



FLUCTUATING TYPOLOGIES

Investigating the relationship between commerce and leisure

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INTENTION

This thesis program is situated within the master unit 'Architecture and Extreme Environments'. The unit explores architecture as a vehicle to develop a site-specific understanding of the environment, as a response to local and global issues. This year's location of Manaus, examines its geographical conditions, located deep within the Amazon rainforest, in Brazil. Its extreme weather conditions in a humid tropic-climate, and atmospheric phenomena, bringing heavy rainfall and flooding as well as droughts, presents apparent strategic obstacles for the built environment.

The ambition of the project is to investigate the edge conditions between the city and the river, and the meeting of a bustling city at the border of the rainforest. In doing so the project intends on exploring the intersection between trade and commerce, and social characteristics of leisure and gathering. This architectural investigation will manifest through:

a program that reinterprets temporal shifts, at both a daily and seasonal scale, inherent in the typology of the marketplace, by redefining the relationship between distribution, trading space, food vendors and public leisure activities.

The project will engage with studying the flow of people and goods, the meetings and crossings of traders and customers during their everyday life, and the insights into the typical leisure life and activities in Manaus. The architectural proposition aims to intimately investigate the transitions between open and closed spaces, from water to land, from day to night, and at a broader scale, the unique climatic conditions impacting the context of Manaus.

The project will include investigations in different scales, from urban planning, to the flow of people and goods, and smaller enclosed spaces with multiple functions.

One of the main daily climatic challenges in Manaus is extreme heat and humidity, thus one of the aims is to investigate notions of human comfort in this type of climate, exploring different kinds of natural ventilation and cooling, trying to reach comfortable indoor, outdoor and in between micro climates integrated in the architecture.

Through preliminary investigations involving direct on-site engagement, independent fieldwork and prototype experiments, the program questions the role of architecture in the extreme context of Manaus.

INTRODUCTION





MANAUS

fig 01
South America, the
Amazon Region and
Manaus

THE CITY IN THE RAINFOREST

The Amazon rainforest is the biggest in the world, covering an area of 5.500.000 m², which is almost the size of France times 10¹. One would think, that deep inside the rainforest one would only stumble upon small remote villages scattered around in between the vast vegetation and along the rivers, still deserted and disconnected from the surrounding world.

But this is not the case everywhere in the massive rainforest, thus some 1600 km from the Atlantic sea up the Amazon river, within the Brazilian border, you find the city of Manaus. A modern city, highly globalized and connected to the rest of the world, even though the physical distance from any other large city is more than a thousand kilometers away.

Nevertheless, tons of goods are every single day being shipped either by water, by air or by land, through this massive and rather impassable rainforest and into Manaus. Practically everything needs to be imported to the 2 million people living in the city, including food and other consumable products, clothes, electronic products, and building materials. A Free Trade Zone in the city also entails that several companies and manufacturers have located their production there, resulting in an increased demand for imported products.

The city is in on constant move, and walking around you almost forget that you are surrounded by thousands of kilometers of rainforest in any direction. Nevertheless this rainforest is the cause to what is today a bustling and sometimes chaotic city with a busy everyday life.



fig 02



fig 03



fig 04

fig 02
Workers tapping
rubber, 1882
America.Pink

fig 03
Amazon Theatre, 1898
RED RESE, red internacional
de estudios socioespaciales

fig 04
Tram in the center
of Manaus, 1905
Allen Morrison

INTRODUCTION

THE RUBBER BOOM

Indigenous people in the Amazon discovered the liquid latex used for rubber from the bark of the rubber tree thousands of years ago, but Europeans first began investigating its uses during the 18th century, with the invention of vulcanization of rubber discovered by Charles Goodyear in 1844².

With the advent of the motor car and the invention of the rubber tyre, Europeans who wanted to be part of the lucrative business, traveled to the Amazon, where at that time, the rubber tree was endemic, and the remote rainforest quickly became the hub of a hugely profitable global trade.

Manaus, which was back then a small town on the Amazon River, bloomed into a modern metropolis, and became the most developed and prosperous city in Brazil during the rubber boom. The wealthy so-called rubber barons built their numerous and impressive residences in the city, and Manaus became one of the first cities in Brazil to receive electricity, running water and a sewage network.³

The massive production and wealth had a downside on the indigenous people living in the area, since their labor was exploited, many locals worked for very little, lived in almost slave-like conditions, and were viewed in a negative manner.

However, the rubber boom was short-lived, existing only for a period of around 35 years, after the British smuggled out large amounts of rubber tree seeds and erected plantations with more efficient production in English colonies in Asia. By 1912 Amazonian rubber was undercut in the world market, and demand for it fell. This rapidly resulted in the stagnation of the regional economy, and Manaus sunk back into poverty.⁴

² Mann, Charles C. *1493: Uncovering the New World Columbus Created*. New York: Knopf, 2011

³ Stanfield, Michael Edward. *Red Rubber, Bleeding Trees: Violence, Slavery, and Empire in North-west Amazonia, 1850-1933*. Albuquerque, N.M.: University of New Mexico Press, 1998

⁴ WWF report, 2014, *Going Wild for Rubber*



fig 05



fig 06

fig 05
The Free Trade Zone has resulted in
new industrial boom in Manaus
getteimages.com

fig 06
Parts of the Trans-Amazonian
highway is still dirt road
Nacho Doce, Reuters

FREE TRADE ZONE+URBANIZATION

Half a decade later, in 1967 the Free Trade Zone was created, in order to attract foreign investment to the area and to assist in the development of the country. It was set up with the objective of creating an industrial, commercial and agricultural center in the hinterland of the Amazon Region, which would be equipped with economic conditions that would enable the region to be occupied and developed.

Despite its location, the tax benefits presented to the industries, have contributed in attracting more than 600 companies⁵, both Brazilian and international, to the Free Trade Zone, and has resulted in a new industrial boom in Manaus.⁶

The access to the city has not improved much though, the road network in the rainforest has not developed accordingly, and the Trans-Amazonian highway is still a dirt road several stretches, meaning most of the transportation happens by the river or by air.

49,8% of the population in Legal Amazon lives in the municipality of Manaus, and with a population reaching 2 million people⁷, the city has a high demand on consumable products including food and other necessities, which have to travel a very long distance before reaching their destination.

As in almost all other cities across the globe, the urbanization in Manaus increases, and with an annual growth rate of 4%⁷, which is much higher than in the rest of Brazil, growth in housing, public infrastructure and consumables ensues, which calls for the importance of urban planning and strategies in terms of obtaining and sustaining a healthy development.

⁵ In 2013 more than 600 companies were settled in the Manaus Free Trade Zone. These companies had a combined revenue of around BRL 83.3 billion in 2013, 13.3% higher than in 2012, www.thebrazilbusiness.com/article/tax-exemption-in-manauas-free-trade-zone

⁶ www.suframa.gov.br/invest/en-zona-franca-de-manauas.cfm

⁷ Caleb Harper, Vasco Portugal, Layla Shaikley SIGUS, *High-density Incremental Expansion*, UN-Habitat World Urban Forum Training Session 2012



fig 07



fig 08



fig 09

fig 07
The sunlight
diffuses through the
translucent latex
sheets

fig 08
Metal wires and
strings pulls the
latex and opens up
the skin

fig 09
Strings hold up
flaps in order to al-
low airflow through
the tent

INITIAL STUDIES

The initial studies relates to my experimental project conducted in the third semester, in the master unit 'Architecture and Extreme Environments'. The unit focuses on prototype development as an approach and design methodology to understand and survey site-specific conditions. This project acts as a departure point for the thesis program, to gain an understanding of spatial conditions in varying climatic environments.

The substantial import and logistical aspect of Manaus in relation to the rainforest and the rest of the world, led me to the starting point and interest of study for the prototype, since I wanted to investigate alternate materials to be used in the built environment, that are found locally and naturally grown, in order to cut down on unsustainable transportation and production.

My choice of study was natural rubber, made from tapping liquid latex from the Amazonian rubber tree, and the starting point was to test out the properties of the latex, which could then lead me to the design of a prototype, to be tested in Manaus and surrounding areas.

The prototype manifested as a tent-like structure covered with latex sheets, investigating in the properties of elasticity, translucence and water tightness.

The prototype starts to discuss the notion of human comfort in the humid tropics, and the importance of airflow, light materials for sun- and rain cover in the built environment, over highly insulated building envelopes which characterize other climatic conditions.

For a more detailed description of the prototype manufacturing and investigations, go to appendix, page.



fig 10

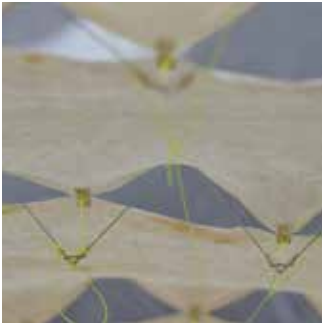


fig 11



fig 12

fig 10
The latex sides are
connected with large
zippers

fig 11+12
Close ups of the
details

LOCAL ENVIRONMENTAL ECOLOGY

The project, dealing with a natural locally grown material, starts to discuss the presence of a local environmental ecology, which has become a more central concern over recent years. The increasing realization that the unprecedented growth of the cities is one of the main causes of many environmental and social problems facing the world today. This has created an urgent need to increase the ecological understanding of human settlements, in order to develop inhabitable, sustainable cities and towns in the future.

According to the World Health Organization, the urban population accounts for more than half of the total global population and continues to grow, especially in less developed regions of the world.⁹ This resonates with an ecological understanding of cities, not only in the western world, but developing countries and cities, like Manaus, which as stated earlier, has a annual population growth of 4%.

A number of urban planners have mentioned the importance of the local ecology when developing cities in a sustainable way, one of them being Robert L. Thayer⁸, who has coined the term "life-place", related to the notion of bioregion:

"In reaction to a globally shallow, consumer-driven, technologically saturated world where humans are alienated from nature (...), a bioregion offers an appropriate venue for the natural predisposition toward graceful human life on earth. (...) Although by no means a unified philosophy, theory, or method, the bioregional approach suggests a means of living by deep understanding of, respect for, and, ultimately, care of a naturally bounded region or territory."¹⁰

8 Professor of Landscape Architecture at the University of California, Davis

9 The urban population in 2014 accounted for 54% of the total global population, up from 34% in 1960. The urban population growth, in absolute numbers, is concentrated in the less developed regions of the world. It is estimated that by 2017, even in less developed countries, a majority of people will be living in urban areas. WHO 2016, www.who.int

10 Thayer, Robert L., *LifePlace: Bioregional Thought and Practice*. Berkeley: University of California Press, 2003. 4

INTRODUCTION

Thayer describes it as a series of relations to place, such as knowledge, awareness, affection, action, and puts up the hypothesis, that a mutually sustainable future for humans and nature can best be achieved by means of a spatial framework, where people live as rooted, active, participating members of a reasonably scaled, naturally bounded, ecologically defined "life-place".¹¹

The increased globalization and the negative impact on the environment that comes with it, has also been addressed by the Australian environmental planners Peter Newman and Isabella Jennings, who mentions that cities are increasingly drawing in resources from across the globe and exporting waste beyond their boundaries, which has a disproportional impact on natural ecosystems and the biosphere as a whole.¹² They present one of their visions on how to pursue a sustainable city:

"Cities as Sustainable Ecosystems can be seen as healthy (effective), zero waste, self-regulating, resilient, self-renewing, flexible, ethical, psychologically fulfilling, cooperative, and coexisting."¹³

The issue with waste has long been a discussed subject, thus an issue that architect William McDonough and chemist Michael Braungart illuminate in "The Hanover Principles" design guidelines (1992), where they point out waste as one of the most important issues.

"[...] Not reduce, minimize, or avoid waste, as environmentalists were then propounding, but eliminate the very concept, by design."¹⁴

They see it as a holistic approach, where one should acknowledge the waste issue in the whole design phase. The concept has been the foundation of their book *Cradle to Cradle*, and has later become a trademark, referring to a biomimetic approach to the design of products and systems.

11 Thayer, Robert L. *LifePlace Bioregional Thought and Practice*. Berkeley: University of California Press, 2003. 5-6

12 Newman, Peter, and Isabella Jennings. *Cities as Sustainable Ecosystems Principles and Practices*. Washington, D.C.: Island Press, 2008. 3.

13 Newman, Peter, and Isabella Jennings. *Cities as Sustainable Ecosystems Principles and Practices*. Washington, D.C.: Island Press, 2008. 108.

14 William McDonough, and Michael Braungart. *The Hannover Principles: Design for Sustainability*: Prepared for EXPO 2000, the World's Fair, Hannover, Germany. New York, NY: W. McDonough Architects, 1992.

Principle 6: Eliminated the Concept of Waste

INTRODUCTION

"What if humans designed products and systems that celebrate an abundance of human creativity, culture and productivity? That are so intelligent and safe, our species leaves an ecological footprint to delight in, not lament?"¹⁵

Both Newman and Jennings, and McDonough and Braungart address predominantly developed cities in the Western world, but several of the issues have also been acknowledged by the Brazilian urban landscape designer Cecilia Herzog¹⁶, who often uses Rio de Janeiro, where she lives, as an example.

Herzog addresses the fundamental linkage between landscape and people, seen as the outcome of human intervention and natural processes and flows, that transform environments over time. Further, asserting how this has a great relevance to human development and physical and emotional wellbeing.¹⁷ She points out the importance of ecosystems and landscape in the city in order to cope with the challenges we are dealing with today, such as climate change, urban heat islands, and floods, and furthermore that the landscape is much more than a beautiful scenery.¹⁸

The architectural proposition intends on exploring these readings of the environment and ecosystems in order to devise an understanding of Manaus' local ecologies. A spatial and architectural dialogue will be constructed between broader urban and environmental readings of Manaus and the quotidian intersection of marketplace and leisure activity.

15 McDonough, William, and Michael Braungart. *Cradle to Cradle: Remaking the Way We Make Things*. 2010, 15

16 Brazilian urban landscape designer who is very engaged in urban ecology in Brazil. Professor at the university in Rio de Janeiro (PUC-Rio), president of the Inverde Institute for Research on Green Infrastructure and Urban Ecology, and president for the Society of Urban Ecology (SURE)

17 Griffin, Toni L., Ariella Cohen, and David Maddox, eds. *The Just City Essays, 26 Visions for Urban Equity, Inclusion and Opportunity*. Vol. 1. New York City: J. Max Bond Center on Design for The Just City at the Spitzer School of Architecture, City College of New York, Next City and The Nature of Cities, 2015.

18 From the debate "Visions of the Just City from Around the World" for MAS Summit 2015 for New York City. 2015. www.summit.mas.org/a-just-and-equitable-city

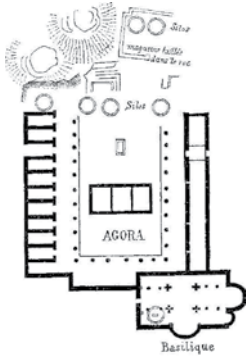


Fig. 187. Plan de l'agora d'Antipheles.

fig 13



fig 14



fig 15

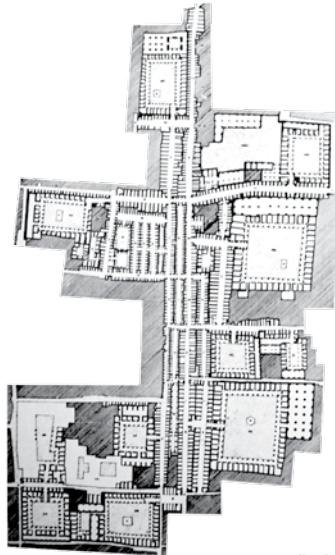


fig 16

fig 13
Ancient Greek
agora
wikimedia.org

fig 14
Pompeii Forum plan,
including market-
place (macellum),
from AD 79
dept.washington.edu

fig 15
English market in
Cork, Ireland, from
1788
englishmarket.ei

fig 16
Souq al-Madina,
Aleppo, Syria, dates
back to 14th century
adricu.wordpress.com

THE MARKETPLACE

The marketplace is an ancient typology which coincides with the rise of cities, and as a typology and institution it dates back to ancient Greek cities, from the agora, meaning 'open place for assembly'. In early Greek history, the agora was designated to free-born citizens where they could gather to hear civic announcements, muster for military campaigns or discuss politics. Later the agora defined the open-air, often tented, marketplace of a city (as it still does in Greek) where merchants had their shops and craftsmen made and sold their goods.¹⁹

The marketplace has later spread out to practically all corners of the world, and can be found throughout history in practically all cultures, from the Roman 'Forum', the medieval squares, the Renaissance 'loggias', the Arab 'souk', the Persian 'bazaar', and the Phillipeneese 'palangke'. Also in Central and Southern America has the marketplace had a central role in the city, and the Mexican 'tianguis', meaning open-air market, has its roots in the pre-Hispanic period and continues in many cases essentially unchanged into the present day.

Throughout history places of commerce showed moments of encounter and exchange, and the reflection of a complex and dynamic process in which, in addition to goods, moving people, knowledge, values, ideas, tastes and techniques. Since the Greek agora, places of trade function as transmitters of culture and act as communication spaces. The marketplace acts as a place where people mingle and express different social and cultural sensitivities, identifiable in its colors, in its smells, noises and its people.

In "Invisible Cities" Italo Calvino points out the relationship between the buyer and seller in the bazaar of the Empire of the Great Khan, despite being a simple activity of exchange of goods, raised a series of inner restlessness, requesting ideas, sensations and emotions.²⁰

¹⁹ Joshua J. Mark, "Agora," Ancient History Encyclopedia, last modified September 02, 2009, www.ancient.eu/agora/

²⁰ Calvino, Italo. *Invisible Cities*. New York: Harcourt Brace Jovanovich, 1974.



CONTEXT





fig 17



fig 18



fig 19

fig 17
Vegetables sold
on the street

fig 18
Hand held sewing machines
sold on the street

fig 19
Fresh fish sold in
the food market

CONTEXT

URBAN CONTEXT

The city of Manaus is in a constant move. The center of the city resembles a typical large South American city, and is characterized by a bustling and busy atmosphere.

People navigate through the vibrant and colorful streets, buying a pastry at one of the small food stalls, shopping for the next celebration party in one of the many decoration shops, or shopping local groceries at the large food market. Vendors stand on every corner selling everything from sliced watermelon ready to eat, to hand held mini sewing machines, and you see people walking, standing or sitting everywhere.

The center is located in the southern part of the city, facing the Rio Negro, which is one of the main rivers in the Amazon Basin. Traces from the great wealth from the Rubber Boom can be seen around the city, in the form of colonial buildings from that time. The Teatro Amazonas is the greatest of these, but also the church, as well as the old Adolpho Lisboa market and the custom house at the port, together with smaller buildings scattered around the city, are physical memories of an aristocratic era.

The port is the main hub for logistic strategies, allowing people and goods to arrive from their long journey on the main river, embarking on the harbor edge. People stowed together in hammocks hanging side by side come, from either the West or East direction on the river, arrive at the main port located in the Northwestern end of the shore.



fig 20



fig 21



fig 22

fig 20
Street at the old
market

fig 21
The old custom
house at the port

fig 22
Busy shopping
street



fig 23



fig 24



fig 25

fig 23
Boats at the
traveler's port

fig 24
Busy shopping
street

fig 25
Street vendors in
the center



fig 26



fig 27



fig 28

fig 26
Boi Manaus, 1991
skyscrapercity.com
fig 26
Carnival in Gloria, Manaus,
February 2016
Rozileide Melo

fig 28
Dancing performance on a
square in Rio de Janeiro, 2015

SOCIAL LIFE

The Brazilian culture is one of the world's most varied and diverse. This is due to it being a melting pot of nationalities, as a result of centuries of European domination as well as slavery, which brought hordes of African migrants across Brazil's borders to live in and influence the local cultures with their ancient customs and ideas. The European settlers also brought ideas, innovations and belief systems with them, shaping the local societies significantly. All of these different influences have meant that the modern-day culture is unique and very complex.

Nevertheless, the Brazilians share a national culture, making Brazil a true case of unity in diversity. Music has a central role and has been called the "soundtrack" of national life and remain an integral part of the identity of a society.²¹

Manaus is home of several social and cultural celebrations throughout the year. This counts among others, the Amazonas Carnival, where samba student put on a parade in the city, the Amazonas Opera Festival, the Amazonas Folklore Festival, and the Anniversary of Manaus, 'Boi Manaus', which is the world's biggest samba festival. This event generally attracts unprecedented amount of guests and performing bands from around the world to become a part of the prestigious festival.²²

But also in their daily life, the residents value social gatherings, and the public places in the city is widely used during day and night.

²¹ www.everyculture.com/Bo-Co/Brazil.html

²² www.celebratebrazil.com/manaus-brazil.html



CITY CENTER

SITE



1000m

fig 29
MANAUS





fig 30
Aerial view of proposal site
Portal de Copa, FIFA 2014



fig 31
Map of Manaus center and harbor including
the three main ports

PROPOSAL SITE - THE MARKET

The port of Manaus acts as an important commercial center for ocean-going vessels traveling the Amazon and in fact, the main transport hub for the entire upper Amazon Basin. The port of Manaus is divided in three parts, one area in the Northwestern end mainly for large containers and larger cargo ships, one area in the middle mostly for travelers and cruise ships, and one area in the Southeastern end mostly for goods.

The tonnes of bananas and all kinds of other local or nonlocal food come in by boat embarking at the port in the Southeastern end, which is much more primitive than the other one. During low tide, the boats are shored on the sand bottom, and all the goods are either transported in small trucks, or carried up along the massive wall dividing the port from the city (see images, page 42), then transported by small carts or trucks to the market, where men in human conveyor belts throw it the last distance into the market stands.

The food market is busy with an almost unchanging flux of people and goods going in and out constantly (see fig. 38, page 45). From early morning when the first goods arrive, throughout the day where people bargain and chat, until it all closes down in the late afternoon.

The food market is located in the southern part of the city, where the river Rio Negro arches around and connects the city with the river. The market sits just north of the Southeastern end of the port, and has the outlet of one of the three main tributaries in Manaus on the eastern side.

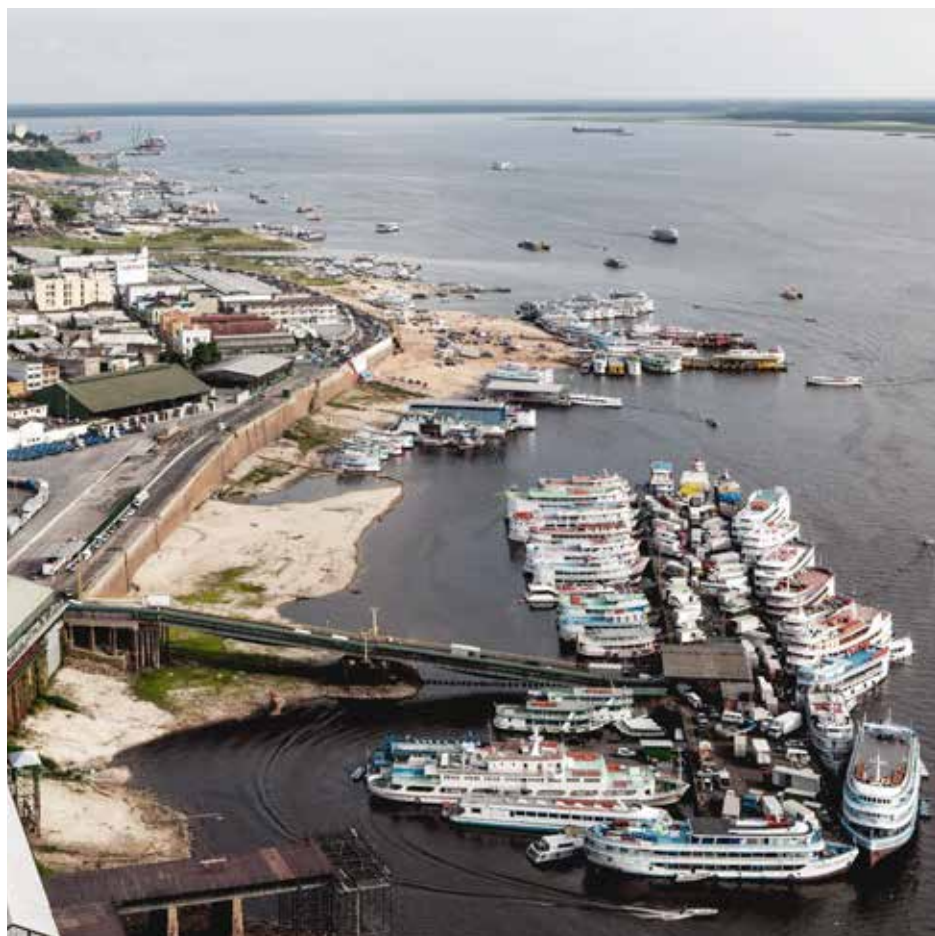


fig 32
Aerial view of the harbor, passengers port in the foreground,
and market and small cargo port in the background
Portal de Copa, FIFA 2014



fig 33
Map of main market including port
and surrounding areas



fig 34



fig 35



fig 36

fig 34+35+36
Port and street next to the food market,
December 2015

CONTEXT

Today the market is split into two buildings, one with a rather closed plan selling fish, meat, fruit and vegetables and other types of food, and one with a more open plan selling only fruit and vegetables mostly in larger bulks. The two buildings are rather simply constructed with steel columns and trusses covered by corrugated metal roof sheets. The interior of the food market is a open plan fish and meat department with tile cladded built-in tables in one end, and the rest constructed of narrow alleys with small stalls separated by one story walls, also with built-in desks cladded with white tiles.

The market and the port is separated by a large road, that runs all the way along the shore. By day it is occupied by a series of parked trucks, on loading fruits and vegetables to the market, by the afternoon and night, it is deserted, with a few abandoned trucks still parked. Northeast of the market, there is a large parking lot, which is also filled with cars and trucks during the day, but gets deserted at night. The surrounding streets north of the market are busy shopping streets with merchants selling a big variety of products.



fig 37
Fruit market, December 2015



fig 38
Food market, December 2015



fig 39



fig 40

fig 39+40
Adolpho Lisboa market,
December 2015

CONTEXT

THE OLD MARKET

The main market has not always been located at the same site. The first market, which still exists, was the Adolpho Lisboa Municipal market located a little north of the present market, still facing the port. It was built in 1880 and consists of three connecting large buildings, and one single building perpendicular to the others.

Today the Adolpho Lisboa market acts mostly as a destination for tourists, still selling a bit of fish and fresh meat from two of the buildings, and the selling souvenirs and crafted goods in the large middle building.

The site of the main food and fruit market was before a part of the river, where the informal settlement of a floating village was located. The area has always been a place for commerce, described as the place where people met to 'converse and pass the time'²³, where floating markets and trade from the boats was happening before the area was rebuilt into the present market in the 1990's.



fig 41
Floating village, 1960's
Josué Ferreira

23 Despres, Leo. A, *Manaus: Social Life and Work in Brazil's Free Trade Zone*, State University of New York Press, Albany, 1991



BUILDING PROGRAM



SCOPE+SUBMISSION

The main program of the project is a new interpretation of the existing food market in Manaus, including new building(s) and rethinking the surrounding areas and the connection to the port with better integrated logistic routes.

The project deals with the criteria of removing the existing buildings related to the market place, relocating the functions and creating new buildings and surrounding areas, that deal with the investigated assets and potentials.

Furthermore the project is introducing a hybrid program, suggesting adding public leisure activities within and overlapping the program of the market place.

The annual changes in climate and the followed changes in water level works as one of main drivers in the design, aiming to use these changes as an advantage.

The project will engage in studying the flow of people and goods, the relations, meetings and crossings of traders and customers during their everyday life, the insight and understanding of the typical leisure life in Manaus, the transitions of open and closed spaces, the transitions from water to land, the transitions of daily rhythms going from one state to another, and the annual transitions where water level, rainfall, drought and flood has a great impact certain times of year.

The main climatic challenges in Manaus, situated in a hot-humid tropical climate, is the extreme heat, reaching over 40°C during the day, and the high humidity being at a minimum of 80%, day and night. One of the aims is to study climatic management related to human comfort in this type of climate, in terms of shading and ventilation, aiming for



BUILDING PROGRAM

using natural processes. This may include studies of cooling through the ground, means of water, evaporation, etc. I will integrate the use of simulation programs in the process, in order to support the findings.

The program will be studied in several scales, from the small scale dealing with constellations of market stalls (+/- 1:50), the constellation of stalls and logistic flows (+/- 1:200), facilities for e.g. leisure activities, and the large scale in the connection with the surroundings, reaching out to the port and river, and further in the city (+/- 1:1000).

The users in the program are mainly the local people of Manaus, the traders and costumers, and the normal citizen, but since the city is also the main hub for tourists going on guided tours into the rainforest and other travelers traveling along the river, the program, being a public building, reaches out to a broad range of people.

I will investigate in natural materials inspired by my initial investigations, and study the zero waste principle from Cradle to Cradle as well as other design principles, aiming for using a naturally degradable material for parts of the building components. Latex can be a possibility, but other materials with similar, or perhaps differing properties suited for the purposes in the building design, can also be introduced. In relation to the zero waste concept, dealing with the degradable waste from the market may also be integrated in the design decisions.

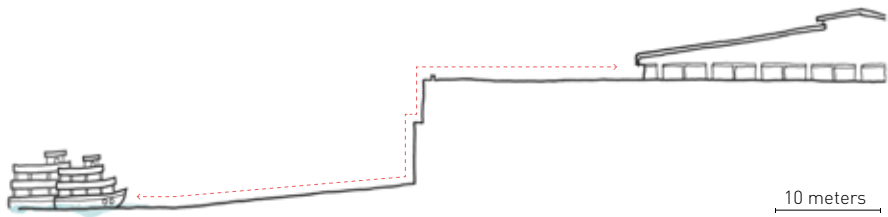


fig 43

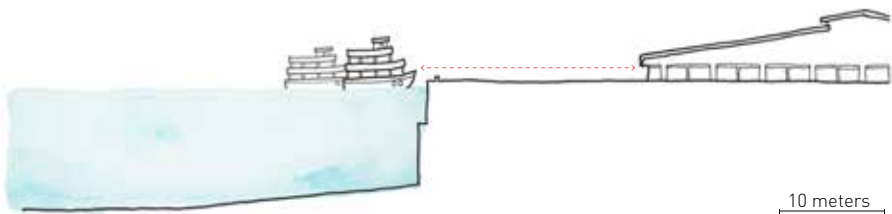


fig 44

fig. 43
Concept section, low
tide conditions. Large
distance between boats
and market

fig 44
Concept section, high tide
conditions. Short distance
between boats and market

MAIN PROBLEMATICS/POTENTIALS

The project will address the main problematics related to the current situation of the market, and will explore a series of unused potentials.

Due to the great difference in the water level during a year, there are annual changes in the relationship between the marketplace and the port. During dry season, the water level can drop to approx. 12 meters below street level, leaving the shored boat on the sandy banks, deserted from the market, and increasing the distance of transportation. During wet season, the water level rises approx. 10-12 meters, allowing the boat to shore just along the edge of the road, creating a much closer relation between the market and the port (see also fig. 45-48 on page 56). But this relation only happens a few months every year.

Within recent years, the water level has been rising so much during wet season that occasional flooding of the streets around the market occurs, creating problematic conditions for both people moving around and transportation of goods (see fig. 49-50 on page 56).

The project will aim to integrate these extreme water phenomena in the design process, drawing on the potentials of relocating the marketplace. I will study different constellations of the position, and may include studies of the floating market, market on a pier, drawing the river inside the market, vertical propositions, etc.



fig 45



fig 46



fig 47



fig 48



fig 49



fig 50

fig. 45+47+49
Views from the site; port, large road, between market buildings, December 2015, dry period

fig. 46+48+50
Views from the site; port, large road, between market buildings, 2012, wet period, fig. 41 flooded
Augusto Braga



fig 51
Aerial view of proposal
site
Portal de Copa, FIFA 2014



fig 52



fig 53



fig 54



fig 55



fig 56



fig 57

fig. 52+54+56
Images of site during the day; entrance to food market, fish department, fruit market

fig. 53+55+57
Images of site in the evening closed down; entrance to food market, fish department, fruit market

BUILDING PROGRAM

Furthermore, the market and port is separated by a large road, half the time full of trucks, the other time being empty, leaving a deserted open space, thus I will look into rethinking the infrastructure on land in order to improve the surrounding area. This may include introducing greener surrounding areas, that invites people to use the space.

In addition to this, I will work with a hybrid program, exploiting the potential in bringing in a different program when the market is closed down in the evening and at night. At the moment, when all the stalls have packed up their goods, the area goes into a sleeping mode, where a few guards look out for the packed up fruits and vegetables, slowly rock in their rocking chairs, some falling into a deep sleep. At this time the area becomes an almost dead zone, and becomes deserted and unsafe.

People in Manaus use the public places, such as parks and squares, mostly in the evening and at night, where the climate is usually more comfortable, thus I see a potential in bringing in leisure activities to the program, in order to activate the area in the evening, which is now rather unsafe and deserted. Overlaying the programs, will desirably bring new life to the area at night, and add new aspects to the architecture.

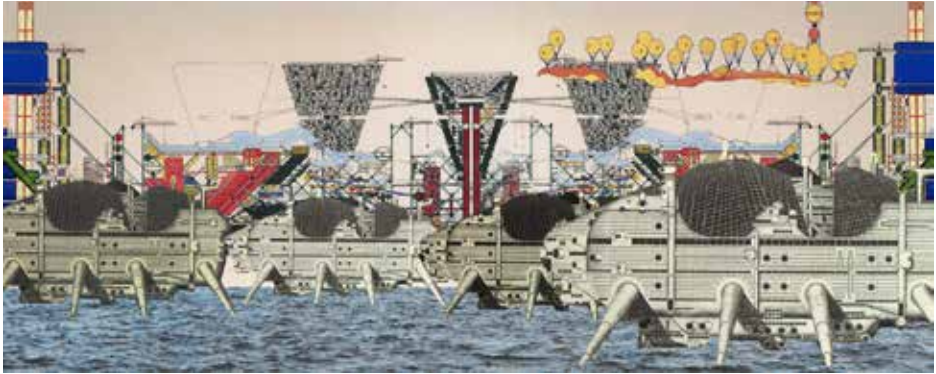


fig 58

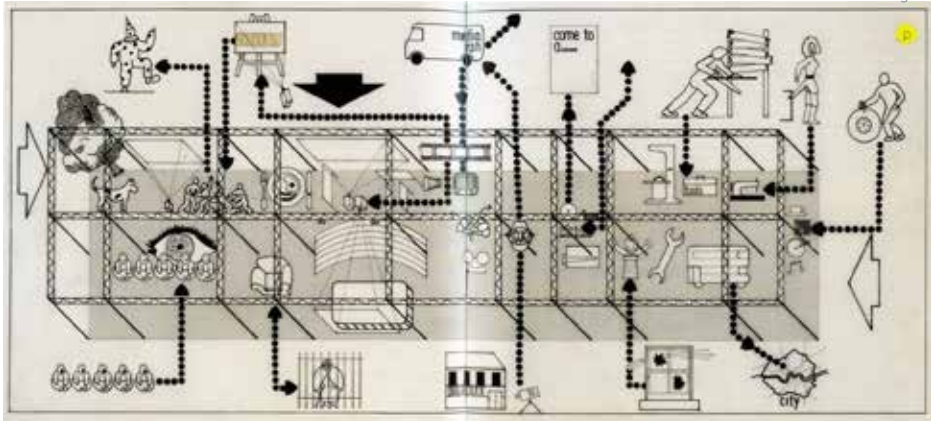


fig 59

fig 58
Walking Cities, Ron Herron, Archigram, 1964
Investigations in large machine-like buildings,
celebrating the mass consumption and automation,
and the city as an engrossing generic organism
subject to humans, but at the same time controlling

www.openbuildings.com

fig 59
'Fun Palace' diagram, Cedric Price, 1964
A socially interactive machine, highly adaptable to the
shifting cultural and social conditions of its time and
place, and a constantly varying design for a new form of
leisure center.

Stanley Mathews, *The Fun Palace: Cedric Price's experiment in architecture and technology*, *Technoetic Arts: A Journal of Speculative Research* Volume 3, 2005.

METHODOLOGY

The overall direction towards the proposal concerns correlative strategies for design development, sliding between investigative and representational modes.

I will aim to engage with a series of frameworks to further investigate the development of the proposal. This may involve studies concerning various flows, climatic cycles, materiality, geometric forms, different market typologies, performance space/activity typologies, private/public zones, land intervention.

The generative methodology of the program is committed to an iterative process of development through drawing and modeling, operating between the architectural scales of the human body and its relations, the immediate site and surroundings, reaching further out into the city area.

The representation of time in the project is an important aspect, in order to communicate the notion of the dualism in the program, both regarding daily changes of the program of the building, and the annual changes in the climatic conditions, which will have an effect on the architectural proposal. This may include explorations in the process of collage, superimposition and layering to interpret the adaptive conditions of the building. In addition to progressional representations, the project will try to engage with a series of comparative narratives in juxtaposed programmatic states, such as: arrival vs. departure, embarking vs. disembarking, inside vs. outside, dry season vs. wet season and day vs. night.

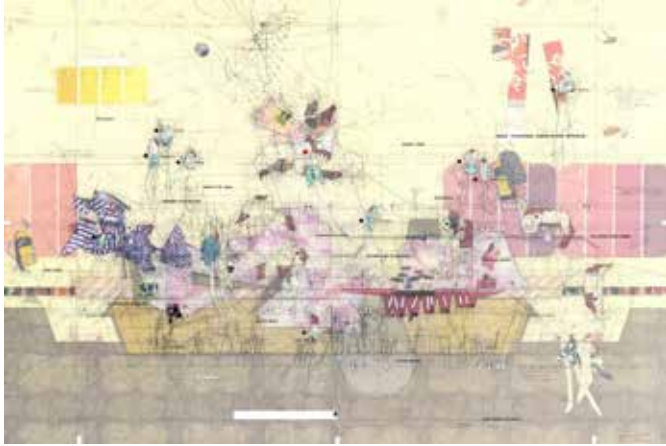


fig 60

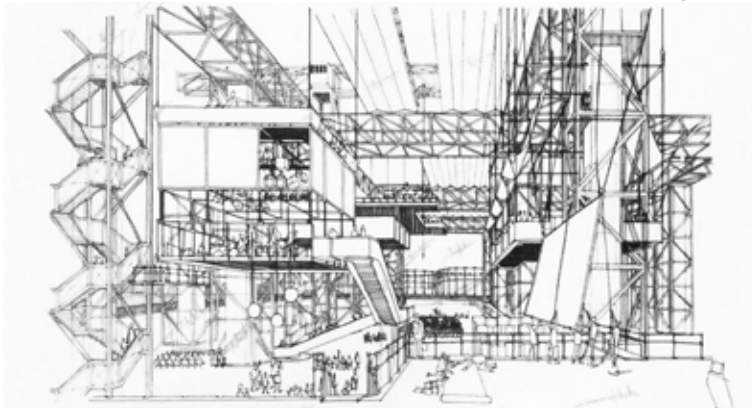


fig 61

fig 60
Sketch, Perry Kulper
chairsandbuildings.com

fig 61
'Fun Palace' sketch,
Cedric Price, 1964
www.8late.wordpress.com

BUILDING PROGRAM

I will aim on integrating parts of the findings from my prototype investigations, such as the idea of expansion and contraction in relation to the chancing program and the chancing climatic conditions, as well as the light qualities, how the strong equatorial sun light filters through the latex sheets and creates a more diffuse light.

Furthermore I will study a sustainable passive management of the climate around and in the building and aim to use this, not only technically, but also as an integrated part of the development of the architecture and the design process giving spatial qualities to the building.

A photograph of a white fabric sculpture, possibly a dress or a piece of art, with several green and blue threads and wooden clips attached to it. The sculpture is set against a light-colored, textured background. The word "APPENDIX" is centered in the image.

APPENDIX



fig 62



fig 63



fig 64



fig 65

fig 62
The reflective latex sheet
taken out of the mold

fig 63
Using liquid latex as
an adhesive was very
tenable and efficient

fig 64
Altering the latex
sheets worked almost
like cutting out fabric

fig 65
Assembling the large
sheets into the skin

ON SITE PROTOTYPE INVESTIGATIONS

From the initial studies described earlier, the investigatory prototype has been manifested in a small tent-like structure, covered with latex sheets on all sides.

Using relatively simple manufacturing techniques, the liquid latex has been purred out on a flat surface where it coagulated, and turned into flexible fabric-like sheets after drying for about 10 hours. The sheets have then been cut up to allocated sizes, and zippers and push bottoms have been attached for an efficient assemblage to the supporting structure, being aluminium tubes joined by steel joints into a hexagonal shaped structure.

The shape of a tent evolved from the purpose of been able to inhabit and go inside the latex envelope, allowing a more human perceptual analysis in terms of comfort.

Different types of openings on the sides, allow for a natural airflow inside the tent, and silver pigment and sunscreen mixed in the liquid latex create a reflective surface protecting for the sun, making the translucent sheets more resistant to sunlight, which is otherwise one of the weak properties with latex and rubber in general.

The latex sheets have a high translucency and especially at night with light coming from inside, it creates a nuanced and diffuse light pattern. Together with the silver pigments added to the latex, that reflects the lights from the outside, the prototype works well both at day and by night in terms of lighting.

The structure, being detachable with relatively simple joints, allows for assemblage and dis-assemblage several locations, and encourages a temporal inhabitation. Furthermore, the latex sheets are naturally degradable, which underlines the temporality in the project.



fig 66



fig 67



fig 68

fig 66+67+68
Local residents in the neighborhood of Gloria inspect the prototype with great interest

APPENDIX

In relation to this, the prototype, and the production of natural latex and rubber in general, starts to correspond to the life-place idea by Thayer, where the production of the natural rubber happens (to some extent) in coexistence with the local surroundings. The rubber tapper living in the Amazon, usually has a number of daily trails through the dense rainforest to reach around 100 trees each day. He cuts the tree in the morning, in order to allow the liquid latex, which runs really slow, to drip into a cup all day, before he returns to collect it in the afternoon. A rubber tree can produce 5-10 liters of latex in a year, which makes it a rather slow process. Living and working every day in the forest gives the rubber tappers a very close relationship with it, and most of them have a deep knowledge of the local flora and fauna, including its uses for food and medicine.

Even though ambivalent opinions regarding the rubber production occur upon history, I did not meet any of these, in my attempts to put up my prototype. I had a few concerns regarding the negative aspects and the exploitation of labor during the rubber boom, and if people still looked at it negatively, but the people around the sites where I was able to put up my prototype, did not meet me with any negative comments. The people I introduced my prototype to, and where able to talk with, were very interested, but also unaware of that way of using the material. None of the people I met, seemed to relate it to the rubber boom, or had any negative feelings about it. The comment closest to some social relation, was that it smelled a little bit like condoms.

The production of latex calls for a symbiotic and sustainable relationship with the surrounding nature, hence the dependence on the trees being healthy and able-bodied, in order for it to produce the latex. Contrary to the use of wood in the built environment, where you need the actual trunk as the material, and thereby eventually cut down and remove the tree from the environment and live circle, the latex is a produce of the tree, and thus can only be produced when the tree is alive. It requires that the trees are taken care of and not exploited, in order for it to keep producing latex in a sustainable way.

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