WHICH MEASURES AT BUILDING LEVEL WILL HELP CAN THO CITY ADAPTING TO CLIMATE CHANGE

Climate sensitive world deltas

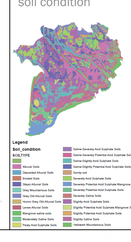


[Delta Alliance, 2009]

Vietnam- Netherlands



Soil- Mekong Delta
soil condition



Flood- Mekong Delta
flood water level



Urban city- water
Mekong delta



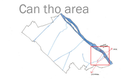
Can tho area



Strategic position
Mekong delta



Can tho area

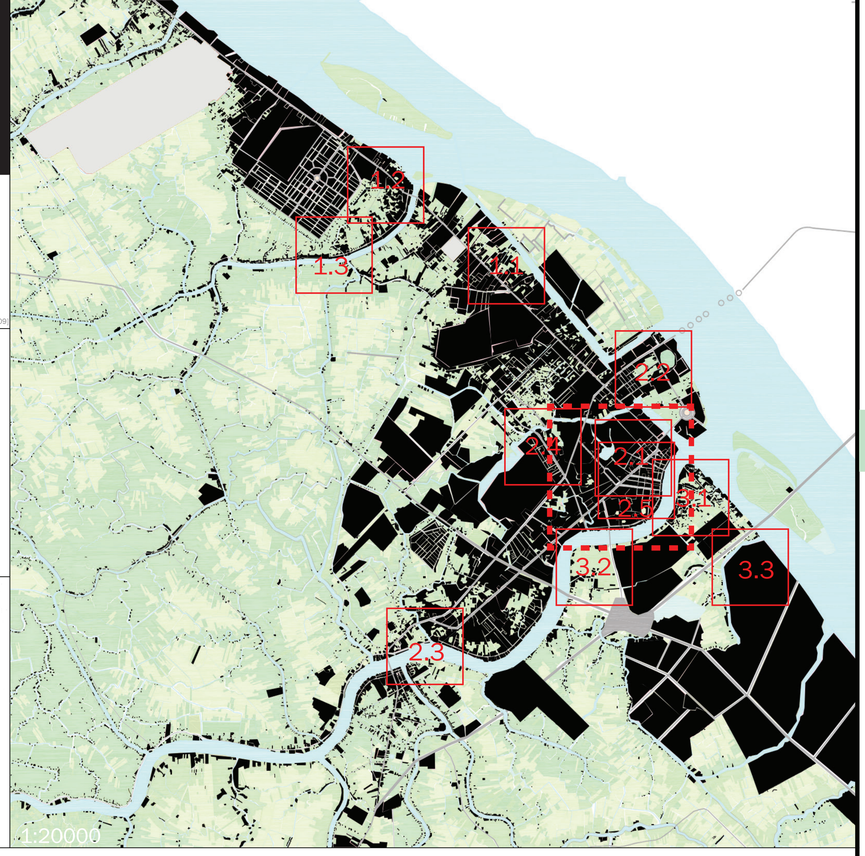


Height- Low area
Mekong delta

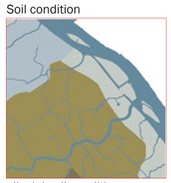


Can tho area





Soil condition



alluvial soil condition
nea Hau river humid till young soils inwards- at least 30% clay

aeric fluvaquents
aquic tropaquepts
ustifluvents
ustropepts

Heights



Low to heigh, +0,3 till +1,2m

+ 1.2 m
+0.6 to 0.9 m
+0.9 to 1.2 m
+0.3 to +0.6 m

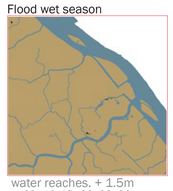
Flood dry season



water reaches. + 1.5m

0 0.5 1.0 1.5 2.0 2.5 3.0

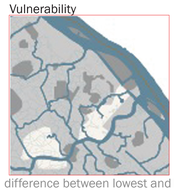
Flood wet season



water reaches. + 1.5m

0 0.5 1.0 1.5 2.0 2.5 3.0

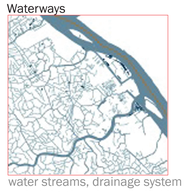
Vulnerability



difference between lowest and highest reaches +1.7m during the ebbing tide

high
low vulnerability
dikes (erosion protection)
medium vulnerability

Waterways



water streams, drainage system main irrigation channels (fish)

fish farm
irrigation channel
river/ canal

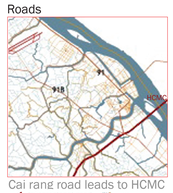
Agriculture



landuse for farming purposes (rice fields, fish farms)

rice field
long term crop
annual crop
fish farm

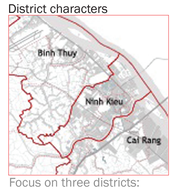
Roads



Cai rang road leads to HCMC

interrogional road
village road
city road

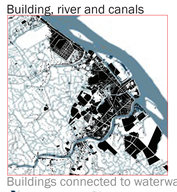
District characters



Focus on three districts: Binh Thuy, Ninh Kieu, Cai Rang

district borderline

Building, river and canals



Buildings connected to waterways

fish farm
irrigation channel
river/ canal
building

Built area



Urban, sub- urb and rural areas

building

Google maps



(Googlemaps, 2013)

[Rahmanti et.al., 2009]

CAN THO DISTRICT ANALYSIS

1.1 Binh Thuy district





urbanised area, residential redeveloping area, landuse for fish farmings

1.2 Binh Thuy district





residential developing area, landuse for farmings

1.3 Binh Thuy district





rural area
landuse for rice fields farmings

2.1 Ninh Kieu district





urban historic centre. orthogonal structure, lack of green

2.2 Ninh Kieu district





urban industries centre. orthogonal structure, green

2.3 Ninh Kieu district





urban centre. organic shaped with variable structures, lack of green

2.4 Ninh Kieu district





sub- urban centre area, illegal housing, star- grid system, residential development

3.1 Cai Rang district





industries developing area, illegal housing, star- grid system, residential development, green

3.2 Cai Rang district



rural area, industries developing area, illegal housing, green

3.3 Cai Rang district

rural area, industries developing area,illegal housing, residential development, green

CONCLUSION CAN THO DISTRICT ANALYSIS

	MEASURES EFFECTS		PEOPLE	PLANET	PROFIT
BINH THUY	flourishing urbanism consisting residental projects and industries, important connection Can tho airport	sub- urban, fishery industries, green	X		
NINH KIEU	X center of the governmental seat of Can tho and center of the historical urban development	urban, lack of green, concretion area	X	X	X
CAI RANG	zones for new residential projects and industrial platform passed by recent project of A1 national highway	new zones, industrial factories, green	X	X	

CAN THO DISTRICT ANALYSIS - INWARD LAND - WATER LAND

A. Ninh Kieu - informal settlements

B. Ninh Kieu - corner can tho river and hau river

C. Ninh Kieu - land inward urban centre

2.5 Ninh Kieu hospital district

urban centre area, hospital, cuu long hotel

AA'

BB'

CC'

CONCLUSION CAN THO NINH KIEU DISTRICT

	MEASURES EFFECTS		PEOPLE	PLANET	PROFIT
NINH KIEU- A	X informal settlements green	sub- urban, green	X		
NINH KIEU- B	X connected with hau river and can tho river, lacking green	urban, industrial lack of green	X	X	X
NINH KIEU- C	X zones for new residential projects and industrial platform passed by recent project of A1 national highway	hospital, lack of green, formal settlements	X	X	X

MEASURES	Flooding due sea level	Flooding due tides	Heavy rainfalls	Droughts	Fresh water supply	Salt water intrusion	Heat stress	Water pollution	Disease	Economy	Poverty
1. High reflection material							X		X	X	
2. Cooling by rivervater				X			X		X	X	X
3. Green Roofs			X	X					X	X	
4. Solar collectors on roof										X	X
5. Flat Roofs				X			X			X	
6. Shadowing building				X			X			X	
7. Terrace spray installation				X			X			X	
8. Nature ventilation							X		X	X	

[Deltaprogramma Maatregelenmatrix, 2013]

MEASURES	People	Planet	Profit
1. High reflection material			X
2. Cooling by rivervater		X	
3. Green Roofs		X	
4. Solar collectors on roof			X
5. Flat Roofs			X
6. Shadowing building	X		
7. Terrace spray installation	X		
8. Nature ventilation			X

Ninh Kieu map

water
green
islands network
other

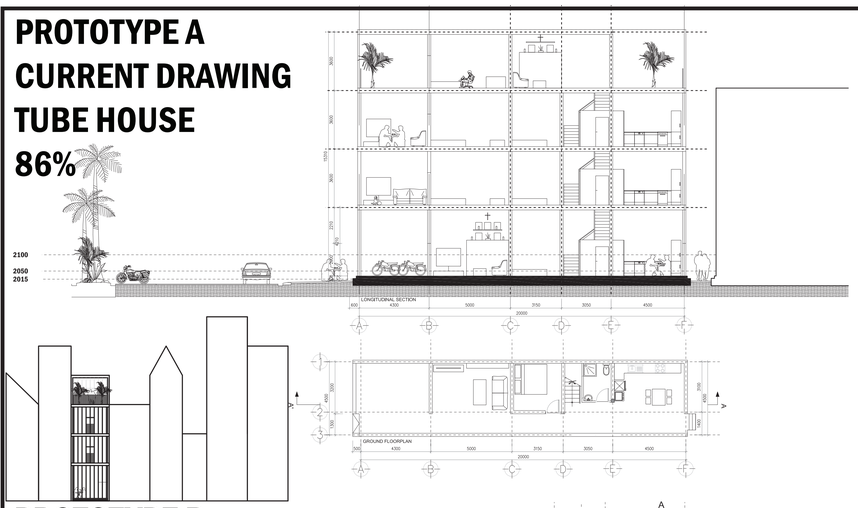
Vietnam CAN THO CITY

WHICH MEASURES AT BUILDING LEVEL WILL HELP CAN THO CITY ADAPTING TO CLIMATE CHANGE

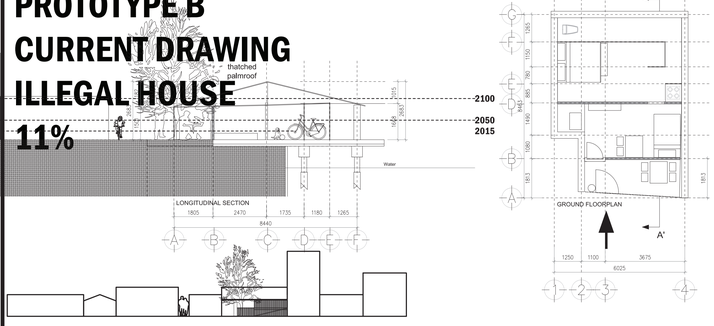
BEFORE	DURING FLOODS				AFTER FLOODS			
04:00-06:00h	06:00-08:00h	08:00-12:00h	12:00-13:00h	13:00-17:00h	17:00-18:00h	18:00-22:00h	22:00-00:00h	00:00-04:00h
DRY SEASON /// DECEMBER - JANUARY	DRY SEASON /// DECEMBER - JANUARY	DRY SEASON /// DECEMBER - JANUARY	DRY SEASON /// DECEMBER - JANUARY	DRY SEASON /// DECEMBER - JANUARY	DRY SEASON /// DECEMBER - JANUARY	DRY SEASON /// DECEMBER - JANUARY	DRY SEASON /// DECEMBER - JANUARY	DRY SEASON /// DECEMBER - JANUARY
RAINY SEASON/// FEBRUARY - JULY	RAINY SEASON/// FEBRUARY - JULY	RAINY SEASON/// FEBRUARY - JULY	RAINY SEASON/// FEBRUARY - JULY	RAINY SEASON/// FEBRUARY - JULY	RAINY SEASON/// FEBRUARY - JULY	RAINY SEASON/// FEBRUARY - JULY	RAINY SEASON/// FEBRUARY - JULY	RAINY SEASON/// FEBRUARY - JULY
RAINY FLOOD SEASON/// AUGUST - NOVEMBER	RAINY FLOOD SEASON/// AUGUST - NOVEMBER	RAINY FLOOD SEASON/// AUGUST - NOVEMBER	RAINY FLOOD SEASON/// AUGUST - NOVEMBER	RAINY FLOOD SEASON/// AUGUST - NOVEMBER	RAINY FLOOD SEASON/// AUGUST - NOVEMBER	RAINY FLOOD SEASON/// AUGUST - NOVEMBER	RAINY FLOOD SEASON/// AUGUST - NOVEMBER	RAINY FLOOD SEASON/// AUGUST - NOVEMBER

04:00h CLEANING STREET MINI FOOD MARKETS — 06:00h DEPARTURE FROM HOME TO WORK OR SCHOOL — 08:00h OFFICE WORKING HOURS — 12:00h PAUSE — 13:00h OFFICE WORKING HOURS — 17:00h BACK HOME — 18:00h DINNER TIME STREET MINI MARKETS ARE STARTING UP — 22:00h CLEANING STREETS LAST EMPLOYERS GO BACK HOME — 24:00h BEDTIME — 04:00h

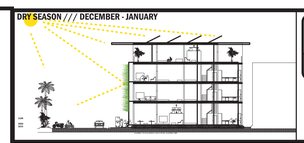
PROTOTYPE A
CURRENT DRAWING
TUBE HOUSE
86%



PROTOTYPE B
CURRENT DRAWING
ILLEGAL HOUSE
11%



DRY SEASON /// DECEMBER - JANUARY

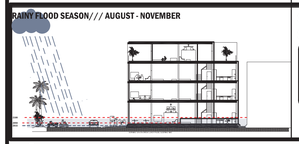


THERE WILL BE LESS HEAT IN THE HOUSE, DUE EXTENDING THE ROOFTOP
SOLLULAR CELLS WILL GAIN ELECTRICITY POWER AND CAN BE USED AS SAVING

GREEN ROOFS MAKE INSIDE COOLER, BUT PLANTS COULD DRY OUT EASILY, HAVE MORE WEIGHT, NEEDS DIFFERENT CONSTRUCTION, MAKE MORE GARBAGE. BUT DOES REDUCE CO2 AND MAKES THE BUILDING IN ITS ENVIRONMENT MORE HEALTHY

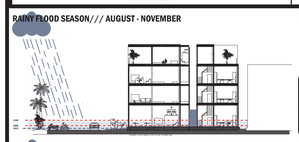
HIGHLY REFLECTIVE FACADE WILL DIRECT THE SOLAR REFLECTION TOWARDS THE TRAFFIC, WHICH IS JUST PUSHING THE PROBLEM SOMEWHERE ELSE

RAINY FLOOD SEASON/// AUGUST - NOVEMBER



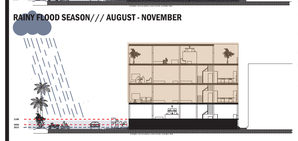
SPLITLEVEL WILL WORK TILL 2050, BUT THE WATER STILL ENTERS THE HOUSE

RAINY FLOOD SEASON/// AUGUST - NOVEMBER



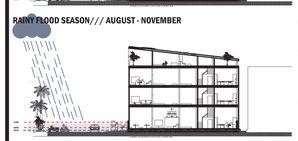
WATER STORAGE ATRIUM, STORES WATER AND MAKES SELF SUFFICIENT WATER SUPPLY.
HOWEVER FLOOD IS STILL ENTERING THE HOUSE AND IS TAKING TO MUCH SPATIAL M2 AND MAINTAINCE ISSUE.

RAINY FLOOD SEASON/// AUGUST - NOVEMBER

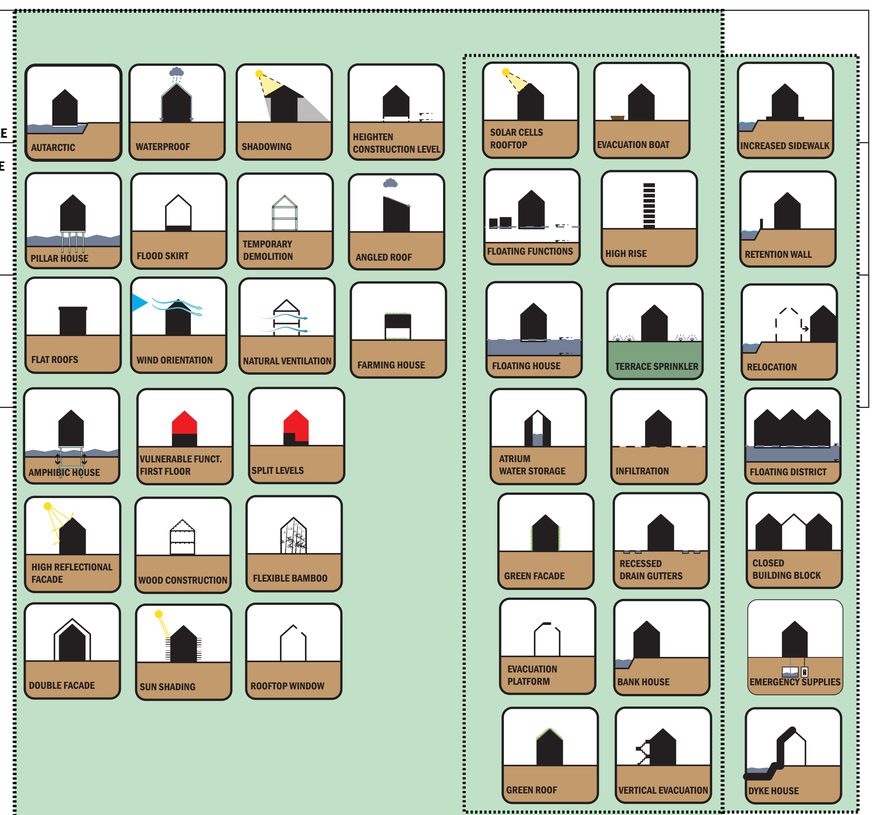


HEIGHTEN CONSTRUCTION FLOOR WILL KEEP THE WATER OUTSIDE OF THE BUILDING. HOWEVER ENTERING, RESTAURANT AND SELLING ACTIVITIES ARE NOT ACCESIBLE ANYMORE.
VULNERABLE FUNCTIONS FIRST FLOOR KEEPS THE FURNITURE SAFE, BUT IT IS HARD FOR ELDERLY TO GO UPSTAIRS ALL THE TIME, THEY SHOULD LIVE NEAR THE GROUND.

RAINY FLOOD SEASON/// AUGUST - NOVEMBER



ANGLED ROOF IS DIRECTING THE WATER TO THE ALLEY AND DIRECTIONS THE PROBLEM ELSEWHERE. THE WATER SHOULD BE STORED SOMEHOW.
RETENTIONWALLS KEEP THE WATER OUTSIDE, BUT FOR HOW LONG WILL THIS LAST? THE BUSINESS ACTIVITIES CANNOT CONTINUE EASILY WITH HAVING SUCH A “WALL” BARRIERE IN FRONT OF THE SHOP.



FINAL GRADUATION
FACULTY OF ARCHITECTURE AND THE BUILT ENVIRONMENT

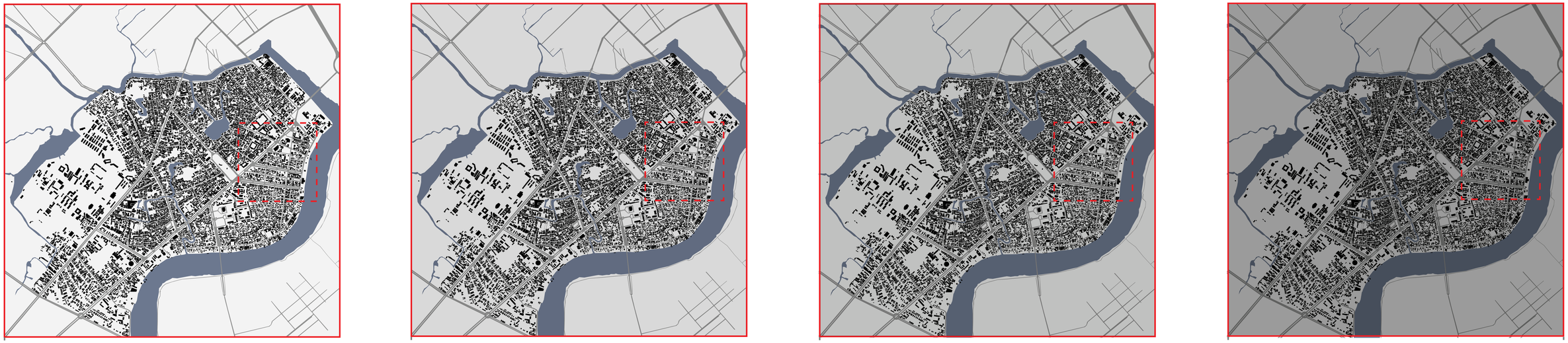
PROJECT NAME:

Rethink Can Tho.

MADE BY:

Hanh Nguyen

WHEN TO USE WHICH CLIMATE MEASURE?



STRATEGIES PER INUNDATION LEVEL

FACULTY OF ARCHITECTURE AND THE BUILT ENVIRONMENT

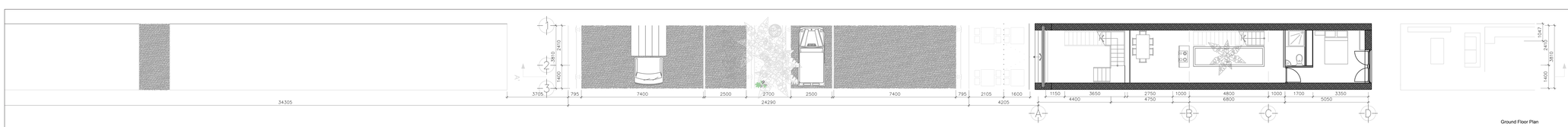
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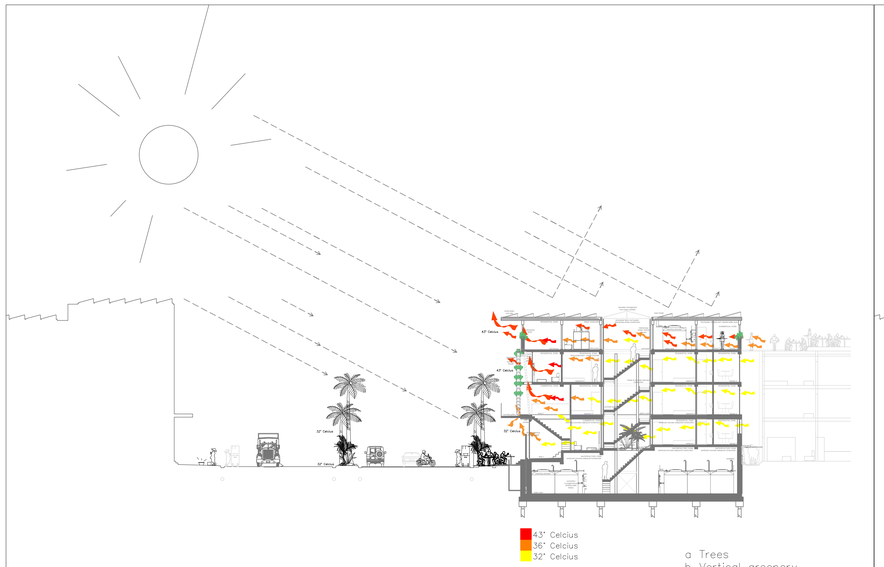
Rethink Can Tho.

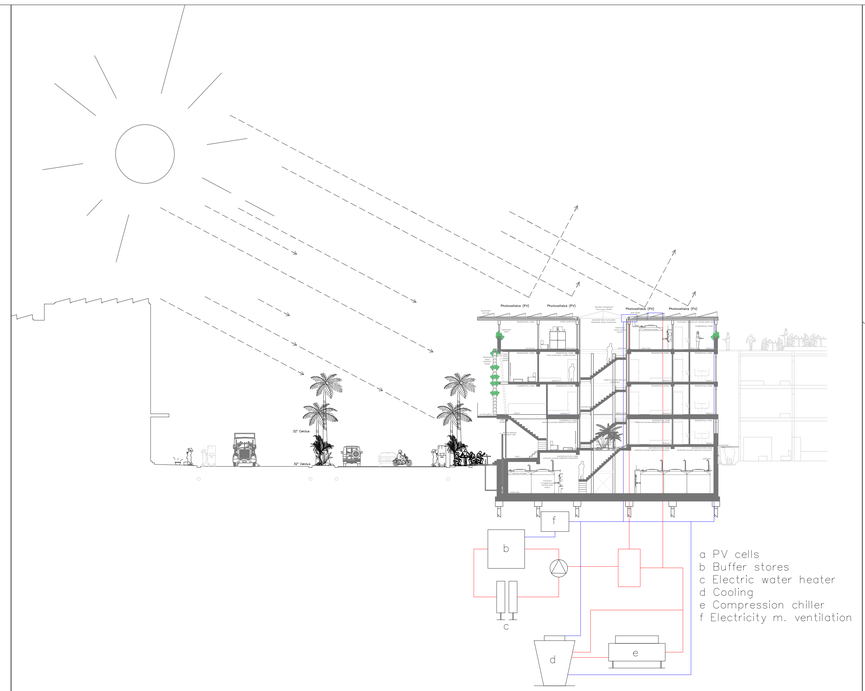
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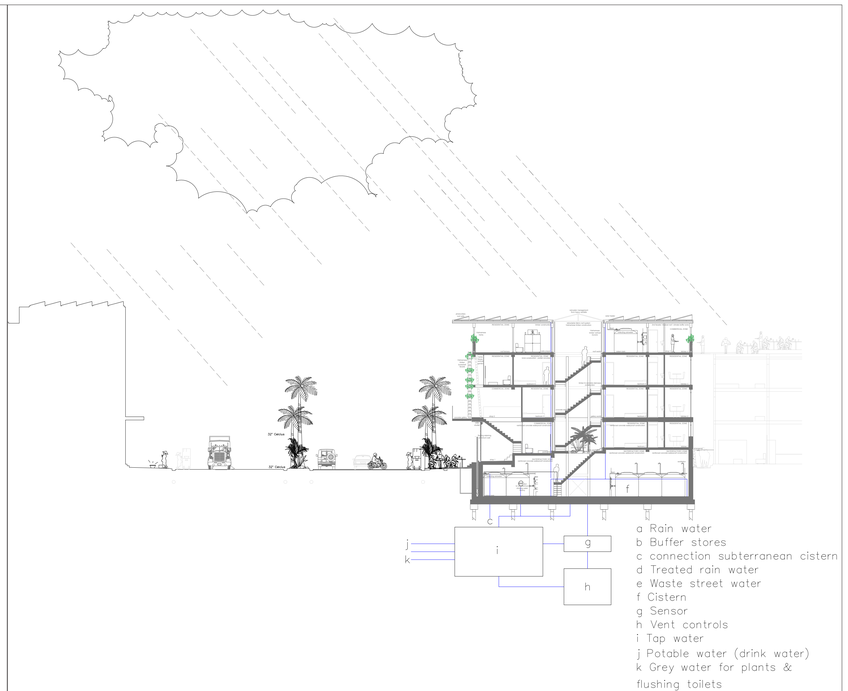
Hanh Nguyen











Project Name: Rethink Cần Thơ
Place and Date: Delft, 27th of January, 2016
Scale 1:100 & Scale 1:200

Delft University of Technology
MSc Graduate Student, Hanh Nguyen (1303171)
Faculty of Architecture and the Built Environment