Luminous Land of Phon

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ABSTRACT

This thesis, Luminous Land of Phon, explores how architectural spaces, even interior spaces, interact with nature along different dimensions. Light and sound are the two very powerful elements of nature and are the focus of this study. Louis Kahn once said: “The sun does not realize how wonderful it is until after a room is made.” (Source: https://www.quotetab.com/quotes/by-louis-kahn#GdaYdAfrZ8tmvcyh.97)

The question of nature is explored in an urban environment to challenge the tired dualistic division between the human and the natural world. This project transforms the way we think about the urban so that architecture and nature can have great harmony and elevate each other instead of canceling each other. The project is a school of architecture and landscape architecture that promotes fine spaces with desirable qualities of light and sound for the design professionals of the future. The project is sited in the University of the District of Columbia as an expansion of their existing campus and programs.
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GENERAL AUDIENCE ABSTRACT

The architecture is a school of Architecture and Landscape architecture consisting of a full scale natural water pool underneath the building, Gallery and shop space under the pool, studio spaces, class rooms, faculty offices, cafeteria, and ceremony halls for the University of the District of Columbia at its Van Ness Campus sited at the Connecticut Ave, NW Washington D.C. The thesis is an exploration of the concept of bringing nature into architecture and a formal study of their harmony with each other, Architecture, structure and construction of the building.
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INTRODUCTION

I started my thesis from one of my core beliefs:
I believe that a good Architect is someone who designs spaces that have great HARMONY with NATURE.

What defines Nature?
“The phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations.”

(Oxford Dictionary)

Since Light, Sound and the landscape are the three very powerful elements of Nature, they are selected to represent nature as well as the base and main idea of my thesis.

What is Light?
“The natural agent that stimulates sight and makes things visible.

Visible light is electromagnetic radiation whose wavelength falls within the range to which the human retina responds, i.e. between about 390 nm (violet light) and 740 nm (red). White light consists of a roughly equal mixture of all visible wavelengths, which can be separated to yield the colors of the spectrum, as was first demonstrated conclusively by Newton. In the 20th century it became apparent that light consists of energy quanta called photons which behave partly like waves and partly like particles. The velocity of light in a vacuum is 299,792 km per second.”

(Oxford Dictionary)

Light itself is not given form until it is isolated and accepted by physical objects.
Light gives objects existence.
David Murray wrote in his book, *Architecture and Shadow*, page 53, “Light attains significance within the relations among objects. In the instant when one of those fluid relations is fixed, all relations are determined. An instant of light is simultaneously the instant of that light’s own extinguishing. At this boundary between light and dark, the individual object is articulated and given shape.”

What is Sound?

“What vibrations that travel through the air or another medium and can be heard when they reach a person’s or animal’s ear.”

(Oxford Dictionary)

Barry Blesser and Linda-Ruth Salter wrote in their book *Spaces speak, are you listening?*, page 12, “Physical sound is a pressure wave that transports both sonic events and the attributes of an acoustic space to the listener, connecting the external world to the listener’s ears. Because the physics of sound is complex, transmission includes such processes as reflection, dispersion, refraction, absorption and so on, all of which depend on the acoustic properties of the space. When arriving at the inner ear, sound waves are converted to neurological signals that are processed by the brain; the external world is connected to inner consciousness.”

What is Landscape?

“All the visible features of an area of land, often considered in terms of their aesthetic appeal.”

(Oxford Dictionary)
Luminous Land of Phon is the title of this project which means bright or shining land of phon.

What is Phon?

“Phon, unit of loudness level. The loudness level of a sound is a subjective, rather than an objective, measure. To measure loudness, the volume of a 1,000-hertz reference tone is adjusted until it is perceived by listeners to be equally as loud as the sound being measured. The loudness level, in phons, of the measured sound is then equal to the sound-pressure level, in decibels, of the adjusted reference sound above the standard reference level, which is the minimum audible threshold. A variation of one phon in the loudness level of a sound is approximately the smallest change in sound-pressure level detectable by the human ear under normal listening conditions.”

(https://www.britannica.com/science/phon)
ARCHITECTURAL SITE

Soapstone Valley Park is an eastern branch of Rock Creek Park in Washington DC, surrounded by an urban environment. While walking in this park, I experienced an amazing feeling of walking under tall and green trees where sun light reached me only from the open spots among the tree branches and leaves. Those spots and the sun light passing through them created such a desirable texture on my face and on the ground that could only be felt. As there is a great saying by Helen Keller, “The best and most beautiful things in the world cannot be seen or even touched - they must be felt with the heart.”
In addition to that, the sound of water from the Broad Branch, a branch of the Rock Creek, underneath my feet, was a true soul meditation; a deep journey of self-love and deep healing. (Illustrations 1 and 2)

The amazing experience I had from the Soapstone Valley Park, I could not have it anywhere else in an urban environment; but in a part of the University of the District of Columbia, Van Ness Campus. On the north side of the UDC- Van Ness Campus there is a natural hill covered with tall green trees. That hill is located between their Tennis court and Athletic building. My intention is to extend that natural quality of the hill towards the Soapstone Valley Park and also add some water qualities that it lacks today. (Illustration 3)
University of the District of Columbia wrote in their Final Campus Plan that the University of the District of Columbia is devoted to the improvement of the District’s public higher education system. UDC has built many successful Community Colleges, acting as independent open admissions institution at satellite locations throughout the District of Columbia. The University is now in the process of transforming its main campus at Van Ness into a flagship location that will operate as a premier, selective admissions institution.

The 2011-2020 Campus Plan features four primary changes to the Van Ness campus that are key to this transformation (Illustration 4):

- Construction of a new Student Center at the highlighted area (SITE 1).
- Construction of student housing at the SITE 1.
- Improvement of sustainability as installation of green roofs.
- Population increases in students, faculty, and staff that support the change to a selective admissions flagship institution.”

As mentioned earlier, the red highlighted areas (Site 1, Site 2 and Site 3) in the illustration-4 are the areas under the university’s development plan. Site 1 (Student Center) is already built. Site 2 (Students housing building) is under construction and Site 3 where the hill side is
also included in it, is the area where I’m proposing school of Architecture and Landscape Architecture for the university.
5- School of Art, Design & Media
Illustrations 5 and 6 are images of School of Art, Design & Media at Nanyang Technological University campus, Singapore. This school is a 5-storey building with three intertwining blocks. What inspired me more about the architectural and landscape design of this building are:

1- Each of the intertwining blocks has an amazing sloped green roof which blends with the ground contour as if it emerges from it.
2- Its fully glass facades allow maximum light to get into the building as well as it reflects its surrounding nature.
3- Water features as pool, waterfall and water fountains in its courtyards bring more natural quality to the space.

6- School of Art, Design & Media
UDC does have architecture program at their Van Ness Campus, but the program is very small. Architecture students are sharing the same building with engineering students. If they have a separate building for their Architecture program and Landscape architecture, a new program, at the campus; help the university achieve the goal of “improving the
District’s system of public higher education and transforming its main campus at Van Ness into a flagship location that will operate as a premier, selective admissions institution.”
My project, School of Architecture and Landscape architecture, will not only play a key role in attracting students from all around the United States, but also from all over the world.

What if we bring at least one characteristic of each continent into the space/spaces we design, so that it becomes an environment where students of all races, nationalities, cultures, ethnicities and backgrounds are welcome?

In the illustration 7, each circle represents a continent based on the colors shown in the map. Each circle has the right proportion based on the actual sizes and proportions of the continents, and each circular continent is actually base of a calla lily. Since the main idea of the project is to create and extend natural quality of the landscape in an urban environment, the building shape itself is inspired by one of the natural phenomena, Calla Lily. (Illustration-8)
STUDIO SPACE - CONCEPT DESIGN

The circular beam that gradually turns into a column was my first concept design for a studio space/pod designed for every two students. The red dotted lines show how the rain water drain pipes run inside the column plus beam. The semicircular shading system controls the amount of sunlight that gets into each studio space. The rain water drain pipes are used to lead the rain and snow water from roof top to each floor level and finally to the ground level. The pipe runs inside each studio space where it allows every single student to experience the amazing quality of sound produced while water running through pipe.
STUDIO SPACE - CONCEPT DESIGN

This design led to some critical and non-critical issues as:

- The drain pipes are located inside the concrete. If it leaks, the structure is at risk.
- Since pipes are hidden inside the concrete, the sound of water will not be felt at its maximum.
The idea of circular beams that gradually turned into a column, transformed to a circular and straight beam connected to a central share wall.
STUDIO SPACE - FINAL DESIGN

Sometimes, some elements give us a feeling that they are the most important parts of the design and they should always stay in there, but we finally get to a point where we discover that those elements are no longer useful. This is the exact time when they get eliminated from the design.

Finally, the rain and snow water drain pipes made of copper are fully exposed supported by a middle steel rod furnished with copper. The concrete beam and column whom I started my design with, are no longer a part my design.
The calla lily representing Africa Continent has different programs in each floor:
First floor: Information Desk+Cafeteria+
Catering Kitchen+Shower rooms
Second floor: Classrooms
Third floor: Classrooms
Fourth floor: Faculty staff offices
Fifth floor: Ceremony hall
Sixth floor: Ceremony hall

Each circle represents a floor and each floor is 5 feet more in radius than the floor below except the roof level. Roof level is 10 feet more in radius than the floor below.

The calla lily representing North America Continent has different programs in each floor:
First floor: Computer lab
Second floor: Library
Third floor: Classrooms
Fourth floor: Faculty staff offices
Fifth floor: Ceremony hall

The calla lily representing South America Continent has different programs in each floor:
First floor: Printmaking studio
Second floor: Library
Third floor: Classrooms
Fourth floor: Faculty staff offices
Fifth floor: Ceremony hall

The calla lily representing Oceania is dedicated for the school shop..

The biggest calla lily representing Asia Continent is dedicated to studio spaces. Each of the smaller circles is a studio space for every two students.
FINAL

ARCHITECTURAL DESIGN
FLOOR PLANS' PROGRAMS

LEGEND
- Gallery Space:
- Shop Space:
- Studio Space:
- Printmaking Studio:
- Computer Lab:
- Library:
- Photography Spaces:
- Cafeteria+Catering Kitchen:
- Information Desk:
- Classrooms:
- Faculty Staff Offices:
- Ceremony Hall:
- Printer/Plotter Room:
- Mech/Elec Room:
- Restroom:

Basement floor plan
First floor plan
Second floor plan

Third floor plan
Fourth floor plan
Fifth floor plan
Sixth floor plan
SOLAR STUDY
FIRST DAY OF EACH SEASON (SPRING, SUMMER, FALL, WINTER
SOLAR STUDY
FIRST DAY OF EACH SEASON (SPRING, SUMMER, FALL, WINTER
STRUCTURAL MODEL OF THE CALLA LILY REPRESENTING AFRICA CONTINENT
CONCLUSION

I started my thesis research looking for inspirations, by experiencing different aspects of nature in terms of light, sound and landscape. These experiences clearly set my main ideas - though very challenging - as a path towards my final destination. The first step I took while designing my project, titled *Luminous Land of Phon*, was to connect light and sound from outside with inhabitants inside the building via the columns. To achieve these goals, I placed load bearing and non-load bearing columns inside the building to form natural sound waves. Water pipes were placed inside the columns and sunlight sensors on the surface in order to get the waterfall sound on the surface of the columns while sun rays were shining on the column sensors. Then I realized that this design relies more on electric power than architectural techniques which makes it more engineering and mechanical than architecture. Sometimes it happens when your goal/destination is clear, but the path you take is full of turns and twists that some of those turns may take you to a different destination. The path I took was less than ideal, so I started over and took another path instead of changing my initial idea. The second path I took was bringing light and sound inside the building in a natural way. I started by designing studio spaces where every two students have a workstation/pod and each pod experiences light and sound in itself. Then I took that element and multiplied a number of those studio spaces pods to form the whole building. I designed exposed rain leader pipes made of copper to form the studio spaces/pods. The rain leaders led the snow and rainwater from the roof through each floor and finally to the pool under the building as shown in the final architectural design. The idea of bringing nature into architecture or connecting nature with architecture might be achieved in many different ways, yet the way I chose and the result I got; satisfied me as what I was looking for. My conclusions that I learned from this experience suggest: that a designer should have clear thoughts and ideas, understand those ideas very well and stick with them. Make sure the paths you take do not harm your thoughts and ideas. Sometimes we have great ideas, but the path we take is a wrong path and then we are tempted to change our ideas. But do not change your ideas easily. If the path you have taken does not work for your idea, change the path, not the idea. If your idea is strong enough all of those
obstacles and challenges coming your way, one day will automatically turn to supporting hands pulling you towards your destination. Edmond Mbiaka once said, “The struggles, challenges, and obstacles that it takes to succeed in life are what makes success more valuable. Nothing great comes easy, and nothing easy can ever equate to greatness.” (https://www.goodreads.com/quotes/tag/achieving-great-things-in-life)
ILLUSTRATION CREDITS

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