THE IMMOBILE CITY

Mobility and urban development in the Cuban capital
Area: 2,754,000 km$^2$
Population: 39,170,000
CHANGING CONDITIONS
“WE REFORM, OR WE SINK”
Raul Castro (2006), Cuban President
SOME NEW DEVELOPMENTS

- political reforms
- economical system
- tourism
- self-employment
Jeep carrying Castro's remains broke down during funeral procession
NEGLECTED CONDITION
THE PROBLEM

Havana: 2,2 million Inhabitants
limited personal car possession
full reliability on public transport
collapse of transportation facilities
Research question:

How can Havana become a more connected city with a high level of mobility?
ESTABLISH A MODERN TRANSPORTATION HUB TO DRASTICALLY IMPROVE THE MOBILITY CONDITIONS
GLOBAL INTEREST TO INVEST IN CUBA’S INFRASTRUCTURE

Mitsubishi Corp says scouting for Cuba infrastructure projects

Prospects for foreign investment in Cuba

Russia offers to finance $4bn in Cuban development schemes

Russia and Abu Dhabi in talks to develop major new airport in Cuba
WHAT WILL THE FUTURE BRING?

FOREIGN INVESTMENTS
CHINESE INFRASTRUCTURE INVESTMENTS IN CUBA

- **2010-2015**: $600 MILLION
- **2015**: $370 MILLION
MARIEL 2014: FIRST NEW RAILWAY LINE SINCE REVOLUTION
HYPOTHETICAL SCENARIO

2014
New railway line opened linking Havana with its new port of Mariel

2018
Raul Castro resigns as ruling president, Cuba is ready for further opening up to the world

2020
Chinese invest in new railway line that improves the connection between the airport of Havana and the city center

2022
All port activities are now moved outside the city, making the old port free for redevelopment

2025
Chinese invest in new station for Havana to safe the train network and improve mobility

2028
Development of a tram line that connects the city center with the new redevelopments of the former port

2035
Opening of new HABANA CENTRAL STATION

2040
Profits from port redevelopments are injected to restore the crumbling city center

2050
First high speed line completed in Cuba that connects Havana with Santiago de Cuba
>2017 SIGNIFICANT INCREASE OF TOURISM IN HAVANA
2020: SECOND NEW RAILWAY LINE NEEDED: TO CONNECT THE AIRPORT WITH THE CITY
IN ORDER TO PROVIDE IN THIS TREND:

NEW HAVANA

TRANSPORTATION HUB
HAVANA 2035
RESEARCH

Mobility in the capital
MOST MOBILITY PROBLEMS ARE A CONSEQUENCE OF THE SPECIAL PERIOD, TILL NOW THEY HAVE NEVER FULLY RECOVERED

Special period 1989 - now
CONTINUES DECLINE OF MOBILITY
Overall lack of maintenance
4 MOBILITY PROBLEMS

Overall lack of maintenance + Second-hand equipment
4 MOBILITY PROBLEMS

Overall lack of maintenance + Second-hand equipment + Scarcity of resources
4 MOBILITY PROBLEMS

Overall lack of maintenance
Second-hand equipment
Scarcity of resources
Logistic inefficiency
PROBLEMS AFFECT ALL MEANS OF TRANSPORTATION

- **Company buses**: Yellow American school buses
- **Train network**
- **Truck transport**: Cuban local transport
- **Ferries**: Local ferries to cross the bay
- **GETA**: Grupo Especial de Transporte
- **Alemendrones**: Collective taxi service
- **Taxi service**: Yellow cab
- **Public bus system**: Omnibus and Metro-bus
- **Tourism Mobility**: CUC Taxi, illegal taxi, Oldsmobile, Horse carriage and coco-taxi
- **Tourist Ferry**
- **Truck transport**
- **Ferries**
- **GETA**
- **Alemendrones**

**Prices**
- **0.0447/Km**
- **0.01-0.04**
- **1-2.4**
- **5-20**
- **Free**
- **0.55-1/Km**
- **1**
- **All**
- **Limited number of tourists**
- **Accessible to tourists**
## 13.1 - Passengers transported by specialized state enterprises

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<th>Concept</th>
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(a) Includes taxi tourism.

**SOURCE:** Oficina Nacional de Estadística e Información República de Cuba.
THE BUS SEEM THE ONLY RELIABLE SYSTEM
OVERCROWDED
THE PROBLEM

EXISTING vs WORKING

- **Public busses**: 13%
  - Existing: 1000
  - Working: 68%

- **Company busses**: 68%
  - Existing: 0
  - Working: 13%

**SOURCE:** Oficina Nacional de Estadística e Información República de Cuba.
THE BEST AMONG THE WORST

- Company buses
  - Yellow American school buses

- Public bus system
  - Omnibus and Metro-bus

- Train network

- Taxi service
  - Yellow cab

- Truck transport
  - Cuban local transport

- Ferries
  - Local ferries to cross the bay

- Tourism Mobility
  - CUC Taxi, illegal taxi, Oldsmobile, Horse carriage and coco-taxi

- GETA
  - Grupo Especial de Transporte Alternativa

- Alemendrones
  - Collective taxi service

8.700.000 mil. passengers

1140.400.000 mil. passengers

70.100.000 mil. passengers
LOCAL CONDITIONS OF INFRASTRUCTURE

VIEJA

Area: 4,4 km²
Population: 87,560
THE HAVANA CENTRAL TRAIN STATION
THE CROWN ON THE FLOURISHING TRAIN INFRASTRUCTURE
19TH CENTURY: THE GOLDEN AGE OF TRAINS IN CUBA
SUGAR INDUSTRY & THE CUBAN RAILROAD
NOW...
ABSENCE OF TRAIN
### ABSENCE OF DEPARTURES

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<th>Tren</th>
<th>Origen</th>
<th>Hora de Salida</th>
<th>Estación</th>
<th>Destino</th>
<th>Hora de Llegada</th>
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<td>11</td>
<td>Habana</td>
<td>18:13 hr</td>
<td>Est/Cobre</td>
<td>S/La Habana</td>
<td>19:05 am</td>
<td>Cada 4 días</td>
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<tr>
<td>15</td>
<td></td>
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<td></td>
<td>21:24 hr</td>
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<td>S/Spiritus</td>
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<td>Est/Central</td>
<td>G/El Cobre</td>
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<td>Diario</td>
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<tr>
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<td>A/Artemisa</td>
<td>24:50 hr</td>
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<tr>
<td>137</td>
<td></td>
<td>17:35 hr</td>
<td></td>
<td>L/Palos</td>
<td>23:00 hr</td>
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</table>

**Observaciones:**
- Los Lunes #133 Taller por la mañana
- Los Domingos #135 Taller todo el día
- Nota: Los trenes #73 Pinar del Río Sale de Estación #73 Cienfuegos "19 de Noviembre"
ONLY 7 DEPARTURES A DAY

HAVANA CENTRAL STATION

GUANTÁNAMO
12:38u
08:05u

S.SPRITUS
18:53u
21:21u

SANTIAGO DE CUBA
10:005u

GÜINES
11:00u

LOS POLOS
21:00u

ARTEMISA
21:30u

MATANZAS
11:30u

GUANTÁNAMO
12:38u

S.SPRITUS
18:53u
21:21u

SANTIAGO DE CUBA
10:005u

GÜINES
11:00u

LOS POLOS
21:00u

ARTEMISA
21:30u

MATANZAS
11:30u
FLAWS OF HAVANA CENTRAL STATION

2/3 of the site has lost its function
FLAWS OF HAVANA CENTRAL STATION

2/3 of the site has lost its function

The station blocks the connection to the bay and obstruction for vehicle-flow
Flaws of Havana Central Station

2/3 of the site has lost its function.

The station blocks the connection to the bay and obstruction for vehicle-flow.

Fenced off or elevated border, isolating itself from the surroundings.
IT SEEMS THAT WHAT WAS ONCE STATE-OF-THE-ART
HAS FALLEN INTO DISREPAIR
HAVANA IS A CITY OF IMMOBILITY
SITE ARGUMENT

23° 7’19.52” N  82°21’33.02” W
FOUR SCALES OF MOBILITY

CUBA
COUNTRY

HAVANA
REGION

VIEJA
CITY DISTRICT

NEIGHBOURHOOD & SITE
FOUR SCALES OF MOBILITY

- intercity train connection
- intercity bus-lines
- ferry connection to Miami

- mayor city bus-lines
- connection to the airport
- inner city train to two other stations in Havana

- ferry network across the bay
- centerpoint of all mobility lines

- Transit hub that connects the different scales and transport-options
(INTER)NATIONAL CONNECTIONS

- Miami (356km, 7-10hrs)
- Toronto (4 hrs)
- Trinidad (4 hrs)
- Key West (170km, 4-6hrs)
- To Mariel (50 min)
- International Airport (28 min)
- Europe (11-17 hrs)
- Santiago de Cuba (16 hrs)

Key:
- National Railway Connection
- InterCity Bus-Lines
- Mayor City Bus-Lines (Omnibus)
- New Line to Connect the Airport by Train
- Inner City Train Connects Two Other Stations in Havana
- Ferry Network Across the Bay
- Ferry Network (Water Taxi)
- Tram City Center
- Transit Hub That Connects the Different Scales and Transport-Options

Cuba Map Overview
INNER-CITY CONNECTIONS
LOCAL TRANSPORT CONNECTIONS

- NATIONAL RAILWAY CONNECTION
- INTERCITY BUS-LINES
- MAJOR CITY BUS-LINES (OMNIBUS)
- NEW LINE TO CONNECT THE AIRPORT BY TRAIN
- INNER CITY TRAIN CONNECTS TWO OTHER STATIONS IN HAVANA
- FERRY NETWORK ACROSS THE BAY

- FERRY NETWORK (WATER TAXI)
- TRANSIT HUB THAT CONNECTS THE DIFFERENT SCALES AND TRANSPORT-OPTIONS
NEIGHBORHOOD & SITE

CENTRAL LOCATION IN THE CITY
VIEJA; THE HISTORIC CENTER
TWO IDENTITIES
STATION SITE REQUIREMENTS

- excellent accessibility
- connected to existing infrastructure
- central location
- natural landmark
- connection to other neighborhoods
POTENTIAL SITES
Perfect location for a merge of water, road and rail infrastructure and connecting the two areas.
THE INBETWEEN OPTION
CASTILLO DE ATARÉS
1916
SITE VS TYPOLOGY
Running Junction Crossing Terminus

Transit station

End station
TERMINUS: ONE WAY IN = ONE WAY OUT
- MORE TRACKS
- MORE PLATFORMS
- LESS EFFICIENT
CONCLUSION: TRANSIT STATION

Transit station
SITE POTENTIAL
PROPOSE: THE LOOP STATION
PROPOSE: THE LOOP STATION

European standard: R minimum = 150m
R Atarés = 170m
Speed coefficient (Xn) = 3,65

VMAX = Speed coefficient \cdot \sqrt{(R - 6)}
VMAX = 46.7 km/h

* All numbers relate to standard gauge track
The loop station: A hybrid typology, that combines the qualities of the transit station on a location designated for a terminus station.
DESIGN

Proposal
MODERN TRAINSTATIONS

Rotterdam Central station
MODERN TRAINSTATIONS

Kyoto station building
MODERN TRAINSTATIONS

Antwerpen Centraal
MODERN TRAINSTATIONS

Berlin Hauptbahnhof
INTERGRATION WITH THE CUBAN CONTEXT

Vibrant street culture
INTERGRATION WITH THE CUBAN CONTEXT

Commercial habits
BASIC ELEMENTS OF A CONTEMPORARY STATION IN CUBA

- **Trains**: 20%
- **Trams**: 8%
- **Buses**: 6%
- **Ferry’s**: 6%
- **Lobby**: 15%
- **Comercial**: 7%
- **Station square**: 5%
- **Logistic offices**: 20%
HABANA CENTRAL

DESIGN PROGRAM

TRANSPORTATION HUB INFRASTRUCTURE

LOGISTICS OFFICES
PUBLIC SPACE
SERVICE FACILITIES

Basic (hard) Program
Additional Program
Basic (soft) Program

HARD PROGRAM

SOFT PROGRAM
DESIGN PROGRAM

TRANSPORTATION HUB INFRASTRUCTURE

TRAIN PLATFORM 20%
BUS PLATFORM 8%
TRAM 6%
FERRY 6%
LOGISTICS 11%

SERVICE FACILITIES

COMMERCIAL 7%
LOBBY 15%
STATION SQUARE 5%
OFFICE 20%
PARKING 2%

PUBLIC SPACE

HEADQUARTERS OF MOBILITY

HARD PROGRAM

GFA = 31.100 m²
FOOTPRINT = 18.500 m²
STATION AREA = 64.400 m²

SOFT PROGRAM
SCALE OF THE PROJECT

New Havana station

Havana central station

Helsinki Central railway station

grand central station

Leiden centraal station

Gare do Oriente

Michigan central station

Luz Railway Station

Gare de Lyon Saint-Exupéry

Post industrial stations

Modern stations

Post modern stations
SCALE OF THE PROJECT

CURRENT STATION
145.000 m²

NEW HABANA CENTRAL
64.400 m²
NEW HABANA CENTRAL

64,400 m²
**SPECIFIED PROGRAM**

**TRANSPORTATION HUB INFRASTRUCTURE**
- TRAIN PLATFORM 20%
- BUS PLATFORM 8%
- TRAM 6%
- FERRY 6%
- LOGISTICS 11%
- COMMERCIAL 7%
- LOBBY 15%
- STATION SQUARE 5%
- OFFICE 20%
- PARKING 2%

**SERVICE FACILITIES**
- Service spaces
- Sanitary facilities
- Cleaning facilities
- Shops (different activities)
- Foodcourt (tourists)
- Market (local)
- Information point
- Stairs/elevator/escalator

**PUBLIC SPACE**

**HEADQUARTERS OF MOBILITY**

**GFA = 31.100 m²**
**FOOTPRINT = 18.500 m²**
**STATION AREA = 64.400 m²**
TO CREATE A STRONG TRANSPORTATION TYPOLOGY THE BUILDING APPEARS AND FUNCTION AS ONE GESTURE
FUNCTIONAL SCHEME

LOBBY

STATION SQUARE

20%
ESSENTIAL PROGRAM

- RAILWAY
- TRAM
- BUS TERMINAL
- FERRY TERMINAL
- LOBBY
- STATION SQUARE

51%
BASIC PROGRAMATIC ELEMENTS

Train platform 20%
Bus platform 8%
Tram 6%
Ferry 6%
Logistics 11%
Commercial 7%
Lobby 15%
Square 5%
Headquarters 20%
Parking 2%
The difference between the two characteristics (HARD & SOFT) are the fundamental principle of the station, together they form the spatial concept of the project.
The design task is how to express this difference of the two characteristics into one unified building, while fulfilling the different spatial requirements needed for both.
1. ONE BUILDING GESTURE

- MERGING INFRASTRUCTURAL TYPOLOGIES
- TRANSIT STATION TYPOLOGY
- EXPRESSION OF UNITY
2. SITE CHARACTERISTICS

• CONNECTOR BETWEEN THE OLD AND THE NEW CITY
• RESPONDING TO THE CONTEXT OF ATARÉS
3. INFRASTRUCTURAL LAYOUT - FIRST CANOPY

• THE HARD PROGRAM
• ALIGNED NEXT TO EACH OTHER
4. PUBLIC CONNECTOR - SECOND CANOPY

- FREEDOM OF TRANSFER
- CONNECTION OF THE BAY WITH THE HILL
- DIRECT VIEW ON THE MOVING INFRASTRUCTURE
5. REGULATED BY HQ OF MOBILITY

- CONNECTION THE TWO SPATIAL CHARACTERS
- EMBODIES THE CLOSED OF PROGRAM
PROGRAM ARRANGEMENT

local

touristic
TRAIN
PUBLIC PROGRAM
Eliminating the closed facades
EXPRESSION OF THE CUBAN OPEN CHARACTER
FADING BORDER IN & OUTSIDE
TRAIN TERMINAL

first floor

ground floor
CENTRAL LOBBY
BUS TERMINAL

ground floor

first floor
TRAM & FERRY
...BY ELIMINATING THE FACADE,
THE STRUCTURE FORMS THE FACADE
FACADE DEVELOPMENT
FACADE DEVELOPMENT
COLUMN AS EXPRESSION OF THE TWO CHARACTERISTICS

The public slab (soft)

The infrastructural slab (hard)
ONE REPETATIVE ELEMENT
ONE REPETATIVE ELEMENT
ONE CRITICAL ELEMENT:

- Conceptual expression
- Construction
- Materialization
- Climate
- Lighting
- Visual connections
VERTICAL CONSTRUCTION
REFLECTIVE CEILING MIRRORS
STEEL CRUCIFORM COLUMN 460X460mm
CASSETTE ROOF STRUCTURE 2000X2000 mm CONCRETE CAST IN PLACE
PRIMARY CONCRETE BEAM STRUCTURE CAST IN PLACE
CONCRETE RAINWATER BASIN CAST IN PLACE 41 000 L
RAINWATER GUTTER OUTLET
POLYCARBONATE SKYLIGHT
RAINWATER GUTTER
ROOF & REFLECTIVE CEILING
PASSIVE CLIMATE PRINCIPLE

RAINWATER COLLECTION BASIN 41.000 L

NATURAL VENTILATION FROM BAY

FLOOR OPENINGS ILLUMINATE GROUND FLOOR

PV CELLS ON ROOF HQ

CANTILEVER 4M

SHADOW OFFSET MAX 6M

MAX 45°

DRAINAGE TO HQ BASIN OR DISPOSAL TO BAY

HABANA BAY

HQ WATER STORAGE

HAVANA BAY

DRAINAGE TO HQ BASIN OR DISPOSAL TO BAY
RAINWATER STORAGE

Rainwater gutters

Collection basin

Drainage trough column to storage basin or bay disposal
LIGHTING

NIGHT

DAY
CONNECTION TO FUTURE DEVELOPMENTS
CONNECTION TO THE SURROUNDINGS
CONNECTION TO THE CITY

VIEJA (city center)

FINANCIAL DISTRICT (former harbor)
GOAL: TO CONNECT PEOPLE, PLACES AND INFRASTRUCTURE