FINAL PROJECT

[re]STITCH TAMPA WITH HILLSBOROUGH RIVER USE BUBBLE BREATH TECHNOLOGY

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APPROVAL FORM

FINAL PROJECT TITLE :

[re]STITCH TAMPA WITH HILLSBOROUGH RIVER USE BUBBLE BREATH TECHNOLOGY

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YOGYAKARTA, 26 APRIL 2012

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Final Project Title : [re]Stitch Tampa with Hillsborough river use Bubble Breath Technology

The quality of the final project report : **medium good very good** *) please Circled

So,

Recommended / not recommended *) please circled

To be a reference to the final project.

Yogyakarta, 26 April 2012

Advisor,

Ir. Arman Yulianta, MUP.



Gayuh dedicated this final project, for ...

my Mom, Mrs. **Munjiyat**,

My Dad, **Warsono**,

My Brother, **Hashfi Ken Pradipta**,

My Beloved **Mukti Anggoro**,

All Families,

All Friends,

The future always comes faster than your prediction , whether you are prepared or not it is always better to design the future now.
[Arman Yulianta]

Dreams will always just a dream, utill You start to make it come true.
[Gayuh Winisudaningtyas]

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Praise Allah SWT has bestowed His mercy and blessings so author can complete this final project report entitled **[re]Stitch Tampa with Hillsborough River use Bubble Breath Technology** in order to comply one of the conditions to achieve a Bachelor of Architectural Engineering Islamic University of Indonesia.

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At least, author hoped this final project report can be reference and useful for readers and knowledge.

Gayuh Winisudaningtyas

ABSTRACT

Tampa is a downtown in the Florida, America. There's Hillsborough river, which running through over the city which has no presence caused by urban renewal development. Expressway and More than 50% area in this city is parking area caused environmental problem, the rain water running out directly to the river over the street, make the rain water drainage empties and makes theres no natural habitat for oyster and clamps then no reason for people come here. Besides that, carbon dioxide issue became another problem.

The direction of this design is to looking for solution in the City of Tampa about environmental problem especially in the parking area which has a large amount. Using biomimicry approach author make bubble breath technology which inspired by synthetic tree and adaptive architecture. Bubble breath technology is an ecological infrastructure which apply in building envelope to decrease carbondioxide pollution and control storm water in this downtown, in order to [re]stitching Tampa's people and Hillsborough river.

Keyword : bubble breath, biomimicry, adaptive architecture, Tampa Florida

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GLOSARIUM

Amino silicon	: new low-cost CO_2 capture material.
Biomimicry	: studies nature best idea and than imitates this designs and process to solve human problem.
Bubble Breath	: bubble which can expand when temperature is higher and shrink when temperature is Low.
Capillary	: is the ability of a liquid to flow in narrow spaces without the assistance of, and in opposition to external forces like gravity.
Capillary tube	: a tube with very small diameter
Tampa	: Downtown in South Florida
stitch	: a loop made in thread to interlace some part; make a connection.
Synthetic tree	: artificial tree; human made tree, which can do some tree function, such as capturing CO_2, generate energy, etc.
Re-stitch	: stitching again some part whichever together then fall apart.
[Re]stitch Tampa	: turn back the connection between Tampa City with its river, Hillsborough river.

CHAPTER I
[RE]STITCH TAMPA

1.1. BACKGROUND

1.1.1. TAMPA, Florida

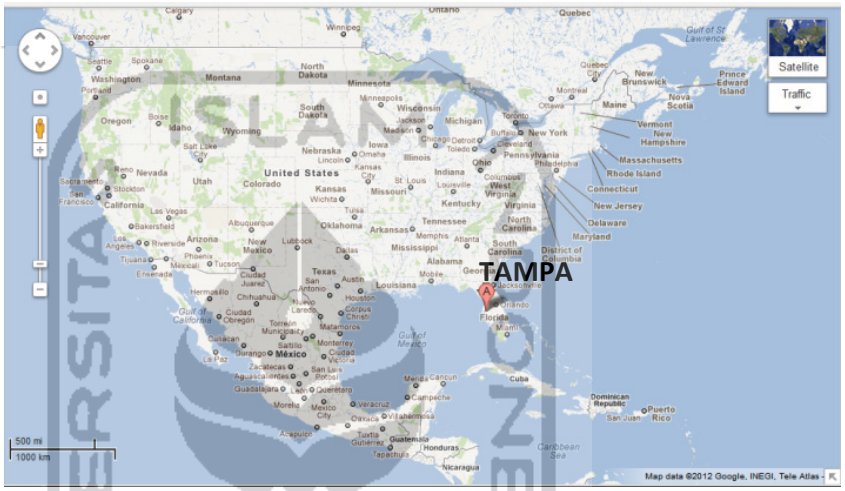


Figure 1. Location of Tampa in America
source : www.en.wikipedia.org/tampa,_florida

Tampa is a city in United States of America. Include in Florida state, and Hillsborough County. There's Hillsborough river, which running through over the city. It has a large watershed and empties out into the Tampa Bay on the west side of the downtown core, and which forms a "U" around the southern tip of the city alongside the shipping channel. Nowadays this river has no great presence anymore, because of urban renewal strategies carried out in the 60'ies and 70'ies.

Tampa is unique downtow, different with many urban condition on northern America cities wich influenced by Europe tradition. There area some neighbourhood in the downtown of Tampa. Tampa Heights, Encore Housing project, channelside District, Ybor City and Hyde Park.

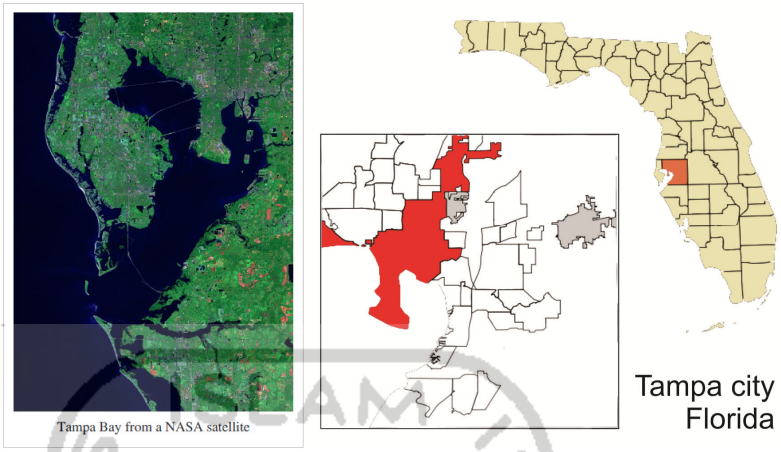


Figure 2. Location The City of Tampa, Florida
source : www.en.wikipedia.org/tampa,_florida

Beside that, this infrastructural development caused some ecological disfunction. For the case, at past time, people come to Hillsborough river to eat some oysters and some clamps, but now, the city storm drains are empties directly into the river and destroy natural habitat for oyster and clamp. Its one of reasons, Tampa's people and Hillsborough river are disaparately.



Figure 3. The City of Tampa, Florida
source : www.en.wikipedia.org/tampa,_florida

Tampa is car-oriented city, suffering from the impacts of suburban sprawl. Heavy-handed highway infrastructural development. The downtown has a distincly rural-urban condition, which is so high density along the day, then empty at 5.00 PM and at week end. This city has more than 50% surface parking lots to acomodates the car. From this data, shows that so many vehicle in this town.



Figure 4. Figure ground of Tampa
source : [re]stitch Tampa Competition brief

1.1.2. CARBON DIOXIDE (CO_2)

So many parking area in Tampa City caused so many problem, one of them is there are so much vehicle exhaust. Cars have emission waste because of oil fuel from fossil. This emission consist of carbonmonoxide 0,5-1 %, Carbon dioxide 12-15 %, oxygen 0,5-1 %, and some nitrogen oxide. Carbon dioxide hase large amount presentation. Actually, this gas has bad effect for human.

According to wikipedia.org, **Carbon dioxide** (chemical formula **CO_2**) is a naturally occurring chemical compound composed of two oxygen atoms covalently bonded to a single carbon atom. In the normal tempratur, carbondioxide is gas, in low temperature, carbondioxide as a solid, wich called dry ice.

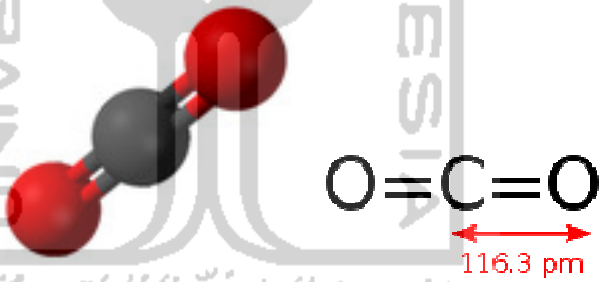


Figure 5. carbon dioxide structure,
source : www.en.wikipedia.org/wiki/file:carbon-dioxide-structure.png

In this world, besides carbondioxide as the waste of organism respiration, carbon dioxide are in the earth atmosphere, Carbon dioxide also is a by-product of combustion; is emitted from volcanoes, hot springs, and geysers; and is freed from carbonate rocks by dissolution. And nowadays, as long as industrial revolution, carbondioxide presentation in this world are increasing, as the waste

of production in fabrication. Moreover, almost of vehicle in this world are use oil fuel so, which is, make more amount carbondioxide in this world increase.

The advantages from carbondioxide are for photosynthetic with water, clorofil and solar energy, then a tree can make carbohydrate. But in more concentration, it can be toxic for human. This diagram bellow shows carbon dioxide toxicity to human body by percentage volume of the carbondioxide in the air.

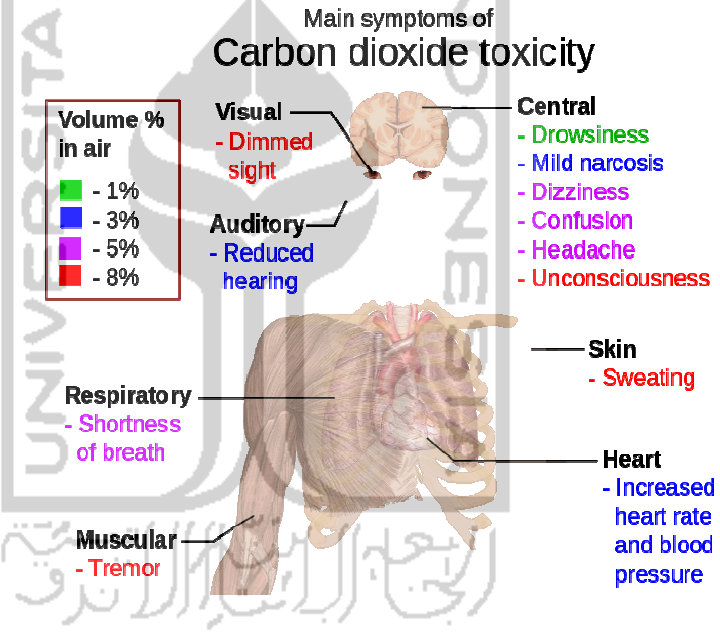


Figure 6. Figure 7carbon dioxide toxicity
source : www.en.wikipedia.org/ carbon_dioxide

1.1.3. GLOBAL WARMING

Another side effect of a large number of Carbondioxide is global warming and nowadays global warming become a great issues to be explored. Global warming describes the currernt rise in the temperature of the Global atmosphere and the seas. And contnously

rise in the earth's temperature sill lead to rising of the sea levels wich cause a shift in the natural balance on earth. global warming cause ice pole melting, and the sea level is rises. When the sea level rise, low iland will covers by water, and it will be abig problem for natural life, plant, animal, and of course human being.

The mind maps about global warming above, explain that most of global warming are caused by Carbon dioxide (CO_2) such as : the waste of transportation, greenhouse effect which is also caused by carbondioxide (CO_2), besides caused by industrial waste gas. The carbon dioxide is one of greenhouse gases which make greenhpuse effect.

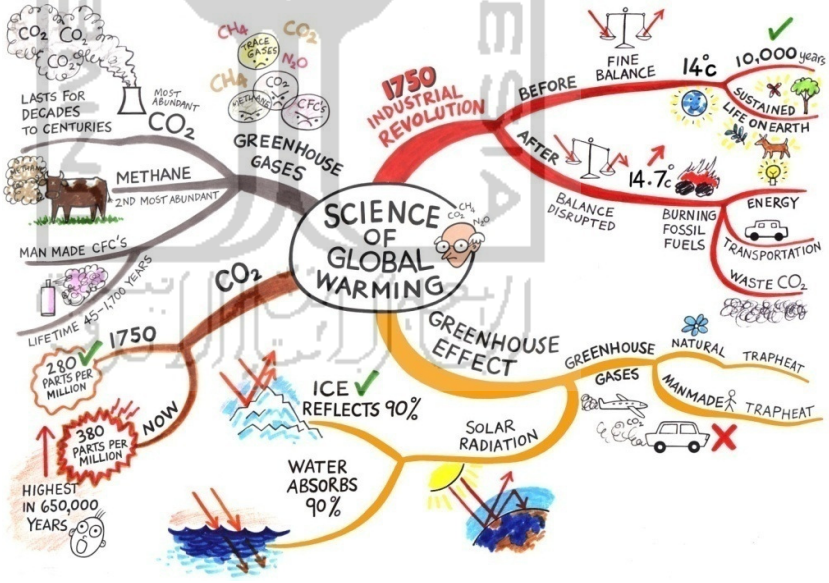


Figure 8. Mindmaping Of Global Warming
source : www.live-the-solution.com/wp-content/uploads/science-mindmap.jpg

Green house effect is the gradual heating of the atmosphere caused by air pollution which traps energy from the sun. This condition make the earth warmer its means that its seems dangerous for organism in this earth included human being. Even humans are causing global warming it self.

Public Opinion on Climate Change	
Worldwide	• 35% blame human activities for global warming • 14% blame natural causes • 13% think it is both • 36% are not aware of global warming
Developed Asia	• 76% blame human activities for global warming • 12% blame natural causes • 7% blame both
United States	• 58% believe there is solid evidence of global warming, down from 72% in 2008 • 29% think climate change is an urgent problem and should be addressed now in spite of costs, down from 43% in 2008 • 42% think climate change should be addressed, but gradually with low-cost measures • 26% think no steps involving costs should be taken until climate change is certain, up from 17% in 2008 • 67% think U.S. should participate in a new climate-change treaty to limit greenhouse gases
Earth Scientists	• 90% overall agree global temperatures have risen • 82% overall think human activity is a significant factor in rising temperatures • 97.4% of climate specialists think human activity is a significant factor • 90% of 3,146 Earth scientists polled are from U.S.
Sources: Brookings Institution, Chicago Council on Global Affairs, Gallup Poll, Peter T. Doran	

Table 1. Public Opinion on Climate Change
Source:
news.thomasnet.com/green_clean/2011/07/05/Does-the-public-really-believe-humans-are-causing-climate-change-?/publicopinionchart/

Carbondioxide is the most contributor of global warming. The facts is tree as natural filter are lower. Forest are cut down, change with agriculture field or housing and another building while this world seems warmer because of transportation, industry and energy consumtion of the building. From diagram above, architecture has big part in order to causing global warming. So does the large amount of cars like in Tampa city.

1.1.4. TAMPA'S PARKING AREA



Figure 9. Tampa Bay Saint Petersburg Tropicana parking
Source: www.tampa gov.net/dept_parking/Program_and_service/Garages_and _Lots/Saint_Petersburg_Tropicana.asp

Another problem which is caused by a large parking area is make water absorption are decrease. The storm water are running out to the river directly over the parking area, besides it goes through the road and building and make the storm water drainage are empty. The result is, native habitat of oysters and clamps are damage. Finnaly Tampa's people have no reason to come to Hillsborough shoreline anymore.

As the natural aminities, hilssborough river is suffer because of renewal development. To returning its presence, there must be connection between Tampas people and Hillsborough river. At past time, theres good relationship between Tampas people and Hillsborough river, till the highway project make this connection apart. A new development have to [re]stitching this relationship between the city of Tampa's people with Hillsborough river. Another relationship that should be stitched is the connection between the infrastructure with the nature.

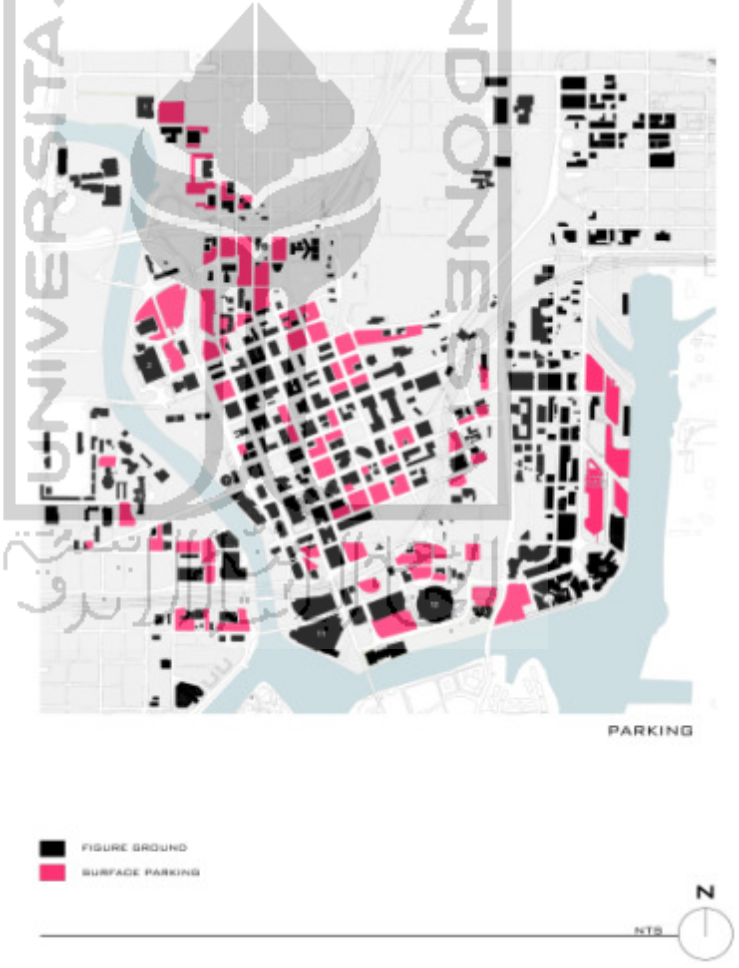


Figure 10. surface of parking area
Source: restitch Tampa Competition brief

1.2. PROBLEM STATEMENT

From the background above, there's problem how to [re]stitch the city of tampa with Hillsborough river as natural aminities, which has no presence today. Large amount of parking area can be the most potential reason for some peoblems in this city. Besides the direct impact to human from carbon dioxide, causing global warming, and native habitat destruction, which cause Tampas people and Hillsborough river apart.

1.3. PURPOSE

The direction of this design is to looking for solution of some problem in the City of Tampa about environmental especially in the parking area which has a large amount. Designing ecological infrastructure to find solution for carbondioxide pollution and storm water control in this downtown, in order to get problem solving for [re]stitching Tampa's people and Hillsborough river.

Specifically, this new ecological infrastructure design can decrease amount of carbon dioxide. Not only that, but also this design expected to absorb and save storm water to control it. So it can be usefull for native habitat restoration.

1.4. METHOD

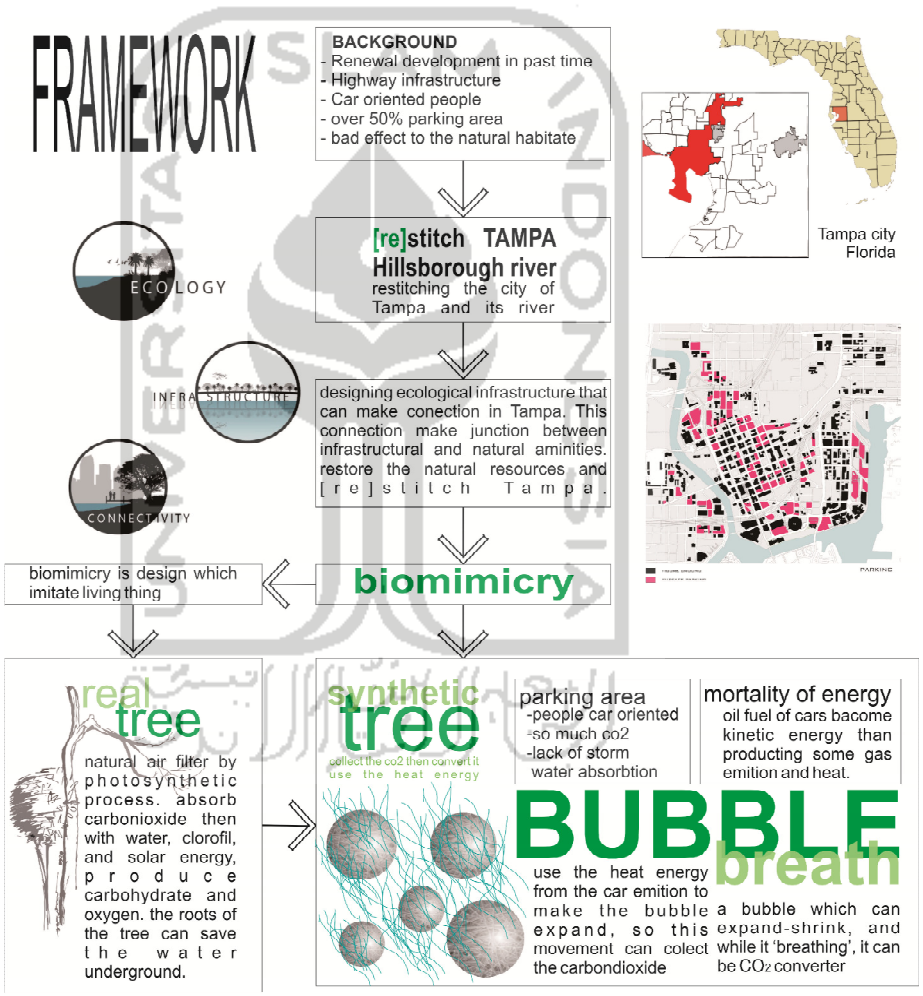
1.4.1. LITERATUR REVIEW

Books, on-line open literatur and internet, Elektronic book, and Other database. Which examine about The city of Tampa, biomimicry, tree, CO_2 , capture and filter and some material that used in it such as aminosylicon and some fiber. And also about H_2O absorption by capillarity pipe, and synthetic tree.

1.4.2. DESIGNING METHOD

Use Biomimicry method, which is imitate any living thing. Not only mimic the shape but also imitate the system. This method use biological and natural system to inspire a good design.

1.5. FRAMEWORK



CHAPTER II
THEORETICAL RREVIEW

2.1. BIOMIMICRY

Biomimicry originates from greek word bios, meaning life, and mimesis meaning imitate. Biomimicry is studies nature best idea and than imitates this designs and process to solve human problem. Nature with all amazing facts can be inspiration source for new sustainable solution. Zari classified biomimicry into 3(three) categories, organism level, behavior level and ecosystem level.

Level of Biomimicry		*Example - A building that mimics termites:*
Organism level (Mimicry of a specific organism)	*form*	The building looks like a termite.
	material	The building is made from the same material as a termite; a material that mimics termite exoskeleton / skin for example.
	construction	The building is made in the same way as a termite; it goes through various growth cycles for example.
	process	The building works in the same way as an individual termite; it produces hydrogen efficiently through meta-genomics for example.
	function	The building functions like a termite in a larger context; it recycles cellulose waste and creates soil for example.
Behaviour level (Mimicry of how an organism behaves or relates to its larger context)	*form*	The building looks like it was made by a termite; a replica of a termite mound for example.
	material	The building is made from the same materials that a termite builds with; using digested fine soil as the primary material for example.
	construction	The building is made in the same way that a termite would build in; piling earth in certain places at certain times for example.
	process	The building works in the same way as a termite mound would; by careful orientation, shape, materials selection and natural ventilation for example, or it mimics how termites work together.
	function	The building functions in the same way that it would if made by termites; internal conditions are regulated to be optimal and thermally stable for example (fig. 6). It may also function in the same way that a termite mound does in a larger context.
Ecosystem level (Mimicry of an ecosystem)	*form*	The building looks like an ecosystem (a termite would live in).
	material	The building is made from the same kind of materials that (a termite) ecosystem is made of; it uses naturally occurring common compounds, and water as the primary chemical medium for example.
	construction	The building is assembled in the same way as a (termite) ecosystem; principles of succession and increasing complexity over time are used for example.
	process	The building works in the same way as a (termite) ecosystem; it captures and converts energy from the sun, and stores water for example.
	function	The building is able to function in the same way that a (termite) ecosystem would and forms part of a complex system by utilising the relationships between processes; it is able to participate in the hydrological, carbon, nitrogen cycles etc in a similar way to an ecosystem for example.

Table 2. framework for the biomimicry aplication
Source: Maibritt Pedersen Zari Biomimetic (2007)

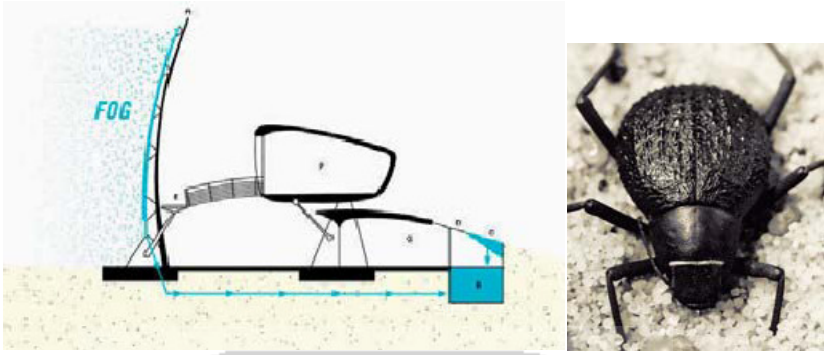


Figure 11. biomimicry at organism level: Mattew Parkes' Hydrological Center for the University of Namibia and the stenocara beetle.

Source:Maibritt Pedersen Zari Biomimetic approaches to architectural design for increase sustainability

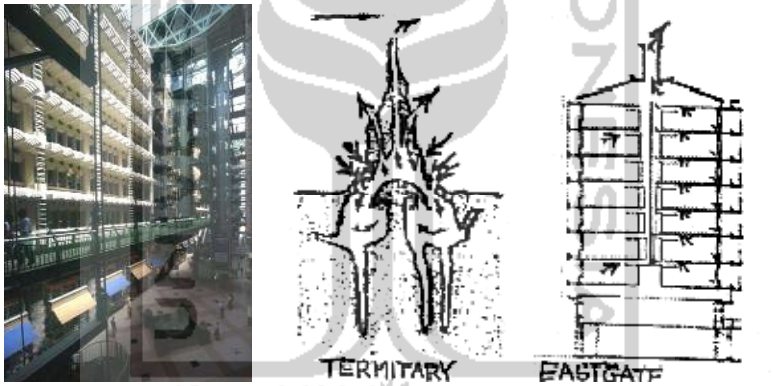


Figure 12. biomimicry at Behavior level: Eastgate building in Harare, Zimbabwe with termite mound
source: Maibritt Pedersen Zari Biomimetic approaches to architectural design for increase sustainability

Nature has a big part in this livelihood, they have through million years, and go through many chalange. And nature have survive from it. Acordingly to In this universe concist of 3 (three) kinds of organism, animal and plant. And plant is organism which has the longest life. Animal can reach 30-40 Years and as we know, there is plant which can live about hundreds years. Its show us that plant are have ability to adapt with the environment.

This is biomimicry design method, by www.brightworks.net . firstly, discover natural models. Than make the abstract, which consist of design principles. Next step is interprete design brief that have been made. After identify the design of the nature, emulate nature's strategies and evaluate against with life's principles.

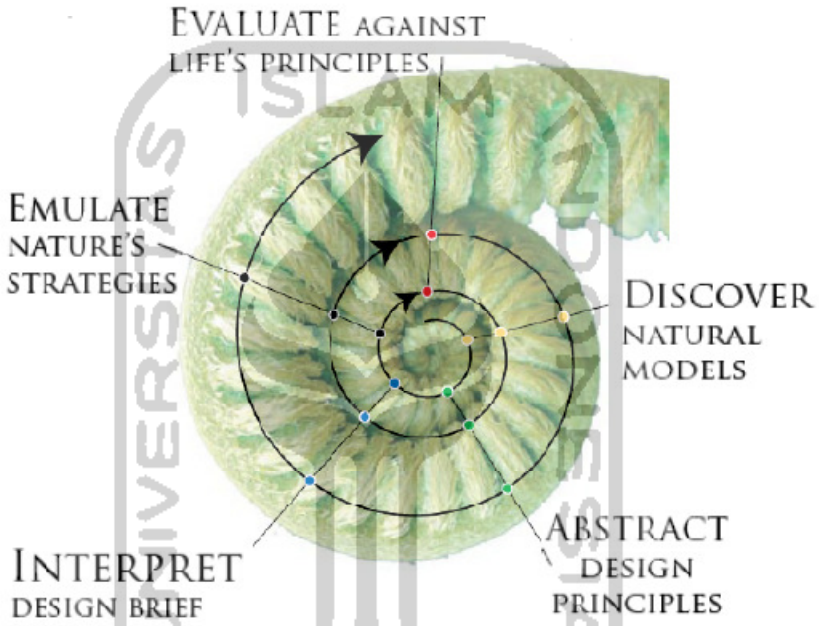


Figure 13. biomimicry method for design
source: www.brightworks.net : biomimicry as design tools, introduction session

2.2. THE REAL TREE

Tree is a perennial woody Plant, means it can live more than two years. the special things of the tree compared with another organism in this world is it can make its own food. Besides that, the tree can also produce Oxygen which is all organism needs. Another main role in this world is, it can be carbon dioxide filter.

This process is called photosynthesis. They have chlorophyll, so they can do photosynthesis. Although there somany ways in photosynthesis but there The photosynthesis process needs carbon dioxide and water, then with sun light energy, the tree can get sugar (carbohydrate) and Oxygen. The chlorophyll as the device to absorb the sun light as the energy in photosynthesis process. The Oxygen is release to the environment and then the carbon became wood in its trunk.

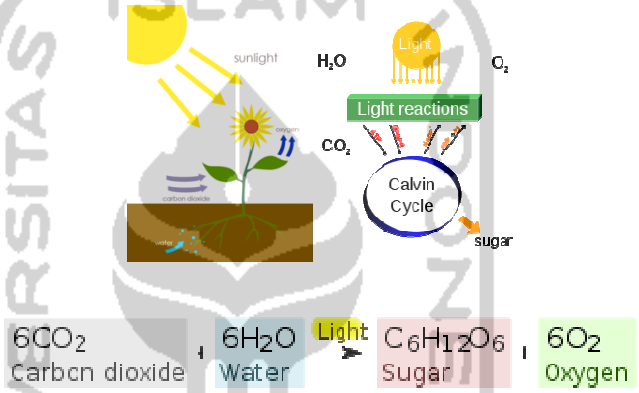


Figure 14. photosynthesis process
Source:www.en.wikipedia.org/wiki/File:Photothesis_equation.svg

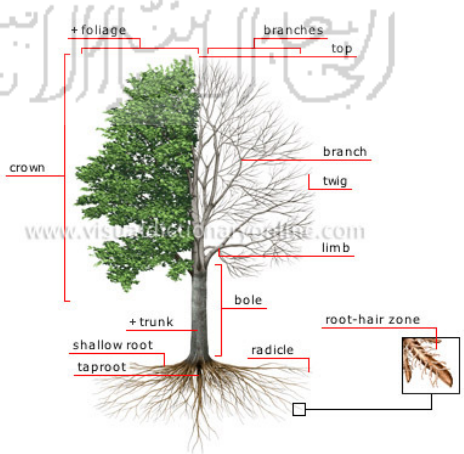


Figure 15. the structure of real tree
Source: www.en.wikipedia.org/tree

Photosynthesis process is held in the leaves, where chlorophyll is in. And the water is absorb by the root which has root hair. Absorption process is use osmotic process, the water trough the root hair membrane come from high concentration to the low. capillarity of the xylem transporting the water from the roots to the leaves through the trunk and the branches. This process also make the water content keep in the soil and prevent erosion and lack of water.

2.3. DISCOVER NATURAL MODEL

The kind of tree that choosen is vine, any plant with a grow habit of trailing or scandent, that is to say climbing, stems or runners or its refer to the stems itselve when used in wicker work. The vines are have a long stem that can wick each other or to another structure like rock or even another tree. They have a strong roots and stems. Besides that, because it has slim body, it can be shaped flexible.

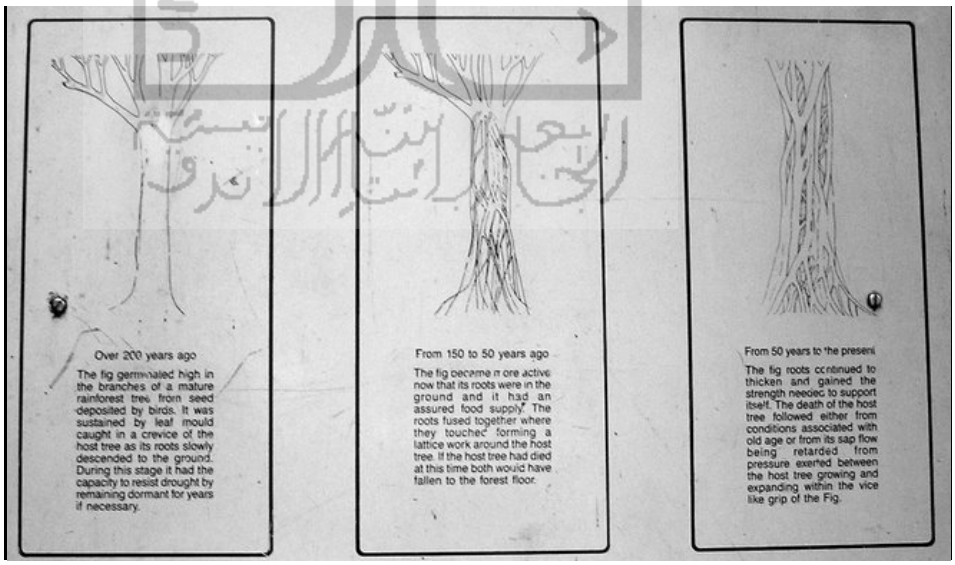


Figure 16. The Strangler fig
Source: www.en.wikipedia.org/strangler-fig.jpg



Figure 17. strangler fig
Source: www.en.wikipedia.org/strangler_fig

And specifically this project mimic strangler fig, especially *Ficus aurea,* also known as the Florida *Strangler* Fig. This is tropical and subtropical plant species, so suitable for Tampa city, which take a place in area between tropical and subtropical. Strangler fig is ephifytes, plant that grows on another plant but is not parasitic. The roots grow downward to get water while also grow upward to reach the sunlight. Sometimes the host tree are die because all of the tree are strangler, then, the strangler fig with its stitched roots becomes columnar tree with hollow central core.

Figs germinate in mature trees and take 200 years to establish themselves. Its still alive the host tree would be well past its prime by the time so the fig actually replace the host tree and could live for another 400 years. Its has a long life, so its suitable to be adapted in biomimicry design.



Figure 18. strangler fig
Source: www.en.wikipedia.org/strangler_fig

2.4. CO_2 CAPTURE

Carbon dioxide has no liquid state at pressures below 5.1 standard atmospheres (520 kPa). At 1 atmosphere (near mean sea level pressure), the gas deposits directly to a solid at temperatures below −78.5 °C (−109.3 °F; 194.7 K) and the solid sublimes directly to a gas above −78.5 °C. In its solid state, carbon dioxide is commonly called dry ice. When early found it call as invisible substance or 'wild spirit' (spiritus sylvestre). Therefore, its hard to capture the CO_2 even its so dangerous for people high concentration. And nowadays, tree as natural air filter are lower and even the pollution are more and more.

So many research which try to make CO_2 capturer. For example is Klaus Lackner synthetic tree was studied at laboratory of Global research Technologies, Colorado. And also the about material that use in this device. Like research about Novel high Capacity Oligomers for Low Cost CO_2 Capture, that have been held at GE Global Research, NewYork. This research studied about aminosillicon, new low cost CO_2 capture material.

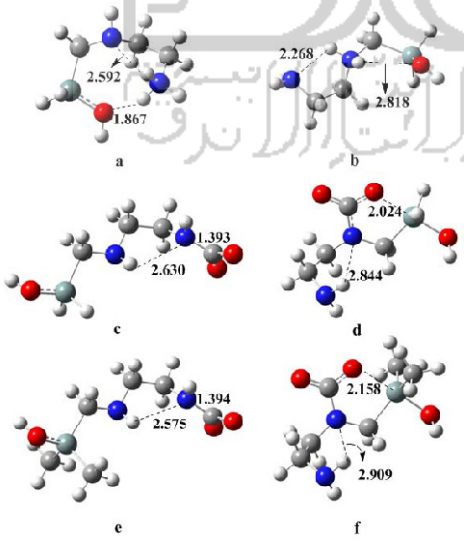


Figure 19. some reaction between CO_2 and some amine. The red balls are for oxygen, blue ones for nitrogen, gray ones for carbon, green ones for silicon and smallest write ones for hydrogen
Source: Novel high capacity Oligomers for low cost CO_2 capture final technical report. Appendix 6: A computational study on the heat of reaction for amino silicones with CO2

2.5. WATER (H_2O) ABSORBTION

Plant need water as the component in photosynthesis and also bring nutrient. Water absorbtion held in the roots especially in roots-hair zone. This process use osmotic process, means, liquid transfer trough osmotic membrane where the liquid come in from the high concentration to the low concentration, or from high pressure to the low.

Than the water can move from the roots to the leaves caused by some ways. First, because of the capillarity of the xylem. Xylem is one of two types of transport tissues, and xylem best-known as the wood. Xylem not just transport the water from the roots to the leaves, but also the nutrient. Another factor is come from the leaves, which there was evaporation so make water concentration low and than water comes from the roots. The capillarity means, the ability of a liquid to flow in narrow spaces without the assistance of and in opposition to external forces like gravity.

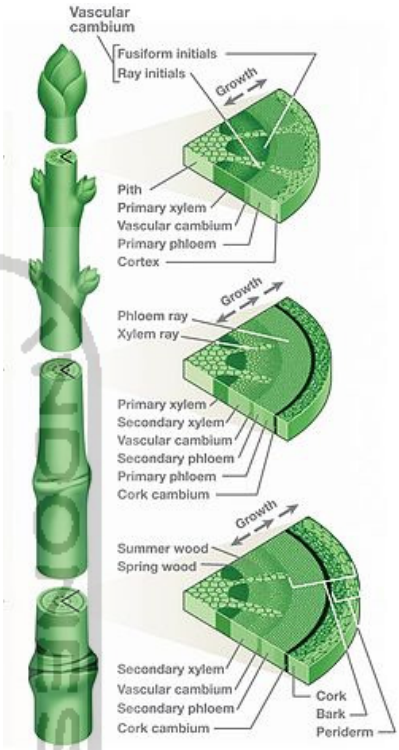


Figure 20. the structure of tree
Source: www.en.wikipedia.org/wiki/file:stem-cross-section2.jpg

2.6. STUDY PRESEDEN

2.6.1. SYNTHETIC TREE



Figure 21. synthetic tree
Source: http://inhabitat.com/OejSL/100000-synthetic-trees-could-help-combat-climate-change/

This synthetic tree is designed by Klaus Lackner, professor of Columbia University in New York. The idea come when he sugest his child to make dust collector for homework. Then he make further research about CO_2 collector. He make device, mimic of real tree do, extract carbon dioxide (CO_2) from the air. It's look like a giant fly squat which can soak the carbon dioxide (CO_2).

Dimension of this artificial tree is about 30m X 5 m, one of this tree can soak about ahectare, it is about 90 thousands ton CO_2 (emission from 15 thousands cars) in a year. This artificial tree 1000 times better than a real tree of comparable size. And this giant rack of coated resin membranes can soak carbondioxide 30 minutes, while the real tree need 100 thousands years absorption.

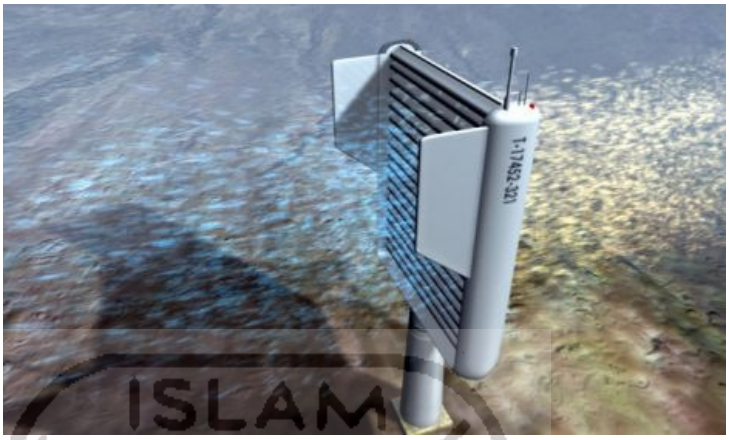


Figure 22. the synthetic tree
Source: http://inhabitat.com/OejSL/100000-synthetic-trees-could-help-combat-climate-change/

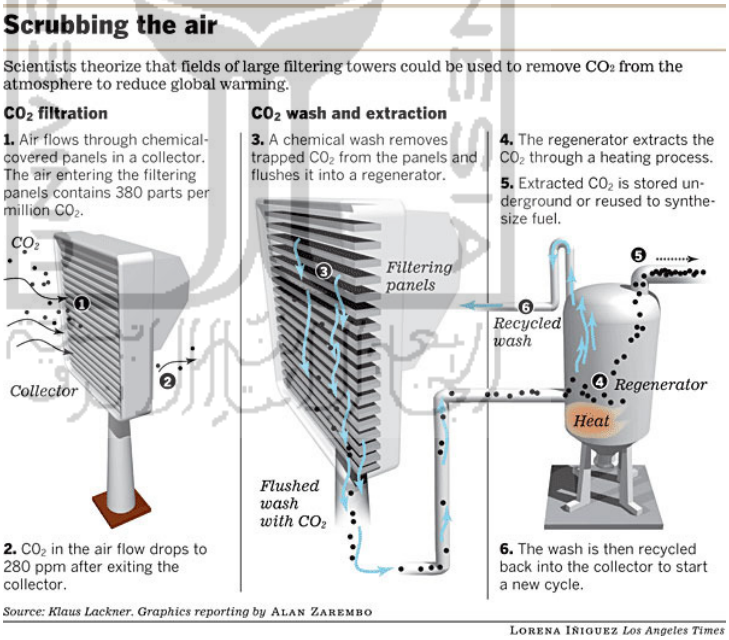


Figure 23. scrubbing the air process
Source: http://inhabitat.com/OejSL/100000-synthetic-trees-could-help-combat-climate-change/

But in the other side, this stuff need energy to extracted the CO_2 to be prossesed and store underground or reused to synthetize fuel. So, in some design, this artificial tree are use wind generator, use natural resources.

2.6.2. TREEPODs



Figure 24. Treepods
Source: www.greenparenthood.com/blog/2011/03/14/synthetic-trees-to-provide-fresh-air-in-urban-areas/treepod/

Mario Caceres and Cristian Canonico design this synthetic tree for *SHIFT Boston urban intervention contest*. They realize that trees, the natural air filter is becoming lower while the pollution are more. The Treepods mimic like real tree, not just removing carbondioxide and releasing oxygen. The decarbonization process, air filters carbon-dioxide and deliver fresh air to the environment, need power. This Treepods has solar energy panels and seesaw which harvest kinetic energy, to fulfill the power needs to filter the air.

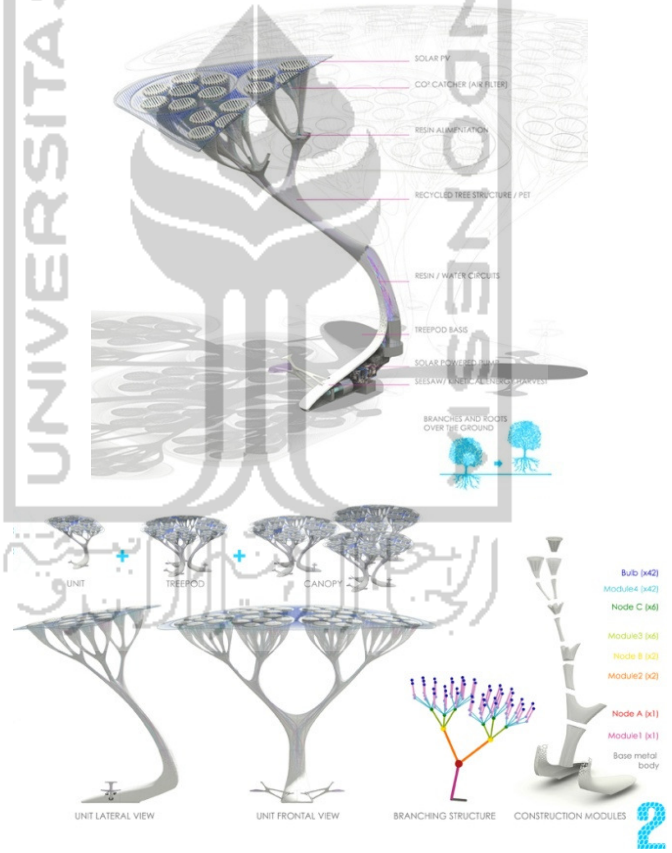


Figure 25. Treepods scheme
Source:
www.greenparenthood.com/blog/2011/03/14/synthetic-trees-to-provide-fresh-air-in-urban-areas/treepod/

The Treepods made from recycled/recyclable plastic bottles. This design is so flexible. Every parts of the branches can be apllied in any urban environment. As urban furniture, the Tripod can be applied single unit, treepod, applied some unit then make canopy.

2.7. PARAMETRIC

Car size that come in this parking area are:

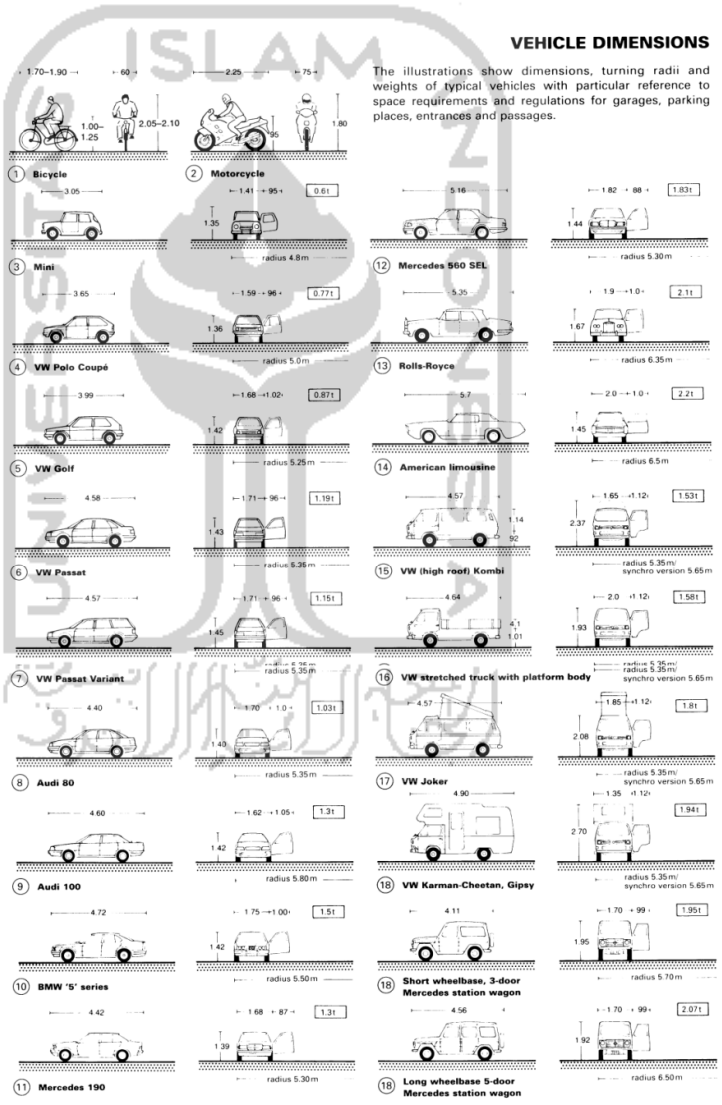


Figure 26. Treepods scheme
Source: architect data:neufert

CHAPTER III
ANALISYS

3.1. LOCATION ANALISYS

From the online information of Tampa's government, parking department, shows that about 31.625 parking space available. It means that parking space needs of this city so much because of people here are car oriented. Its examine by 50% of Tampa City is parking area. Its cosist of 30 garage, 70 paved parking lots and 20 unpaved parking lots. For this project, its use the paved parking which has big part in lack of water absorbtion in this city.



[a] [b] [c]

Figure 27. [a] primary area of concern [b] transportation of Tampa [c] surface parking
source : [re]stitch tampa competition brief

Location for this project is at parking area in the Downtown of Tampa. The parking area is choosen which has high potention of carbon dioxide. This criteria can be look at the figure above. First, the parking ara must be in the primary area of concern. Another potential qualification is it was the largest area of parking. From the figure of surface parking we can see that the

location to Royal Regional Lot. Which location is near the highway at the north. The location is near Hillsborough river and also near Tampa's point of interest Starz Center for the performing arts and John F Germany Library. This Parking area has 375 parking space, it's the largest paved parking area which regulated by the City.

88	Sisters Lot (Harrison & Franklin)	Private		30	Unpaved		Y	$20.00	none
89	The Times Bldg. - Phase I Lot	CL Parking	224-9721	202	Paved	$10.00/day	Y		Tenants only
90	1440 Franklin Lot (Franklin & Harrison)	private		30	Unpaved			$0.00	Tenants only
91	Goody/Goody Lot	717	228-7722	150	Paved	Monthly Only		$20.00	70
92	Tampa St. Parking Lot	717	228-7722	60	Paved	Monthly Only		$20.00	30
93	Mass Brothers Lot	717	228-7722	125	Paved	$5.00	Y	$100.00	125
94	Element (808 N. Franklin Street)	Element Prop.	463-1994	44	Covered Garage	$2.00/hr	Y	$100.00	19
95	Royal Regional Lot	City	274-8182	375	Paved		Y	$19.00	169
96	The Times - Phase III Lot	CL Parking	224-9721	430	Paved		Y	$45.00	200
103	Crosstown Health Lot (Kennedy)	City	274-8182	103	Paved	Monthly Only		$30.00	0
104	Morgan and Madison (SW corner)	private		65	paved		Y	$0.00	Tenants only
105	St. Andrews Church Lot (Twiggs)	717	228-7722	40	Paved	Monthly Only	Y	$90.00	30
106	Cochran Lot (Kennedy & East St)	Central	221-2754	200	Paved	Monthly Only		$48/58/68	102
107	Crosstown East Lot (Nebraska)	City	274-8182	34	Paved	Monthly Only		$30.00	0
108	Crosstown Lot L-4G (Union Station)	City	274-8182	88	Paved	Monthly Only		$30.00	7
109	Twiggs St. Garage (East St. & Nebraska)	City	274-8182	890	Garage	$7.00/day		$72.00	250
110	Zack St. Lot (Nebraska)	717	228-7722	150	Unpaved	$5.00/day		$55.00	100
111	Peters Lot @ Twiggs St.	717	228-7722	116	Paved	$5.00/day		$65.00	40
112	Twiggs Street Garage	County	276-2825	417	Garage	$7.00/day		$38.00	Employees only
113	Zack Street Lot (Jefferson)	City	274-8182	40	Paved			$33.00	0

Table 3. Parking area in Tampa City
Source: www.tampasdowntown.com/getting-around/parking.aspx

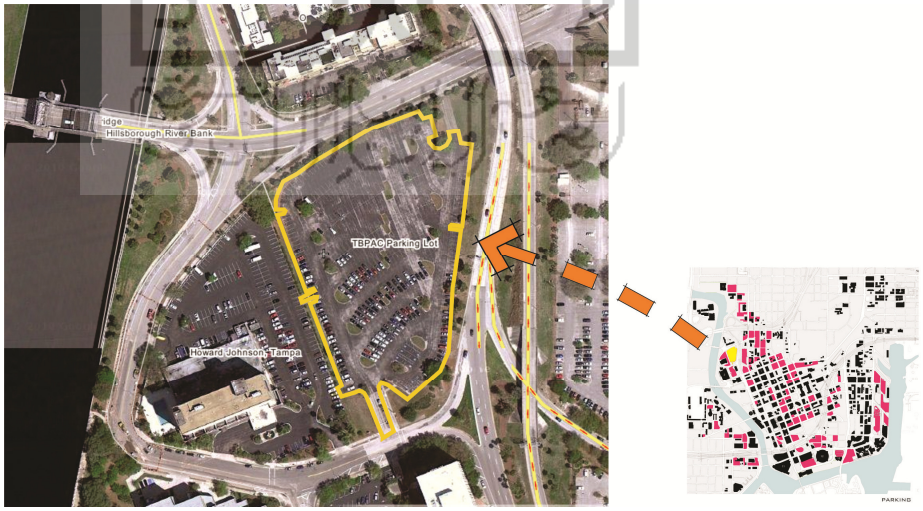


Figure 28Parking area in Tampa City
Source: www.maps.google.com

Tampa city location is at 27°56’50”N 82°27’31”W, its edges area between tropical and subtropical area, so its has specific character. People say that this place is the last place where the coconut tree can live. At the past time there four season, but now, winter comes in a long time, once in about 20 years.

3.2. SITE ANALSISYS

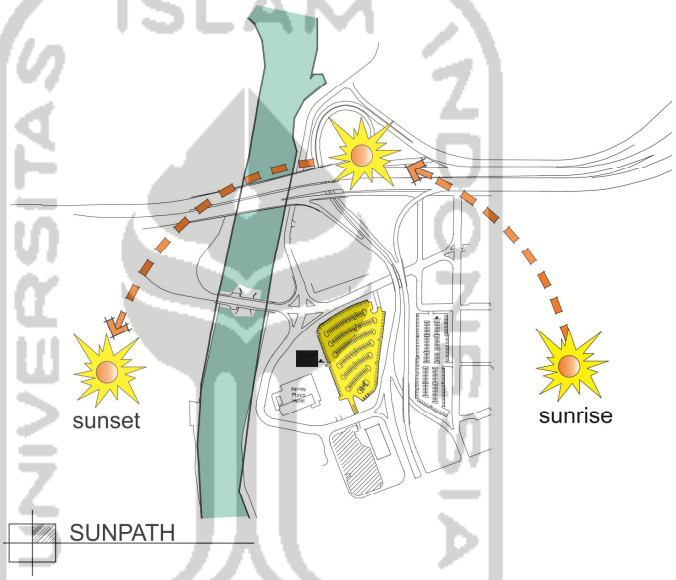


Figure 29. Sun Path
Source: sketch by author

the range of temperature in the City of Tampa very high. It can reach about 37°C at the summer and so cold until -8°C at the winter. This city precipitation reach 197.1 mm in July and August. Its so high, but its mean, it has a big potential in stormwater. Although in this city, has problem with storm water because of too much ground cover. The rain water running out to the Hillsborough river trough the road, so the storm water drainage is empty now.

Climate data for Tampa, Florida (Tampa Int'l), 1981-2010 normals [hide]													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F (°C)	86 (30)	88 (31)	91 (33)	93 (34)	98 (37)	99 (37)	98 (37)	98 (37)	96 (36)	95 (35)	90 (32)	86 (30)	99 (37)
Average high °F (°C)	70.3 (21.3)	72.8 (22.7)	76.6 (24.8)	81.3 (27.4)	87.5 (30.8)	90.0 (32.2)	90.4 (32.4)	90.5 (32.5)	89.3 (31.8)	84.6 (29.2)	78.3 (25.7)	72.4 (22.4)	82.00 (27.78)
Average low °F (°C)	50.8 (10.4)	53.6 (12.0)	57.5 (14.2)	62.2 (16.8)	68.9 (20.5)	74.1 (23.4)	75.2 (24.0)	75.5 (24.2)	73.7 (23.2)	67.3 (19.6)	59.6 (15.3)	53.6 (12.0)	64.33 (17.96)
Record low °F (°C)	21 (−6)	24 (−4)	29 (−2)	40 (4)	49 (9)	53 (12)	63 (17)	67 (19)	57 (14)	40 (4)	23 (−5)	18 (−8)	18 (−8)
Precipitation inches (mm)	2.23 (56.6)	2.80 (71.1)	3.03 (77)	2.03 (51.6)	2.10 (53.3)	6.68 (169.7)	7.06 (179.3)	7.76 (197.1)	6.29 (159.8)	2.25 (57.2)	1.55 (39.4)	2.47 (62.7)	46.25 (1,174.8)
Avg. precipitation days (≥ 0.01 in)	6.8	6.6	6.6	4.9	5.5	12.7	15.9	16.0	12.2	6.5	5.1	5.8	104.6
Sunshine hours	198.4	203.4	266.6	300.0	313.1	279.0	266.6	248.0	222.0	232.5	201.0	192.2	2,922.8
Source: NOAA [61], HKO [62] The Weather Channel (record temperatures) [63]													

Table 4. Climate data of Tampa
Source: www.en.wikipedia.org/tampa,_florida

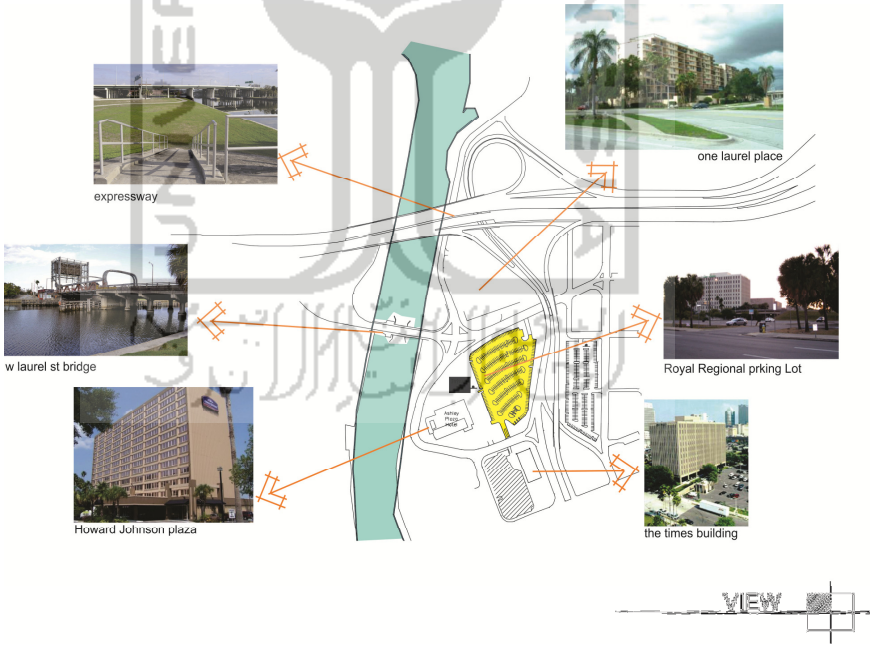


Figure 30. view outside the site
Source: analisys by author

View around the site is some point of interest. At the west of the site is howard Johnson Plaza. And W Laurel Bridge, an old bridge that still operate. This bridge such as the gate of the city from the north at Hillsborough river. This bridge can be open when a big ship is coming trough. At the north is expressway flyover wich come into Fortune st and Ashley st. at the north there also One Laurel place hotel. At East there was another parking area and at the south, there was The Times building and any other point of interest is Tampa bay Performing art center and library, the most reason people use this parking area.



Figure 31. Tampa Bay Performing Art Center
Source: www.tbac.org/welcome/index.html

3.3. POLUTION ANALYSIS

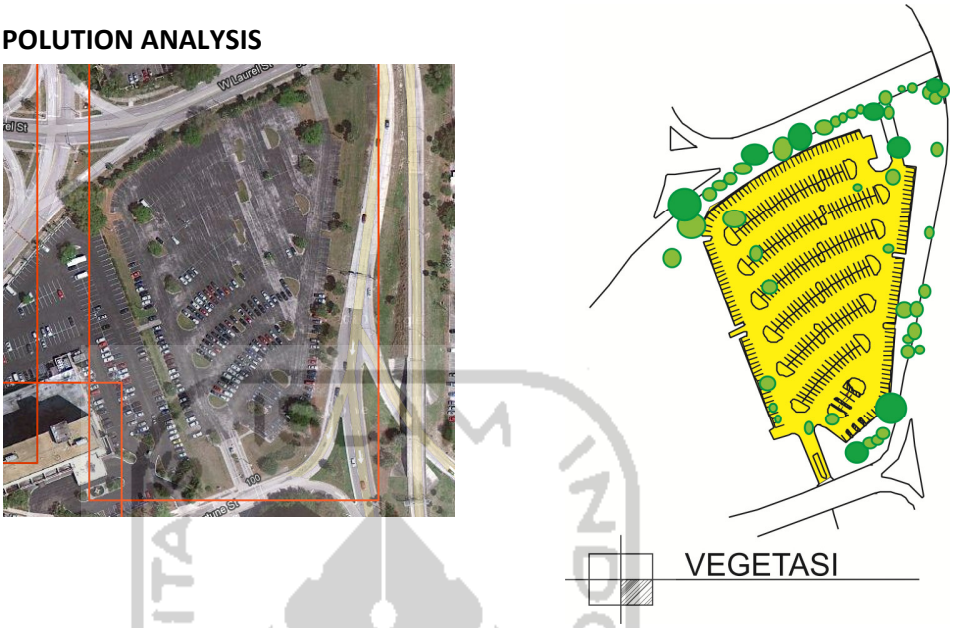


Figure 32. Vegetation
Source: sketch by author

The picture above examine vegetation in the site. Its redraw from satellite picture shown on left. From this picture show that there just a few vegetation less than 50%. Compared with the site wide, its too little, moreover this site function as a parking area. It can be got corollary that, it is one of the reason that caused air pollution. Another examine from the picture above is, the paved parking area decrease the storm water absorption area. It means that its caused the storm water are dry and empty. No more oyster and clamps.

3.4. BIOMIMICRY ANALYSIS

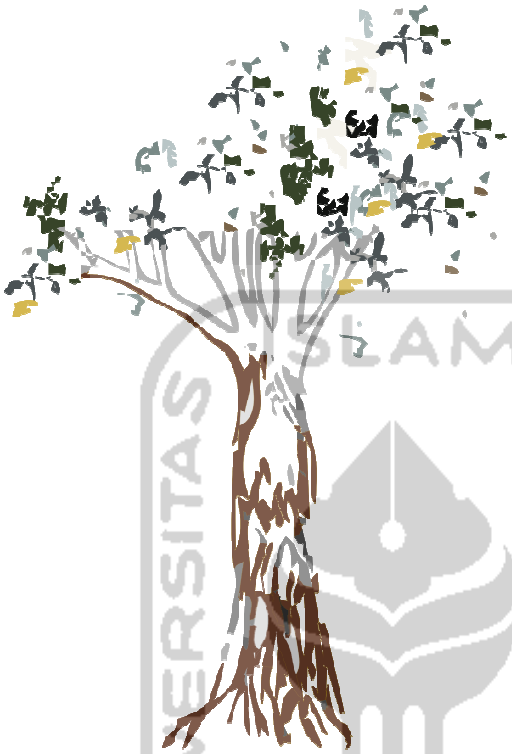


Figure 33. the strangler fig
Source: draw by author

It has ben known that nature can through long ages and survive. So, its naje sense that to get a better life, people can learn from the nature. In this case people can study from plant, especially strangler fig vine tree. Design principles of the tree is examine the main function of the plant is became air filter and absorb water. A tree became air filter because of photosynthetic process. Photosynthetic process by absorb the carbon dioxide (CO_2) and water, then with chlorophyll and solar energy, can make it into (O_2) and some food.

3.5. INTERPRETE DESIGN BRIEF

This behavior of the tree that can be mimicked. How to absorb the carbondioxide as greenhouse gas that harmful for human and one of global warming factor. The ral tree has chlorophyll to make it become oxygen, but there still research to make synthetic chlorophyll. But now, there is synthetic tree, with physics process, it can capture Carbon dioxide and make it as fuel for powerplant.

Compotition that tree needs to have photosynthetic process are: water, carbon dioxide, solar energy and chlorophyll. In the city of Tampa, there is a lot of carbon dioxide, showed by a large amount of parking area. People car oriented and highway infrastructural that support much car. Besides that, this infrastructure also produce a lot of carbon dioxide while developing.

Another potential of this city is a lot of rainfall, from the data the precipitation of this city reach 179,3 mm. It's a high number that can be reach. So, there is a a lot of water, even nowadays it become problem, because there are lack of water absorption area caused by large area are covered. Moreover, it has be ecological problem, when the rain water are runout to the river directly through the road. The impact is the sea level is raised (restitch tampa competition brief, 2011) and the storm water drainage are emptys, caused natural habitat of oyster and clamp are wracked.

The energy which is use by real tree is from solar energy. But if we see the eternity of the energy, that energy can be made and can be used up. There was a fuel energy that convert to be kinetic energy, than has waste as emission and heat. That's why the world seems heater. This heat energy which can be used as the energy of the system. Every substance in this world if they get heated up, they will expand and shrink when it was chilled. This potential can be used in a system.

The tree behavior that will be mimicked is about absorbing water from the environment. Water can move upward caused by capillarity of the xylem tissue. This process which can make the tree controlled water content in the soil. At the city of tampa, the water content in the soil very lack. To make water absorbtion area it's a possible thing, because, there's lack of green zone. Actually make the water shink to the soil need green area

without infrastructural ground cover and its imposible in Tampa city, every metres area are use for building and parking area which is must be developed well. The idea is mimicked the tree to save water upward. Use capillarity process, water can be absorbed and save for a while till its needs.



Figure 34. capilary tube
Source: www.alibaba.com/product-gs/485851961/copper_capilary_tube/showimage.html

To make water absobtion, use capillary tube with diameter about 0.2-0.3 mm. if it just one, its very weak, than to make it stronger, it can be wricked some capillary tube. This capillary tube made from copper. The characteristic of this tube are, light weight, low temperature and high strength, small diameter copper tube used in the delivery pressure of liquid.

CHAPTER IV
DESAIN CONCEPT

4.1. BIOMIMICRY APROACH

When mimic the tree there are two point in this concept. First, is became carbon dioxide filter and as water controller. The real tree use chemist process to filter the carbon dioxide, called photosynthetic. Then, with precedent of synthetic tree, carbon dioxide process can be through mechanical process in this idea use bubble breath technology. Secondly, about water process, it use capillarity process which any liquid can through a little tube which can make it move to opposite of it have to be, such a gravitation. With use this potential technology, it's become zero energy design.

4.2. BUBBLE BREATH

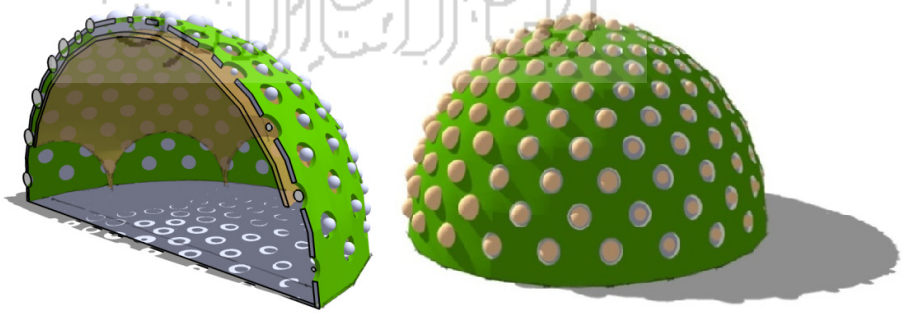


Figure 35. author design for IccA competition
city sense
Source: design by author

Any substance in this world, they're will expand when they're heated be the first idea of this concept. Begin from the idea to make bubble breath, a bubble that can expand and shrink apply in porous structure and became kinetic day lighting which when expand this bubble will close all the porous, and it make the sun direct light which unnecessary didn't pass through to the building. But building still get another day lighting from another side which isn't get direct sun lighting.

Begin from this idea if its apply to the city of Tampa wich has potential about parking area, people car oriented and connection between Hillsborough river with Tampa's people which because of ecological damage. This bubble breath has been developed which has new function, based on the idea that any substance can expand if its heated. Then linked with Tampa's people car oriented and over than 50% parking area means there so much heated as the side effect from the cars.

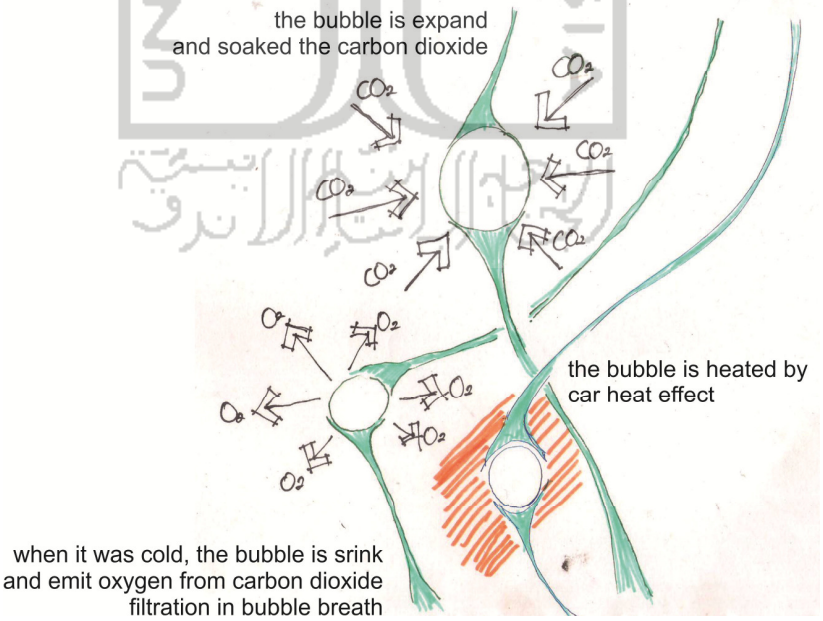


Figure 36. bubble breath process
Source: sketch by author

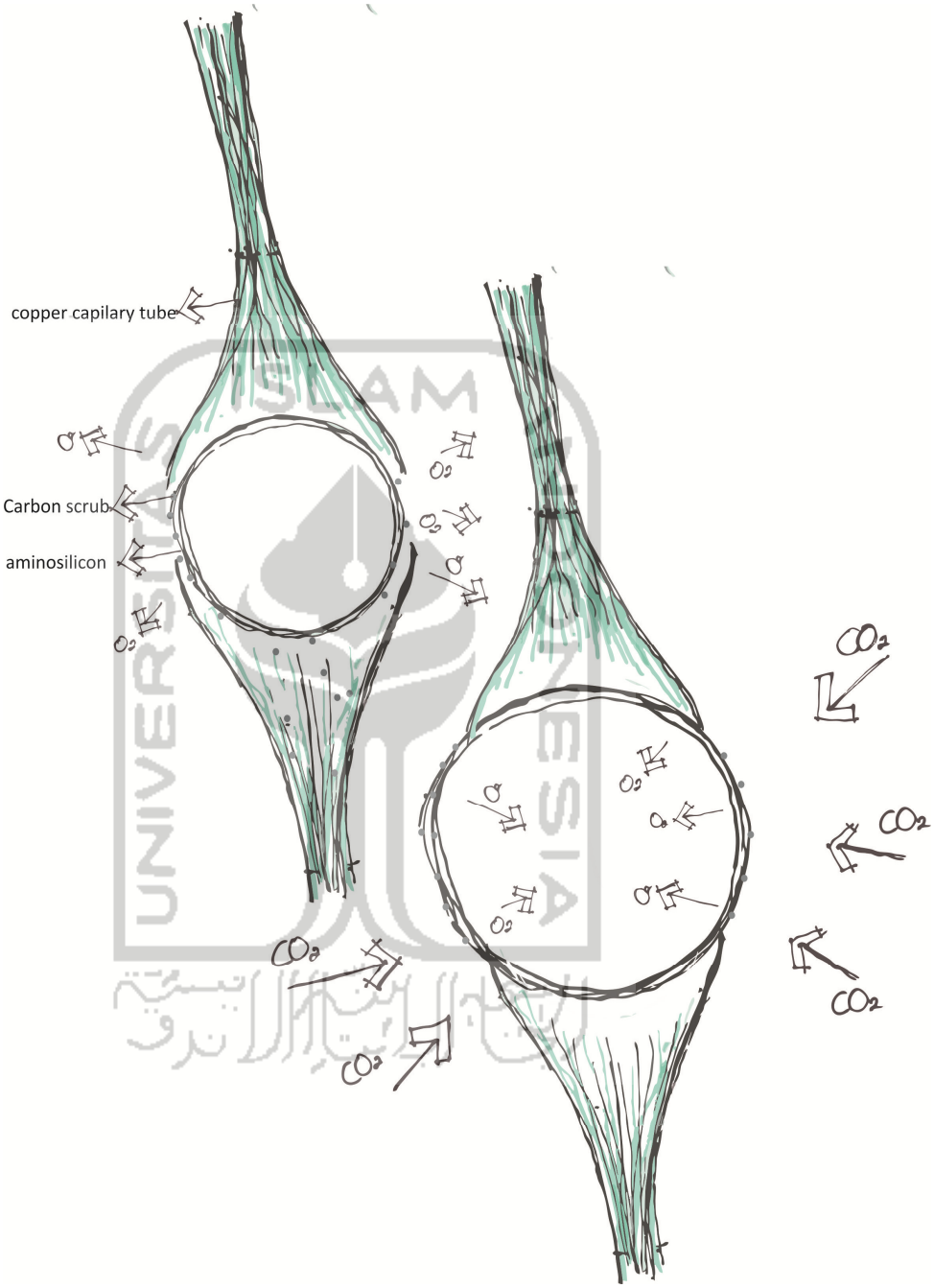


Figure 37. bubble breath process
Source: sketch by author

An flexible material that can expand and shrink in not too much different temperature. The material is silicone and amino silicone composite. This material can filter the air. Amino silicone can absorb CO_2 in a low cost. And the silicone is material which can expand and shrink easily.

This stuff use the heat as side effect of car machine besides the solar energy. When its expand the volume of the bubble is rise and make air from outside the bubble come in. The bubble breath soaks the air, then filter it. The Oxygen is through inside the bubble, while the C react with amino silicone become scrub outside the bubble. Then the oxygen will come out the bubble breath when the bubble is shrinking, caused by the volume of the bubble is seems lower then make the air pressure is high and push the Oxygen come out.

This bubble apply in tube spout from rubber which not too sensitive with temperature. When the bubble expand it will fill the space between the spout and the bubble and inhibit the water slow from the tube. Then when the bubble is srink, there will be space between the bubble and the tube's spout and make some water from the capillary tube flow through the bubble surface, and bring the Carbon scrub flow with it. Then the water with carbon scrub through the pipe with longer diameter, so the water can through easily bring the carbon, to the carbon water container which then it can be proceed to carbon for power plant.

4.3. WATER ABSORBTION

Another biomimicry is to absorb the water to control the storm water. Before its been absorb by the copper capillary tube, the storm water is collect in a pond outside the building. Its pond collect the rain water wich is through the road and any ground cover which can't absorb the water. In this pond the water is been filtered before absorb by the capillary tube.

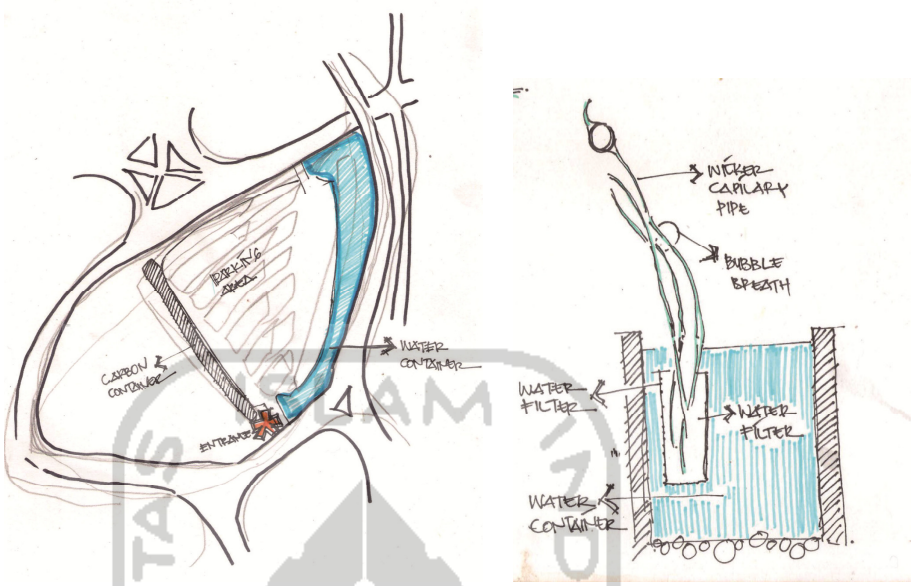


Figure 38. water absorbtion
Source: sketch by author

The water collecting pond is on the east of the parking area, this area is a vacant area. Then the Carbon collector area is in the west of the are, the space between Howard Johnson plaza parking area with the royal regional parking area. This palace is easy access to get the carbon water scrub.

4.4. THE STRUCTURE

The copper capillary tube is wicked, to make it support each other. The wicker of the tube make it became structure of its self. But, to wide span building cover, its not strong enough. So, it have to be support beneath it. To support the wicker of the copper capillary tube using beam that being design look like a tree. In bio mimicry concept, its just look like the host tree of the strangler fig.

This profile steel is selected because its strong and easy to be apply in this design. Besides that, this I, H and O profile which has straight character, its been contrast with the wicker of the cooper capillary tube which has organic character that cornerless. But, its not lost the unity of both of this. Just like a tree, the structure use biggest size of the profile steel, and seems smaller to the top. Like branch and stem.

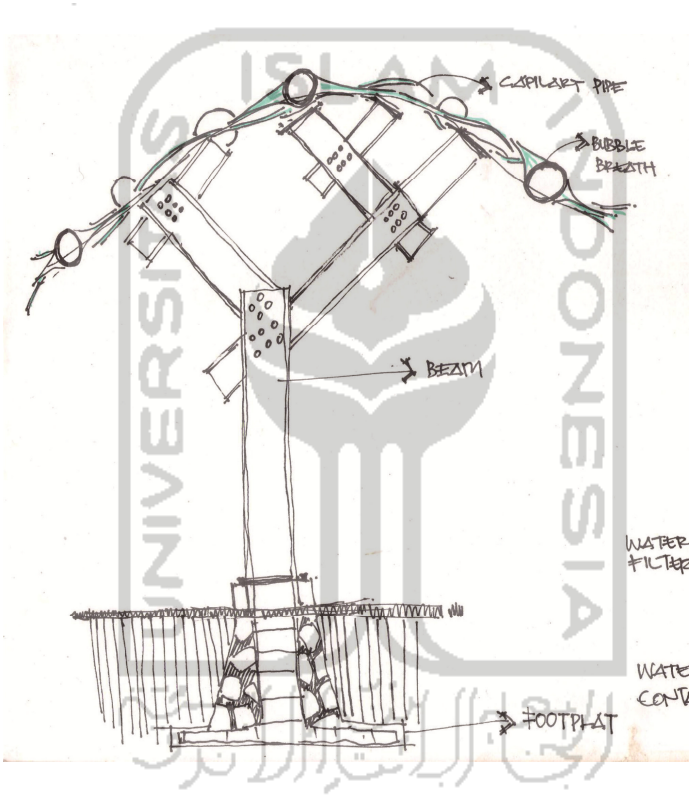


Figure 39. water absorbtion
Source: sketch by author

This structure is spread in some point, in the parking area island to support the wicker copper capillary tube. This structure of course has been support by footplate foundation. Each branch are joined by bolt. To make this structure strong the structure balancing must be design carefully.

4.5. THE DESIGN

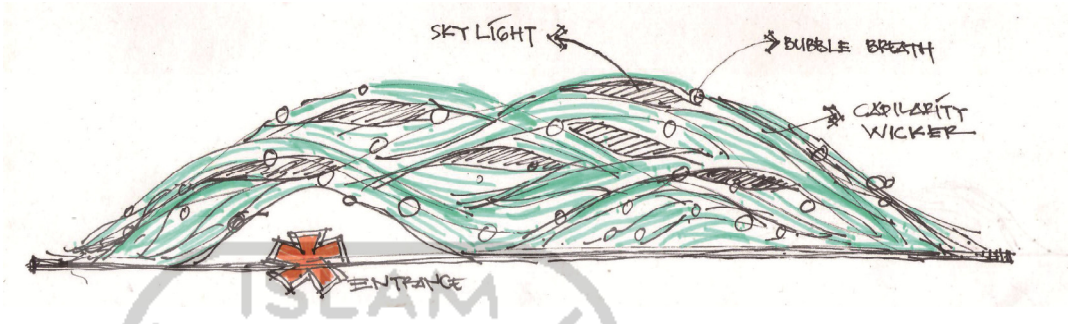


Figure 40. façade of bubble breath parking area
Source: draw by author

The shape of the building is follow the parking area. Then the wicker capillary tube become organic shape. Just like a real strangler fig, which wick the host tree and make a new shape of the tree. This wick of tube are not full of solid wicker. Wick of anything will left some space between it. It can be ventilation of the building. In large space of this form can be skylight to let the day lighting come in.

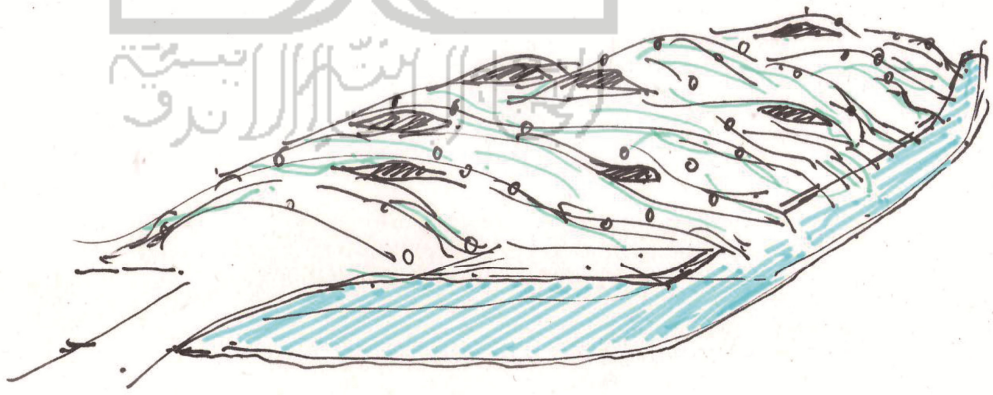


Figure 41. the bubble brath parking area
Source: sketch by author

4.6. THE PROTOTYPE

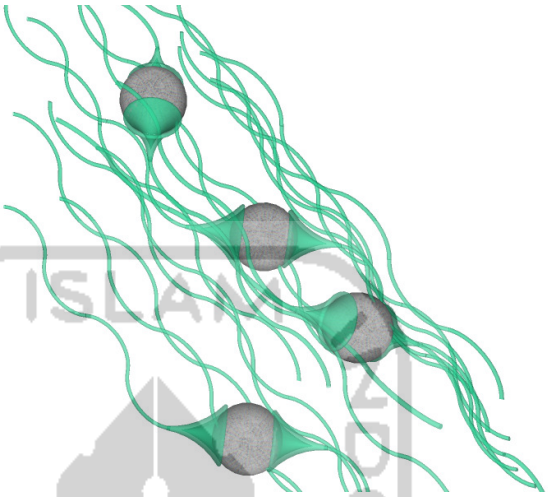


Figure 42. bubble breath prototype
Source: design by author

CHAPTER V
BUBBLE BREATH DESIGN TECHNOLOGI

5.1. BUBBLE BREATH

Bubble breath is an echological infrastructure which can control rain water absorb a bubble that made from aminosylicon which can expand and shrink use heat energy from cars. This technology can be apply as building envelope. In this case, this technology use to cover parking area which has carbon dioxide pollution potential.

When the bubble is heated by car pollution, its expand and fill the tube and make the water in the pipe cant through. When the bubble is shrink caused by temperature decrease, the water tube is open, and then the water can flow, bring the carbon scrubber and bring it into carbon container to be processed become fuel for another industrialism.

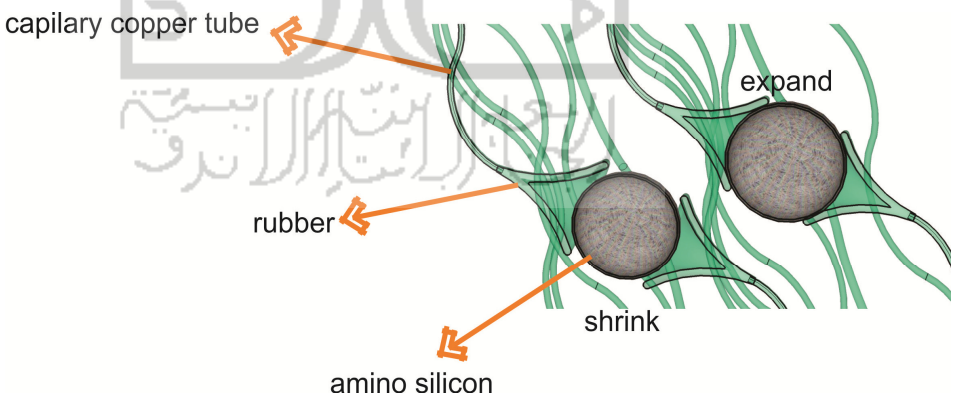


Figure 43. bubble breath prototype
Source: design by author

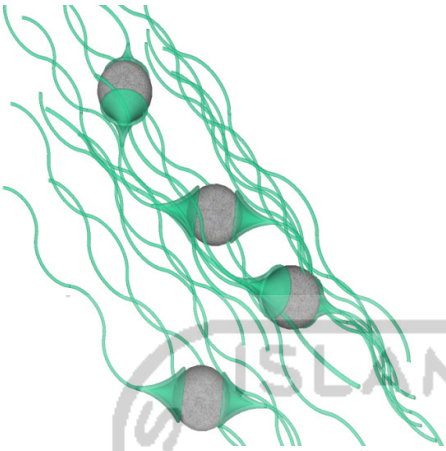


Figure 44. bubble breath prototype
Source: design by author

This bubble breath just like a cloth, the thread is stitching one another, this buble breath system make a web then become a membrane. This membrane that become building envelope which apply in royal regional lot.

This membrane make organic shape, just like nature. Looks like forest, this bubble breath membrane make hill and valley.

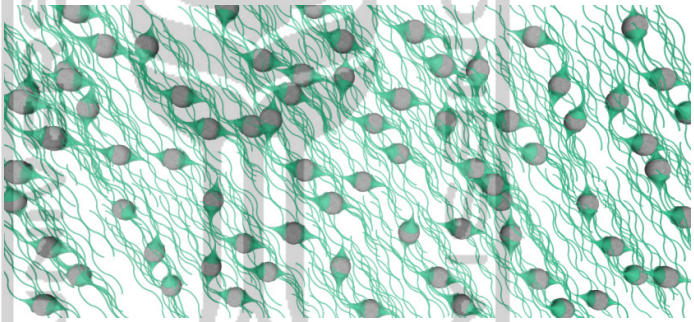


Figure 45. bubble breath prototype
Source: design by author

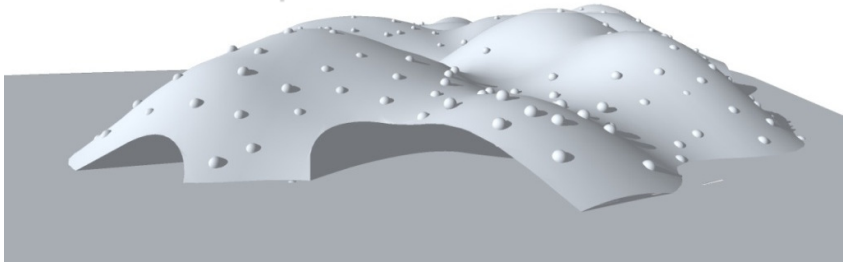


Figure 46. bubble breath prototype
Source: design by author



Figure 47. bubble breath prototype
Source: design by author

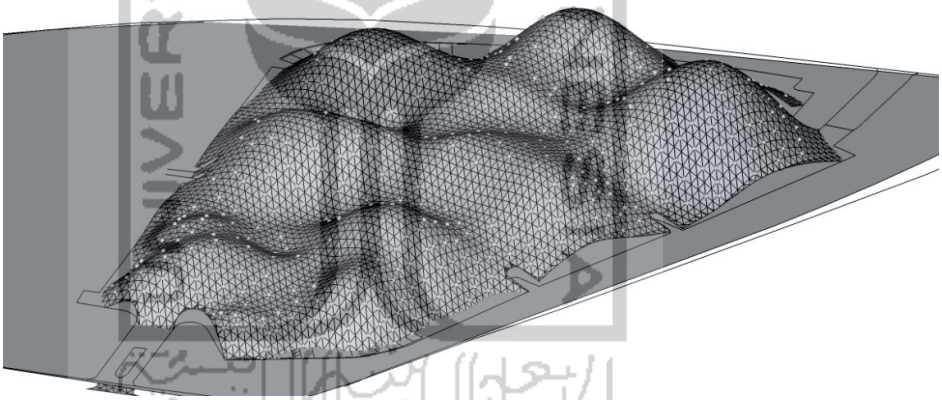


Figure 48. bubble breath prototype
Source: design by author

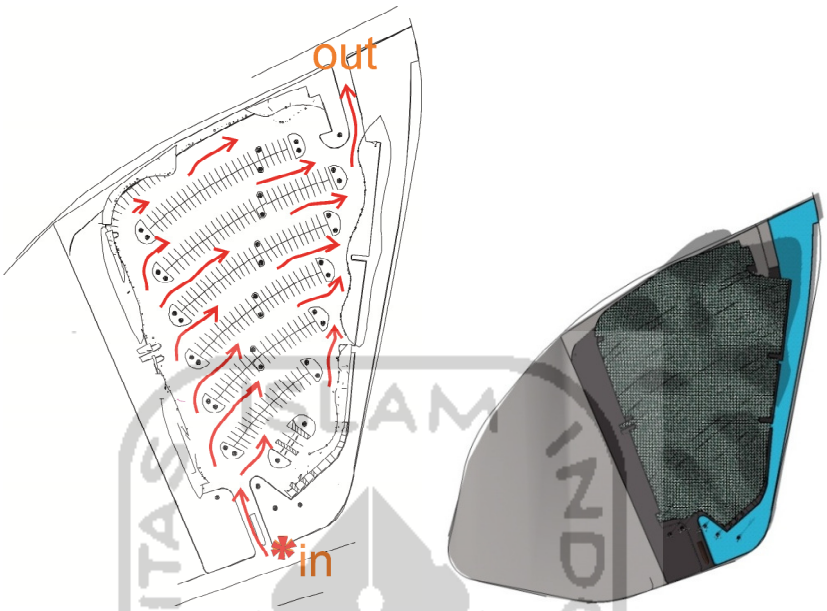


Figure 49. sirculation
Source: design by author

The sirculation just like existing sirculation. Entrance at W. Fortune St and exit at W. Laurel St. To provide every cars that come to this area the building envelope high is considered by the cars high so every cars can used this parking area. The lowest of the membrane high is ± 2874 mm, it can provides van and truck.

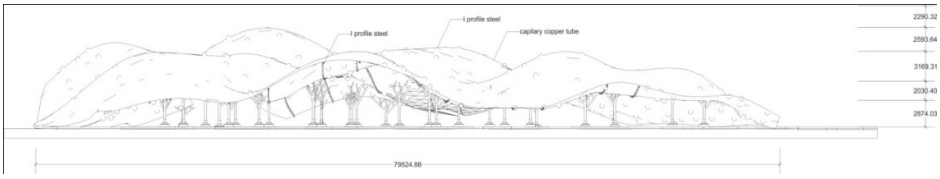


Figure 50. section
Source: design by author

5.2. PRELIMINIARY DESIGN

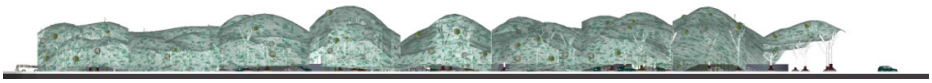


Figure 51. west elevation
Source: design by author

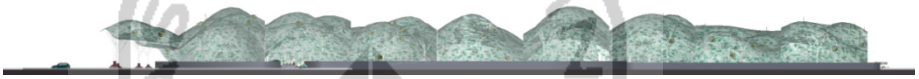


Figure 52. east elevation
Source: design by author



Figure 53. north elevation
Source: design by author

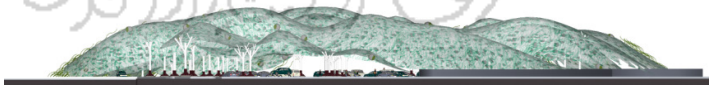


Figure 54. south elevation
Source: design by author

5.3. 3D MODEL

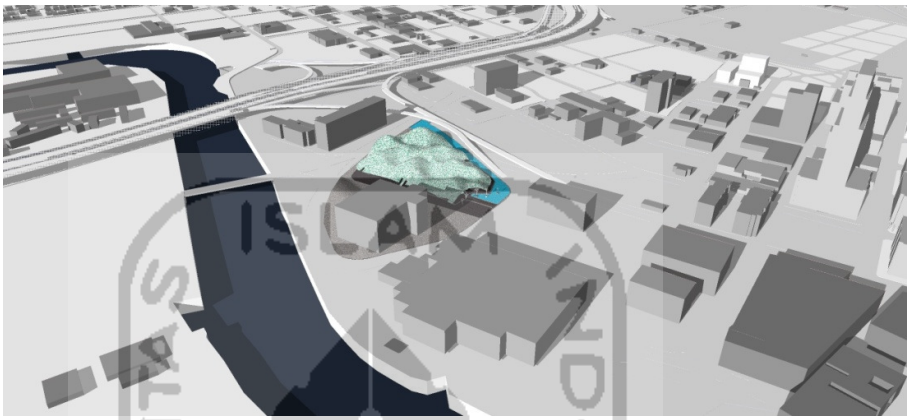


Figure 55. the Regional Royal Lot
with bubble breath technology
Source: design by author

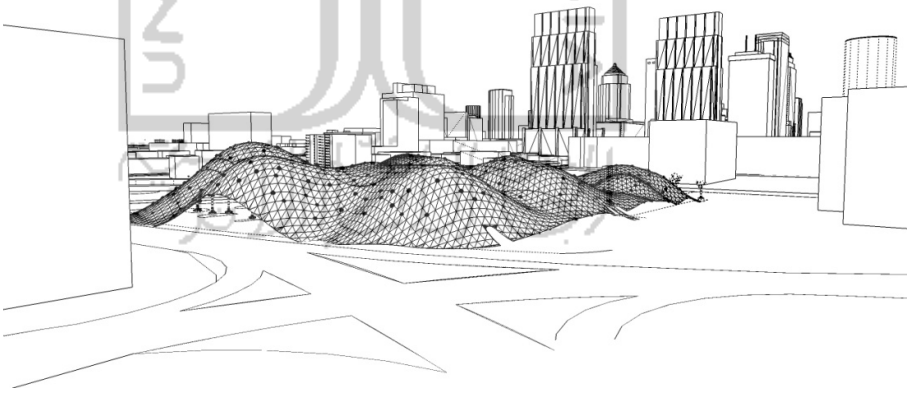


Figure 56. the Regional Royal Lot
with bubble breath technology
Source: design by author

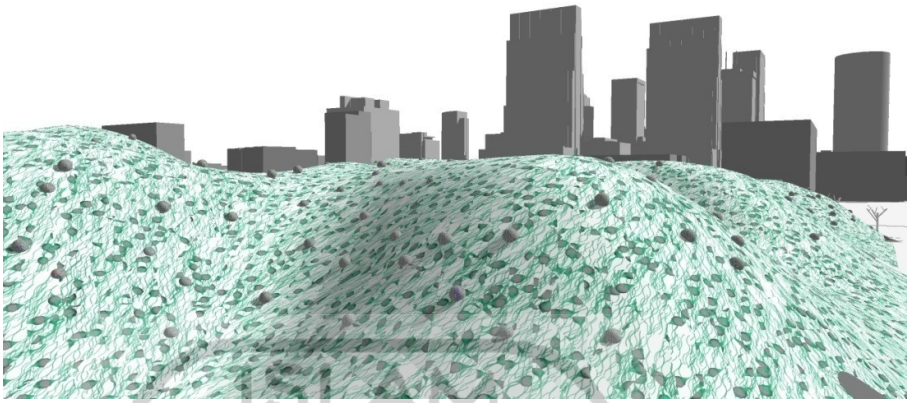


Figure 57. the bubble breath membrane figure
Source: design by author



Figure 58. entrance, view from W. Fortune St.
Source: design by author

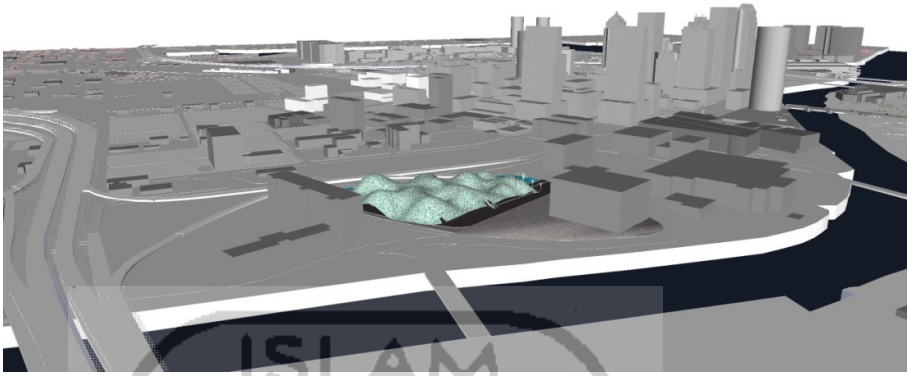


Figure 59. birds view from west
Source: design by author

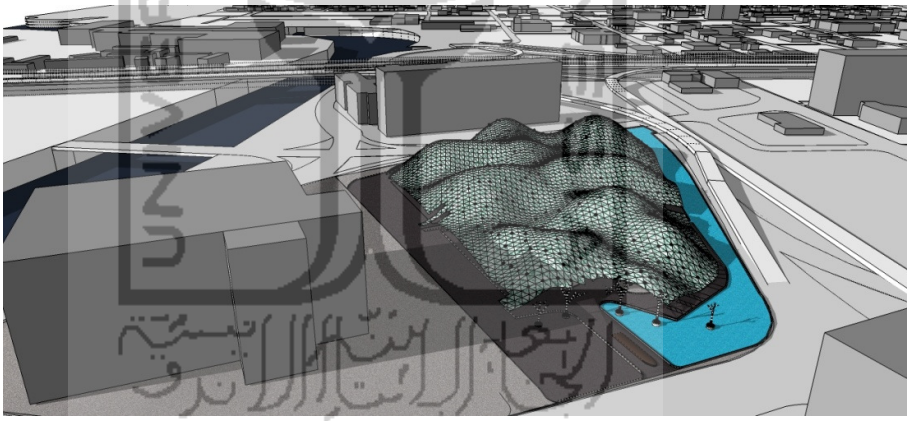


Figure 60. birds view from south
Source: design by author

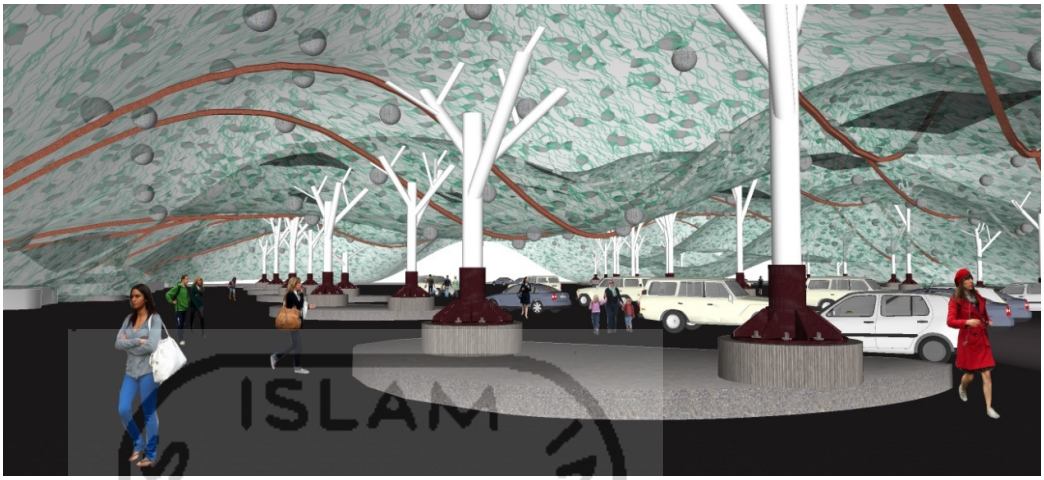


Figure 61. interior of bubble breath
Source: design by author

5.4. STRUCTURE

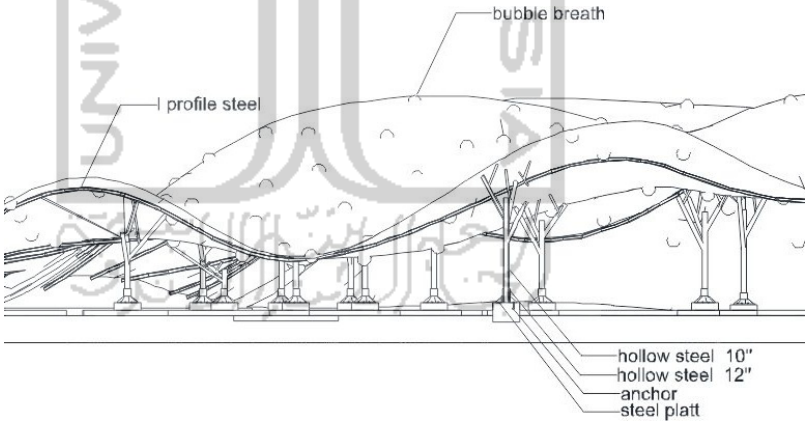


Figure 62. birds view from south
Source: design by author

This membrane supported by branch hollow structure which support I profile steel as the membrane frame. Then it stand on parking island, on footstep foundation.

CHAPTER VI
CONCLUSION AND SUGESTION

6.1. CONLUSSION

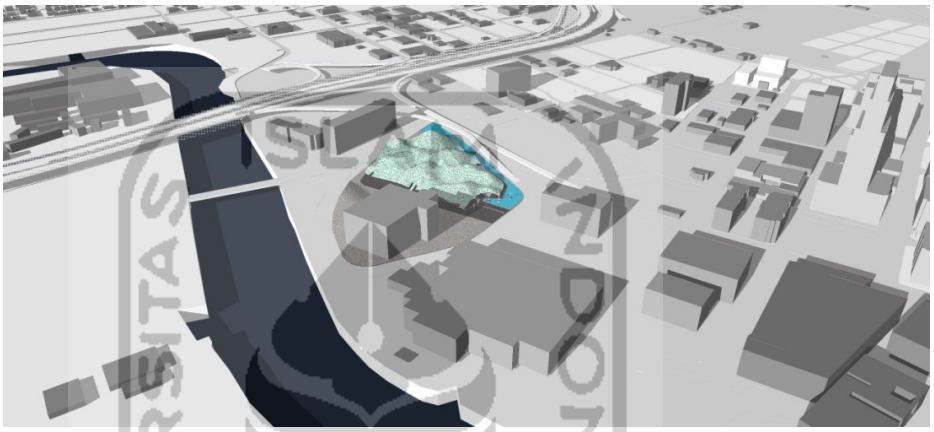


Figure 63. the Regional Royal Lot
with bubble breath technology
Source: design by author

This design try to unveil environmental problem solving in this Tampa city. The bubble breath technology can control rain water absorption. Like sponges, it can absorb water when overflow, and it can supply water when there's lack of water. This capability of the bubble breath technology make possible to nature habitat restoration for oyster and clamps. This condition is expected can [re]stitch the city of Tampa's people with Hillsborough river.

Besides that, the CO_2 filtration hoped can decrease the air pollution and global warming. So this technology can make human life better and better. This zero energy design can be solution for next generation.

6.2. SUGGESTION

This final project use theoretical approach, the designing method use literatural reference. But author recommended this idea is more studying in reaserch, with real model and prototype, because author certain it could be good technologies for human life in the future.

Moreover this design could be apply not only at parking area, but also at tunnel, on the road especially in the express way, which there's carbon dioxide potential and can take the advantages from cars heat exhaust. And the important thing is, how to make something bad, become potential to make better life.

Support from institution especially Architectural Department of Faculty Engineering and Planning, Islamic University of Indonesia to make laboratory for research about new technology in architecture.

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[re]stitch TAMPA

ECOLOGY

INFRASTRUCTURE

CONNECTIVITY

FRAMEWORK

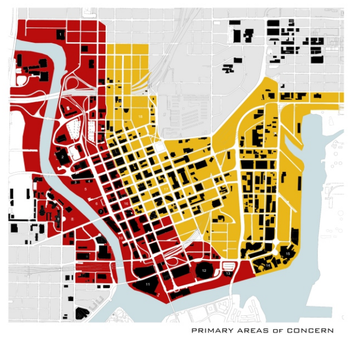
BACKGROUND
- Renewal development in past time
- Highway infrastructure
- Car oriented people
- over 50% parking area
- bad effect to the natural habitate

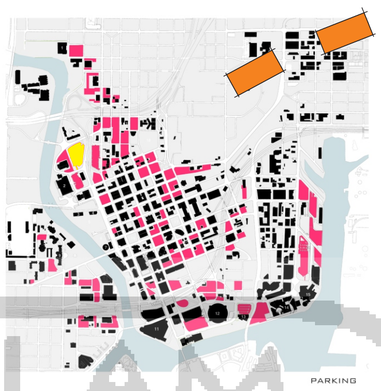
[re]stitch TAMPA
Hillsborough river
restitching the city of Tampa and its river

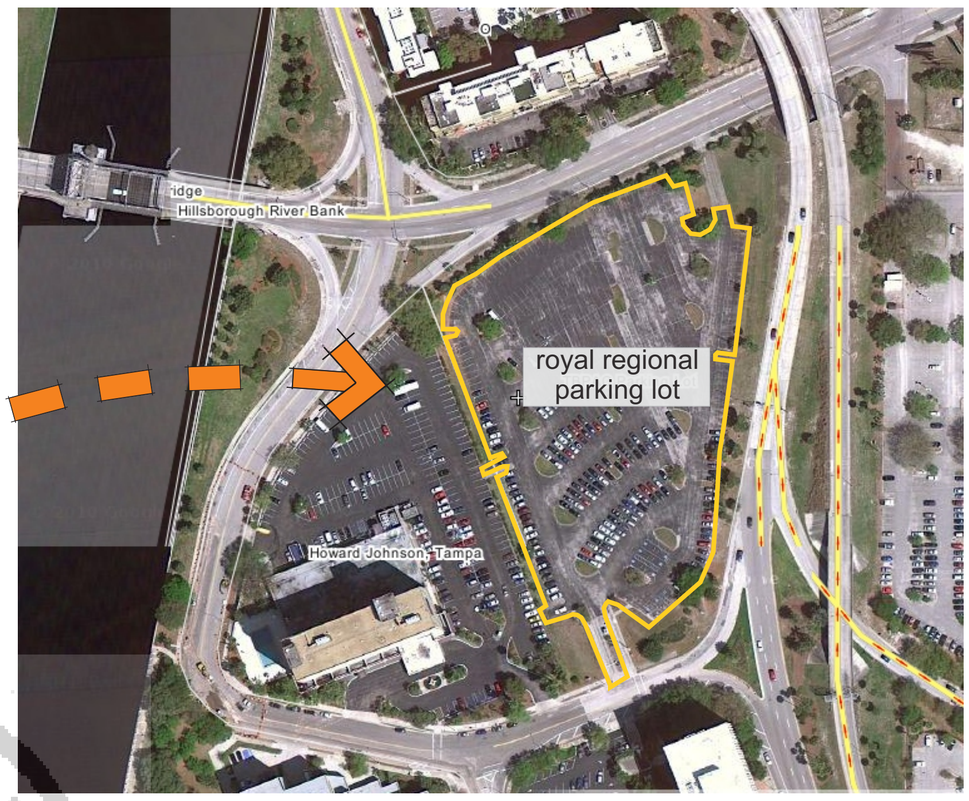
designing ecological infrastructure that can make conection in Tampa. This connection make junction between infrastructural and natural aminities. restore the natural resources and [re]stitch Tampa.

biomimicry

biomimicry is design which imitate living thing







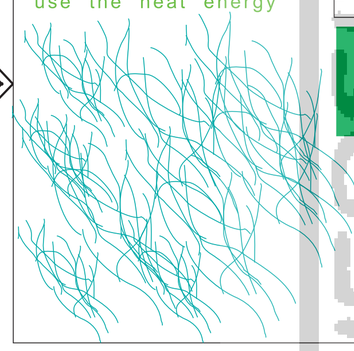
real tree



natural air filter by photosynthetic process. absorb carbonioxide then with water, clorofil, and solar energy, produce carbohydrate and oxygen. the roots of the tree can save the water underground.

synthetic tree

collect the co2 then convert it
use the heat energy



parking area
-people car oriented
-so much co2
-lack of storm water absorbtion

mortality of energy
oil fuel of cars bacome kinetic energy than producting some gas emition and heat.

BUBBLE breath

use the heat energy from the car emition to make the bubble expand, so this movement can colect the carbondioxide

a bubble which can expand-shrink, and while it 'breathing', it can be CO_2 converter

ROYAL REGIONAL PARKING LOT

For this project, its use the paved parking area because it has big part in caused lack of water absorbtion in this city and also as the place of car which has exhaust emission with so much of carbin dioxide. Location for this project is at Royal regiomal parking area in the Downtown of Tampa. The parking area is choosen because . First, the parking area is in the primary area of concern. Another potential qualification is it was the largest area of parking. From the figure of surface parking we can see that the location of Royal Regional Lot. Which location is near the highway at the north. The location is near Hillsborough river, which is actually this area should be the water bank of Hillsboroug river. And also near Tampa's point of interest Starz Center for the performing arts and John F Germany Library, so people are often come here. This Parking area has 375 parking space, it's the largest paved parking area which regulated by the City. from the figure of vegetation show that this parking area lack of vegetation, its less than 50% of naturalair filter. So in this case the Royal Regional Parking Lot, is the suitable for the project.

SITE analisys

the city of Tampa'climate is in the edge betwen Trpical and subtropical zone. it has high frequences of rain and reach high temperature 37 degree Celcius and the lowest reach -8 degree celcius. in the parking area, there are lack of vegetation

Climate data for Tampa, Florida (Tampa Int'l), 1981-2010 normals [hide]

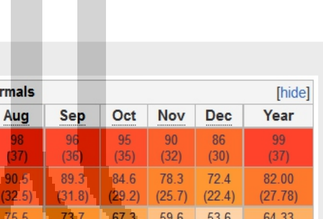
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F (°C)	86 (30)	88 (31)	91 (33)	93 (34)	98 (37)	99 (37)	98 (37)	98 (37)	96 (36)	95 (35)	90 (32)	86 (30)	99 (37)
Average high °F (°C)	70.3 (21.3)	72.8 (22.7)	76.6 (24.8)	81.3 (27.4)	87.5 (30.8)	90.0 (32.2)	90.4 (32.4)	90.5 (32.5)	89.3 (31.8)	84.6 (29.2)	78.3 (25.7)	72.4 (22.4)	82.00 (27.78)
Average low °F (°C)	50.8 (10.4)	53.6 (12.0)	57.5 (14.2)	62.2 (16.8)	68.9 (20.5)	74.1 (23.4)	75.2 (24.0)	75.5 (24.2)	73.7 (23.2)	67.3 (19.6)	59.6 (15.3)	53.6 (12.0)	64.33 (17.96)
Record low °F (°C)	21 (−6)	24 (−4)	29 (−2)	40 (4)	49 (9)	53 (12)	63 (17)	67 (19)	57 (14)	40 (4)	23 (−5)	18 (−8)	18 (−8)
Precipitation inches (mm)	2.23 (56.6)	2.80 (71.1)	3.03 (77)	2.03 (51.6)	2.10 (53.3)	6.68 (169.7)	7.06 (179.3)	7.76 (197.1)	6.29 (159.8)	2.25 (57.2)	1.55 (39.4)	2.47 (62.7)	46.25 (1,174.8)
Avg. precipitation days (≥ 0.01 in)	6.8	6.6	6.6	4.9	5.5	12.7	15.9	16.0	12.2	6.5	5.1	5.8	104.6
Sunshine hours	198.4	203.4	266.6	300.0	313.1	279.0	266.6	248.0	222.0	232.5	201.0	192.2	2,922.8

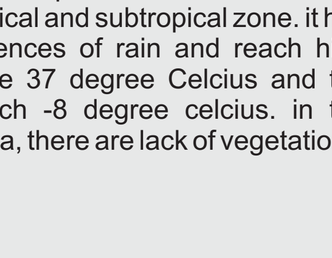
Source: NOAA [61], HKO [62], The Weather Channel (record temperatures) [63]

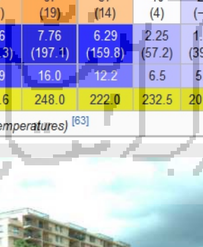

expressway

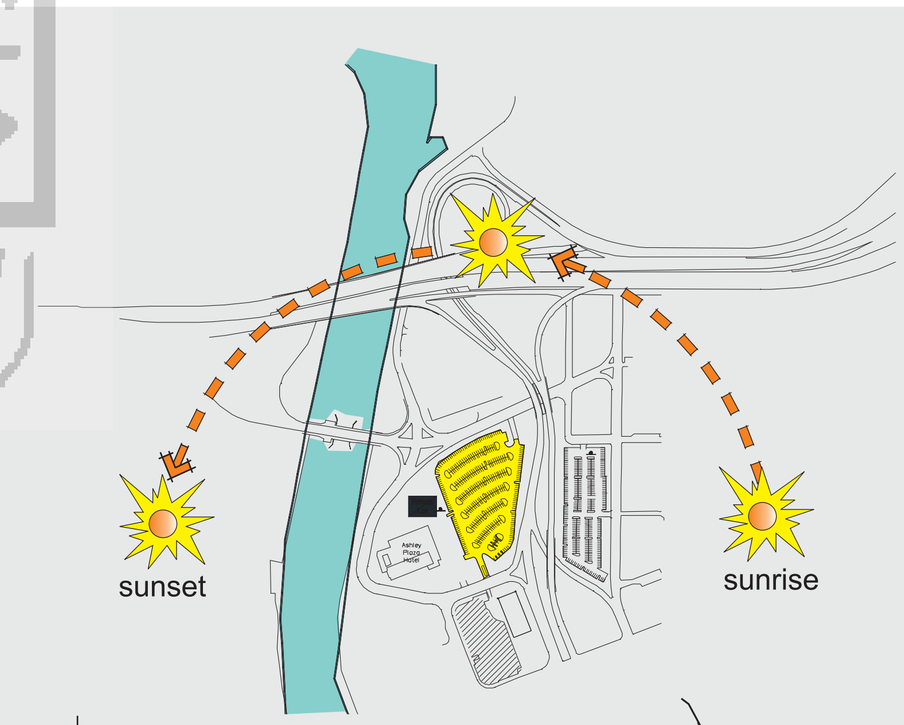

one laurel place


w laurel st bridge

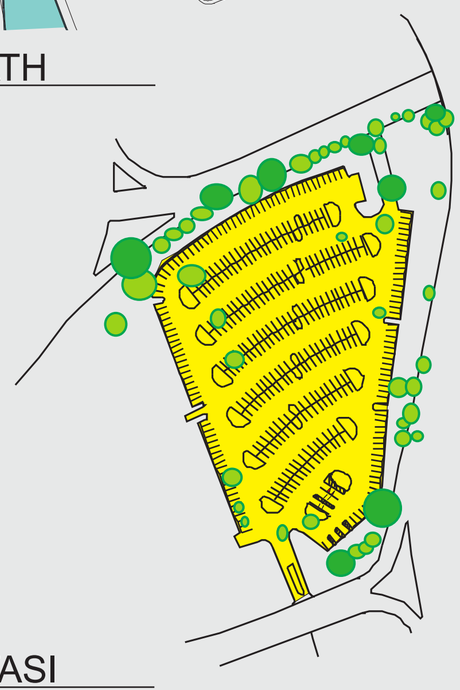

Royal Regional prking Lot


Howard Johnson plaza


the times building



SUNPATH



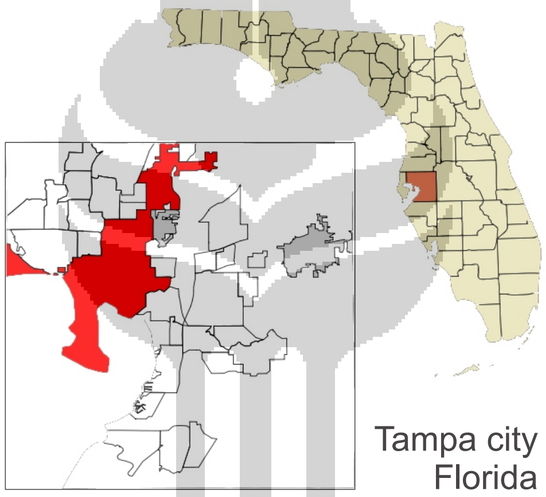
VIEW

VEGETASI

[re]stitch TAMPA

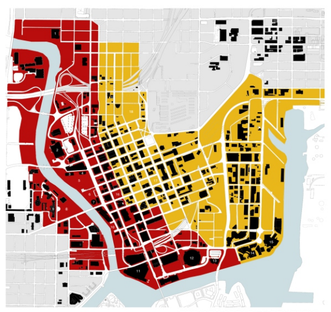
with HILLSBOROUGH river use bubble breath technology

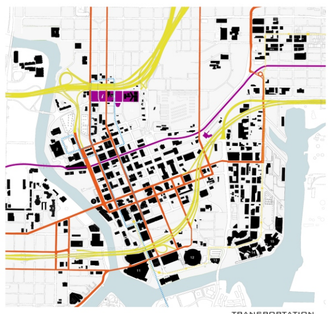


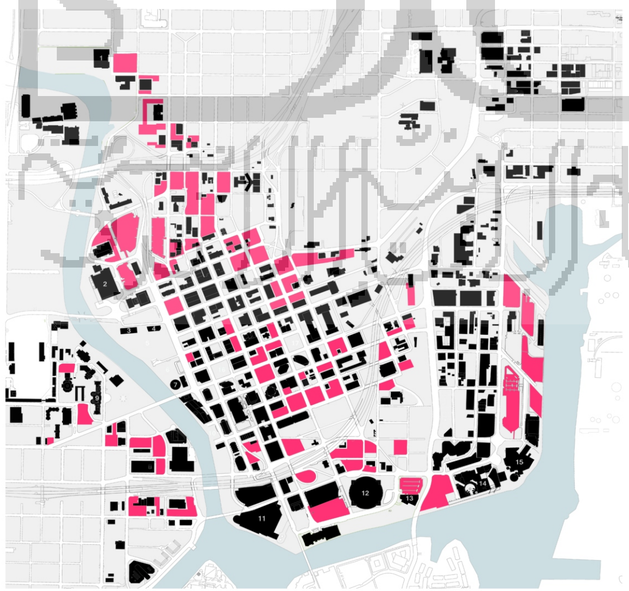


Tampa city
Florida

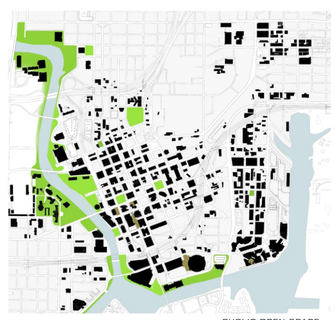


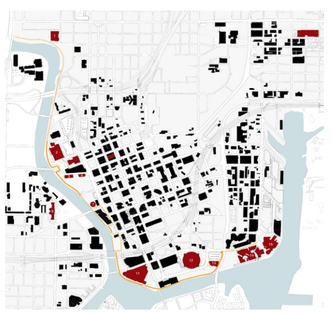






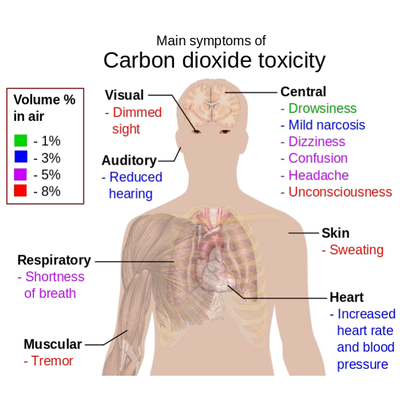


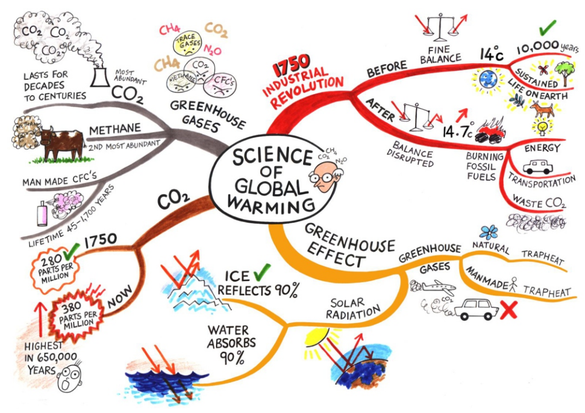




Tampa is a City in United States of America include in Florida State and Hillsborough County. There's Hillsborough river, which running through over the city. it has a large watershed and empties out into the Tampa bay o thr west side of the downtown core, make U form around the southern tip of the city alongside shipping channel. nowadays this river has no great presence anymore, caused by urban renewal strategies carried out in 60'ies and 70'ies. At past time people come to the Hillsborough river to hanging out and eat some oyster or clamps. but now, the rain water running out to the river directly through the road, caused the storm water drainage empties and damage the clamps and oyster habitate. therefore, the people of Tampa and Hillsborough river are fall apart.

There must be connection between Tampas people and Hillsborough river. At past time, theres good relationship between Tampas people and Hillsborough river, till the highway project make this connection apart. A new development have to [re]stitching this relationship between the city of Tampa's people with Hillsborough river. Another relationship that should be stitched is the connection between the infrastructure with the nature.





So many cars bring so many problem, one of them is air polution caused by vehicle exhaust. Cars have emission waste because of oil fuel from fossil. This emission consist of carbonmonoxide 0,5-1 %, Carbon dioxide 12-15 %, oxygen 0,5-1 %, and some nitrogen oxide. Carbon dioxide hase large amount presentation. Actually, this gas has bad effect for human. besides that, carbon dioxide also become green house gas which caused global warming.

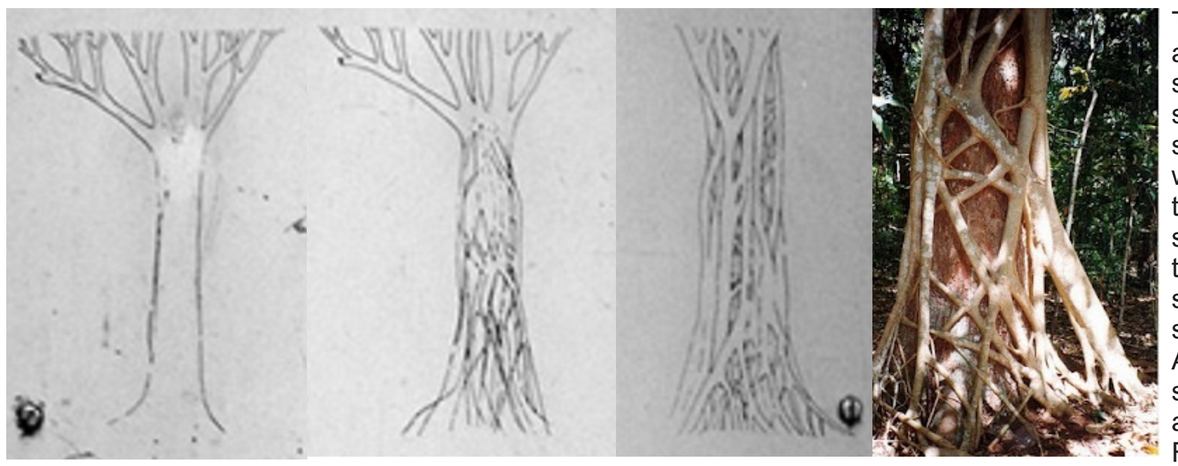
Tampa is car-oriented city, suffering from the impacts of suburban sprawl. Heavy-handed highway infrastructural development. The downtown has a distincly rural-urban condition, which is so high density along the day, then empty at 5.00 PM and at week end. This city has more than 50% surface parking lots to acomodates the car. From this data, shows that so many vehicle in this town.



biomimicry

Biomimicry originates from greek word bios, meaning life, and mimesis meaning imitate. Biomimicry is studies nature best idea and than imitates this designs and process to solve human problem. Nature is amazing. Nature has a big part in this livelihood, they have through million years, and go through many chalange. And nature have survive from it. Acordingly to In this universe concist of 3 (three) kinds of organism, animal and plant. And plant is organism which has the longest life. problem solving for Tampa with biomimic aproach is by ecological infrastructure. infrastructure which can filter carbon dioxide and control water. just k like a tree.

discover natural models



The kind of tree that choosen is vine, any plant with a grow habit of trailing or scandent, that is to say climbing, stems or runners or its refer to the stems itselve when used in wicker work. The vines are have a long stem that can wick each other or to another structure like rock or even another tree. They have a strong roots and stems. Besides that, because it has slim body, it can be shaped flexible. And specifically this project mimic strangler fig, especially Ficus aurea, also known as the Florida Strangler Fig.

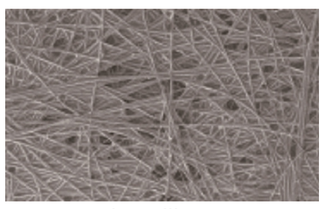
emulate nature's strategy

CO_2 Filter

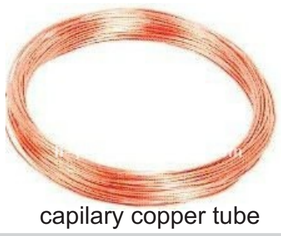
bubble breath is bubble which can expand when heated and shrink when it cold. When its expand the volume of the bubble is rise and make air from outside the bubble come in. The bubble breath soaks the air, then filter it. The Oxygen is through inside the bubble, while the C react with amino silicone become scrub outside the bubble. Then the oxygen will come out the bubble breath when the bubble is shrinking, caused by the volume of the bubble is seems lower then make the air

water absorbtion

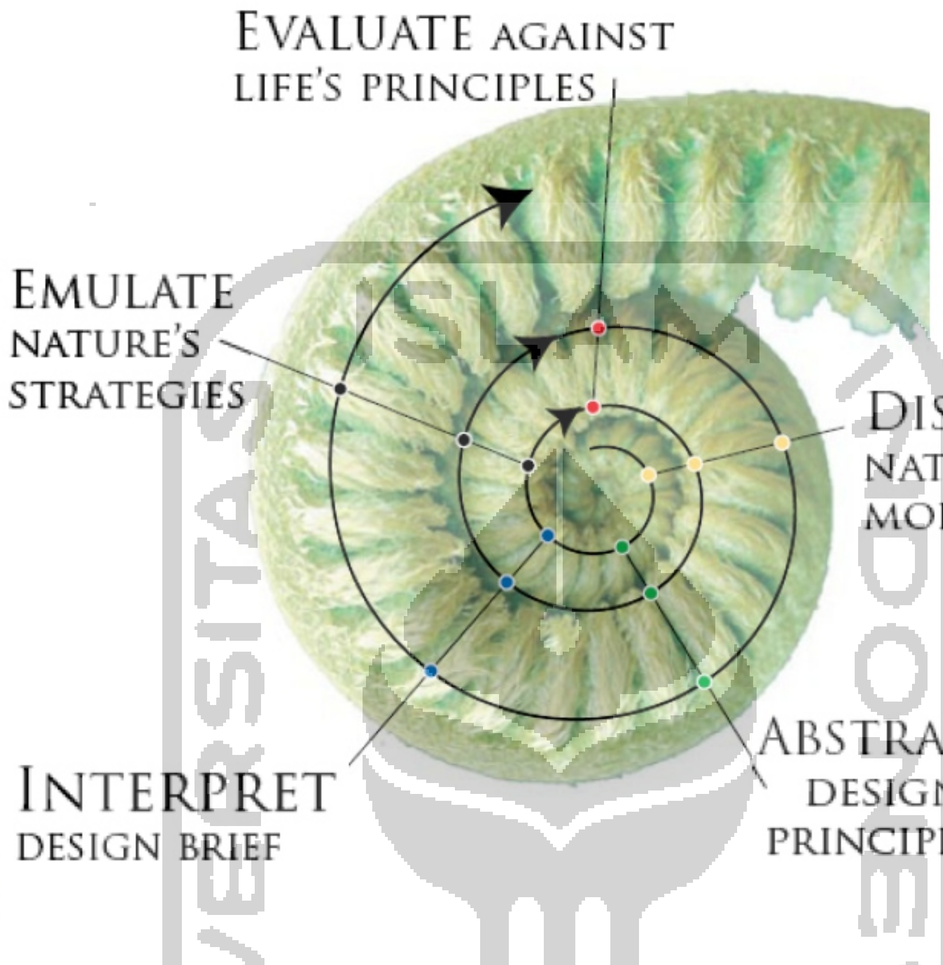
to absorb the rain water use capilarity proces. The capillarity means, the ability of a liquid to flow in narrow spaces without the assistance of and in opposition to external forces like gravity. in this design, use copper capilary tube. then this capilary tube in a large amount is wicker each other to make it stronger. then it can be bubble breath water flush.



amino silicone



capilary copper tube



abstract design principles

main function of the tree is filtering air, carbon dioxide and water with chlorophyll and solar energy make it become Oxygen and carbohydrate. second principle is, the tree is absorb water from hair-roots to leaaves use capilarity of xylem.

interpret design brief

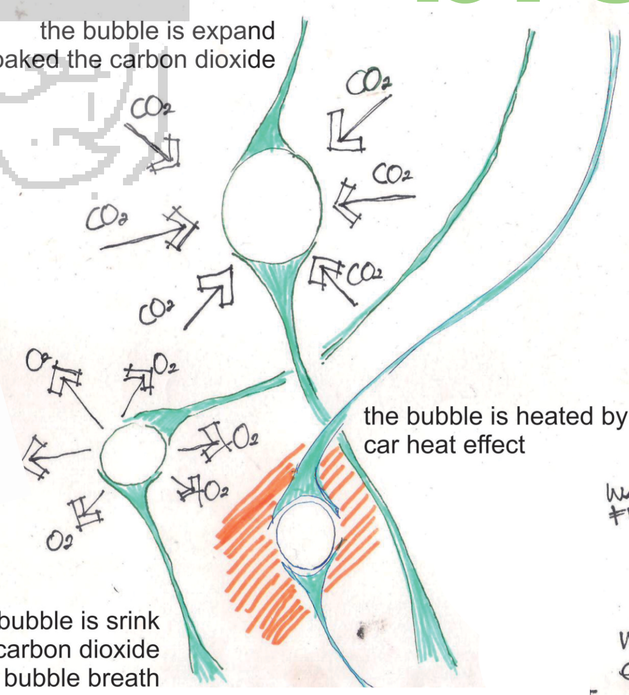
acordingly to the main function of the tree, it means there should be Carbon dioxide sytem and water transportation system. in the real tree, carbon dioxide filter through chemical process called photosythetic. in this case, this process subtitute by mechanicall process reffered to synthetic tree by Klaus lackner.
then the water transport process use cappilary system.

BUBBLE breath

This bubble apply in tube spout from rubber which not too sensitive with temperature. When the bubble expand it will fill the space between the spout and the bubble and inhibit the water slow from the tube. Then when the bubble is srink, there will be space between the bubble and the tube's spout and make some water from the capillary tube flow through the bubble surface, and bring the Carbon scrub flow with it. Then the water with carbon scrub through the pipe with longer diameter, so the water can through easily bring the carbon, to the carbon water container which then it can be proceed to carbon for power plant.

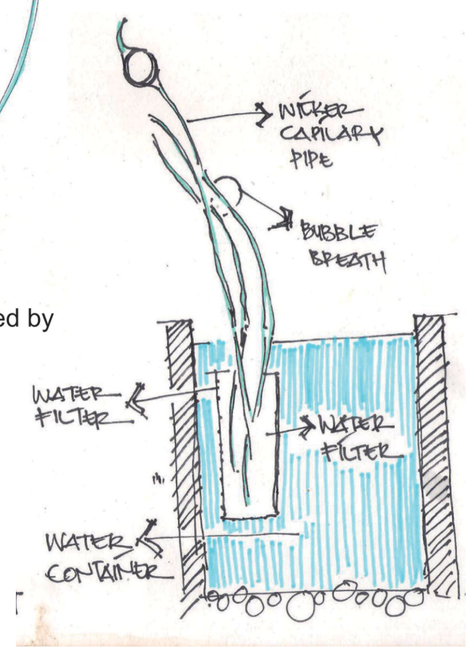


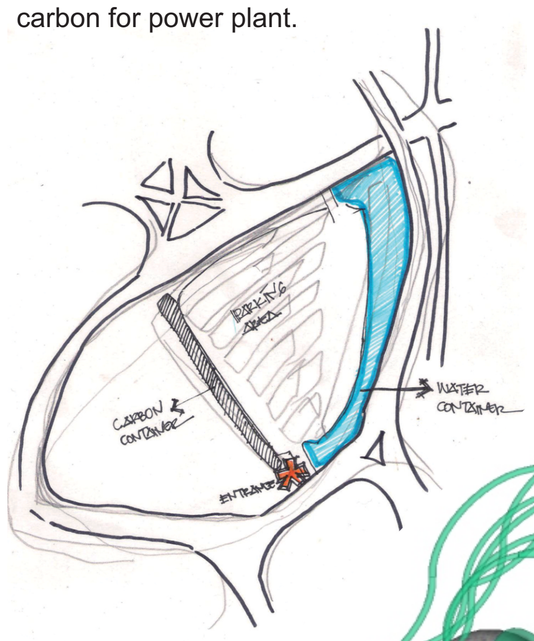
the bubble is expand
and soaked the carbon dioxide

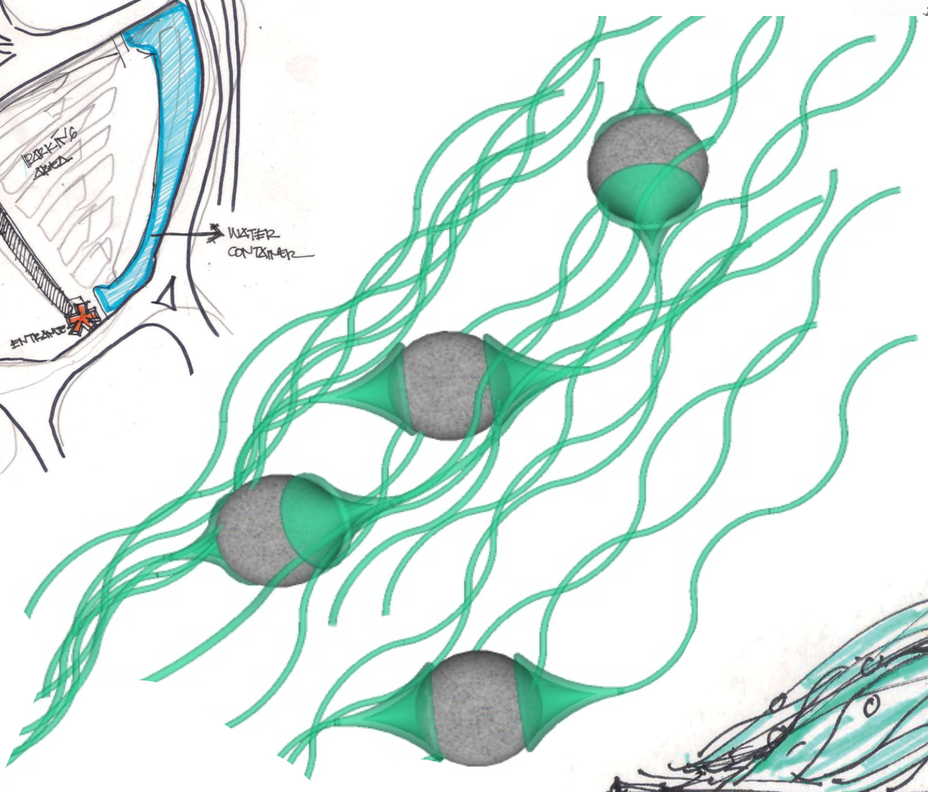


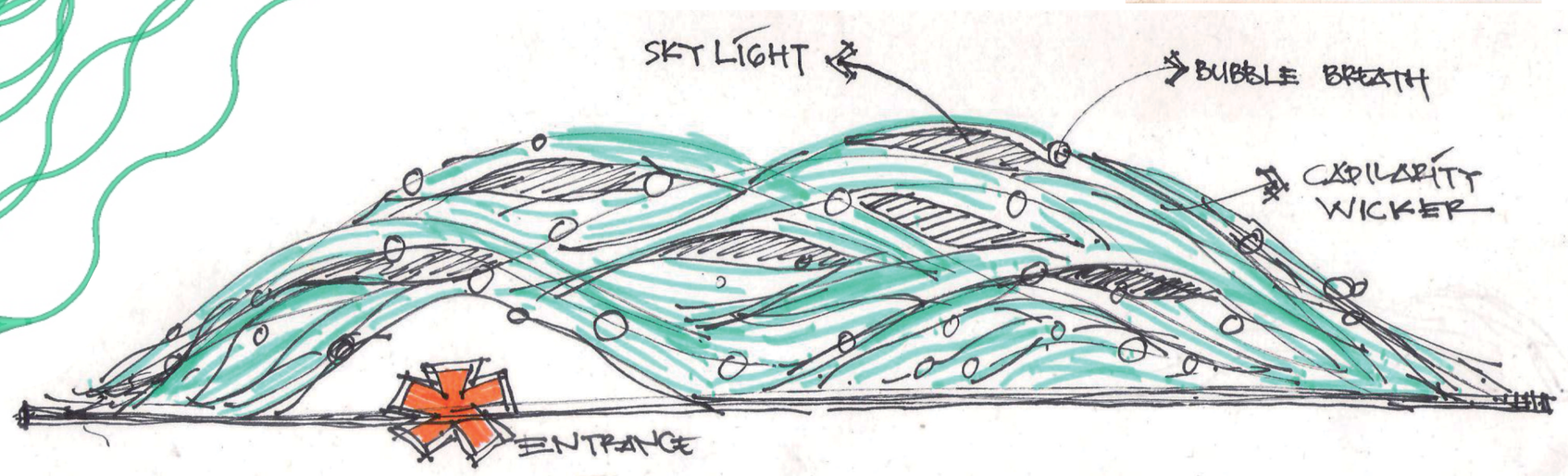
the bubble is heated by
car heat effect

when it was cold, the bubble is srink
and emit oxygen from carbon dioxide
filtration in bubble breath





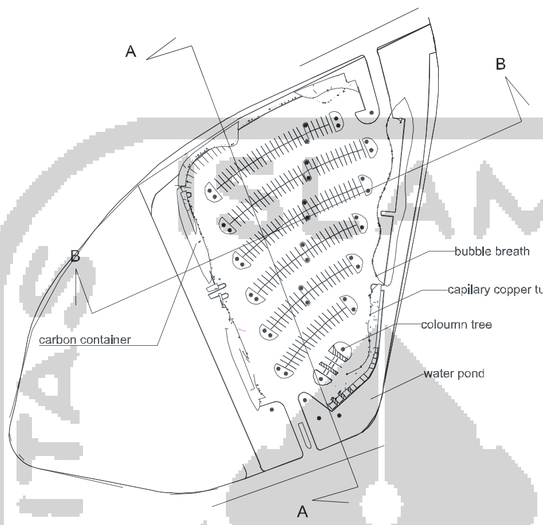


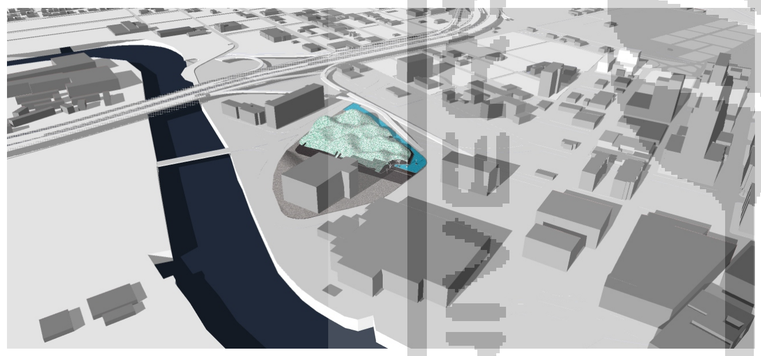


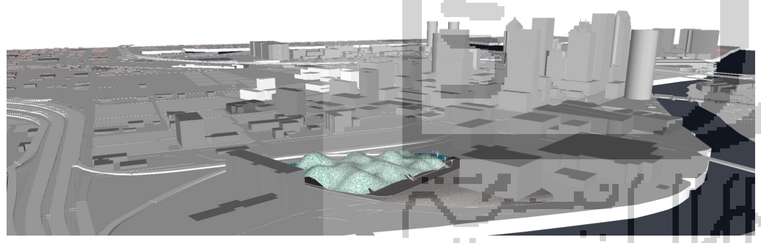
BUBBLE breath

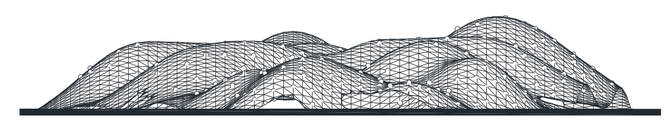
in the city of Tampa

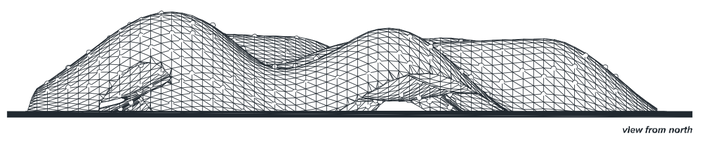


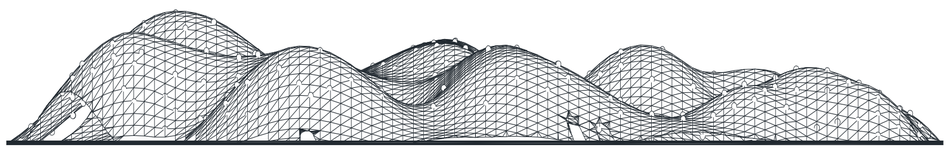


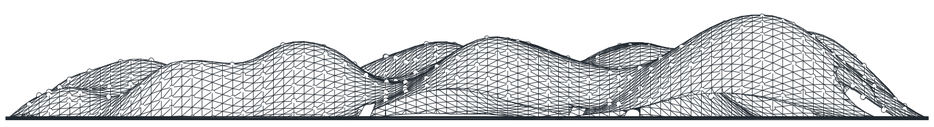


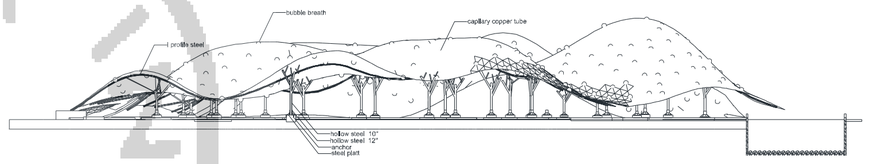


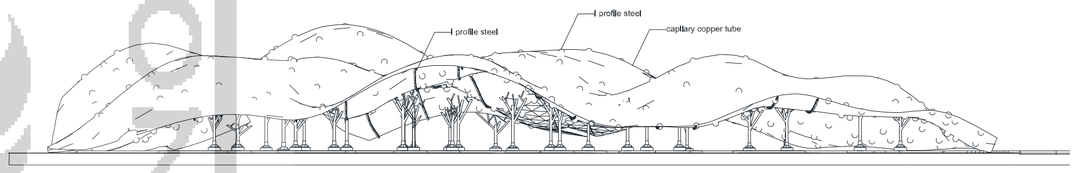


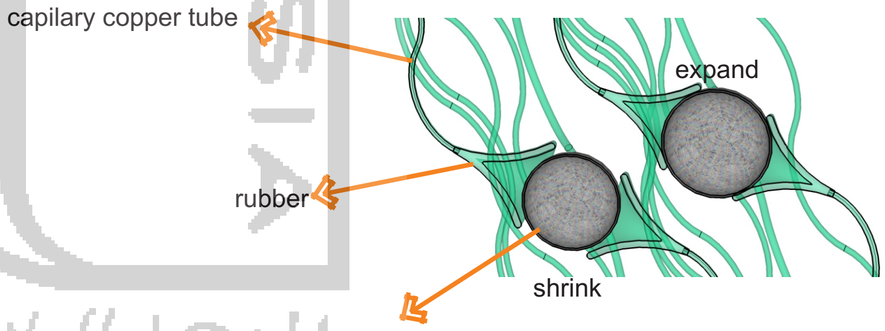


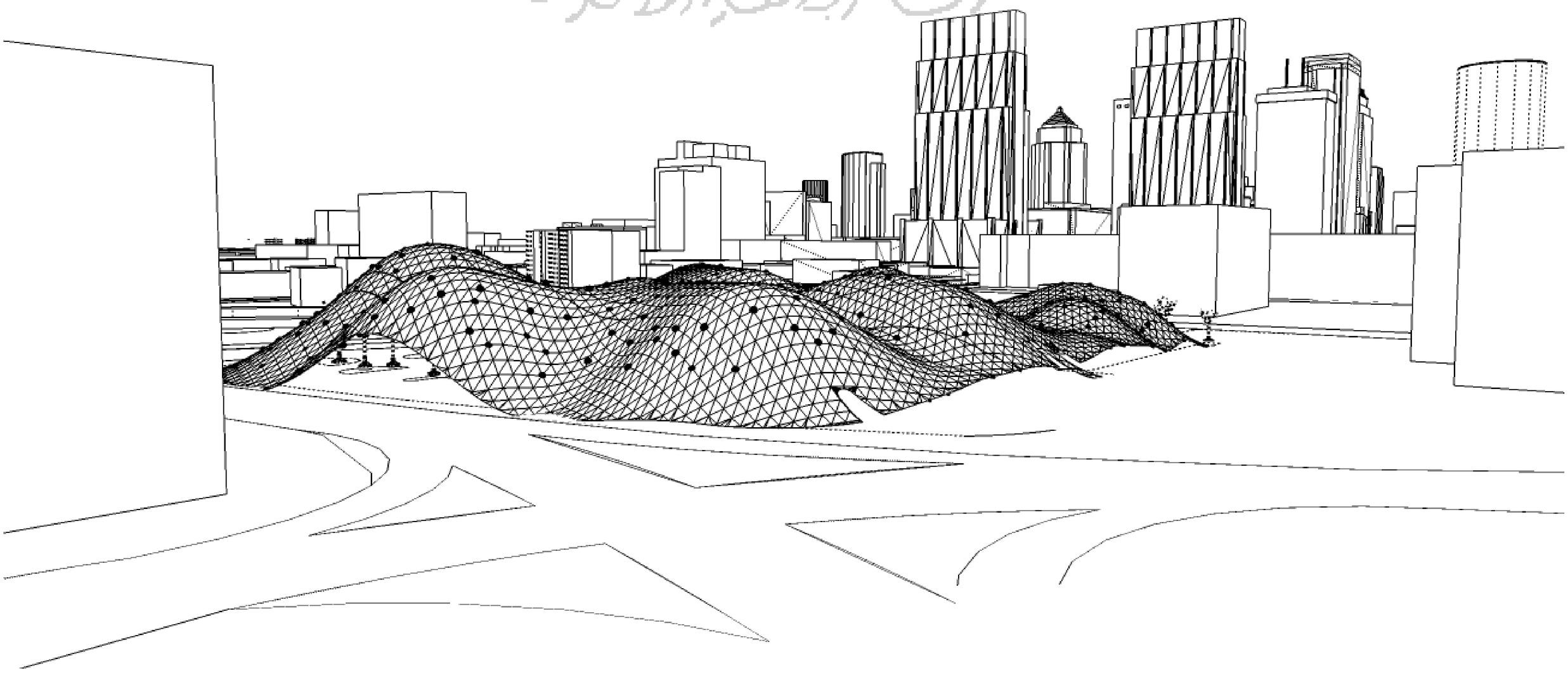




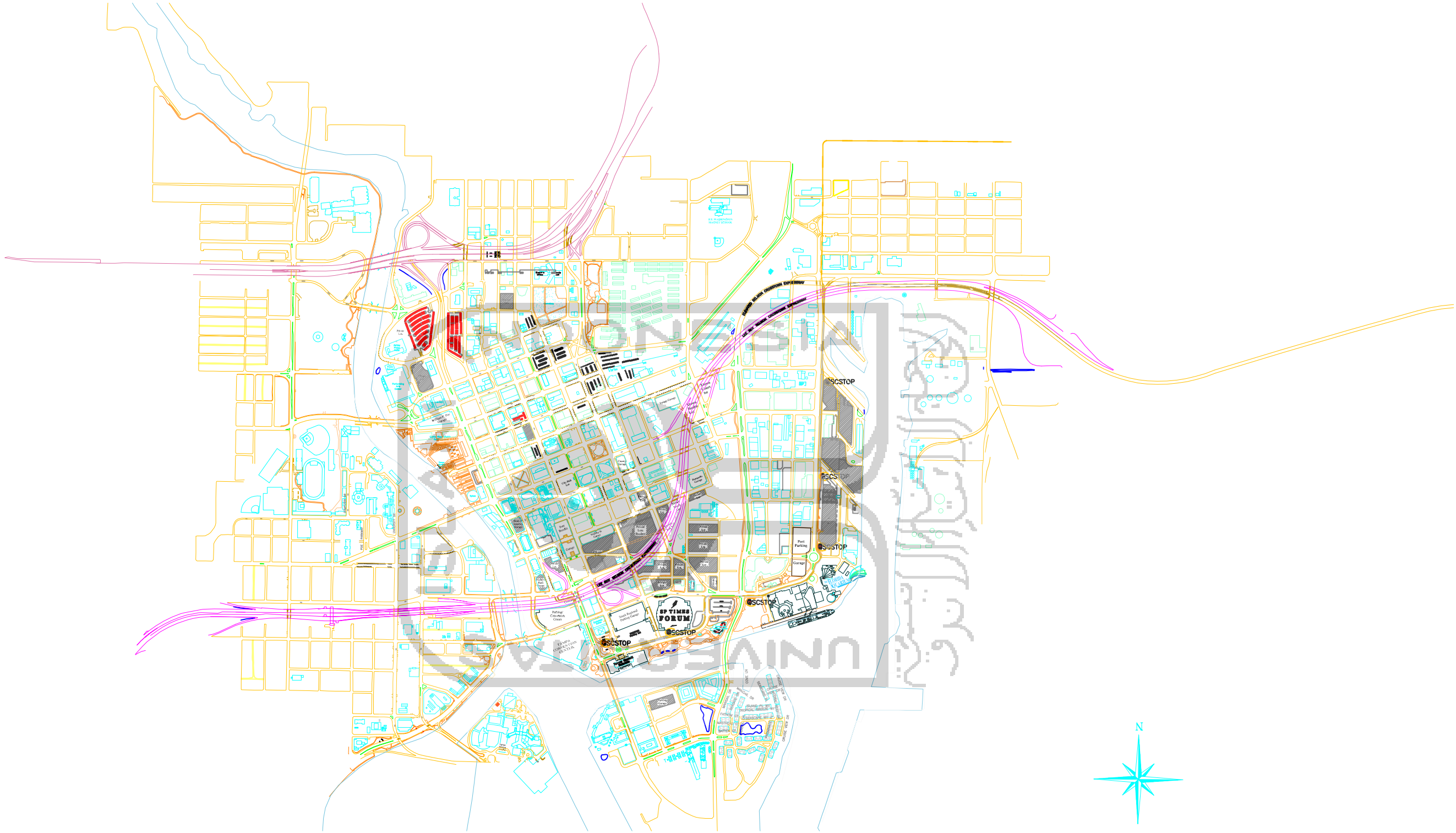








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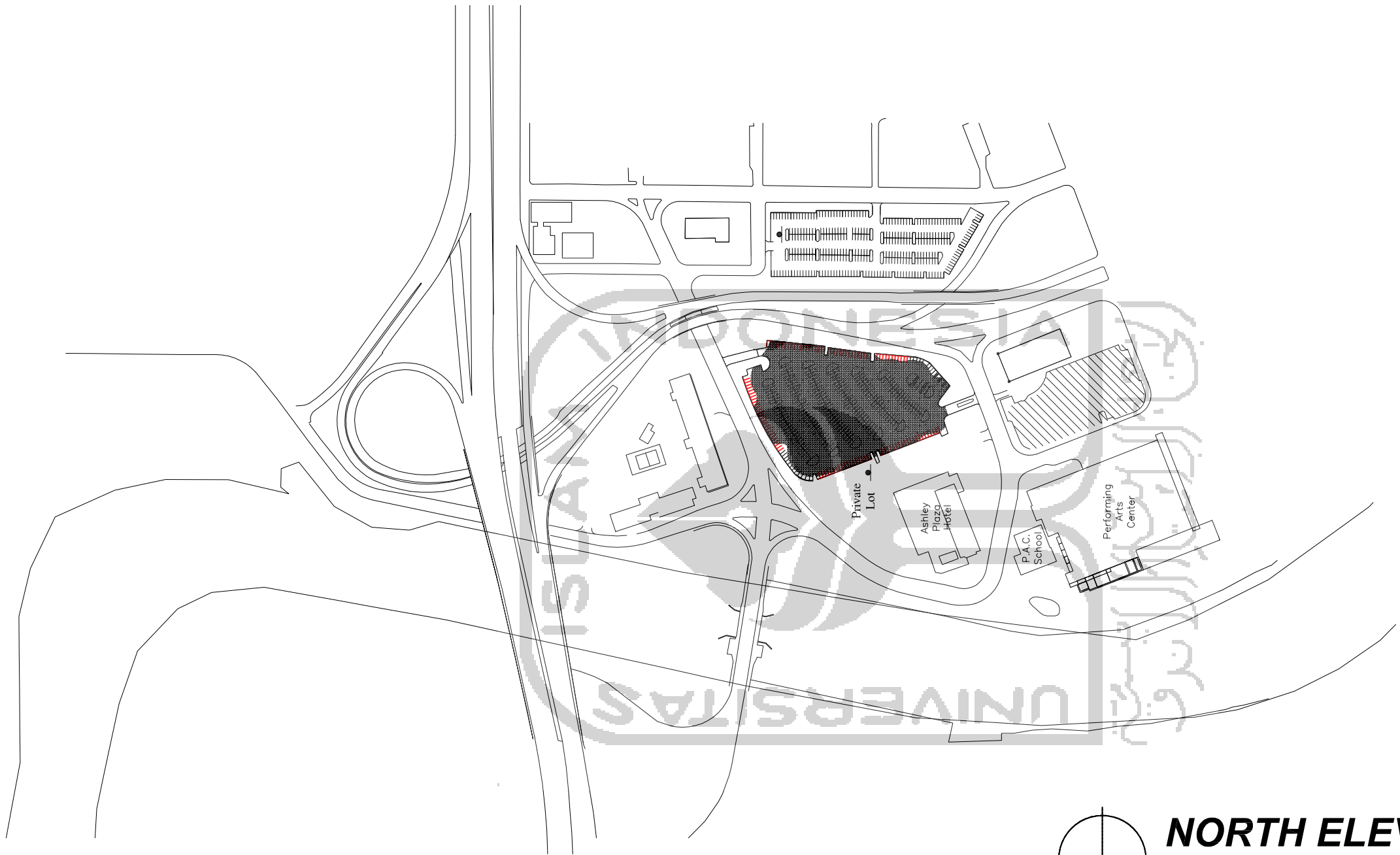


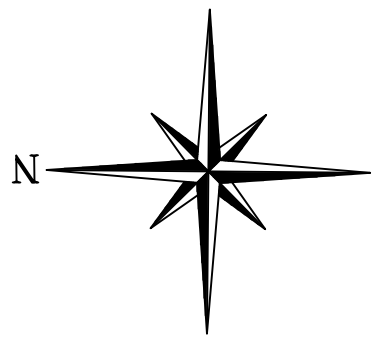
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FINAL PROJECT ARCHITECTURE DEPARTMENT FACULTY OF CIVIL ENGINEERING AND PLANNING ISLAMIC UNIVERSITY OF INDONESIA	6th PERIODE 2011-2012	[re]Stitch Tampa with Hillsborough River use Bubble Breath Technology	Lecture Advisor	STUDENT IDENTITY		TITLE	SCALE	NO OF PAGE	TOTAL PAGE	APPROVAL
			IR. ARMAN YULIANTA, MUP.	NAME	Gayuh Winisudaningtyas	The City of Tampa				
				NO. of ID	07.512.162					
				TANDA TANGAN						

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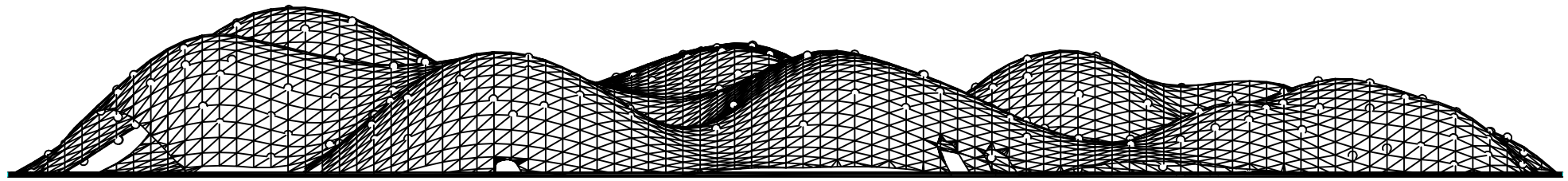
NORTH ELEVATION

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FINAL PROJECT ARCHITECTURE DEPARTMENT FACULTY OF CIVIL ENGINEERING AND PLANNING ISLAMIC UNIVERSITY OF INDONESIA	6th PERIODE 2011-2012	[re]Stitch Tampa with Hillsborough River use Bubble Breath Technology	Lecture Advisor	STUDENT IDENTITY		TITLE	SCALE	NO OF PAGE	TOTAL PAGE	APPROVAL
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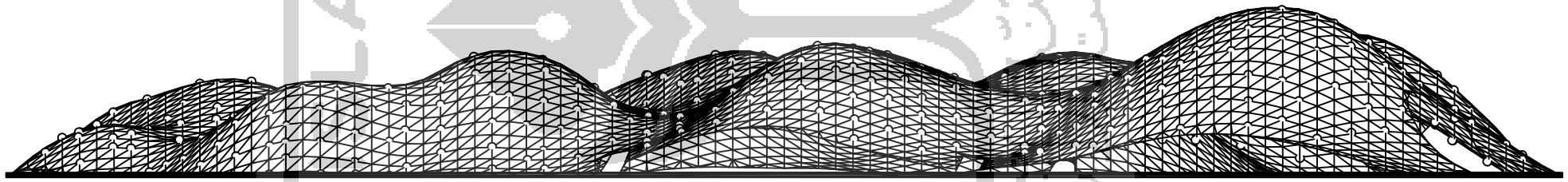
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EAST ELEVATION

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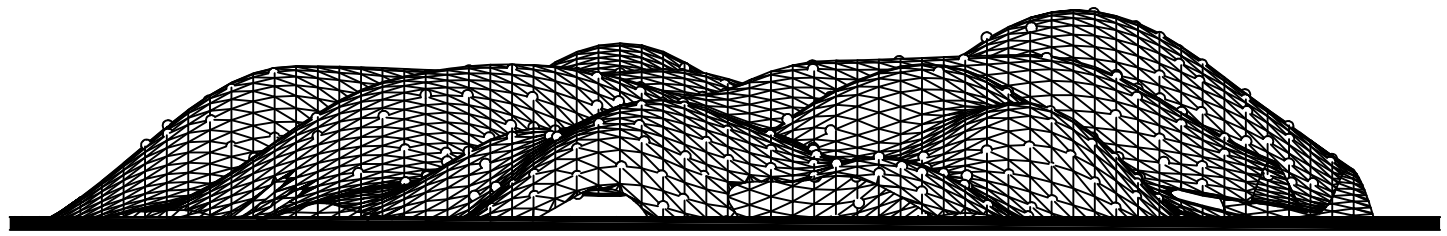
WEST ELEVATION

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FINAL PROJECT ARCHITECTURE DEPARTMENT FACULTY OF CIVIL ENGINEERING AND PLANNING ISLAMIC UNIVERSITY OF INDONESIA	6th PERIODE 2011-2012	[re]Stitch Tampa with Hillsborough River use Bubble Breath Technology	Lecture Advisor	STUDENT IDENTITY		TITLE	SCALE	NO OF PAGE	TOTAL PAGE	APPROVAL
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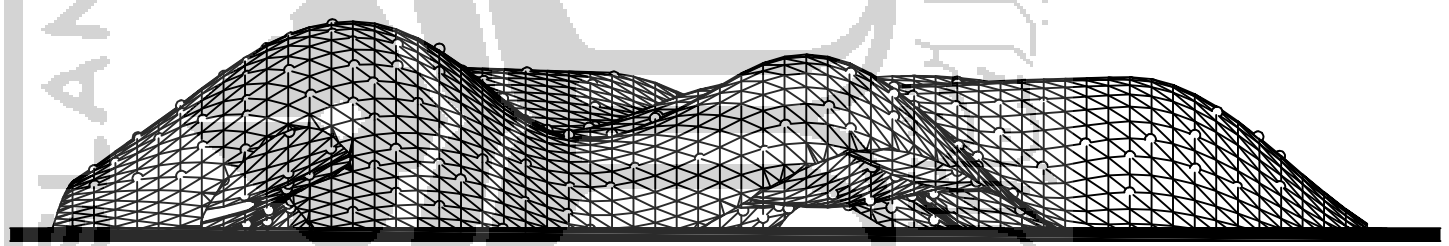
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SOUTH ELEVATION

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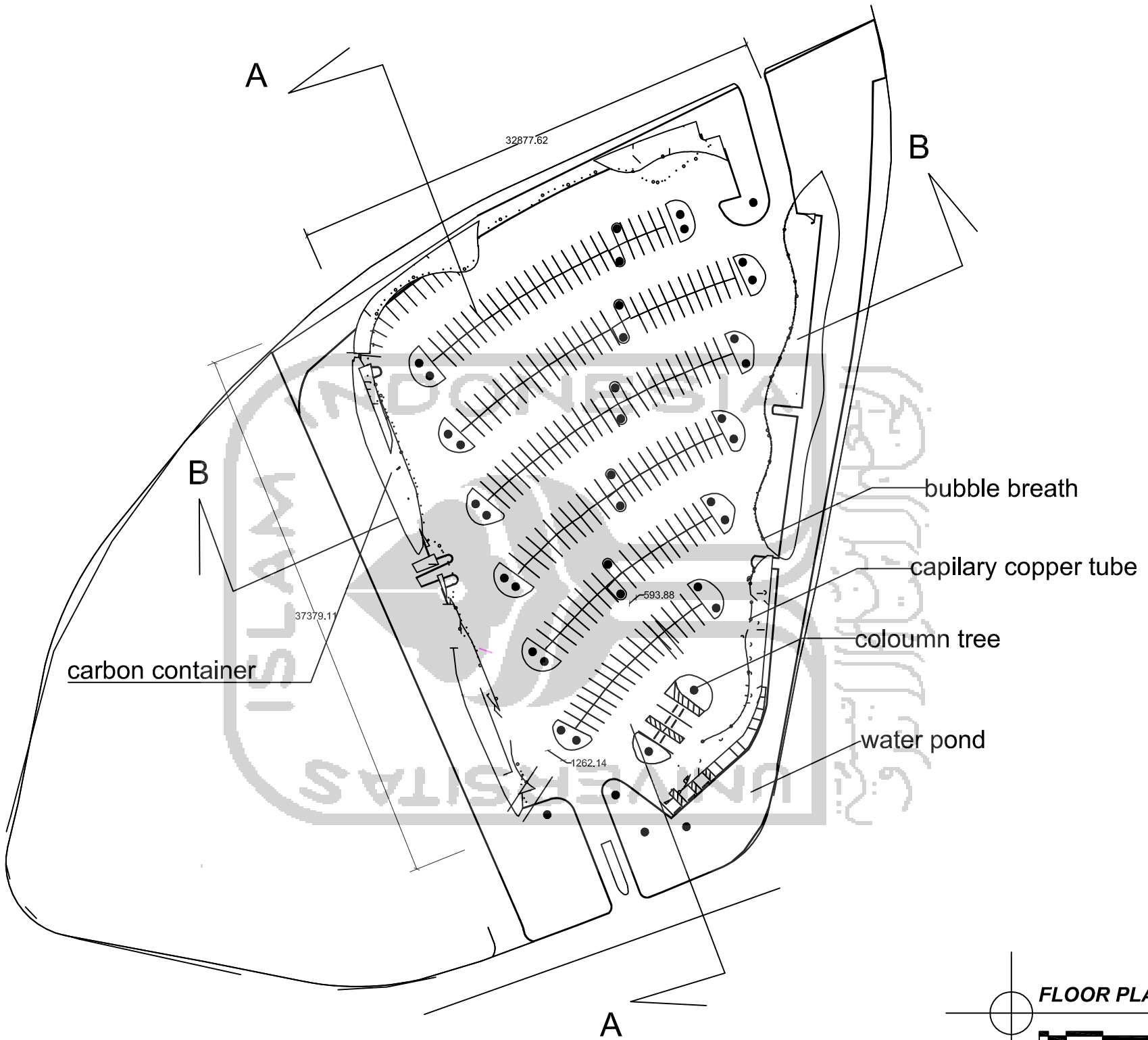
NORTH ELEVATION

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FINAL PROJECT ARCHITECTURE DEPARTMENT FACULTY OF CIVIL ENGINEERING AND PLANNING ISLAMIC UNIVERSITY OF INDONESIA	6th PERIODE 2011-2012	[re]Stitch Tampa with Hillsborough River use Bubble Breath Technology	Lecture Advisor	STUDENT IDENTITY		TITLE	SCALE	NO OF PAGE	TOTAL PAGE	APPROVAL
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				NO. of ID	07.512.162					
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FLOOR PLAN

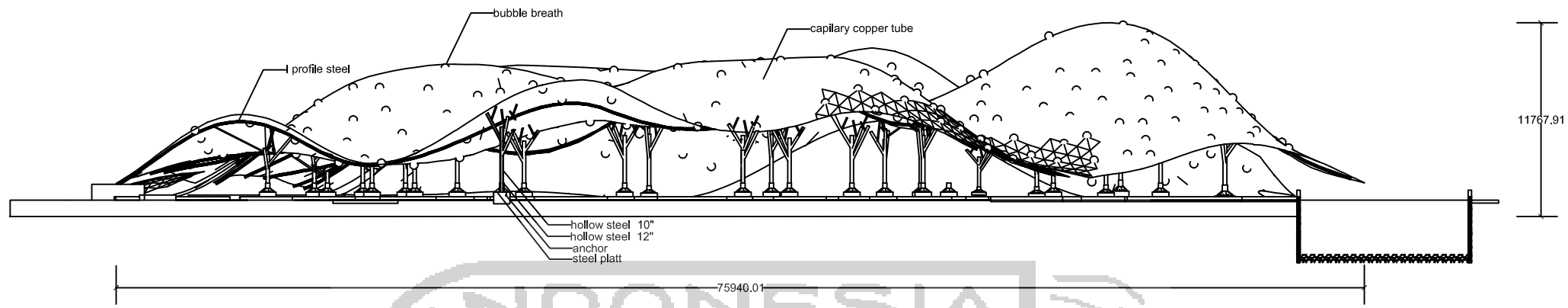
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FINAL PROJECT ARCHITECTURE DEPARTMENT FACULTY OF CIVIL ENGINEERING AND PLANNING ISLAMIC UNIVERSITY OF INDONESIA	6th PERIODE 2011-2012	[re]Stitch Tampa with Hillsborough River use Bubble Breath Technology	Lecture Advisor	STUDENT IDENTITY		TITLE	SCALE	NO OF PAGE	TOTAL PAGE	APPROVAL
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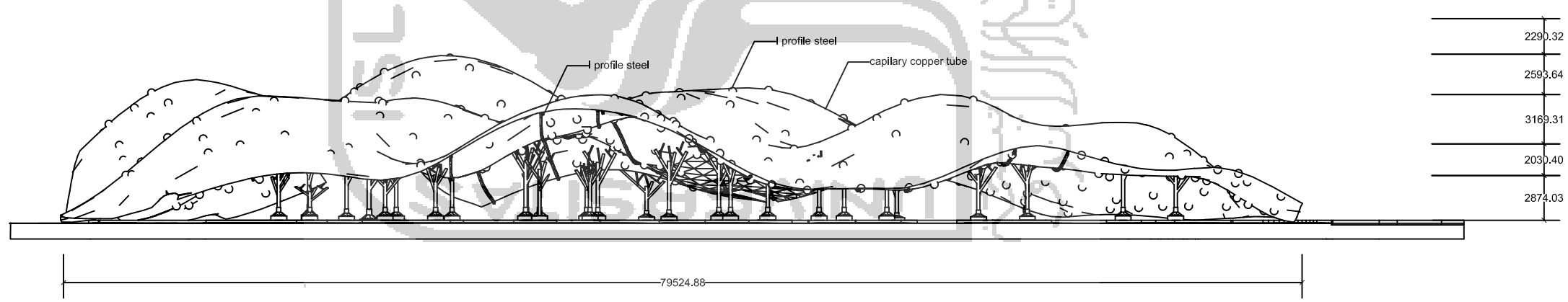
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SECTION A-A

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SECTION B-B

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FINAL PROJECT *ARCHITECTURE DEPARTMENT* *FACULTY OF CIVIL ENGINEERING AND PLANNING* ISLAMIC UNIVERSITY OF INDONESIA	*6th PERIODE 2011-2012*	*[re]Stitch Tampa with Hillsborough River use Bubble Breath Technology*	*Lecture Advisor*	*STUDENT IDENTITY*		*TITLE*	*SCALE*	*NO OF PAGE* / *TOTAL PAGE* / *APPROVAL*
			IR. ARMAN YULIANTA, MUP.	*NAME*	*Gayuh Winisudaningtyas*	*section A-A* *section B-B*		
				NO. of ID	*07.512.162*			
				TANDA TANGAN				

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