Figure 1. Burnham's Plan for Central Chicago 1909.

Figure 2. Path Network

Figure 3. Existing Buildings

Figure 4. View Across Site Before

Our proposal for the reinvisioning of Chicago's Northerly Island has several motivating forces that have developed into a series of complex relationships. The project strives to: respect Daniel's Burnham's original vision for the site; create a valuable community resource in terms of recreation, education, tourism and public events; showcase the numerous advantages and contemporary techniques in design using metal; propel the sustainable consciousness and environmental responsibility of Chicago; all while maintaining a strong relationship with nature.

The vastness of the site poses a significant design problem in realizing the sites full potential with such a limited program. It can also be regarded as a great opportunity if one realizes that the great value of the site lies in its abundant open space, and its potential for a more natural recreation area. To fully appreciate the site we feel it is necessary to experience it in its entirety, whether it's through walking atop it, viewing it from a variety of perspectives, or interacting with it directly. To achieve such a relationship with the site we felt it was imperative to beak up and distribute the program into a series of buildings that form a network throughout the site. (Figure 2) There is no predefined loop through the site that would lead to a singular and repetitive experience of the site, but a network of paths between the buildings that provide different experiences through a variety of land formations, sculptures and views. Such a dynamic interaction with the island would also incite unique experiences with the local flora and fauna, as one might take a shoreline path on one occasion and an interior path on another. The range and variety of experiences on the site is a crucial part of making it a valuable resource for the citizens of Chicago, as they would be more inclined to visit the project on a regular basis; as opposed to a more singular experience that would lead to its limited value as a tourist attraction.

Another crucial decision was to demolish the existing airport buildings on the site (Figure 3). This is in part to return the island to a more public resource as Burnham had originally intended, and the airport buildings largely represent private industry and capital gain. To many citizens of Chicago, the airport and its buildings never should have been on the site to begin with. Being conscious of the waste involved with the demolition of such buildings we propose to use the materials as fill in creating our large earthworks that characterize a large portion of the site. The mounds create a much more dynamic and labyrinth like network of pathways through which a sequence of experiential progressions unfold. In its present state one can stand on the site and see all the way across it, which makes it extremely uninviting as it leaves no room for intrigue, curiosity or adventure. (Figure 4) One must be given glimpses of what lies ahead, if too much is revealed there would be no need to move on. The scale of the site can also be rather daunting, and thus breaking sight lines of the site allows people to experience it in parts, without realizing the large distances they would be travelling.

Figure 5. View Across Site After.

Figure 6. Site Gradient

The organization of the site occurs as a gradient from North to South. The area furthest north is the most developed and as you move south it becomes more natural, which reflects one's departure from the city as one moves deeper into a natural setting. The larger programmatic designations on the site consist of a large wetland or lagoon area, a large camping area in the center of the island, and the area furthest south will become a prairie field that will serve as a habitat for bison and more inconspicuous native species. It is critical to our thesis that the adjacent pleasure boat harbour to the west of the island be transformed into a wetland or lagoon as was originally intended by Burnham.[1] The wetland would create a larger variety of recreational activities to occur in a more sheltered body of water, such as canoeing, kayaking, fishing, etc. It would more importantly create a natural habitat for threatened species of native aquatic species of plants and animals, and act as a natural biofilter for the runoff from the surrounding area. (Figure 7)

Figure 7. Wetland Character Image.

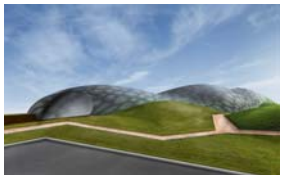

Figure 8. Exterior View of Main Building. Large interior spaces with minimal visual impact from the exterior.

The building program for the site is dived into four logical parts that relate to the overall aspirations of the project, and its range of educational components. To maintain the strong connection to nature we propose to break up the program into its corresponding primary elements; earth, air, fire and water. The buildings are intended to make a minimal visual impact on the site in keeping with the projects aspirations as a natural resource for the city. We achieve this by partially submerging the buildings into the earth and berming the earth around their walls. The low visual impact of the buildings also serves to accentuate and provide contrast to the surprisingly dramatic and light filled interiors evident in our renderings. (Figure 8)

Figure 9. New Life After Forest Fire.

The main building of the site is the fire building as it relates to the transformative properties of fire. The building is a microcosm of the scheme as a whole and represents the project's transformative effect on the site. Much like a forest fire engulfs the woods, reducing it to ashes and providing it with the basic nutrients to return to a lush and vibrant wilderness, our project acts as a catalyst returning the site to its originally intended form, and provides it with the basic elements to become an activated and animated resource for the city. The building achieves this through its programming as it contains the most public and active spaces. The major elements of the fire building are the lobby/exhibit space, conference space, food service/dining and an outdoor performance or lecture space. The exhibit space serves as an orientation to the project, demonstrating the layout of the site and the content of the buildings so people can plan their routes through the site. All of the spaces maintain close connections to each other as they are completely open. This is to allow a blurring and overlapping of the various activities which will maintain the public spirit of the project. (Figure 10)

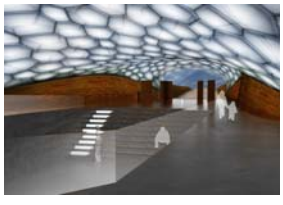

Figure 10. Fire Building Interior View

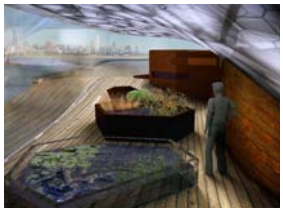

Figure 11. Water Building Interior View.

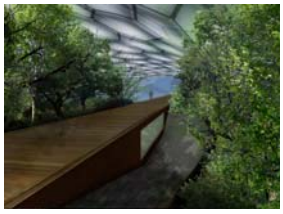

Figure 12. Air Building Interior View.

Figure 13. Earth Building Interior View.

Figure 14. Groundhog Exhibit.

Figure 15. Corten Steel.

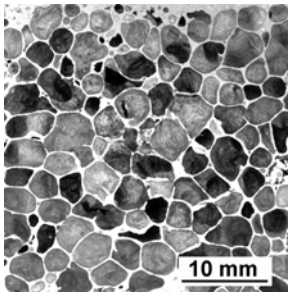

Figure 16. Foamed Aluminum Cell Structure

The water building is sited on the west shore of the island and serves as an extension to the nearby Shedd Aquarium's native species exhibit. Directly on the water the building provides an interactive experience with the native species of aquatics plants and animals. The building would grant visitors the opportunity to experience the wildlife and vegetation within its natural habitat, via the dock and boardwalk through the wetlands and also more intimately inside the building within the various aquarium exhibits. The building also provides research labs for investigation, experimentation and documentation regarding the process of the harbour reclamation.

The air building serves as an aviary and hospital for native and migratory species of birds. The building is designed to provide multiple vantage points of observation for the visitors viewing the birds. They can observe the birds within the level of the tree canopy by moving along the elevated walkway that runs through the center of the building; they can also observe them from the ground on the footpath that ramps down from above. Such vantage points would let people see the range of nesting, feeding and mating habits of the variety of different species of birds.

The earth building is submerged into the ground with only the very top left exposed. The building is about the rich history of the formation of the island and gives visitors the opportunity to experience it first hand. The island is completely man made as it was constructed using debris from the Chicago Fire and also backfill from excavations of the cities numerous construction projects. A cross section through the earth that makes up the site reveal a unique and interesting history of man's toying with nature. The building contains several terrariums that display the various strata found beneath the site, one located within the 'core sample' at the center of the building and others along its walls. The building also contains a groundhog habitat and exhibit that allows visitors to experience the habitat from the perspective of the animals themselves. There are a series of domed cut outs in the floors of the exhibit that allow users to pop there heads up out of the ground right amongst the groundhogs.

One of the largest aspirations of the project is to demonstrate the versatility of metal in architectural design, not only through its multitude of applications but also through its timeless appeal and continuous advancement. One of the major applications of metal within the project is the use of cor-ten steel panels as retaining walls throughout site and various surfaces on the interior of the buildings. Steel panelling has been used for hundreds of years and its use in the project is to demonstrate the continual use of traditional applications of metal in contemporary projects. The cor-ten also manifests the passage of time through the corrosion of its outer most layer in the formation of its protective shell.

The focus of the use of metal in the project is surely the use of aluminum in our roof structures. To demonstrate the perpetual advancement of metal we strove to use metal in a new and unprecedented way. Through our research we discovered foam metals, which are currently captivating the interests of many researchers for their exciting performance capabilities and variety of applications, but they are yet to be incorporated into architectural design.[2] There are many examples of foam structures found in nature such as coral, animal quills and plant stems, all of which provided valuable inspiration for the project. Such structures found in nature consist of an internal foam structure that provides a lightness of material without compromising strength and an outer shell or membrane that provides resistance to buckling. We employed a similar approach in the design of our structural

members with an internal core of foamed aluminum with a thin outer shell of solid aluminum. Such a system would drastically reduce the overall weight of the structure and allow for larger spans that are ideal for the spaces we are creating.

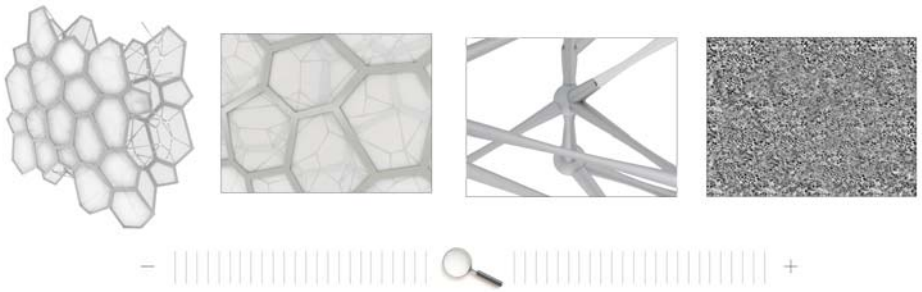

Figure 17. Fractal Structural Diagram, Macro to Micro Scale

In an attempt to reflect and perpetuate the environmental sensibility and sustainable consciousness of Chicago's inhabitants we strove to integrate a strong and self evident sense of ecological responsibility into the design. The scheme is intended to not only perform in the many areas of sustainable design but also serve to educate the visitors in its applications.

Figure 18. Three Wind Turbines at the south end of the island.

We strove to create a project that could not only operate independently of the grid but also generate a surplus of energy to give back to the city. Sited on Northerly Island the project encounters a great deal of wind, which we propose to harness using three large wind turbines. The turbines will also serve as a landmark for the project and a symbol of the project's and the city's environmental consciousness. The landmark is crucial to our scheme as our buildings have a minimal visual impact on the site, and require a significant visual queue to draw visitors from the mainland.

The roof/wall system of our buildings is an innovative form of a double skin façade. The dual layered ETFE panels supported by a closed cell foamed aluminum armature allow a large amount of natural light to enter the spaces while maintaining the ability to limit or harness the resultant heat gain depending on the season.

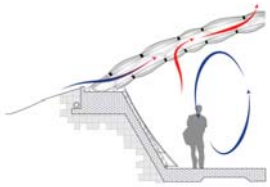

Figure 19. Typical Wall Section. Demonstrating double skin functions.

The abundant natural light will reduce the electric loads that would otherwise be required to light dark interior spaces during the day. The ability to harness or limit the resultant heat gain will also drastically reduce heating and cooling loads on the buildings, and the natural ventilation free to move through the open space will eliminate the need for a mechanical ventilation system. To supplement the heating and cooling requirements of the building we also propose to implement a geothermal system that will serve to neutralize the temperature of the building by taking advantage of the earth as a natural heat sink.

To fully remove the building from the typical dependencies on city services, a water management scheme is also required. We propose to harness natural rainwater by collecting the run off from our roof structures; we also propose to incorporate a series of Waterloo Biofilters to treat the run off before storing it in cisterns beneath the buildings. Wastewater in the building could be reduced using composting toilets and the remaining blackwater could also be treated using the biofilters. The large reclaimed wetland to the west of the island will also be incorporated in to the system as a natural filter.

The project aspires to create a strong connection with nature in a variety of ways. By first "renaturalizing" the site, providing it with the required basic elements so that it may develop into a thriving natural landscape. Also by providing valuable educational resources

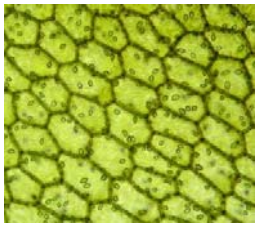

Figure 20. Microscopic Plant Cells. Relates to the building structure and path network.

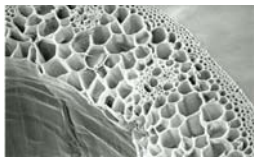

Figure 21. Three Dimensional Electron Scanning Microscope View of Cell Structure Within A Plant Stem

within the programming of the buildings the project serves to create a heightened awareness and an increased sense of value and obligation towards the natural world.

We felt the connection to nature on the site was one of the most important aspects of the project and actually found ourselves using inspiration from nature throughout the entirety of the design process. It started with taking inspiration from foam structures found in nature and developed into a set of fractal relationships threaded through a range of scales. There are numerous examples of fractal relationships in nature, at the microscopic scale of DNA molecules, the macro scale of plant growth, and the larger scale of hurricanes. We used the foam structure at the smallest scale in the use of materials through the implementation of foamed aluminum in our structure. We also wanted the structure to possess a direct fractal relationship with its material and implemented a larger foam like structure with the network of mullions and supports. (Figure 17) At the largest scale we developed a flexible scheme for our site that takes a two dimensional section through our hexa/pentagonal pattern and overlays it on the site (Figure 2). The pattern works perfectly with our original aspirations for the site as a network of interconnected paths that provide a wide range of dynamic experiences for the users. In the end it was inspiration from nature that brought our design process full circle and solidified it as a cohesive whole.

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[1] Bennett & Burnham, *Plan of Chicago*. Page 98. Princeton Architectural Press; Reprint Edit. (1996)
[2] Clyne & Simancik, *Metal Matrix Composites and Metallic Foams*. Page 36. John Wiley & Sons Canada (2000)
Figure 1 - Bennett & Burnham, *Plan of Chicago*. Page 11. Princeton Architectural Press; Reprint Edit. (1996)
Figure 3 - http://www.flickr.com/photos/littlebabyjesus/164952559/
Figure 4 - http://www.flickr.com/photos/swanksalot/17829297/
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Figure 15 – Mostafavi & Leatherbarrow, *On Weathering: The Life of Buildings in Time*. Page 29. MIT Press (1993)
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Figure 20 - Menges, Weinstock & Hensel. Emergence: Morphogenetic Design Strategies. Page 84. Academy Press (2004)
Figure 21 - Menges & Weinstock. Techniques & Technologies in Morphogenetic Design. Page 6. Academy Press (2004)