibiting the Tregaron stream to flow through causing an overload of sediment. The goal is to collect sediment in certain places and capitalize on the trees growing along the retaining wall, and also create a more park-like condition as this is the official entrance into the Tregaron nursery. In the proposed plan the bridge is large enough that sediment will not be blocking the entrance of the Tregaron Stream. The newly designed buttress dam’s edges also work as Jetty’s, where the Tregaron and Klingle meet there is a lot of pressure on the path in terms of scouring and depositing, the series of vortex weirs will allow scouring to occur on the stream bed rather than the sides of the path. The vortex weirs are walkable.
MATERIAL EROSION PATTERNS:

- Exposing of Roots
- Erosion
- Deposition
- Exposing of Clay
- Cutting of Granite
- Crumbling of Asphalt
- Disassembly of Brick
- Cracking of Concrete

**THE FAN - DEPOSITION OVER TIME**

**1994**

**2015**

"Vortex Flow" has been caused by the Creek meandering along the convex edge of the road and higher water speed and the raised flood plain, and the secondary Tregon Stream result in deposition of sediment to occur along this convex path forming point bars conditions in the form of tree banks.

**2040**

**THE FAN - DEPOSITION OVER TIME**

**Scale 1" = 10'**

**The Fan Sections Over Time**

**NATURAL -** Tulip Poplar
- Clay Soil
- Granite Bed

**MAN-MADE -** Asphalt
- Brick Wall
- Concrete

**NATURAL -** Tulip Poplar
- Clay Soil
- Granite Bed

**MAN-MADE -** Asphalt
- Brick Wall
- Concrete

**NATURAL -** Tulip Poplar
- Clay Soil
- Granite Bed

**MAN-MADE -** Asphalt
- Brick Wall
- Concrete
The design of the Fan was inspired by three moves - reveal, carve, and place, particularly place. The dashed line shows the existing section and the pattern of sandy and scoured walls. The goal was to allow the Tregaron to meet the Klingle Creek without sedimentation backup. This was done by collecting sediment in certain places. The experience of the Fan is enhanced by allowing people to sit along the edge of the path and climb the vortex weirs.

**Reveal:**
Dips for vortex weirs by re-grading to create place for eddy.

**Carve:**
Expand the Culvert to allow for better water connectivity.

**Place:**
Stone retaining wall perpendicular to the concrete path to allow for sediment collection.
It's a beautiful summer day in Rock Creek Park, and the families of Woodley Park are looking for an excursion, luckily a pool has filled in their own backyards. This moment of stream deposition occurs along the Klingle Road as it nears the Rock Creek, the existing path sits in a swale and completely disappears during storms. When water is given a path and the pedestrians are given a pool. The alignment of the road has been shifted outside of the 100 yr-flood zone so that the path can be used throughout the year, however the Creek becomes a special attraction during floods, after a series of beautiful and fast cascades all the water falls into the pool then sheet flows under the wooden boardwalk. The people in the perspective can stay dry to the right of this water fall, or sit in the scouring pit and get soaked. The bridge allows the pedestrians to stay dry and the water moves underneath uninterrupted.
The strategy is to move the existing road out of the way, and to allow for the stream deposition pool to fully form. The undefined water path is destroying the road entirely, deep pockets have been caved out. Water is crossing the road and creating pools on either side of the road, and eventually sheet flowing over the rest of the road. The goal is to define a path for the water and hold it all in one place before and allow it to become clean. I have proposed a granite path, connecting to a granite weir system, and having a boardwalk so that water can continue to move underneath it. The umbrellas provide shade for people to stop and unwind and enjoy the deep slow water.
THE POOL - GULLY EROSION OVER TIME

C.

1994

2015

“Down-cutting” is peeling away the hard-
scape, which sits on the valley floor creating
both rapids and still water pools.

2040

MATERIAL EROSION PATTERNS:

EXPOSING OF ROOTS

Erosion

Deposition

EXPOSING OF CLAY

CUTTING OF GRANITE

CRUMBLING OF ASPHALT

DISASSEMBLY OF BRICK

CRACKING OF CONCRETE
The design of the Pool was inspired by three moves - reveal, carve, and place, particularly reveal and place. The dashed line shows the existing section and the pool-like conditions caused by a deep gully cutting across the road. The goal was to preserve the experience of the Pool by designing a waterfall creating a deep pit to swim in.

**Reveal:**
The entire existing road, to allow for water to use swale and create a water path.

**Carve:**
Granite weir

**Place:**
Dead trees as weirs, to allow for streambed to become more pronounced.

Granite Boardwalk
It’s another snowy day in Rock Creek Park. Klingle Road is lined with fresh snow, but as we approach the end, water is rushing off the road and into the large scoured valley of granite. Tremendous sheet flow of water ends at a natural overlook created in this part of the site. Designed as an overlook, the water is given a more prominent path and the pedestrians are given access through this natural ice luge. The existing road remains in place, however the existing retaining wall is built as a bridge to accommodate pedestrians. The overlook offers a view of Klingle Creek meeting the Rock Creek, and symbolizes the threshold of Rock Creek Park. The bridge allows the pedestrians to stay dry and the water moves underneath uninterrupted.
The strategy is to preserve everything at this part of the site and just add a bridge to allow sheet flow to continue, this part of the site belongs to the water entirely as it’s entire path uses the already exposed concrete. The part of the site is monumental, it is an official entrance into Rock Creek park. The granite is large, the slopes are the steepest, and the water is moving fast and leading to the Rock Creek. The goal is to create a viewshed, and emphasize the Rock Creek Park threshold by using a wooden bridge of a similar style.
THE OVERLOOK - SHEET EROSION OVER TIME

d.

1994

The Overlook Sections

2015

"Thalwegs" are the line of fastest water velocity in a river. Thalwegs strike the cut-bank in a river meander and high-speed water. A cut bank has been revealed in the form of a small cliff.

2040

SCALE 1" = 10'
The design of the Overlook was inspired by three moves - reveal, carve, and place, particularly carve and place with the addition of a bridge. The goal was to preserve the sheet flow experience of the overlook by allowing water to continue moving across the path and under the bridge. The strongest element on the site are the retaining walls, so the move is to rely on the retaining walls as the point of accessibility at this part of the site. The bridge allows people to float atop the most monumental part of the site in terms of scale, and realize the power of water and the connection between the storm water and it emptying into the Rock Creek.

**Carve:**
Gullies into the concrete path to allow for ice luge

**Place:**
Wooden bridge next to the concrete path at a higher elevation.
Several resources were used to better understand the topography of the site: the public record GIS information provided by Washington D.C. and used by the National Park Service (NPS), and the topography of the creek as collected and provided by the D.C. Department of Transportation (DDOT).

Challenges:
The sets of information used reflect two different dates, 2013 and 2010 and the data has changed in that short time. The topography is represented differently in sets of data, as shown by the overlay of available information in the image. The process of erosion is drastically changing the site according to the two sets of information, bringing about a question of erosion and deposition rate, how fast is this place falling apart?

The second challenge in evaluating the site slopes is that the sets of information represent topography differently. The DDOT engineers really focused specifically on the conditions of the road and the creek by using 1 foot contours, while the horticulturists focused on representing the entire valley by using 2 foot contours. Both sets don’t give a clear depiction of microtopography because erosion and deposition is happening on a smaller-scale.

Resolution:
Compiling select information provided by the NPS survey in terms of the surrounding slopes, and the DDOT survey for the road and creek built a more accurate depiction of the site. Through this overlay the processes for how the site is transforming into a valley, how the road is a part of that large-scale transformation, and where erosion and deposition are happening specifically are conveyed. The role of the landscape architect should be to convey both sets of information from the engineers and horticulturists and reveal a process. There is also a necessity in visiting the site consistently to see how quickly the slopes are eroding.

To best visually represent site findings several methods were used throughout the thesis; photography, 3-D modeling using Rhino, diagramming, and mixed-media (charcoal, acrylic, pencil, ink, ripping). The most effective visual tools were diagramming each material found on site - as was done through the analysis. The diagrams led to discovery of the erosion and deposition process. Then progressing to hand-drawing the moments of severe erosion and deposition, which required several visits. Finally, the last step was layering all the information to create 3-D mixed-media drawings for the plans and perspectives that offer a real sense of what the site is like, which is a constantly changing place.

Material Diagrams through Site Visits:
Granite outcrops in slopes told a story of how the slopes were eroding and revealing the layers underneath. Parts of the stream bed with no exposed granite are concealed with deposition from surrounding slopes, patterns in movement became easier to detect by regularly visiting the site.

Plans + Perspectives through Process of Erosion and Deposition:
Layering all the information also captures the layered experiences of the power of water, and emotional moments on the site.

Sections Through Process of Time and Material Opportunities:
Tulip Poplars double in growth in 25 years, the amount of time the road has been closed. Understanding this process of growth has sparked an investigation of material opportunities and what the future of the site will become if left alone, as demonstrated by the sections.
RESEARCH METHODS & CHALLENGES: UNDERSTANDING STORM-WATER

Watercolor Existing and Proposed Water and Slopes

To better understand the Klingle Creek, both the NPS and DDOT studies provide storm water data for the site that was incorporated in the research. Visiting the site during a variety of water related events. Figuring out where water moves, meetings, undulates, collects, and focus on the variety of water related events. The pattern I discovered and worked with was riffle, scallop, deposition pools, and coming up with characteristics of materials our walks home from work and school and even welcome natural processes that lead to the very productivity of all materials by mimicking the process of damage, which are to reveal, carve, and place. By changing our perception of damage within the city as a process of how nature has been seen as a separate entity from civilization, therefore creating a duality in designing with nature. Frederick Law Olmsted set a precedent for designing paths to capture and preserve the beauty of nature. His parks are highly curated versions of nature that offer us an oasis of quiet in the urban jungle. Why can’t our walks home from school and work be as engaging and enlightening as a hike through the woods or Central Park?

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The design embraces the productivity of all materials by mimicking the process of damage, which are to reveal, carve, and place. By changing our perception of damage within the city as a process of how nature has been seen as a separate entity from civilization, therefore creating a duality in designing with nature. Frederick Law Olmsted set a precedent for designing paths to capture and preserve the beauty of nature. His parks are highly curated versions of nature that offer us an oasis of quiet in the urban jungle. Why can’t our walks home from school and work be as engaging and enlightening as a hike through the woods or Central Park?

RESEARCH METHODS & CHALLENGES: UNDERSTANDING STORM-WATER

Watercolor Existing and Proposed Water and Slopes

Challenges: The Klingle Creek is coupled with a historic road that also acts as a boundary and entrance to Rock Creek Park, making the valley the jurisdiction of the NPS and the road and it’s bordering creek DDOT’s, with no overlap. The information about storm water has no common ground whatsoever. The NPS doesn’t provide technical data about the creek, but rather shows the overall storm-water for the watershed in two instances, a 1-year storm and 100-year. DDOT breaks the creek into separate parts and provides data for a variety of storm events. There is a discrepancy in data. The storm-water data is given in cubic feet per second (CFS), expressing the amount of runoff in this valley. Because there is a Creek, the numbers become somewhat arbitrary and difficult to use. The Creek itself is very rocky and inconsistent, water moves differently at every part, so these formulas and provided information don’t capture how fast the water is actually moving. DDOT’s intentions are to design catch basins for run off, in that sense measuring cubic feet per second makes sense, but the goal of this thesis was to allow water to continue moving by accelerating it, slowing it down, and changing its pattern. The challenge was finding a formula to use, attempting to use this formula and creating a new method of collected storm water information.

Resolution: I learned that the way engineers view the site in terms of storm water is as cubic feet per second, and the horticulturists from National Park Service were more concerned with the erodibility of natural materials. I tried to combine this view. I decided to view storm water as a set of patterns based on how water moves and focus on the variety of water related events. Figuring out where water moves, meetings, undulates, collects, slows down, that is critical to how I designed and viewed the site. The pattern I discovered and worked with was riffle, scour, deposition pools, and coming up with characteristics that fit those categories. Riffles are fast and shallow, scouring is when the water collects and cavities in, and deposition pools are slow and deep.

CONCLUSION: DESIGN AND THE FUTURE

Essentially the project deals with the negative connotation of the term “damage” in our urban environments. We label faulty or aging infrastructure as “damaged” and as a result invest our funds in continued design and maintenance of the spaces we inhabit. Yes, it is necessary to maintain our landscape and urban environments to a safe and comfortable standard of living, but it is not our only goal as landscape architects. We have the greater role of designing more resilient and experiential infrastructure, which can actually anticipate and even welcome natural processes that lead to the “damage” we dread. We have been designing against the wildness of nature, but we will not win this race, we should join it.

For centuries, nature has been seen as a separate entity from civilization, therefore creating a duality in designing with nature. Frederick Law Olmsted set a precedent for designing paths to capture and preserve the beauty of nature. His parks are highly curated versions of nature that offer us an oasis of quiet in the urban jungle. Why can’t our walks home from school and work be as engaging and enlightening as a hike through the woods or Central Park?

The goal of the thesis was to enhance pedestrian and water passage while facing a multitude of challenges: the majority of the existing road sitting in the 100-year flood zone, a long history of nature and the road, and its steep erodible slopes. Understanding the natural processes that posed challenges offered guidelines that could be used in other urban settings. The difficulty of the design emerges in documenting a quick eroding site, its processes, and the time spent studying the existing site. There were also many challenges in understanding storm-water information provided by engineers, the rate of cubic feet per second becomes less relevant when the goals of diverting water changes. Finding patterns rather than a set of numbers becomes more important. Education and a more complex understanding is required for maintaining and caring for a path that relies on natural processes. The design embraces the productivity of all materials by mimicking the process of damage, which are to reveal, carve, and place. By changing our perception of damage within the city as a process of how nature has been seen as a separate entity from civilization, therefore creating a duality in designing with nature. Frederick Law Olmsted set a precedent for designing paths to capture and preserve the beauty of nature. His parks are highly curated versions of nature that offer us an oasis of quiet in the urban jungle. Why can’t our walks home from school and work be as engaging and enlightening as a hike through the woods or Central Park?
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