

# WALKABILITY THROUGH CHALLENGING TERRAIN

CONNECTIVITY BETWEEN FREDERICK DOUGLASS NATIONAL HISTORIC SITE AND ANACOSTIA COMMUNITY MUSEUM

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# ABSTRACT

## WALKABILITY THROUGH CHALLENGING TERRAIN: CONNECTIVITY BETWEEN FREDERICK DOUGLASS NATIONAL HISTORIC SITE AND ANACOSTIA COMMUNITY MUSEUM

Daria Lvovna Gelman

This thesis is an investigation of how to achieve walkability over steep urban topography greater than Americans with Disabilities Act accessible 8.33% standard. I studied how landscape architects and architects have overcome challenging topography in a variety of international cities and how to increase connectivity in the steep terrain of Washington D.C.'s Anacostia neighborhood. Specifically, this thesis explores the roles of staircases in the city and how staircases can enhance the experience of moving through the city.

Walkscore's walkability map presents a unique view of the city where walkable parts follow the topography of the city. Topographic changes can be an obstacle to walk on: the steeper the path the harder it is to move through it, which in turn may encourage a person to use a car to travel between low and high points in the city. My hypothesis is that steep topography can be an enhancement to walkability in the city.

The experience of traveling through steep terrain is unique as it can provide a visually engaging environment of walking, including expansive views of the city, engaging architecture, and physical exercise. To test this hypothesis, I designed two distinct routes over steep topography to connect the Frederick Douglass National Historic Site, the Smithsonian's Anacostia Community Museum, a sports field, and the Fort Stanton Recreation Center. The paths respond to L'Enfant's method for laying out the city in "diagonal avenues superimposed over a grid system" (Nps.gov, 2018) and the very steep terrain of Anacostia, which seems to

defy in places the orthogonal and axial relationships underlying L'Enfant's plan.

Drawing on both L'Enfant's ordering scheme of the city and the given form of the two hundred foot escarpment above Anacostia, the design demonstrates that paths through steep terrain can be a great asset, revealing the larger order of the city through views to the monumental core, bringing people through the native forest, making more direct connections between the civic infrastructure, including the Frederick Douglass National Historic Site and the Smithsonian's Anacostia Community Museum. It shows that expanding the notion of walkability to include terrain that is not ADA accessible is important, and can be the impetus for the strategic inclusion of accessible paths where the topography permits.

# GENERAL AUDIENCE ABSTRACT

## WALKABILITY THROUGH CHALLENGING TERRAIN: CONNECTIVITY BETWEEN FREDERICK DOUGLASS NATIONAL HISTORIC SITE AND THE ANACOSTIA COMMUNITY MUSEUM

Daria Lvovna Gelman

This thesis is an investigation of how to create walkable spaces over steep topography in Washington, D.C. By steep topography, I concentrated on grade changes that are greater than the steepest slopes allowed in construction so that anyone can access the site. I studied how landscape architects and architects have overcome challenging topography in a variety of international cities and how to increase connectivity in the steep terrain of Washington D.C.'s Anacostia neighborhood. Specifically, this thesis explores the roles of staircases in the city and how staircases can enhance the experience of moving through the city.

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established by Pierre L'Enfant, the designer of Washington, D.C., over the steep terrain of Anacostia, which seems to defy in places the orthogonal and axial relationships underlying L'Enfant's plan.

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# INTRODUCTION

People often settle on level ground and leave sites with steep topography undeveloped, however, there are many cities built on steep terrain that make it habitable. When I started this work I was interested in investigating how people developed unlevelled land in cities and how it was made habitable.

This investigation was sparked by David Leatherbarrow's hypothesis that "landscapes lacking level can be aesthetically pleasing, yet they may well be only that, which is to say they may well be useless and unlivable" (171). Leatherbarrow discusses different ways people have been building and occupying land, which most often was connected with leveling of land.

What are the limits of inhabitability and walkability on steep sites? Is Leatherbarrow correct in suggesting that leveling is an indicator of habitability? We know of many significant cities built on steep topography - San Francisco in California, Santorini in Greece, Rio de Janeiro in Brazil. Not only are these places successful centers of human activity, these places are well interconnected despite the challenges in topography. What makes them walkable in spite of their given conditions? These are some of the questions that drove this thesis.

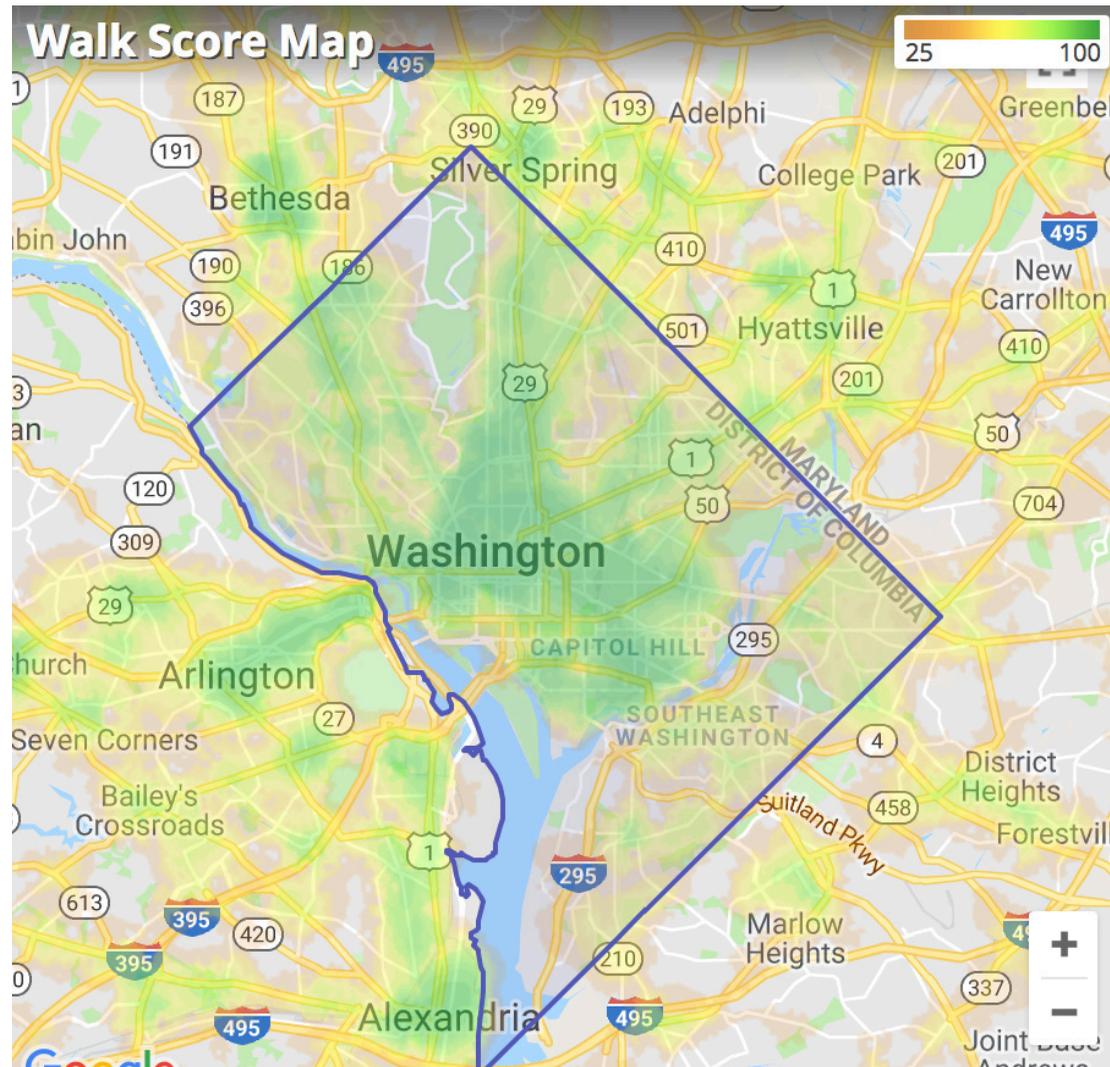
Washington DC is considered to be the second most walkable city in the US, according to the 2016 George Washington University School of Business report named Foot Traffic Ahead. That conclusion is drawn based on the proximity and number of WalkUps (or walkable urban places) to metro stations. In other words, how close a Mixed-Use development is located to a place of public transportation so that people who work at the WalkUp can use a combination of public transportation and walking to travel to their space of work.

However, the report does not look beyond the WalkUps location in its analysis. Such factors as the topography of the landscape, spaces of cultural interest, and neighborhood hubs fall beyond the scope of the report. The question arose: despite the city's high ranking on walkability, the city does not feel very walkable. It seems that the city is walkable in small hubs concentrated around metro

stops, but walkability beyond fifteen minutes of walking between these walkable hubs seems to reduce drastically and people resort to using cars to get to places located beyond fifteen minutes of walking from a metro, which is a distinctively American habit of getting around the city.

To narrow down my thesis question, I looked at Walkscore's walkability map. The map presents a unique view of the city where walkable parts correlate not only with the location of metro stations, but also follow the topography of the city. This presented an opportunity for inquiry - how can walkability be increased in the parts of the city where topography is steep.

By overlaying the topography of the city with the street grid, land use maps, and important civic buildings, it became apparent that two important civic sites of the Frederick Douglass National Historic Site and the Smithsonian's Anacostia Community Museum are located in an area with steep terrain and do not have a direct route between them. By designing a connection between the Frederick Douglass National Historic Site and the Smithsonian's Anacostia Community Museum over a 200' elevation change through a wooded park, this thesis shows how steep terrain can be made into an asset that encourages people to walk to each site and the surrounding neighboring infrastructure.



Walk Score Map - Washington, DC

## TERMINOLOGY

Walkability can be defined in different ways. For the purposes of this thesis, I am concentrating on the idea of walkability as “physically-enticing environments [that] have full pedestrian facilities such as sidewalks or paths, marked pedestrian crossings, appropriate lighting and street furniture, useful signage, and street trees. They may also include interesting architecture, pleasant views, and abundant services attractive to those who have other choices for getting around and getting exercise” (Forsyth 4, 2005).

The Americans with Disabilities Act (ADA) Guidelines state that slopes shall be considered accessible at the maximum of 1:12 (8.33%). I analyzed the topography of Washington, D.C. for steep topography and determined that this work concentrates on slopes higher than 8.33%.

Rodriguez and Joo’s findings state that “estimates reveal that local topography and sidewalk availability are significantly associated with the attractiveness of non- motorized modes” [of transportation] (151, 2004). “Non-motorized trips [...] have shown high sensitivity to variations in the local physical environment” (Rodriguez 152, 2004). “These attributes include sidewalk continuity, sidewalk width, presence of cycling and walking paths, and the local topography, among others” (Rodriguez 153, 2004). Topography is one of the factors that is taken into account when people choose to walk. Most importantly, the authors state that “pedestrian attributes of the route between home and work, rather than the attributes of the endpoints themselves, appear to matter most in the decision to walk for work trips” (Rodriguez 154, 2004). This means that the experience of the walk influences the choice to walk in the city - even though the walk might take longer or be physically challenging. This is an important distinction for the purposes of city building - even though steep topography might be a barrier against connectivity, the factors that come with challenging topography present a unique experience that can enhance the experience of moving through the city.



Nizhny Novgorod - Old City Complex from Above

## CASE STUDIES

As part of the investigation of existing precedents, I analyzed several urban examples where steep topography appears to be an enhancement to people's walking experience: I looked at the Chkalov Staircase in Nizhny Novgorod, Russia, Parc de Buttes Chaumont in Paris, France and the Olympic Sculpture Park in Seattle, WA, USA.

### CHKALOV STAIRCASE NIZHNY NOVGOROD, RUSSIA

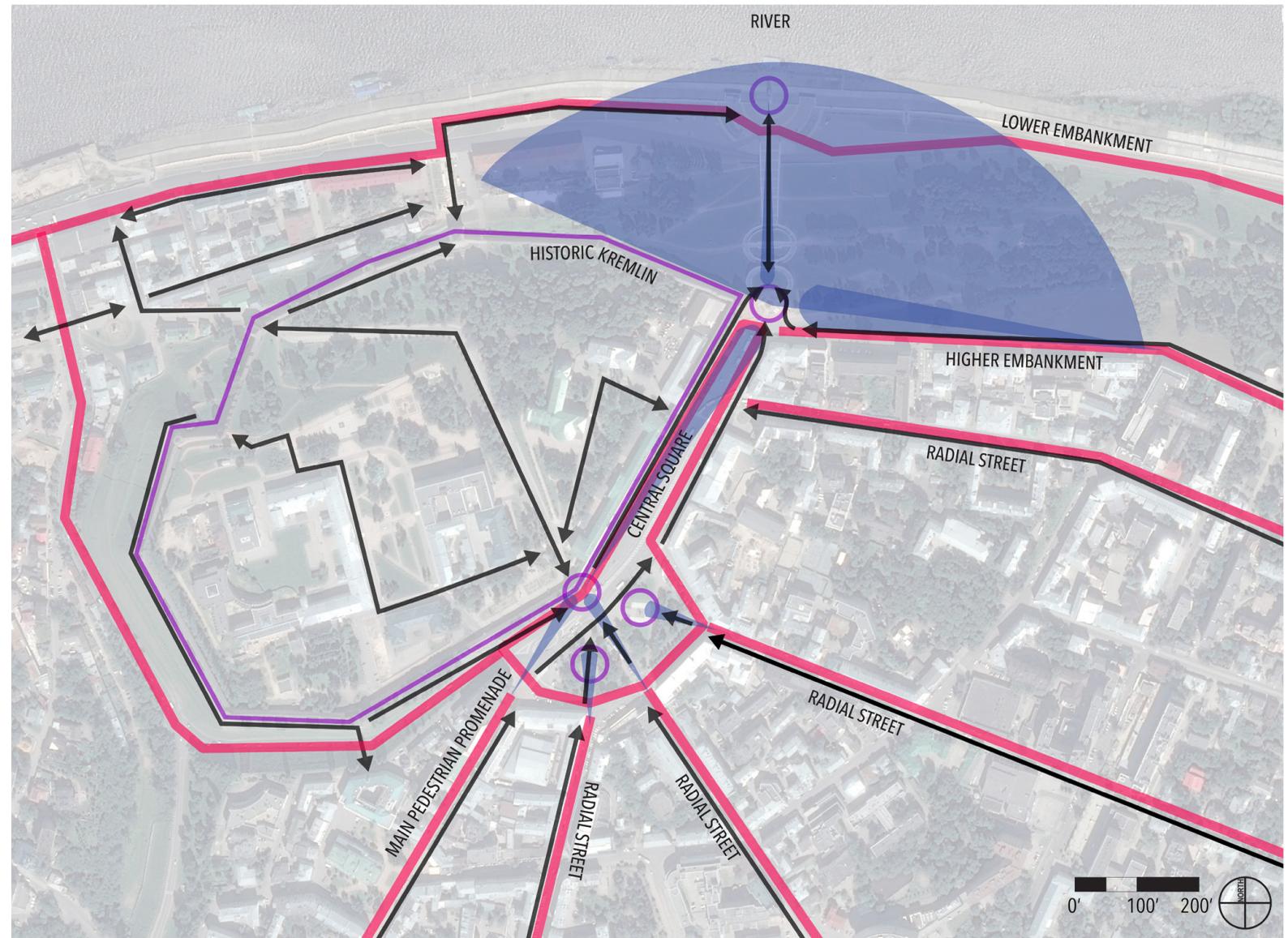
Nizhny Novgorod is located three hundred miles away from Moscow. Nizhny, as we call it, was founded in 1221 as a fortress at the convergence of two major rivers Volga and Oka. The fortress, or the Kremlin, is located on top of a hill with roughly 200 feet elevation from the river bank to the top of the hill. Centuries later, the Kremlin became the historic part of the city with its central square adjacent to the Kremlin and major streets and promenades radiating from the city center.

The historic part of the city is the most walkable and loved part of the city with hundreds of people

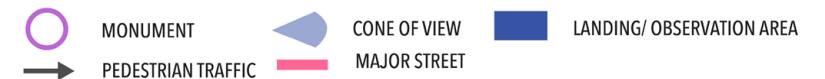
visiting and walking the main promenade of Bolshaya Pokrovskaya Street through the central Minin Square to the Chkalov Staircase overlooking the convergence of the Volga and Oka rivers.

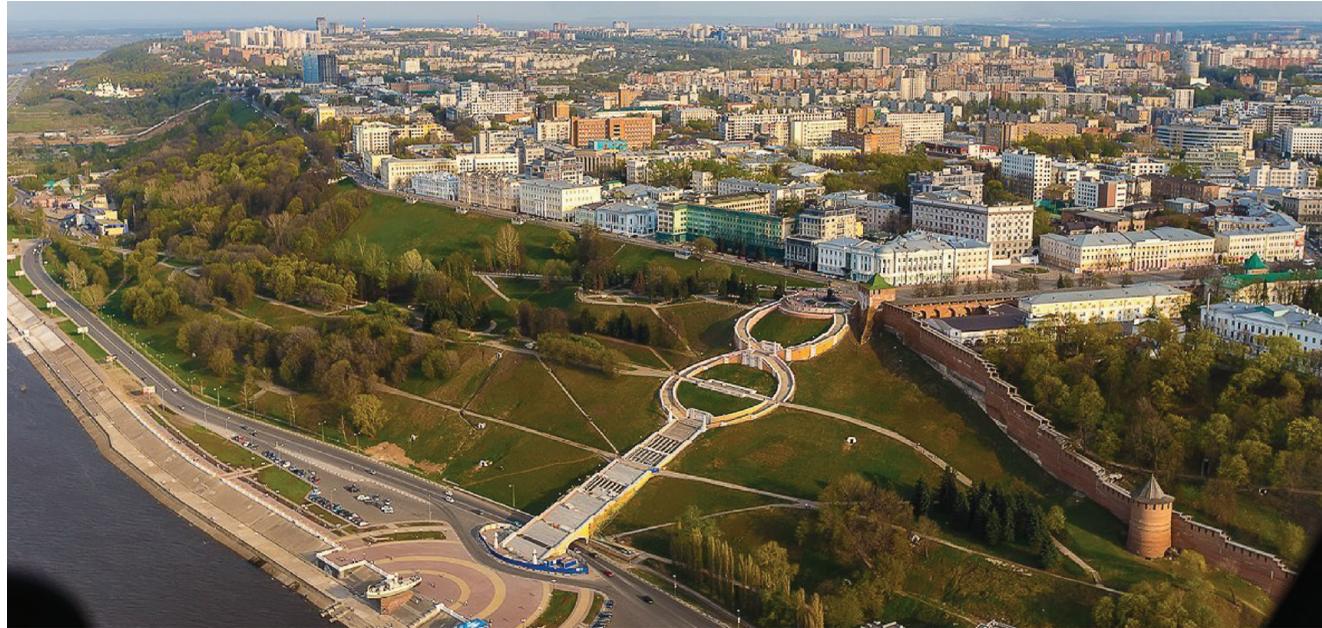
When analyzing the walkability of the central part of Nizhny Novgorod, it becomes apparent that at every point of change in setting, the view ahead is framed in a way that peaks the curiosity of the person, thus propelling the person forward to keep walking. For example, when one is traveling down the main pedestrian promenade, the view of the Kremlin Tower reveals itself as one approaches the end of the street. Upon arrival to the Kremlin Tower, the monument to Chkalov is visible on the horizon, indicating that this is an interesting point in the urban fabric. Upon the arrival to the monument, the view of the river and the city beyond is displayed.

The design of walkable area is formulated in a way that constantly intrigues the person, especially when the topography is steep. Thus the experience of walking is that of engagement with the surrounding urban fabric and observation of the architecture and natural phenomena.



Nizhny Novgorod - Old City Walkability Diagram





Chkalov Staircase - Birds Eye View



View of the Volga and Oka Rivers Converging at the Chkalov Staircase

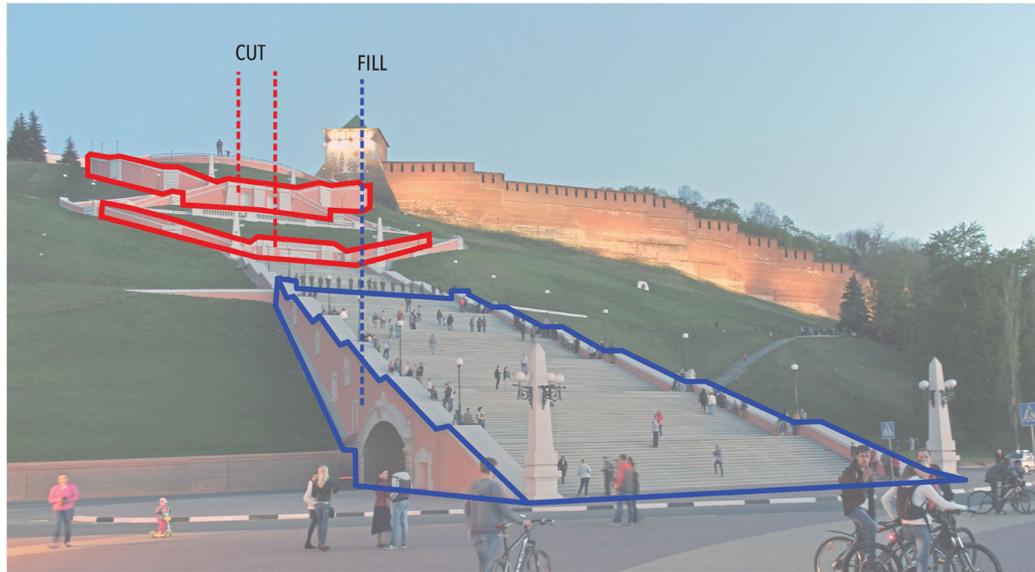
Chkalov Staircase is one of the most provocative pieces in the fabric of the city offering expansive views of the river and city.

In 1949 the proposal to connect the top of the city with the lower embankment was funded and architects Yakovlev, Rudnev, and Muntz were hired for the project. The structure is an embodiment of the Soviet brutal architecture - it was built after Second World War in part by captured soldiers from the Nazi Germany and meant to symbolize the defeat of the Nazi regime by the Soviet Union.

From a distance the staircase's shape reminds of the number eight. The structure is built into a steep hill with over 200 feet of elevation. Landings between stairs are few and widely spaced and the curved path consists of stairs - not ramps as one might assume by looking at the aerial image.

In order to accommodate the dramatic changes in elevation and relatively short distance, the top part is largely cut into the hillside and the lower part is largely filled. There are over 500 steps in the structure which proves to be a physical endeavor for those who commit to going all the way down the stairs to approach the river, or going up to the main square.

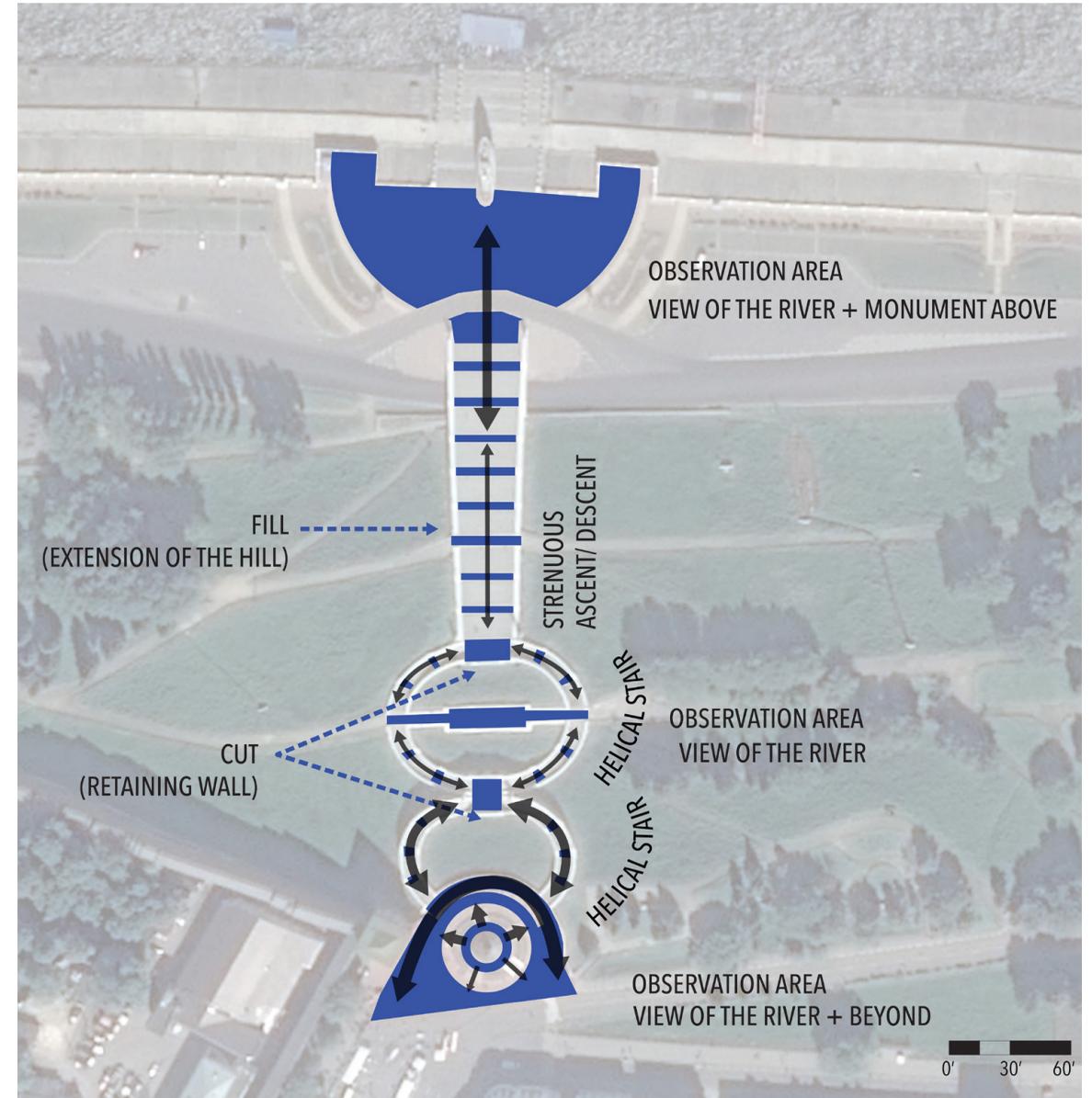
Today the staircase is used for recreational purposes, however, at the time of its building the assumption was that people would use the stair



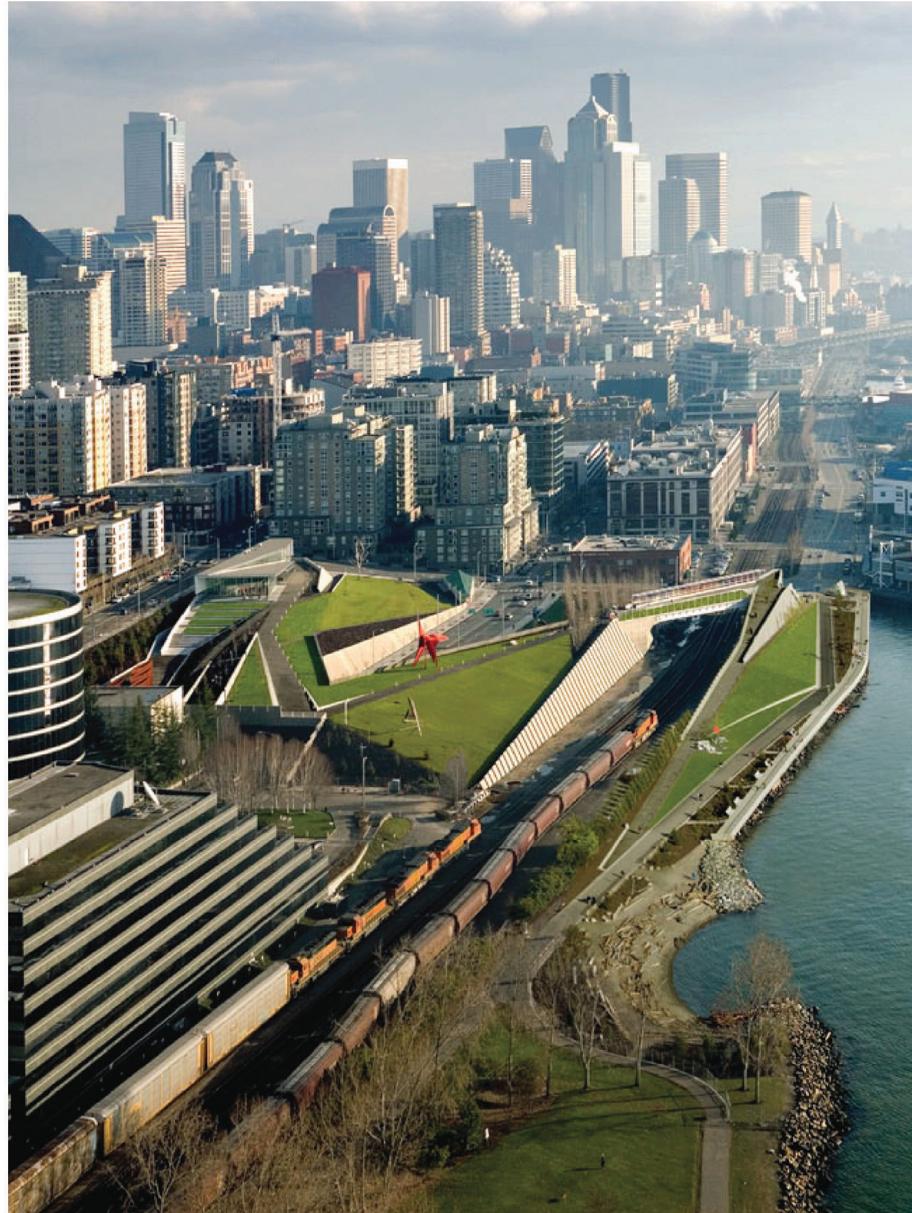
Chkalov Staircase - View from the Volga River Front

for commuting between the lower and higher elevations in the city, as vehicles were only used by the select elites at the time.

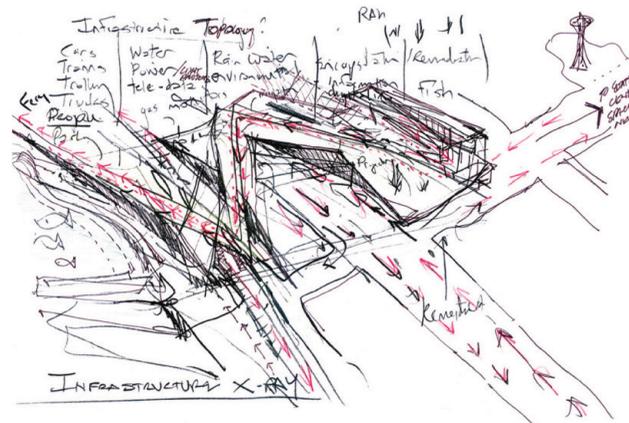
The staircase is a widely loved space by the city residents and visitors as it presents dramatic views of the river and the forest beyond - it is the celebration of the natural phenomena surrounding the city, as well as the connection with the central part of the city that makes this project unique.



Chkalov Staircase - Walkability Diagram

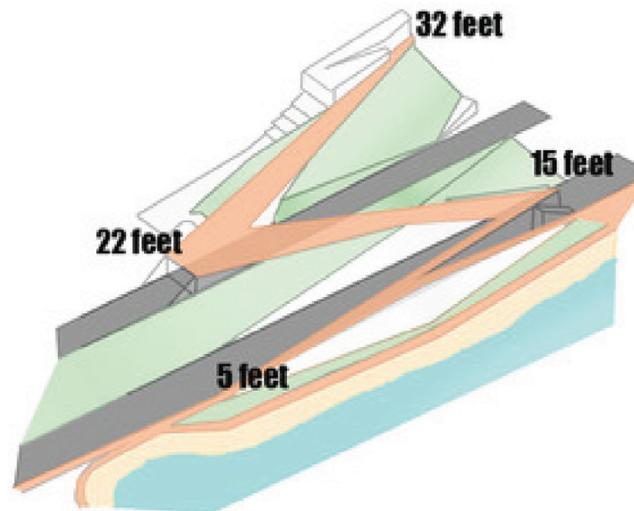


Seattle Olympic Park - Birds Eye View



- CAN THE POINTS OF SCULPTURE BE RECONSTRUCTED AS A TOPOGRAPHICALLY INFORMED & INFRASTRUCTURE-BASED LANDSCAPE.
- HOW CAN ONE INTELLIGENT INFRASTRUCTURE SUPPORT CONTEMPORARY ART/URBAN LIFE
- HOW CAN A PROGRAM OF REMEDIATION BE RECONSTRUCTED TO SUPPORT A PROGRAM FOR ART.

Seattle Olympic Park - Design Sketch



Seattle Olympic Park - Elevation Changes Diagram

# OLYMPIC SCULPTURE PARK SEATTLE, WA, USA

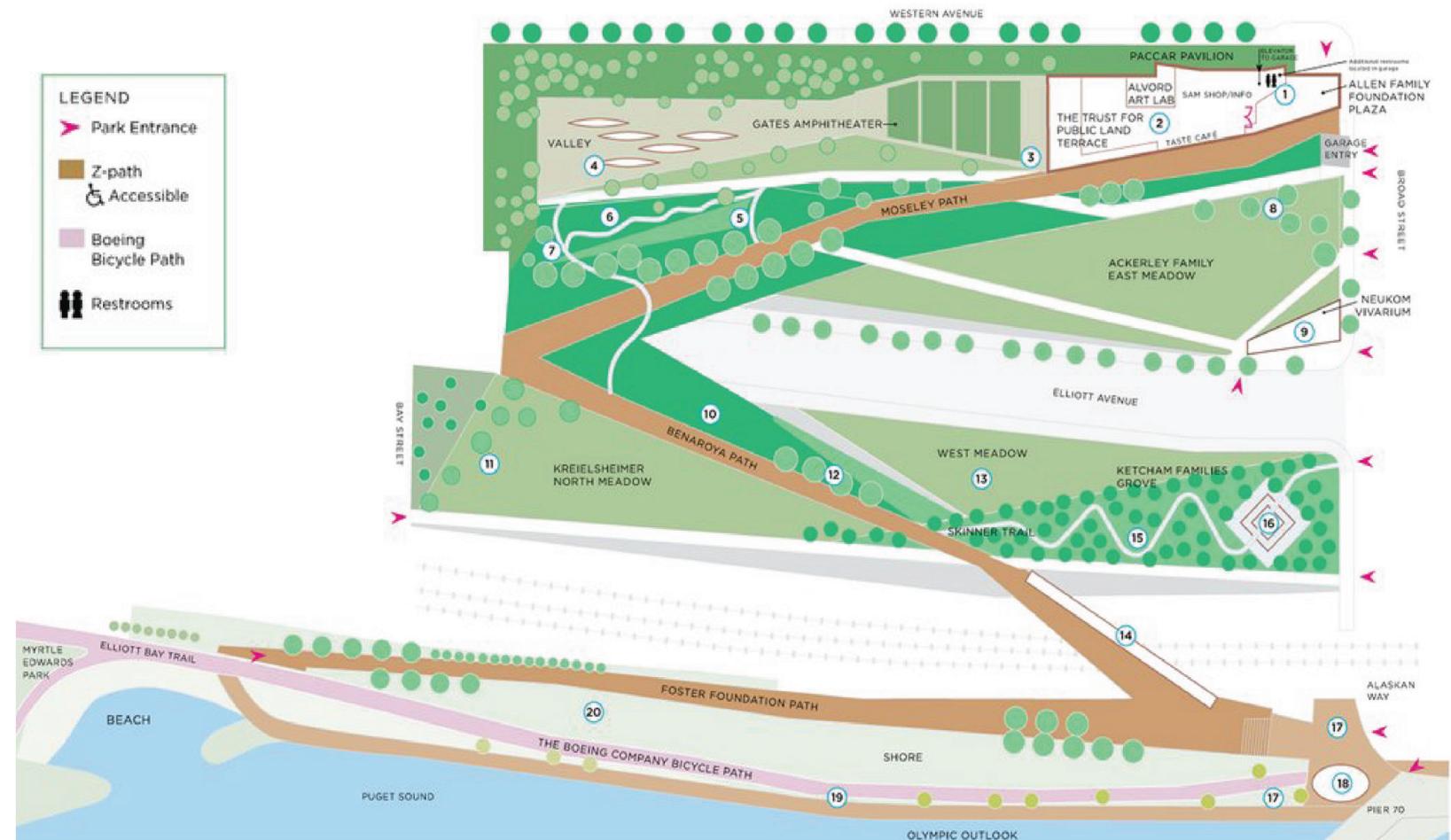
My choice for studying Olympic Sculpture park was based on the desire to examine contemporary solutions to challenging topography. The park is located near the downtown area of Seattle on the previously contaminated site and connects the street to the waterfront by going over the railroad tracks. The park is located at the waterfront and serves as an attraction point for visitors to admire the natural phenomena of Ellicot Bay.

Designers Weiss/Manfredi Charles Anderson | Atelier PS created a Z-shaped pathway that covers the adjacent highway and railroad to connect the park's visitors from the street to the water.

One of the main challenges of the site was to remediate the contaminated soil. "The soil was remediated, and the entire site was capped and covered with no less than 3 feet of clean fill to help prevent stormwater migration into deeper soils that were not reached during the remediation process. A specially formulated layer of topsoil was engineered to filter rainwater, reduce runoff and support the growth of native plants. The shoreline restoration zone features a constructed underwater

habitat bench integrated with a newly reinforced seawall as well as a terraced beach that invites users to touch the water and explore the tide pools at low tide" ("Olympic Sculpture Park").

In addition to remediation, a series of paths are created on the site to enhance connectivity - meandering and bike paths through the site connect people to and from the water front. This park serves as an attraction in itself being a sculpture garden and an educational space. The experience of walking in this park is emphasized to be of slow pace as the main route is an exaggerated ramp that allows for slow pace of walking. There are no stairs on the main route and the path of walking is somewhat constricted by going towards or away from water. The part that is interesting in this park is the decision to manipulate the slopes of the site in order to create connectivity that was lost by the railroad and the highway. This site uses the constraints of the city infrastructure to create an exaggerated slope and accommodate circulation system through the park.

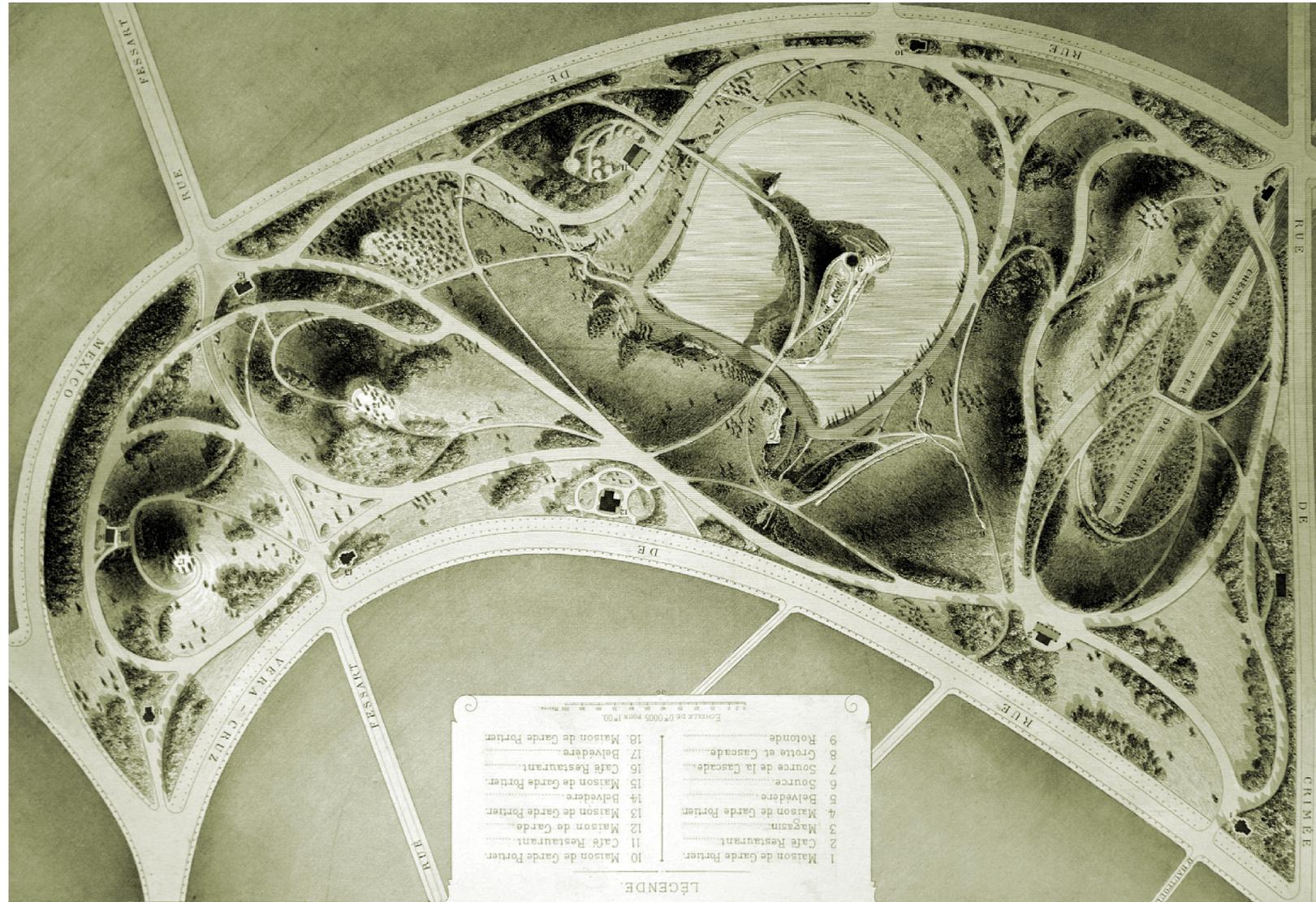


Seattle Olympic Park - Park Connectivity Diagram

# PARC DES BUTTES CHAUMONT PARIS, FRANCE

A previous quarry site, the park was opened in 1867 at the end of the Napoleon regime for the purposes of showcasing the might of the French technological advances. The park "is located in an odd-shaped crescent space between two boulevards. Occupying a scarred landscape containing quarried limestone and gypsum cliffs, the abandoned Mountfaucon gallows and sanitary sewage dump, and a mass grave for those killed during periods of civil unrest" (Pinkley 1958).

When the park first opened it was located on the fringe, clearly overlooked space where the noble part of the society would not go. Today, however, the city absorbed the park. Five metro stations are located within a seven minute walk to the park and a mixed use of buildings surround it. One can walk through the park in order to get to their destination. As Meyer states, "four grass mounts and a rocky island were sculpted from the irregular quarry slopes.

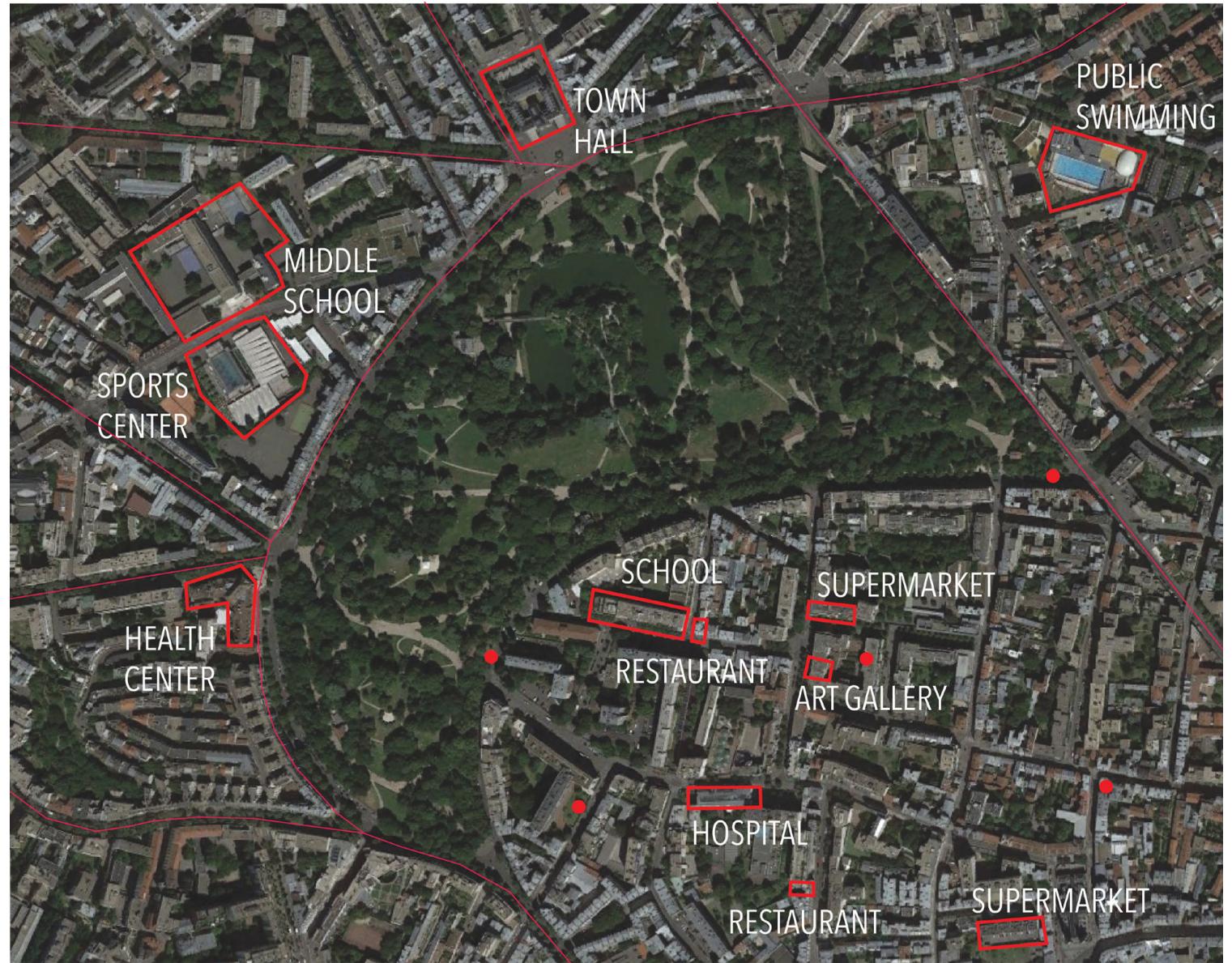


Parc des Buttes Chaumont - Historic Map (Shown Purposefully Upside Down for Comparison with Contemporary Map)



Parc des Buttes Chaumont - Temple de la Sibylle

These mounts, distributed across the park and separated by undulating vales and a pool of water, create a multitude of park centers [...] Each mount's summit reveals a multitude of places from which to view the city" (20). The park presents a unique experience of getting out of the city by providing the green elements and dramatic views of the park, but also serves as a frame for the city - a unique experience that can be integrated into a Parisian's life as part of the movement through the city.



Parc des Buttes Chaumont - Neighborhood Infrastructure Analysis



Parc des Buttes Chaumont - Connectivity within the Park Diagram

Most distinctive features of the park are its meandering paths through wooded areas that lead into the center of the park with the Temple de la Sibylle perched up on a steep cliff overlooking an artificial lake.

“The park’s perimeter contour was outlined with wide carriageways inscribing the base of the park’s four buttes and aligned with perimeter street intersections. A separate, but equal, circulation system gave a flaneur - a 19th century Parisian strolling aimlessly while observing the city’s changing physical and social structure - access to the steep slopes along tightly wound spiral walks to the four summits” (Meyer 19). The park’s circulation patterns are expressed through driveways, walkways, rugged paths, bridges, overpasses and staircases located on the topography varying up to 100 feet between levels. The hard-packed, well-graded bitumen and gravel paths “whose slopes do not exceed 10 centimeters per meters ( a 10 percent slope), but require sometimes staircases, give to foot passengers the means to take short cuts between the carriage drives, and to ascend to the heights of the park without making too long a course” (Komara 34).

Leatherbarrow’s point of needing to level ground in order for it to be habitable (or walkable for the purposes of this work) is partially disproven as photos on the right show a multitude of people inhabiting the park’s steep slopes. At the same



Parc des Buttes Chaumont - Multitude of People on steep slope

time, these slopes are mowed, planted, and generally maintained for public use - in that sense Leatherbarrow's point stands as relative leveling of walkways made this abandoned quarry site habitable.

What is remarkable is the amount of people on the steep slopes of the park which seems to be an initial deterrent because they are hard to walk on, yet, because of the proximity to the larger urban infrastructure, the immediate transition from heavily urban to green space, and the attractive steep topography, the park is widely used.



Parc des Buttes Chaumont - Steep Walkways in the Park

# STAIR FUNCTION

In order to understand how to design for steep topography I needed to understand how the design of a stair can impact the experience of moving through it.

One of the main elements used in city making when dealing with slopes is stairways - a convention that has existed through centuries. When one walks on stairs the motion goes something like this: place one foot in front of the other, with every step feel yourself elevated or

lowered from the previous step, look around - you are probably seeing the neighborhood from a different perspective, your perception of the way ahead is getting more and more concentrated as you are feeling yourself exert energy to move, while at the same time observing the focused view ahead of you as you are getting closer and closer to the landing. Finally, you get at the final landing and you take a break from the pace of walking, maybe breathing heavily, and observing the view in front of you, as well as marveling at your own athletic ability and mentally patting yourself on the shoulder while visually measuring how far you just walked.

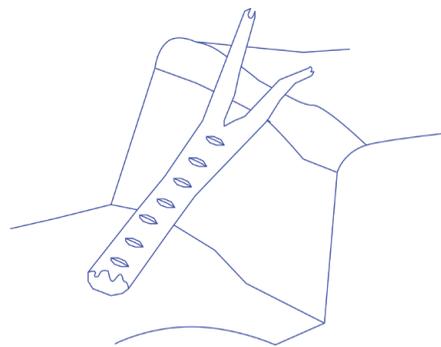
Stair is a simple concept that has existed ever since humans started looking for higher ground. The initial prototype of a stair was a forked tree leaning against a wall with cut out nodes for stepping. A more permanent solution was holes for hands and feet carved into cliffs. Eventually the hatches became a ladder and the ladder became a staircase. The difference between a ladder and a staircase is that one cannot descend with face forward on the ladder, while staircase allows for moving with face forward both up and down.

A stair consists of a riser and a tread. There is a limit to riser and tread widths, which is directly

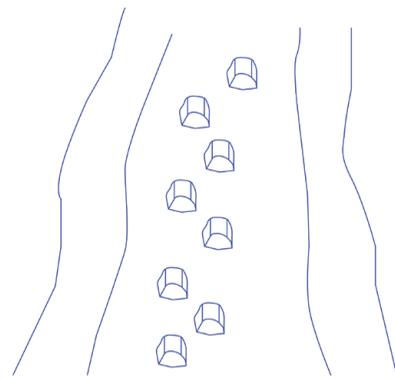
connected to the anatomy of the human body - when the tread is too narrow we can't step up and down face forward (we have to move backwards on ladders). Maximum limit of riser is 8.5" high, minimum limit of tread is 9" width.

The angle of a stair dictates how high the risers are and how fast a person can move through the stairs. The shorter the tread of a stair, the faster a person is signalled to move through the stairs. Wide tread allows a person to slow down and take breaks on the stair (Templer, 1994).

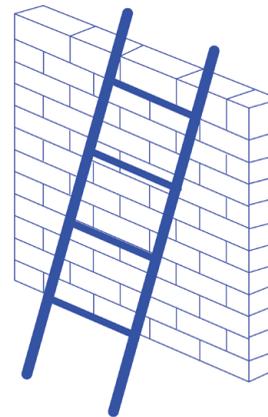
## FROM HATCH ON A TREE TO STAIRCASE



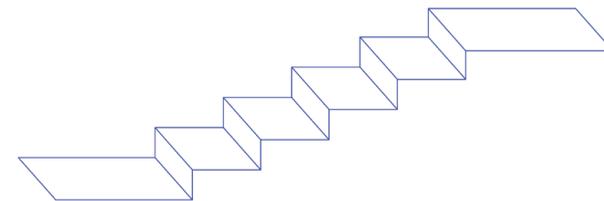
FORKED TREE OVER CLIFF



ALTERNATING TREAD HATCHING



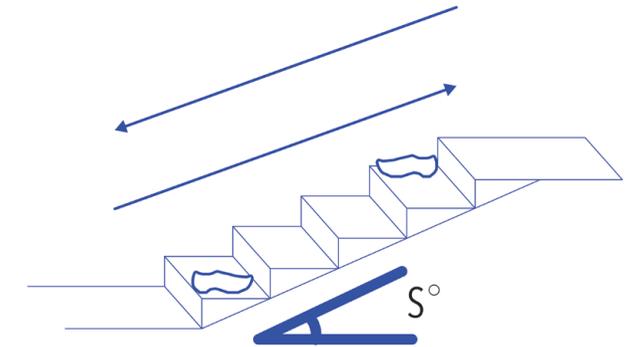
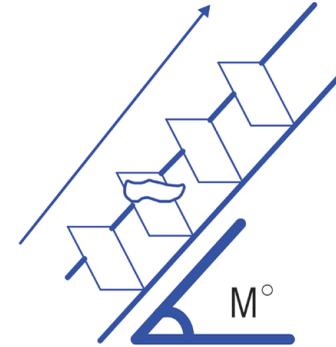
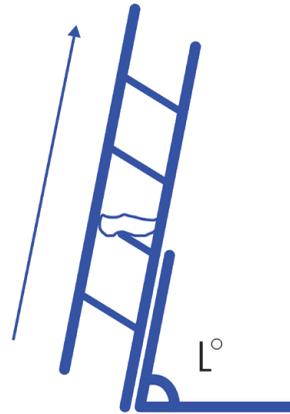
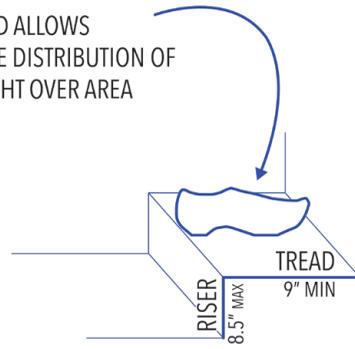
LADDER



STAIRCASE

# STRUCTURE AS DICTATED BY DISTRIBUTION OF WEIGHT FOR HUMAN ANATOMY

TREAD ALLOWS MORE DISTRIBUTION OF WEIGHT OVER AREA

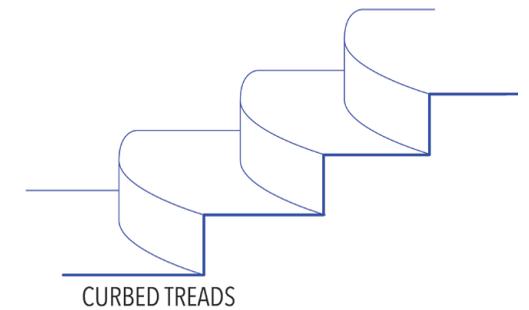
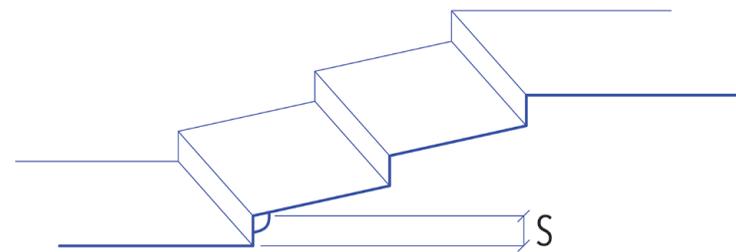
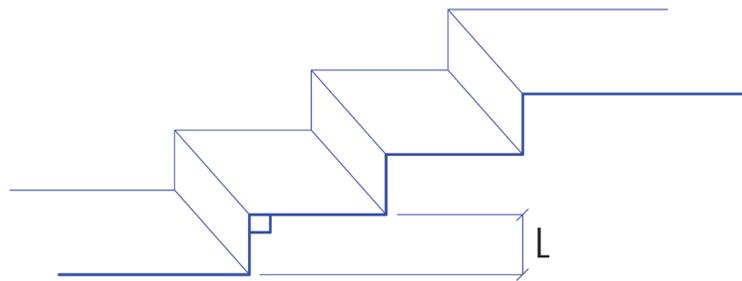


DESCEND BY BACKING DOWN

DESCEND BY FACING FORWARD

TREAD + RISER + ANGLE = STAIR

RAMPING OF TREADS REDUCES HEIGHT OF RISERS



People experience the volume of the surrounding environment through physical elevation in space, thus, the need to concentrate on the placement of foot on the tread forces us to concentrate on the moment of passing through stairs. The number of steps in one run dictates which foot will be used - same or differing.

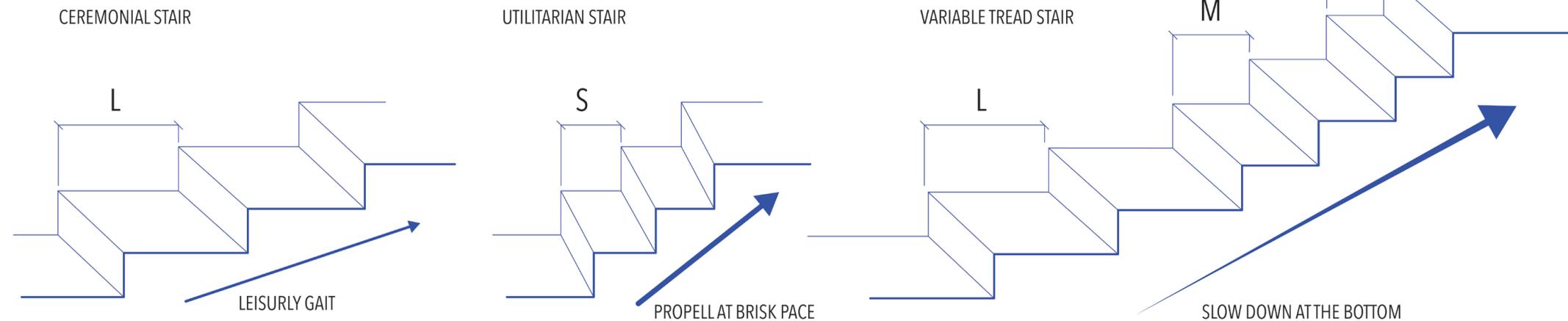
Change in the number of steps in one run from another disrupts the rhythm of walking and can create a tripping hazard. Changes in landing widths between stair runs also changes the rhythm of walking and can indicate the change in pace of walking.

Throughout the history of stairs several distinct innovations are of note. Change in the width of treads in one run can signal slowing down as one moves closer to the wider treads. The vertical elements above the stair can frame the view of the person and create a visual focus of the experience of moving through the stair. Similarly, the view can be directed towards the wall or away from it to the expansive view at the stair, for example.

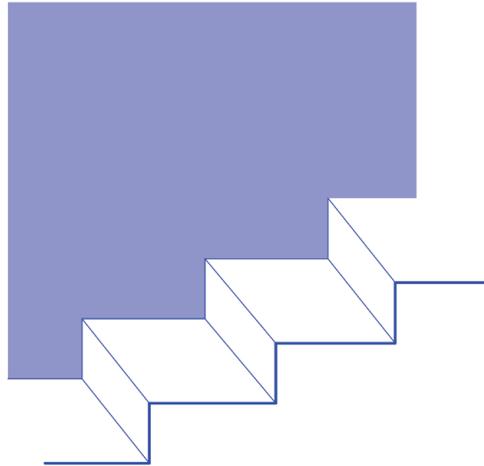
When there is a need for pivoting the stairs, a helical stair allows for circular movement around the stair core, or the newel (Templer, 1994).

## STAIR INNOVATIONS

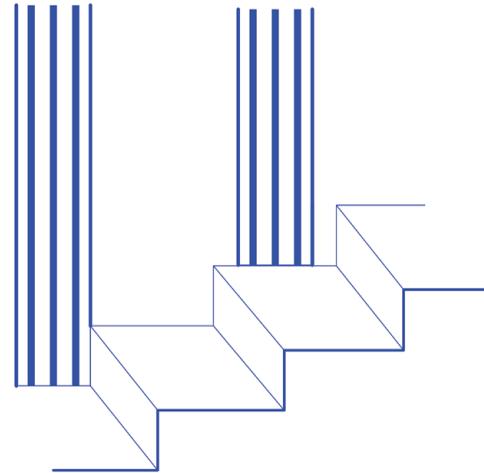
### WIDTH OF TREAD



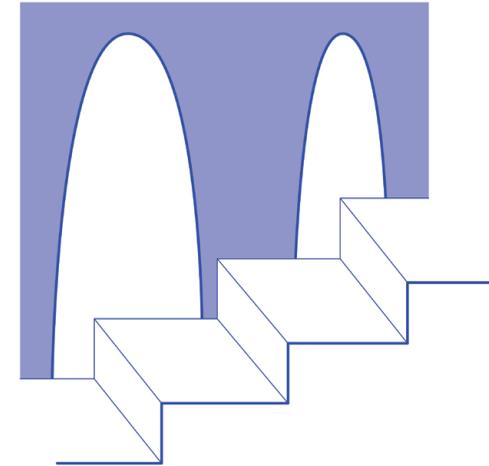
## VERTICAL ELEMENTS



WALL - VISUAL FOCUS OF EXPERIENCE

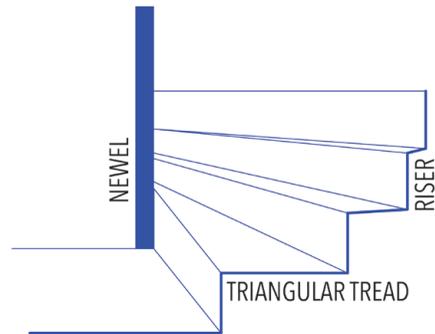


COLUMNS - RHYTHM

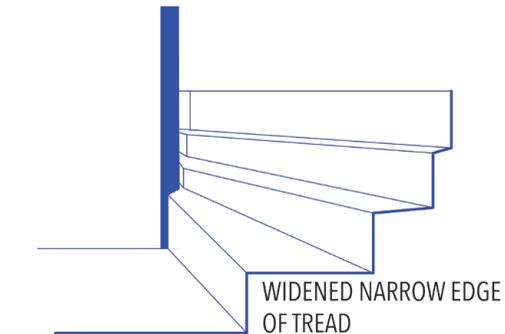


ARCH REDUCING IN SIZE FOR FORCED PERSPECTIVE

## HELICAL STAIRS

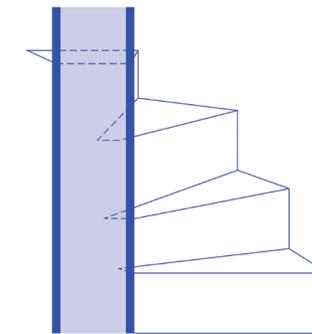


HELICAL STAIR



DANCING HELICAL STAIR

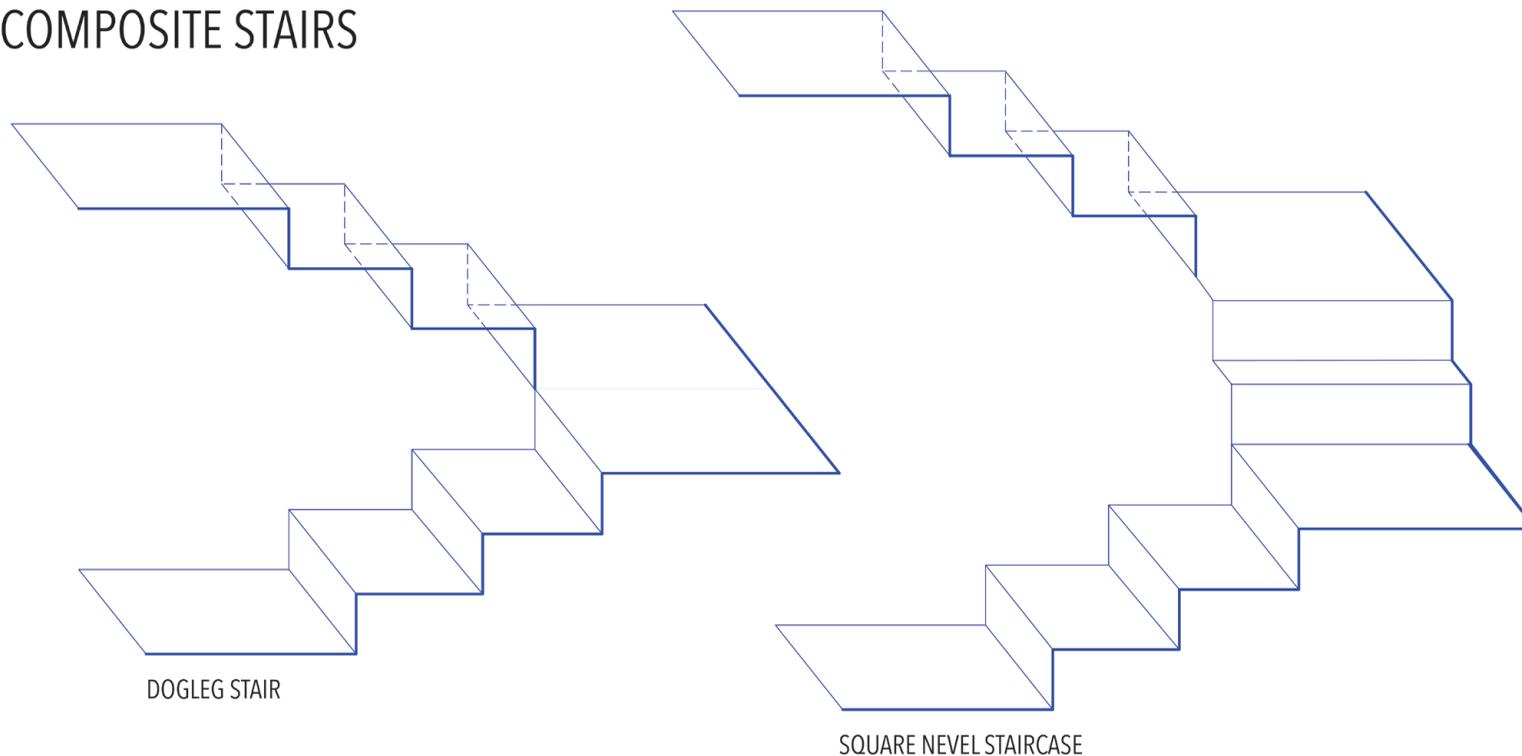
WIDENED NARROW EDGE OF TREAD



OPENED EYE OF STAIR

With the development of technology and building materials, stairs have been transformed into composite structures that direct the person from one level to another via a route that can allow one to move back and forth, or around a square center, or even allow the movement to be centered on an axis, such as to enhance the experience of moving through space. All these innovations allow the experience of moving through space with determination dictated by the designer (Templer, 1994).

## COMPOSITE STAIRS



DOGLEG STAIR

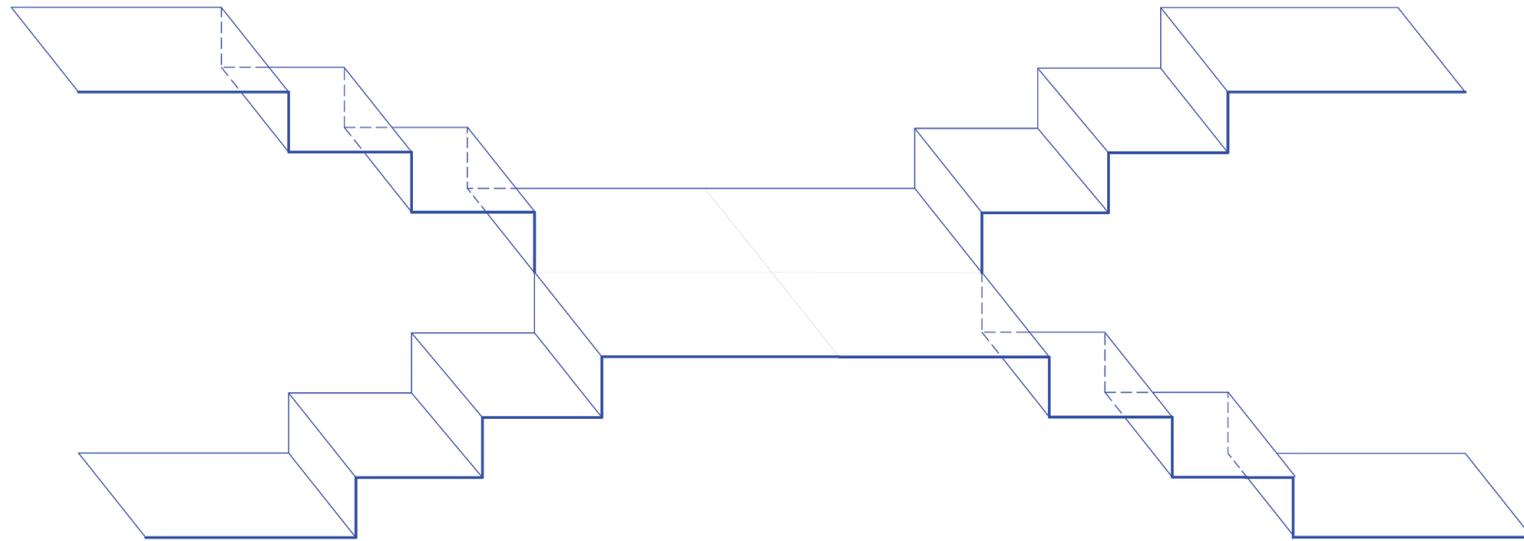
SQUARE LEVEL STAIRCASE

## PHENOMENA

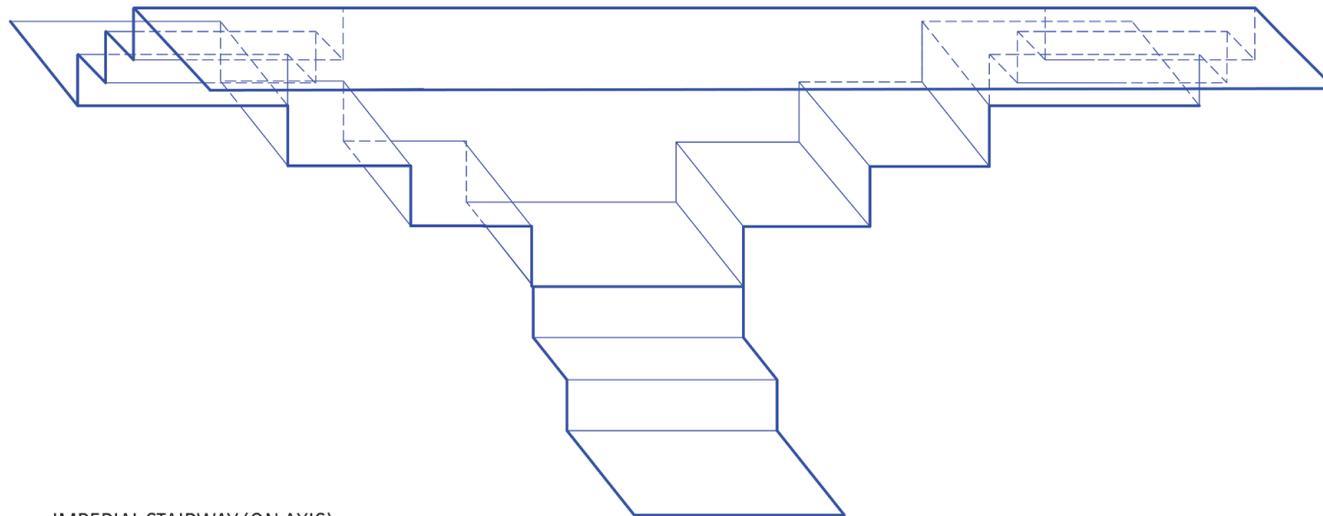
SUSPENSION IN SPACE  
CANTILEVERED IN SPACE  
HELD BETWEEN GROUND AND SKY

↓  
NEED TO CONCENTRATE ON GAIT

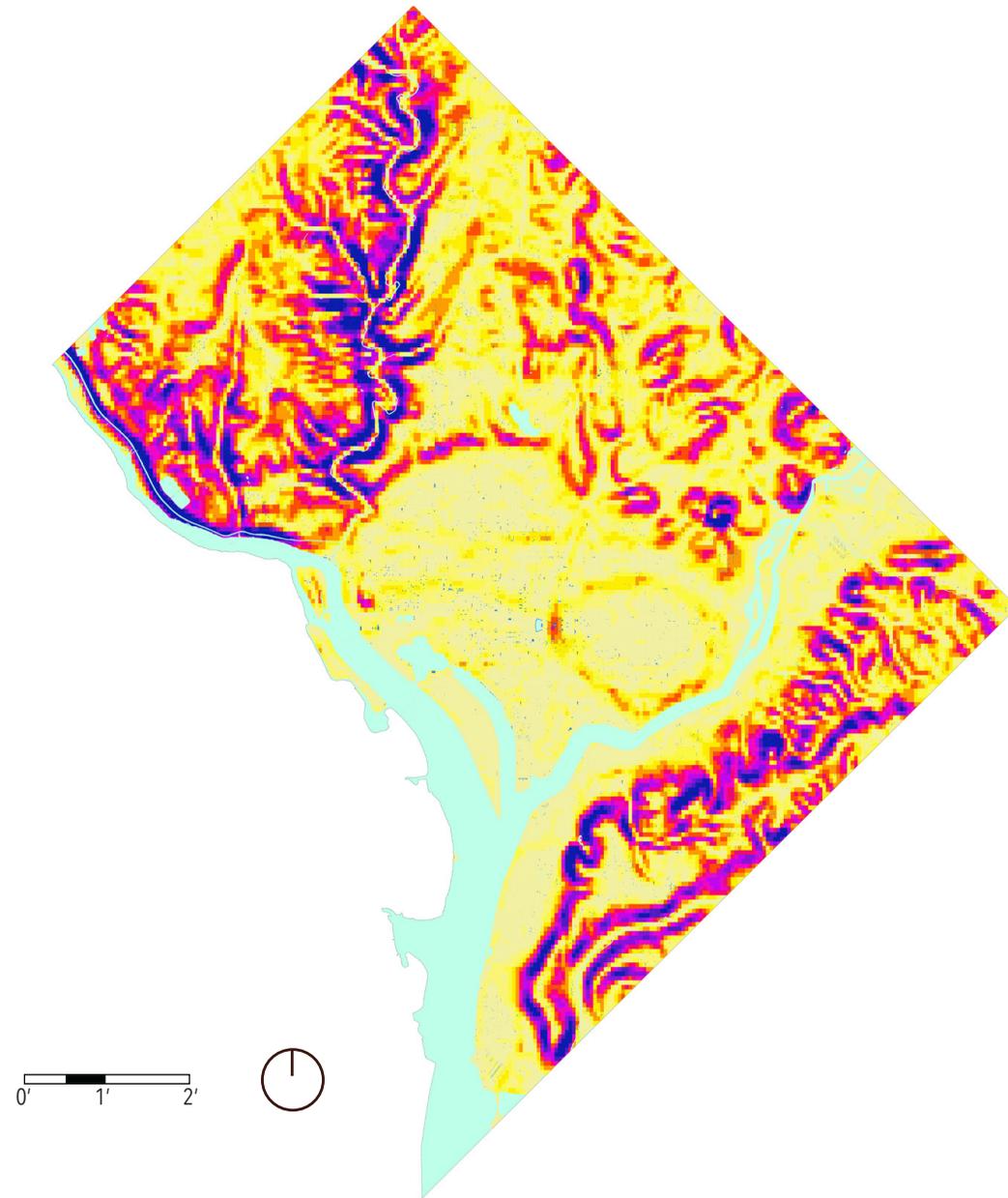
↓  
PRESENCE IN THE CURRENT MOMENT  
BREAKING OF PACE



OVERTURNED H (AWAY FROM AXIS)



IMPERIAL STAIRWAY (ON AXIS)



slope percent

- <8
- 9-15
- 16-20
- 21-25
- 26-30
- 31-35
- 36-40
- 41-45
- 46-50
- 51-55
- 56-60
- 61

Washington, DC - Slope Analysis

## SITE SELECTION

In order to find the site where the ideas of walkability through steep terrain can be explored through design, I analyzed the topography of Washington, D.C. through the means of ArcGIS program. The map on the left reveals large sections of land where changes in topography are steep - sections in non-yellow color are topography changes with slope exceeding 8.33% slope.

Two distinct areas with ridges are in the North West part of Washington, D.C. along the Potomac River and the Rock Creek, and the South East (SE) part of Washington, D.C. Along the Anacostia River. I was intrigued by the South East Ridge because the area is largely underdeveloped and I am curious to study this part of the city.

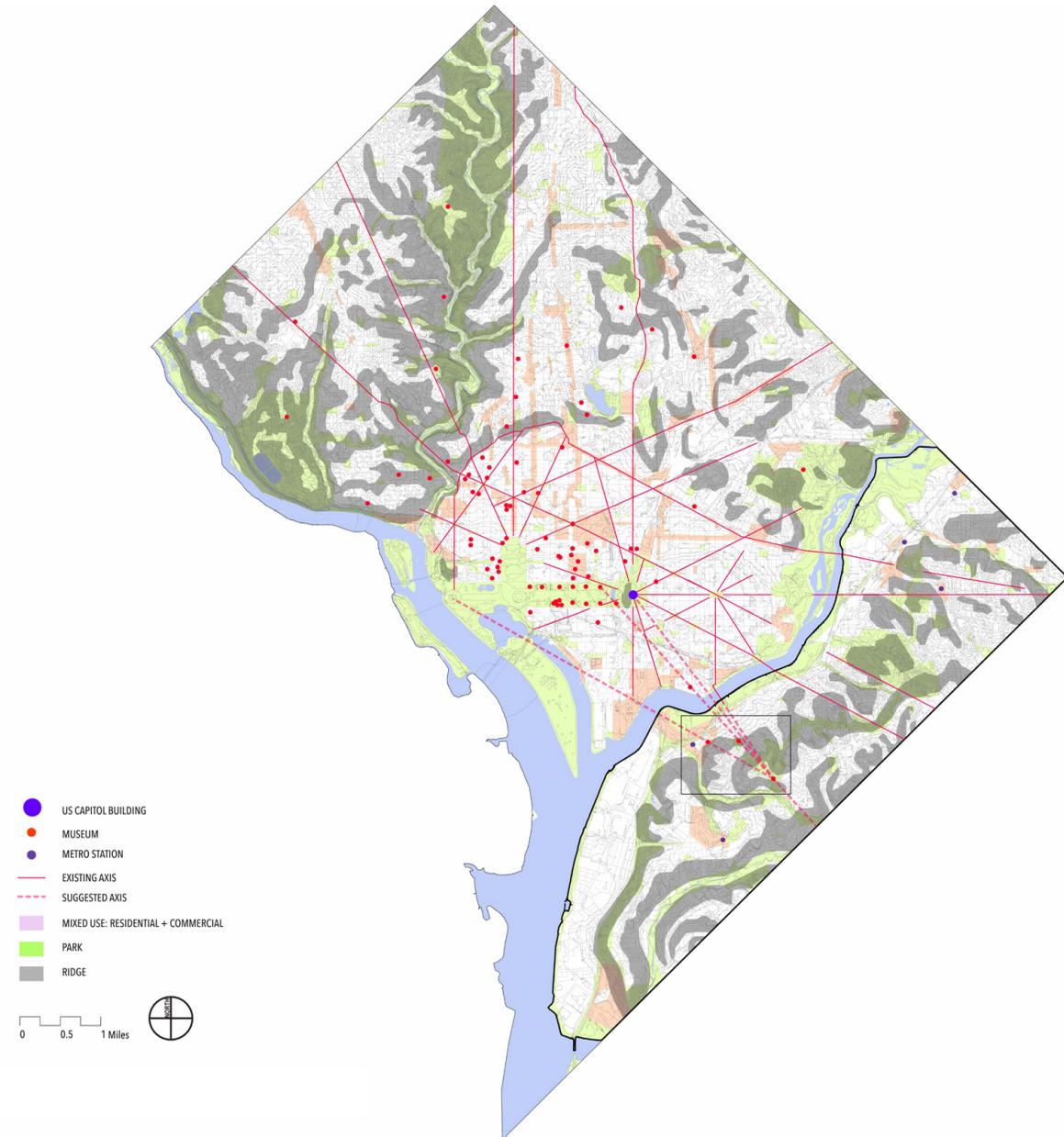
Analysis of infrastructure of Washington, D.C. reveals a pattern of street development based on the original L'Enfant Plan of Washington. "L'Enfant developed a Baroque plan that features ceremonial spaces and grand radial avenues, while respecting natural contours of the land. The result was a system of intersecting diagonal avenues superimposed over a grid system" (National Park Service). These diagonal avenues extend beyond the original border of the Federal City to the city border. In some cases, the avenues continue in a

linear fashion disregarding the natural topography of the landscape, and in other cases the roads adjust to the topography.

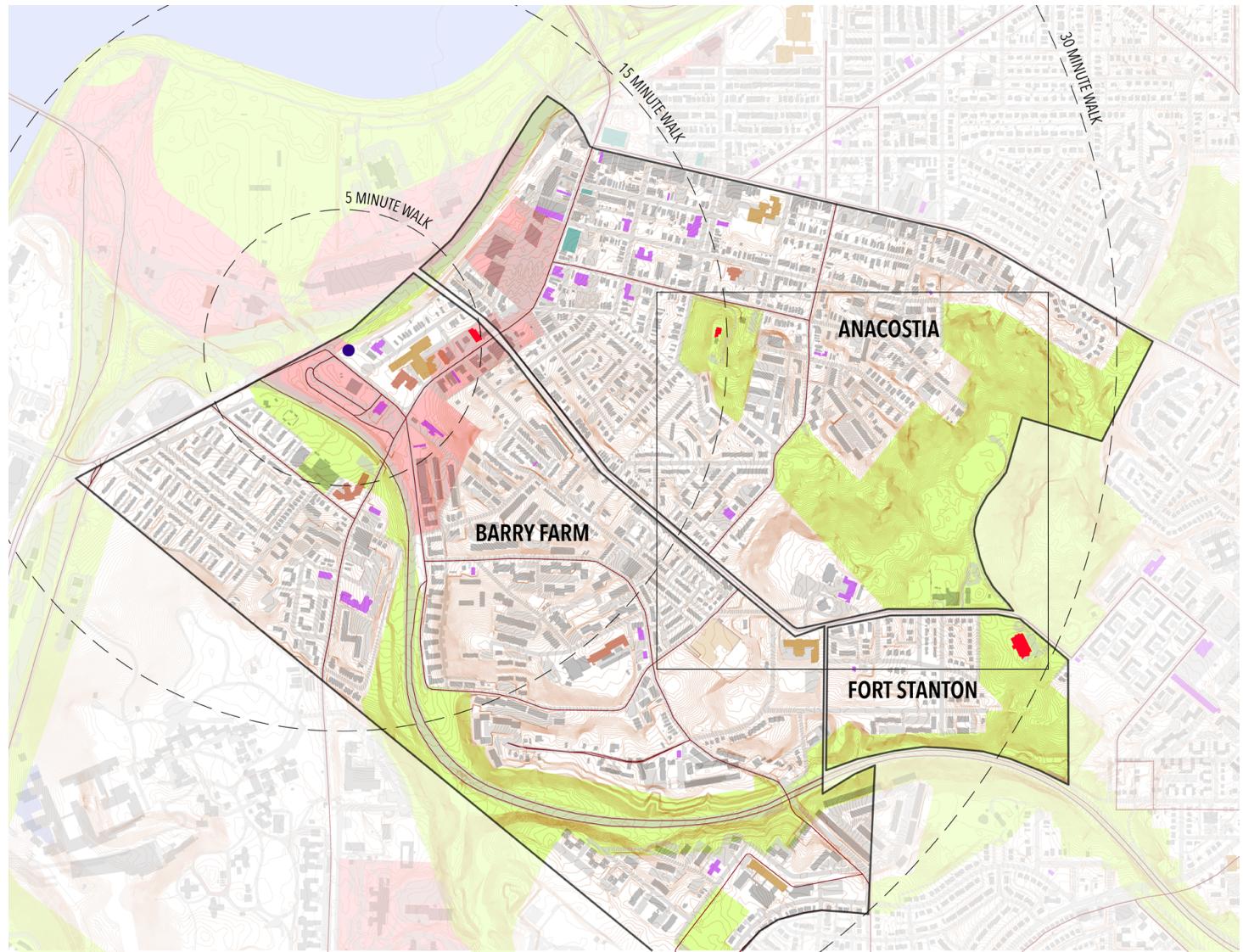
In the case of SE ridge, few roads follow the geometry set in the core of the city. The reason for that is dual: SE portion of the Anacostia river became an official part of Washington, D.C. in 1878, eighty eight years after the city's founding in 1790; and the physical separation by the Anacostia River and the steep topography prevented large excavations, thus only few roads follow the strict linear geometry radiating from the Federal Core.

When examining the infrastructure in the SE ridge, it turns out that there are three museums located East of Anacostia, and all three museums are within a 30-minute walk from the Anacostia Metro Station. Additionally, the museums are located on axes that lead to the National Mall.

The three museums are America's Islamic Heritage Museum, Frederick Douglass National Historic Site, and Smithsonian's Anacostia Community Museum.



Washington, DC - Slope, Street Grid, Museums, Land Use Analysis



The museums are located in the Anacostia, Barry Farm, and Fort Stanton neighborhoods of Washington, D.C. The urban fabric of the area shows an area for mixed-use land near the Anacostia metro station and park land crossing the neighborhoods.

Frederick Douglass National Historic Site and Anacostia Community Museum (indicated by red color on the map to the left) are located within fifteen minutes of walking from one another, yet, there is no direct connection between these two important institutions. The two museums are separated from each other by 150 feet of elevation with parkland occupying a large part of that area.

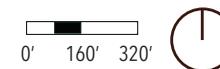
South East D.C. - Urban Fabric Analysis

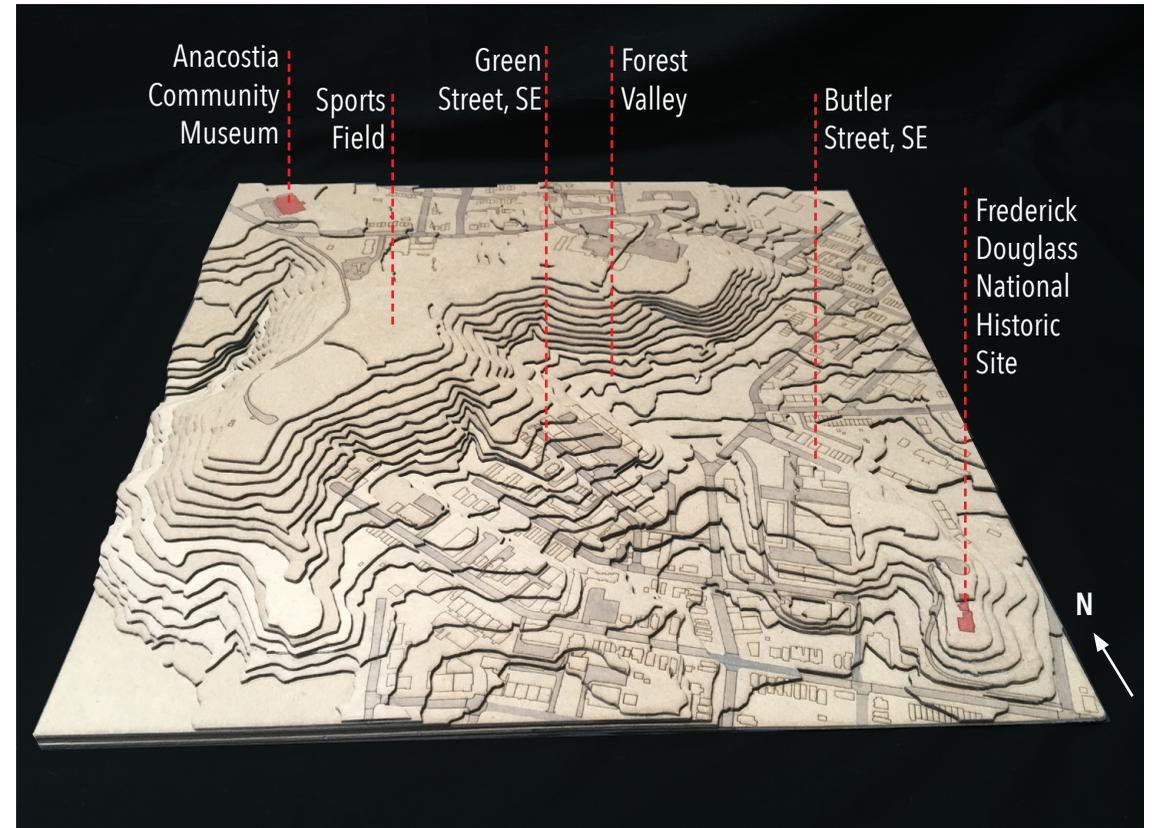
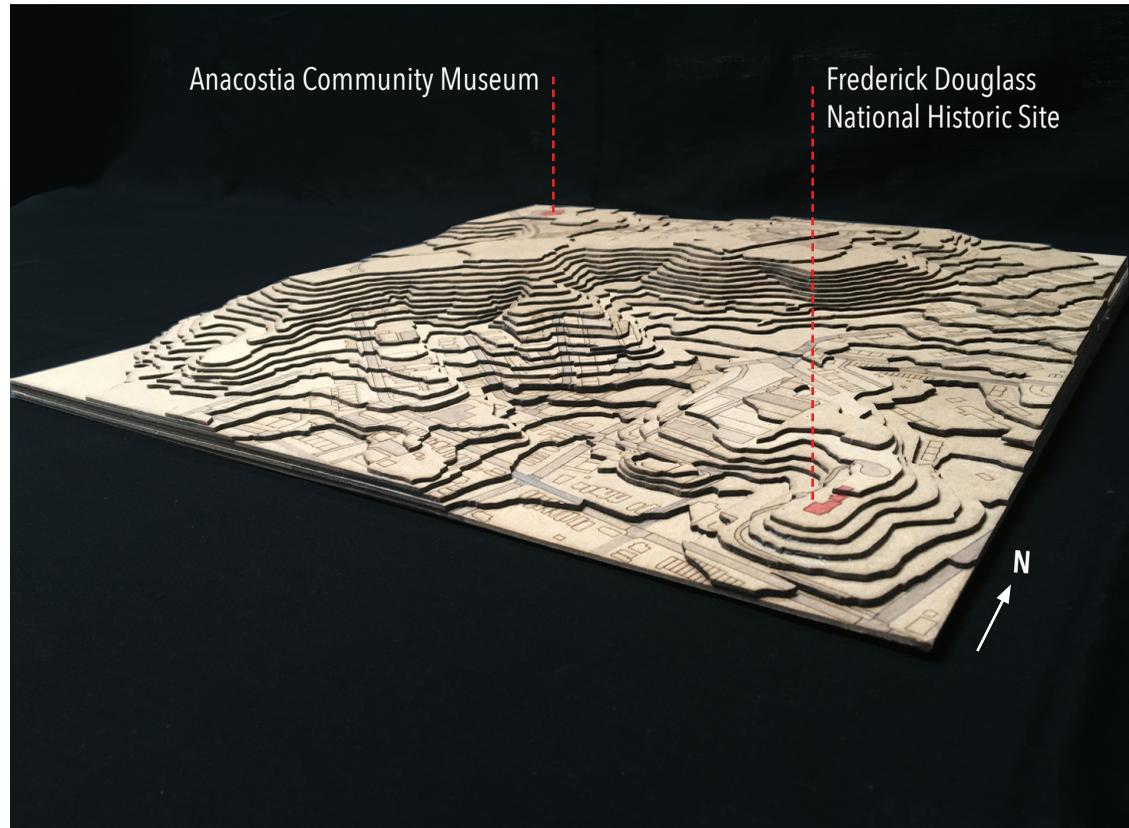


A closer look in the area between the Frederick Douglass National Historic Site and Anacostia Community Museum reveals several important neighborhood institutions, such as a recreation center and playground, a community garden, two elementary schools, and a church. In addition, a mature forest grows on the forest land, which could be a big attraction for the area but is currently inaccessible.



Anacostia Neighborhood Infrastructure





Site Model - Topography Changes and Infrastructure on Site



Frederick Douglass National Historic Site Building  
(View 1 on Narrowed Site Plan, p. 27)



View to Federal City Core from the Frederick Douglass National Historic Site  
(View 1 on Narrowed Site Plan, p. 27)

## SITE PHOTOS

Site visit of the area revealed valuable views and cultural buildings in the area, such as the Frederic Douglass House and the view from it towards the federal core of Washington, D.C.

A closer look at the forest fringe reveals a unique view of the federal core from the top of Green Street, SE (bottom left). The street is located on top of a ridge and is at significantly higher elevation than the neighboring streets. The slope at the street is 12.5%. The street dead ends at the edge of the forest. The forest edge itself shows informal pathways, soil erosion, and general littering of the forest (bottom right). These signs indicate that the forest is not cared for and is likely a site for anti social behavior.

Inside the forest, the trees are healthy and mature with established canopy and understory layers. The transition between the urban and

forest conditions is quite dramatic and has the potential of being a major attraction (top right). The topography reveals a large valley next to the ridge.

At the top of the elevation, an existing sports field borders the forest (right bottom). The sports field is well maintained and Anacostia Community Museum is visible from a road connecting the field to the main road.



View of Butler Street, SE from Frederick Douglass National Site  
(View 2.1 on Narrowed Site Plan, p. 27)



View of Federal City Core from Green Street, SE  
(View 4.1 on Narrowed Site Plan, p. 27)



View of Forest from Green Street, SE  
(View 4.1 on Narrowed Site Plan, p. 27)



View of Forest Valley (View 6 on Narrowed Site Plan, p. 27)



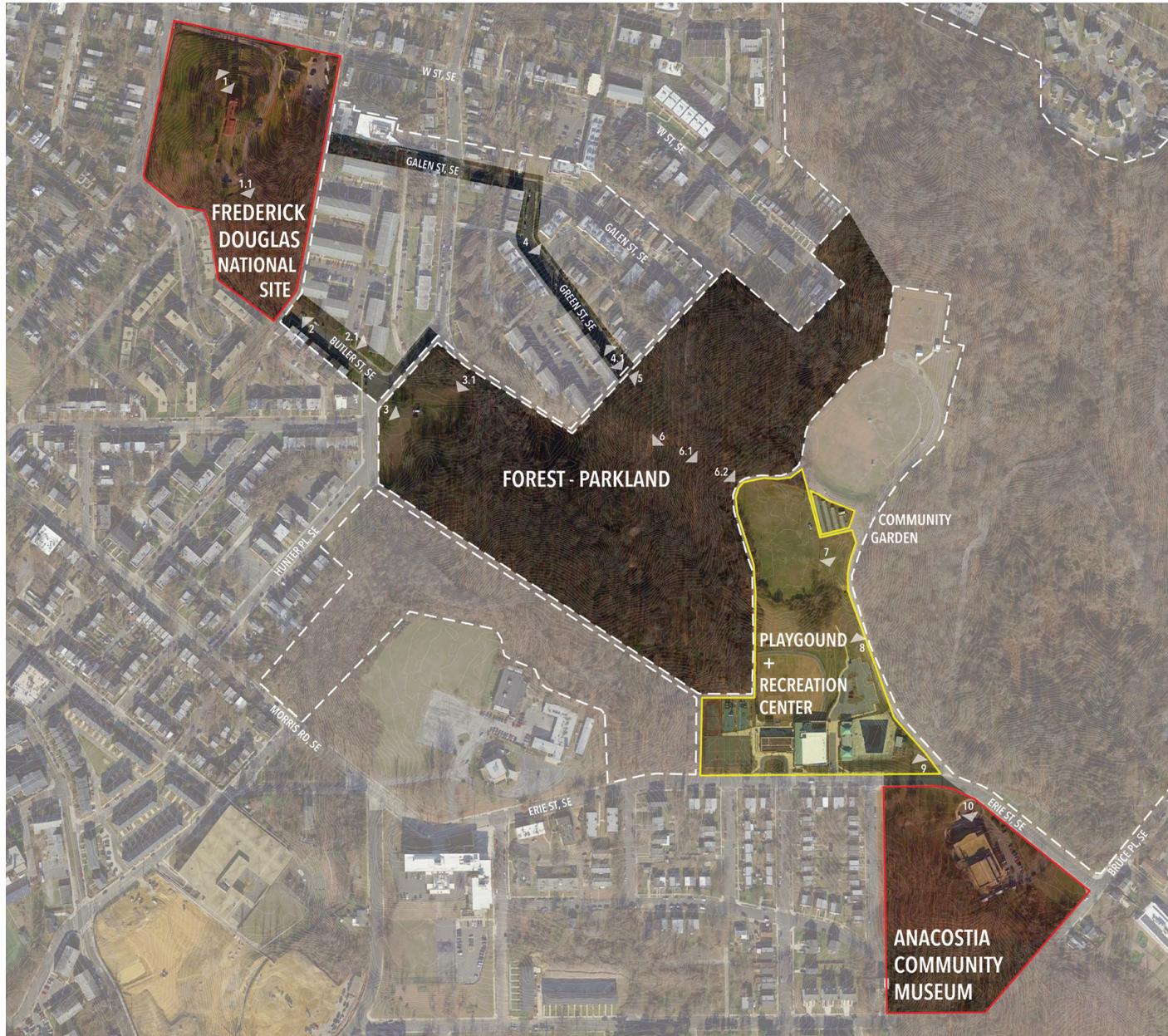
View of Anacostia Museum from Sports Field (View 7 on Narrowed Site Plan, p. 27)



View of Sports Field from Anacostia Museum (View 8 on Narrowed Site Plan, p. 27)



View of Anacostia Community Museum (View 10 on Narrowed Site Plan, p. 27)



# NARROWED SITE MAP

To explore designing connections through steep topography the site was narrowed down to the connections between the two museums through Galen Street, SE, Green Street, SE, and Butler Street, SE, the parkland, the sports field and adjacent recreation center.

Narrowed Site Map





# DESIGN PROPOSAL

The design of the pathways between Frederick Douglass National Historic Site and the Anacostia Community Museum includes a dual approach to dealing with steep topography.

One approach is a reference to the linear design of Washington, D.C. with the extension of straight street geometry from the federal core to the edges. As such, I am proposing to connect the Frederick Douglass Museum to the Anacostia Community Museum via two additional routes - a linear path through Galen Street and Green Street and a curvilinear path through Butler Street.

At the point where Green Street borders the forest, I am proposing to extend the street into the forest and bring the line through the forest, to the athletic field and to the Anacostia Community Museum, which aligns with the direction of the street.

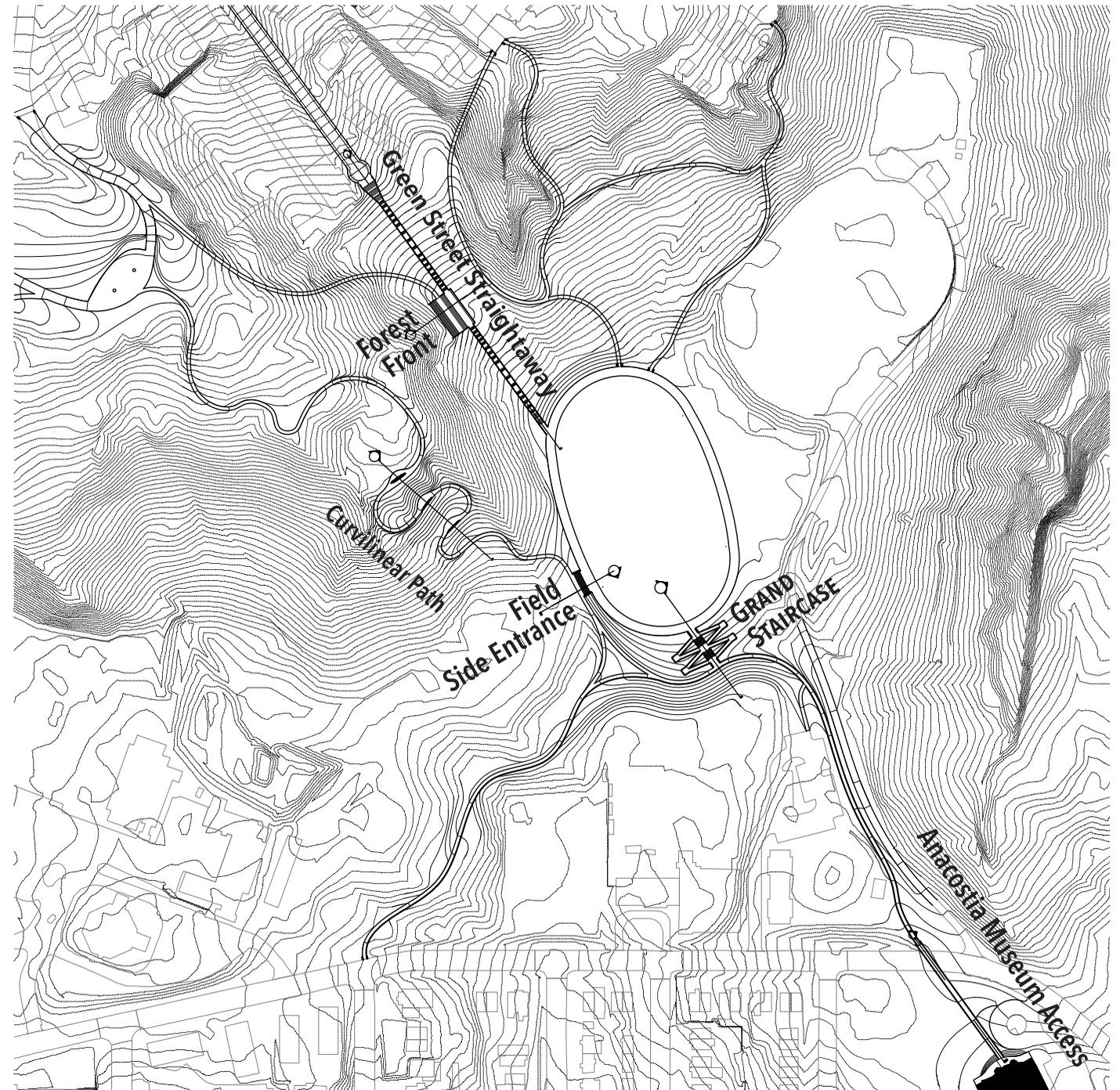
The curvilinear path extends Butler Street into the forest. The curvilinear path is responsive to the topography of the landscape with the maximum slope of 12.5% and accentuates the existing valley in the forest and allows for gradual movement around the valley and joining the linear path at the top elevation.



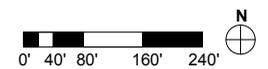
Site Plan

An existing sports field at the top of the elevation is accentuated with an oval pathway that leads to a grand staircase located on axis with the Anacostia Community Museum. Additionally, the sports field becomes the center point between the museums and the neighborhood, and allows for a new space of gathering.

Access to the Anacostia Community Museum is redesigned to accentuate the linear connection of the museum to the federal core of the city, and connect the museum to the neighborhood located on the other side of the forest.



Enlarged Site Plan - Major Access Points





In making adjustments to the topography of the landscape, I paid attention to making minor changes in topography in order to minimize disturbance on the site. The proposed Topographic plan illustrates the design intent for the park with topography lines being adjusted fairly slightly and close to the extents of design intervention.

# PLANTING PROPOSAL

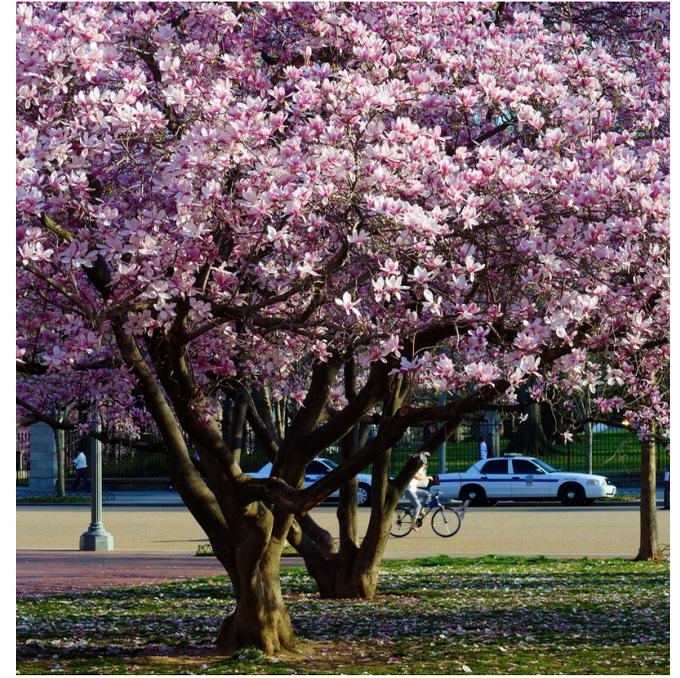
The planting proposal includes tulip trees (*Liriodendron tulipifera*) along the paths in the forest. The reason for the selection of tulip trees is that the species rapidly grows to 80' high and provides a distinct vertical element to the design. Evergreen trees along the axis path near Anacostia Community Museum are magnolis trees (*Magnolia grandiflora*). Flowering trees along neighborhood streets and around the oval path are Chinese magnolia trees (*Magnolia X soulangeana*) which follows the tradition of celebrating seasonal blossoms in Washington, D.C. Low-laying shrubs along the curvilinear paths are *Forsythia*. Perennial plants at the top grand staircase are *Rudbeckia hirta*.



Tulip *Liriodendron tulipifera*



Magnolia *Magnolia grandiflora*



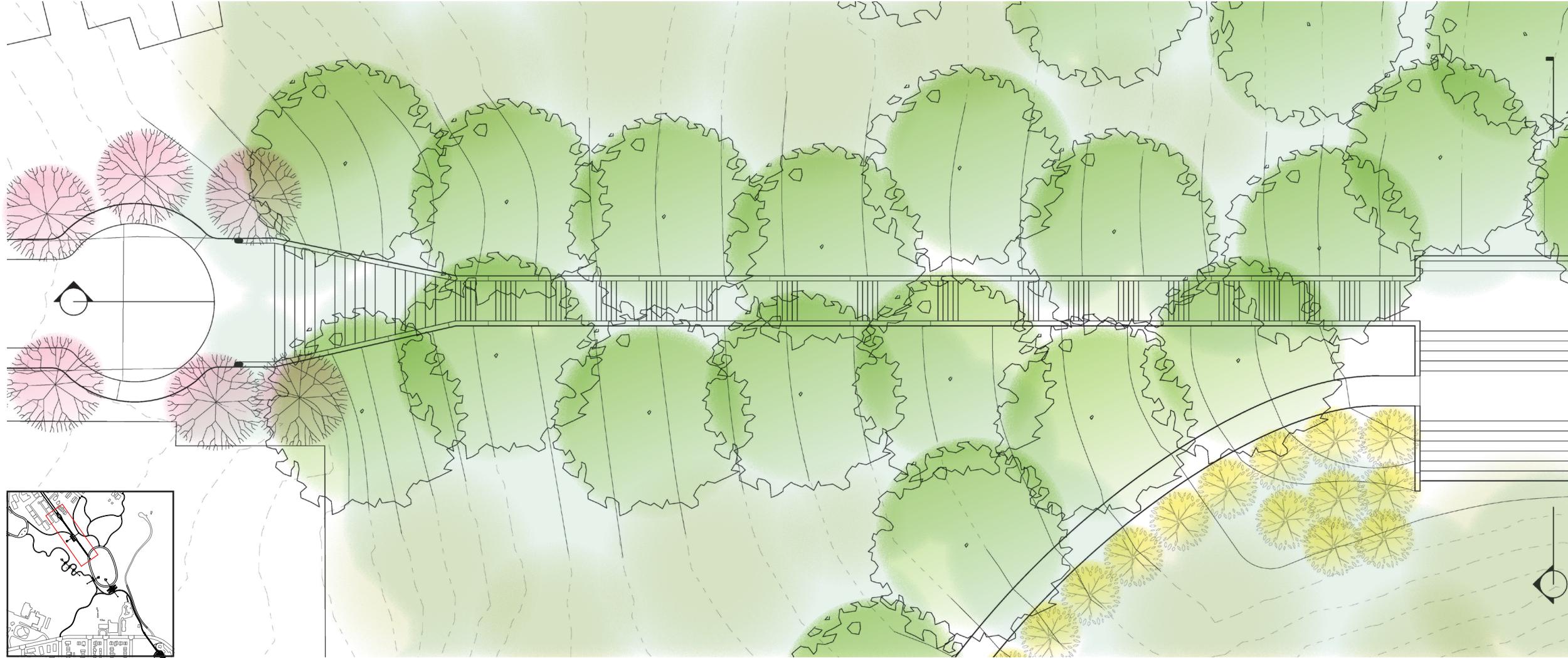
Chinese magnolia *Magnolia X soulangeana*



Forsythia



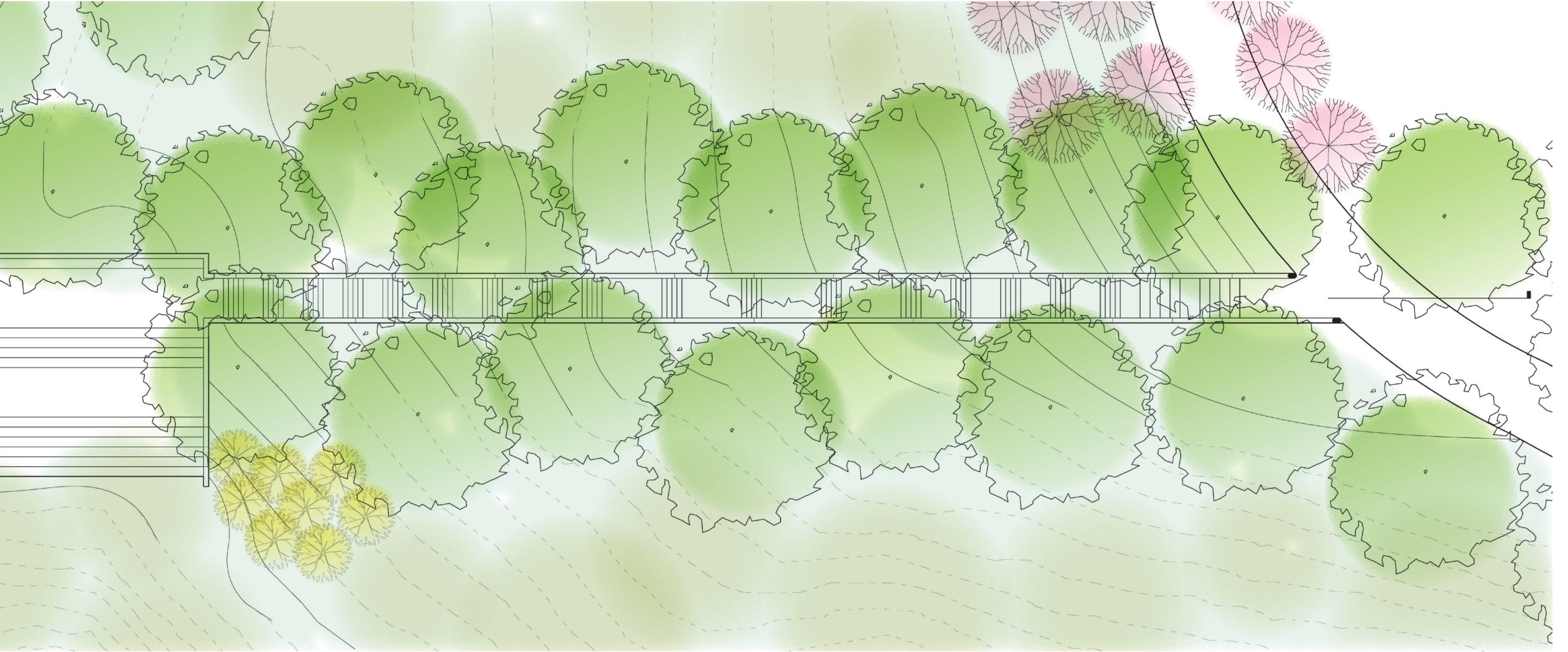
Rudbeckia *Rudbeckia hirta*



## GREEN STREET STRAIGHTAWAY

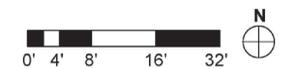
The Green Street Straightaway is designed as an extensive staircase that connects Green Street with the athletic field at the top of the forest. A roundabout at the foot of the staircase, reminiscent of the Spanish Steps in Washington, D.C.'s Dupont Circle neighborhood, formulates an important mini-plaza connecting

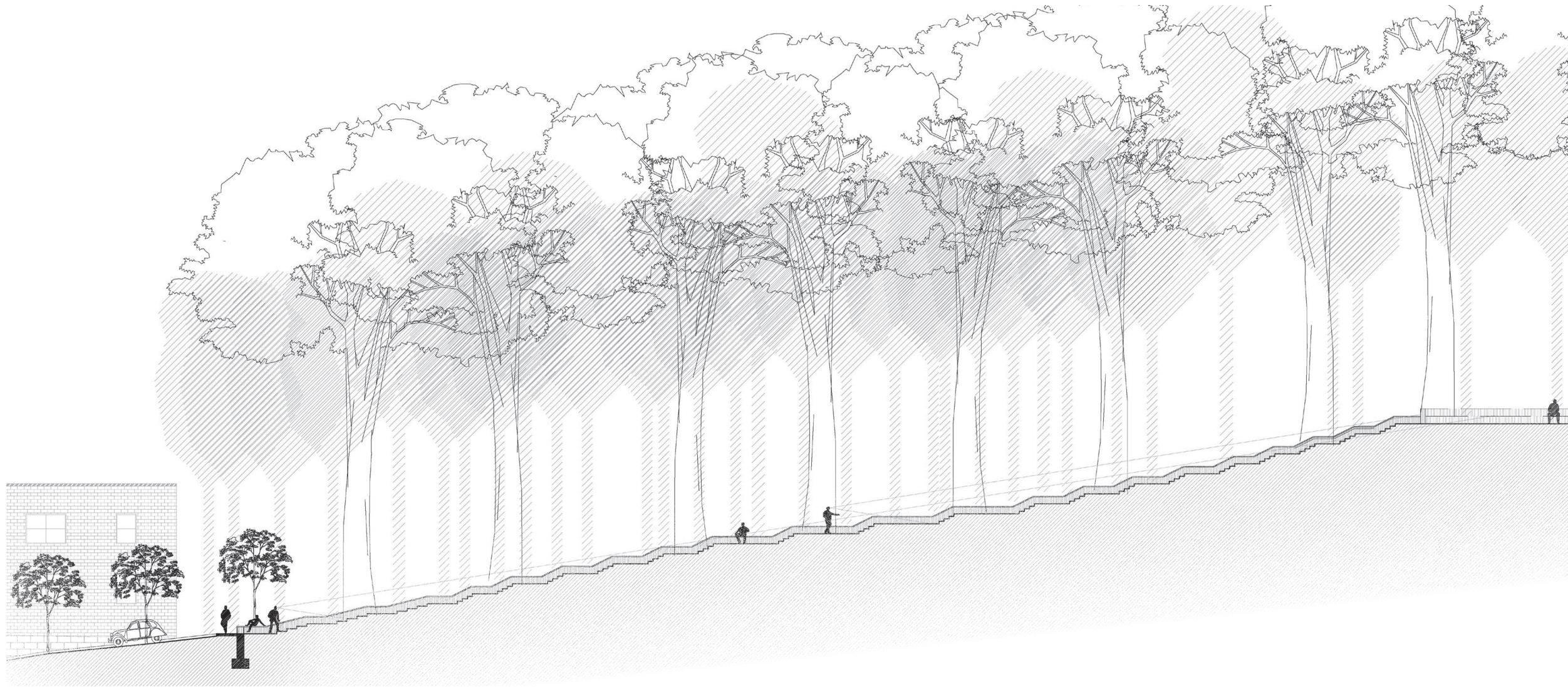
the urban condition with the forest. Borrowing from the form of Campidoglio in Rome, the stair widens from 8' to 25' to frame the view of the federal core while the tread width widens to two feet to allow for slow pace of movement and ability to sit on the stairs. The variations between landing widths are designed



to propel a person to the middle of the forest and slow down once the person is inside of the forest. As one progresses from the bottom of the stair the length of landings changes from 4' to 6' to 12'. As a person moves into the forest, the tread width switches to one foot in width to signal faster pace of movement. Midway

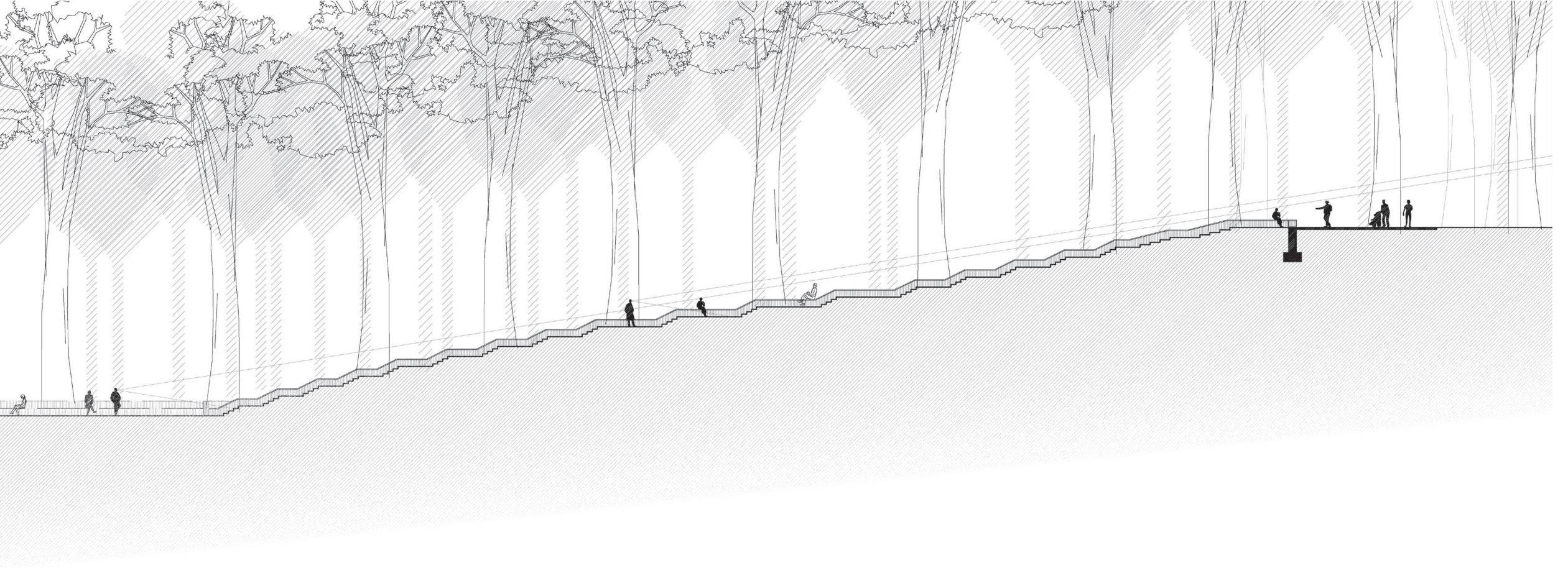
through the staircase, a Forest Front staircase formulates the important point of being mid-way through the journey and allows the person to rest. The Forest Front is directed towards the forest valley and becomes a forest front (like a river front), and allows for a moment of observation and contemplation at the forest.





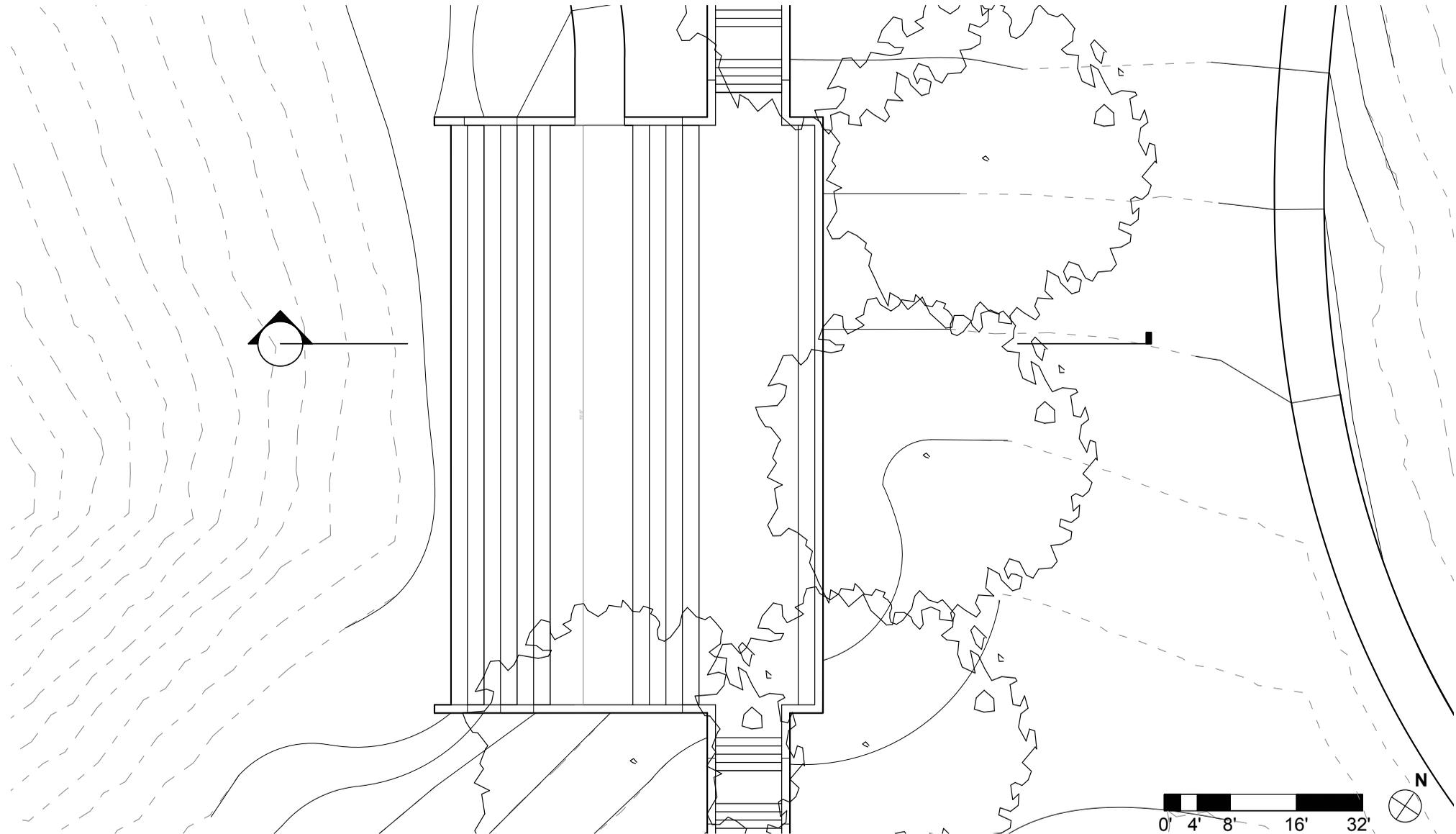
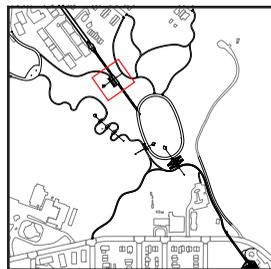
A longitudinal section through the staircase reveals the pattern of travel from narrower to wider landings and the relationship with the cone of vision. This design decision is influenced by the "variable-tread steps at Vaux-le-Vicomte, outside Paris" (Templer 24, 1992). The design of the landing

widths can be split into four parts with narrow landings and narrow treads propelling the person up and as the topography gets steeper, the landings become wider allowing the person to rest between stair climbs. Midway between each end of the stair and the middle forest front observation area, the



width of landings widens to 12' to allow rest and slower pace of the gait. The height of the retaining wall along the stair path is designed to be at 1.5' height to allow seating at any point on the journey through the staircase and allowing additional rest spaces. At the mid-way point at the Forest Front

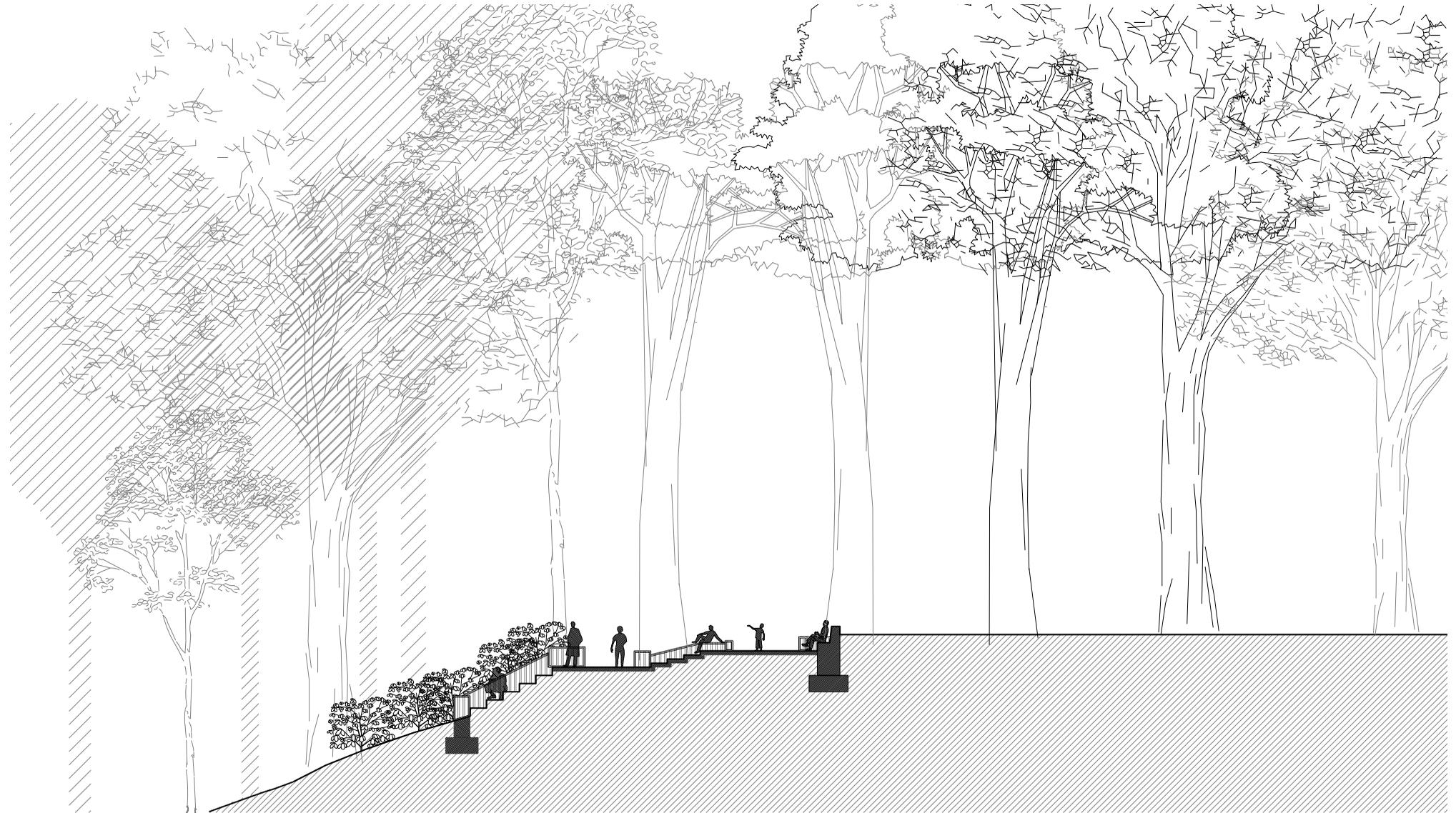
observation area, the seating wall is designed to retain soil on the forest side and allow enclosed seating on the stair side. At the point of joining the linear and oval paths at the top of the elevation, a low-height post indicates entrance to the linear path and allows for additional seating.



## FOREST FRONT STAIRCASE

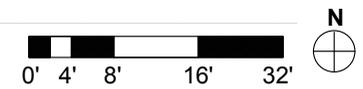
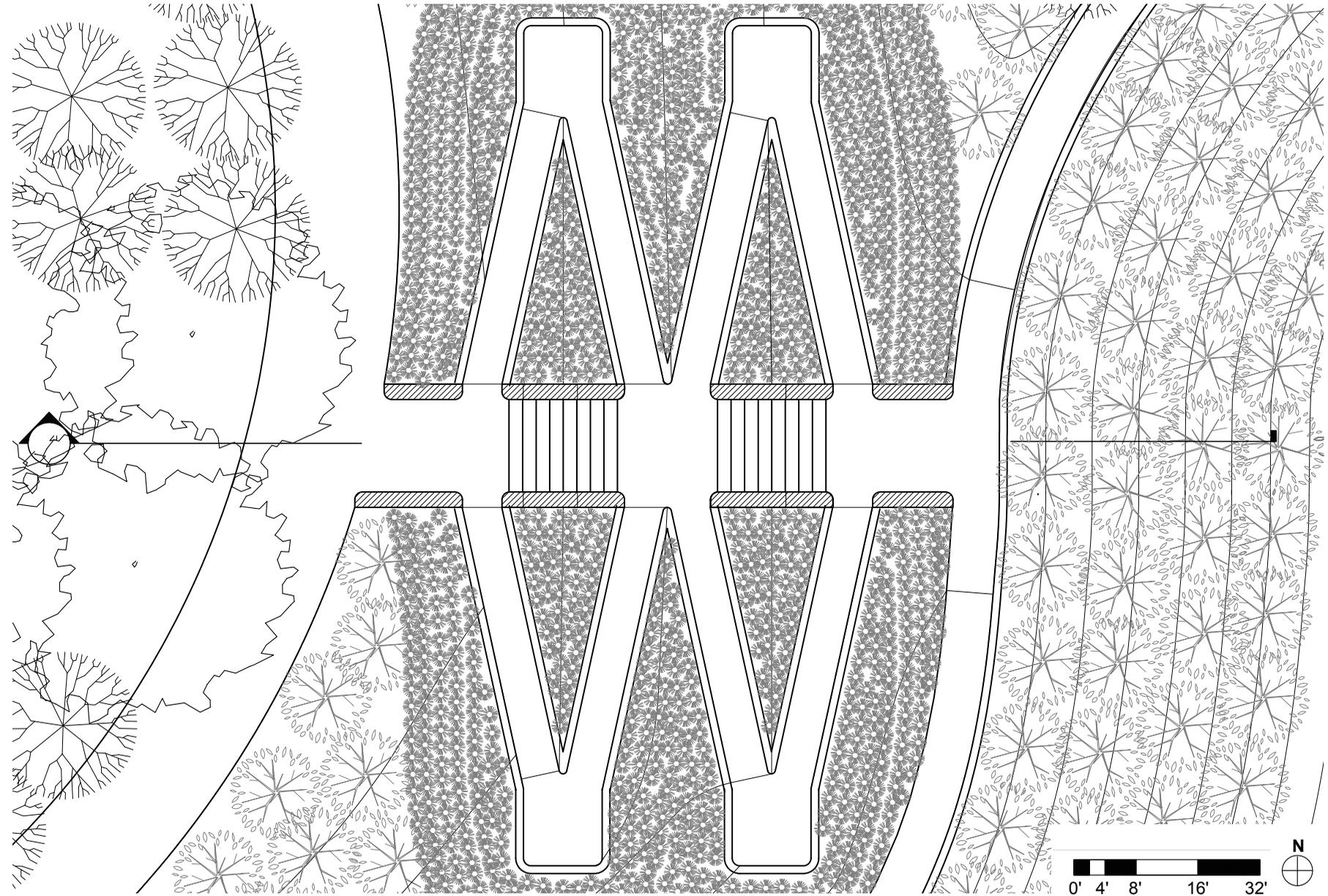
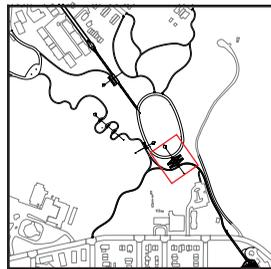
Forest Front Staircase is located mid-point through the Green Street Straightaway and features a 70'x30' observation area with 6" high

stairs between two levels that connect the linear path with a secondary curvilinear path. Like Chkalov Staircase, this staircase is designed to



attract people for the view of the forest - in this case the forest, rather than the river. A lower level set of stairs provides seating and an amphitheater into the valley of the forest. Lower level risers measure

at 1' which allows for comfortable seating and transition into the forest. One can easily walk into the non-designed part of the forest through this staircase.

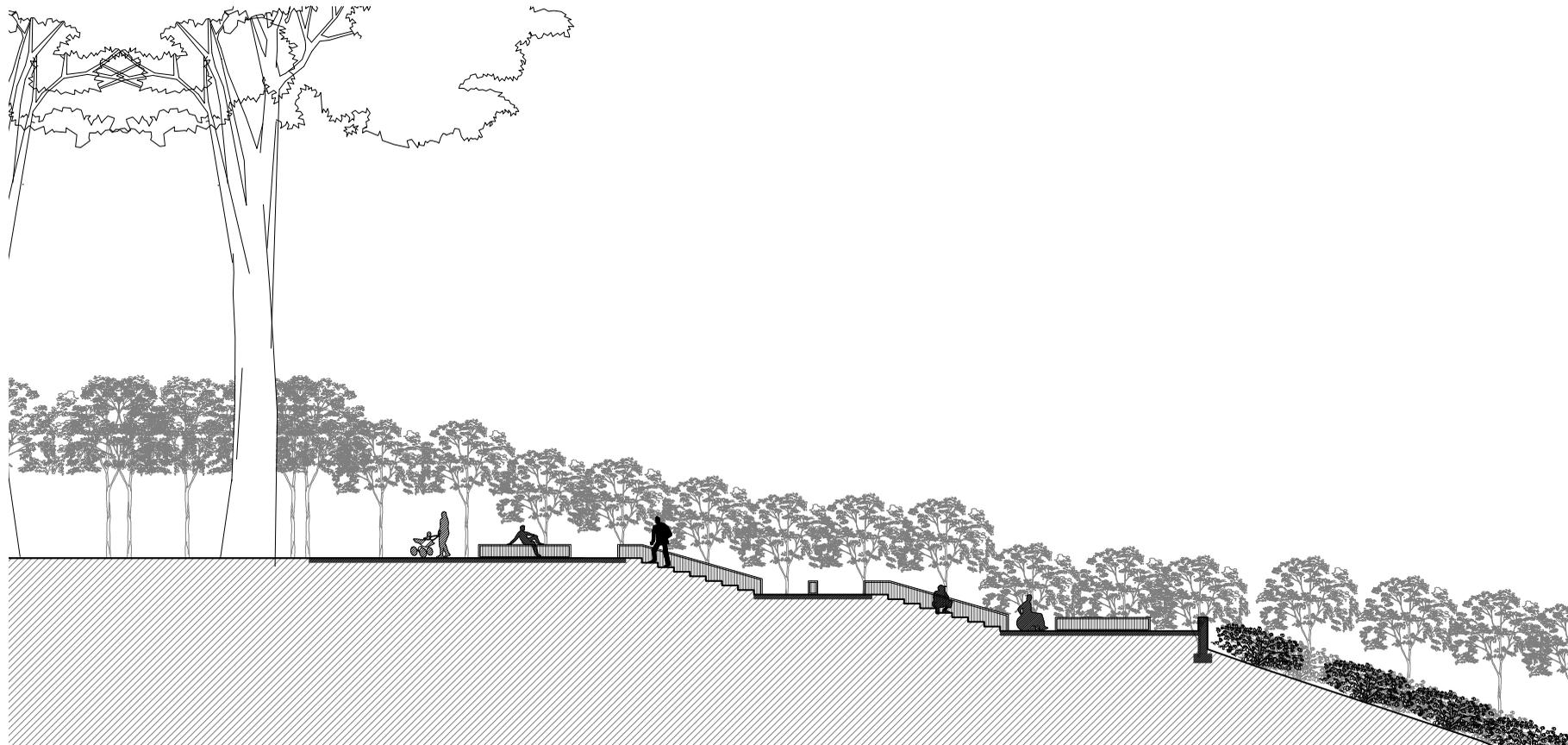


# GRAND STAIRCASE

DESIGN PROPOSAL

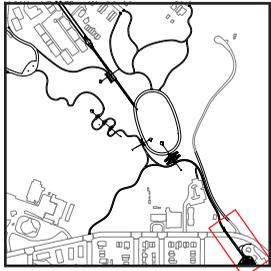
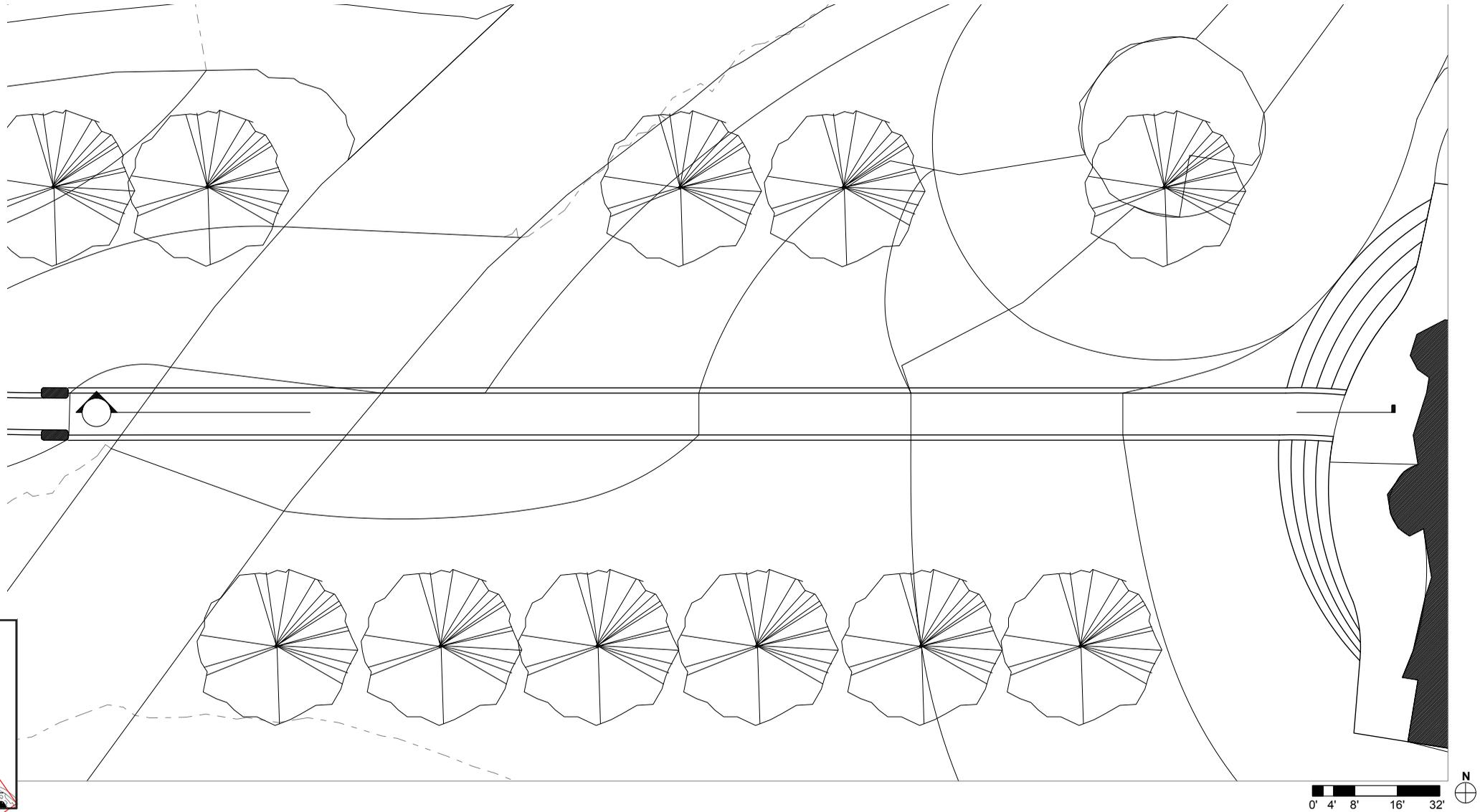
Grand Staircase at the South East part of the oval extends the axis from the Green Street Straightaway and extends the view from the top

elevation from the sports field to the Anacostia Community Museum that is visible across the community center infrastructure.



The shape of the Grand Staircase is designed according to ADA compliance so as to allow people from the neighborhood an easy access to the sports field. The

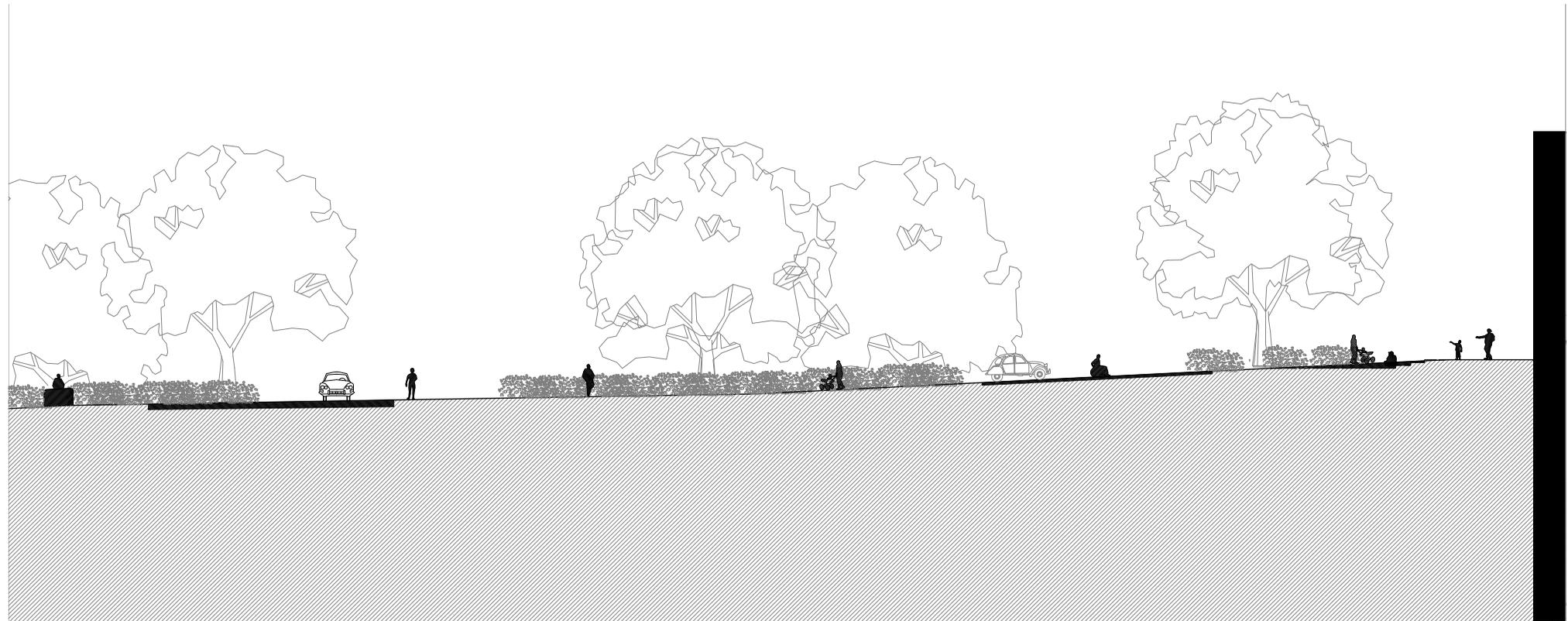
shape of ramps is reminiscent of Baroque ramps in Italian villas and allows for seamless movement to and from the main axis.



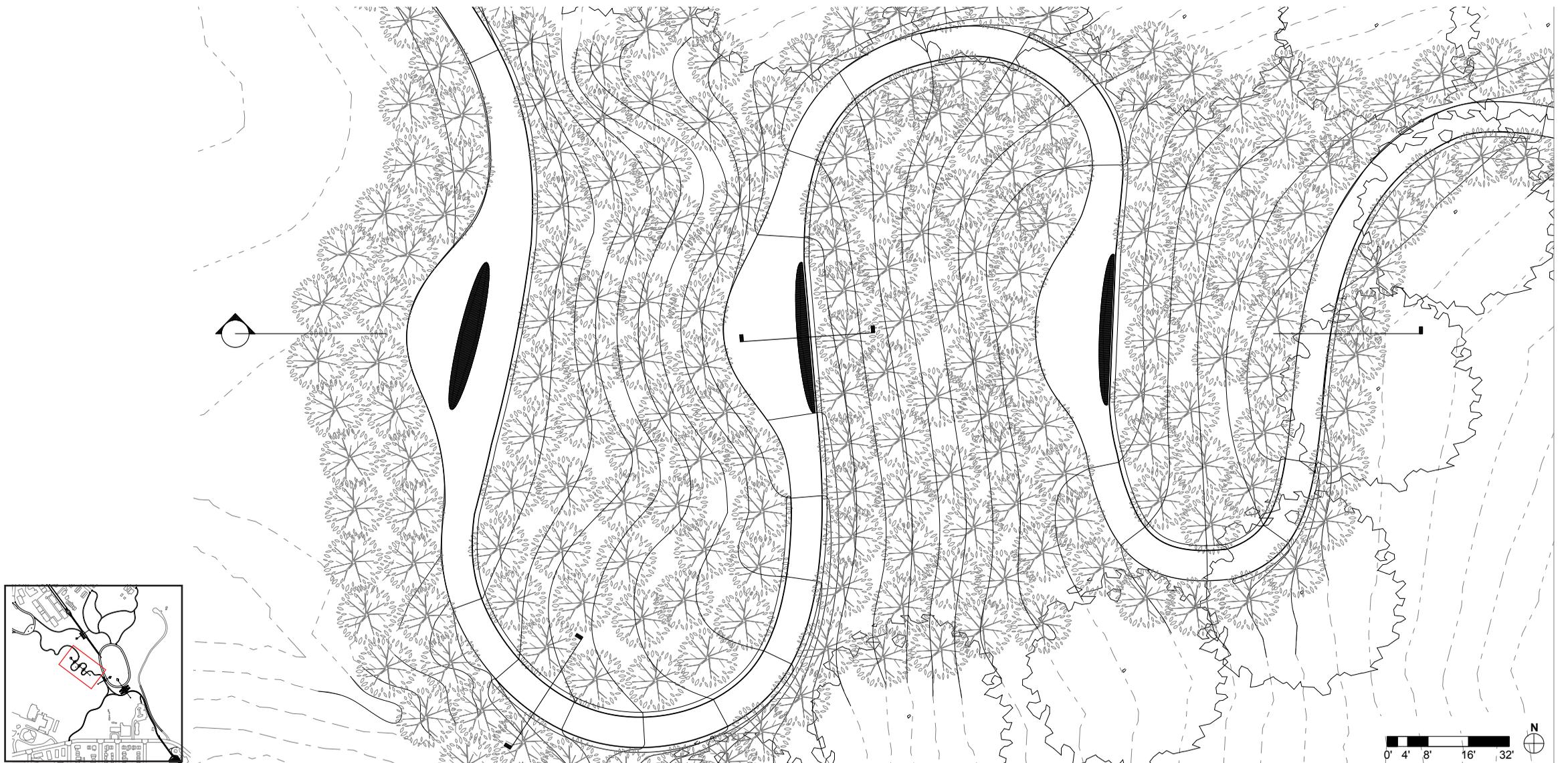
## ANACOSTIA MUSEUM ACCESS

Access to the Anacostia Community Museum has been redesigned to follow the established axis from Green street and

provide ADA-accessible path directly from the sports field to the museum entrance. The radial unfolding of circular stairs at the



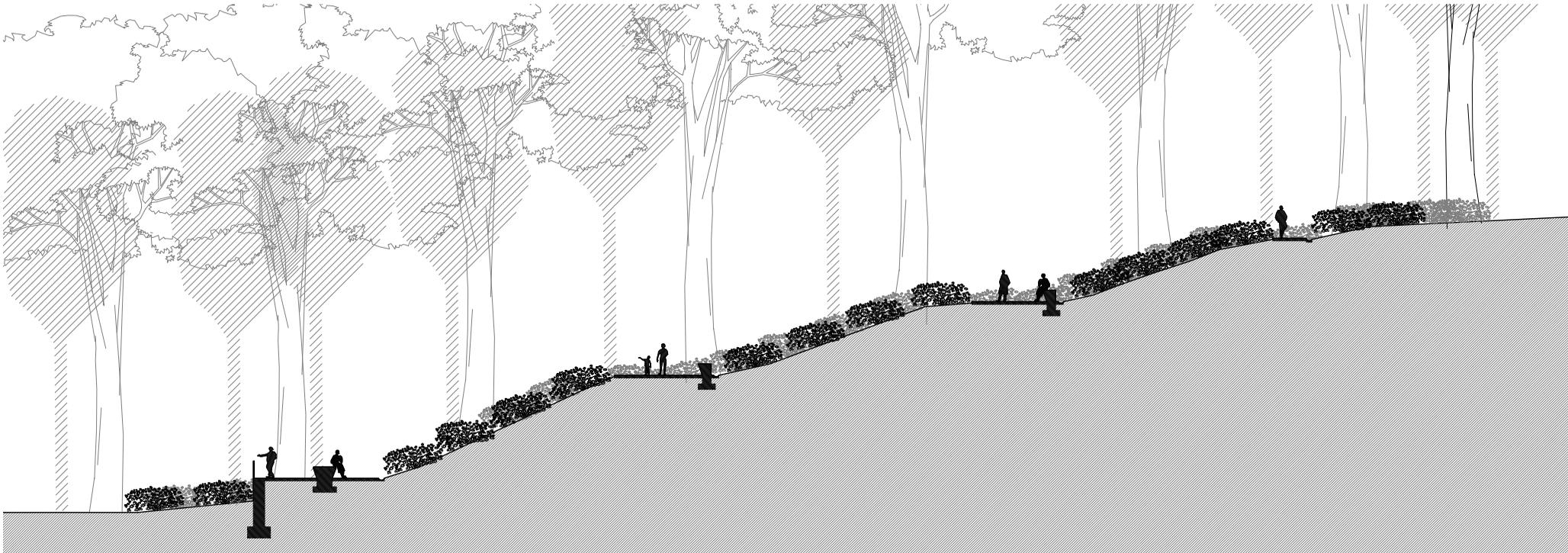
entrance allows for gradual adjustment from the axis to the central doors to the building. Linear planting along the axis reinforces the visual connection between the museum and the sports field.



## CURVILINEAR PATH

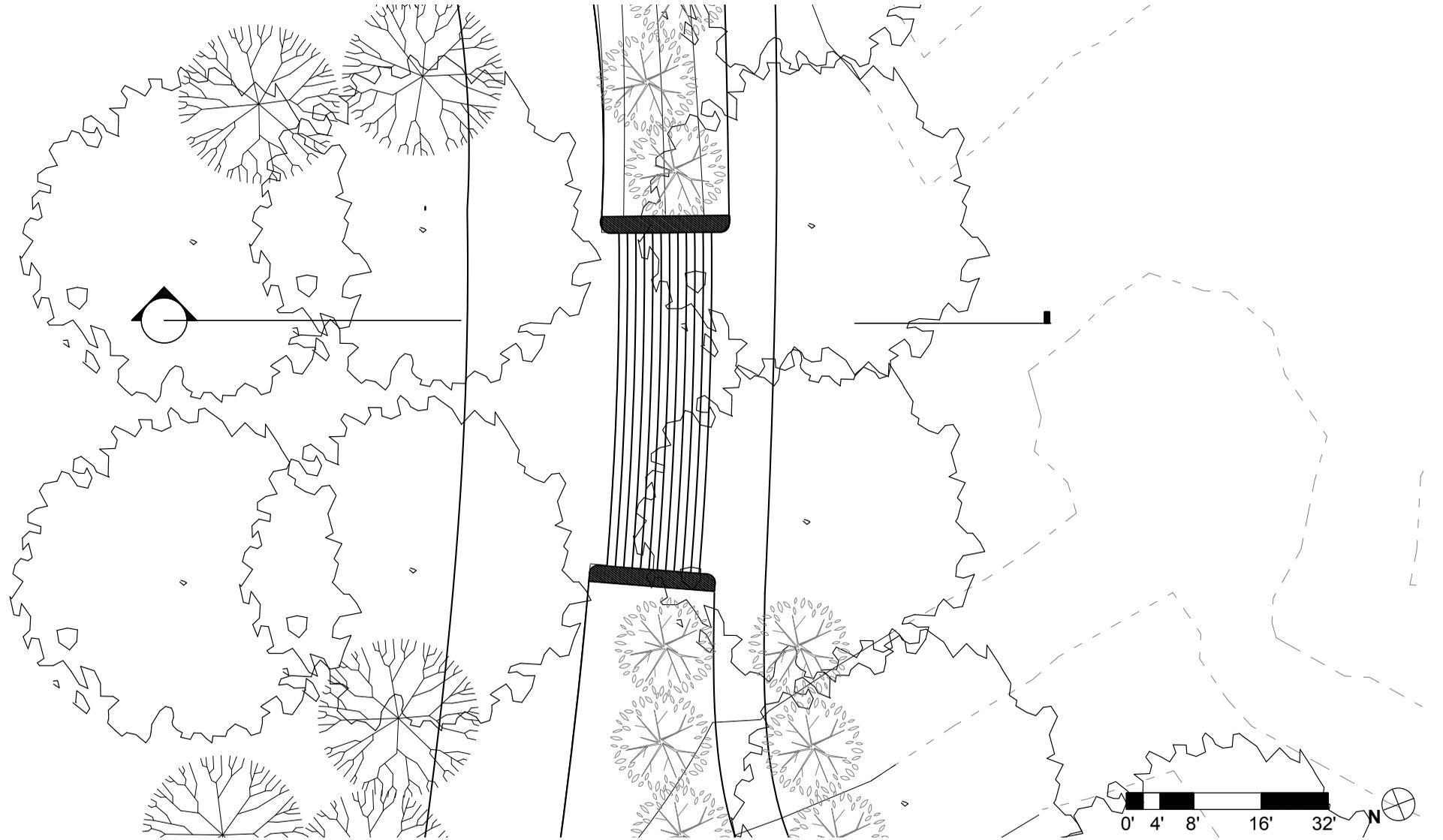
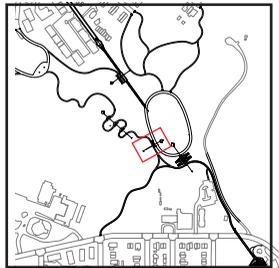
The curvilinear path through the woods is located on the steepest side of the valley and has been regraded to 12.5% slope. The path meanders back

and forth in order to maximize the experience of moving along the edge of the forest valley.



Seating at every level allows for spaces of rest and reflection while looking down the valley floor. Extensive planting of low-laying shrub Forsythia, reminiscent of plantings by Beatrix

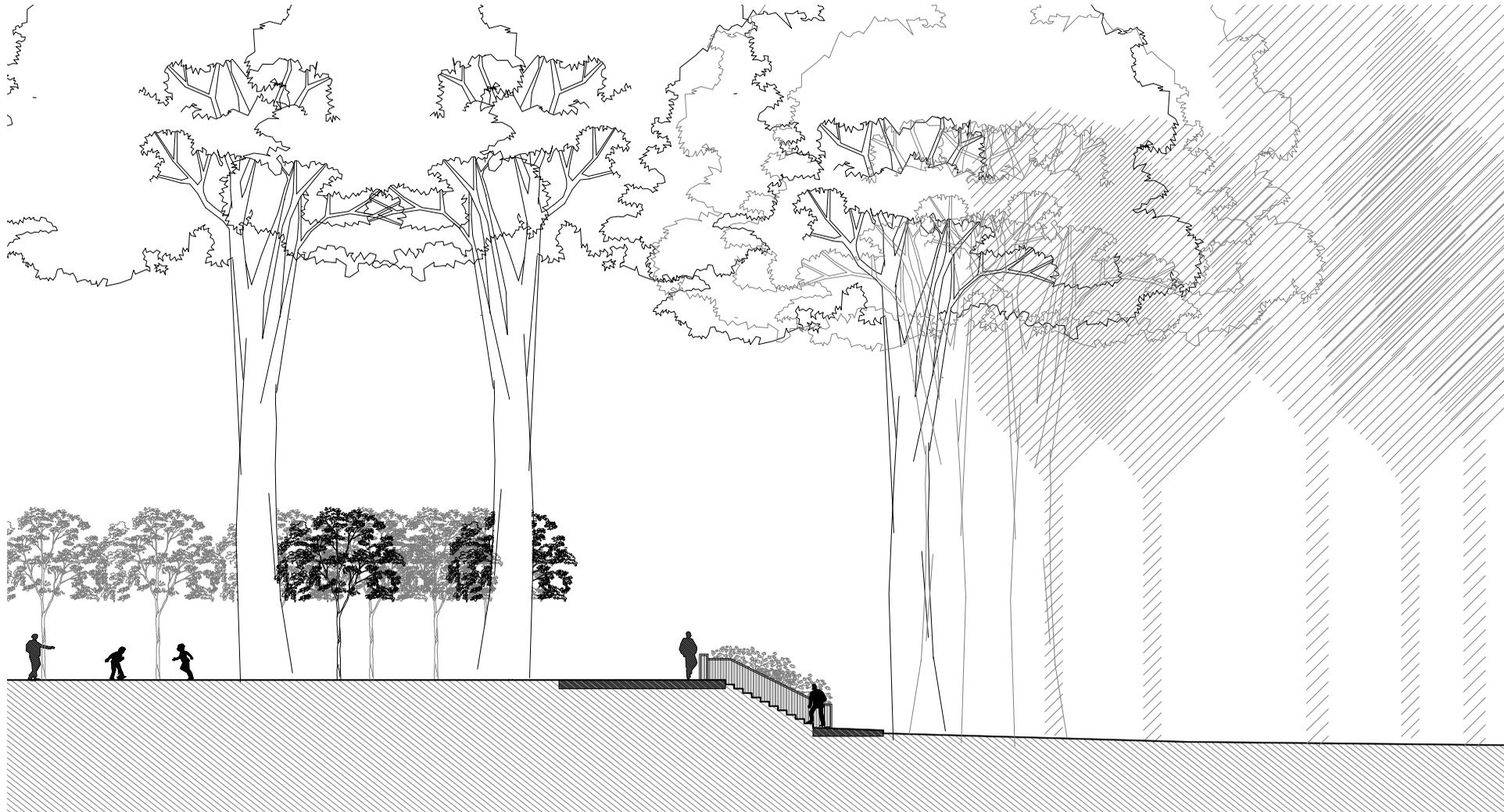
Farrand in Dumbarton Oaks, and tall trees Liriodendron Tulipifera allows for the view at the forest to be framed by splashes of color and columnar tree trunks.



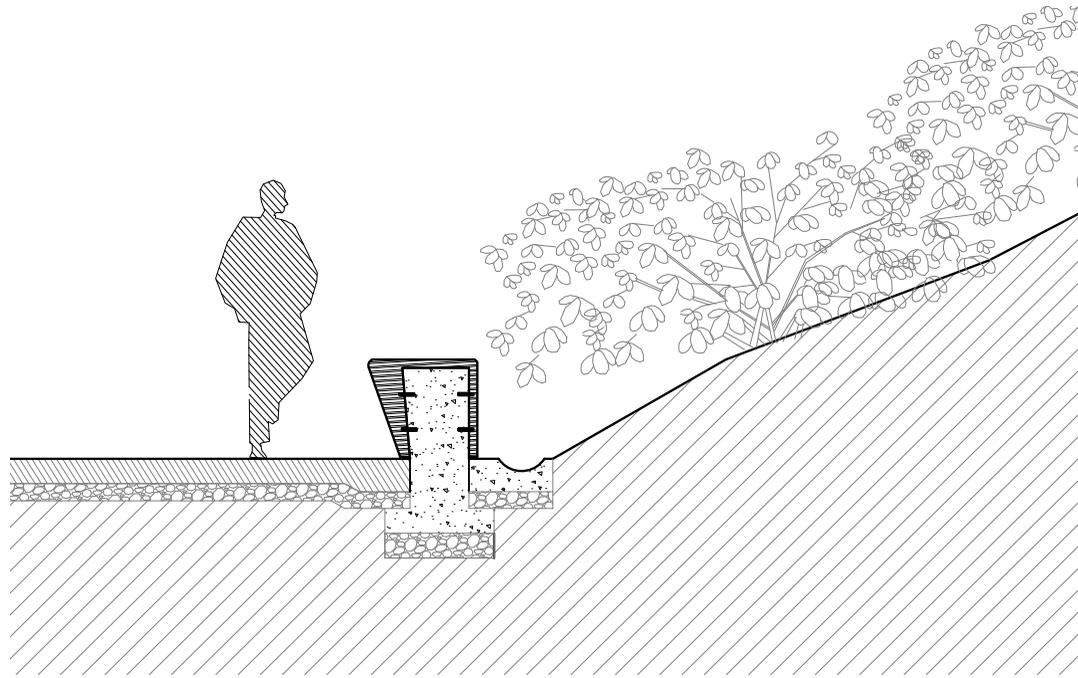
## FIELD SIDE ENTRANCE STAIRCASE

Field Side Entrance Staircase allows for a point of connection between the oval and the curvilinear path from the forest.

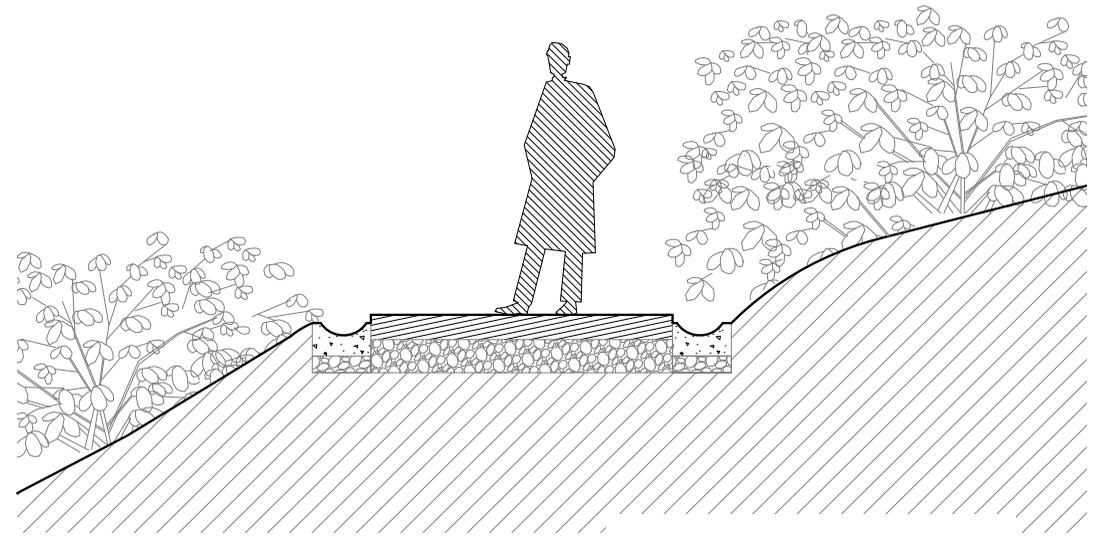
The staircase is located at the saddle between two high points in topography.



By bringing two experiences together, the design allows fluid movement through different experiences in the park: from meandering to linear and vice versa.



GUTTER AT SEATING SECTION



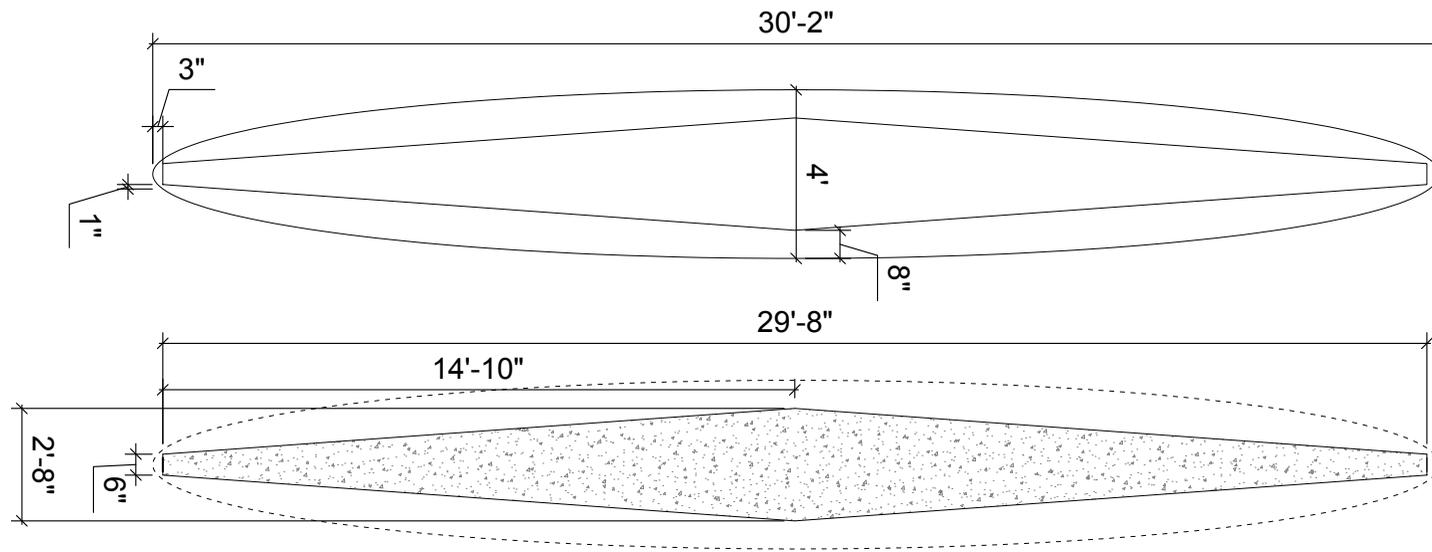
DOUBLE GUTTERS SECTION



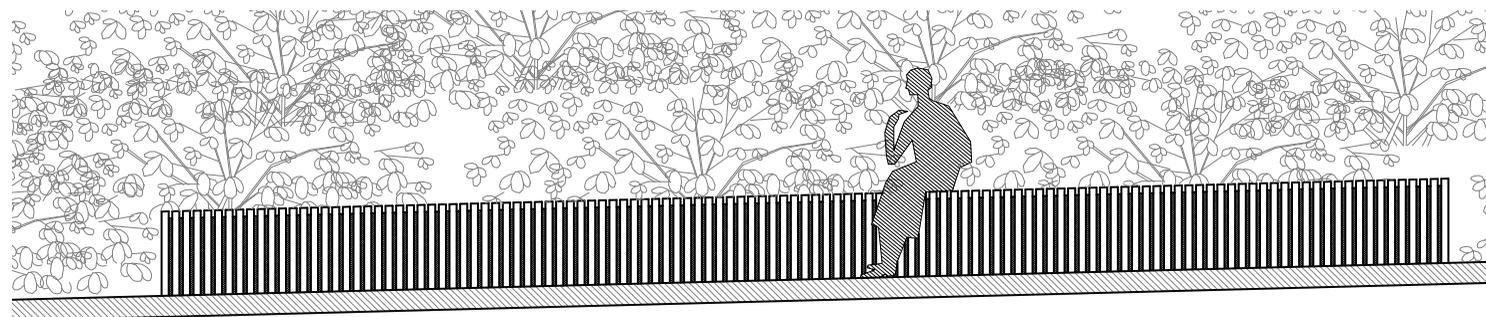
## DETAIL DRAWINGS

Gutters are proposed to be installed along the paths in the park. Above left, is a detail of the gutter location in relationship to seating. Above right, is

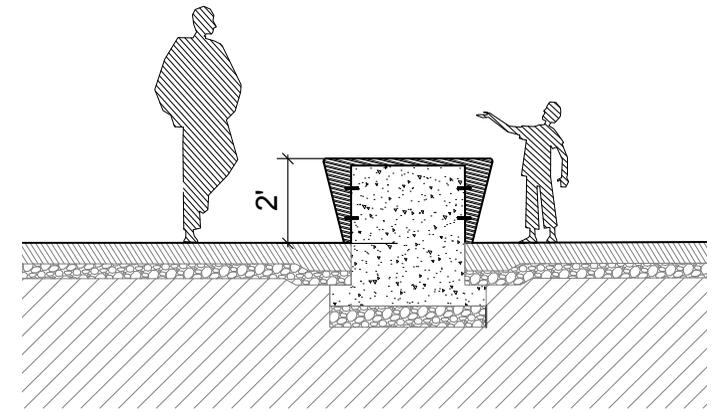
the detail of gutter on both sides of path. Double gutter is to be installed in cases when water flows on the path.



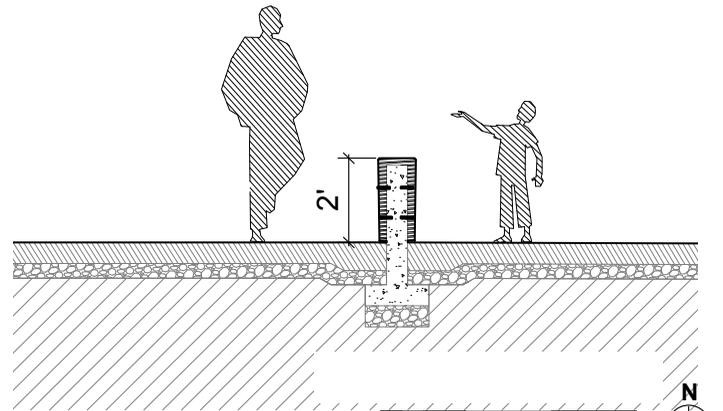
SEATING - PLAN DETAILS



SEATING - ELEVATION



SEATING - MIDDLE SECTION



SEATING - SIDE SECTION



This series of details describe seating at the meandering path.

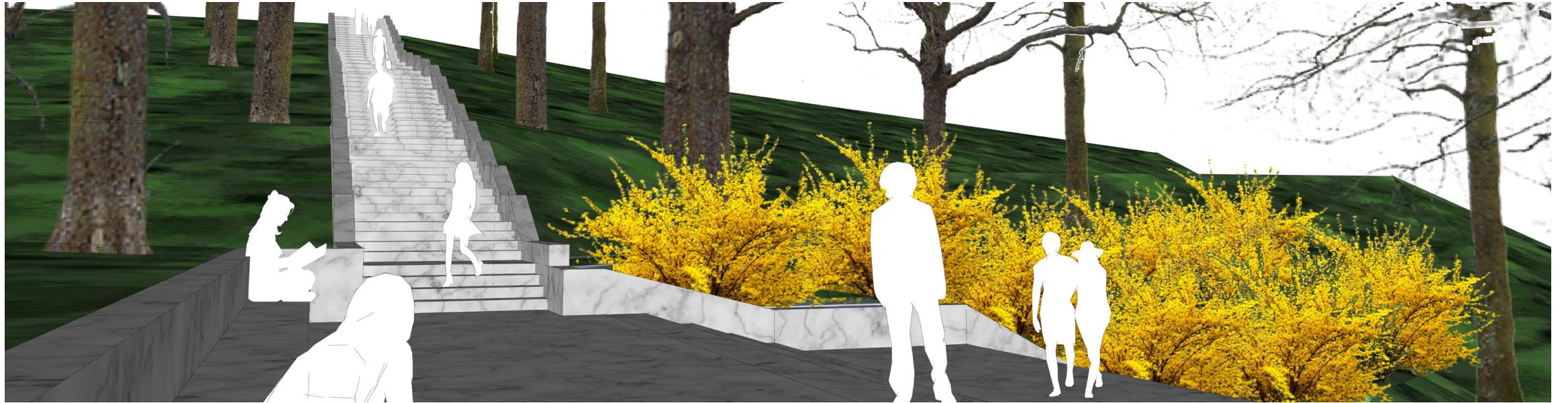


49 GREEN STREET STRAIGHTAWAY - LOOKING INTO THE FOREST



GREEN STREET STRAIGHTAWAY - LOOKING AT THE CITY





Perspective at Top of Forest Front Staircase Looking Up to Green Street Straightaway



Perspective at Bottom of Forest Front Staircase Looking Up to Seating Area



53 CURVILINEAR PATH - AERIAL PERSPECTIVE



Perspective at Bottom of Meandering Path towards Seating Area



Perspective at Middle of Meandering Path Down to Lower Level Seating Area



Perspective at Top of Meandering Path towards Seating Area



Perspective at Bottom of Meandering Path Up to Higher Levels

# CONCLUSION

This thesis aimed at understanding how steep topography can be an enhancement to walkability. By studying examples of walkable steep landscapes in different parts of the world, I found that parts of these designs can be implemented in South East, Washington D.C. Specifically, the super imposed linear design of the Nizhny Novgorod Chkalov Staircase provided inspiration for extending L'Enfant's radial street organization. Yet, the experience of traveling through Chkalov Staircase is intimidating, because the structure is visible from most points of the city and only few people walk it from top to bottom - largely because the design is instantly exposed making it clear that the walk up and down the stair is physically exhausting. Alternatively, the Green Street Straightaway is tucked under the forest canopy allowing for the element of curiosity to keep a person interested while walking through it. Additionally, extending a city street into a forest, while keeping its rigid linear form allows for the combination of two very different conditions and creates an engaging experience where the surrounding elements change from regulated urban structures to non-regulated columns of trees.

One of the most important goals for the design of the Green Street Straightaway was bringing people to the top of Green Street to introduce an amazing view of the Federal Core to the larger audience. Currently, Green Street dead ends into the forest and there is no connection between these two conditions. By widening the width of the stairway and creating a roundabout at the foot of the staircase, reminiscent of the Spanish Steps in Washington, D.C.'s Dupont Circle neighborhood, as well as framing the view with flowering trees, a special moment of observing the city is created.

All pathways in the proposed design are highly influenced by the existing topography. While the Green Street Straightaway and the Forest Front are linear, they are placed on a ridge that allows great access to a beautiful valley in the forest. By reading the existing conditions of the landscape, landscape architects are equipped to create designs that work with the existing conditions, rather than over imposing design on the landscape.

Similarly, the curvilinear pathway is highly dictated by the existing landscape. The curves in the

path are designed to accentuate the experience of moving from a linear urban street into the forest edge and through the forest valley. At each point of the curve, the person is brought around

the natural conditions of the forest - being in the bottom of the forest valley surrounded by steep walls of forest floor and gradually moving up the hillside until the point when the path brings the person to the saddle in the landscape, at which point the visual cues of the walk suggest the direction towards the Anacostia Community Museum located nearby. This design is inspired by the curvilinear paths through Parc des Buttes Chaumont where the curvilinear pathway system allows for seamless meandering through different parts of the park and escape from the busy city life. However, what Parc des Buttes Chaumont might lack is the directionality of the experience. In the proposed design of Curvilinear Path, there is a very intentional direction to the experience where linear form becomes curvilinear and, at the top of elevation, meets with strict forms that allow for views of the nearby Anacostia Museum. In this way, the meandering path is still very directional and accentuates conscious moving through the forest.

The path connecting the Grand Staircase with the Anacostia Community Museum is designed to accentuate the linear connection with the Federal Core. While the museum is located on the ridge, it is not visually connected with the city and the linear design of the path allows for the visual connection with the Federal Core. This design strategy borrowed from the Seattle Olympic Park where the top elevation of the park was disconnected from the water front and through design of a large ramp the connection between these elevations became possible. The proposed access between the Grand Staircase to the Anacostia Museum provides a visual connection between these points and creates an interesting experience of moving on and off axis.

South East Washington D.C. is an overlooked part of the city and steep terrain is prevalent there. However, the steep terrain can be viewed as a major attraction point and designing a park on steep terrain can be a significant enhancement to the neighborhood revitalization. My approach in designing the path system in the park was to pay attention to the existing topography and change the perception of steep topography from being an obstacle to an enhancement. This thesis shows how that can be done in a culturally and environmentally sensitive way. It shows how to incorporate the L'Enfant tradition and the existing topography in the creation of memorable and moving routes through steep topography to make this portion of the city more walkable.



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