VIEWING BRANCH BROOK PARK:
THE HISTORY AND FUTURE OF LANDSCAPE REPRESENTATION

By

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Richard Alomar

And approved by

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ABSTRACT OF THE THESIS

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This thesis discusses how graphic representation is used in design, to make design decisions and inform visitors about park design, history and use. Using Branch Brook Park as an example, this thesis examines the initial historic representations of the Park, its documented changes over time, and representations that can expose the process to park visitors. This thesis found that technologies like Augmented Reality could facilitate visitor engagement in the landscape by providing cultural and historic context embedded in a digital/virtual platform. This approach could also initiate new ways for park administrators to engage in public outreach.

Acknowledgements

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Last but not the least, I would like to thank my parents who firmly supported my education abroad and always believe in their daughter. I would like to thank my boyfriend Xiaoran Fan for all your love and support. The endless discussion with you about design and technology is where my research idea started from.

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List of Illustrations

Chapter 1: Introduction

Representations of the landscape can be dated back to cave wall murals in 30,000 BCE[1]. The cave wall mural was a method of recording scenes in the landscape like religious rituals, hunting activities, and imaginative folkloric figures. These primitive landscape representations showed how to view and share the experience of landscape. Eventually over centuries, these representations went from the wall to the canvas, then to paper and now to computers. Regardless of the media, graphic representations of landscapes became a method to formalize ideas, show design intent, and document how to construct landscapes. An example of this progression can be seen in the representation of garden designs in ancient China, where the primary representational media was the landscape painting. In Europe we see gardens represented in paintings and tapestries. All of these forms of representation portrayed a static and idealized landscape.

In 1795, Humphry Repton created a new format that provided landowners with a vision of what their landscapes could be. This new landscape representation form showed the existing landscape with an overlay of the imagined landscape after his design alterations[2]. In his "before and after" drawings, he showed a drawing of his alterations, then he used the same framework to draw part of the existing landscape that was changed in his design. He attached the two pieces together and clients could flip the top piece to see his alterations. This became the preliminary form of landscape representation and communication of the time.

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[1] MuralForm Team, "The History of Murals," MuralForm, April 27, 2017. August 10, 2020, https://muralform.com/2017/the-history-of-murals/

[2] Humphry Repton. *Sketches and Hints on Landscape Gardening, Etc*. (London: 1794).

When Andrew Jackson Downing and Frederick Law Olmsted started their respective practices in the middle of the 1800s, landscape designers had developed their own representational methods based on architectural formats[3]. The plan, section, and perspective became the formats used to communicate with clients, while construction documentation became the method to guide construction and implementation. Currently, representations span across multimedia platforms that include physical and digital models, photography, and film, as well as some edging technologies, such as augmented reality and virtual reality.

This thesis explores the roles of graphic representation in landscape, for the designer, and the public. In particular, the focus is on the graphic methods designers use to communicate and engage the public in viewing the landscape's complexity.

Figure 1: Diagram of the landscape, the designer, and the public. Diagram by author[4].

This thesis first identifies the role of landscape representation in design, examining the different forms of landscape representation, including plan, section, perspective, axonometric, physical and digital model, photography, film and video,

[3] Brian Davis and Thomas Oles. "From Architecture to Landscape: The Case for a New Landscape Science." Places Journal, October 1, 2014. Accessed August 28, 2020. https://placesjournal.org/article/from-architecture-to-landscape/?gclid=Cj0KCQiApt_xBRDxARIsAAMUMu9w5ARcE2zJY7sA8CIbqW-FiCIx_45Q1DiE-PaufKTafJ-sBBHJtSEaAk1aEALw_wcB.

[4] These diagrams are inspired from the *Baltic Art Park competition* by LCLA office. The first diagram comes from LCLA office's work, which is used to represent landscape in here. The second and third diagrams are recreated by author.

augmented reality and virtual reality. This thesis reviews the history, function, and utility of those types of landscape representation, and discusses their strengths and shortcomings in expressing design concepts to professionals and non-professionals.

Branch Brook Park is used as a case study to show landscape representation utilized in design and maintenance processes, by looking at its design history and maintenance. The park has a long-documented design and maintenance history which includes representations completed by different designers over a long period of time. This allows for analysis and comparison of representations that expressed design concepts and communicated clients and the public.

The thesis summarizes the landscape representations used in the design of Branch Brook Park and discusses how current technology and standards such as augmented reality and virtual reality could be used to complement the existing body of design information and enhance the visitor experience. Furthermore, the thesis comes up with a smart device application prototype for Branch Brook Park to show the process of engaging park visitors with the complexity of landscape. Using various landscape representations, it shows the historical, cultural, and social context of the park, as well as the design process. The prototype aims to create a platform for public engagement in the park.

The thesis concludes with a discussion of the landscape representation research, then discusses the future of landscape representation.

Chapter 2: Landscape Complexity and Landscape Representation

2.1 Landscape Complexity

Landscape is complex in the sensory interaction between itself and visitors. Its complexity includes plants, topography, social and cultural context, history, and people. Landscape complexity also includes how people receive or perceive information from the landscape.

2.2 Forms of Landscape Representation

Landscape representation connects the visual to the physical levels of thinking. This organizes and streamlines the thoughts of designers, then expresses them on a specific media that is sharable and understandable to others. In this process, landscape representation becomes a way to communicate and, like other forms of communication; it has developed many representational types to express ideas in the design field. Usually, when we talk about landscape representation, we refer to drawings made by design offices. They usually provide guidance during the construction process, advertising a particular design, or explain a typical idea to the public[5]. In design offices, different forms of landscape representations are utilized based on the ideas expressed. Some have evolved with the growth of technology, for instance from the physical media to the digital media. Some have adapted to accommodate the increased demand for public outreach, for instance from the abstract representations to the photorealistic representations. This section takes a close look at 8 different types of landscape representation, including plan, section, perspective, axonometric, physical and digital model, photography, film and

[5] Marc Treib, Representing Landscape Architecture (London: Taylor Francis, 2008), 28.

video, augmented reality and virtual reality, that are commonly used in landscape architectural design projects. Through introducing, commenting, and critiquing, this section discusses these landscape representational forms from the lower dimensional to the higher dimensional, as well as from the single medium form to the multimedia form.

2.2.1 Plan

A plan is a two-dimensional diagram or drawing. It is a technical term, used in architecture, landscape architecture, and the engineering fields. It describes the features of a site and communicates design or construction instructions[6]. Technically, a plan is a 2 dimensional representation of topography, elevation, structure, water, and other elements within the plan boundary. The representational style of a plan could be as simple as pure linework. The plan of Villa Lante below provides an example linework used to represent landscape elements, including structures, trees, and paths. It also expresses the design in terms of axes and spatial layout.

[6] Umar Yusuf. "The differences between a map and plan." Last modified June 24, 2016. https://umar-yusuf.blogspot.com/2016/06/differences-between-a-map-and-plan.html.

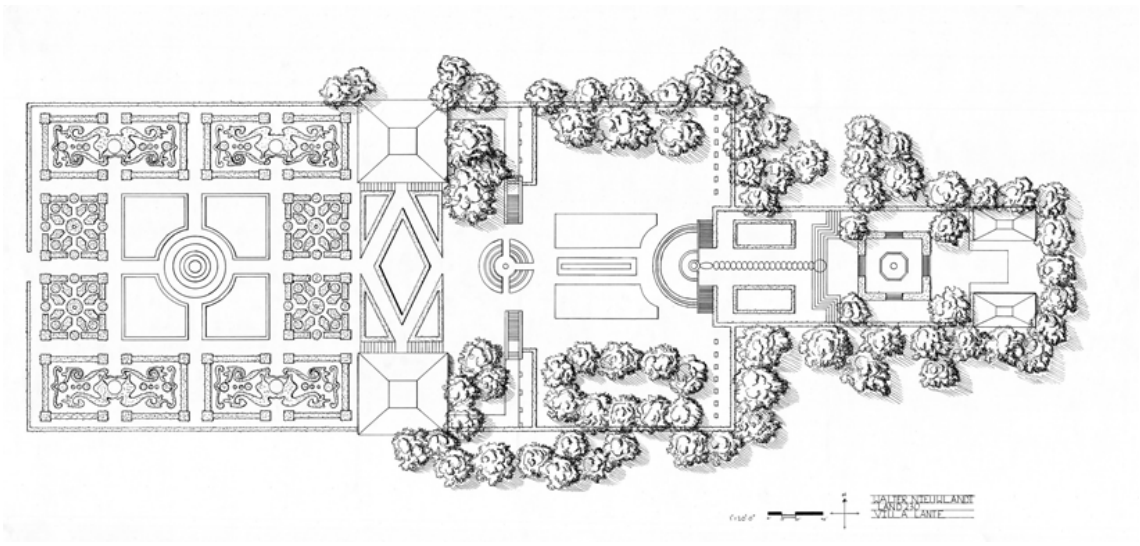

Figure 2: A Plan of Villa Lante. Image Credit: https://walternieuwlandtla.wordpress.com/classes/land-230/assignments-2/121115-final-project-villa-lante/

Plan and map are created in a similar philosophy, which is to project three-dimensional objects onto a two-dimensional plane, but they are different in many ways. Both of them are common terms used in urban design and urban planning. To a degree, maps are extensions of plans. This continuity between map and plan and its impacts on design was demonstrated by Ian McHarg. This great designer, combined the process of representation and identification of landscape features in plan and mapped them to accommodate his regional scale planning thinking. Figure 3 below shows the way he blended the idea of map and plan together, through using symbols and textures to represent the features of the woodland area. In Figure 4, McHarg shows the generalized spatial information in the layering cake model. In his model, he aligns information, including the watersheds, slope, soils, land use, animal loading, and agricultural pollution potential, in a vertical sequence to analyze the spatial relationship among those elements.

There are still many differences between plan and map. A map is a summary of the up-to-date information, while a plan is the imagination of the alternatives; a map

gathers the existing data, while a plan organizes existing spatial elements as well as introduces new elements into the target site.

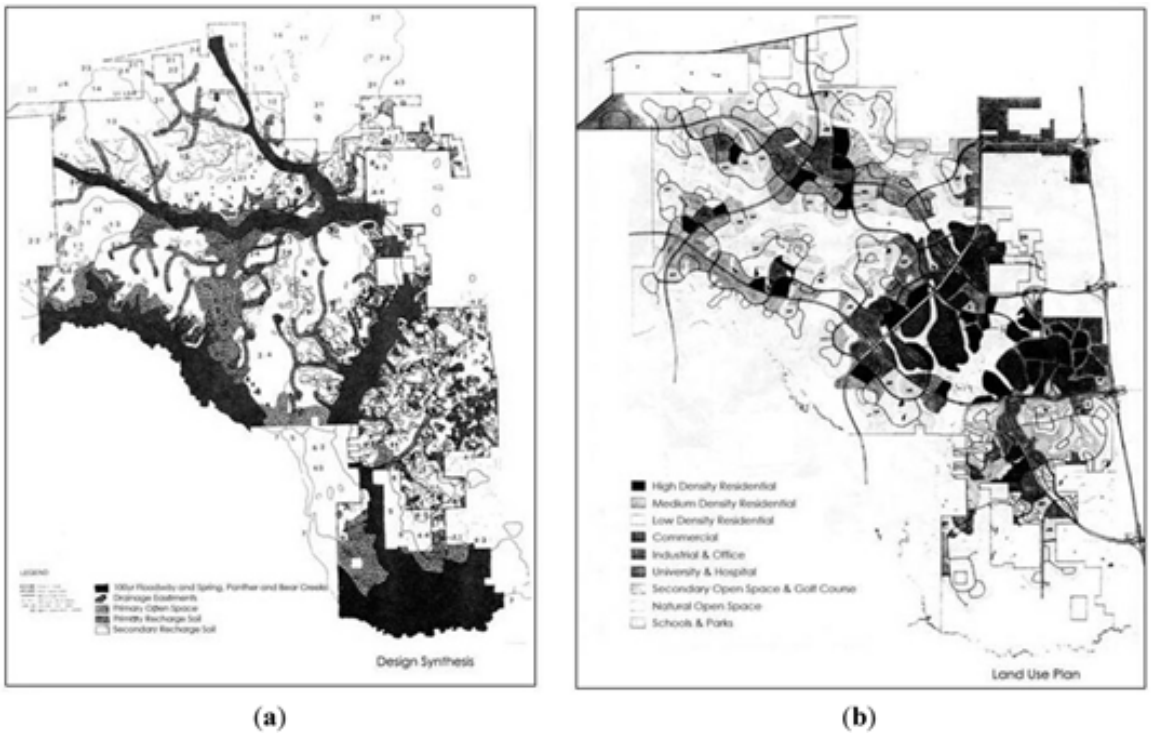

Figure 3: The Woodlands - Design synthesis: stormwater runoff. Image credit: http://www.mdpi.com/ijerph/ijerph-10-05433/article_deploy/html/images/ijerph-10-05433-g001.png

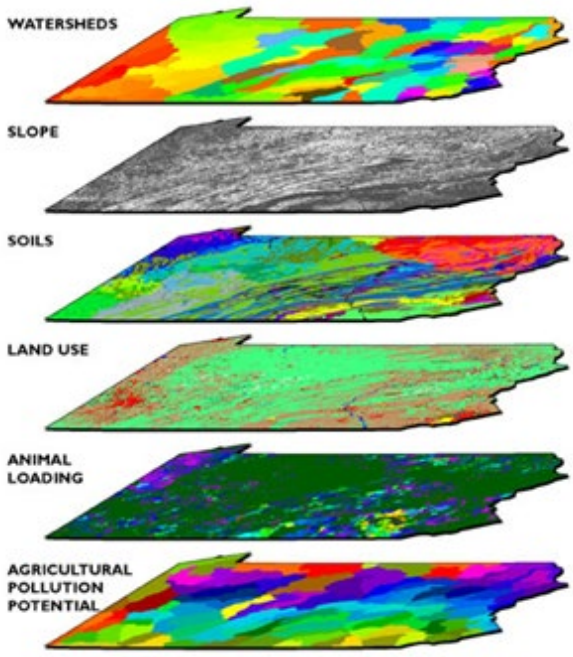

Figure 4: Layer Cake Maps. Image Credit: https://www.e-education.psu.edu/natureofgeoinfo/sites/www.e-education.psu.edu.natureofgeoinfo/files/image/pa_layers.jpg

The plan is an integral component of landscape design used in every design practice office. However, since a plan is uses abstract representational language (linework, color, shades and texture) and requires the ability to visualize 3 dimensional spaces from the two-dimensional drawings, designers and clients may have different levels understanding of a plan, which leads to miscommunication. For example, the plan of Ryoan-ji delineates the layout of the garden with a great level of detail, from the location of the big rocks to the dimension of every single tatami in the room. However, even with a detailed plan, important design elements like the height of the walls, the vertical proportions of the yard, and the texture of the garden ground plane are not represented. Those elements are essential to the design of the garden and their absence allows different ways of interpreting the plan.

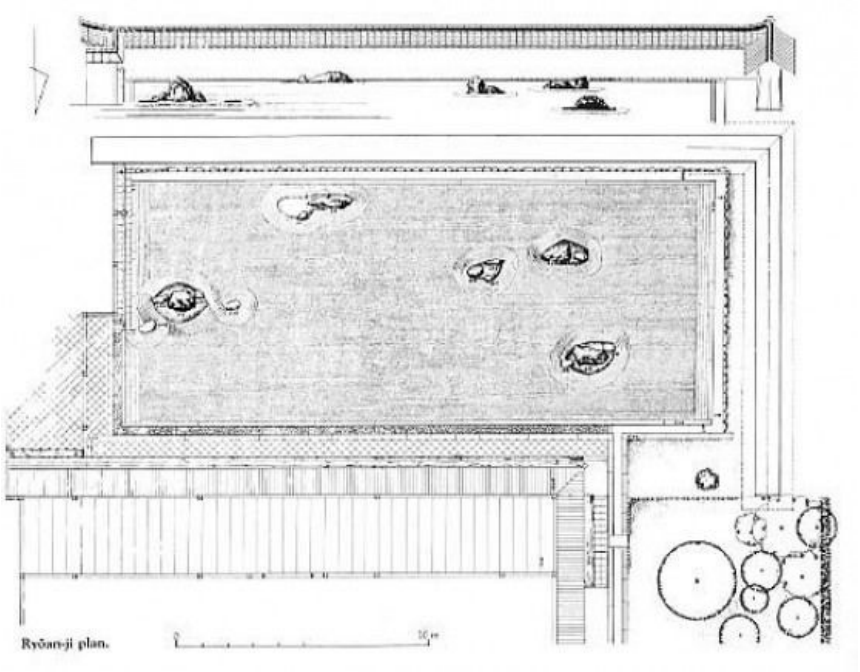

Figure 5: The plan of Ryoan-ji Garden. Image Credit: https://basilathanasiadis.com/wp-content/uploads/2019/11/Pages-from-PHD-Thesis-Final-2.pdf

Large scale landscape plans condensed and edit a great deal of information on a sheet of paper and many details are lost. The Central Park plan, for example, shows the walking and driving paths but does not show the material, pattern, and grading, which are important elements in representing the design.

To understand and interpret a plan requires the ability to visualize three-dimensional objects from an abstract two-dimensional representation. This mental process becomes an obstruction for people of varying degrees of understanding to communicate and discuss ideas in plan. On the other hand, varying degrees of understanding in plan view allows for more interpretation of ideas as the design is explained and discussed in spatial, aesthetic and practical terms.

In addition, when a designer works only in plan, pattern-oriented designs that are appealing as a two-dimensional drawing, may lack spatial quality in 3 dimensions.

2.2.2 Section

In the 18th century, the German geographer Alexander von Humboldt used illustrative graphics to show the distribution of the vegetation on mountains. In an example Figure 6 shows one side of the mountain depicted with the visually obvious parts like topography and vegetation, while the other side represents a cut through or a "slice" of the mountain depicting aspects of the mountain's geology not accessible at plain sight. This drawing is not the typical section cut used in landscape architecture professional practice, because of the scale and nature of the representation, but it shows the philosophy of simplifying and generalizing information on a vertical layout.

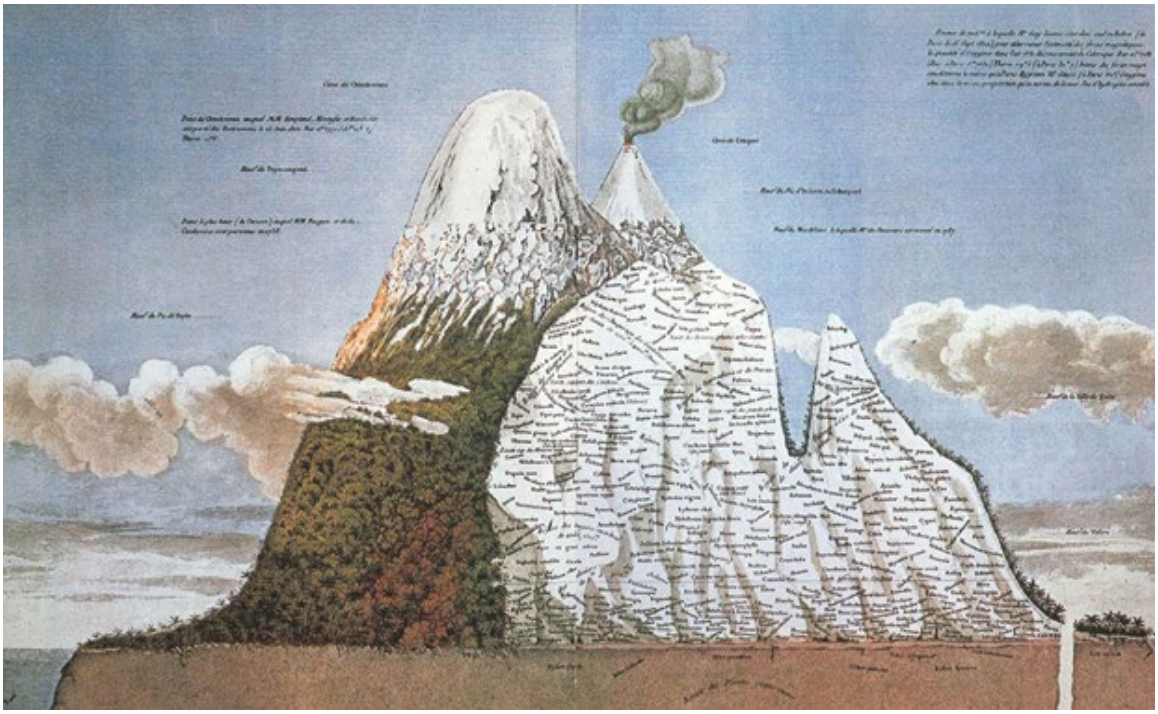

Figure 6: Alexander von Humboldt. Distribution of Vegetation. Photo Credit: https://www.smithsonianmag.com/history/pioneering-maps-alexander-von-humboldt-180973342/

Inherited from Humboldt's illustrative graphics, the section that the designers use today focuses on communicating and describing vertical spatial dimensions. A section can express the informative idea (Figure 7) or the diagrammatic concept (Figure 8). Like

the plan, the section shows technical information in an abstract way, which helps professionals streamline site information and concentrate on the major issues. For instance, Figure 7 below clearly shows the elevation of the breakwater, as well as the relationship between the structures and the animals around it. Figure 8 shows a list of sections that delineates the elevation changes of Parc de la Villette.

Like the plan, this level of abstraction will impact communication between professionals and users. For instance, Figure 8 shows some typical sections with a high level of abstraction. When people are looking at the drawing, they need to imagine from the two-dimensional representation to the three-dimensional idea. In addition, many sections concentrate on the elevation changes and eliminate the texture and material of the structure, so they will need to be used with other representations to show the whole design idea.

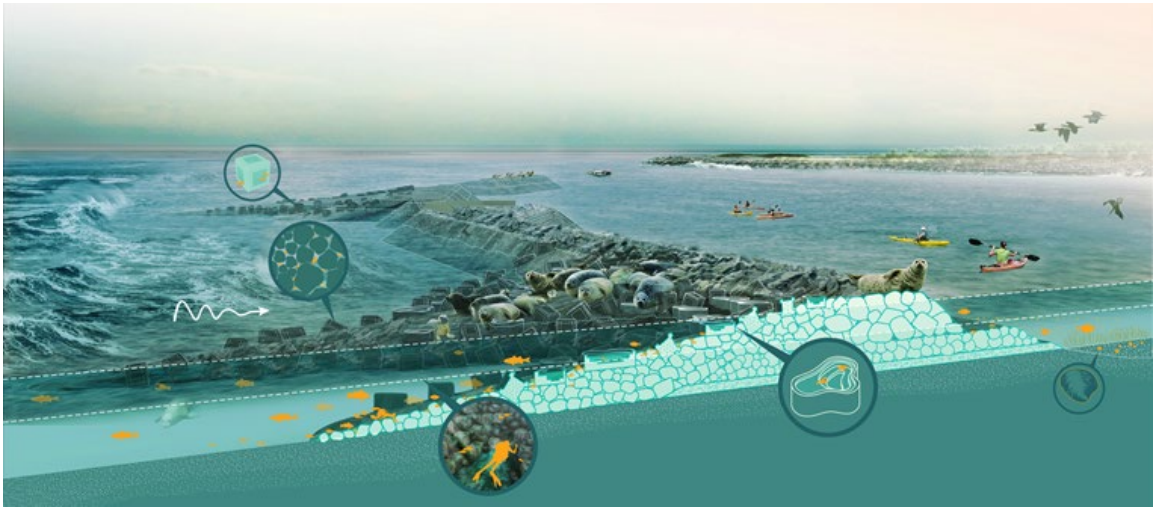

Figure 7: Rebuild by design. SCAPE. Image Credit: https://www.scapestudio.com/projects/living-breakwaters-design-implementation/

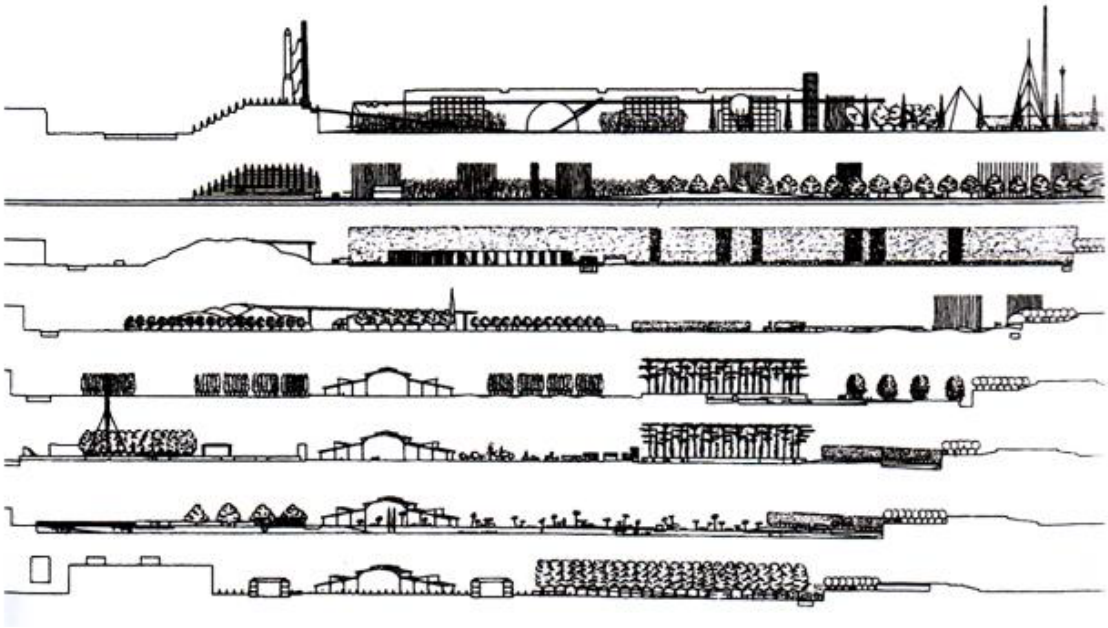

Figure 8: Programmatic sections, Parc de la Villette, competition entry. Office for Metropolitan Architecture,1983. Image Credit: https://scenariojournal.com/article/the-performative-ground/

2.2.3 Perspective

Perspectives are created to simulate space in 3 dimensions, which requires the designer to blend the designed elements into the existing landscape and to manipulate light, environment, atmosphere to make the perspective realistic. Perspectives can also be used as tools to explore ideas and concepts. Generally, there are two types of perspective that are both widely used in the design field. One is composite perspective that concentrate on selecting elements for the design to create the sense of the space; the other is photorealistic perspective that focuses on blending the designed elements into a site photo that to show the actual scale, light, and shadow of the site. To better discuss these two perspectives, I will call the former photomontage and the later photorealistic perspective.

The photomontage delineates the design-thinking progress, starting from deconstructing, selecting, and reconstructing. The photomontage is created upon the observation of the site and the existing conditions. Through observation, the designers deconstruct the existing conditions, picking and choosing the elements that contribute to their design idea, then rearranging and reconstructing them. The composite montage separates and varies either the color, sun exposure or scale of the perspective, as a method to liberate design concepts from limitations and towards an open-ended exploring process[7]. Sometimes the photomontage appears to be difficult to understand, in particular when people attempt to interpret it literally. It is because that photomontage means to be read as a whole; it expresses its meaning as an impression. For instance, Figure 9 shows the conceptual design for a landscape preserve where scientist could use to develop new species for the upcoming climate change.[8] It does not focus on the specific species of the plants, and further dematerializes the framework of the greenhouse; it just concentrate on the impression of tropical plants being preserved in the greenhouse, which is the major concept of the design. As a form of perspective, photomontage opens a broader conversation for the design, allowing more possibilities to merge. In particular, the composite montage could benefit analysis and diagram.

[7] James Corner, "Eidetic Operations and New Landscapes," in *Recovering Landscape: Essays in Contemporary Landscape Theory*, ed. James Corner (New York: Princeton Architectural Press, 1999), 166.
[8] Lara Nixdorf and Laura Brasé, "The New Humboldt Institute of Ecology and Plant Genetics." Last modified February 20, 2018. https://www.koozarch.com/interviews/the-new-humboldt-institute-of-ecology-and-plant-genetics/.

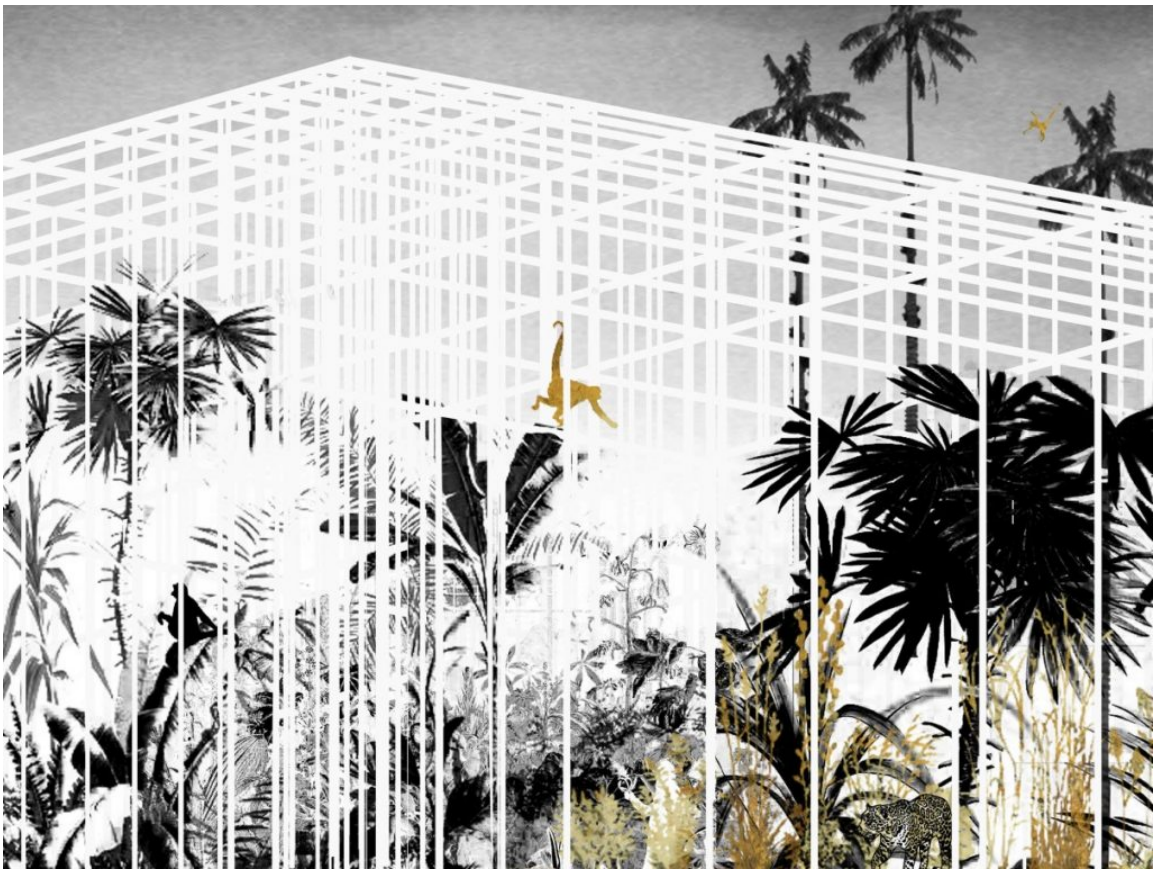

Figure 9: A photomontage of indoor landscape design. Image Credit:

https://www.koozarch.com/interviews/the-new-humboldt-institute-of-ecology-and-plant-genetics/

Figure 10: Photomontage by James Corner. Lake/City/Horizon, Töölönlahti Park. Image Credit: James Corner.

The other type of perspective is photorealistic perspective, which simulates the nature and blends the digital representation into the nature. Through using photorealistic representational elements, the boundaries of imported information are diffused or dissolved into the background of the existing condition. For instance, Figure 11 shows an example of photorealistic representation of a freshwater pond and the habitats around it. To emphasize the photorealistic character, the representational elements – plants, animals, water, and sky – are exclusively clipped from real photo and they are arranged under a unified light, shadow, and reflection. Looking at the perspective, the boundary of each piece is erased, or the pieces are blended into a big and unified background.

Figure 11: Photorealistic Perspective Sample. Image Rendered by author.

The strength of the photorealistic perspective is that it brings people directly to the site through blending the design element into the existing view. It builds the connection between the design and the existing condition so that makes the communication with non-professionals more convenient. Thus, the photorealistic perspective is often used in public outreach.

To some extent, the photorealistic perspective could be seen as a specific type of montage – a process of compiling visual information and rendering styles to achieve a complex and exploring form of investigating design concepts or expressing design intent.[9] Both perspectives share the same design-thinking progress, which is to select elements from the design database then rearrange them into the target site. For instance, Figure 10 shows the designer's selection of the form of the trees, even though the

[9] Charles Waldheim et al., "Introduction: Photomontage and Landscape Architecture," In Composite Landscapes: Photomontage and Landscape Architecture. Edited by Charles Waldheim and Andrea Hansen. Ostfildern (Germany: Hatje Cantz Verlag, 2014), 14-23.

selection is not as detailed as each individual tree species. Figure 11 shows the selection and rearrangement of the gradual change of the habitats, from marsh to forest, and from the low level to the high level.

Both perspectives put selected design elements together but for different reasons. The photomontage concentrates on the sense of the design while the photorealistic perspective focuses on the scale and material; the former is the progress of brainstorming expressed in a lossy way while the latter is the product of design expressed in a formal way. In term of the design communication, those two perspectives might also be different. The photorealistic perspective showcases a vision that is closer to the real world, with the light, shadow, reflection, and scale presented to follow the unified rule. People can easier to receive the information that the design tries to express through the photorealistic perspective. The photomontage, on the other hand, might be a little difficult to be visualized into a picture that links to the real world. Those symbolized elements are used in the photomontage as the icons to show the sense of the design, instead of the actual scale, material, and activities.

Figure 12: Humphry Repton. Before and After Painting. Image Credit: https://www.metmuseum.org/art/collection/search/356088

Perspective is usually applied to show the change of the design. The Before and After Painting by Humphry Repton clearly indicates the design alternations through putting the existing condition and the altered view together. In 1795, Repton published a hand-colored aquatint of England landscape. In the book, he shows his landscape alternatives on the page while pasting the liftable flaps on the alternative drawing. With the liftable flaps, he was able to show the site scene before and after his alternatives. Figure 12 above shows one of the before and after paintings, he published in his book. The left drawing shows the existing landscape, or so-called "before", with the liftable flap closed on the drawing. The right drawing opens the liftable flap up, showing Repton's alternative of the landscape. Through comparing the before and after drawings, we can read that in Repton's design, he removed the fence to open up the view over the rolling meadow, filled with picturesque grazing cattle[10]. Repton's photorealistic painting shows his design in an obvious way. The landscape alternative is shown in the same way or the same projection that people see landscapes through their eyes, without abstractions.

Figure 13: The Big U Rebuild by Design. Before and After Perspective. Image Credit: http://www.rebuildbydesign.org/our-work/all-proposals/winning-projects/big-u

[10] Humphry Repton. *Sketches and Hints on Landscape Gardening, Etc*. (London: 1794).

The photorealistic perspectives utilized presently seem to be the inheritance of Repton. Figure 13 above shows the before and after photorealistic perspective used in the Lower Manhattan Big U design in Rebuild by Design. The image on the left shows the existing condition of the highway and the surrounding buildings. The image on the right, using the same view, shows the design alternative by adding the green roof on top of the highway to gain more green space and protect the highway from flooding. This photorealistic representation is easy to read for the general public since view of perspective is straightforward. However, since it is very straightforward and literal, people might read this perspective as a commitment of the design, in particular some details, such as the texture, furnishing, dimension, and plant species.

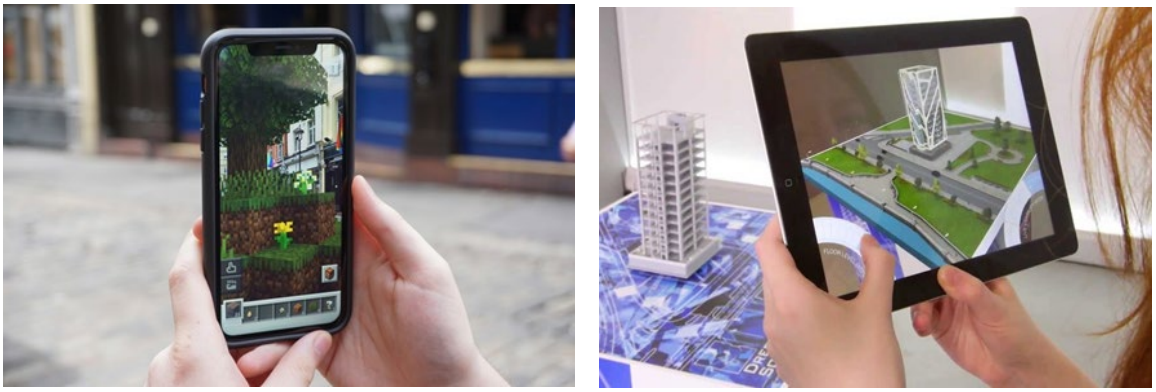

Figure 14: Augmented reality on smart devices. Image Credit: https://selular.id/topik/minecraft-earth-ar/

Recently, mobile applications use augmented reality to show design alternatives, as the extension for the “Before” and “After” idea. They use an interactive experience to apply app generated objects to the physical objects in real life. Essentially the method replicates the before and after type of perspective representation. The object in real life works as the “before”, while the representation on the smart devices becomes the “after”. The options in augmented reality gives the user choices in the design process, by

allowing them to select and place the design elements on their own. However, the technique as of today is still very rudimentary, as most augmented reality applications only provide cartoon graphics which require another layer of processing from the cartoon graphics to the photorealistic images.

2.2.4 Axonometric

Axonometric drawings designate an orthographic projection of a three-dimensional object, on a plane inclined to each of the three principal axes of the object; the projection is three-dimensional but without perspective[11]. As a method of projecting a 2 dimensional plan into 3 dimensional plan, the axonometric is used for technical drawings since the object are to scale along its length, width, and height.

Figure 15: Ancient Chinese Painting, "Along the River During the Qingming Festival", by Zeduan Zhang. Image Credit: https://www.comuseum.com/painting/famous-chinese-paintings/along-the-river-during-the-qingming-festival/#

[11] Orli Hakanoglu, "Architectural Drawings: 8 Masterful Parallel Projections - Architizer Journal," Accessed August 13, 2020. https://architizer.com/blog/inspiration/collections/axonometric/.

It is difficult to trace back the origin of Axonometric drawings, as it has been used widely in the painting across the world. Axonometric was the main technique used in ancient Chinese painting, in particular the cultural and landscape paintings which focus on delineating the large scale views. Figure 15 above, *Along the River During the Qingmimng Festival*, is a famous ancient Chinese painting that records the vernacular life during the Qingming Festival. All the buildings and landscape are shown in axonometric way. Through using axonometric, the drawing shows the buildings, landscape, and human activities on a certain scale.

Since the painter and garden designers are usually the same group of people, they applied this typical painting method into their design drawings. Figure 16 is the design of Wangchuan Villa by Yuanqi Wang. In the design, Wang uses axonometric to show the spatial layout of the trees, structures, and the paths. In this way, the function of axonometric is between plan and perspective. The floating view point shows the whole spatial layout of the design and the three-dimensional drawing shows the textures and materials.

Figure 16: Ancient Chinese Landscape Design. "Wangchuan Villa", by Yuanqi Wang. Image Credit: https://www.metmuseum.org/art/collection/search/49187

Since the time of Leonardo da Vinci, artists, architects, and landscape architects have been taking advantage of the three-dimensional projection[12]. The features of axonometric drawings make the representation easy to read. Figure 17 shows the progress of the design, Jan Kaplický, streamlining his design idea, through dividing each idea into its own cell and arranging them in axonometric way. In this example, Kaplický even uses axonometric as a method to organize his thoughts.

[12] Treib, 125.

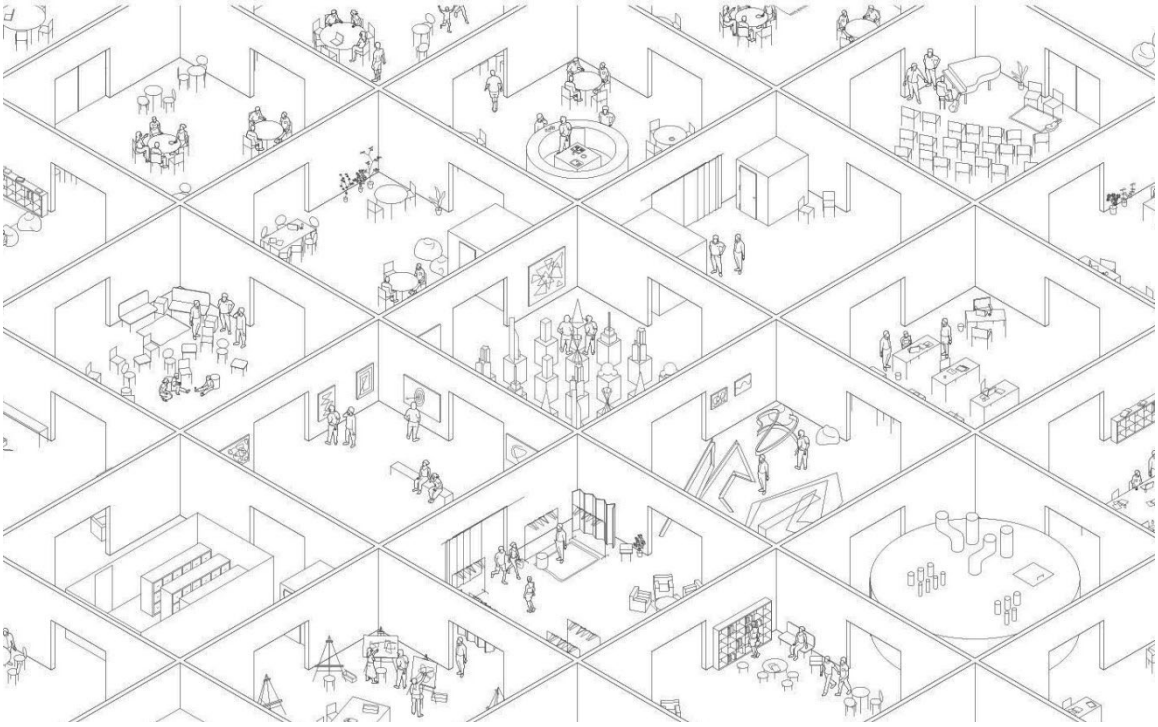

Figure 17: Jan Kaplický. Neofuturistic Drawing of Streamlining Ideas. Image Credit: https://archeyes.com/jan-kaplicky-drawings/

Axonometric, with its unique scaled three-dimensional view, helps to explain more complicated design. Figure 18 shows the exploded axonometric of Parc de la Villette by Bernard Tschumi. The image on the left shows the exploded pieces floating around and the image on the right shows the design building exploded into three layers.

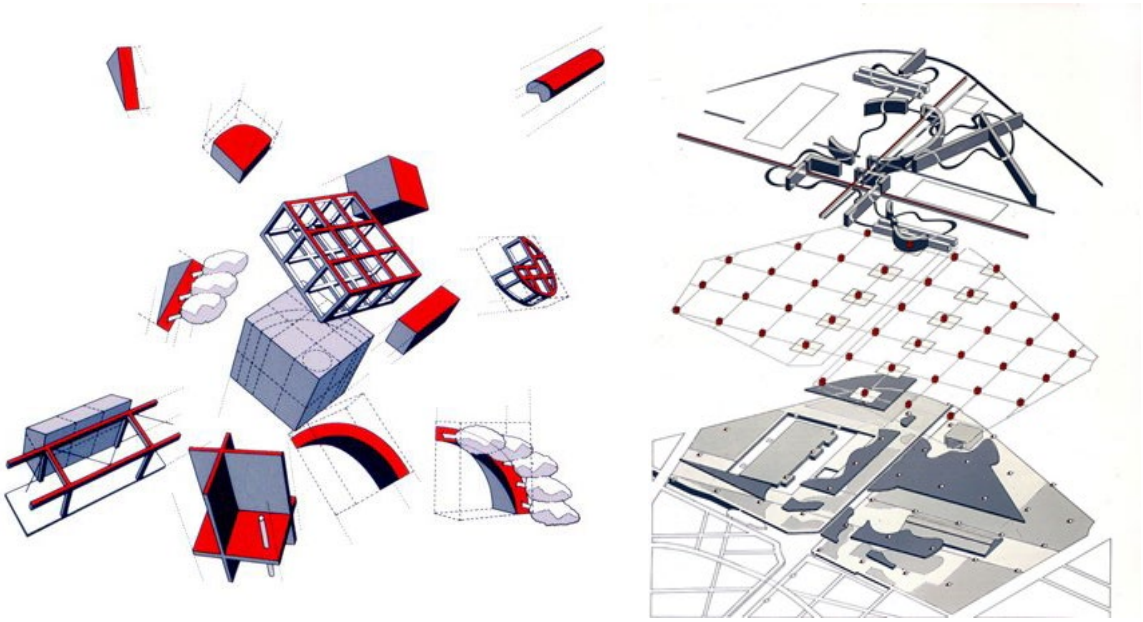

Figure 18: Bernard Tschumi. Parc de la Villette. Image Credit: http://www.tschumi.com/projects/3/

2.2.5 Model

The representations discussed above are two-dimensional, while starting from here, the model is the first three-dimensional representation that we discuss. In the very early stage, model only refers the physical model for three-dimensional representation, but since the development of digital technology, the digital model has gained a significant role in the design field.

Physical model bridges the abstract design with the actual vision. Figure 19 shows the park design by Isamu Noguchi and Shoji Sadao, represented as physical model. From the model, it is easier to tell the topographic changes, the layout of the plants, the transportation system, and the spatial sequences. With a physical model, it became easier to communicate design with the public and the clients.

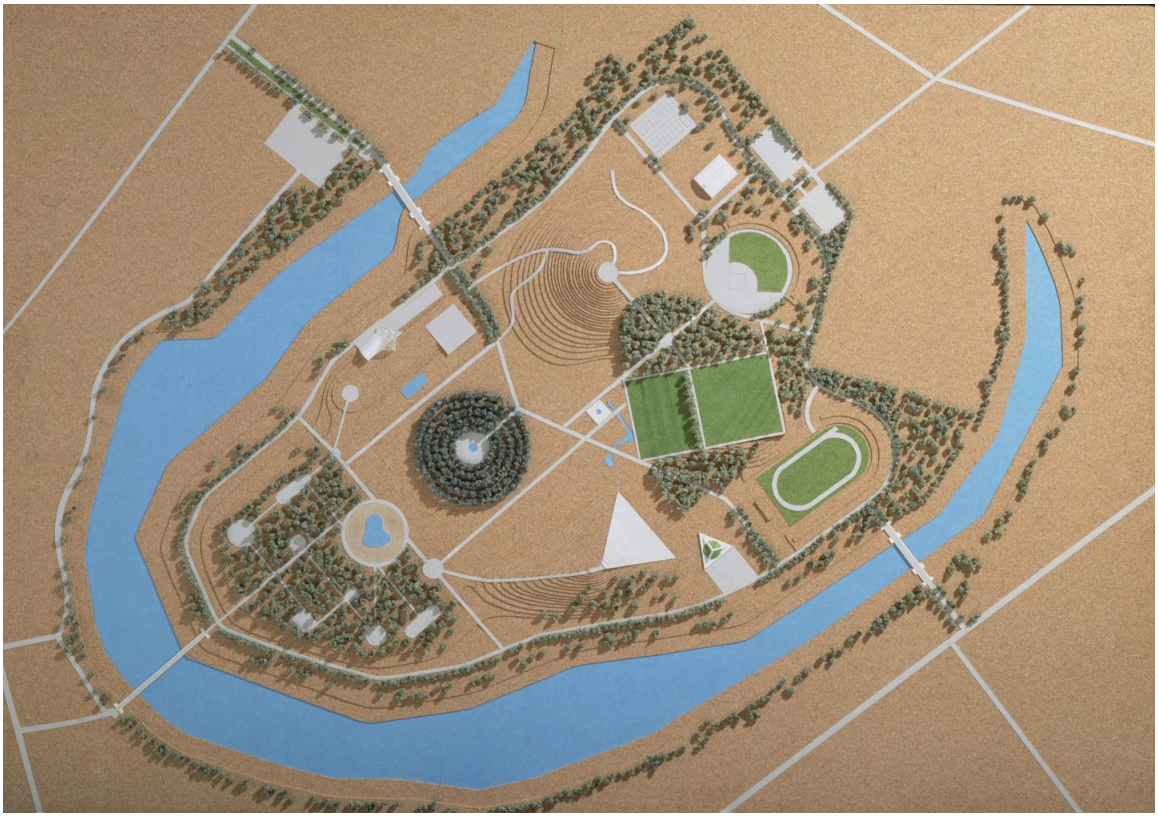

Figure 19: Isamu Noguchi (design) and Shoji Sadao (architect). Moerenuma Park, Sapporo Japan. 1988-2004. Image Credit: The Isamu Noguchi Foundation and Garden Museum, New York / ARS

Physical model is also a good tool for designers to grind their design. Sometimes, a minimal change yields a huge difference in the design, but it might be hard to tell from two-dimensional representation forms, such as plan and section. In this case, physical model can help designers to make design decisions. James Rose, as he stated, likes thinking and designing with model. Figure 20 is him designing with model and the buildup home in Ringwood, NJ. He was studying his model to make design decisions.

Figure 20: James Rose with his model of Ringwood House (Left). The Ringwood House (Right). Image Credit: http://jamesrosecenter.org/about-james-rose/ridgewood/

Landscape architects use physical models to design landforms. For those who rely on physical models, the selection of material becomes very important. Some materials have specific characteristics that affect representation. Cardboard is used for laser cutter; clay is a great material to mimic soil as stated by Kathryn Gustafson; 3D printing is a bridge between digital modeling and physical modeling[13]. It produces a more accurate model than the hand-crafted models. Figure 21 is the 3D printed model by the design office Gustafson Porter + Bowman. For this model, they firstly created a physical model to help to grind the design, then they scanned the revised physical model into computer and 3D printed out the digital model based on the scanning. This is a great example showing the workflow of modeling, which uses hand-crafted model to modify the design, then represents the model in the accurate and digital form, and finally 3D prints the model out. Figure 21 is the product of the physical model to 3D printing process.

[13] Anton James, "Episode 1 - Kathryn Gustafson," landscape conversations. Last modified April 2, 2017. http://www.landscapeconversations.com/podcast-episodes/2017/4/2/episode-1-kathryn-gustafson.

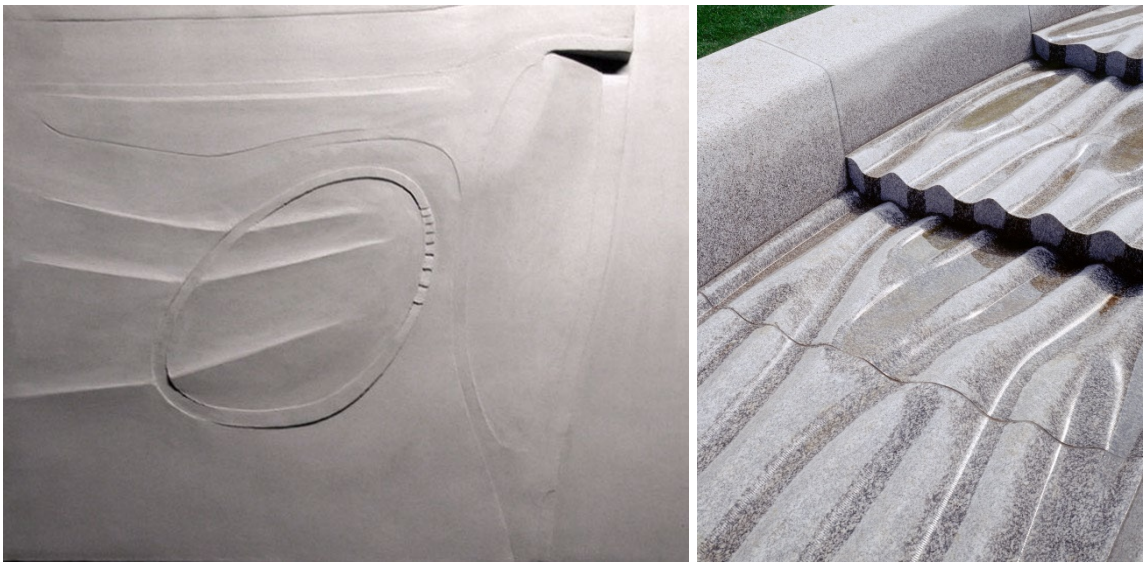

Figure 21: Clay model of Diana, Princess of Wales Memorial Fountain. Image Credit: Gustafson Porter + Bowman

Both physical and digital models are excellent in representing landforms. Digital modeling fabrication requires a process of simulation, simplification and abstraction. Digital modeling simulates existing conditions and overlays the proposed design. In that process, important elements of landscape architecture - landform, vegetation, water, structures, animals and people, and atmosphere[14] - are key elements to that need to be represented. Physical models create a static scene of a landscape moment. And while the physical reality of the model conveys a clear representation, digital models are able to represent a landscape through space and time, augmenting the designers intent and clarifying the users understanding.

[14] Stephen M. Ervin, "Digital Landscape Modeling and Visualization: A Research Agenda," Landscape and Urban Planning, Volume 54, Issues 1–4 (2001): 49-62. Accessed August 28, 2020.

2.2.6 Photography

It is hard to decide whether photography should be identified as a landscape representation form. On the one hand, photography is an honest way to record what has been done on the land; on the other hand, photography showcases the design product involving the personal understanding of the photographer. Thus, photography, as one of the landscape representation forms discussed in this paper, specifically refers to the latter, which involves personal understanding of the photographer or the designer, as opposed to purely recording the landscape in a neutral way.

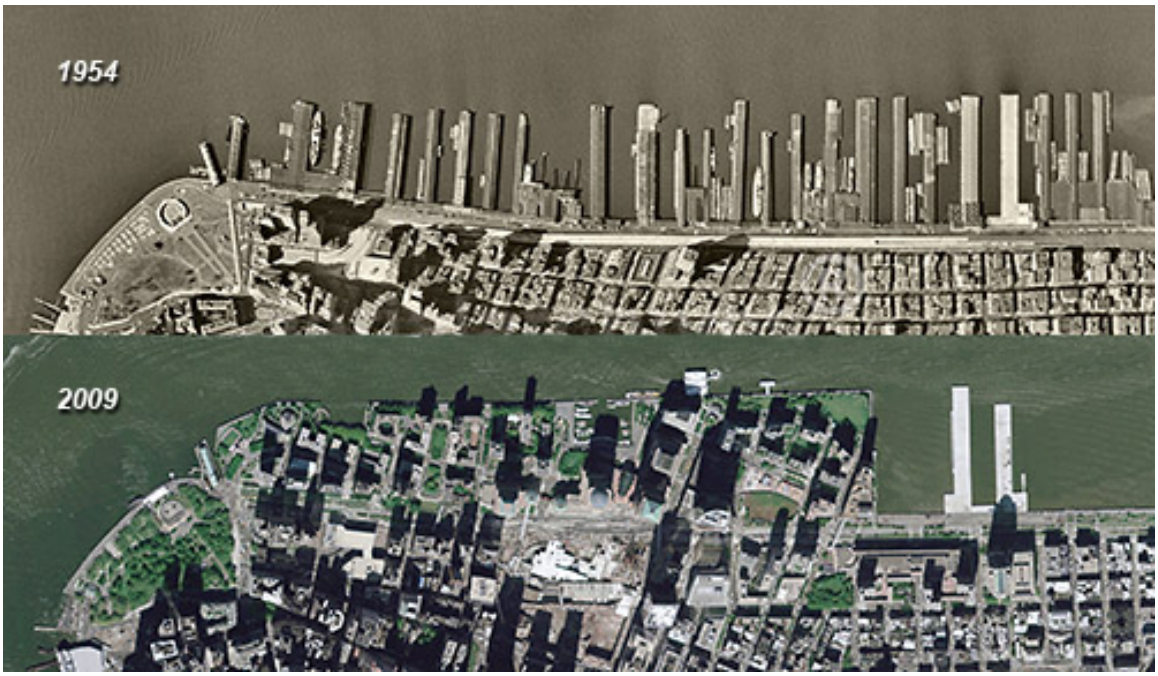

Figure 22: Aerial Archives. Historic Aerial Photograph of Piers at the Hudson River Waterfront Comparison of Changes in 55 years. Image Credit: https://www.aerialarchives.com/Historical-Aerials-New-York.htm

The power of landscape representation shifted from a scenic human scale image to an artificially managed scape at the cosmic scale[15]. Obviously, this technique brought landscape place-making into a new era; it endorsed the greatness of the landscape at the satellite level and gave everyone a broad scene of the earth, and its landscape. Aerial photos reveal the fact that the earth's green landscape connects as a whole to one ecosystem. This was the stunning fact that aerial photography, as a form of landscape representation, brought to people. It also brought a new dimension for landscape architects and artists interested in creative works by providing a lense to create non-human scale appreciated through the aerial photo.

"The power of aerial photography shows more in its ability to reflect and construct the world than its ability to describe."[16] Figure 22 reflects construction on the Hudson River Waterfront over 55 years. It shows the massive transfer of land on the shoreline. Figure 23 is a collage of the Spiral Jetty from 2005 to 2018. It indicates the gradual change of the Spiral Jetty under the natural forces. Tracing back to the idea of the Spiral Jetty by Robert Smithson, this piece of art meant to show how it was embedded into nature. Given this idea, the photography of the Spiral Jetty over time became part of the design itself, using the lens to record the gradual change and represent them in a chronological form.

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[15] Charles Waldheim, "Aerial Representation and the Recovery of Landscape," in *Recovering Landscape: Essays in Contemporary Landscape Architecture*, ed. James Corner (New York: Princeton Architectural Press, 2006), 121.

[16] James Corner, *The Landscape Imagination. The Collected Essays of James* Corner, 1990-2010. (New York: Princeton Architectural Press, 2014), 136.

Figure 23: Spiral Jetty by Robert Smithson, Rozel Point peninsula in Great Salt Lake. Photo taken in (from top left to bottom right) 2005 spring, 2012 fall, 2015 spring, and 2018 spring. Image Credit: https://www.diaart.org/collection/spiraljettyaerials

However, as a representation form, aerial photography suggests an unique way of viewing the landscape, which might lead to a limited understand of the land. Under the vision or scale of aerial photography, some specific features of a landscape might be eliminated and generalized to be associated with some formal terms, such as forestland, wetland, open space. From the urban planning perspective, these generalizations make the landscape more relatable, but risks sacrificing the unique features of a specific area of land.

Figure 24: Photos of Las Vegas. Robert Venturi. Learning From Las Vegas. Image Credit: Venturi, Robert, Denise Scott Brown, and Steven Izenour. Learning from Las Vegas. Cambridge, MA: MIT Press, 1972.

Site photography is another type of landscape representation. Unlike the aerial photography, site photography is taken from the human scale. Figure 24 is the photography collection from Robert Venturi and his observation of Las Vegas. In the photo, he introduces human scale as the comparison to the building and landform.

2.2.7 Film/Video

Film and video are four-dimensional landscape representation, which includes time as the fourth dimension. Figure 25 is a snapshot of the device that Bradley Cantrell created to simulate the water flow over time and its impact on the sediments. In the video, he uses the device to control the water flow volume and direction to analyze the impact on sediments and make comparison to show the results. Figure 26 is part of the project, 2050: An Energetic Odyssey, which simulates and predicts the renewable energy sources on and around the North Sea.

As a landscape representation form, Film/video might include all the characteristics of the representation forms that discussed before. Depending on the way the film/video is made, it could show as plan, section, aerial view, and perspective. By

adding time as the fourth dimension, it makes even easier for people to understand the design idea.

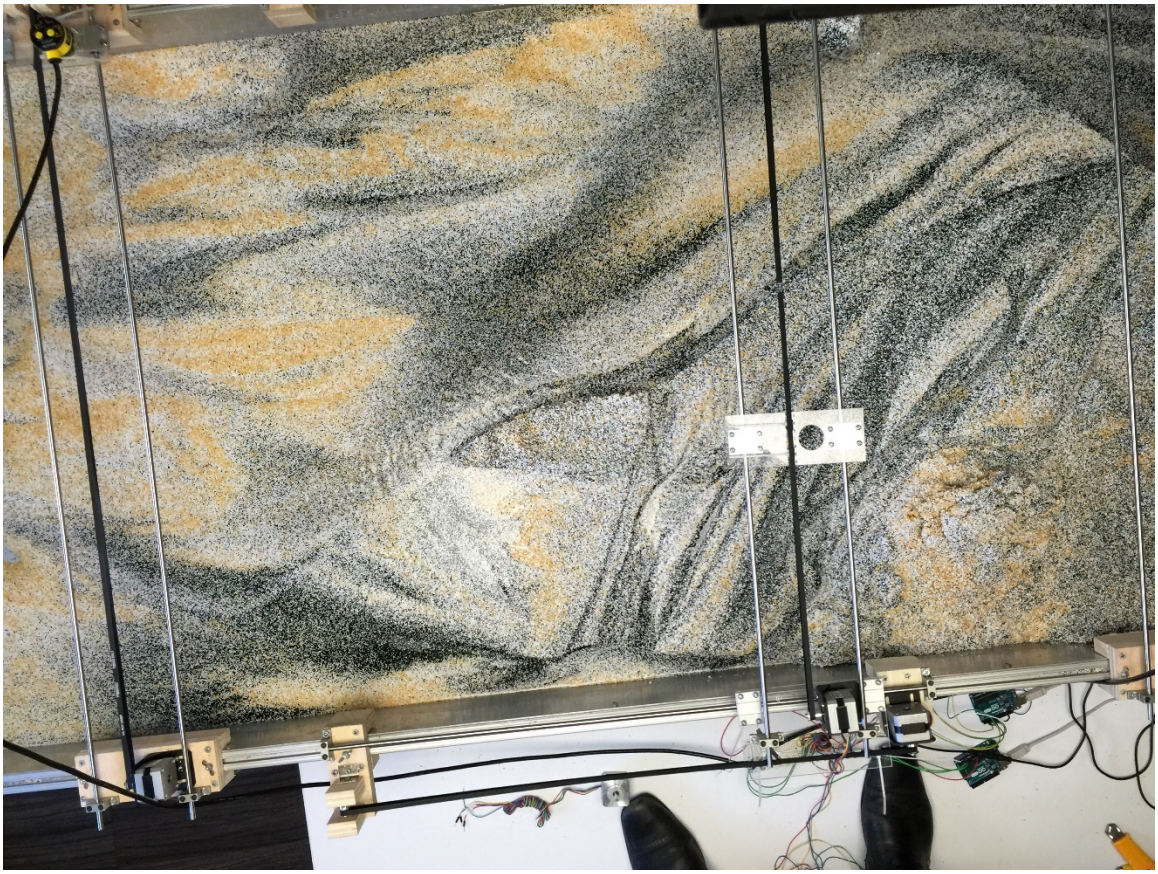


Figure 25: Bradley Cantrell. Model and Simulate the Water Flow. Image Credit: https://www.gsd.harvard.edu/exhibition/responsive-topography-fluvial-landscapes/

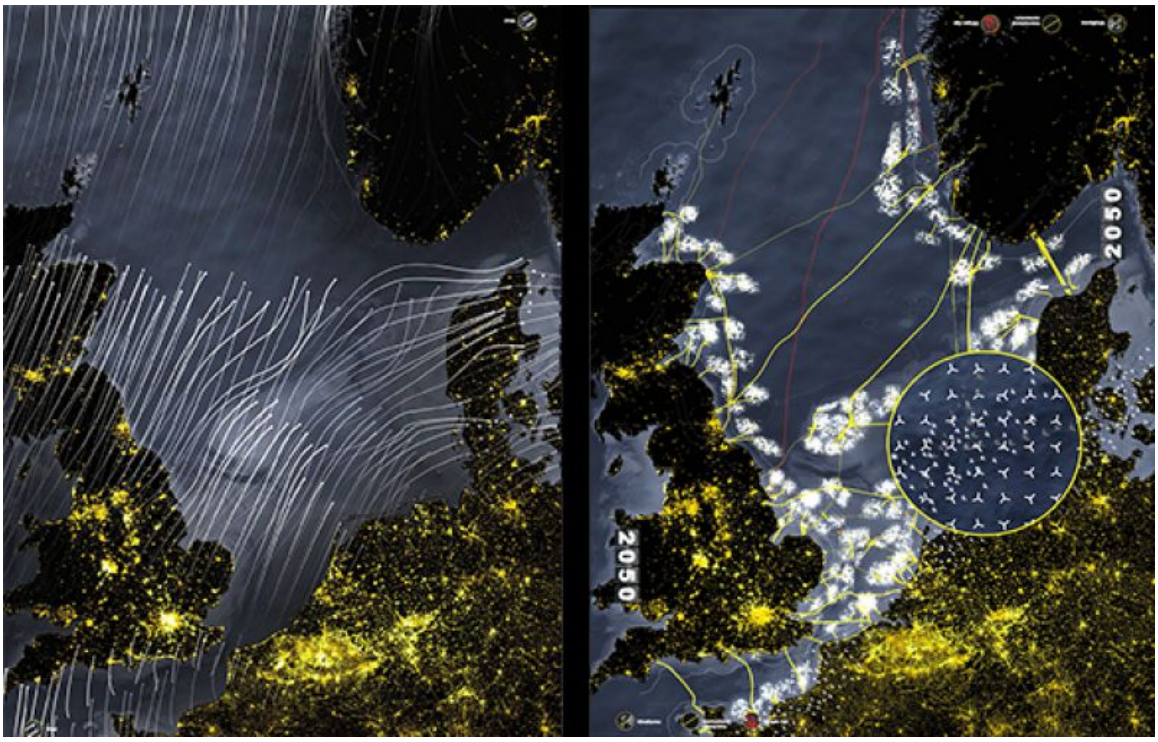


Figure 26: H+N+S Landscape Architects, Ecofys and Tungsten Pro. 2050: An Energetic Odyssey. Image Credit: http://www.hnsland.nl/en/projects/2050-energetic-odyssey

2.2.8 Augmented Reality/Virtual Reality

Augmented Reality (AR) and Virtual Reality (VR) are not specific representations for landscape architecture. They are design practices and digital products that may be used to represent landscapes and landscape designs. Ideally, AR/VR breaks the block that people have in imaging a proposed design in the existing landscape. Imagination is a beautiful part of the design process, but from the perspective of design communication and public outreach, 2 dimensional representations can create difficulties for professionals and the general public in communicating what will actually be constructed and what it will look like. AR/VR invites people to into the imagined landscape world built by the designers, viewing the design through digital devices, immersed in a constructed “real” space. Clearly there is still a long way to go from the preliminary

virtual graphics to the realistic graphics. In most of the accessible AR/VR products, the graphics are not real enough for people to understand the materials, texture, and color in the design.

2.3 Conclusion

Landscape representation is part of the larger cultural, historic, artistic, and social way that humans have documented their lived experience. For example, axonometric drawings used to represent ancient Chinese gardens, unknown to westerners, eventually became a modern form of landscape representation created in a different media - from brushes to computer programs. The same can be said for the plan, section, and perspective. These representational types continue to be part of and influence new technological platforms like AR and VR projects.

Representation is essentially the abstraction of a concept. The style and techniques used in these different types of landscape representations, plan, section, perspective etc., may lead either to a clear and direct understanding of design intent or open the imagination to explore more options and ideas. The choice depends on the intent and the audience.

The plan is an abstract translation of design. Axonometric as a technique that comes from an obscure and poetic expression, but has been transformed to a technical drawing to become accurate and objective. The model is a physical representation closer to reality. Aerial photography has a high level of summary and abstraction, and site photography records landscape in a very honest way. The forms and ways in which landscapes have been represented over time conveys the complexity of how to express an

idea in a specific form and on a specific media; a plan on paper, a perspective in a digital model, landforms in a clay model, in addition to how abstract or clear they should be. What these representational forms have in common, except for the physical model, is that they are two-dimensional representations of three-dimensional ideas.

Contemporary representational media like AR/VR alter the viewer's perception to be able to view and experience layers of visual and written information over time (both real and historic). In the case of AR and VR, the viewer's senses are immersed in a way that the representation can be experienced as four-dimensional. These two tools provide new ways in which to express ideas, designs, and transformations in the landscape and also are part of the historic progression of landscape representation.

Chapter 3: Case Study: The History of Branch Brook Park

3.1 Background of Branch Brook Park

Branch Brook Park, the first county park in the United States, is located within Essex County, New Jersey, and has approximately 360 acres of area. The original site is in Newark and the expanded portion is located within Township of Belleville. The park has the greatest number of cherry blossom trees in the United States and hosts annual cherry blossom festival annually.

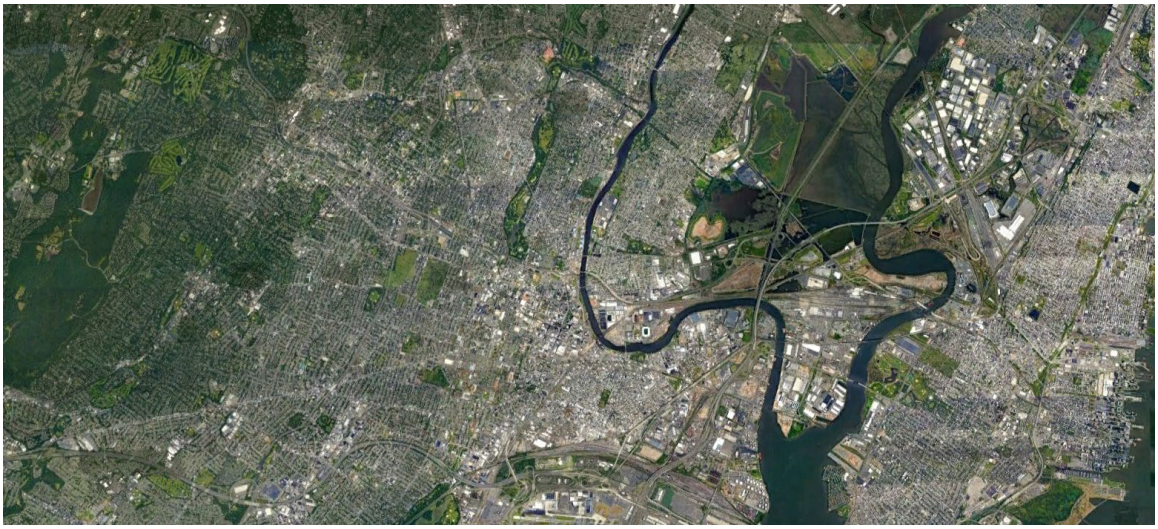


Figure 27: Aerial Map of Newark Area. Data Source: New Jersey Department of Environmental Protection.

3.2 Design History[17]

3.2.1 F. L. Olmsted's Era

The design of Branch Brook Park has a long and well-documented history. Inspired by the design concept of Central Park, the local newspaper, Newark Daily

[17] Information of this section are collected and summarized from "Cultural Landscape Report," BRANCH BROOK PARK ALLIANCE, accessed August 28, 2020, https://branchbrookpark.org/cultural-landscape-report.html, Volume 1.

Advertiser, urged their readers to pressure the legislature to create a “Central Park” for Newark. In response, the New Jersey State Legislature authorized a Newark Park Commission to initiate the project. The Commission requested Frederick Law Olmsted and Calvert Vaux prepare a report on the 420-acre tract selected by the Commission. After a few site visits, Olmsted and Vaux suggested expanding the 420-acre site to 700 acres, to accommodate future growth in Newark and the need for recreational space. The proposal did not pass in the legislature

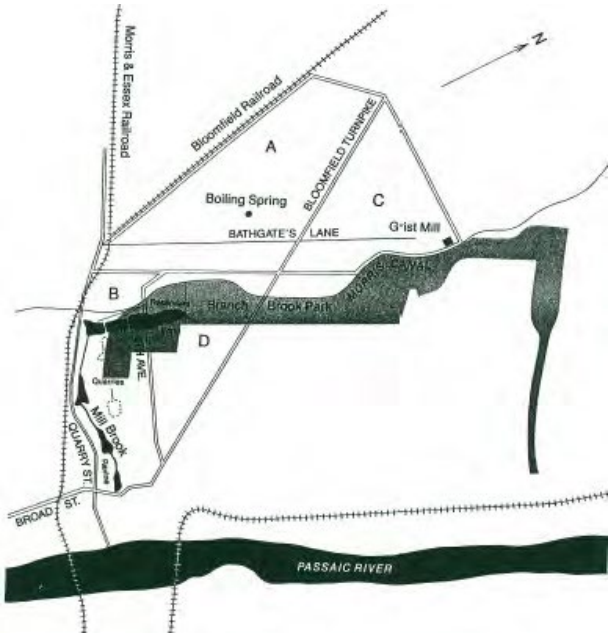


Figure 28 (left): Olmsted and Vaux sketch of the proposed park boundary. Image Credit: Archives of the Essex County Park System, Olmsted Job File #420, OAR.

Figure 29 (right): Plan comparing Olmsted and Vaux 1867 Proposal with the present boundary of Branch Brook Park. Image Credit: Archives of the Essex County Park System, Sketch courtesy of the Frederick Law Olmsted Papers Project, from Volume VI, The Years of Olmsted, Vaux & Company: 1865-1874, p. 213.

The proposal was revived by the 1890’s Park Movement supporters and the Commission. Nathan F. Barrett, a New Jersey-based landscape architect, and John Bogart, a civil engineer, were retained to prepare "plans and designs for the consideration

and decision of the Park Commission." The Park Commission unsuccessfully tried to retain the Olmsteds.

3.2.2 Bogart and Barrett's Era

In 1895, Barrett and Bogart set the park boundary. The park boundary expanded over 2-miles in length with an average width of less than a quarter of a mile. The park was bound by Clifton and Parker Avenues, and Lake Street to the east, and divided into three areas, the north, middle and southern division, by existing roads.

The partnership between Barrett and Bogart and the Park Commission did not last. The construction costs used up most of the initial $2.5 million budget for the park. As the dissatisfaction grew with financial issues, the Park Commission reached out to John Charles Olmsted and ended their contract with Barrett and Bogart in 1898.

3.2.3 J. C. Olmsted and F. L. Olmsted Jr.'s Era

John Charles Olmsted started work on the nearly completed Southern Division of Branch Brook Park in late August 1898. Paths and gardens designed by Barret and Bogart in the east of the lake had been constructed, and the stairs in steep slope areas around the lake had been built. Later that year, the Olmsteds requested a thorough topographic survey of the park, then with the Barret and Bogart plan and the topographic survey in hand , they walked the site to take notes, photos, draw sketches, and evaluate site boundaries. This on location analysis from plans to the actual site, achieved a thorough understanding of the site and the requirements for a new design.

After reviewing the plan and existing conditions, the Olmsteds proposed a wider lake, to support recreation, which at the time included boating and ice skating, being so specific as to recommend an 8’ uniform depth for the lake in the summer and a 3’ depth in the winter.

Their concept for the Middle Division was to link to the lake in the Southern Division and create a narrow water body along with a large shaded woodland area and a recreational space. The shaded woodland area along with the meandering shape of the riverbank created picturesque scenery for people who were boating or walking along Branch Brook Lake. In the grading and planting plans they delineated the meandering waterfront emphasized the contrast between the shaded woodland area and the open recreational area. In the northern division they decided to create a natural environment with a sense of reserved or untouched nature.

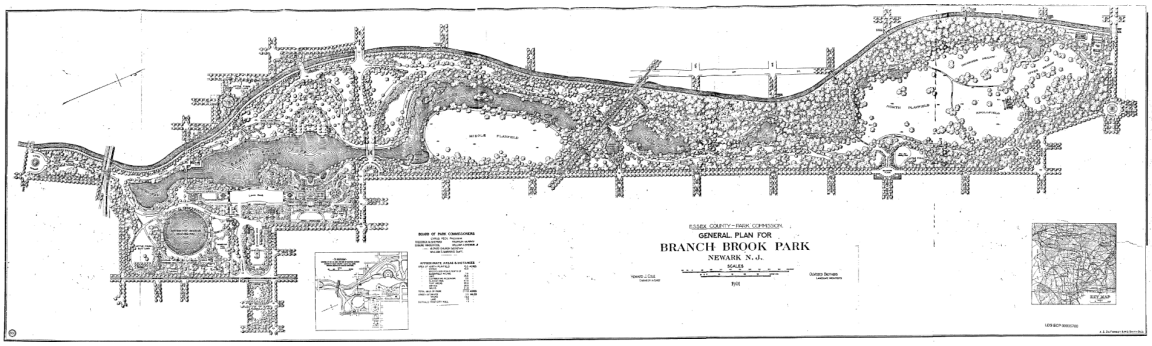


Figure 30: General Plan for Branch Brook Park by Olmsted Brothers, 1901. Image Credit: Archives of the Essex County Park System.

The Olmsteds educated clients and the public on the importance of landscape architecture since it was a relatively new profession. They emphasized that a park design was not merely a beautiful rendering, but included survey, design, planting, construction, and a multi-disciplinary corporation. After working with the Olmsted firm, the Park

Commission widened their understanding of landscape architecture as a professional field.

3.3 The Depression, civil unrest and park restoration

In 1915, the Olmsted Brothers proposed a picturesque parkway system for Essex County. The proposal requested an extension of Branch Brook Park from its northern end towards the mountain reservations. The extension, as we know today, became Belleville Park. The design and construction process took many years and the construction of Belleville Park was not finished until 1937.

According to the philosophy of park design of Frederick Law Olmsted, the park should have a parkway to provide a pleasant, recreational park experience. Following this philosophy, the extension was designed base on a parkway and with open spaces to branch out from the parkway as parklets.

In July 1967, the social unrest tore Newark apart and the visitors to Branch Brook Park dropped. After 1976, Historic preservation advocate Kathleen Galop started the Newark Cherry Blossom Festival to bring people back to the park. The park received designation in the register of NJ and national historic place. The Branch Brook Park Alliance was established to help preserve and maintain the park.

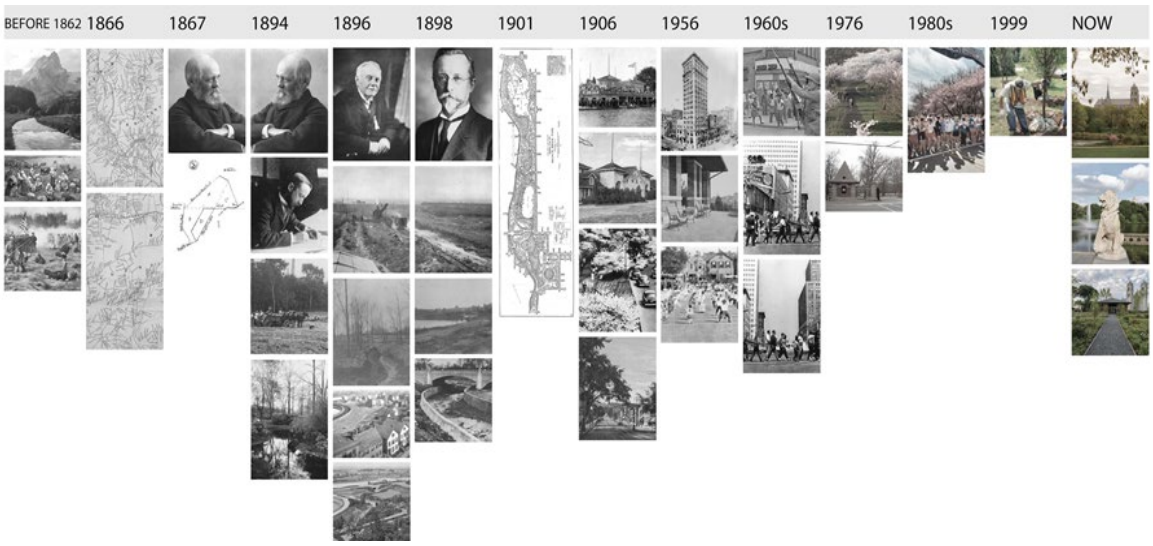


Figure 31: Historic Timeline of Branch Brook Park. Image by author.

Chapter 4: Landscape Representation of Branch Brook Park

4.1 Representations by the Olmsteds

The Essex County Archive provided access to an extensive collection of original Branch Brook Park design and construction documents. The documented design ideas and communication methods used by the Olmsteds reveal the complexity of the design process and events as they unfolded.

Plans are the primary landscape representation document in the Branch Brook Park design drawing set. They were used for site, topographic, and planting designs. As previously discussed plans compress complex information into two-dimensional graphics. The grading plan shows the elevation sequence, at a certain interval and the property map uses text to delineate the land ownership within park boundaries before the land acquisition. Both plan and map require the person viewing them to have a certain level of imagination and technical understanding to interpret their intent.

The Figure 32 shows the topography design of a portion of the Northern Division, superimposing contours on the designed driveways and pathways within the park. Figure 33 is a portion of the property map.

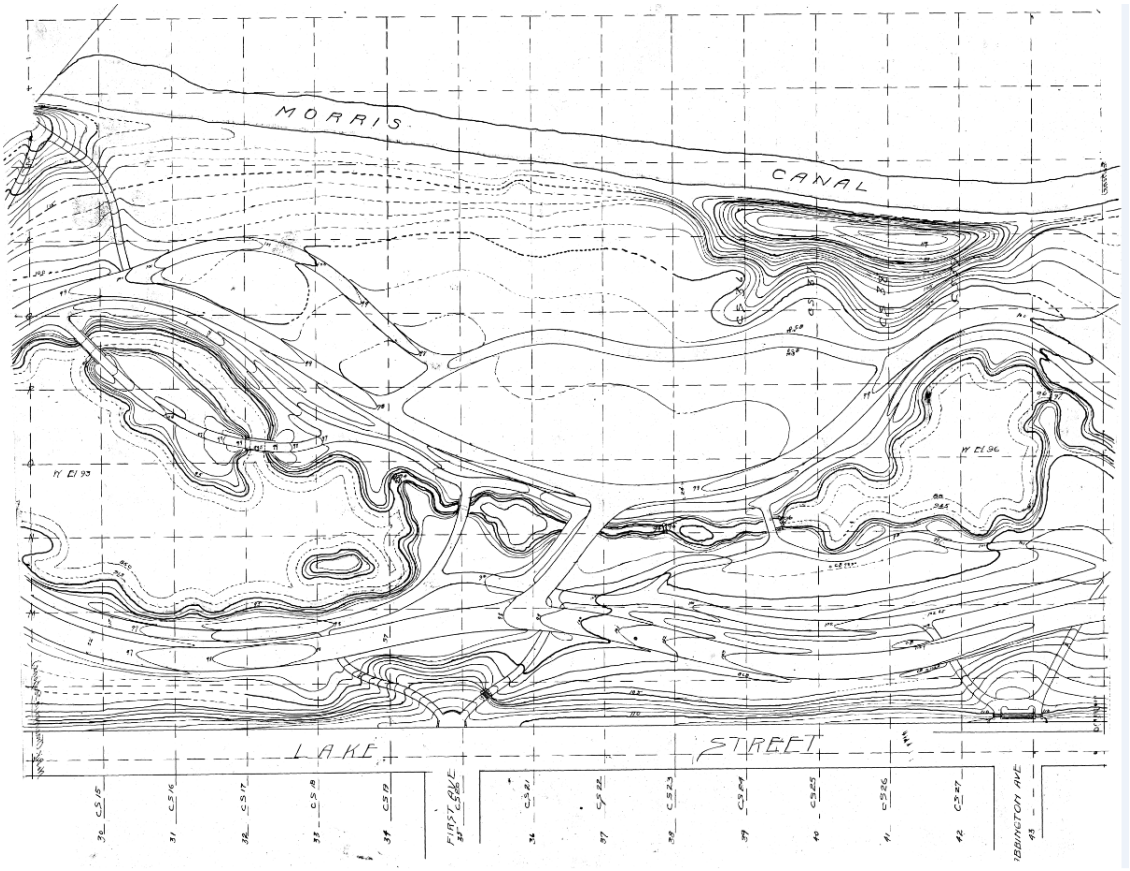


Figure 32: Branch Brook Park: Northern Division Grading Plan. Image Credit: Archives of the Essex County Park System.

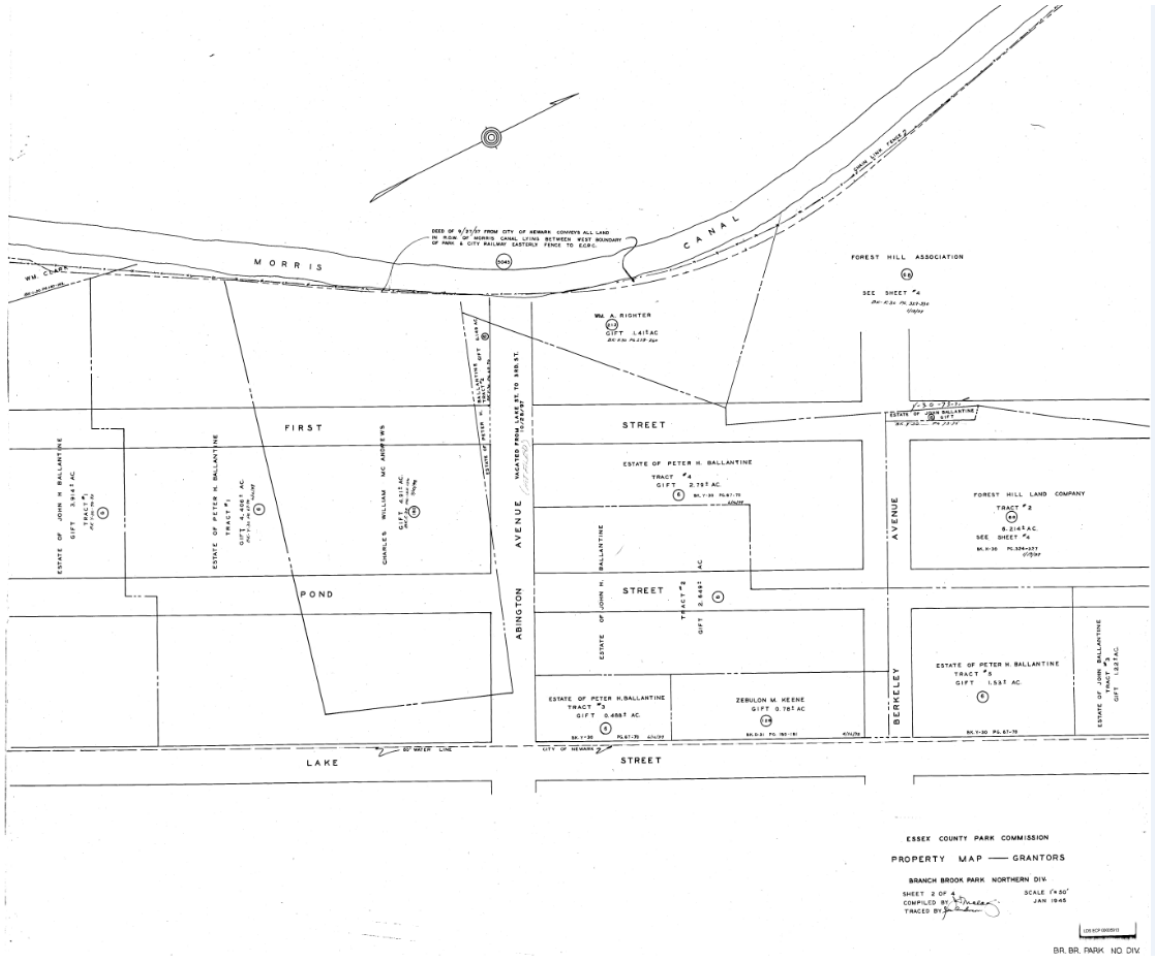


Figure 33: Branch Brook Park: Northern Division Property Map - Grantors. Image Credit: Archives of the Essex County Park System.

Construction documents are used to translate and communicate designs into buildable forms, between the designers and the builders. The section provides a vertical view of a structure to demonstrate the layering of different materials, while the construction document shows how different materials are attached. Both the construction plan and section are forms of representation. Figure 34 below shows the construction detail for the culvert and sewer crossing in the park. It shows how the culvert and the sewer crossing should be installed.

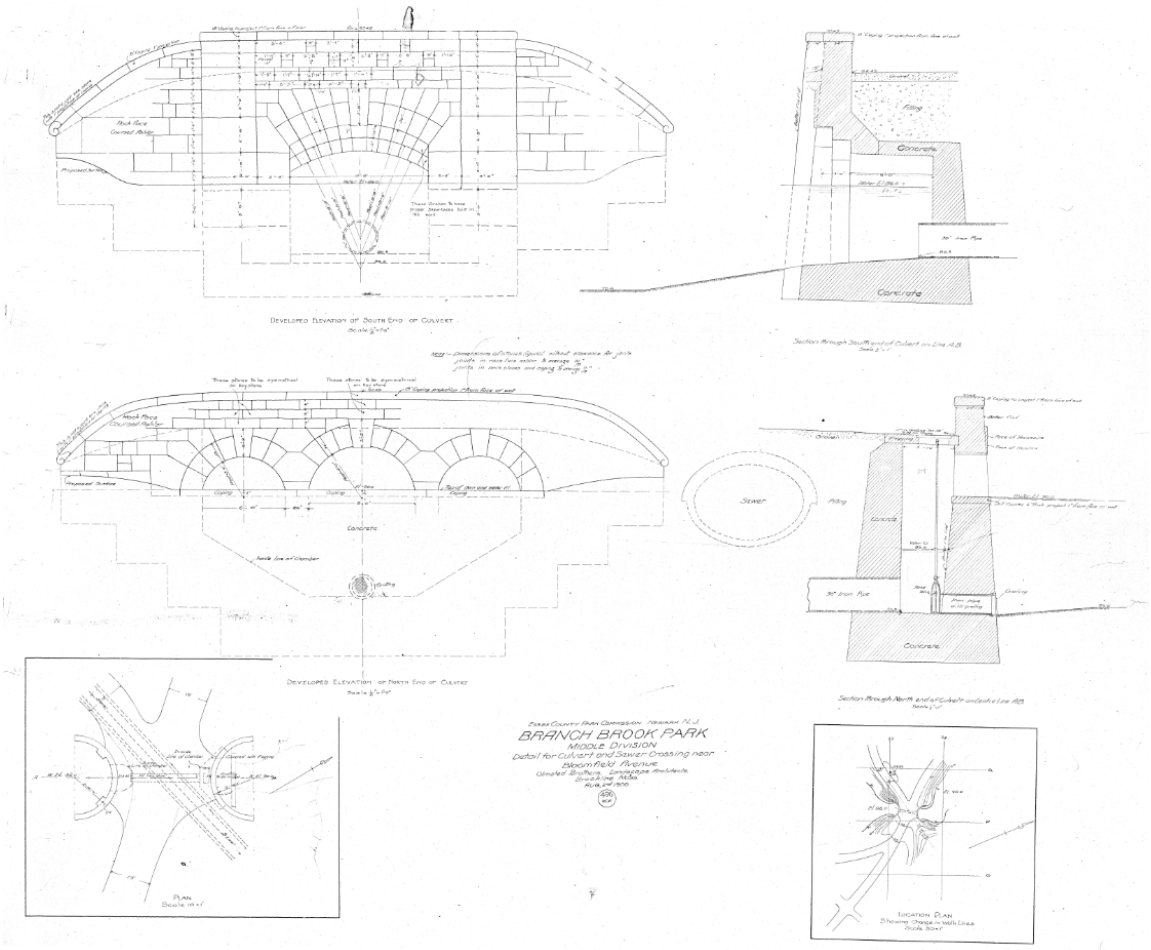


Figure 34: Branch Brook Park Middle Division Detail for Culvert and Sewer Crossing near Bloomfield Avenue. Image Credit: Archives of the Essex County Park System.

The Branch Brook Park set of drawings is composed of an index map and several enlargement maps. This form of representing a large scale design is limited to the size of the paper used. To solve the limitation issue, the paper drawings are divided to keep the details large enough to be legible. Figure 35 and Figure 36 below is the example of the index map and enlarged map that work together to show the design in a legible way. In the index map, the Southern Division has been divided into three sections and Figure 36 shows the enlarged detail of one of the sections, with more information. Digital drafting doesn't have this issue since it contains an unlimited drafting space. Digital drafting content is shown on screen where the content can be zoomed in or out to show the details.

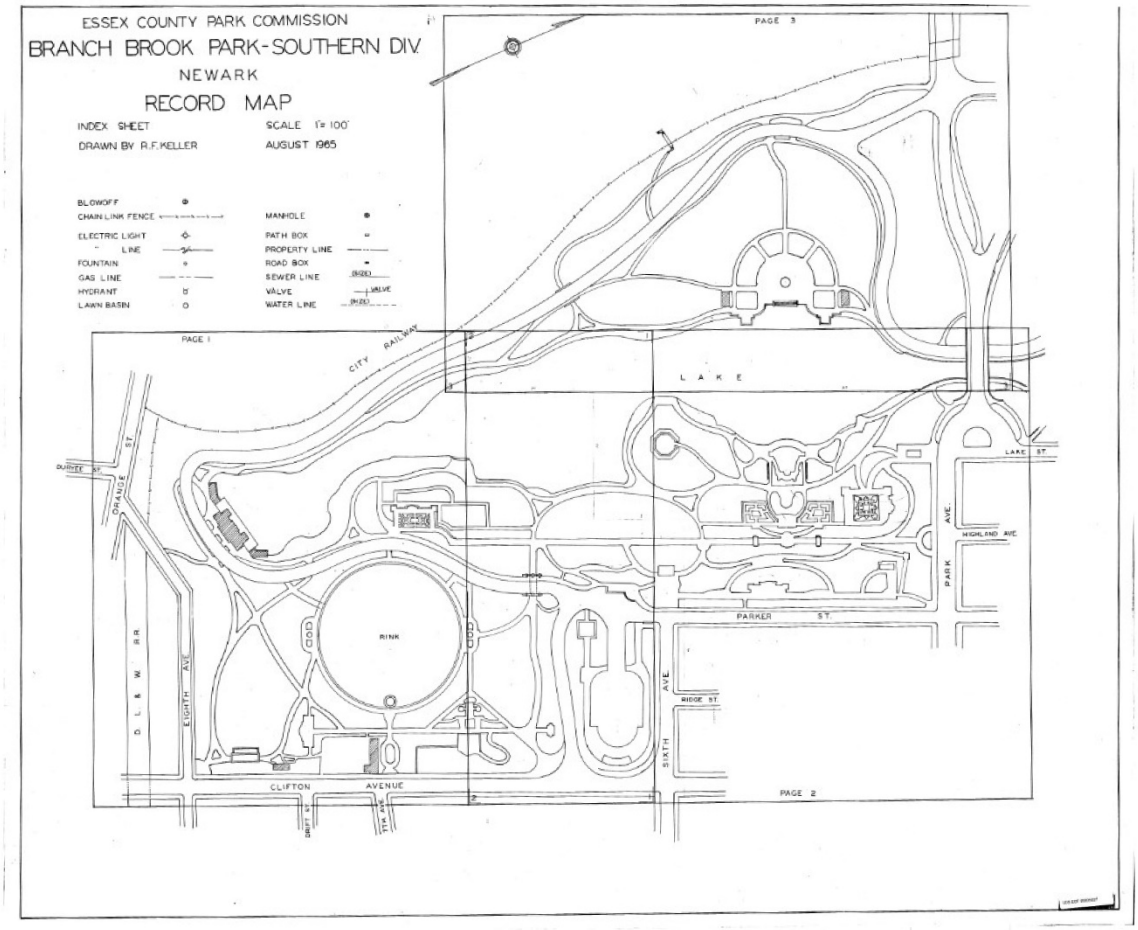


Figure 35: Branch Brook Park: Southern Division Record Map Index Sheet. Image Credit: Archives of the Essex County Park System.

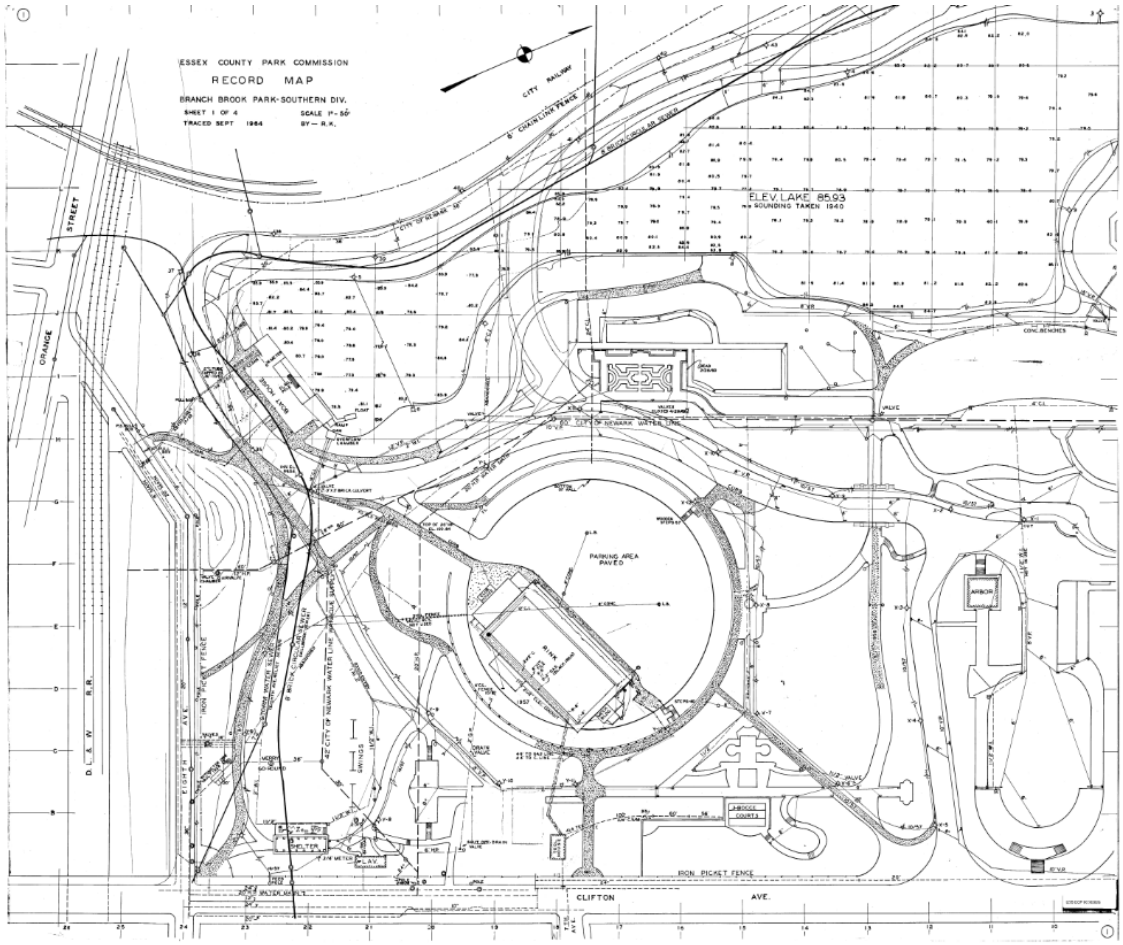


Figure 36: Branch Brook Park: Southern Division Record Map Enlargement Sheet. Image Credit: Archives of the Essex County Park System.

4.2 Representing the landscape complexity

Archival documents present a richness of information, available primarily to researchers and historians. The design plans and maps provide an insight of the development of the park over time but are not directly communicated to the daily experience of the park user. The development other types of representation on digital platforms can bridge the gap between historic context, design decisions and education. In other words, AR, VR smartphones and apps can provide users with a better understanding of the park's complexity using a variety of landscape representation types.

Branch Brook Park initiated a Cell Phone Tour, which included 37 posts installed in the Park where visitors could scan the QR code on the post and listen to a short description of the history of Branch Brook Park (Figure 37). This integrates education and storytelling and provides a new way of using technology to enhance the park experience.

Figure 38 below shows the application, City Story London. It serves as a good example of how to integrate plans, maps, history and general information into a walking experience of a specific place. The app allows users to scan the QR code of the exhibitions in the museum to learn more about the exhibition, and drag the timeline along the history of London to read the stories of the city from the map in every time period. Guides and mobile applications like these have the aim to provide more information to the visitor that can be seen from direct observation.

A similar approach can be used in Branch Brook Park to integrate historic timelines, plans, maps, photos, and other representations to connect the park visitor to the complexity of the park's landscape.

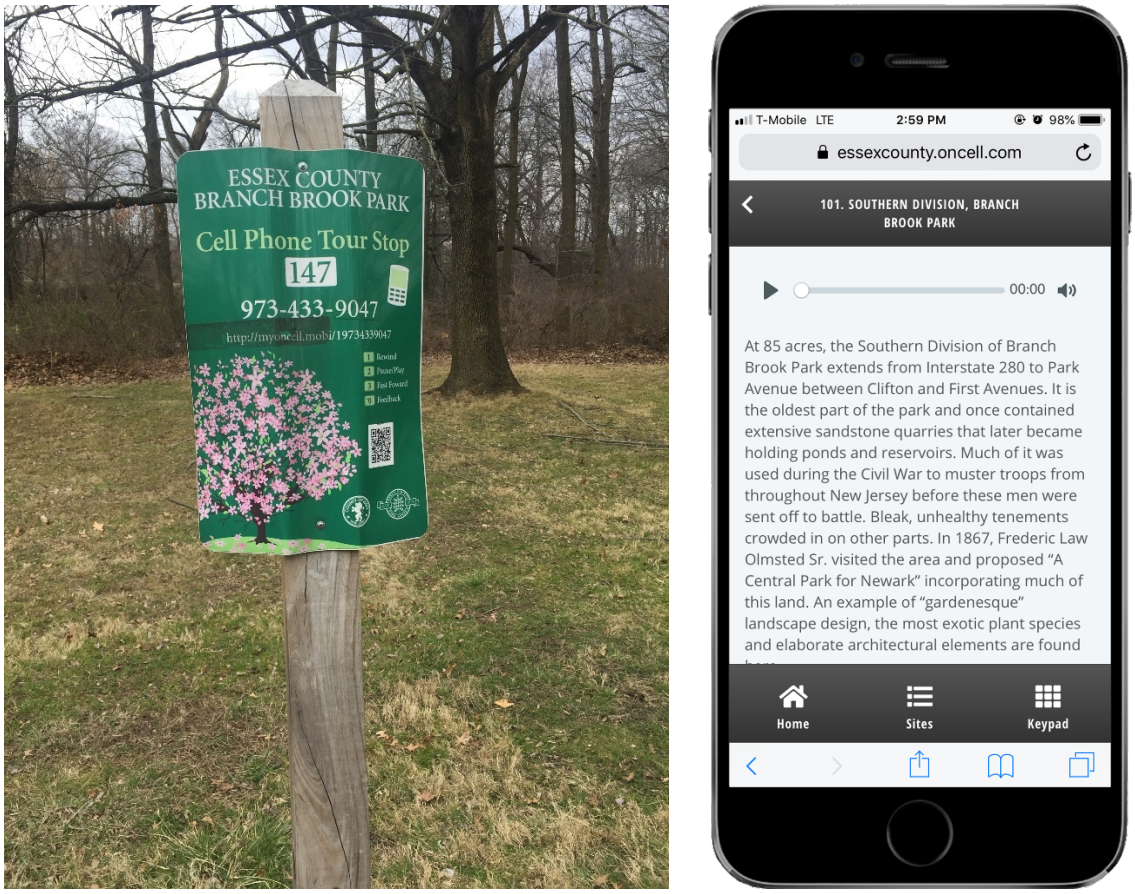


Figure 37: Branch Brook Park Cell Phone Tour. Photo (left) and Rendering (right) by author.

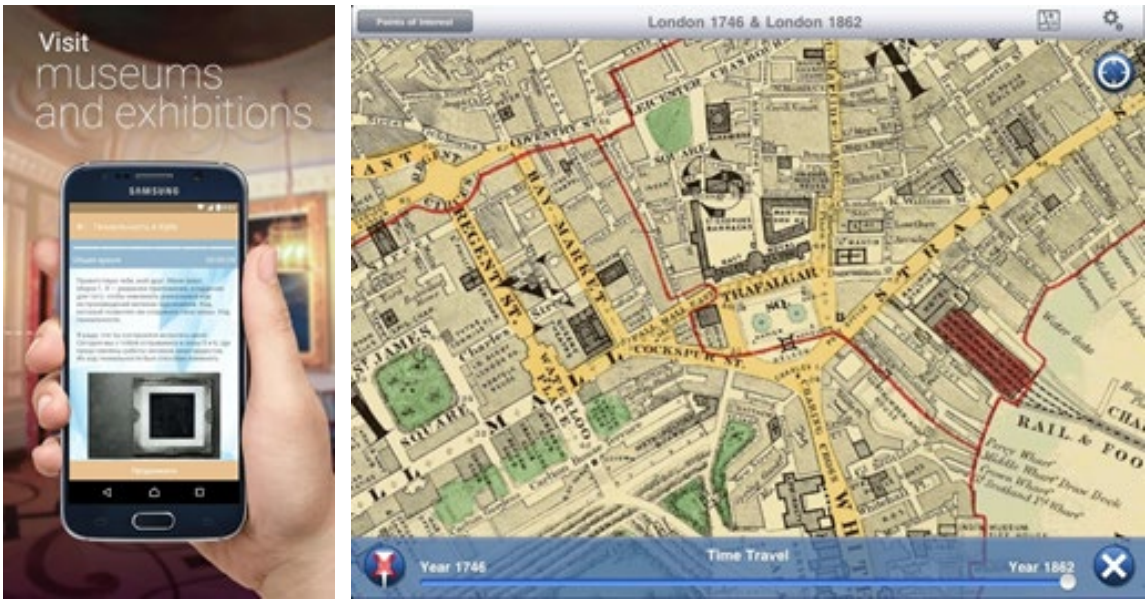


Figure 38: iPhone app, City Story: London. https://theliteraryplatform.com/news/2011/09/city-stories-medical-london-iphone-app/

4.3 The Branch Brook Park visitor app: a prototype

The social and cultural history of Branch Brook Park is a significant component of its design. The events that lead to the establishment of the park and its development over time, like the constructed lakes, ice-skating rink, cherry blossom festival, and chrysanthemum show, have made the park an important part of the social and cultural life of the Newark community.

A prototype application that integrates general landscape guides, historic documentation, in a mobile format was developed in response to the research goal of this study. The prototype of the App serves as a portable and accessible lens to view through when observing the landscape. The lens or visual portal has multiple layers showing the complexity of the landscape through plans, maps, photos and other relevant documents. It allows the social and cultural history, design process, maintenance, and the revival of the

park, to be seen and to unfold over 100 years of landscape representation types. The application creates a game within the park by inviting people to create their own storylines in the virtual reality tour and share their stories about the park. For instance, the historic graphics show a snapshot of from the glacial era to the present, providing an overall understanding of the area's historic timeline. The graphics lay out history in a way that is accessible and connects geography to history, social events, politics and park design.

Figure 39: Branch Brook Visitor's app, Branch Brook Park Tour. Image by author.

4.3.1 The prototype: process and development

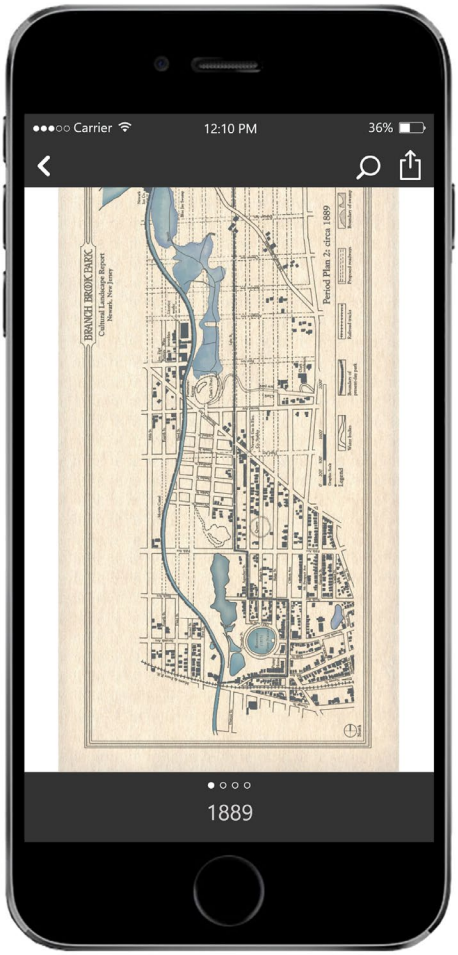
The mobile App includes the social and cultural history of Branch Brook Park, accessible anywhere and anytime. It uses the landscape representation forms discussed in previous sections and ios as the platform, but it is expected to be on all types of smart device systems[18].

Figure 40: The opening pages of the prototype. Image by author.[19]

The prototype consists of two components: history and exploration. The historic component covers the history and social events in Newark, the design and maintenance

[18] The prototype is created on Adobe XD, a user interface (UI) design platform.
[19] Figures 40-41, 43-45 are made by the screenshots of Adobe XD and superimposed into the iPhone 6 frame.

history of the park through time. The prototype includes details of the topographic change of the park boundary, bounded by Route 280 to the south, the railroad to the west, Belleville Avenue to the north, and Lake Street to the east. By comparing the topographic difference from 1889 to 1898, it uses graphics to educate users on the background, progress, and impact of those topographic changes in the park.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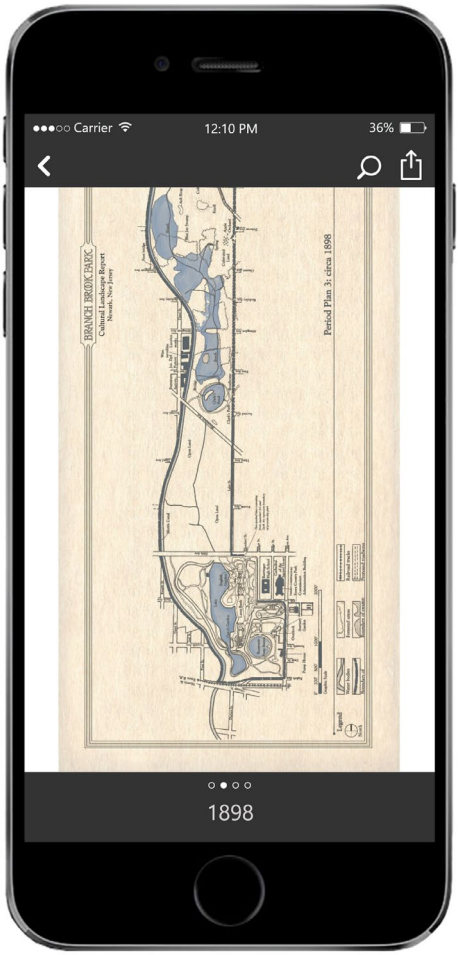
BRANCH BROOK PARK
Cultural Landscape Report
Period Plan 2: circa 1889
Legend
1889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BRANCH BROOK PARK
Cultural Landscape Report
Period Plan 3: circa 1898
Legend
1898

Figure 41: The historic maps of Branch Brook Park. Image by author.

The history of the Newark area is shown in collages from prehistory to the current times. The users can slide left and right to look at the timeline of the history and slide up to read a short paragraph of a certain period of history. This provide users a quick way to learn about the history of the park.

Figure 42: Collage of the history of Branch Brook Park. Images by author.

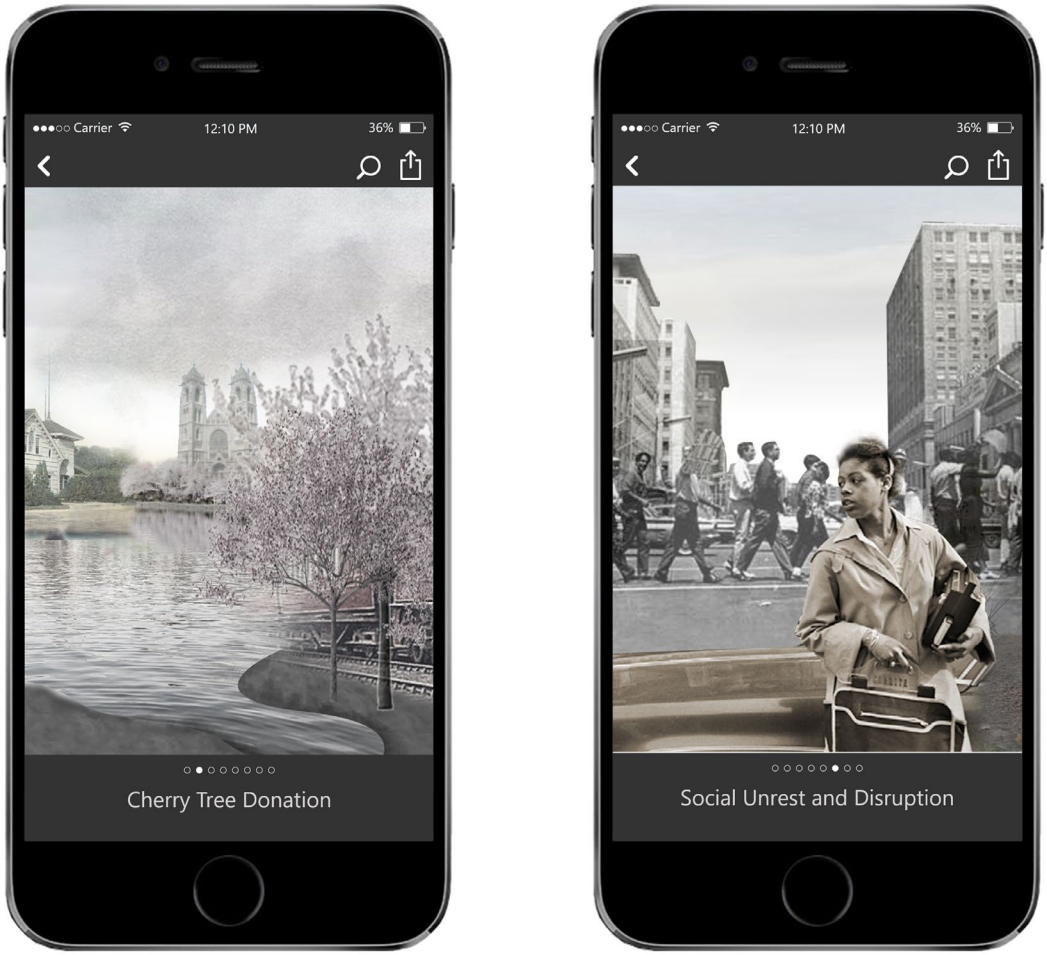


Figure 43: Screenshots of the Historic Timeline Section in the Prototype. Images by author.

The second component is exploration, including off-site and on-site exploration. The off-site exploration shows the attraction locations on the map so that people can tap on any point to explore. For instance, the prototype created a bridge tour in the Northern Division of the park along the trail. People can tap on the spots to read stories on the bridges, see the design drawings, materials, and old photos.

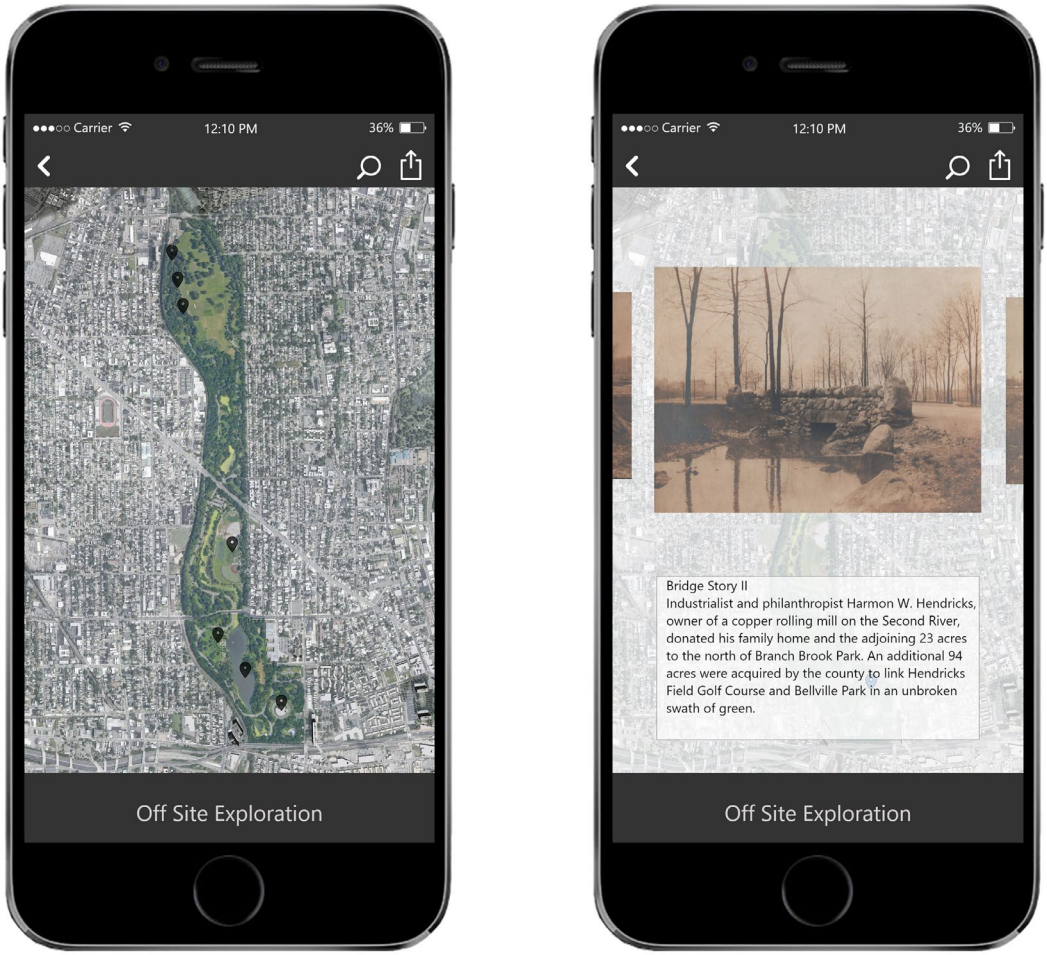
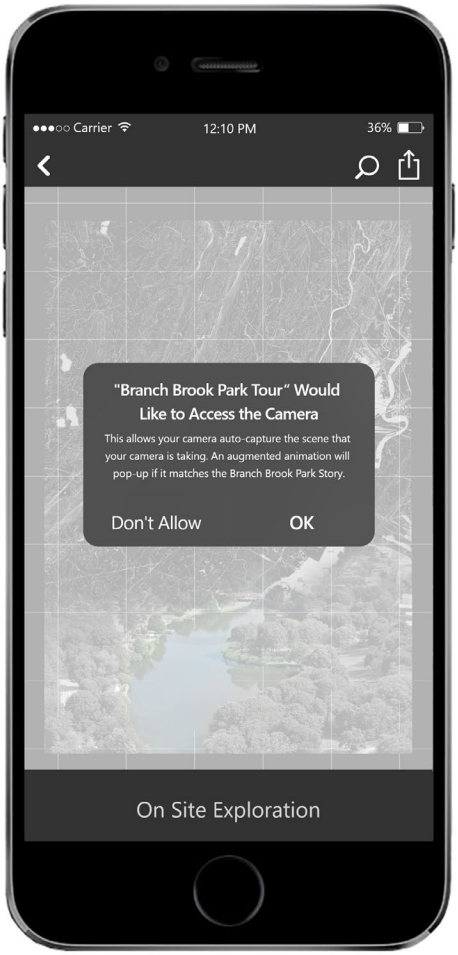
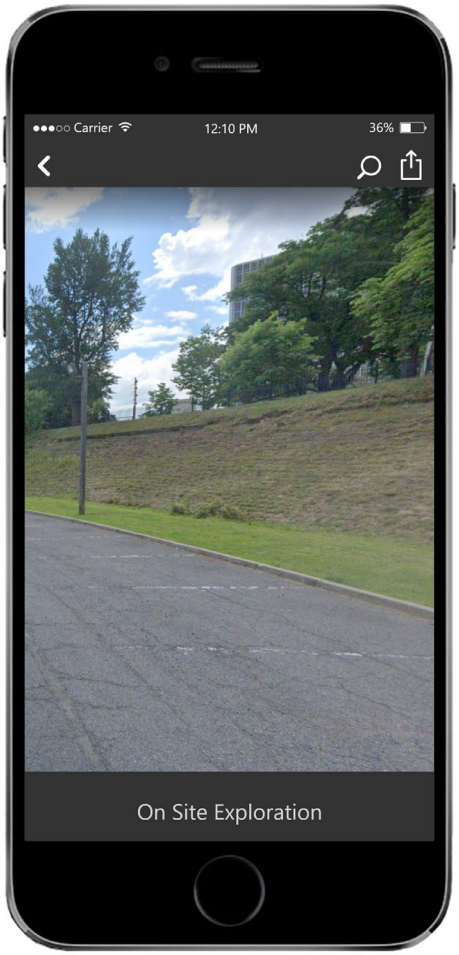


Figure 44: Screenshots of the Off-Site Explorationn in the Prototype. Images by author.

The on-site exploration has an augmented reality tour. Visitors can take their phones or smart devices to the park to capture the scenes in the park. They can turn on their camera, face a scene in the park to find old stories and historic references about that specific site. For instance, if the visitors go to the roller skating center, turn on their camera, swivel their camera around the landscape (Fig 45) Once they find the correct spot and the angle, the historic photo taken from the same angle will show up, along with a paragraph describing historic aspects of the site (Figure 45). In addition, geolocating techniques locate visitors when they use the augmented reality tour.

The augmented reality tour is designed to be a repeatable adventure in the park. It includes information on seasonality and events like the annual cherry blossom festival. The tour would include the location of the cherry trees, the interruption and restart of the festival, and botanical information about the cherry trees. The app will allow visitors to create their own storylines and submit them for review then published and shared on the app. This allows the community to contribute to the story of the park.


●●●○○ Carrier
12:10 PM
36%
"Branch Brook Park Tour" Would Like to Access the Camera
This allows your camera auto-capture the scene that your camera is taking. An augmented animation will pop-up if it matches the Branch Brook Park Story.
Don't Allow
OK
On Site Exploration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On Site Exploration

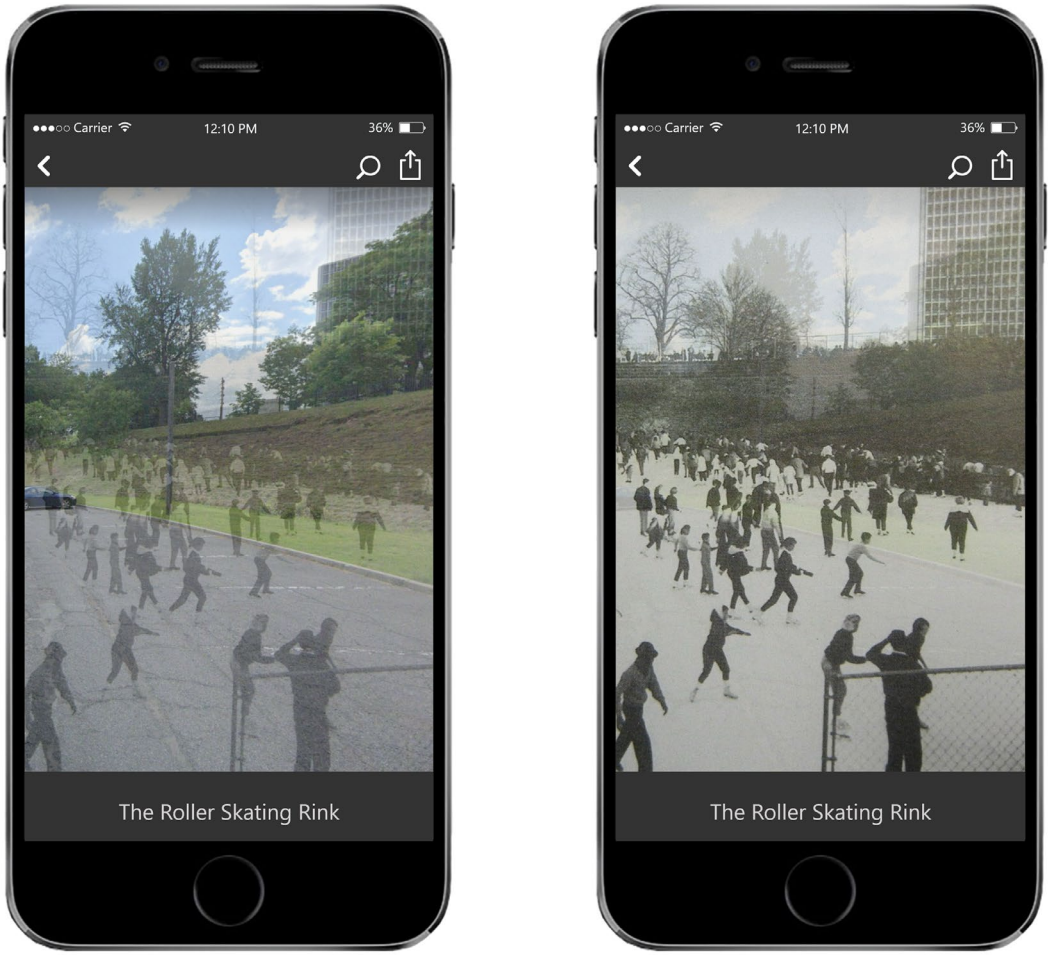

Figure 45: Screenshots of the Sequence of the On-Site Exploration in the Prototype. Images by author.

Chapter 5: Discussion and Conclusion

5.1 Landscape Complexity and Landscape Representation

This study of landscape representation consisted of two parts:

1) The types of landscape representation and their corresponding uses. This described how the characteristics of landscape representations expressed the design ideas in different dimensions.
2) The practice of communicating landscape complexity, including concepts, design, and documenting existing conditions. Here representations, such as plan and perspective, were used as a graphic language to display and educate the viewer.

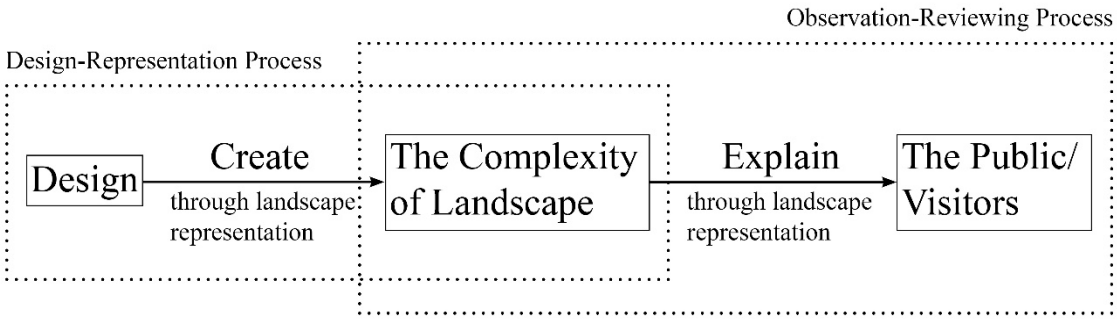

Figure 46: Diagram of the information flows from designer to the public. Image by author.

The diagram above shows the relationship between the designer, the complexity of landscapes, and the public/visitor. The Design-Representation Process refers to the process used to design the landscape through landscape representation. For instance, the process used by the Olmsted Brothers to design Branch Brook Park could be referred to the Design-Representation Process. The Observation-Reviewing Process refers to the sense visitors engage in when in a landscape. On the one hand, when people visit a landscape, they read and receive information that helps them determine how to move

through and experience the landscape. On the other hand, the designed landscape is able to "explain itself" without further direction. The meeting of these two forms of perception overlap and define the landscape's complexity. In the Design-Representation Process, the complexity of landscape is the result, while in the Observation-Reviewing Process, the complexity of the landscape is the trigger. The complexity of landscape bridges between the designers and the visitors. Both processes represent how a design is created and realized for designers, clients and contractors and then how representation helps to convey information to the visitor.

The Design-Representation Process shows how information flows from designer to the public/landscape visitors, using the complexity of landscape as the subject. Designers use different types of landscape representation to express their design thinking in professional and standard forms so that the public can visualize the design and builders can construct it. In this process, some types of landscape representations are utilized heavily. For instance, the plan shows the spatial layout of design elements in a two-dimensional plane, and the section shows the elevational layout that integrates the three-dimensional information of a design. Designers also need intuitive representations, like perspectives and axonometries, for additional clarity. Those landscape representation forms are used by designers as tools to show the clearer design thought. The result of the Design-Representation Process is the built landscape, embedding historic, social, and cultural context.

The Observation-Reviewing Process shows how landscape visitors receive information from their landscape experience. Generally, the landscape visitors understand the landscape by viewing scenes, plant material, and topography. This form of passive

viewing conveys a limited amount of information from the landscape to the visitors. The visitors usually need additional guidance, such as signages, informational booklets, and guidebooks, to understand the deeper meaning of the landscape. This guidance provides an additional layer of information such as the history of the park and its design, specific details about the park's functions, a review of the park programing and other park related information. Printed information usually includes maps, diagrams and photos and are relatively easy to create and maintain, but may lack visual interest and be hard to update. The visualization prototype presented in this study provides an opportunity to facilitate the communication of information from the landscape to the viewer using multi-media, that can be easily viewed and updated.

5.2 Imagining Future Landscape Representations

Technology allows for new platforms to represent landscape and its complexity. The transition from analog to digital has been crucial in being able to view and understand the many layers of information in the landscape. The prototype presented in this study provides a platform and format that allows designers to show the complexity of a landscape to visitors and enhance their landscape experience. It provides a more realistic vision for the public to understand the design, without requiring them to imagine the landscape based on the traditional forms of landscape representations.

The prototype provides a timeline of landscape representation and uses a graphic language, that showcases the Design-Representation process from conditions prior to design, to design concept, to construction, and the current condition. It provides people with a glimpse of the designing process, showing how designers link abstract thoughts

with the actual drawings. It allows people to explore the design decision-making process and shows how a landscape is created through drawings and photos that represent the transition from idea to construction to maintenance.

The prototype allows visitors to expand their perception of the landscape by understanding the breath of its history. Existing designs have a set of landscape features that can be identified and spatially located throughout history and their presence or absence can be traced to the specific history of the landscape. For instance, the cherry trees in Branch Brook Park were not part of the original design, but currently have a meaning beyond their spatial location, because they represent one of the strategies that the Park used to attract people back to the park after the social unrest and urban decline.

Branch Brook Park has a long history rooted in of Newark and the local community. However, when people come to the park, they are less likely to know its history. Independent research of the park can provide information, but it is separated from the landscape visiting experience. This prototype uses the AR Tour to link the learning experience with the landscape experience for the landscape visitors. Here visitors can see history through their devices, learning and posting their stories into the AR Tour. This AR Tour realizes the Observation-Reviewing Process through explaining the landscape complexity to the visitors with the augmented reality technology in an easily accessible way.

5.3 Landscape Representation and Public Outreach

This prototype could be used as a tool for public outreach. Through AR, the prototype provides a more realistic vision for the public to understand the landscape,

including the design, the history, and landscape. Usually, when the designers reach out to the public with a new design, they use traditional landscape representation, such as plans, sections, and perspective renderings, to communicate the design idea and receive feedback. This raises the issue that some of landscape representations are so technical that people need to be trained to understand them. Without training, the public may misunderstand the design or simply not be interested. In the Augmented Reality Tour part, the prototype allows users to engage the sense mixing the real landscape with the photorealistic renderings on their smart devices.

Furthermore, the prototype could be a public outreach platform where people can upload comments about the landscape and share their stories about with each other. Generally, public outreach only happens during a specific time slot, which requires the public to attend several meetings to share their feedbacks, concerns, and recommendations. The prototype, as a public outreach platform, provides a chance to engage more people to share their thoughts and be heard. With this prototype, people leave feedback on their experience and report on highlights or things that need improvement.

The prototype could promote local events. For instance, Branch Brook Park holds an annual Cherry Blossom Festival as one of the most important landscape events of the park. The prototype could be another platform to promote the events to the users, advertising them the time and programs of the festival and attracting more people come to the festival.

The prototype could work in alignment with other outreach tools that focus on public empowerment and online participatory mapping. For example, if the application is

useful to help landscape visitors to understand the landscape, it could be brought into the city scale to help people understand the city. the prototype could be integrated with the smart city system, so that the educational component could transfer from landscape to the city scape scale. From the perspective of the shared database, this application could share its database with the smart city to help to guide people around the city. Potentially, this prototype could be used as a public game platform to engage younger visitors in the park visit experience.

The prototype is also a platform to unite the community during some unexpected periods. For instance, the during COVID-19 when people are recommended to stay at home and keep social distancing, they will need a platform to keep community solidarity.

The prototype platform can also be reviewed on how it compares to traditional QR codes, booklets and maps and that would present an interesting research project; to compare ways of engaging the public through various modes of analogue and digital technology.

The prototype provides an easier way to communicate the design with the public, through utilizing the AR technology. In the Augmented Reality Tour feature, the prototype showcases the way that the AR technology could help to mix the real landscape with the digital renderings so that people can see how the digital rendering of the design fits into the real landscape. With a clearer communication between the designers and the public about the design, the designers could gain more specific requirements and comments from the public.

5.4 Personal Reflections

One of the goals of the prototype is to engage the public with the complexity of the landscape, by educating them on landscape design, urban context, and community history. It is under the assumption that through the visual experience that the prototype provides, people will know more about the landscape and increase their engagement in the landscape. Future studies could explore this assumption.

The reason I decided to use technology as the topic of this thesis was because of my interest in technology. I live in a culture where everything is replaced by technology rapidly – hand renderings is replaced by digital renderings, writing on paper is replaced by typing on keyboard, currently, teaching became an online and remote activity. This made me want to explore the magic of technology and figure out how it could benefit and engage more people. This is how I came up with the idea that using technologies to enhance the landscape experience of the landscape visitors.

Admittedly, there are people being left behind; those who do not use or understand new technologies. It raises the question for designers of how to engage with that specific group. In the prototype, I try to use an easier and more accessible ways to engage them.

During my research on the topic of design and technology, I have heard some comments about the conflicts between nature and technology. For instance, some may think that the technology and the prototype take people from a real and natural world to a digital and artificial illusion, through making people looking at their screen instead of facing the real nature. I understand the concern of these arguments and we all have seen many science fictions and movies, such as Ready Player One, which pictures the world

when people are addicted to digital technologies. I would argue, however, the prototype provides an alternative for people to experience landscape, adding another layer to help them to see that was unseen in their previous visits. As opposed to detach people from the land, I think the prototype helps people to understand more about the land, by rooting their motion and empathy deeply into the land.

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