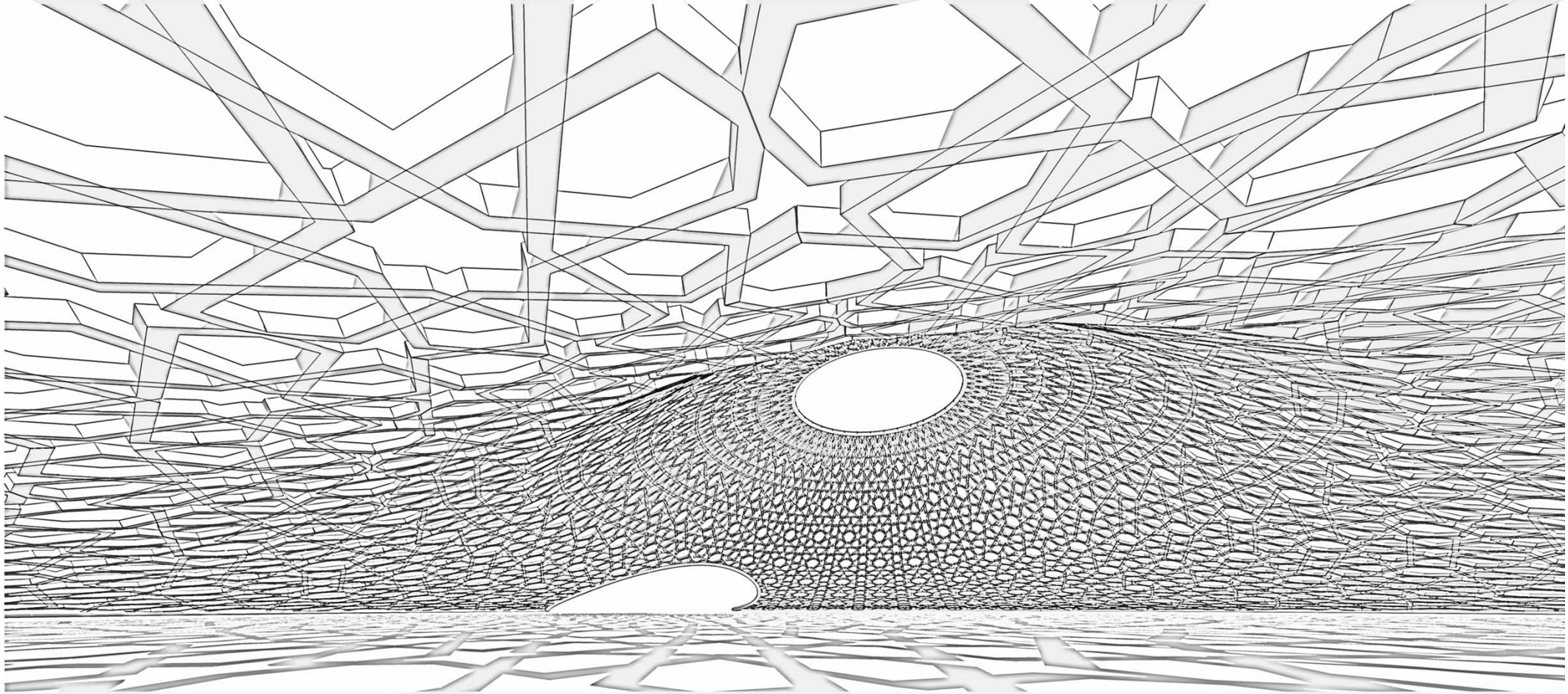
Leadership | Innovation | Process | Design | Research | Technology



Zaki Mallasi

email: zaki@iconviz.com

PORTFOLIO

2022

TABLE OF CONTENTS

1. Professional Projects

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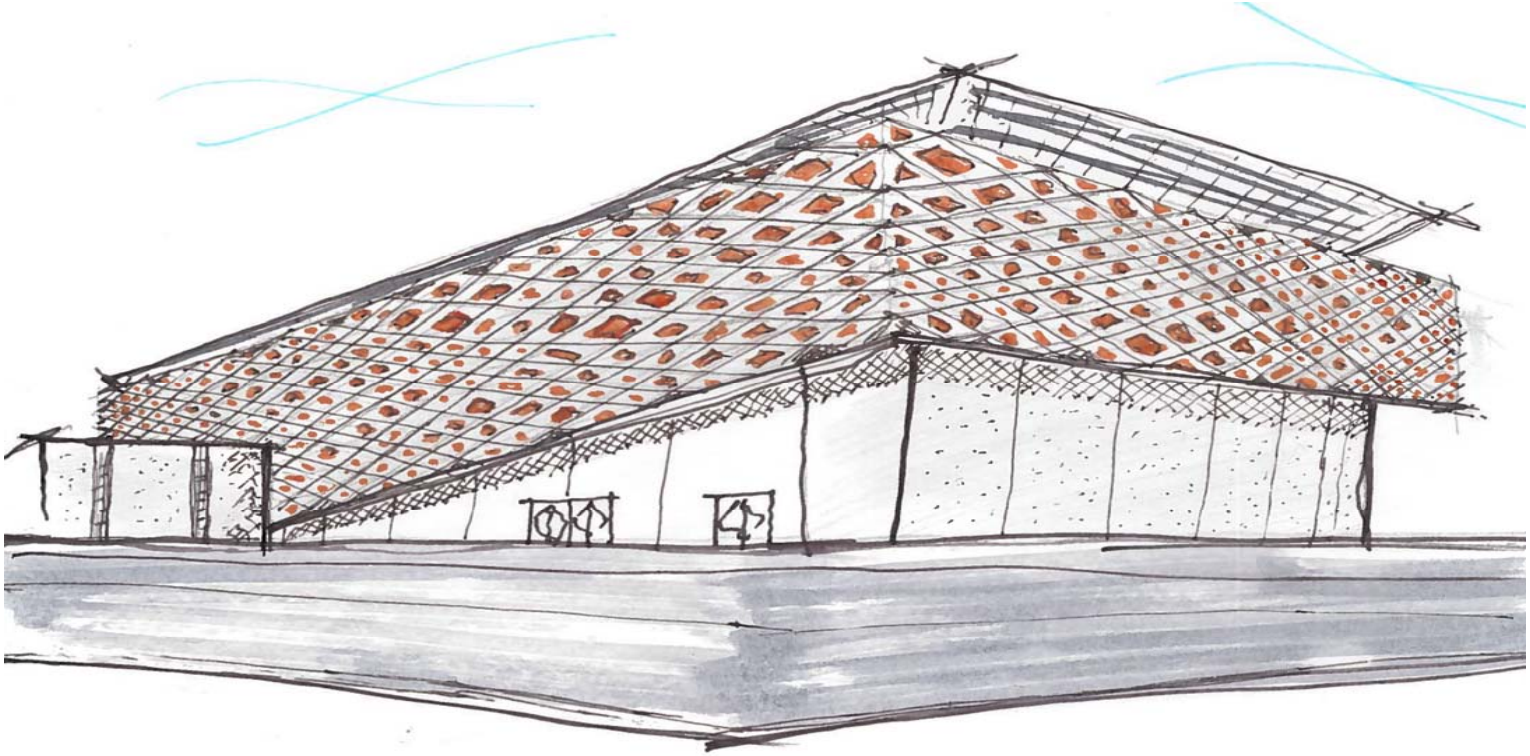
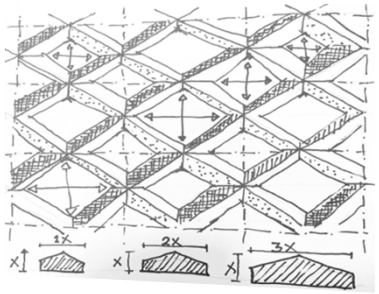
Office Building Exterior and Concept Exploration

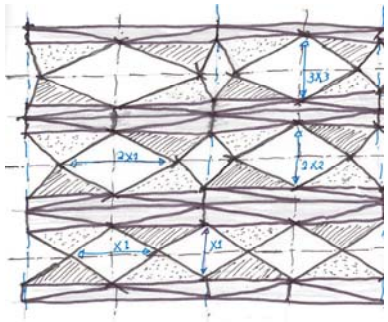
Responding to a unique brief, the exterior concept for the office building head quarter located in the Middle East embodied a higher social / cultural / environmental awareness. During this design research phase, I have identified the natural ingredients as driver for the 3-dimensilanally complex façade pattern. The inspiration came from Folkloric heritage used by Bedouin societies seen in craft of the “Majlis” seats.

I have been responsible for working with the design team to rationalize the parametric geometry especially from a scale/shape behavior and in response to the solar exposure around the building. Several diamond-like geometrical patterns emerged to emphasize the string sand dune-like lines. A multi-faceted knitted pattern interact to create such a avant-garde and yet deeply rooted in its culture and context.

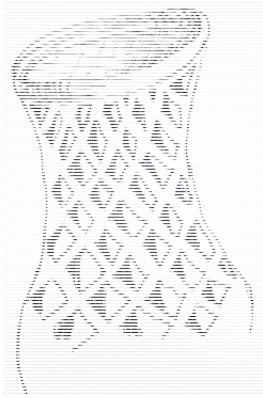


Overall expression of façade lines and geometry pattern





Fluid sand dune formations with ridges

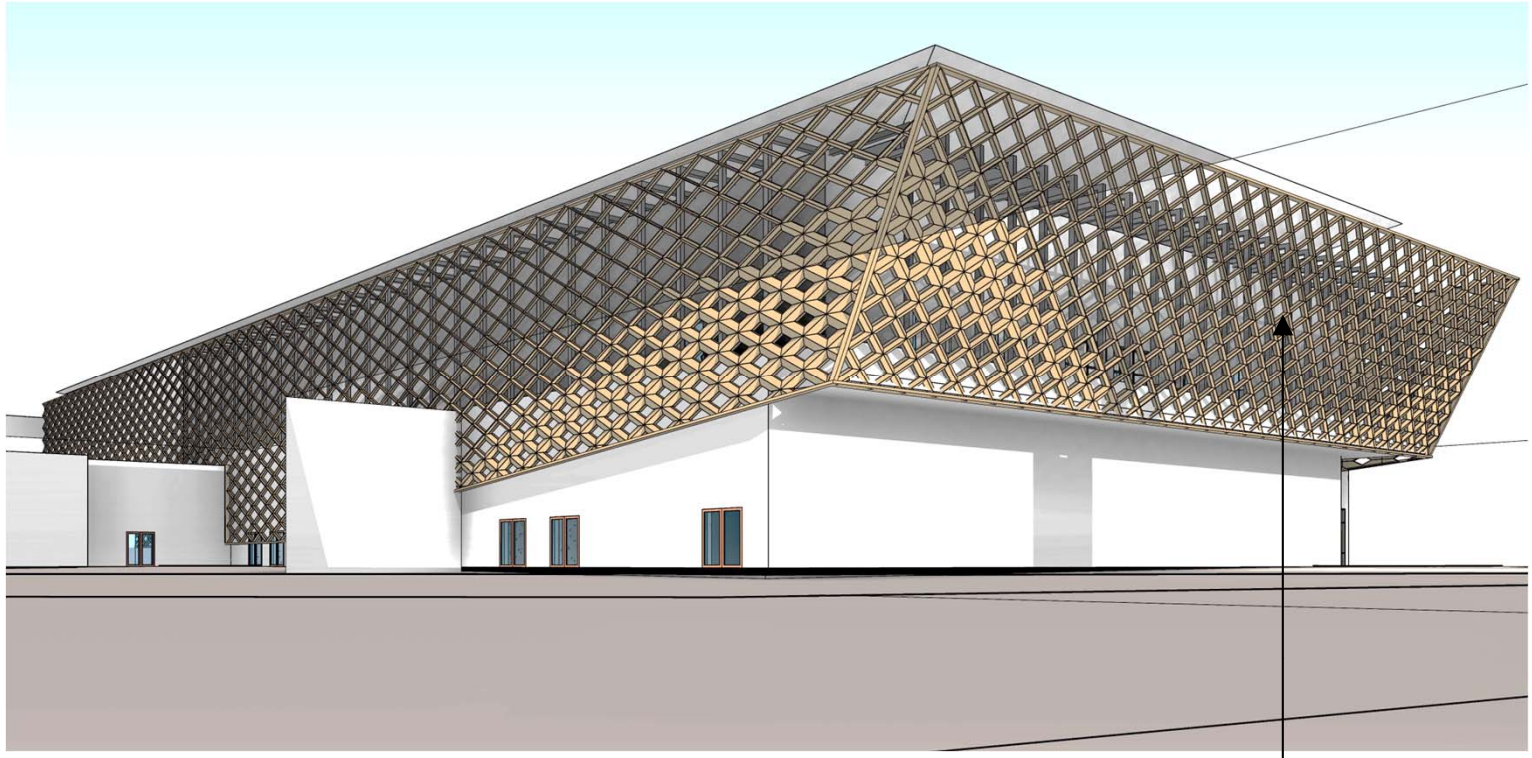


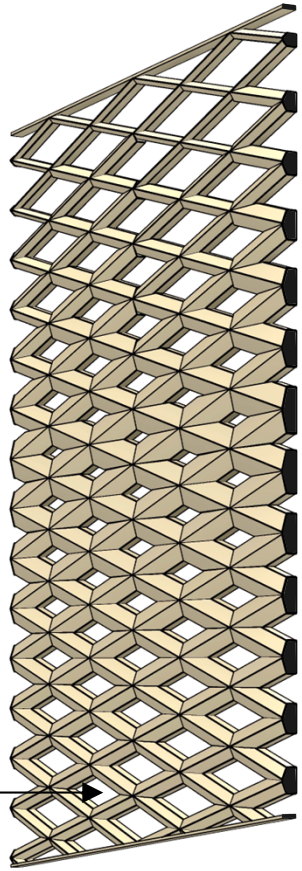
Investigating the traditional “Al Khous” handcrafting as a multi-faceted knitted pattern

Office Building Exterior and Concept Exploration

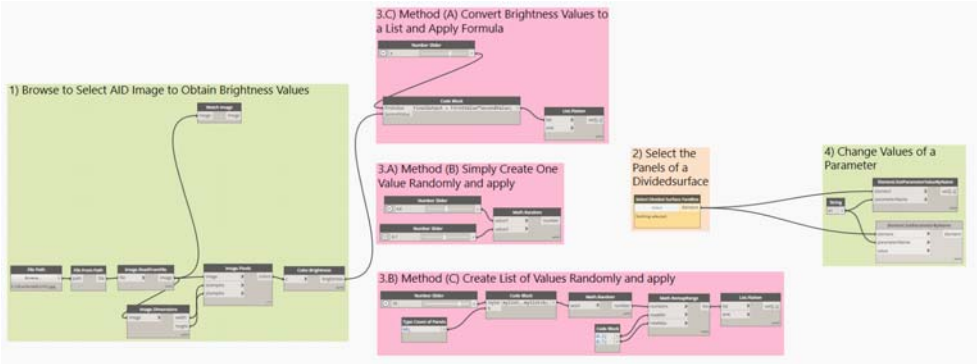
2020

Professional Projects





Façade diagrid diagram and components



Using Dynamo/Revit visual programming to arrange the façade parametric panels

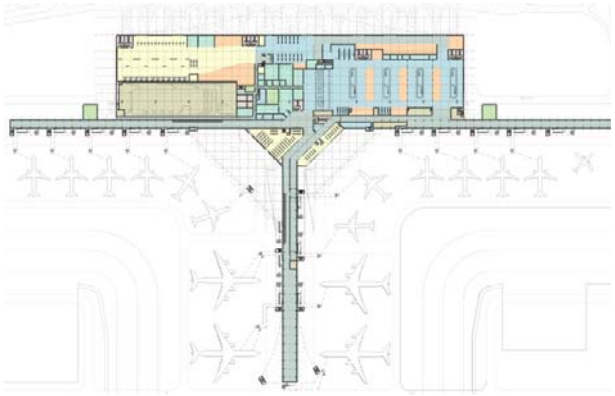
Clark International Airport

2018

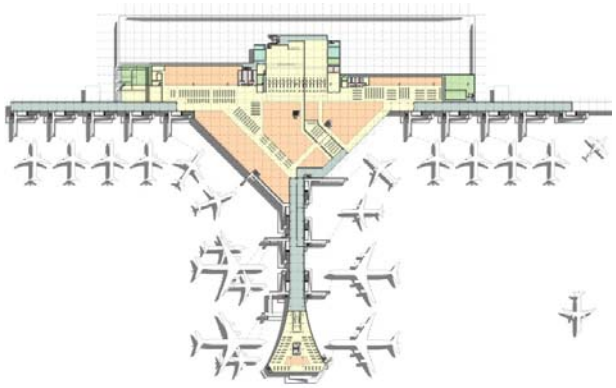
Professional Projects

The new Clark Airport design is based on the indigenous A-Frame structures to create an authentic architecture in the Philippine. The center ridge beam has been replaced by either a steel truss or reinforced concrete. The design uses cables or steel tubes with cables inside for the joists. As these tensegrity joists greatly reduce the amount of steel.

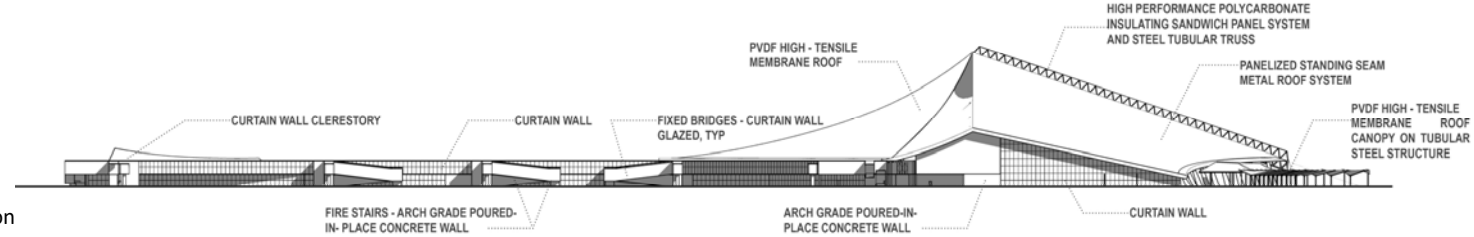
The interiors are day-lighted with high performance skylights which provide diffused light but keep the interiors cool as they reflect heat. The building will provide a unique and memorable experience for passengers and visitors. The facility will be modern with a strong Filipino sense of place.



Lower Ground and Ticketing Level



Upper Departures Level

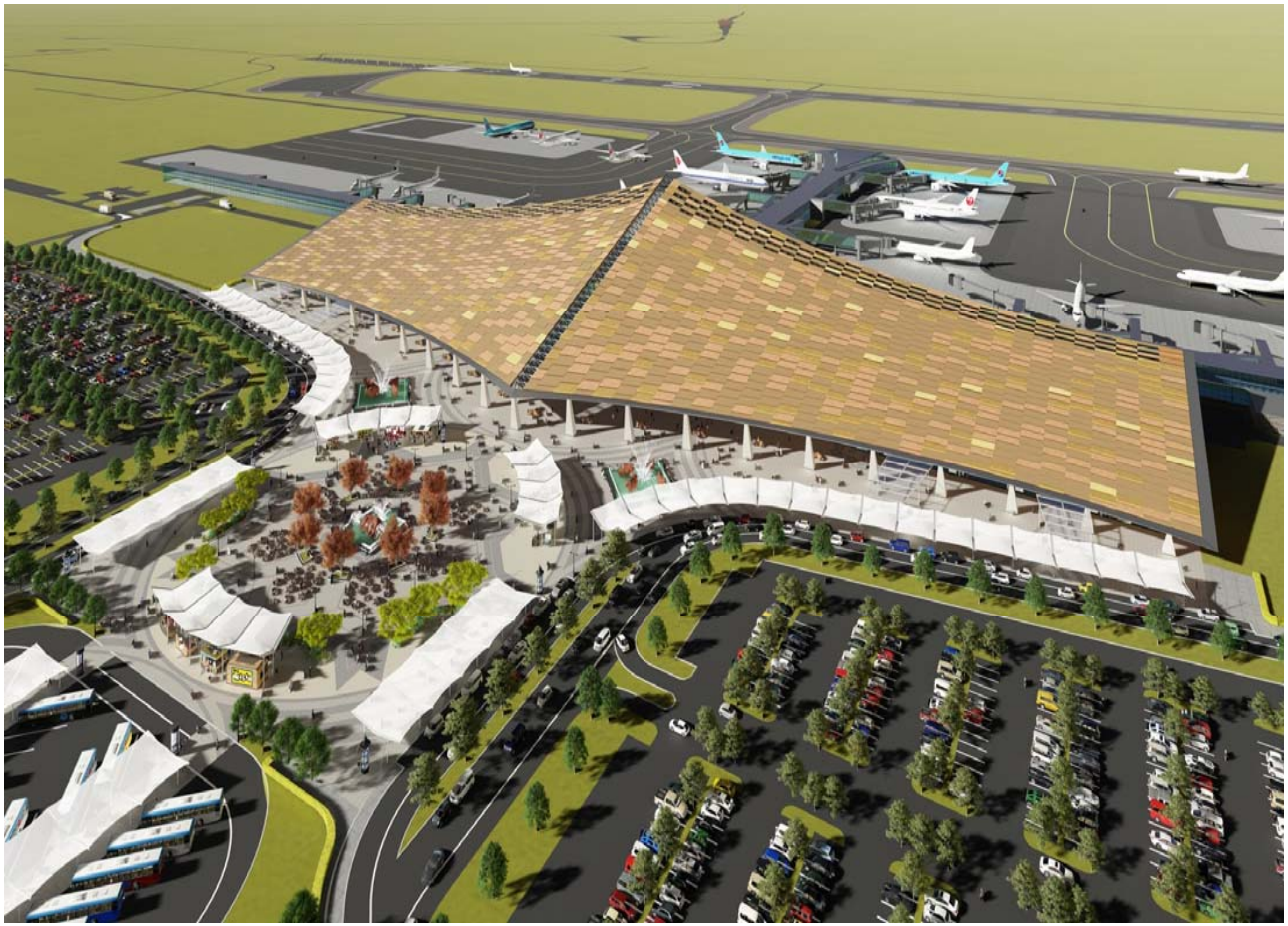


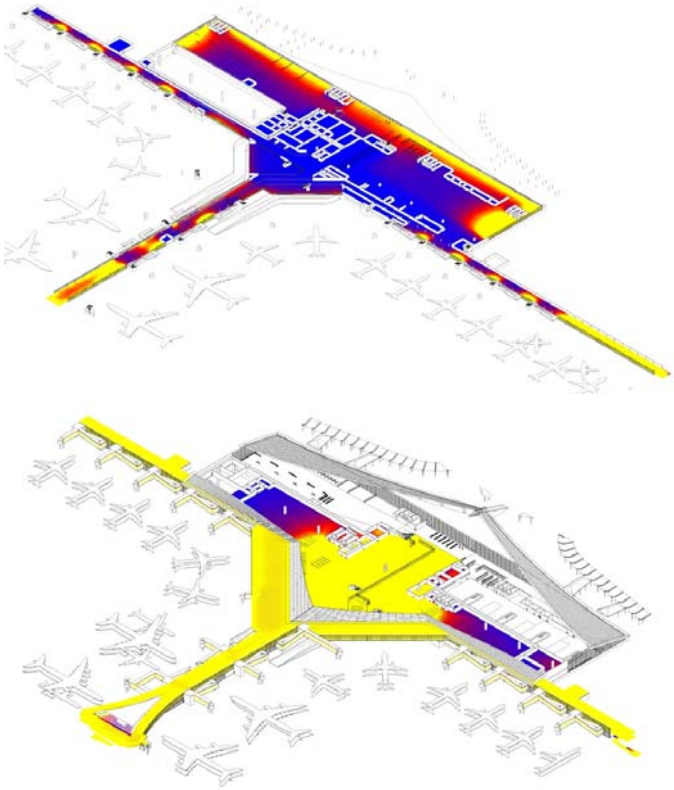
Side Elevation

Clark International Airport

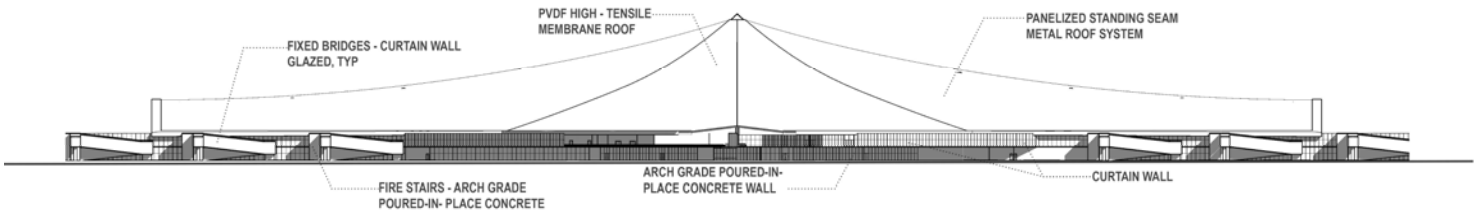
2018

Professional Projects





Natural Daylight Analysis (at Ticketing and Departures)



Airside Elevation

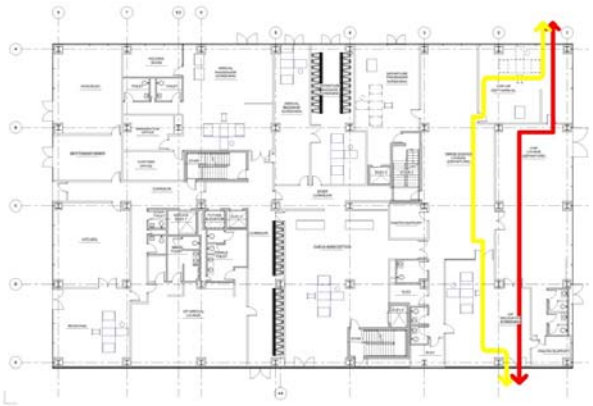
Velana Airport VIP Terminal

2018

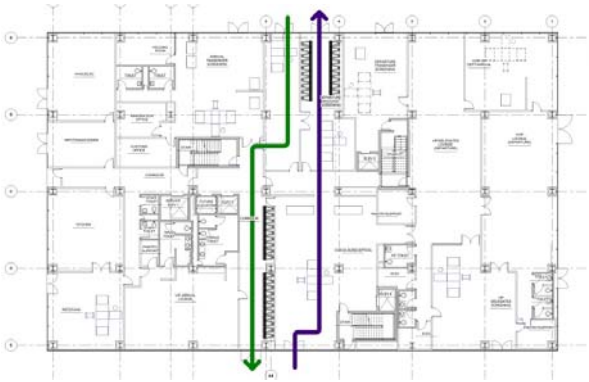
Professional Projects

The terminal is designed to enhance the passenger experience, create a facility that is modern and well-functioning. A world class representation of the Maldives and meets the expectations of the VVIP, VIP, CIP and Jet travelers using the facility.

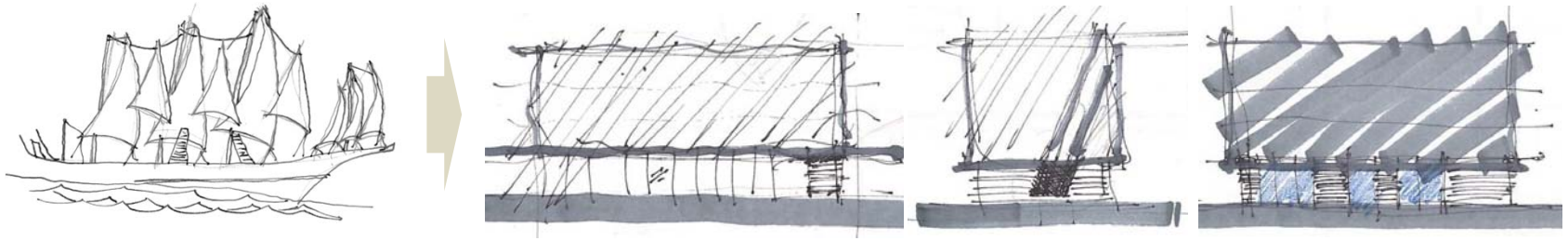
The terminal is designed to have a world class lounges to provide respite for passengers with a façade of transparent curtainwall with screening accentuating the Islamic culture of the Maldives. The exterior façade idea responds to: site surroundings, cost, climate, and inspire the exterior character. Façade geometry lines maintains horizontal and diagonal lines interlaced grid pattern which mimics Yachts sails.



VVIP/Delegates Passengers Route



Inbound and Outbound Passengers Flow

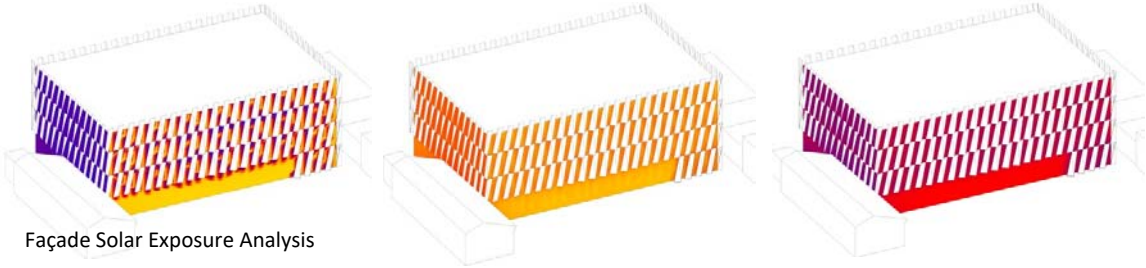


Design Concept Sketches

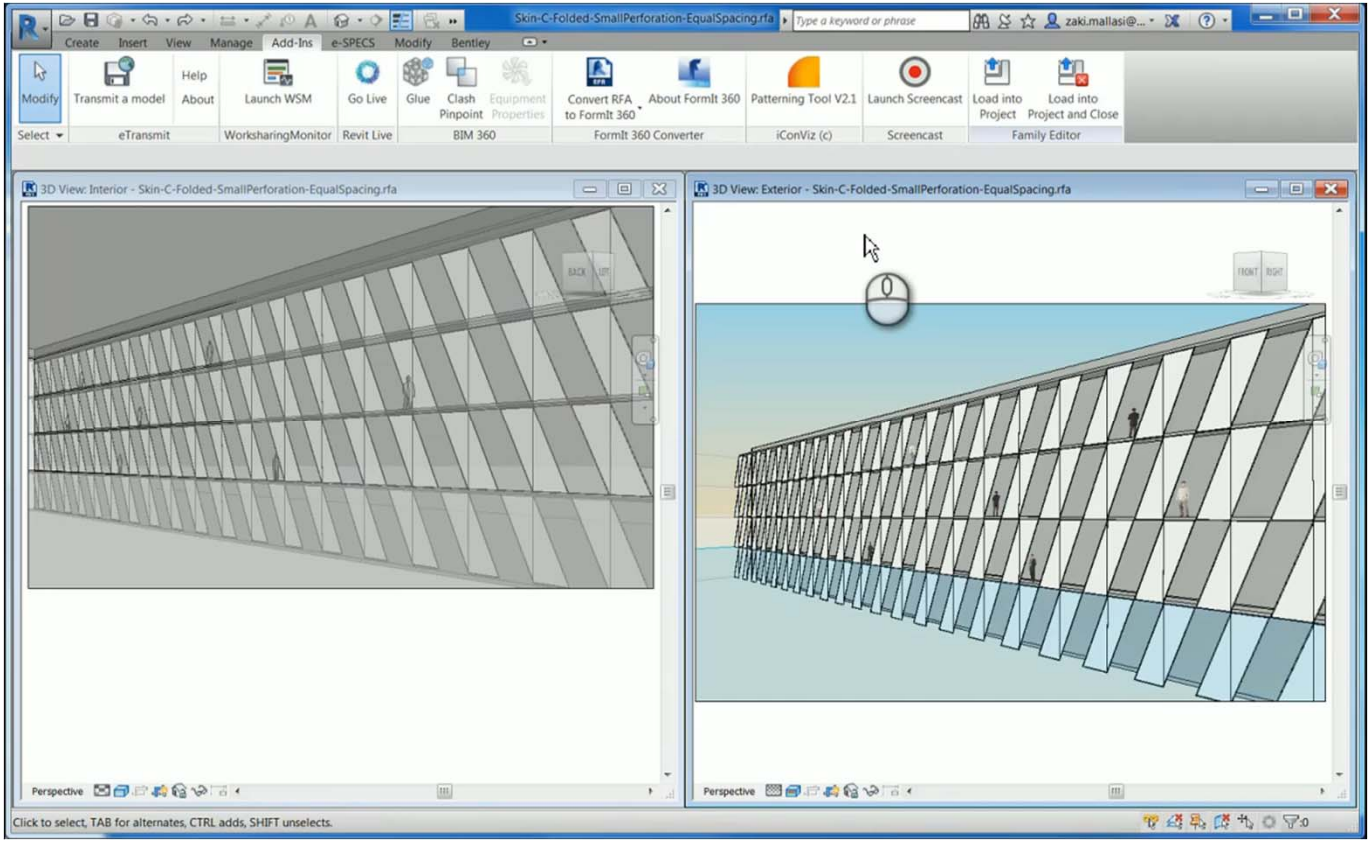
Velana Airport VIP Terminal

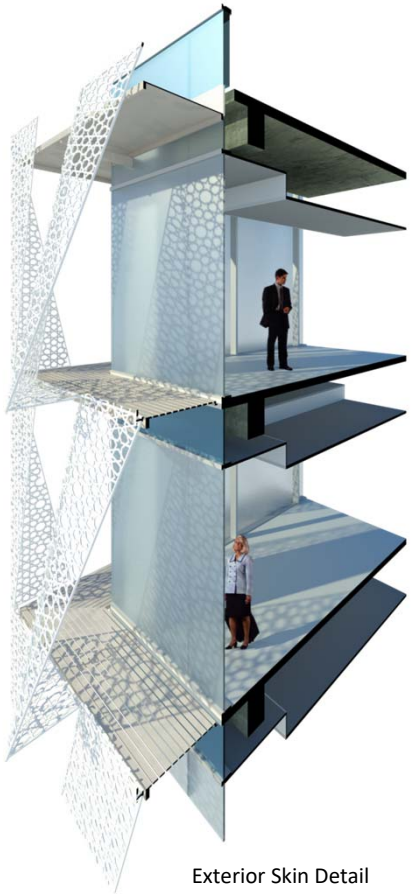
2018

Professional Projects



Façade Solar Exposure Analysis

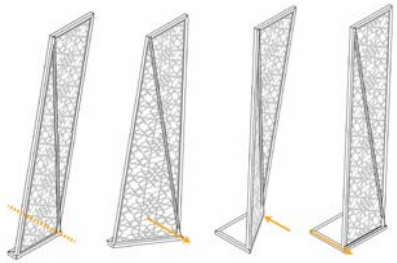




Exterior Skin Detail

Play Video: Custom Revit Façade Penalization Plugin [https://www.youtube.com/watch?v=UEd-PNv0R9k&t=23s]

Landside Elevation



Façade Panels Mechanism

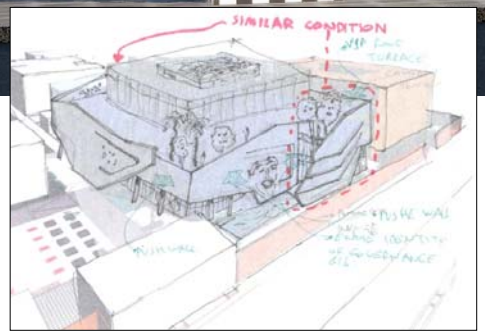
New School of Business

2016

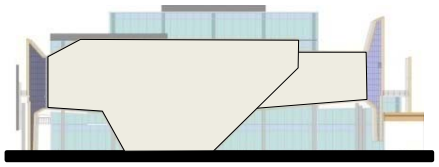
Professional Projects

The New School of Business at Effat University comprised a design challenge to articulate its exterior facade design. Environmental, aesthetics, and visual privacy were taken into account to produce a vibrant facade. The building will form part of the university campus and will be integrated with the western side main gate. It will be constructed on five floors dedicated for classrooms, teaching labs and academic staff offices, general lecture halls, and public lounges.

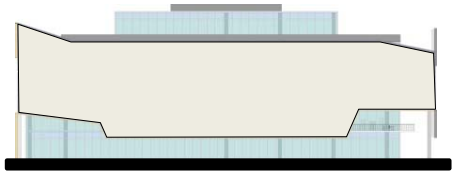
The new project has visible presence both from inside the campus and at the West side main roads. The building envelope has a secondary Mashrabya-like exterior layer shading-system, to read as contemporary as well as respecting the traditional local culture.



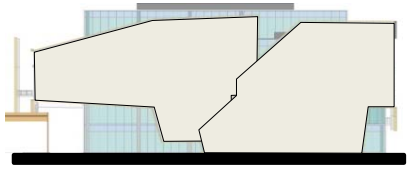
Façade Skin Development



North



South

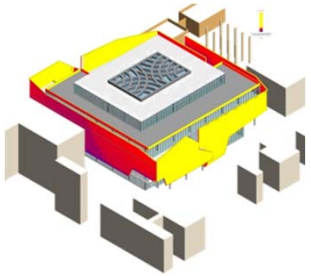


West

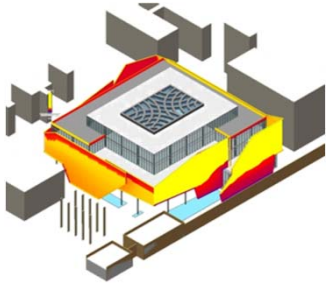
New School of Business

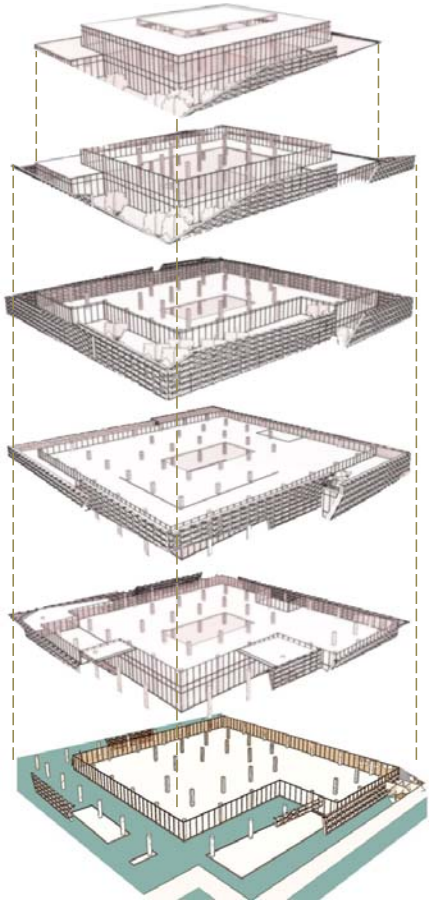
2016

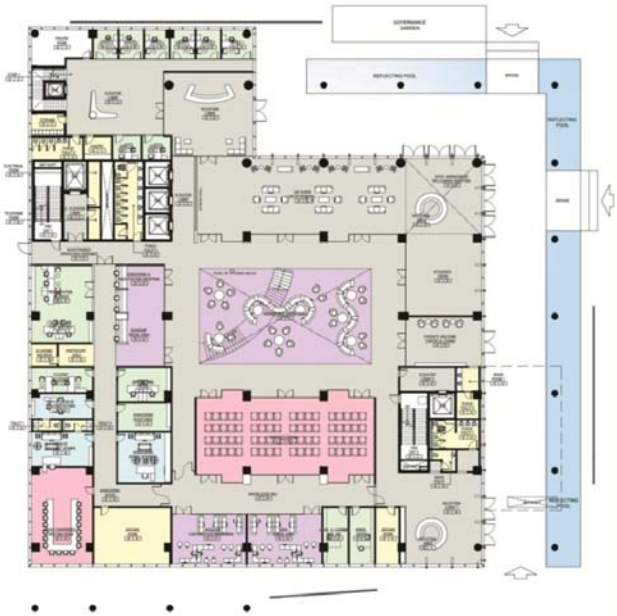
Professional Projects



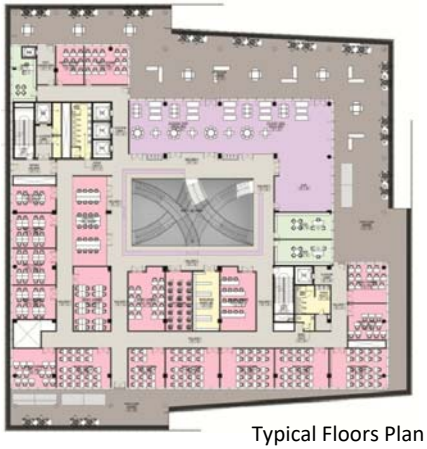
Façades Sun Exposure and Solar Analysis







Ground Floor Plan



Typical Floors Plan

Façade Design Alternatives

Private Villa Complex

2014

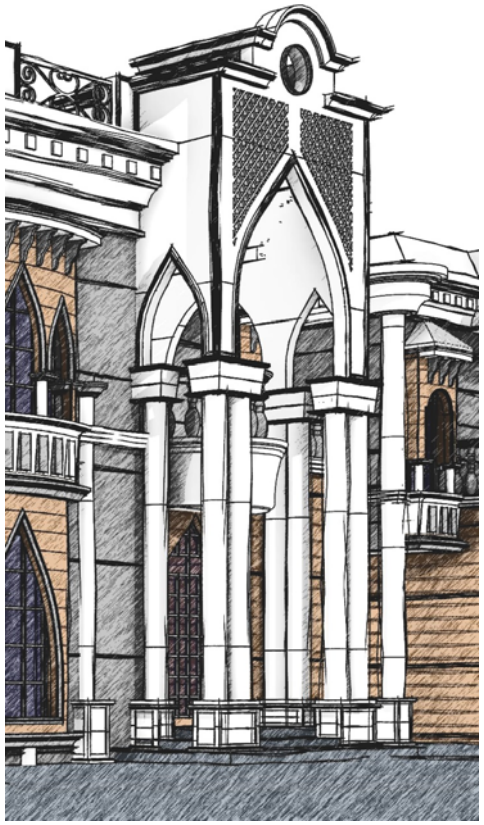
Professional Projects

Typical Villa

The client is a family of three brothers and their parents. The scope of work was to design the exterior facades based on given floor plans. This is two floors 80ft x 200ft lot area per villa with about 1000 sft built up area locate in Jeddah, Saudi Arabia.

The design blends between modern and classical Middle Eastern styles, with careful positioning or exterior architectural features. Here, we consider a delightful interplay between gentle geometric formations, landscape connection, allocation of luxurious and cool lifestyle. Their designs are aesthetic and functional and in this case it has strategically-placed windows, viewing balconies, and covered terraces. Traditional materials and architectural details are used in a contemporary manner to give this villa a relaxed sophistication.

Parents Villa Main Elevation



Entrance Concept Sketch

Group of Villas Main Elevation and Different Design Option

Effat University New Library

2012

Professional Projects

Construction completed on December 2015 to contain: cultural museum, workshop areas, library stacks, silent reading/research, seminar rooms, groups study rooms, and a large reading hall with a café and access to a palm garden. Additional gallery corridors serve as display of new creative works by students, faculty, and invited artists. These spaces and entrances had to be designed in a way that accommodates the social expectations with respect to Saudi Arabia culture and while allowing for intellectual interaction.

The main façade configuration is an inspiring destination to the campus providing higher aspiration for new state-of-the-art 21st century learning whereby the Cultural Museum and Public spaces integrates with the outer community.

North Elevation

Effat University New Library

2012

Professional Projects

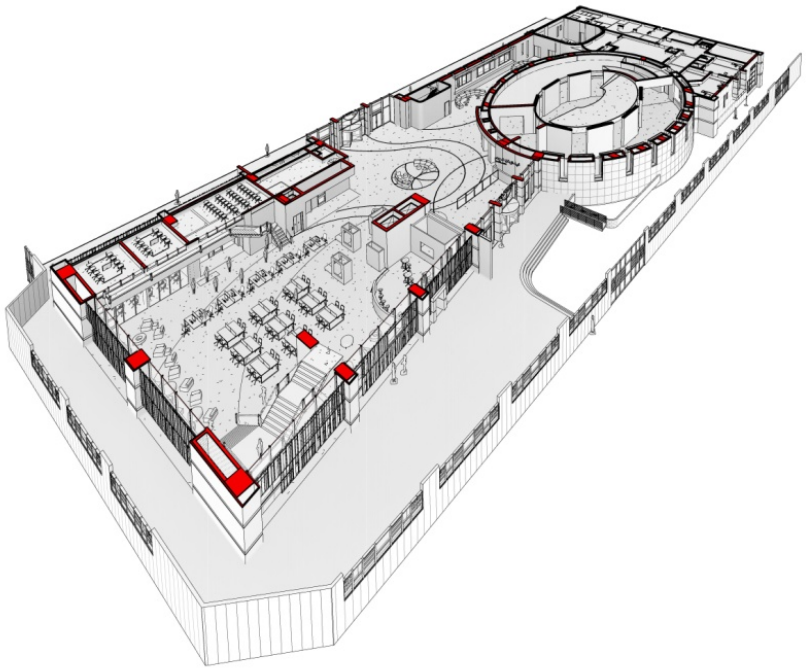
South Elevation

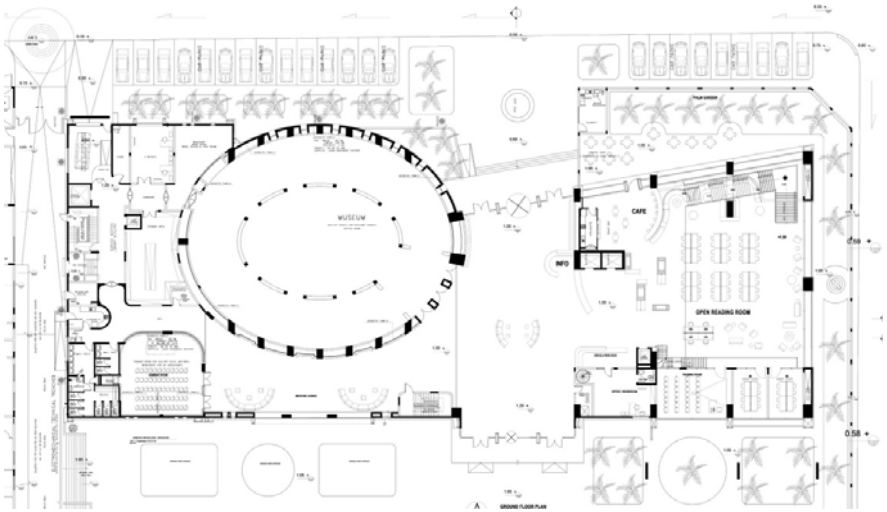
Exterior, main entrance
and canopy development

Effat University New Library

2012

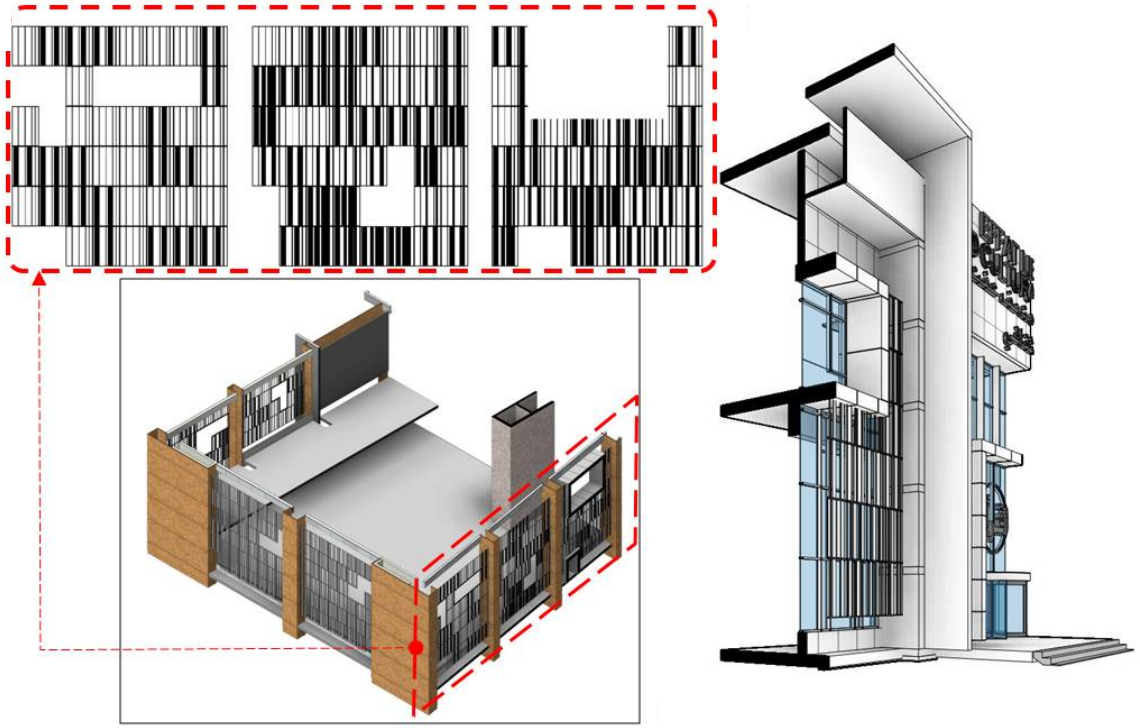
Professional Projects





Ground Floor Plan

Main Entrance and Landscape



Façade Study At Main Entrance

Duke University Medicine Pavilion

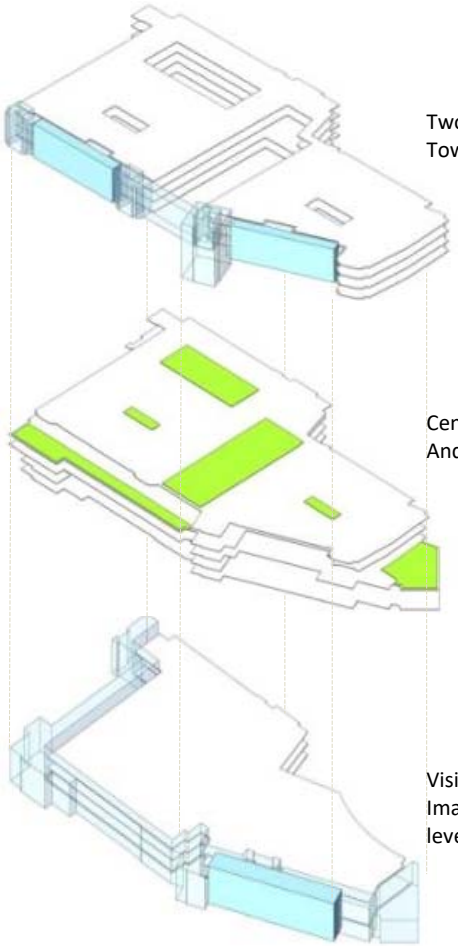
2010

Professional Projects

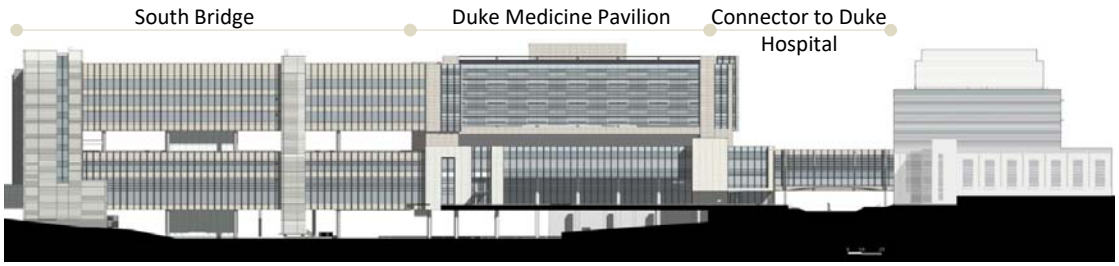
The Duke University master campus plan is a steward of thousands of acres in the forest, taking care of well preserved natural environment. The new medical pavilion (580,000sf) supports a design philosophy and practice through a responsible relationship with site that values open green spaces. The building is a healing center by bringing vision, intellect and high ethical standards to the construction and operation of a sustainable healthcare building.

Building exterior utilizes passive design elements to reduce energy demand in the form of natural day lighting, green roofs and external shading devices. A sustainable healthcare building will be the physical manifestation of this commitment.

Image courtesy of Perkins +Will



Site and Duke University Campus

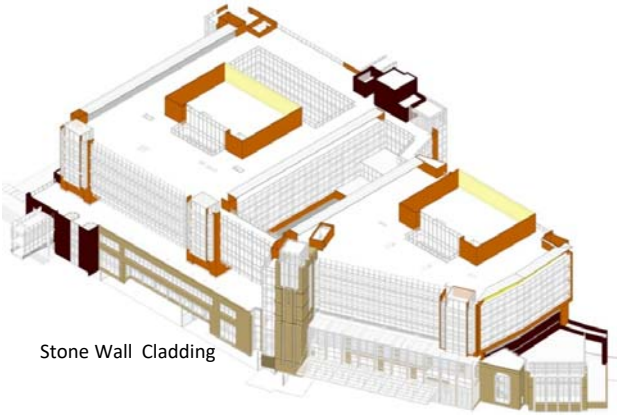


Side Elevation

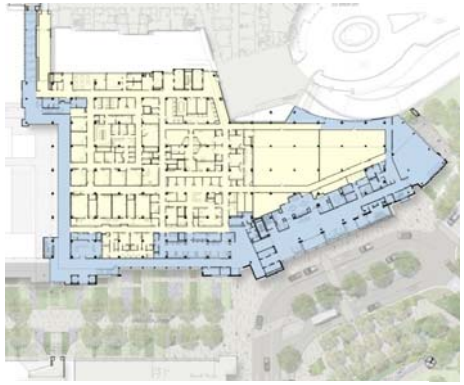
Duke University Medicine Pavilion

2010

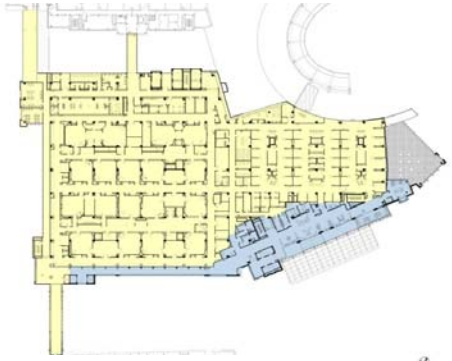
Professional Projects



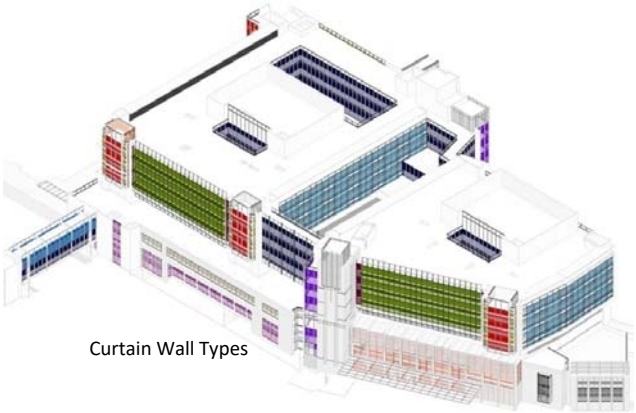
Stone Wall Cladding



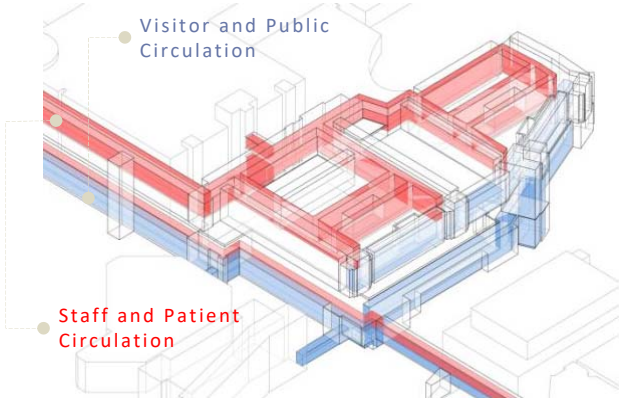
Ground Floor - Imaging



First Floor - Surgery



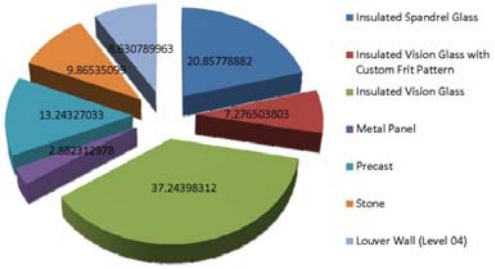
Curtain Wall Types



General Circulation Diagram

Upper Floors Patient Tower

Wall Type	Total Surface Area (ft2)	Percentage
Insulated Spandrel Glass	37456	20.85778882
Insulated Vision Glass with Custom Frit Pattern	13067	7.276503803
Insulated Vision Glass	66882	37.24398312
Metal Panel	5176	2.882312978
Precast	23782	13.24327033
Stone	17716	9.86535099
Louver Wall (Level 04)	15499	8.630789963
Total Area	179578	100



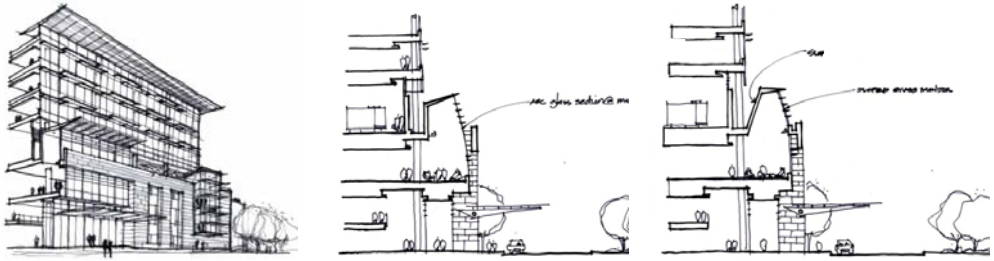
Exterior Envelope Materials BIM Estimating

Lobby and Public waiting Interior

Duke University Medicine Pavilion

2010

Professional Projects



Designer sketches. Ref. Perkins + Will

Curtain Wall Types Study and
BIM Model

Wall Type A

Wall Type B

Wall Type C

Main Entry Elevation

Darden Restaurants Support Center

2008

Professional Projects

A new campus located on a 47 acre parcel in Orlando, Florida, comprises two main buildings (395,000 sf). It consists of a 3-story office building with training rooms & kitchens, common spaces, dining hall, culinary, administration, break rooms, business center, wellness area, and a data center.

The main program blocks are organized around a central circulation spine, "Main Street" taking the form of a three-story atrium. Natural light is introduced to these spaces with a continuous clerestory along the curved Southeast face. Spaces are connected with each other along the Main Street with monumental stairs designed to promote wellness. Elevated walkways along the "Main Street" connect the Southwest and Northwest program blocks.

Site Plan, Proposed Lakes and Parking

Option (1)

Option (2)

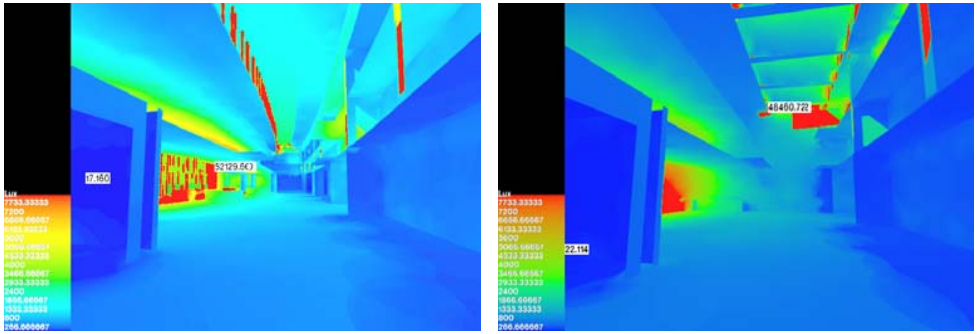
Option (3)

Darden Restaurants Support Center

2008

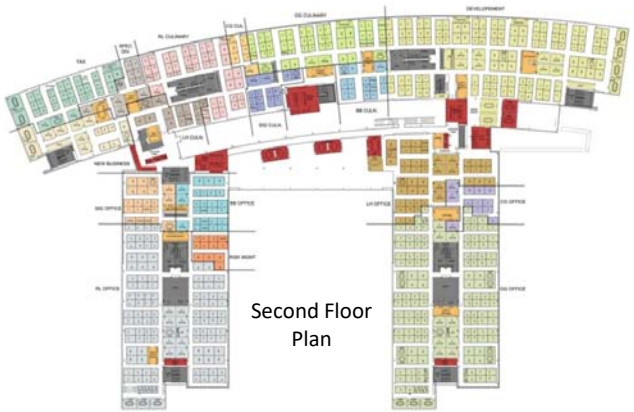
Professional Projects

3D Section Across Atrium and Main Street



Atrium and Skylight Options Daylight Analysis

First Floor Plan



Second Floor Plan

Third Floor Plan

Whitfield High School and Academy

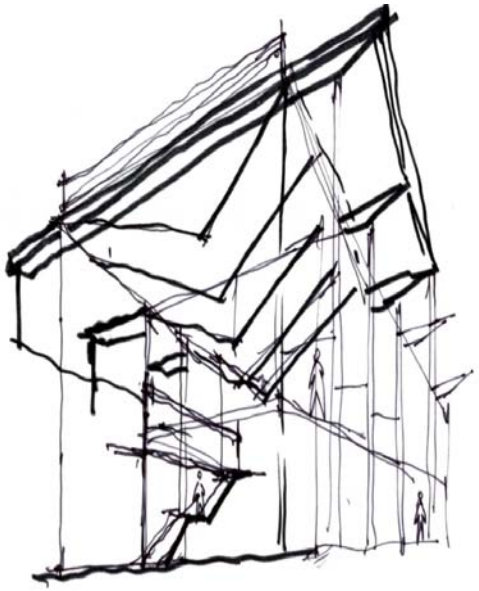
2006

Professional Projects

a new high school located in Dalton county, Georgia with occupancy 1,600 student, K9-12 and approximately 235,450 sf. The design concept supports the instructional models (graphic, musical, visual, linguistic, auditory, print, electronic, etc.) and create inviting learning environment. Socially engaging spaces should attract students and the community to the school.

The learning environment is flexible to accommodate change during the day, week to week, and from year to year. The high school is envisioned to complement the other successful schools already in the district, understanding that each school provides unique opportunities. Creating spaces that can support continuing education for community members after school hours.

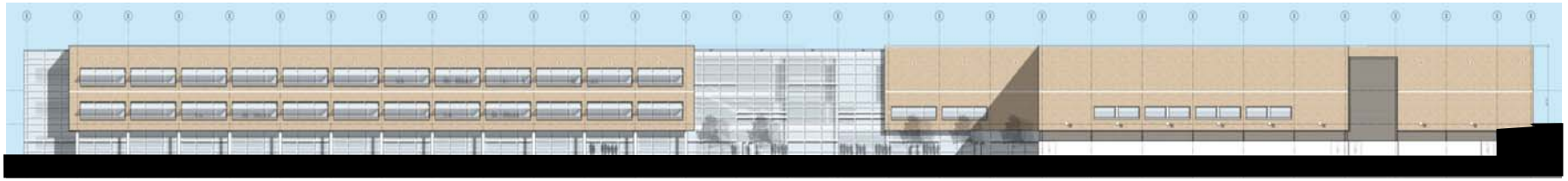
View at the Cafeteria



Classrooms Wing

Entrance Lobby

Wellness and Gym

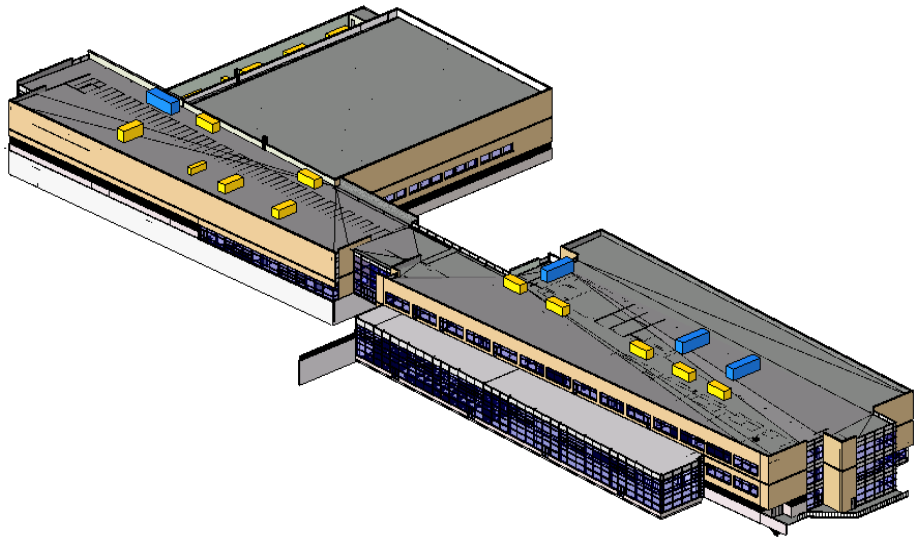


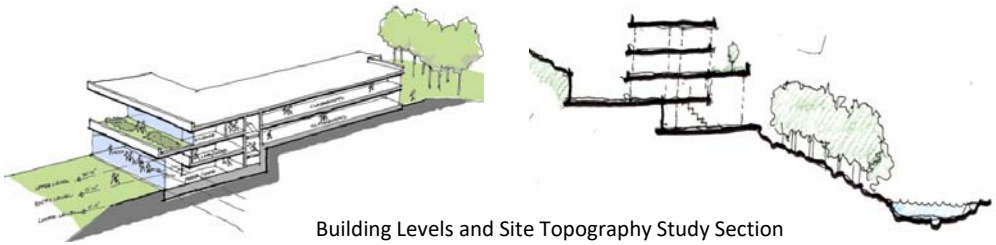
East Elevation

Whitfield High School and Academy

2006

Professional Projects

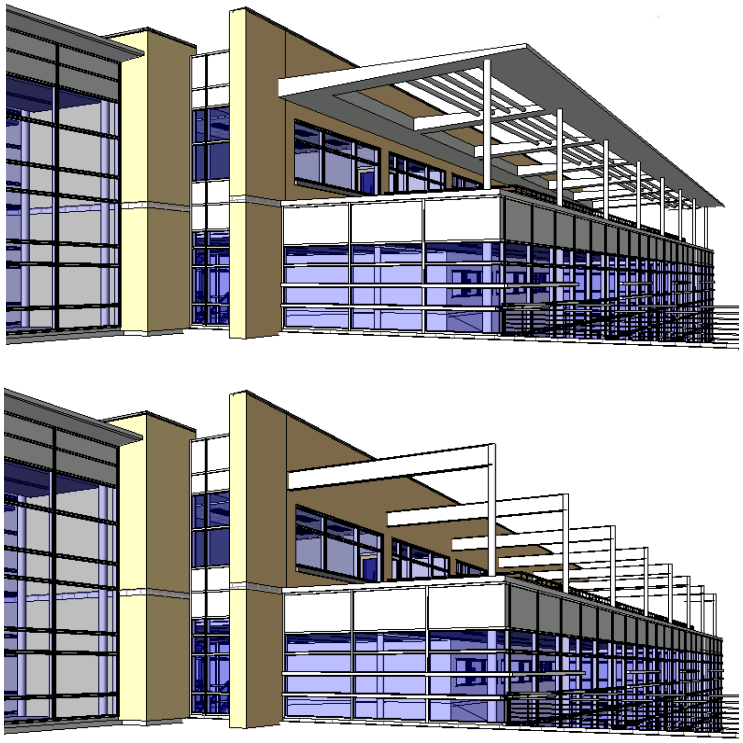




Building Levels and Site Topography Study Section
Designer sketches. Ref. Perkins + Will

First Floor Plan

Ground Floor Plan



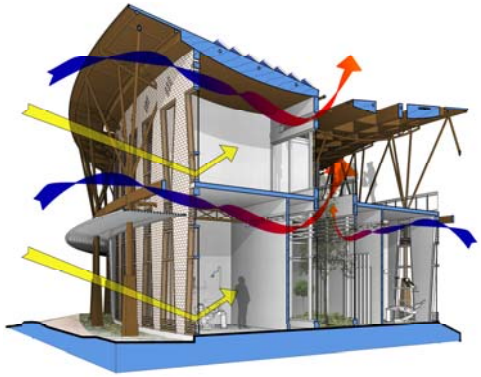
Outdoor Terrace Canopy Design options

Hope Dental Center

2020

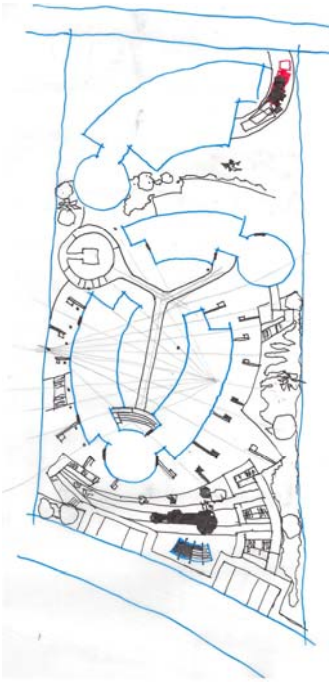
Project Competitions

The idea for this project is a reference to the union between: a Rwanda culture to embrace, an endeavor to heal and a centralized private inclusion. This resulted in an overall master plan and architecture that are sensitive to the roots of Rwanda tradition and environment. Our goal was to invest in the idea of making the buildings climatically responsive, respects the environment and offers a healthy and comfortable internal/external space functions. In that sense, the inward facing of buildings to each other with the central garden hub evokes the special feeling to bring people together on a common goal. The central outdoor space promotes inclusion, emotional support, comfort, and community socialization. The buildings' architecture is characterized by the curved forms which provides an even and optimal exposure to daylight and solar energy throughout the day. The curved walls in combination with the green roof will receive low solar exposure.



Sustainable design solutions

Longitude cross section

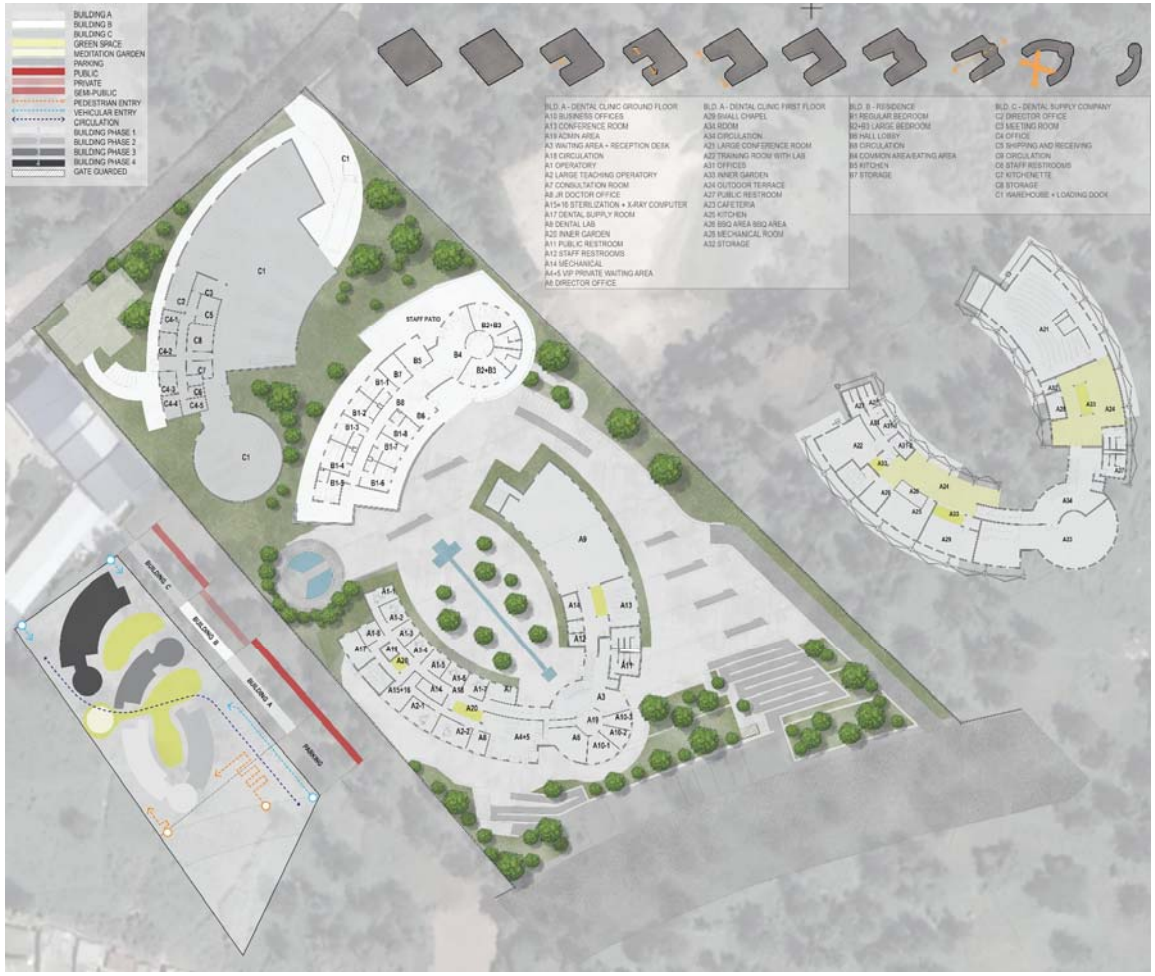


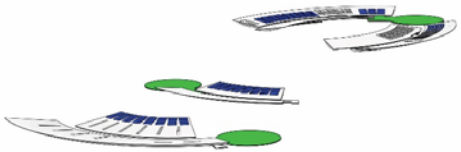
Buildings and site landscaping concept

Hope Dental Center

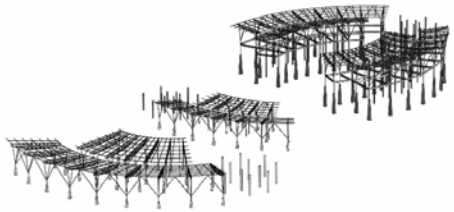
2020

Project Competitions

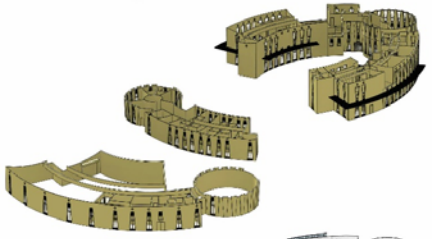




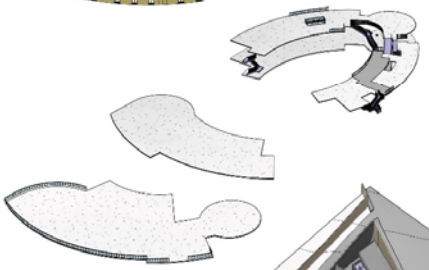
Green roof system



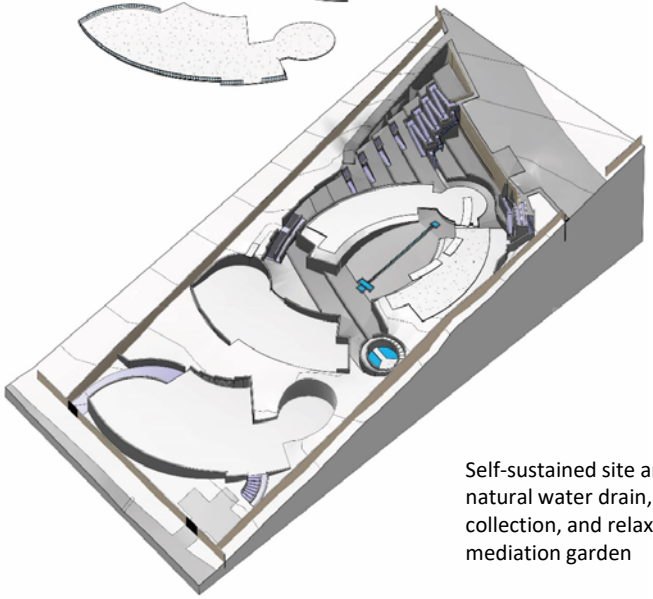
Modular timber truss framing and treated wood joist



Brick walls, window system façade elements



Wood floor layers topped with floor finish material



Self-sustained site area: natural water drain, water collection, and relaxing mediation garden

Vertical Farming Tower

2011

Project Competitions

dynamic convergence

[convergence → synthesis → evolution] = [one tower → self-sustained network → future cities]

DESIGN CONCEPT

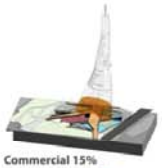
The proposed design is a tower concept responding to an evolution occurring along the river Thames redefining the London Skyline. The iconic tower design demarcates this period in history and defines an era of sustainable awareness impacting design and development strategies. The tower and site development establishes an urban ecological system that is symbolic of convergent synthesis addressing increasing population growth and density in major cities. As a sustainable design solution the project redefines tower typology as an ecological system that is a commercial destination point, urban agricultural solution and a energy generation farm.

The proposed plaza and tower design promotes a sustainable life-style interrelating ideas of urbanism, vertical farming and mixed income housing. The scheme's Porosity feature invites the people to go inside and under the tower to format a mixed-use destination which links People and Nature. The social-dimension is reachable in an interactive and Self-Sustained community.

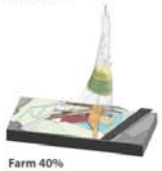
SITE

The site design features a plaza connecting events, urban markets, becoming a connector for adjacent landmarks and the river walk through historic axial relationships which have been modernized as Pathways to Harness Energy from pedestrian movement through the use of piezoelectric pavers. The tower design and site development serve as an Evolution in place making and urban mixed-use development; The new landscape and site elements connect and engage existing with green spaces achieving a Strong Identity for the Community. The base of the two Towers are Rooted in Fertile ground establishing a harmonious base for a sustainable destination inclusive of mixed income housing, commerce, farming and harvesting.

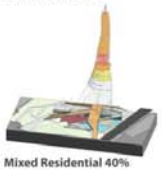
Services 5%



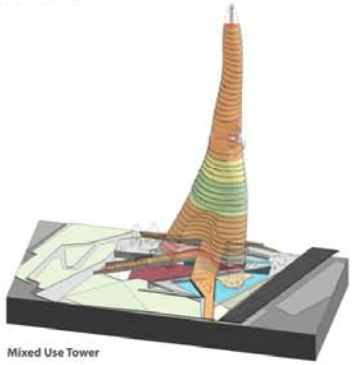
Commercial 15%



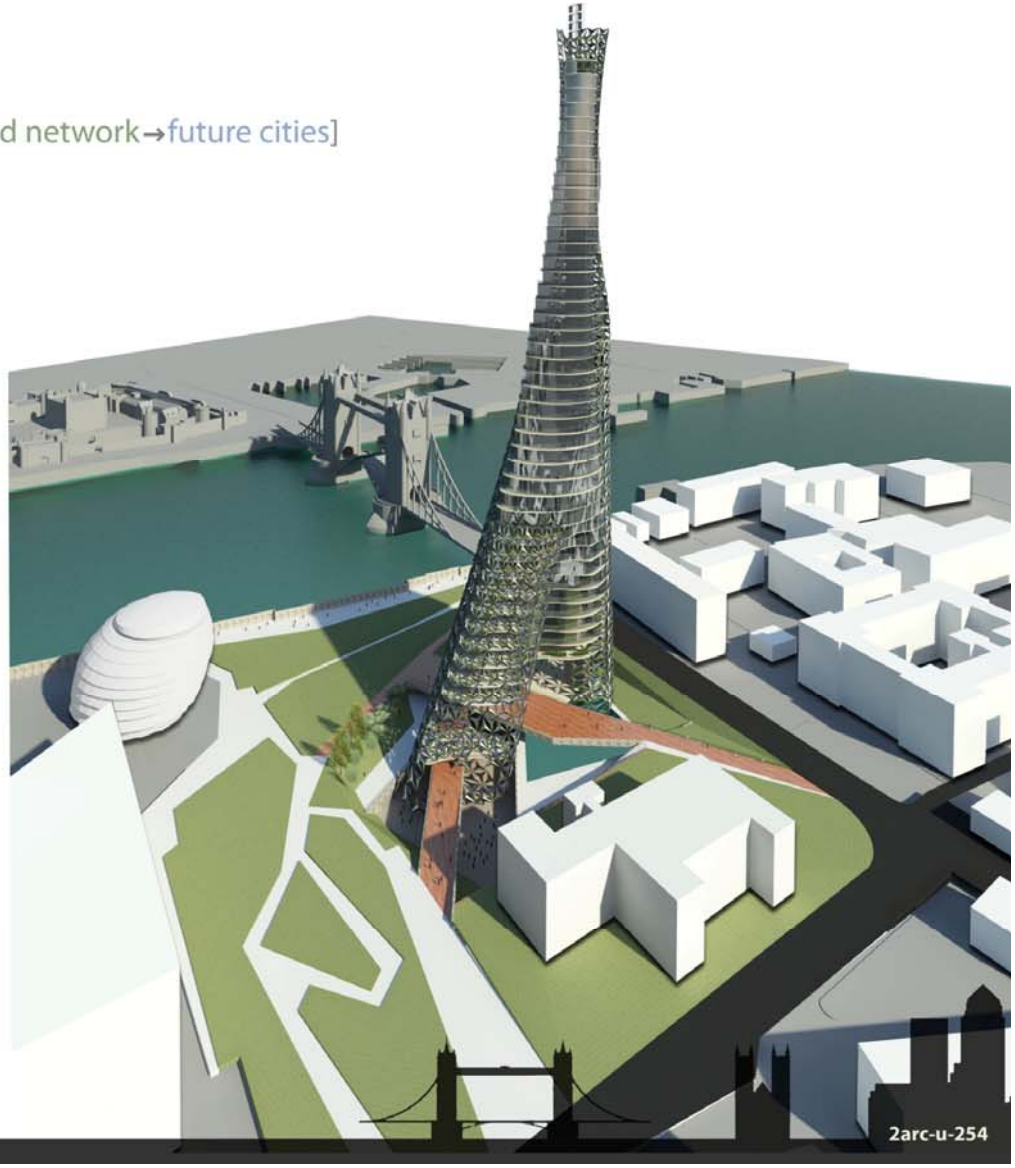
Farm 40%



Mixed Residential 40%



Mixed Use Tower



2arc-u-254

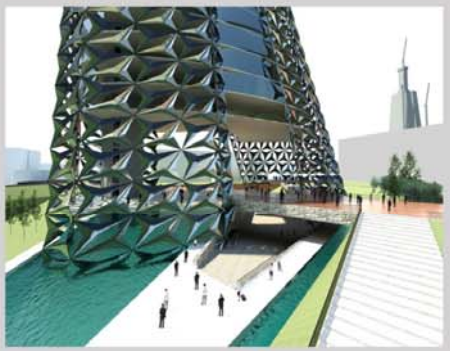
Vertical Farming Tower

2011

Project Competitions

URBAN ENERGY NETWORK

A Collective Network of Towers promotes the sharing of energy resources between each other. More Communities are Connected promoting a Model for a Sustainable Vertical Village Architecture.



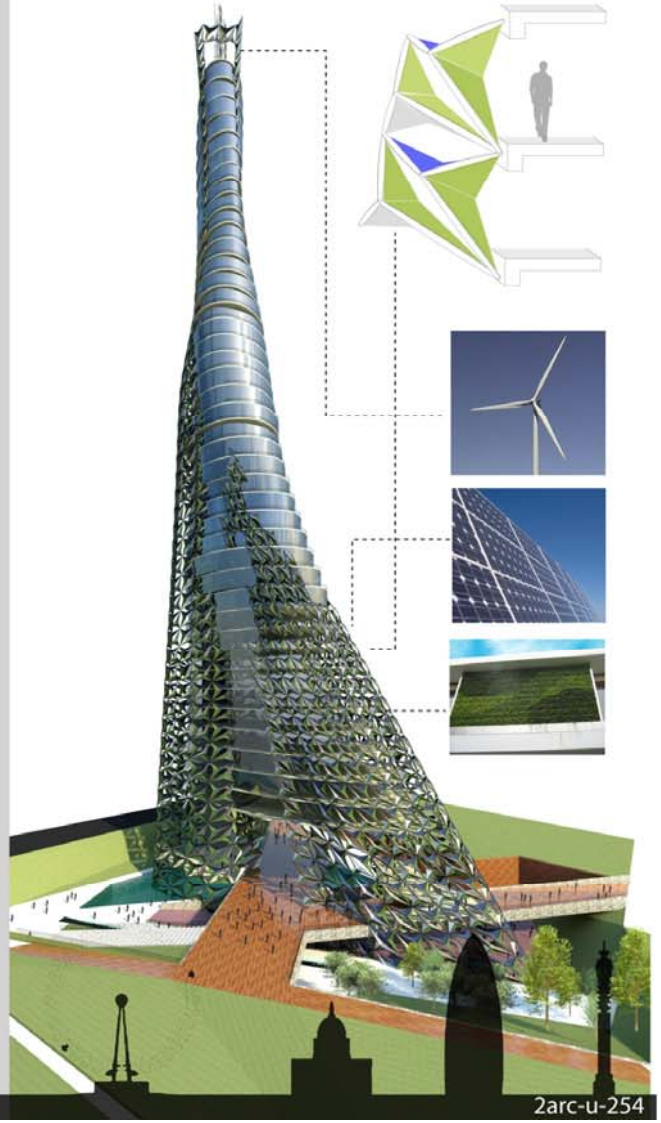
HARVESTING KINETIC ENERGY FROM PEOPLE MOVEMENT - PAVEGEN SYSTEMS

SOLD AT THE OUTDOOR MARKET

GROWN HERE

ADVANTAGES OF A VERTICAL FARM

Year round crops
No crop failures due to bad weather conditions
More crops on less acreage
No agricultural runoff
Ecosystems can be restored
No use of pesticides, herbicides, or fertilizers
Use 70-95% less water
Reduction of crop loss and pollution due to transportation
Higher control over food safety
New job opportunities
Water reuse within the building
Purification of grey water to potable water
Animals can be fed utilizing postharvest plant material
Reduce or eliminate the dependence on fossil fuels



2arc-u-254

“NEST” Institute of Global Design

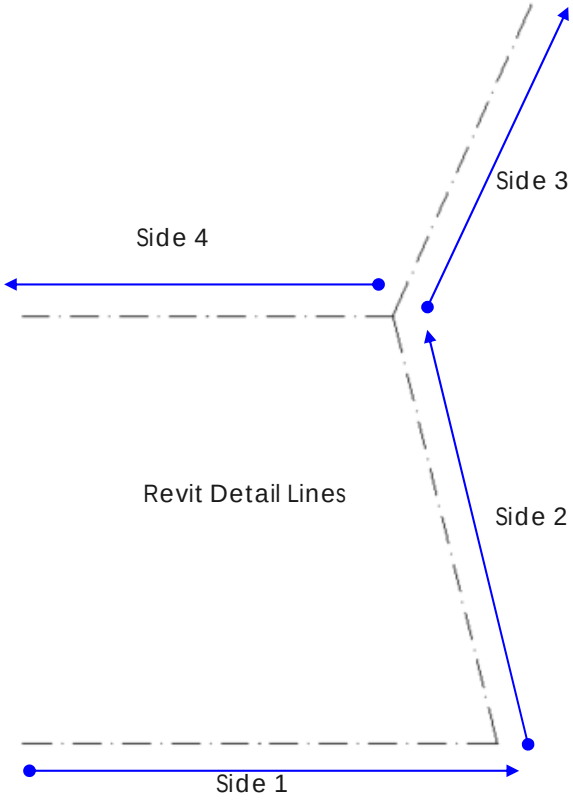
2010

Project Competitions

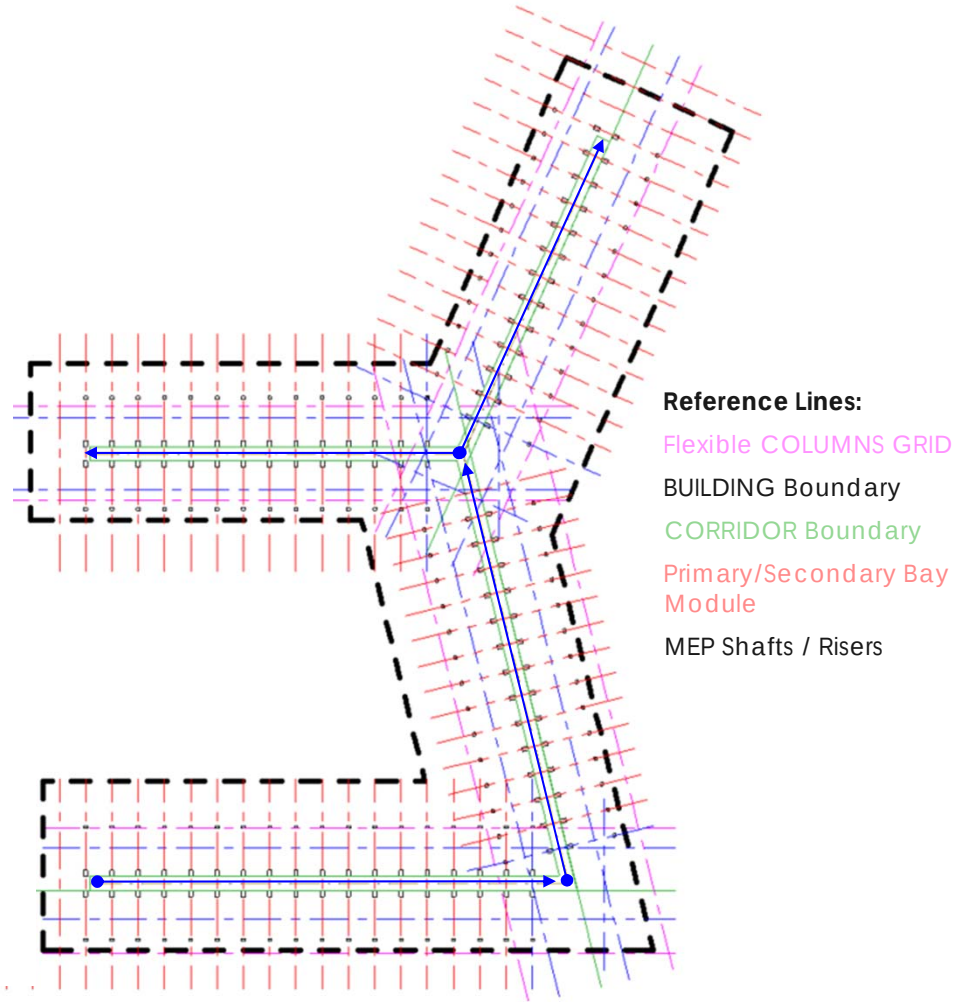
Test-fit, Mix and Automated Apartments Units Layout Generation

2021

Academic Research



INPUT: Corridor Center 2D Line
Start/End/Direction Drawing Sequence

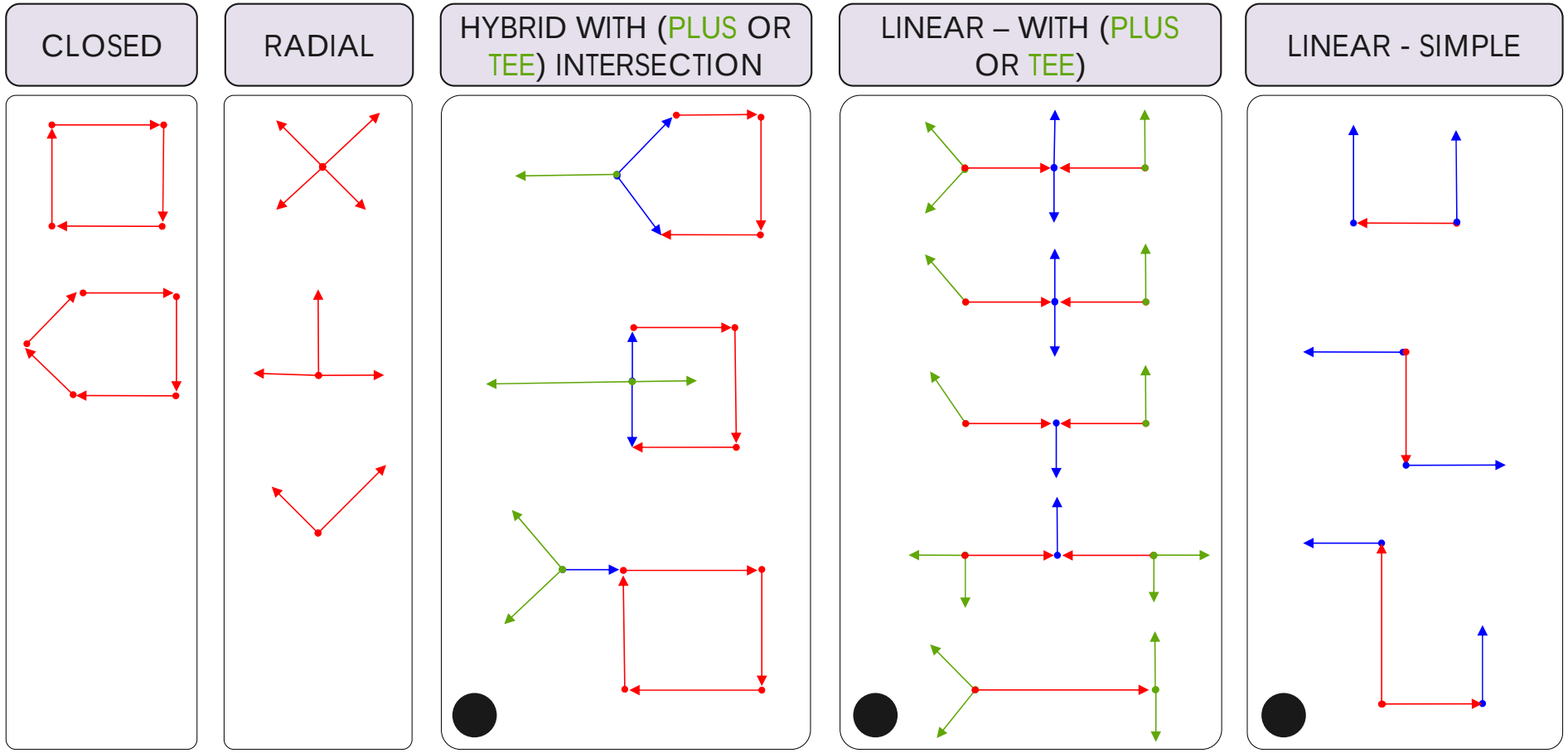


OUTPUT: Generate Building Boundary Shape and Master Planning Grids

Test-fit, Mix and Automated Apartments Units Layout Generation

2021

Academic Research



Corridor **Main** Sketch Lines

Corridor **Branch Lines** - Manual User Selection

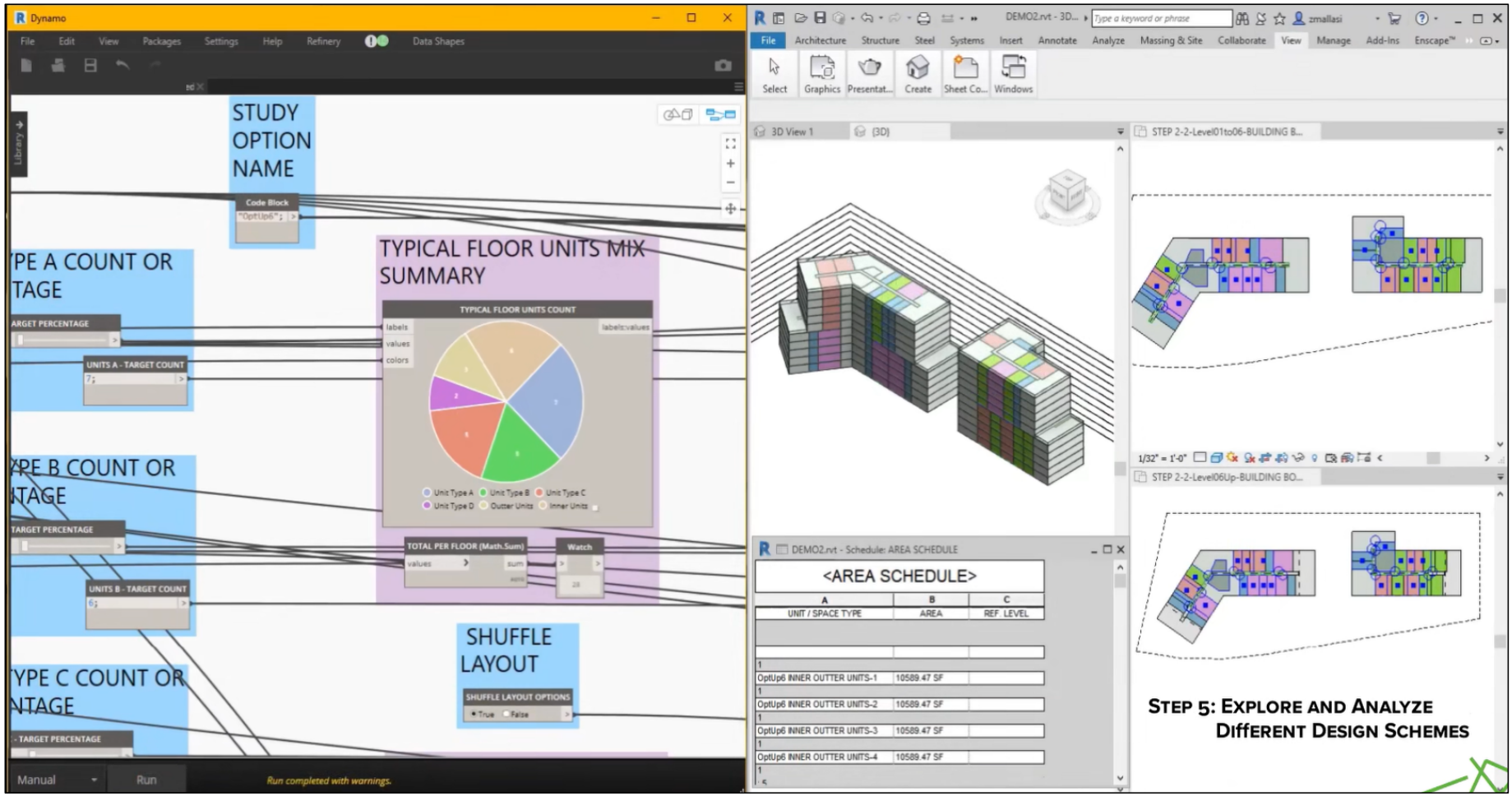
Corridor **End Lines** - Manual User Selection

Some User Intervention Required

Test-fit, Mix and Automated Apartments Units Layout Generation

2021

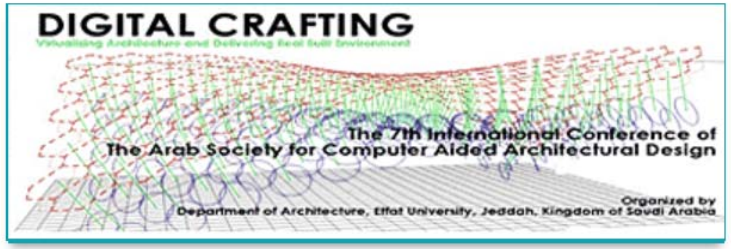
Academic Research

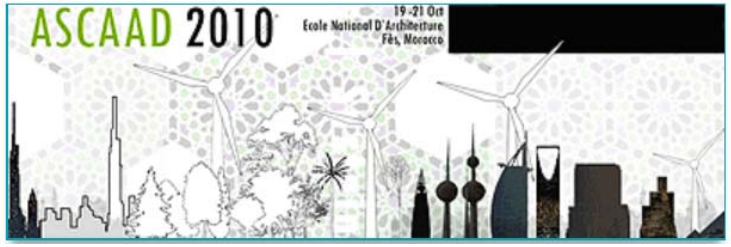


Public Speaking/Engagement in Parametric/Computation Design

2020

Academic Research





ASCAAD .ORG

Arab **S**ociety for **C**omputation in **A**rchitecture, **A**rt and **D**esign

Public Speaking/Engagement in Parametric/Computation Design

2018

Academic Research

ECAM
26,4

668

Received 14 November 2017
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Accepted 27 March 2018

Designing with pixels: parametric thinking for patterning dynamic building facades

Zaki Mallasi
Building and Places, AECOM USA, Baltimore, Maryland, USA and Effat University, Jeddah, Saudi Arabia

Abstract

Purpose – Advances in digital design tools enable exploration and generation of dynamic building facades. However, some processes are formally prescribed and manually driven to only visualize the design concepts. The purpose of this paper is to present a proactive framework for integrating parametric design thinking, paying particular attention to building facade patterning.

Design/methodology/approach – This work developed the PatternGen© add-on in Autodesk® Revit which utilizes an analytical image data (AID) overlay approach as a data source to dynamically pattern the building facade. The add-on was used to manipulate the placement rules of curtain panels on facade surface geometry. As means of validating this research model, a real-life design project has been chosen to illustrate the practical application of this approach. Feedback and observations from a short end-user questionnaire assessed qualitatively the facade patterning and panelization approach.

Findings – The proposed merge (or overlay) of AID images can be used as a parametric thinking method rather than just theory to generate and articulate dynamic facade design. The facade panelization responds to an AID that resembles design-performance data (e.g. solar exposure, interior privacy importance and aesthetics).

Originality/value – This work identifies a form of parametric thinking defined as the expression of geometrical relationships and its configuration dependent on the AID pixel Red Green Blue color source values. In this type of thinking, it explores the impact of the digital process and parametric thinking utility when driven by an AID overlay. The framework highlighted the practical application of AID pixel approach within a digital process to benefit both designers and computational tools developer on emerging design innovations.

Keywords Building facade, Computational design, Image pixels, Parametric modelling, Patterning

Paper type Research paper

1. Introduction

1.1 Parametric thinking: analyses + synthesize + evaluation

Architects consider the panelization of modern facade surfaces an important element of the building to achieve design goals and aesthetics. When the designers produce complex artifacts such as dynamic building facade, they often depend on their design insight (e.g. aesthetic, visual and function) with limited consideration to performances criteria (Rorig *et al.*, 2014). In the current research, the idea of integrating parametric thinking into the early design phase requires careful representation and change to the traditional mindset of designers by evolving the logic in relation with analytical criteria (Figure 1). In this context, the work is motivated by mainstream architectural firms and academic architectural programs are embracing the move toward a process of integrating parametric design thinking in their early design phase discovery process (Turrin *et al.*, 2012).

Consequently, the research question for this work is as follows:

RQ1. How can an analytical-based parametric analytical image data (AID) approach be formulated as design framework to assist the emerging dynamic facade panelization?

The author would like to thank Effat University for their endless support when providing time to write this paper. Much of the illustrations and work presented in this paper would not have been possible without the generous permission to utilize the New School of Business project as real-life case study project.

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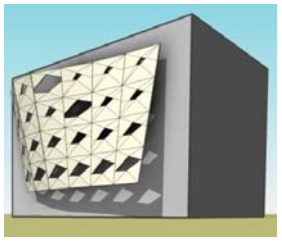
Using BIM for Smart Building Façade

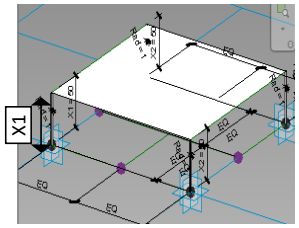
2016

Academic Research



The facade is designed to respond to environmental, social and functional conditions among other considerations. Digital Design Computation is an essential support in understanding the process of connectivity between digital/physical kinetics. Digital and physical fabricated prototypes allow designers to test the qualities of such system and discover new modes of parametric design thinking.

This work developed a custom Add-on in Revit ® application that connects the kinetic parameters of digital and physical model to control a smart façade. We deployed the Application Programming Interface (API) C# programming to manipulate the kinetic response through linear actuation. The proposed system framework connects solar exposure values to a BIM model and actuation thru Arduino Mega board, servo motors, tooth-beam and tensile-fabric material.



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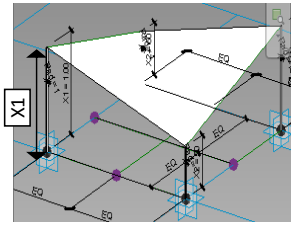
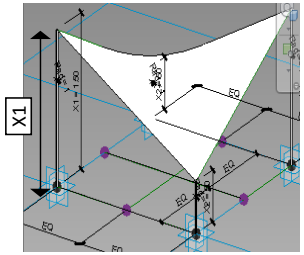
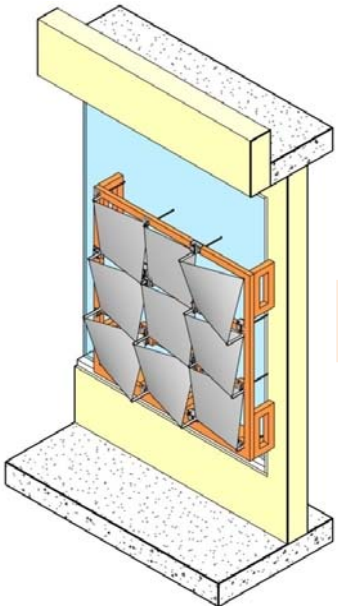
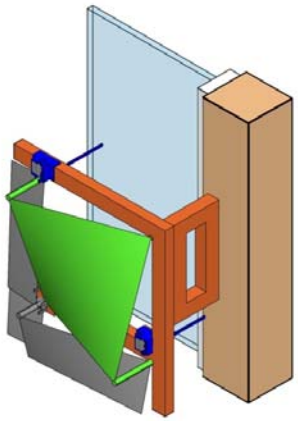


50% Open Status



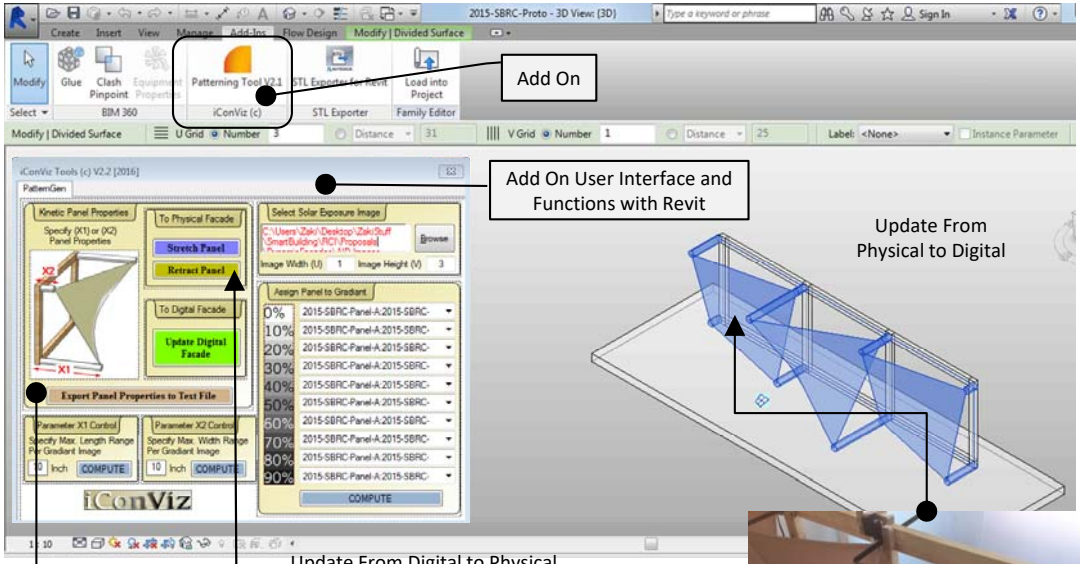
100% Open Status

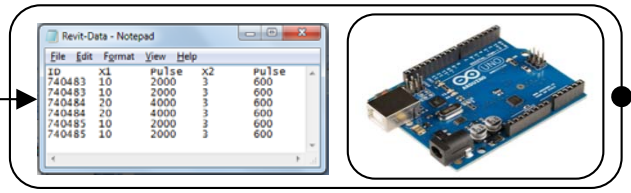


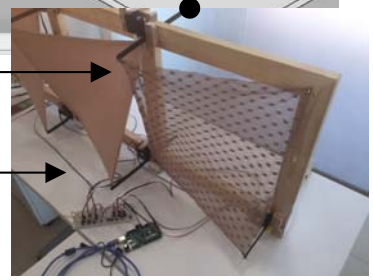


Kinetic Prototype Wall BIM Model

Video Link: *http://www.iconviz.com/protofull.mp4*







Hardware Control / Communication Environment

Effat University New Library and Museum

2015

Academic Research

Construction Week
MIDDLE EAST

Expo 2020 | Business | People | Projects and Tenders | Proc

Effat University library on schedule to complete

Three storey $13.3mn project in final construction phase

by Staff Writer | March 12, 2014 SHARE

Effat University library on schedule to complete

Dr Zaki Mallasi, assistant professor and Effat Library project designer, told Construction Week: "From the inside, when you enter the main public reception hall, users can see the interior ceiling radial-lines meeting at a large rounded void and when looking up through the upper floor in the atrium space, the feeling will provide as if the library is in the centre of the world.

"From outside, the new library building exterior facades project a grand humble character for the project due to the configuration of the different massing and their roof line variations."

WEB LINK

Designing the New Library Project

Dr. Zaki Mallasi
Assistant Professor and Effat Library Project Coordinator

One of the few celebrated campus buildings in our University has been the recently inaugurated Effat Library and Cultural Museum building. The library functions are vital in the educational process. The project design was performed by our Faculty member Dr. Zaki Mallasi, an Assistant Professor in the Architecture Department. It was designed around students' inspiration and made our dream come true. Our achievements speak for themselves. It has made a tremendous difference in the university.

The library is a huge three story building. Part of it in general form is the oval-shaped housing the cultural museum. In addition, there are public areas including: grand reading hall, café, auditorium, training rooms, research and study areas. The upper floors contain 26 quiet study rooms, book shelves that can house 60,000 volumes and a prayer room. From the inside, when you enter the main public reception hall, visiters can see the interior ceiling radial-lines meeting at a large rounded void and when looking up through the upper floor in the atrium space, the feeling will provide as if the library is in the center of the world. Looking from outside, you can see the new library building exterior facades projects a grand and humble character for the project due to the configuration of the different massing and their roof line variations.

The library's mission is "to reduce the boundaries for women to successfully participate in public life and encourages the talent while interacting with some students during the design process, especially my students in the architecture department who wanted to work and support the design concept with their ideas" reported Dr. Mallasi

Q1) How long did it take to finish the project?
[Dr. Zaki]: it took three years from design till end of construction.

Q2) What are the most interesting experiences in the library design?
[Dr. Zaki]: The project began with a very basic concept. Then the process was actually a transformation of the exterior and interior design to reflect the University long vision. It was exciting to work and involve the Client members in the design shaping their requirements to the final building.

35

WEB LINK

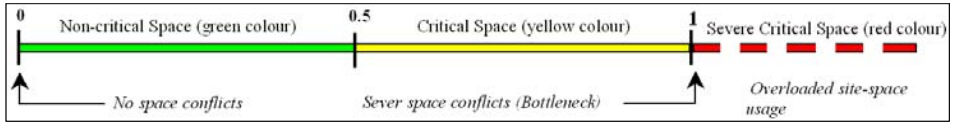
PhD Research: The Virtual Construction Site 4D Visualization

2004

Academic Research

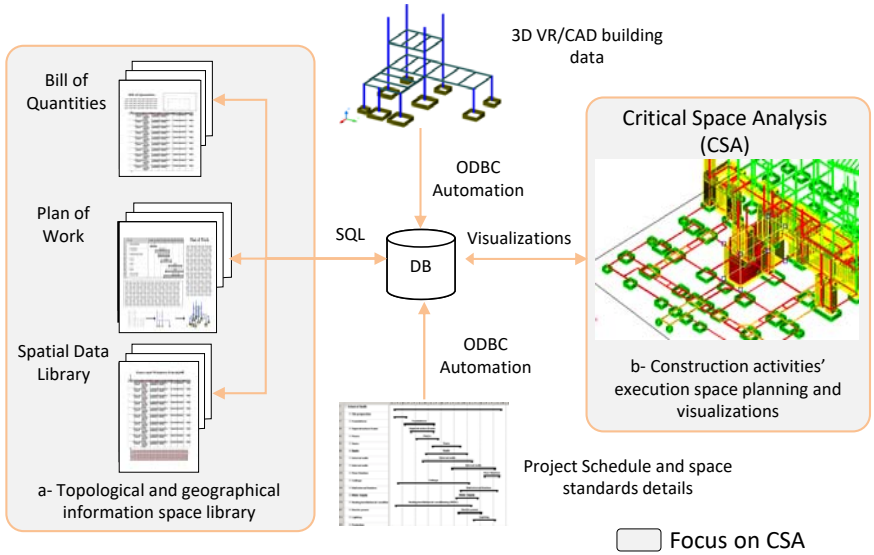
Research Aims and Objectives

- Introduce creative & dynamic 4D visualization medium to convey the execution strategy of a construction project.
- Develop Critical Space-Time Analysis (CSA) measurement for workspace conflicts before commencing work on site.

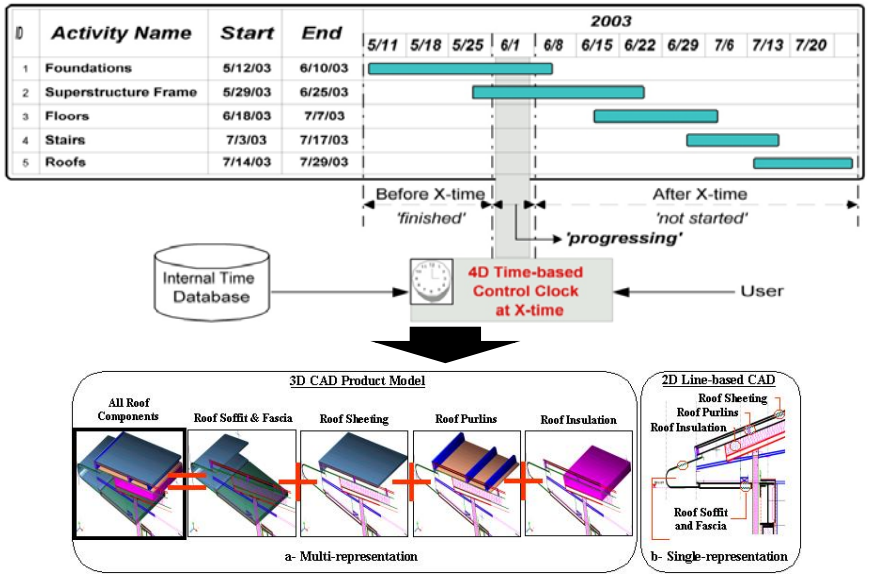


(Data range and coloring scheme for CSA values)

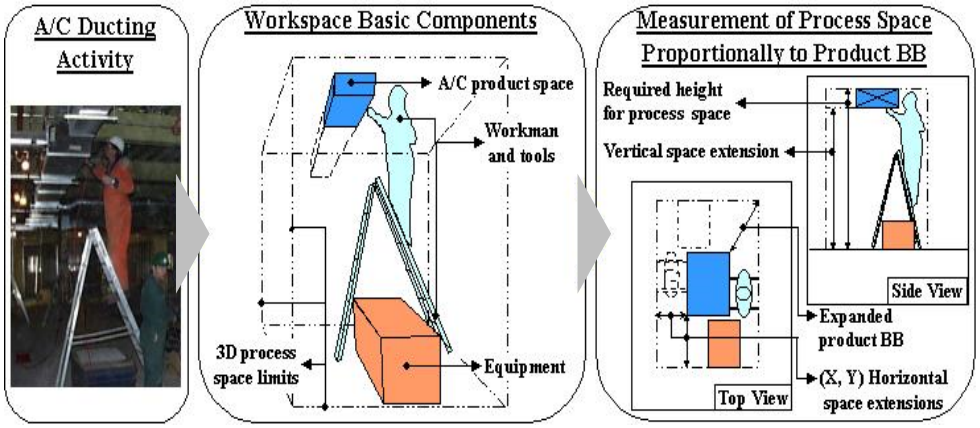
4D Visualization Focus and Concept



4D Time-Based Simulation Mechanism



Dynamic Simulation of Construction Activity Execution Workspace



Additional Projects: *http://iconviz.com/home/?q=node/8*

Design Studio (5) – Mixed Use High Rise Tower

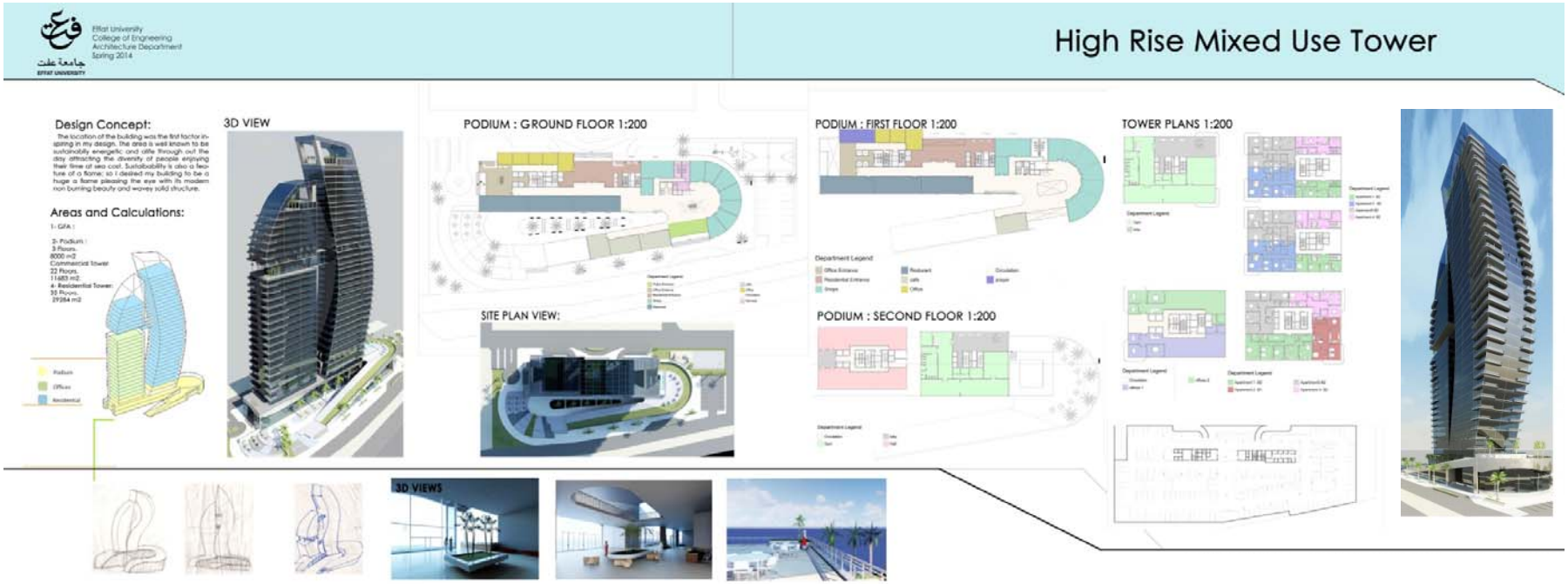
2016

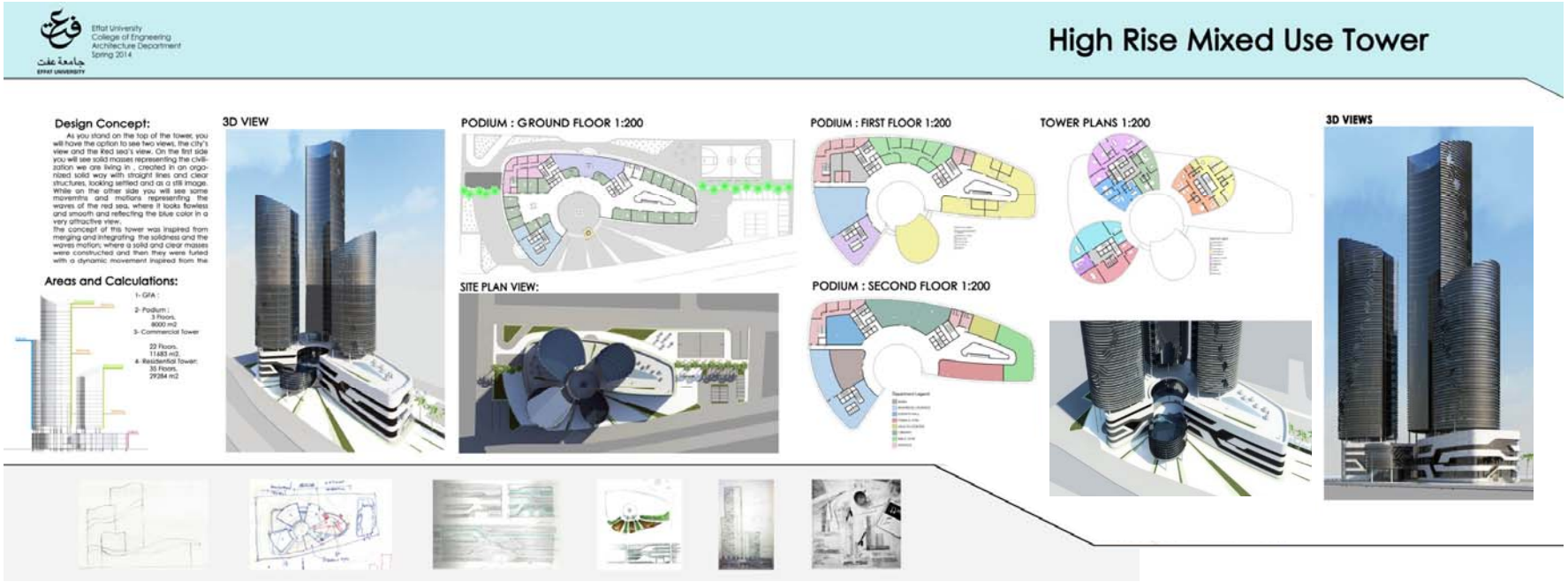
University Teaching

Design Studio (5) – Mixed Use High Rise Tower

2015

University Teaching





Capstone Graduation Projects

2014

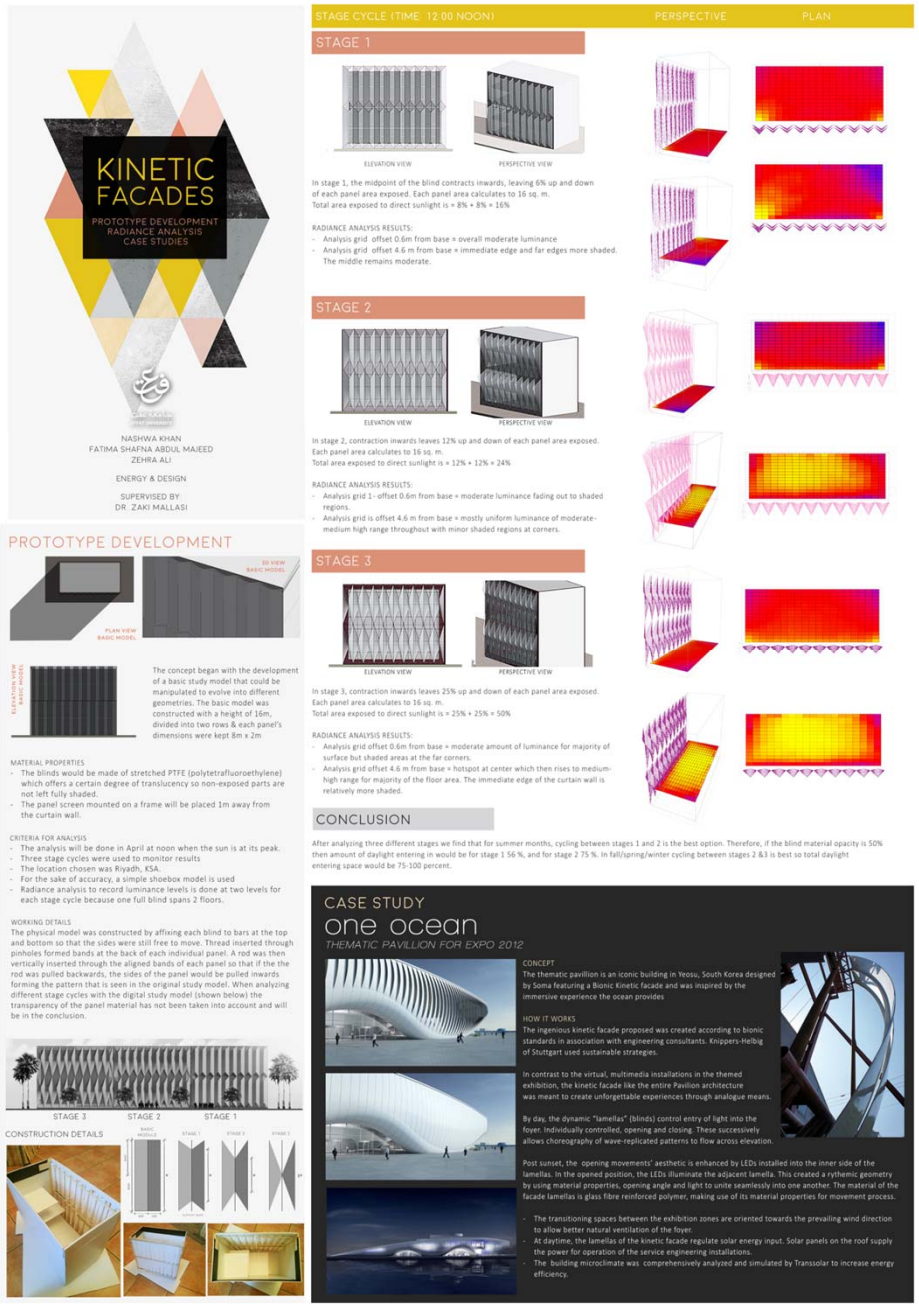
University Teaching

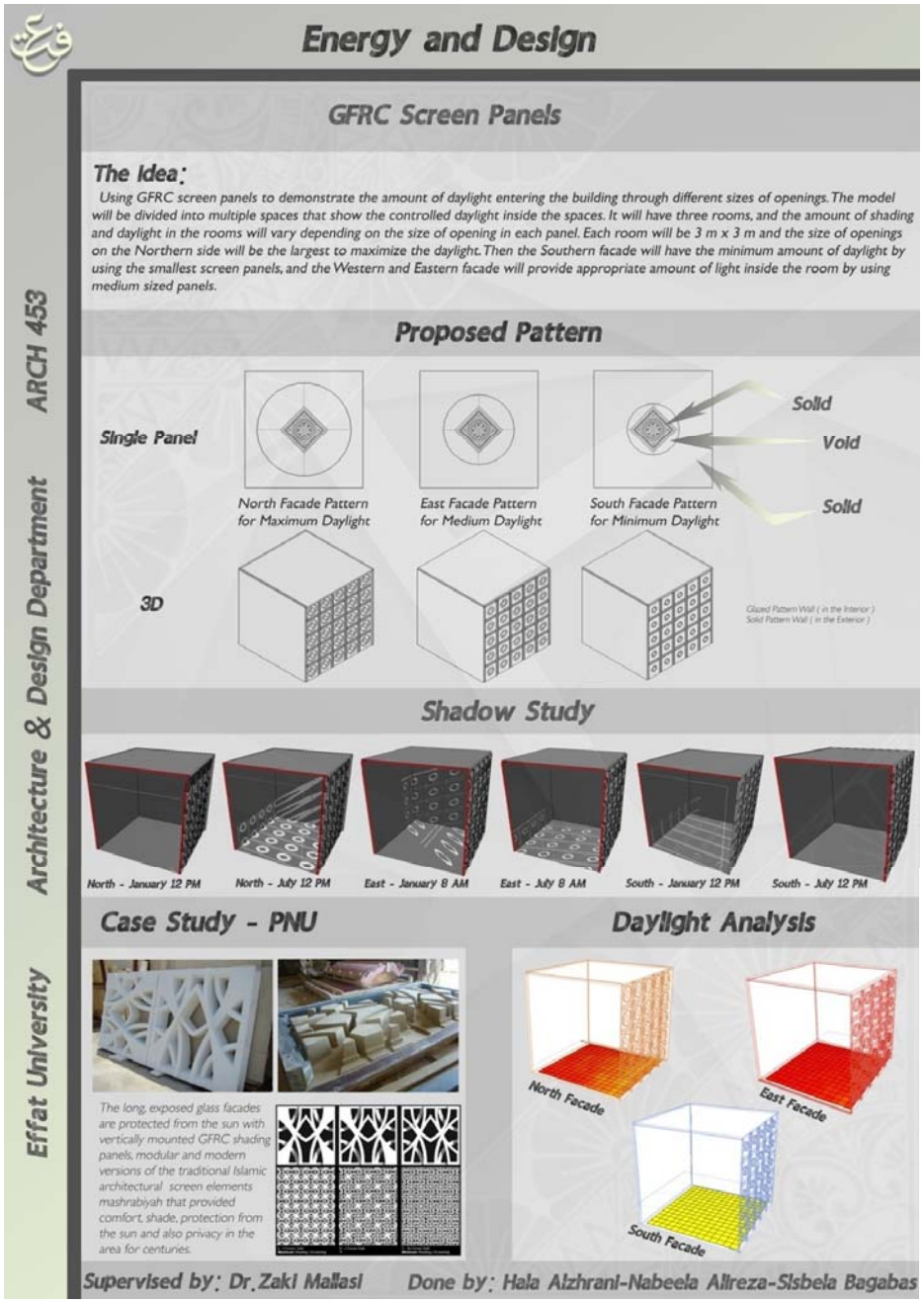
Energy and Sustainable Design Course

2013

University Teaching

Adaptive Performance Base Building Skin





Parametric Modelling and Digital Fabrication

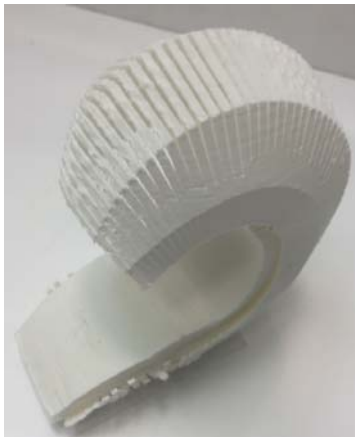
2012

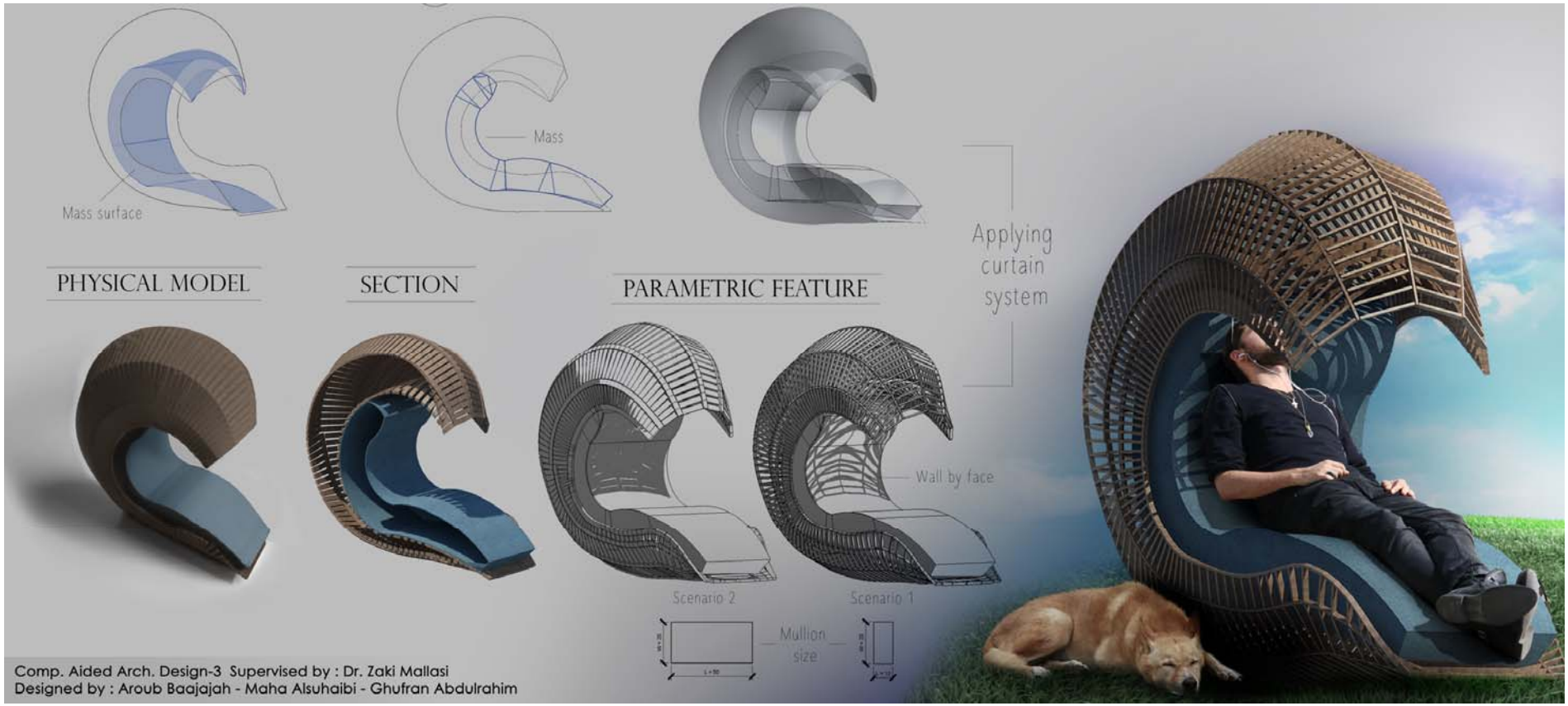
University Teaching

My teaching of BIM Parametric Modeling encouraged students to explore advanced techniques in computational design tools + process. Students will develop their design computation skills to reach advanced ability to produce parametric models in Revit BIM, including 3D parametric building envelope, associative geometries, complex form mass modeling, architectural presentation in Revit, and advanced rendering techniques. By the end of this course, the student will be able to:

- Adjust Revit families using parametric process.
- Learn about advanced features of 3D conceptual massing.
- Drive the parametric model based on performance criteria from schedules.
- Develop professional understanding about performance-based design computation.
- Understand the concept of Adaptive Component system in design and complex geometries.
- Integrate and understand concept of 3D printing.
- Combine the capabilities of parametric modeling with digital fabrication to produce prototype to the fabricator and into actual realization.

Garden Chair



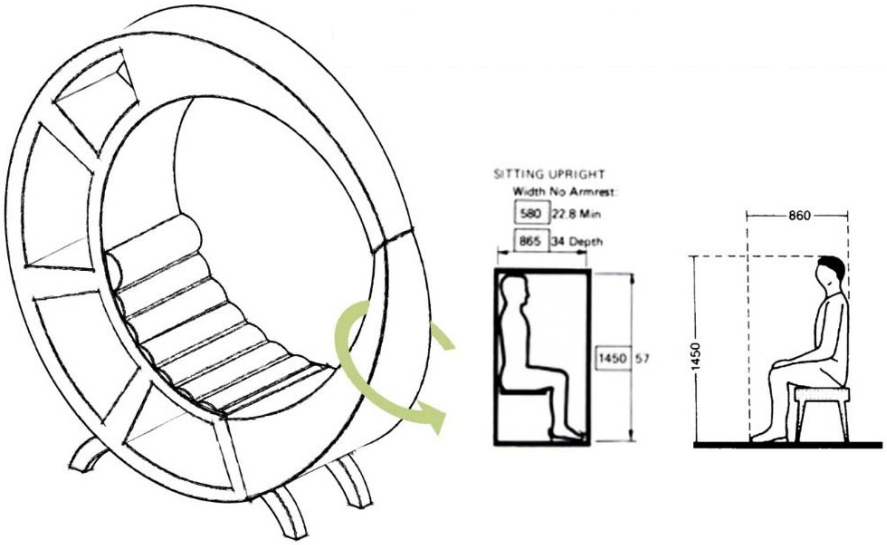


Parametric Modelling and Digital Fabrication

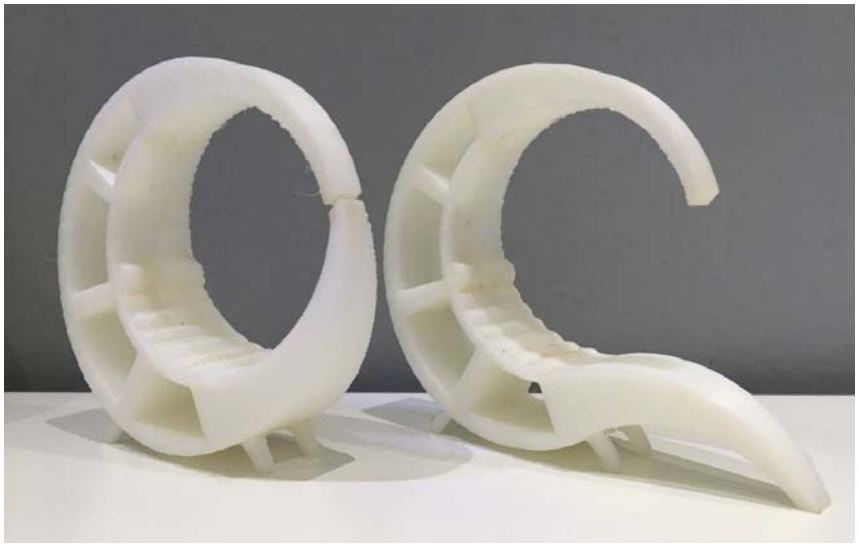
2012

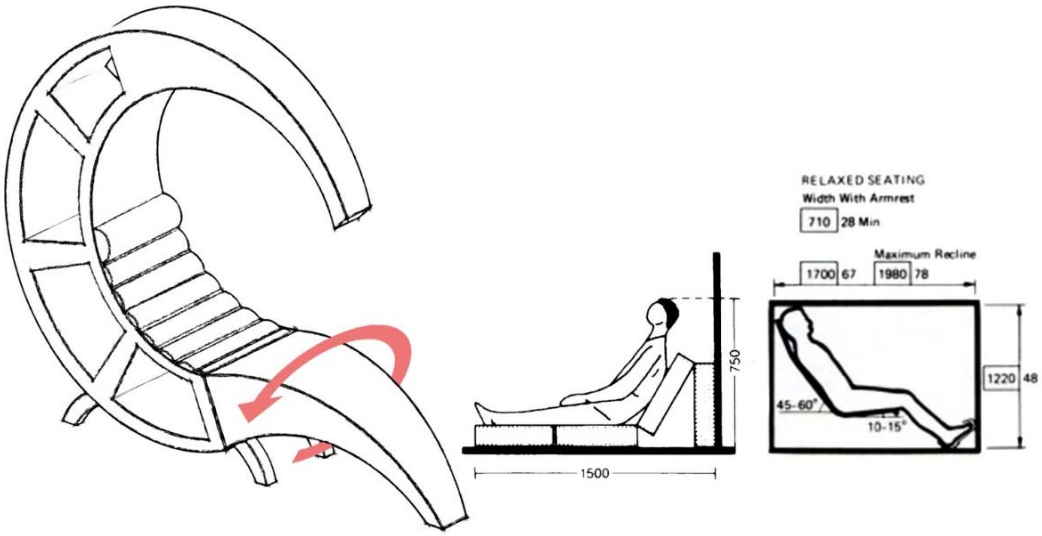
University Teaching

Reading Station



1- Sitting Up straight





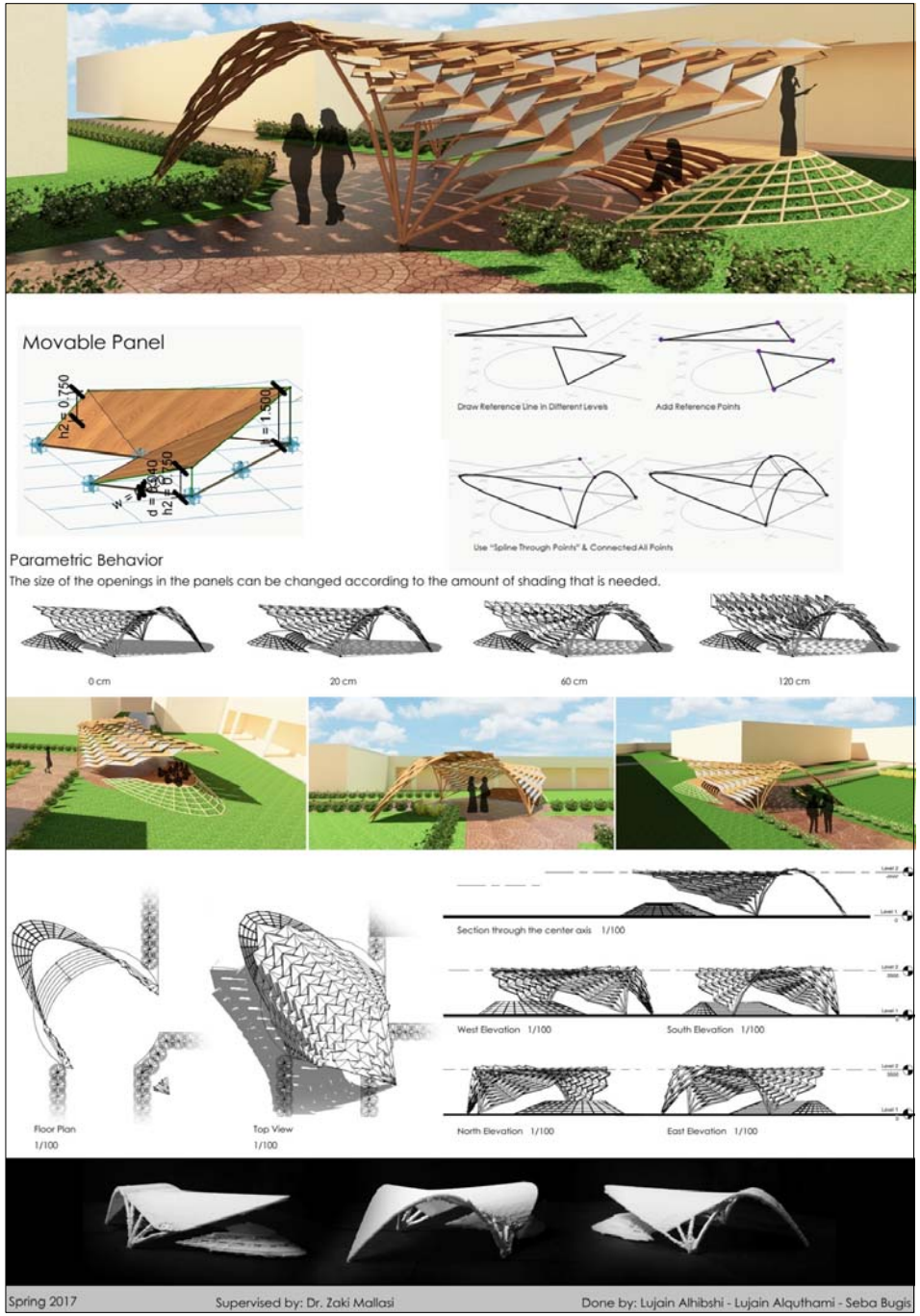
2- Laying Down

Parametric Modelling and Digital Fabrication

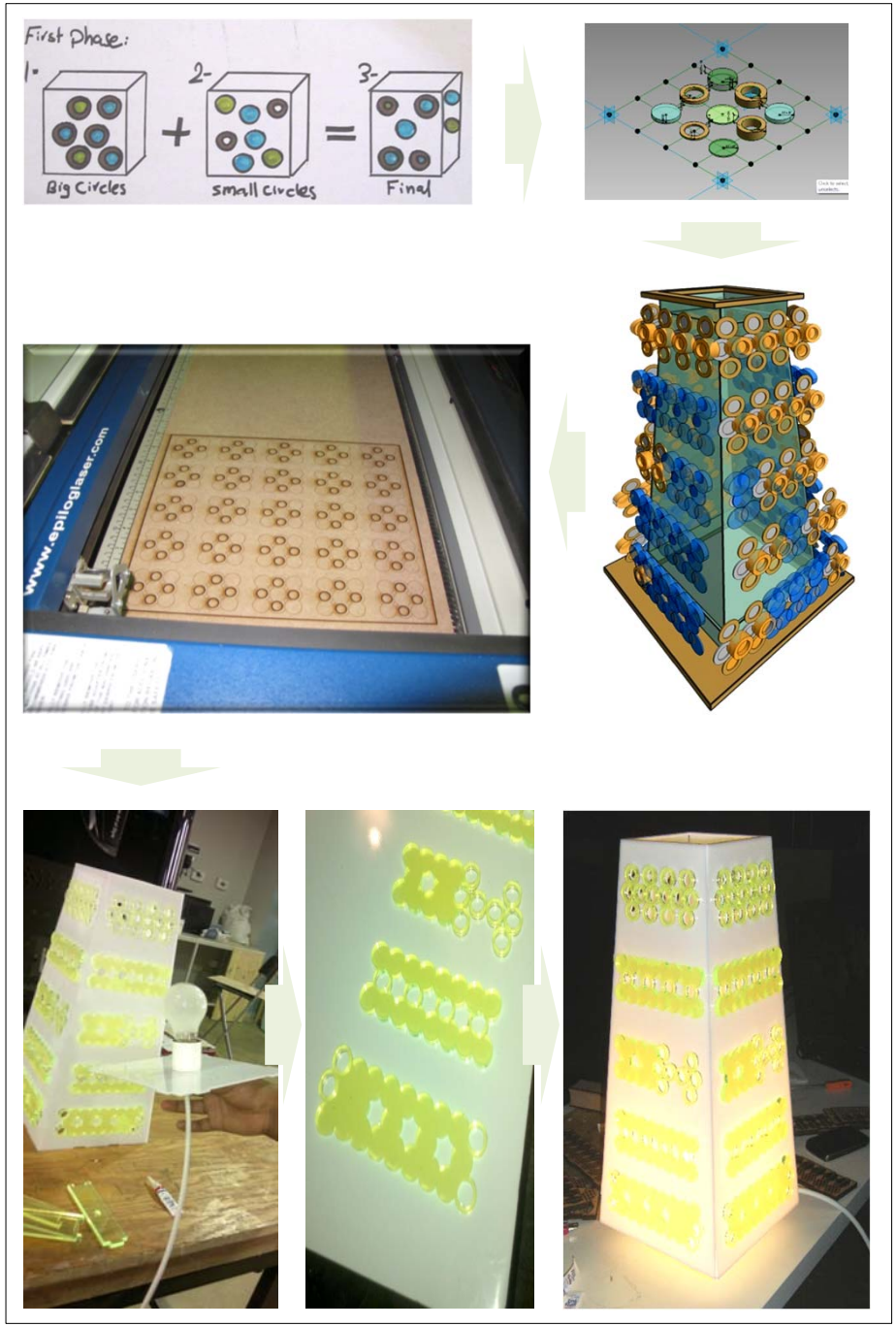
2012

University Teaching

Outdoor Shaded Area Project



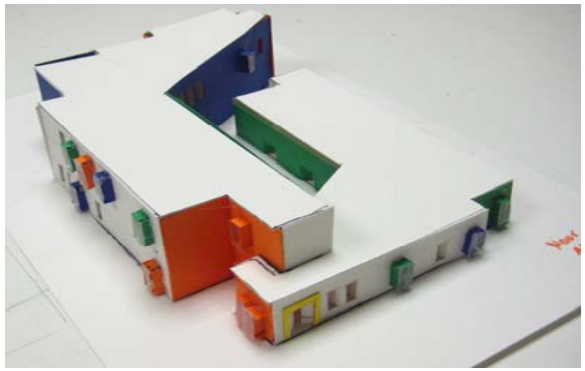
Digitally Fabricated Table Lamp



Selected Students Work from Model Making Workshop

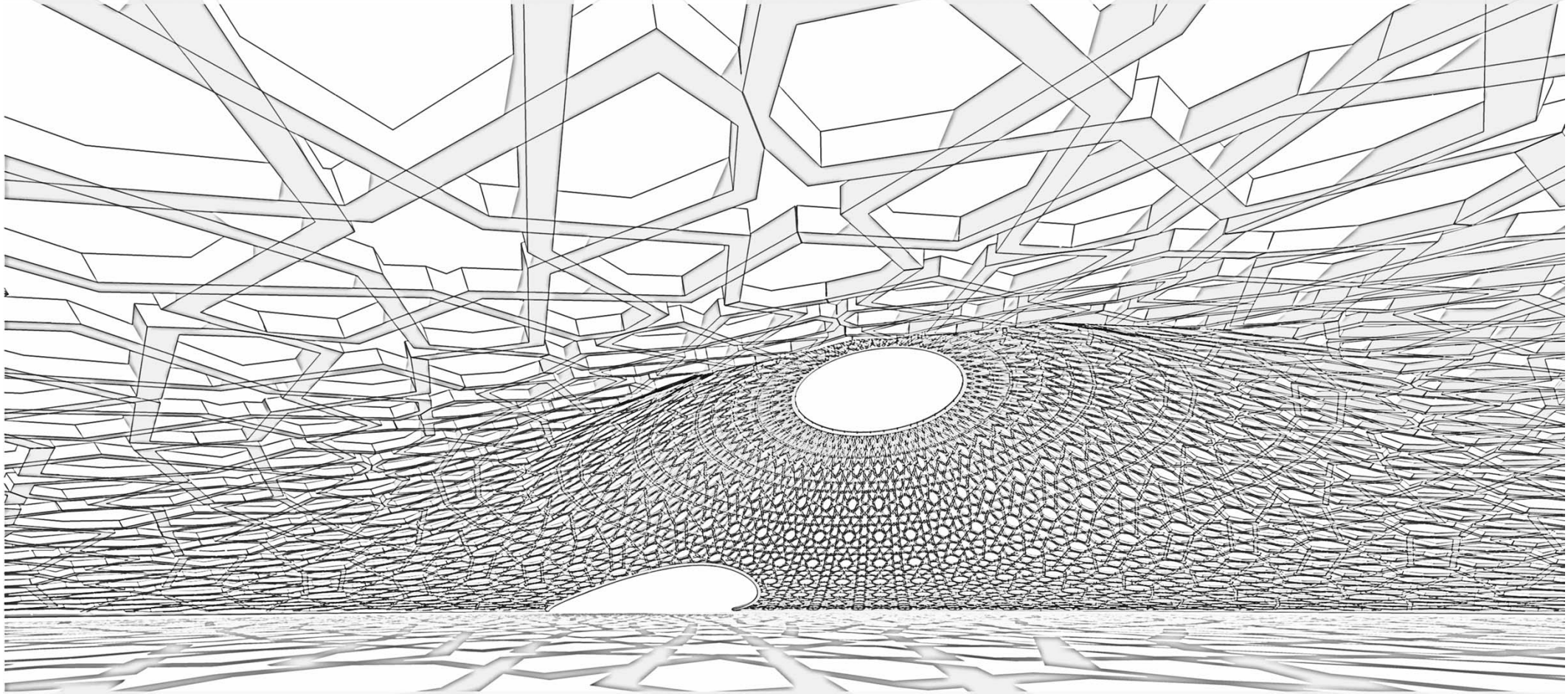
Highrise Mixed Use Tower

Kindergarten School



Office Building

Leadership | Innovation | Process | Design | Research | Technology



Zaki Mallasi

email: zaki@iconviz.com

THANK YOU

2022