BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

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I. introduction
II. analysis
III. problem
IV. method
V. concept
V. design

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
...beginning section which states the purpose and goals of the following research...
port-city located on the Colombian Pacific Coast

introduction

I. analysis
II. problem
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V. design

conclusion

BUENAVENTURA, revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
geostrategic position: equidistant to the main worldwide markets

I. introduction
   - analysis
   - problem
   - method
   - concept
   - design
   - conclusion

BUENAVENTURA
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
cargo terminal: 60% of the country cargo

introduction

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VI. conclusion
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introduction
Introduction

I. Analysis

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VI. Conclusion
Introduction
everything flows, but nothing remains
even with the fluctuation and movement of everything, HOW to PROVOKE SPACES of PERMANENCE - STABILITY?
analysis : taking out

...DATA from the PLACE ...

SITE CONSTRAINTS

introduction
I. analysis
II. problem
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conclusion

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
analysis : taking out

... DATA from the SHIPS

to establish the problem and to define PARAMETERS as design tools...

I. introduction
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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
### CRUISE SHIP DIMENSIONS

<table>
<thead>
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<th>long (m)</th>
<th>wide (m)</th>
<th>height (m)</th>
<th>draft (m)</th>
<th>speed (kn)</th>
<th>passengers</th>
<th>crew</th>
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<td>1000+</td>
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<td>52</td>
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<td>1253+</td>
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</table>

### Medium Ship Cargo - MSC
- Buenaventura present Cargo Ship - 2010
- 220 mts
- 13.5 million / 22.5 (2034)
- 100,000
- 910,172
- 1,200,000
- 273,000

### Small Ship Passangers - SSP
- Buenaventura future Cruise Ship
- 100 to 150 m
- 400/800 passengers per time
- 27 calls along the year
- 10,800 to 21,600 passenger/year

### Big Ship Passangers - BSP
- 300 m
- Future
- CRUISE SHIPS for BUENAVENTURA
PANAMA

BUENAVENTURA PORT + CITY

INTERNATIONAL CONNECTIONS
(PACIFIC OCEAN)

passengers vessels + cargo ships

NATIONAL + REGIONAL FLOWS

COLOMBIA

MOVEMENT of SHIPS & PEOPLE

geostategic position
Close to Colombian Gold Triangle (SEZ)
Special Economic Zone of Exports on the Colombian Pacific Ocean

COLOMBIA:

INTERNATIONAL OCEAN CONNECTIONS (PACIFIC OCEAN)

- passengers vessels + cargo ships

NATIONAL OCEAN & RIVER CONNECTION

- ocean passengers vessels

NATIONAL & INTERNATIONAL ROAD CONNECTIONS

- Ruta del Sol (Bogota-SantaMarta)
- Highway: Buenaventura-Bogota-Cucuta

BUENAVENTURA PORT + CITY

INTERTWINE THE WAVES

COLOMBIA

Buenaventura Port + City

Maritime Terminal for Passengers

INTRODUCTION

I. ANALYSIS
II. PROBLEM
III. METHOD
IV. CONCEPT
V. DESIGN

CONCLUSION

I. INTRODUCTION
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CONCLUSION

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CONCLUSION
**Coast Flows**

**Buena Ventura**

Revival Maritime Terminal for Passengers

**Introduction**

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**Conclusion**

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**I. Analysis**

**Concept**

**Problem**

**Method**

**Design**

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**Intrawaving the Waves**

**Boats + Vessels**

Humpback Whales Migration: 2500

- From Antarctic + Arctic
- Looking for Warmer Water for Reproduction (21C)
- Travelling Distance: 8300 km
- Maximum Speed: 8 km/h
- Average Speed: 1.6 km/h

Juanchaco & Ladrilleros

- Distance: 0-0.5 km
- Time: 1-6 hours

- 1-2 boats/day
- 2-3 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 1000 passengers/day

- 1500 passengers/day

- 2000 passengers/day

- 3000 passengers/day

- 5000 passengers/day

- 10,000 passengers/day

- 15,000 passengers/day

- 20,000 passengers/day

- 30,000 passengers/day

- 50,000 passengers/day

To Juanchaco & Ladrilleros

- Distance: 10-50 km
- Time: 1-6 hours

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500-1000 passengers/day

- 1500 passengers/day

- 2000 passengers/day

- 3000 passengers/day

- 5000 passengers/day

- 10,000 passengers/day

- 15,000 passengers/day

- 20,000 passengers/day

- 30,000 passengers/day

- 50,000 passengers/day

- 100,000 passengers/day

To Galapagos Islands

- Distance: 500 km
- Time: 30 to 40 hours

- 0.5-1 passengers/day

- 5-10 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

To Malpelo Island

- Distance: 500 km
- Time: 30 to 40 hours

- 0.5-1 passengers/day

- 5-10 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

To Gorgona Island

- Distance: 56 km
- Time: 6 h

- 0.5-1 passengers/day

- 5-10 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

To Malaga Bay

- Distance: 100-500 km
- Time: 12-24 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 25-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

To To Solano Bay

- Distance: 24-48 km
- Time: 1-6 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

To To Guapi & Tumaco

- Distance: 24-48 km
- Time: 1-6 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

To San Juan River Mouth

- Distance: 24-48 km
- Time: 24-48 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

To Anchicaya River Mouth

- Distance: 24-48 km
- Time: 24-48 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

To Dagua River Mouth

- Distance: 24-48 km
- Time: 24-48 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

To Galapagos Islands

- Distance: 24-48 km
- Time: 24-48 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

To San Juan River Mouth

- Distance: 24-48 km
- Time: 24-48 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

To Malpelo Island

- Distance: 500 km
- Time: 30 to 40 hours

- 0.5-1 passengers/day

- 5-10 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

To Guapi & Tumaco

- Distance: 24-48 km
- Time: 24-48 hours

- 1-2 passengers/day

- 2-3 passengers/day

- 3-4 passengers/day

- 4-5 passengers/day

- 10-50 passengers/day

- 50-100 passengers/day

- 150-200 passengers/day

- 200-250 passengers/day

- 500+ passengers/day

**Coast + Bay**

Movement of Ships & People

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**Future**

Boats + Vessels for Buena Ventura

13 main destinations

750 to 1,200 passengers/time

200,000 passengers/year

High season = July to October
**Whales Movement - Migration - Flow**

**Breeding Areas**
- Winter BREEDING Areas - Cold Water
- Summer BREEDING Areas - Warm Water @ 21°C

**Feeding Areas**
- Warm Water @ 21°C

**Migration Routes**
- Winter BREEDING Areas (
  - April - June: Tropic
  - July - October: Autumn)
- Summer FEEDING Areas (
  - October - December: Winter
  - January - March: Summer)

**Amount of Whales:** 2,500

**From - To:** Antarctic to Arctic

**Travelling Distance:** 8,300 km

**Maximum Speed:** 8 km/h

**Average Speed:** 1.6 km/h

**Whales Migration Routes**

- Humpback Whale (16 m long / 30-50 ton)
- Killer Whale (8-10 m long / 4-6 ton)
- Blue Whale (30 m long / 150 ton)
- Sperm Whale (18.5 m long / 40-50 ton)

**Human** (1.8 m long / 0.085 ton)

**Migration Routes**
- BUENAVENTURA BAY: CITY + PORT

**I. Introduction**
- Analysis
- Problem

**II. Method**
- Concept

**III. Design**
- Conclusion

**BUENAVENTURA** revival
Maritime Terminal for Passengers

**Interweaving the Waves**
Cargo Terminal

Public Space - "Seafront" Project

Current Passengers Terminal - Pier

Railway + Cargo Transport Road

Alternative Via + Cargo Transport

Main City Road - Cabal Pombo

9 cargo ships

CARGO + PEOPLE

CITY FLOWS MOBILITY

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

I. INTRODUCTION
II. ANALYSIS
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V. DESIGN
V. CONCLUSION
CONNECTIONS CASCAJAL ISLAND

Introduction

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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
Floating Pier
240 mts long
5 mts wide
6 gateways for small ships
1 gateway for big ships

100,000 passengers/year
20 boats
5 ships

Informal commerce
Parking

Administration office
Control office
Ticket office

CURRENT FLOATING PIER LOCATION

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
Latitude 3º.50'.00''
Longitude 77º.00'.00''
Altitude 7 msnm
Temperature 18°C - 26°C
Humidity

Rain 6.980 mm per year
Soil low fertility
Wind Speed av. 1 - 6 m/s
Wind Direction North-West
Sun inclination 70° - 90°

world highest 13.300 mm/year
world lowest 648 mm/year

FLOWS of NATURAL FACTORS

I. introduction
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V. design

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

deepest level now
High Tide (HT) 11.3 mts
Low Tide (LT) 9.5 mts

deepest level future
High Tide (HT) 16 mts
Low Tide (LT) 12.5 mts

HT - LT = 2 mts
Unemployment 28.8%

Illiteracy 83.4% (urban areas)
62% (rural areas)

Health Security 62.0%

Aqueduct 66.2%

Drain System 44.2%
Electricity 90.0%
Natural Gas 0.0%
Telephone 31.4%

Extreme-Low housing conditions 50%
Health Security 62.0%
Community Afrocolumbia, Natives, Mixed Races

Commerce
Industry
Tourism

Ecoregion & Biodiversity
Mangroves, Birds, Mammals, amphibious, reptils & plants
Tourism Development Plan

Harbour Activities
Forestry Activities (96% of the soil)
Sea and River Fishing
Plantation of Caucho, Tagua and Batata

Poverty 80.6%
Population 6.770 km2
350.000 - 400.000 inhabitants

- urban areas: 8 hours/day
- rural areas: 3 hours/day
34% of the population doesn’t have water service, more than 1/3 of the population.

- introduction
- analysis
- problem
- method
- concept
- design
- conclusion

Buenaventura revival
Maritime Terminal for Passengers
Interweaving the waves
FREE ZONE CARGO TERMINAL PROGRAM + ACTIVITIES DEFINITION

introduction
I. analysis
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BUENAVENTURA revival-Maritime Terminal for Passengers
INTERWEAVING THE WAVES

CITY PARAMETERS
- NATIONAL PALACE
- CUSTOM BUILDING
- CAFE BUILDING
- HOTEL "ESTACION"
- GRAN HOTEL
- LIGHT HOUSE
- SANTANDER PARK
- SEAFRONT PROJECT
- CATEDRAL
- REPUBLIK BANK
- CAM
- PACIFIC TRADE CENTER
- SUPERMARKET
- HOSPITAL
- SCHOOLS
- CAM IN HOSPITAL
- CAM IN SEAFRONT PROJECT

FIXED PARAMETERS
- TOURIST INFORMATION DESK
- OFFICE TICKET
- CURRENCY EXCHANGE
- LUGGAGE
- ADMINISTRATIVE OFFICE
- CONTROL OFFICE
- SEA-TROPICAL FOOD SCHOOL
- SAILING SCHOOL
- TROPICAL FRUITS MARKET
- SOUVENIR SHOP
- LOCAL CRAFT MARKET
- RESTAURANT + cafe
- OBSERVATORIUM - TOWER
- OPEN-CLOSE AIR EXHIBITIONS
- LECTURE-CONFERENCE ROOM
- CRUISE + SHIPS DECKS
- REPAIRING SHIPS + OIL FOR SHIPS
- PARKING AREA
- SHUTTLE BUS SERVICE

FLEXIBLE PARAMETERS
- CAM IN CAM IN CAM IN CAM IN
- CRUISE + SHIPS DECKS
- REPAIRING SHIPS + OIL FOR SHIPS
- PARKING AREA
- SHUTTLE BUS SERVICE

PUBLIC SPACE

CARGO TERMINAL FREE ZONE

BUS TERMINAL TRAIN STATION
4.3 kph - low normal average
2.3 kph - slowly
5.3 kph - high normal average

WALKING SPEED

RUNNING SPEED
8 kph - normal average

WALKING SPEED
5.3 kph - high normal average

MEDIUM SPEED
4.3 kph - low normal average

LOW SPEED
2.3 kph - slowly

FOOT PATH - ROUTE - PASSAGE - PASSENGERS

RAIN WATER COLLECTION: ROOF + WALLS SKIN

B U E N A V E N T U R A revival
Maritime Terminal for Passengers
I N T E R W E A V I N G T H E W A V E S
### Time Table Definition

**January**
- **1.000 m²**
- **2.200 m²**

**February**
- **1.300 m²**

**March**
- **2.000 m²**

**April**
- **1.800 m²**

**May**
- **3.000 m²**

**June**
- **5.000 people**

**July**
- **10 boats**

**August**
- **120 tables - 450 people**

**September**
- **50 tables - 200 people**

**October**
- **20 students/time**

**November**
- **300 cars + 100 bicycles + 2 bus stops + taxi stops**

**December**
- **10.000 m²**

### Cruises (International)
- **1.600 passengers/time**
- **21.600 passengers/year**

### Boat Services (National)
- **1.300 m²**
- **15 main destinations**
- **750-1200 passengers/time**
- **200.000 passengers/year**

### Public Transport (Regional)
- **300 m²**

### Precipitation (mm)
- **400**
- **300**
- **350**
- **560**
- **700**
- **600**
- **750**
- **740**
- **970**
- **900**
- **700**
- **600**

### Temperature (°C)
- **28**
- **26.5**
- **26.8**
- **26.5**
- **26.8**
- **26.2**
- **26.4**
- **26.2**
- **25.8**
- **25.6**
- **25.8**
- **26**

### Wind Speed (m/s)
- **5.1**
- **4.6**
- **5.1**
- **5.6**
- **6.1**
- **4.6**
- **4.6**
- **5.1**
- **5.6**
- **5.6**
- **5.1**
- **5.1**

### Humpback Whale
- **Looking for breeding areas - water of 26 degrees**

### Analysis

**I. Introduction**
- **Revival**
- **Maritime Terminal for Passengers**

**II. Concept**
- **I.**
- **II.**
- **III.**
- **IV.**
- **V.**

**III. Method**
- **Design**
- **Conclusion**

**IV. Design**
- **Conclusion**

**V. Conclusion**
- **16 CALLS 460-860 passengers/time**
- **21.600 passengers/year**
- **15 main destinations**
- **750-1200 passengers/time**
- **200.000 passengers/year**

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**Passengers & Animal Migrations in Search of a Particular Temperature**
defining spatial position

horizontal

ships motion

defining spatial position

MAIN LEADING LINE - SHIPS PATH

for

BUENAVENTURA BAY = 20 km long x 2 km wide

[10 mt deep in average]

from the bay mouth [Bocana] to the coast-shore line [Cascajal Island]
Learning from the Ships Dimensions:
to define their routes-paths

\[ X = X_a + X_b \]
\[ Y = Y_a + Y_b \]
\[ Z = Z_a + Z_b \]
\[ W = 2X + 2Y + 5Z \]

\[ X_a = 220 \text{ mts} \]
\[ X_b = 30 \text{ mts} \]
\[ Y_a = 190 \text{ mts} \]
\[ Y_b = 20 \text{ mts} \]
\[ Z_a = 30 \text{ mts} \]
\[ Z_b = 5 \text{ mts} \]

\[ W = 990 \text{ mts} \]
\[ W = 1 \text{ km} \]

\[ W = 1 \text{ km} \]

\[ W = 1 \text{ km} + W \]

\[ W_{\text{Bay}} (a) = 2 \text{ km} \]
\[ W_{\text{Bay}} (b) = 1.5 \text{ km} \]

\[ \text{Bay Width} \]

\[ \text{Distance from the Land} \]

\[ \text{TSA O} = 800 \text{ mts} \]

\[ \text{Terminal Sea Area} \]

\[ \text{Buenaventura revival} \]

Maritime Terminal for Passengers

Interweaving the Waves

introduction
I. analysis
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conclusion
LEARNING FROM THE SHIPS: dimensions, docking manouvering and berth layout

Terminal Sea Area 1 [TSA 1]
L to P = 220 mts
TSA, $\beta = 830$ mts

Terminal Sea Area 2 [TSA 2]

Space

Dimensions

Cruise Ships [CS]
Boats+Vessels [B+V]

Quantity = 2 [CS]
Quantity = 25 [B+V]

Quantity-Density

Distribution

Cruis Ships Docking Maneuvering [DM]

Movements

B+V

Quantity = 2

B+V

P to B+V = 350 mts

Berth Layout

Horizontal

ship's motion

defining spatial position

I. analysis
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Buenaventura
Maritime Terminal for Passengers

INTERWEAVING THE WAVES

B U E N A V E N T U R A

revival
TOPOGRAPHICAL STUDY

Step 4

[CS]
LAND+CITY level + 6.00

[B+V]

OVER WATER [OW] level + 15.00m
HIDE TIDE [HT] level + 2.00
LOW TIDE [LT] level + 0.00
UNDER WATER [UW] level - 5.00
SEA BED [SB] level - 14.00

vertical
passengers motion

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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
Step 5.
INTERLACING CRUISE SHIP (CS):
international connections

I. defining spatial position

II. analysis

III. concept

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introduction

conclusion

BUENAVENTURA
revival

Maritime Terminal for Passengers

INTERWEAVING THE WAVES

vertical position

passengers motion

vertica

provisioning

passenger

crew

walking path

normal speed

car, minibus, path

(high speed

vertical promenade path

[low speed]

[high speed]

visitors

passengers

crew

ship provisioning
Step 6. INTERLACING BOATS+VESSELS: national connections

Step 7. INTERLACING CS+BOATS+VESSELS:

emerges a complex and diversity of intersections and interactions, coming all together on the sea water surface, close to the coast line
I. Analysis
II. Concept
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Sea water surface behavior + Rain water precipitation behavior

Spatial Organization [flows]

Sea motion
Rain motion

Buenaventura Revival
Maritime Terminal for Passengers
Interweaving the Waves
defining spatial organization
ships coming from the water - people coming from the land

sea water surface behavior
sea motion
(flows)

how to produce paths intersections on land - water transition?

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
IDEAL OCEAN WAVE

sinusoidal wave
constant in height, length, frequency and period.

defining spatial organization
sea water surface behavior

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
ACTUAL OCEAN WAVE

variation in height, length, frequency and period. CHAOTIC state of the sea surface, which has no discernible organization
OCEAN WAVES FROM DEEP to SHALLOW WATERS

change in orbital motions of water particles
defining spatial organization
sea water surface behavior

NOTHING IS CONSTANT
there are always changes and adaptations according with external factors:
storms, marine currents, ships, animals, human activities, etc, etc
defining spatial organization
sea water surface behavior

INTERWEAVING
[sea paths + land paths] + [ship paths + people paths]

horizontal and vertical bifurcation of paths generating space

white foam = [more density + more movement] = paths

space in between foam = [less density + less movement] = program [space]

I N T E R W E A V I N G

B U E N A V E N T U R A
revival Maritime Terminal for Passengers
INTERWEAVING THE WAVES
IDEAL RAIN FALL

90 degrees
vertical precipitation

with zero [0] wind speed
+ constant wind direction

CONSTANT DROPLETS
in size: no diameter variation
in trajectory: wind speed+direction
ACTUAL RAIN FALL

RAIN DROPS VARIATION
size, trajectory, direction and speed

main factor:
wind direction + wind speed

<table>
<thead>
<tr>
<th>changes in motion of water particles</th>
</tr>
</thead>
<tbody>
<tr>
<td>diameter : 1mm [fog droplets] to 5mm [raindrops]</td>
</tr>
<tr>
<td>speed : 2 to 9m/s [wind speed &gt; 0]</td>
</tr>
<tr>
<td>fall angle : 80 degrees to 10 degrees [wind speed &gt; 0]</td>
</tr>
<tr>
<td>fall direction : north-south-east-west [wind direction]</td>
</tr>
</tbody>
</table>
defining spatial organization

I. rain water precipitation behavior

II. concept

III. problem

IV. method

V. design

introduction

I. analysis

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IV. concept

V. design

conclusion

PATHS SURFACES
collecting rainwater

multiple sloping surfaces optimizing rain water catchment:
multiplicity of angles oriented to changes in rainfall direction+

mesh panels of suitable material increasing the catch of rain +

CAPTURED WATER 3[1mm/year]

and also collecting fog +

rain water catchment
ideal rain fall

rooftop collector under
ideal or unusual circumstances

wind speed = 0
constant wind direction
rainfall angle = 90 degrees

captured water = 1mm/year [1lt/m2]

actual rainfall

rooftop collector under
actual or usual circumstances

wind speed > 0
changes in wind direction

captured water > 1mm/year [>1lt/m2]

Rainwater Catchment and Fog Collection.
defined spatial position + spatial organization

initial position

I. analysis
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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
defined spatial position + spatial organization
defined spatial position + spatial organization

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

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conclusion
defined spatial position + spatial organization

BUENAVENTURA revival
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INTERWEAVING THE WAVES

final position + path
defined spatial position + spatial organization

final position + path + program + ships flows

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Maritime Terminal for Passengers
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defined spatial position + spatial organization
final position + path + program + ship flows + people flows

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final position + path + program + ship flows + people flows
final position + path + program + ship flows + people flows

defined spatial position + spatial organization

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final position + path + program + ship flows + people flows
defined spatial position + spatial organization

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B U E N A V E N T U R A

revival

Maritime Terminal for Passengers

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defined spatial position + spatial organization

final position + path + program + ship flows + people flows
defined spatial position + spatial organization

final position + path + program + ship flows + people flows

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
[CS] arrival deck path
passengers path +
normal walking speed +
connecting entrance with international lobby +
international exchange hall +
paths definition

I. analysis
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B U E N A V E N T U R A revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

[CS] cars+supplies path
ship supplies load -unload path +
passengers and crew cars +
private buses +
high speed path +
[CS] visitors path
open public space +
magnificent viewing platform +
transformable into grandstand seating area +
for entertainments events on the water +

paths definition

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

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paths definition
[B+V] arrival deck path
passengers path +
normal walking speed +
connecting entrance with national lobby +
national-regional exchange hall +
paths definition

[B+V] sailing school + repairing boats path
load-unload small supplies + load-unload small tools-equipment + connecting entrance with national lobby + high speed path+

I. analysis
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B U E N A V E N T U R A revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
[B+V] visitors path
open public space +
magnificent viewing platform +
transformable into grandstand seating area +
for entertainments events on the water +
[CS] + [B+V] paths
interweaving of pathways +
enables passengers and visitors +
to move down closer to or up away from the water +
activities are in between paths +
paths generating space through vertical+horizontal splitting (spaces in between paths)

permanet activities +
temporary installations or events +

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
[CS] + [B+V] paths generating roofs+walls

roofs+walls definition

rain water collection + skin component +

B U E N A V E N T U R A revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
paths+space+roofs+walls definition

[CS] + [B+V] paths generating space+roofs+walls

I. analysis
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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
axxis radiated along each curve surface path
[B+V] visitors path

structure definition

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
structure definition

axxis radiated along each curve surface path
[B+V] passengers path
axxis radiated along each curve surface path
[B+V] sailing-repairing path

structure definition

I. analysis
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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
intersecting axis radiated along each curve surface path
[CS] + [B+V] visitors paths

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BUENAVENTURA
revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
structure definition

intersecting axxis radiated along each curve surface path
[CS] + [B+V] passengers paths

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
intersecting axes radiated along each curve surface path

[CS] + [B+V] cars, supplies, sailing, repairing

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II. problem
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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
structure definition

intersecting axxis radiated along all curve surfaces paths

[CS] + [B+V] all paths

spatial position for structural points

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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
structure definition

columns intersecting
uppest and lowest points of each axxis
[CS] + [B+V] paths

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BUENAVENTURA revival
Maritime Terminal for Passengers
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structure definition

columns intersecting uppest and lowest points of each axis

[CS] + [B+V] paths
structure definition

columns intersecting uppest and lowest points of each axxis

[CS] + [B+V] paths

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B U E N A V E N T U R A
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Maritime Terminal for Passengers
INTERWEAVING THE WAVES
structure definition

columns intersecting uppest and lowest points of each axxis

[CS] + [B+V] paths

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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
columns intersecting uppest and lowest points of each axxis

[CS] + [B+V] paths
top view - general plan

programm
1. main entrance
   - information point
   - offices
   - bank
   - post office
   - lockers
   - toilets

2. shopping space
   - fruits shops
   - souvenirs
   - traditional crafts

3. sport activity
   - sailing school

4. social activity
   4a. restaurant
   4b. sea-food school
   4d. coffee

5. cultural activity
   5a. main public open square
   5b. exhibition space + coffee
   5c. theater - civic hall - CS deck
   5d. theater - civic hall - B+V deck

6. cruise deck
   6a. international lobby: check in - out,
      information, control offices, waiting areas,
      lockers, toilets
   6b. passengers deck
   6c. load and supplies deck
   6d. cars deck

7. boats+vessels decks
   7a. national-regional lobby: check in - out,
       information, control offices, waiting areas,
       lockers, toilets
   7b. passengers decks

8. repairing boats
   8a. boats repairing area 21-15mts long
   8b. boats repairing area 15-20mts long
   8c. boats repairing area 11-15mts long
   8d. boats repairing area 6-10mts long
   8e. cranes
   8f. indoors working area, equipment-tools
       control office, toilets

introduction
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problem
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case study
conclusion

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
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Buena Ventura Revival
Maritime Terminal for Passengers
Interweaving the Waves
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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

facade west-north
cultural activity + theater + national civic hall = [turning point] C

[B+V] deck + national-regional lobby = [medium point] B

main entrance + city connection = [city point] A

cultural activity + theater + national civic hall = [turning point] C
BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

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1. main entrance
2. information point
3. tickets offices
4. admin offices
5. bank
6. post office
7. lockers
8. toilets

top view

entrance + city connection
BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

CROSS SECTION A-A’

1. main entrance
2. information point
3. tickets offices
4. admin offices
5. bank
6. post office
7. lockers
8. toilets

introduction
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conclusion
[B+V] Boats + Vessels Lobby

I. Introduction
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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

1. Waiting area outside
2. Waiting area inside
3. Tickets point
4. Information point
5. Control office
6. Toilets
7. Passengers path-deck
8. Visitors deck

TOP VIEW
[B+V] Boats + Vessels Lobby

BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

CROSS SECTION B-B'

[B+V] path
1. waiting area outside
2. waiting area inside
3. tickets point
4. information point
5. control office
6. toilets
7. passengers path-deck
8. visitors deck

national-regional
lobby

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-CROSS SECTION B-B'

[CS] path
- international lobby
- check in - check out

[CS] path
- passengers deck
- arrival - departures

[B+V] path
- national regional lobby
- check in - check out

[B+V] path
- passengers decks
- arrival - departures

[CS] = [B+V] visitors path
- open public space
- magnificent viewing platform

[B+V] path
- Social Activity
- restaurant-coffee-seafood-school
I. Analysis
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BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES
**BUENAVENTURA revival**
Maritime Terminal for Passengers

**INTERWEAVING THE WAVES**

### CROSS SECTION C-C'

1. **[B+V] path**
   - auditorium 340 people
2. **[B+V] path**
   - flexible stage
3. **[B+V] path**
   - lobby
4. **[B+V] path**
   - coffee
5. **[B+V] path**
   - toilets

### Introduction

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V. **design**
   - conclusion

### Auditorium
- 340 people
- Flexible stage
- Lobby
- Coffee
- Toilets

### Maritime Terminal for Passengers
- National-regional lobby
- Check in - check out
- Social activity + restaurant-coffee-seafood school + visitors path
- Main entrance + information point + cross-section C-C'

### Social Activity + Restaurant + Coffee + Seafood School + Visitors Path
- Cross-section C-C'
- National-regional lobby
- Check in - check out
- Visitors path
- Magnificent viewing platform
- Magnificent viewing platform + passengers decks
- Guest-arrival - departures

### Cross-section C-C'
- [B+V] path
- Social activity + restaurant-coffee-seafood school + visitors path
- National-regional lobby
- Check in - check out

### [B+V] path
- National-regional lobby
- Check in - check out
- Social activity + restaurant-coffee-seafood school + visitors path
- Magnificent viewing platform
- Magnificent viewing platform + passengers decks
- Guest-arrival - departures

### National City + Cascajal Island + Cross-section C-C'
- [B+V] path
- Social activity + restaurant-coffee-seafood school + visitors path
- National-regional lobby
- Check in - check out

**[B+V] theater - civic hall - national**
### BUENAVENTURA revival
Maritime Terminal for Passengers
INTERWEAVING THE WAVES

**Materialization**

1. Wooden railing
2. Lighting
3. Steel handrail
4. 50 mm concrete finished layer
5. 40 mm lacquer paint - water proof
6. 50 mm water tight resistance concrete
7. 5 mm damp proof membrane
8. Precast concrete slab deck with integrated edge
9. In-situ pouring concrete
10. Steel plate: technical installations
11. Steel column: lights and fire control
12. Precast concrete wall 30 mm height
13. Removable concrete floor for ducts checking
14. Water collection pipes
15. Water channelled
16. Stainless steel L beam
17. Steel support system
18. Neoprene rain-water collection element moving structure with telescopic arms
19. ETFE (ethylene tetrafluoroethylene)
20. Openings for water control
21. Trapezoidal steel structure
22. Connection for double extrusion
23. Connection for single extrusion
24. Steel rain gutter: channel for rainwater collection

### Technical Details

**Materialization**

- **Steel Handrail**: 40 mm concrete finished layer
- **Concrete Slab Deck**: 50 mm water tight resistance concrete
- **Precast Concrete Slab**: 40 mm lacquer paint - water proof
- **In-situ Pouring Concrete**: 5 mm damp proof membrane
- **Steel Plate**: technical installations
- **Steel Column**: lights and fire control
- **Precast Concrete Wall**: 30 mm height
- **Removable Concrete Floor**: for ducts checking
- **Water Collection Pipes**: channelled
- **Stainless Steel L Beam**: technical installations
- **Steel Support System**: water control
- **Neoprene Rain-Water Collection Element**: moving structure with telescopic arms
- **ETFE (ethylene tetrafluoroethylene)**
- **Openings for Water Control**: trapezoidal steel structure
- **Connection for Double Extrusion**: for ducts checking
- **Connection for Single Extrusion**: channel for rainwater collection

### Diagrams

**DETAIL - CROSS SECTION B-B’**

**DETAIL No. 1**

**DETAIL No. 2**

**Scale**: 1:50

**Technical University of Delft - TU Delft**

**Master Student**: Andreia Peñaloza Caicedo

**Studio Tutors**: Dr. Henriette Bier - Dr. Nimish Biloria - Martin Sobota

**Hyperbody Graduation Lab**

**October 2009 - October 2010**
defining spatial organization

Parametric Logic

Skin Performance

Basic Geometry

Adaptive Geometry

Prototype

rainwater catchment [mesh panel] + light capturing + energy capturing
Rainwater catchment [mesh panel] + light capturing + energy capturing

Technical Section A
LIGHT

Technical Section B
WATER

Defining spatial organization

Skin Construction
- Neoprene Membrane
- Steel Frame
- Glass
- Bone Structure
- Space Frame Structure

Rainwater channelled to tanks through pipes inside the structure

Humidity sensor
- Telescopic arm
- Flaps: open for light capture close when rain
- Actuator

Ambient Light Sensor

Rotating Flap by Wind and Water
Energy will be use to power the membrane actuators

Operable Flap for Water Capturing
Open when raining, close when tanks are full

Water channelled to tanks through pipes inside the structure

Translucent ETFE to prevent water and air coming and diffuse sunlight into building

Defining spatial organization: I. analysis II. problem III. method IV. concept V. design conclusion

Buenaventura revival
Maritime Terminal for Passengers
Interweaving the Waves
Skin Construction

- Neoprene Membrane
- Steel Frame
- Glass
- Bone Structure
- Space Frame Structure

Light Capturing Component
Located on the top part of the building
To maximize sunlight exposure

Energy Capturing Component
Located on the sloping part of the building
To receive wind and transmit
The energy for membrane power supply

Water Capturing Component
Located on the lowest part of the building
To catch grey water
And store it for later use

Buenaventura Revival
Maritime Terminal for Passengers
Interweaving the Waves

DETAIL No.3

- Neoprene Membrane
- Steel Frame
- Glass
- Bone Structure
- Space Frame Structure

- Water Capturing Component
Located on the lowest part of the building
To catch grey water
And store it for later use

- Energy Capturing Component
Located on the sloping part of the building
To receive wind and transmit
The energy for membrane power supply

- Light Capturing Component
Located on the top part of the building
To maximize sunlight exposure

Materialization
22. Stainless steel L beam
23. Steel support system
24. Neoprene rain-water collection element
With telescopic arms
25. ETFE
[ethylene tetrafluoroethylene]
1% glass weight
Self-cleaning material
Reduction of structural frame work
High transparency
High temperature resistance
Fire resistant
Water proof
26. Openings for water control
27. Trapezoidal steel structure
28. Connection for double extrusion
29. Connection for single extrusion
30. Steel rain gutter
Channel for rainwater collection

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Conclusion
"The network of mobility is most strongly expressed at its nodes. The perception of nodes prevails over the awareness of lines, not only because of their intrinsic architectural dominance, but also because of their particular nature as meeting place and point of public interaction".

The Landscape of Contemporary Infrastructure.
Kelly Shannon Marcel Smets. Nai, Rotterdam, NL.
+ it is generating new employment opportunities through its functions:

+ commercial areas
+ sailing school
+ restaurant
+ seafood school
+ repairing boats
visitors and passengers,
local commerce
foreign and local long term investors
+ new city image
+ increasing city identity
+ appropriation feeling
+ new public space
+ citizens spatial conditions
+ stimulating new urban and spatial strategies
+ inhabitants life quality
furthermore, the emerging edilic attractive and monumental shape, is not only effective in relation to the created new image, but also effective because of the new rain water collection system, which helps to solve one of the populations main problem: the lack of water service.

**BUENAVENTURA** : 400.000 inhabitants  
66% have water only 8 hours/day  
34% have no water = 136.000 citizens [1/3 of the population]  

BUENAVENTURA rainfall rate = 6000mm/year  
1mm rain rate = 1lt/m2  
6000mm/year = 6000lt/m2

MTP area = 88.832 m² [paths] x [0.5] + 13.190 m² [roof] x [0.5]  
51.011m² x 6.000mm = 306'066.000 liters/year [divided 365 days]  
838.536 liters/day [divided 50 lts] *  
16.770 persons/day  
12% of 33%  
4% of 100%

* water consume per capita per day = 50lts/day [drinking + sanitation]

Maritime Terminal Passengers [MTP] area  
+ 88.832 m² [paths]  
+ 3.190 m² [roof]

wind speed : 5m/s - 18km/h  
wind direction : north-west  
rainfall rate : 6000-7000mm/year  
“city of eternal rain”

case 1  

Case 2  

102.022m² x 6.000mm = 612'132.000 liters/year [divided 365 days]  
1'677.073/day [divided 50 lts] *  
33.541 persons/day  
24% of 33%  
8% of 100%

case 3  

MTP area = 88.832 m² [paths] x [1] + 3.190 m² [roof] x [3]  
128.402m² x 6.000mm = 770'412.000 liters/year [divided 365 days]  
2'110.717/day [divided 50 lts] *  
42.214 persons/day  
31% of 33%  
10% of 100%
**LAMINAR**

fluid movement = perfectly + ordered + stratified +
soft movement +
fluid moving in + parallel sheets or strips without INTERTWINING

each particle follows a smooth trajectory: powerline

---

**TURBULENT**

= chaotic - desordered movement
+ rapid variation of
+ pressure and velocity in
+ space and time
+ rough movement
+ abrupt movement
forming small aperiodic eddies

each particle follows an unpredictable trajectory

---

transition region

2100 < Re < 4000 movements in between
flows of forces are interwoven, [ships+passengers+natural+social] negotiating the multiple abrupt changes in horizontal and vertical trajectories, alternating open+close spaces... with the main open-common space facing the imensity of the bay....
+ spaces of stability
+ city revival
+ dialogue between city and port
"I learned that without a skilled and dedicated TEAM, anything I wanted to do would not have been successful".

Robert Blaich, Philips.