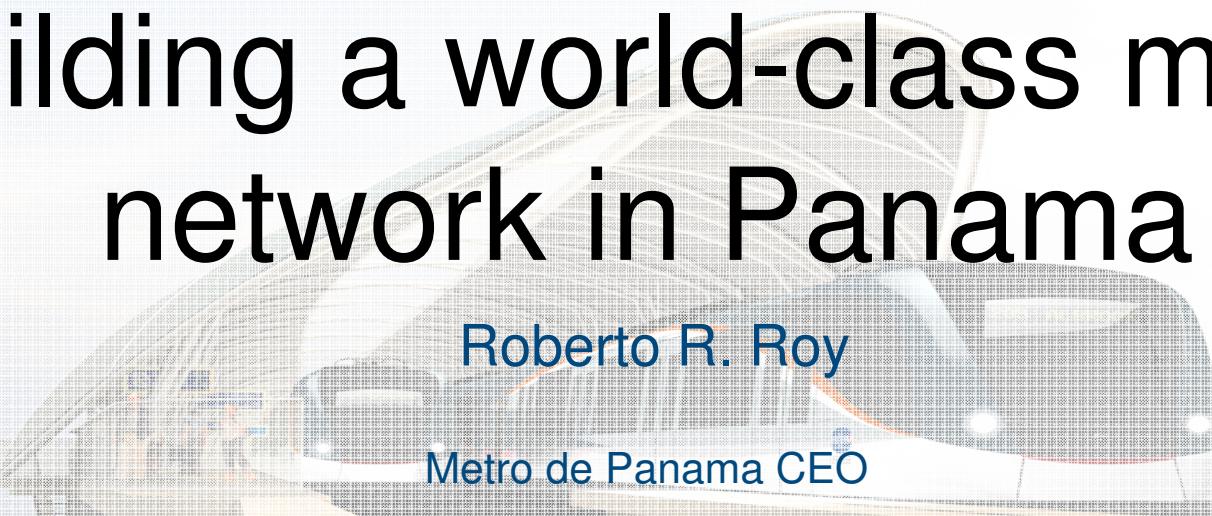




# Building a world-class metro network in Panama



Roberto R. Roy

Metro de Panama CEO

Chairman of the Board, Panama Canal



CONSORCIO LINEA UNO  
METRO DE PANAMA





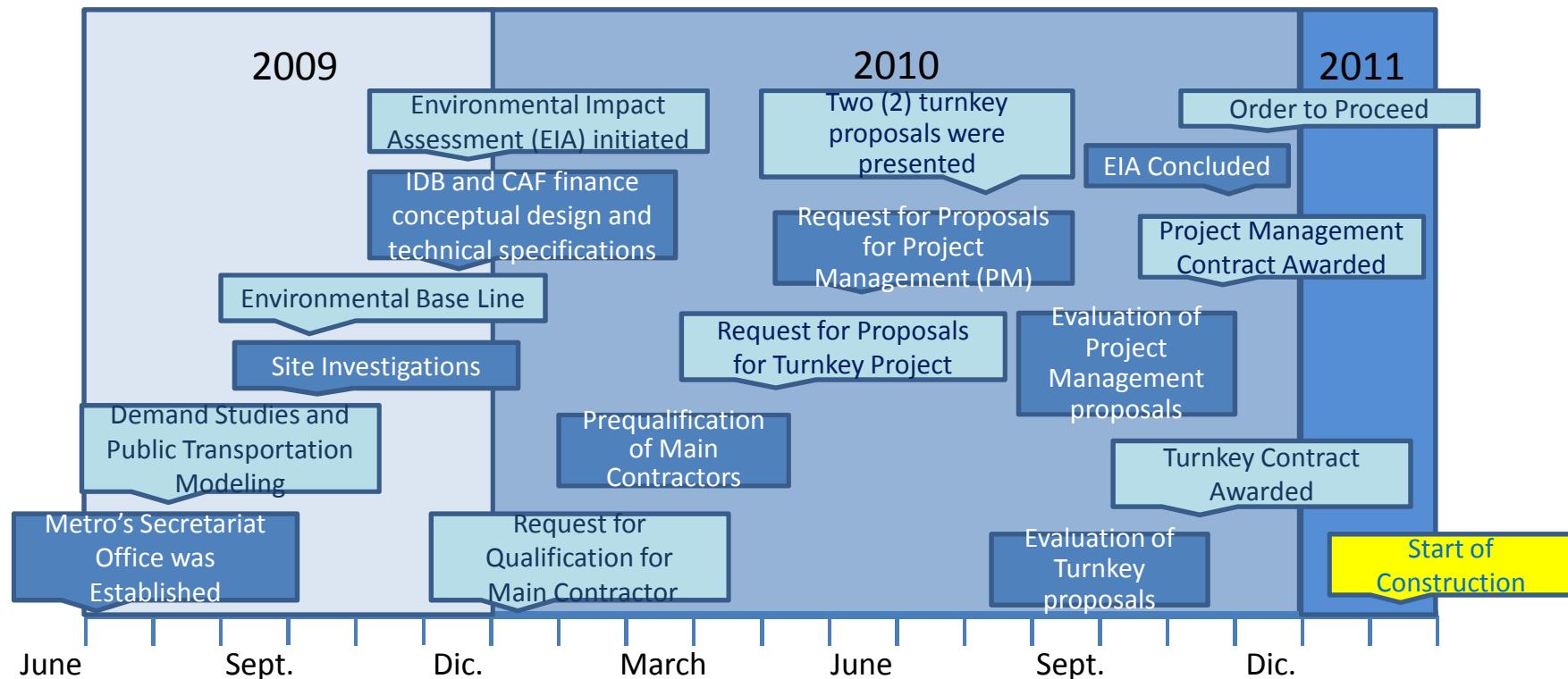
New Metros in Latam , not in  
big countries only anymore

- Metro de Lima
- Metro de Santo Domingo
- Metro de Panamá
- Metro de Quito

Metros small, but world class equipment.



# Panama's Metro Line 1 Planning and Start-up





METRO  
DE PANAMA



## **Line One Project – Panama's Metro System**

### **General Concepts**



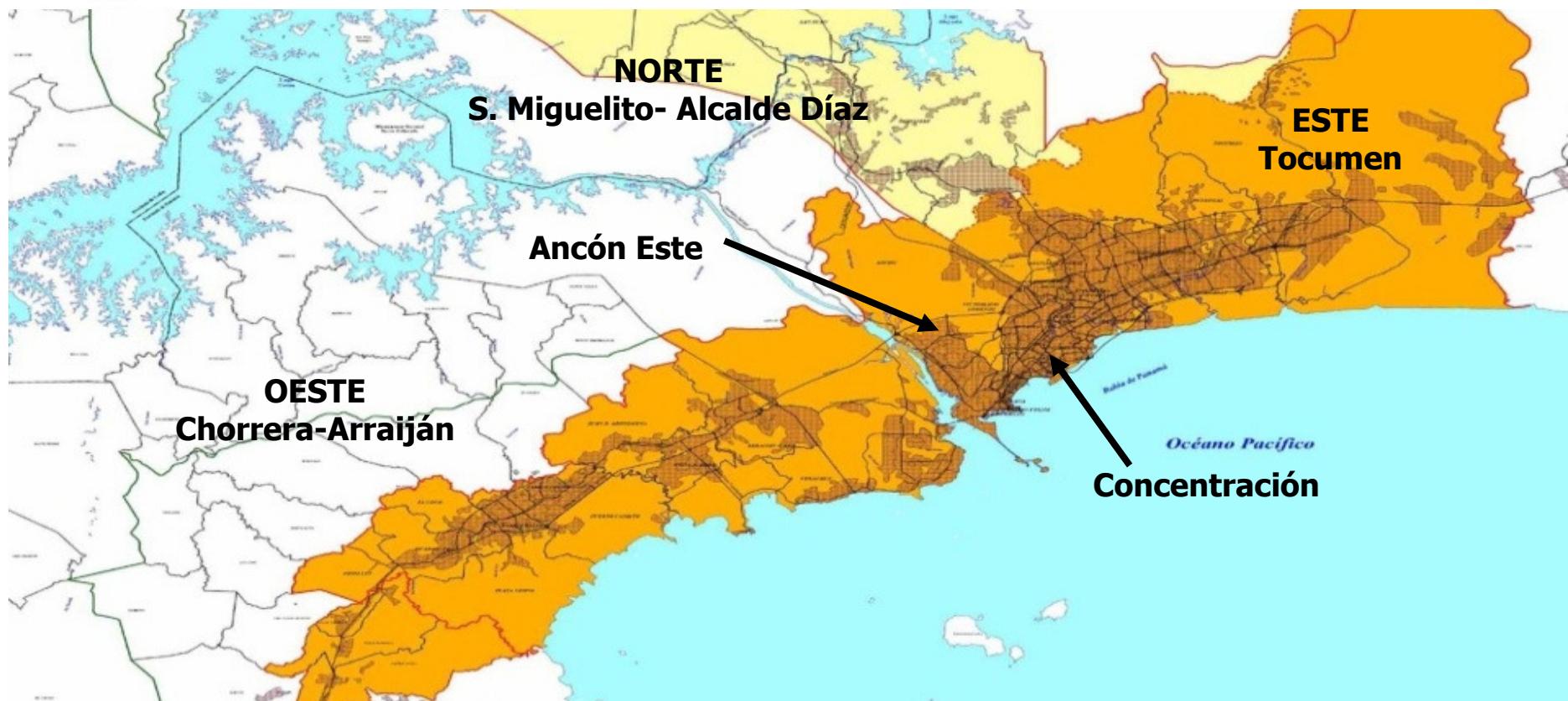
# CENTRAL AMERICA







## Limits to Growth





## Characteristics of the City

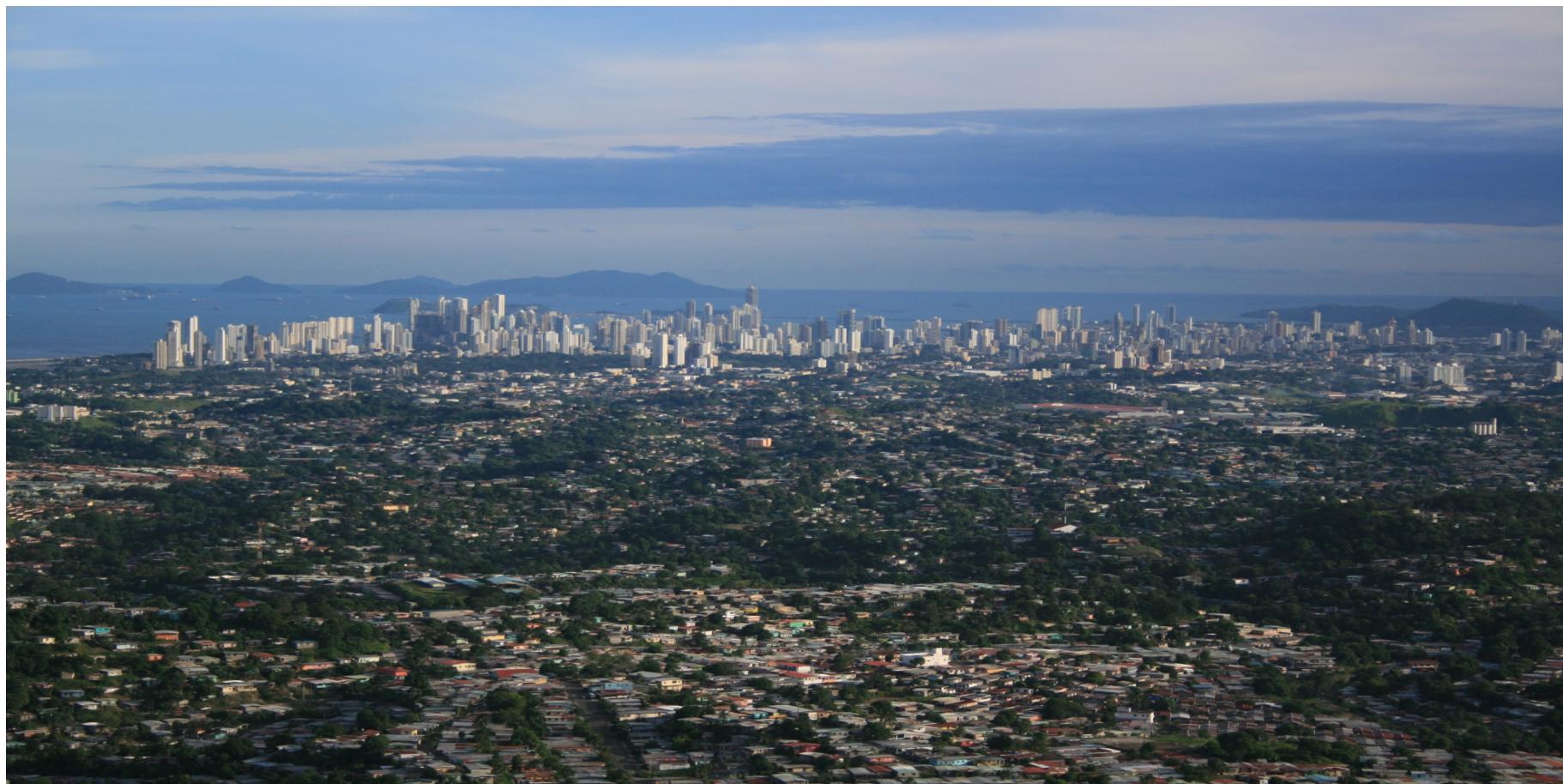
- 3 Limits to Growth: Ocean, Canal and Watershed
- 3 dormitories
- Hence, long narrow corridors













## MOBILIZATION, SMALL CITIES BIG PROBLEMS

Cars sold per month  
Motorized Trips per day  
Average Time at peak hour

TRAFFICO



5000  
2.500.000  
75 minutes  
Autos occupy 80% spc

**Travel modes**

Buses	30%
Cars	19%
Pedestrian	40%
Taxi	11%



## • RED DEVIL!





## Challenges

PUBLIC TRANSPORTATION IN PANAMA REQUIRED A COMPLETE OVERHAUL

### Last Few Year's Situation

- Accelerated population growth. Strong Migration to the City.
- Dangerous old buses (Average age 18 years old).
- Bad business model
- Competition for passengers.
- Non compliance with transit laws.
- Car congestion
- Very Bad public transportation
- Lack of alternatives to the Car
- BLISTERING ECONOMY GROWING STEADILY AT OVER 10% A YEAR**



## SOLUTIONS?

### Combined Multiple Solution !

- METRO+ Road Program+ Intersections, Underpasses, Widening, Asphalt
- New METROBUS System (1300 New Buses), Smart Street Light system
- Aprox 5 billion investment

SISTEMA INTEGRADO DE TRANSPORTE



METRO  
DE PANAMA



## TYPES OF METRO: OPTIONS

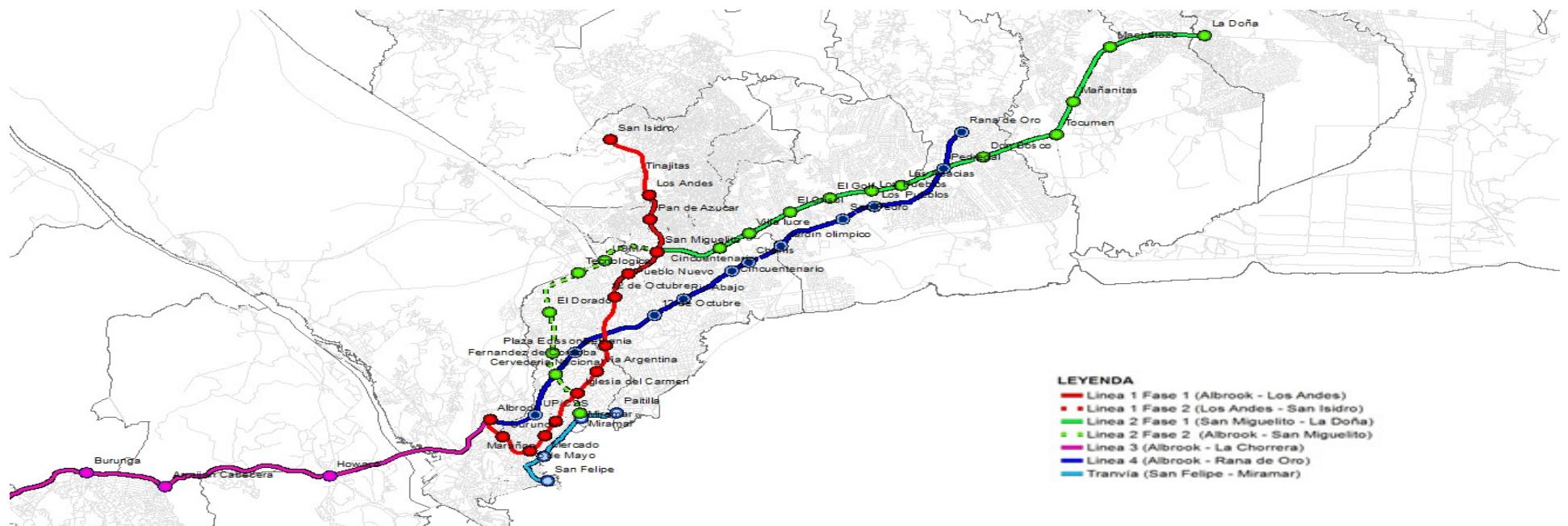
### Alternatives

- A) Light Rail on Surface (Occupied too much space)
- B) Monorail ( good but unique supplier, non standard, lower future capacity)
- C) ELEVATED STANDARD METRO (Social and aesthetic problems in the heart of the City)
- D) ALL UNDERGROUND (MORE EXPENSIVE)
- E) COMBINATION: SUBWAY AND ELEVATED

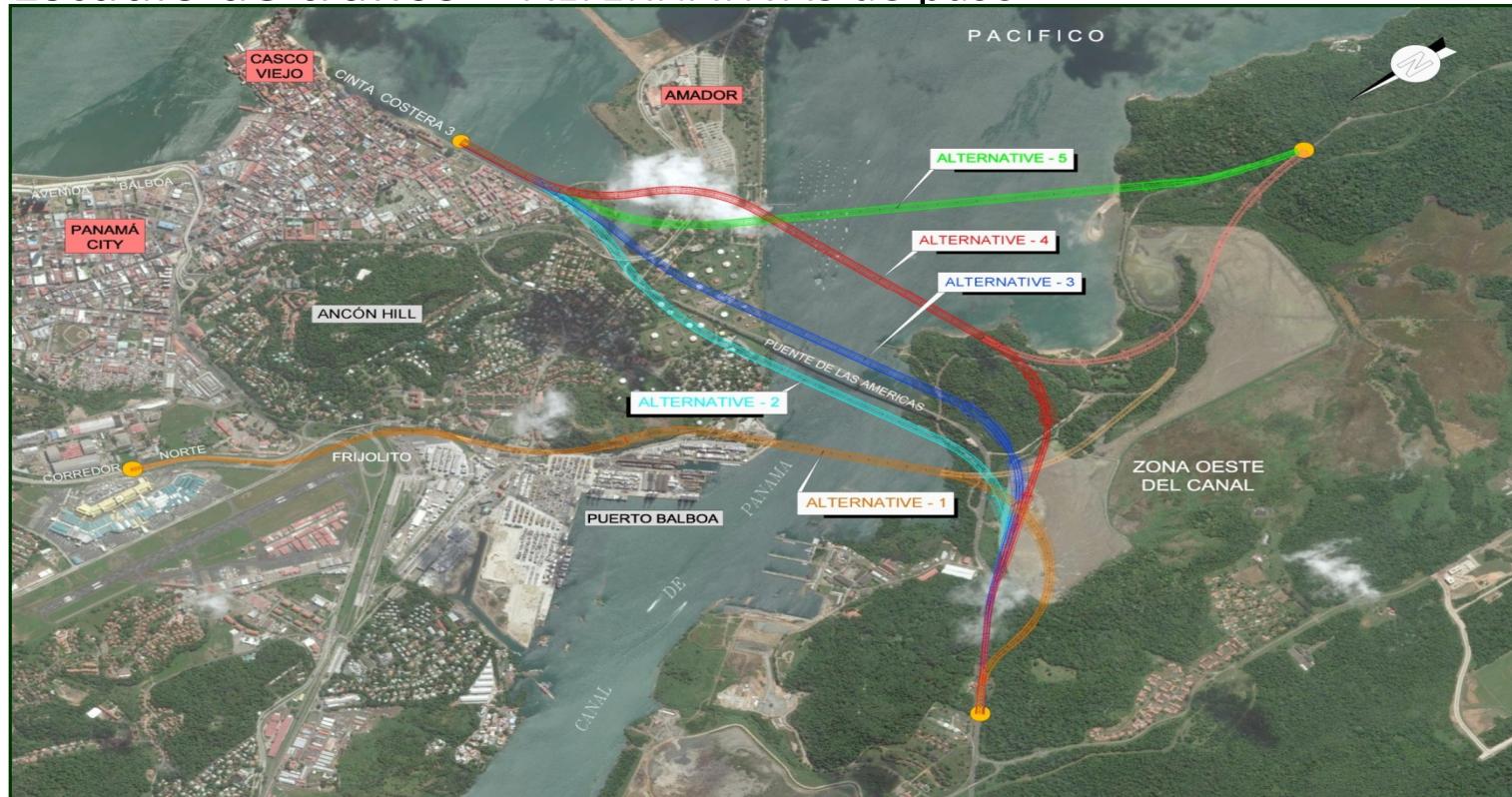
- **OPTION (E) CHOSEN**

# METRO MASTER PLAN FOR 2030



RED LINE 1, 14 KM

### 2. Estudio de tráfico – ALTERNATIVAS de paso





## Fourth Panama Canal Bridge Conceptual Design



GRUPO  
**prointec**

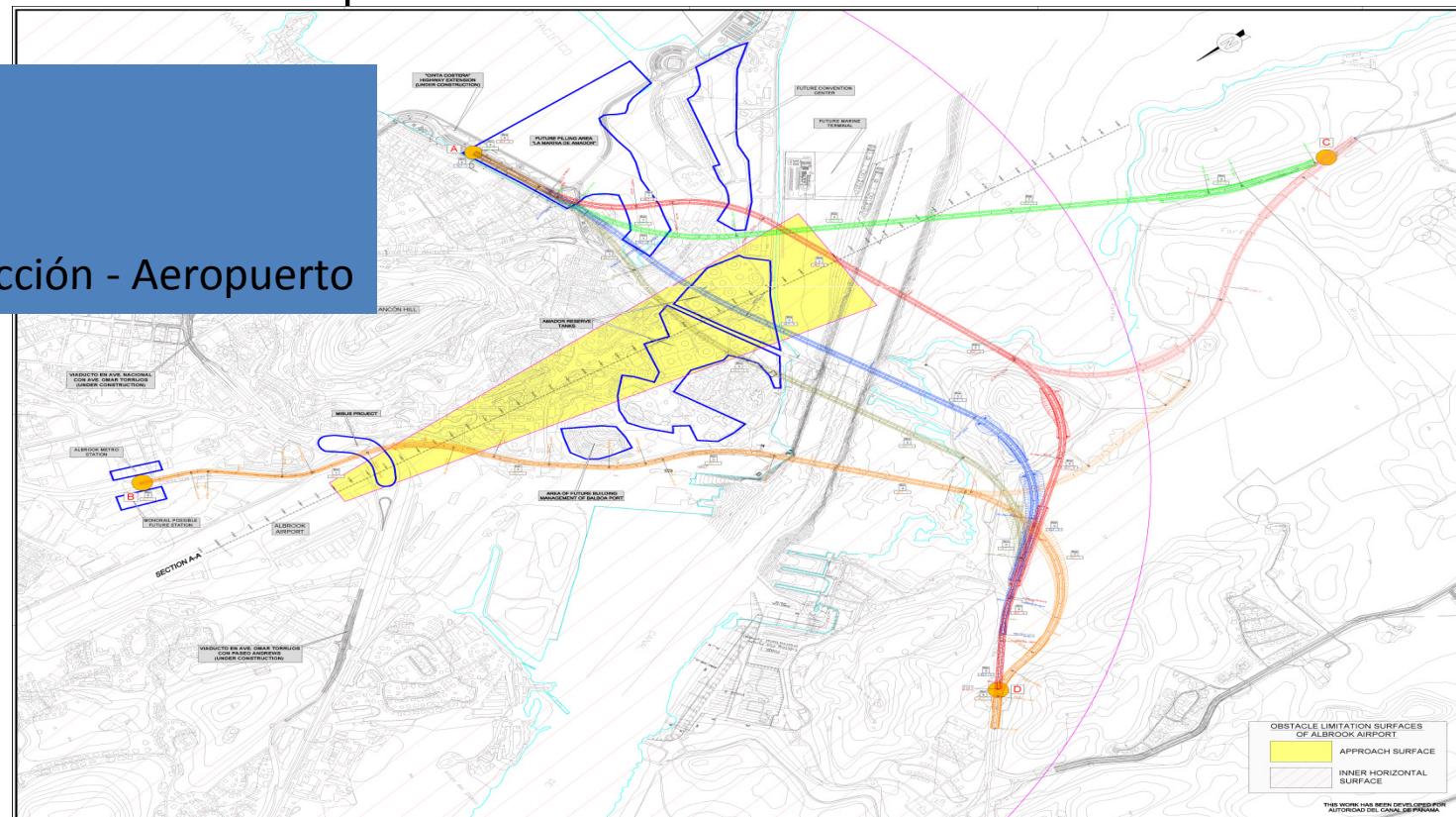
Roughan &  
O'Donovan

**Pondio**  
Ingenieros

### 3. ALTERNATIVAS – Descripción

#### ALTERNATIVAS

- Visión global
- Principal restricción - Aeropuerto





## Fourth Panama Canal Bridge Conceptual Design

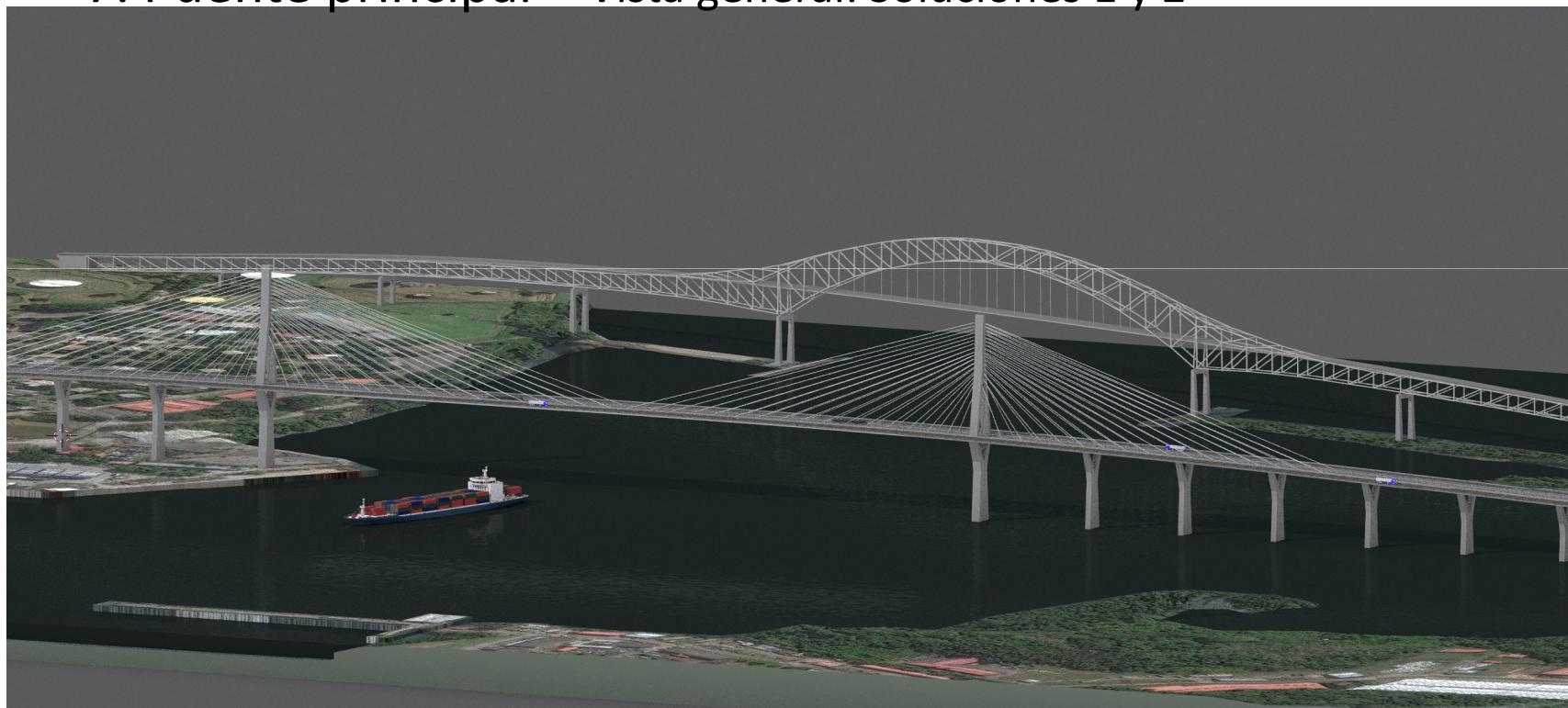


GRUPO  
**prointec**

Roughan &  
O'Donovan

Pondio  
Ingenieros

### 7. Puente principal – Vista general: Soluciones 1 y 2





## Fourth Panama Canal Bridge Conceptual Design



GRUPO  
**pointec**

Roughan &  
O'Donovan



### 7. Puente principal – Vista general: Soluciones 1, 2 y 3





## **Metro Line 1 - Panama**

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**Designs for 14 km Line 1**



## SOUTH TERMINAL STATION

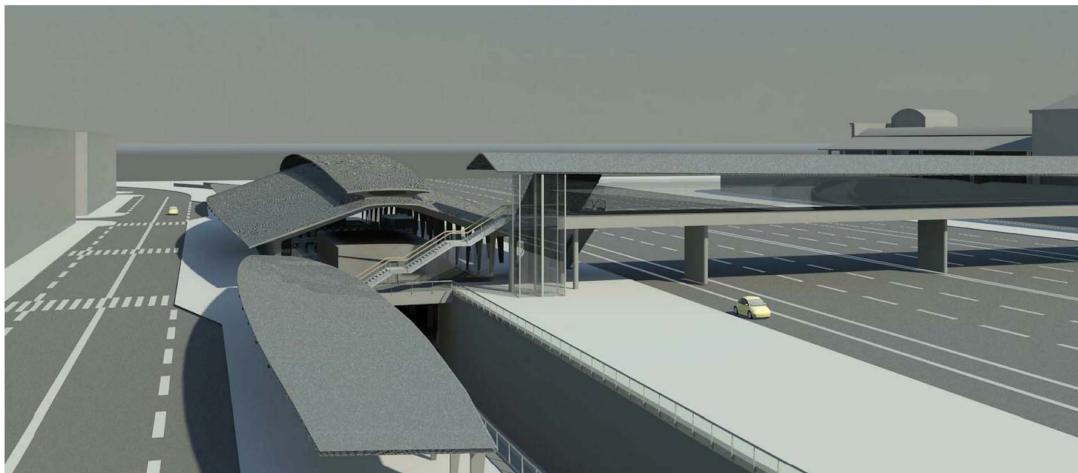


ESTACIÓN SEMIENTERRADA- ALBROOK





3 VISTA 3  
1:1





## BASIC UNDERGROUND STATION DESIGN



# BASIC PROJECT



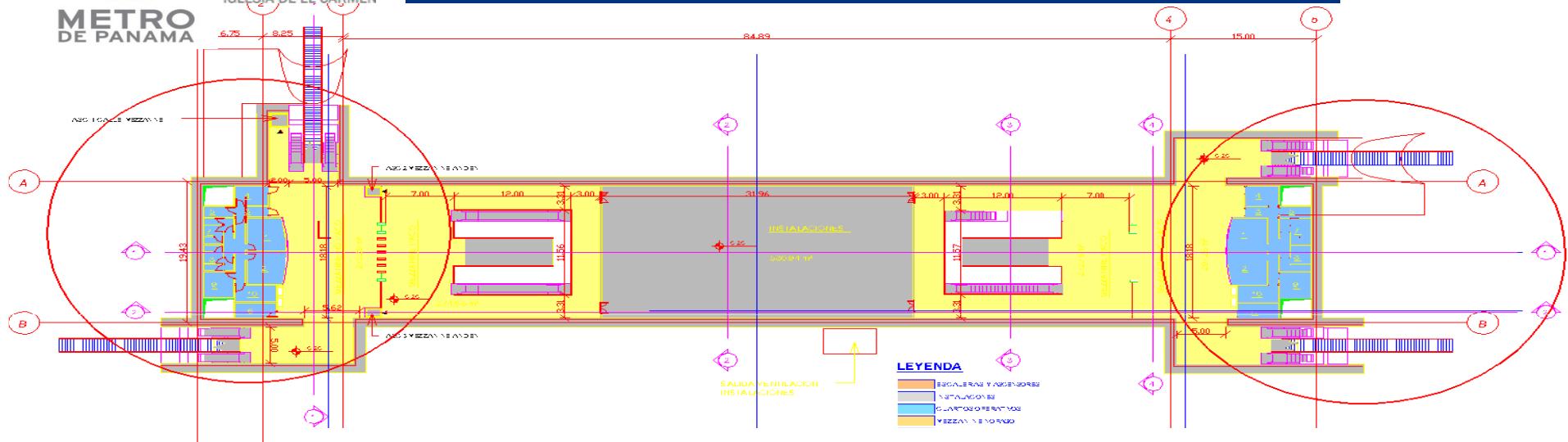


METRO  
DE PANAMA

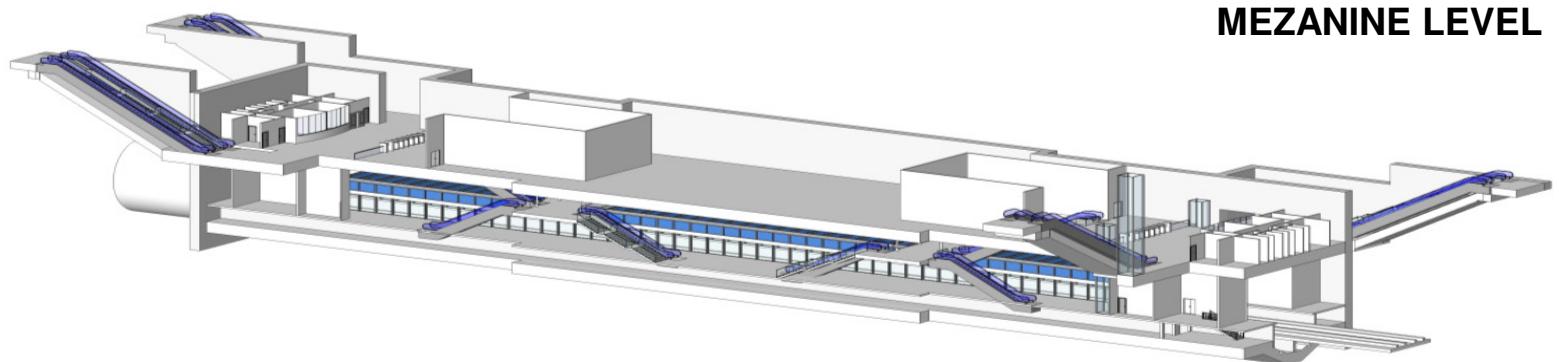


IGLESIA DE EL CARMEN

# BASIC PROJECT

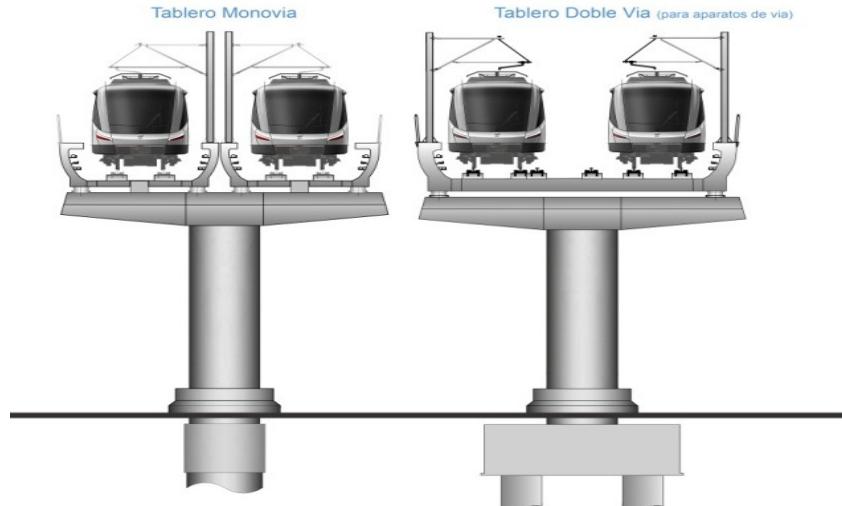


MEZZANINE LEVEL



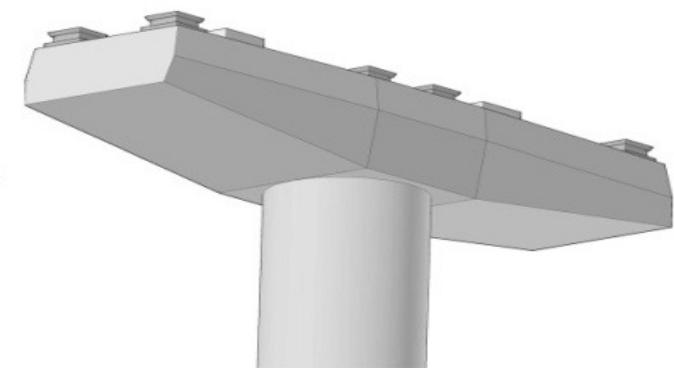
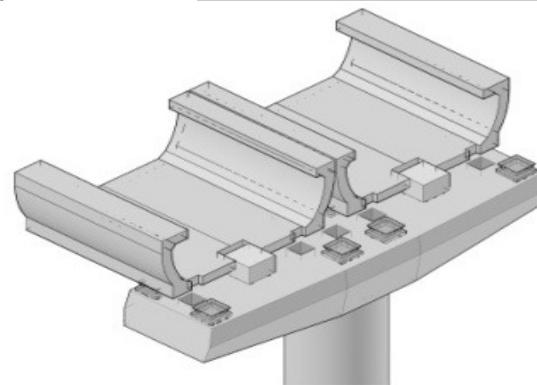


METRO  
Tablero Monovía



# BASIC PROJECT

## DOUBLE "U" ELEVATED TRACK





# BASIC PROJECT

## DOBLE "U" TRACK RENDERING





METRO  
DE PANAMA

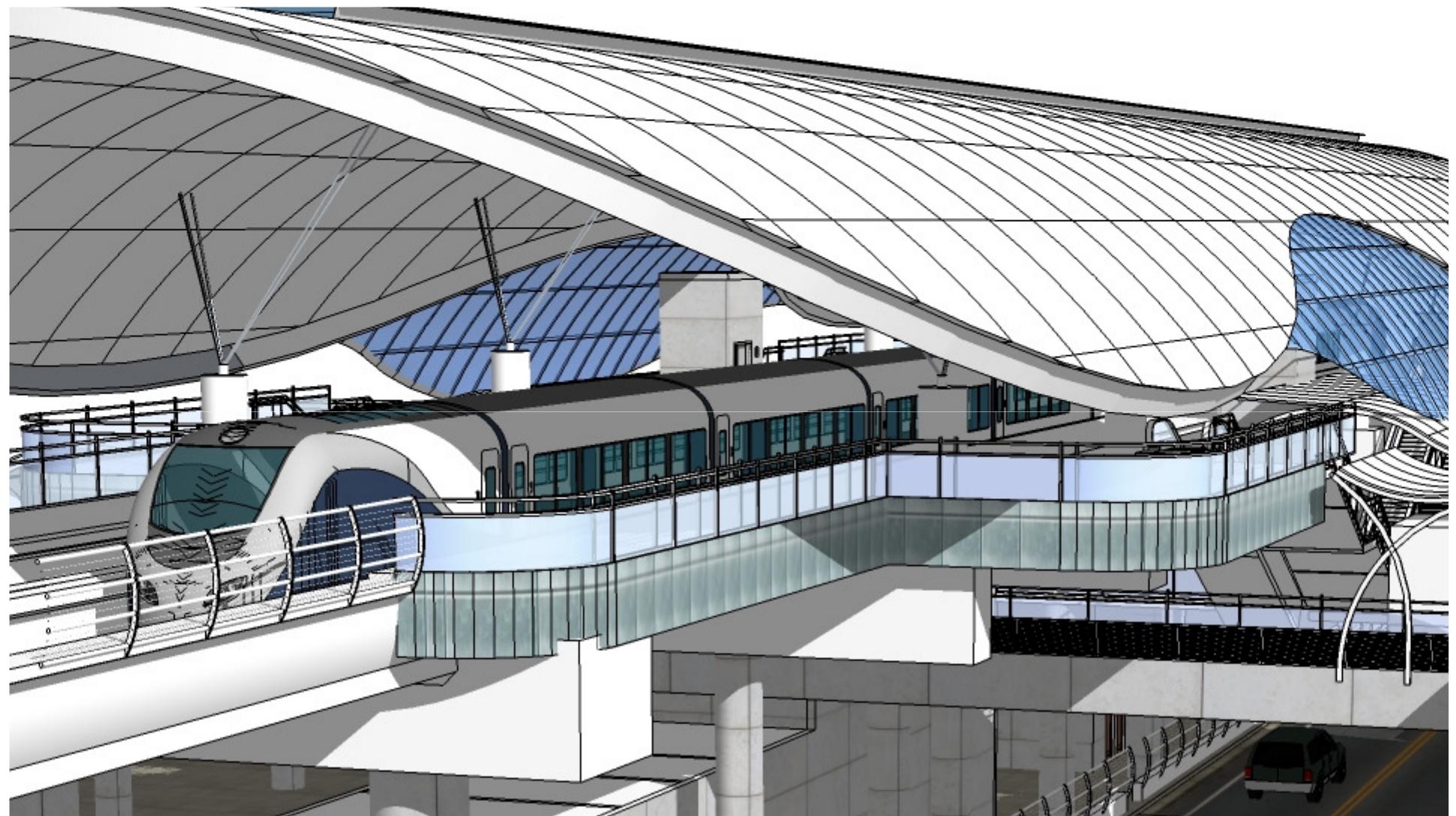


# BASIC PROJECT



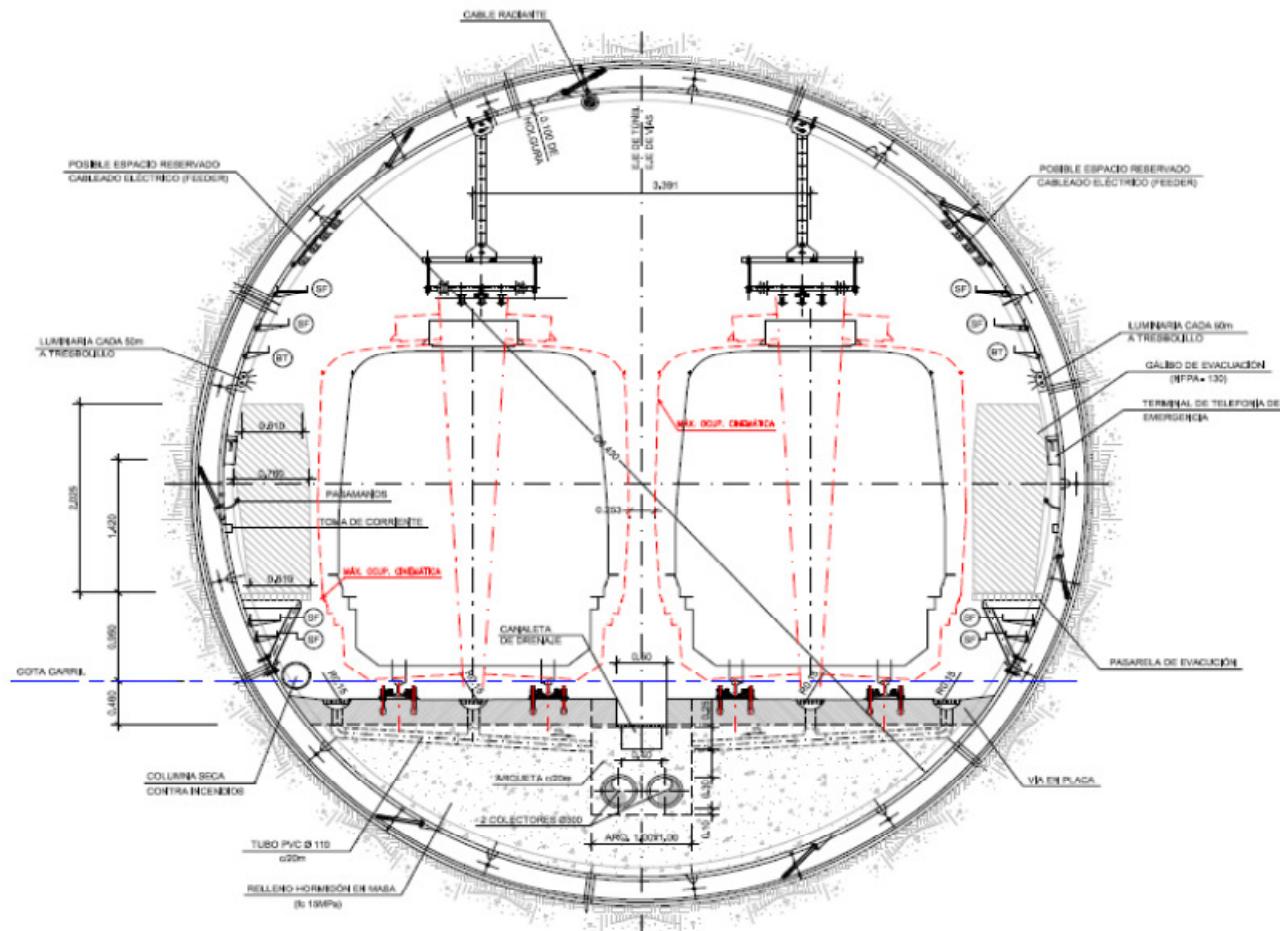
## TYPICAL ELEVATED STATION







# TUNNEL 9.77m DIAMETER



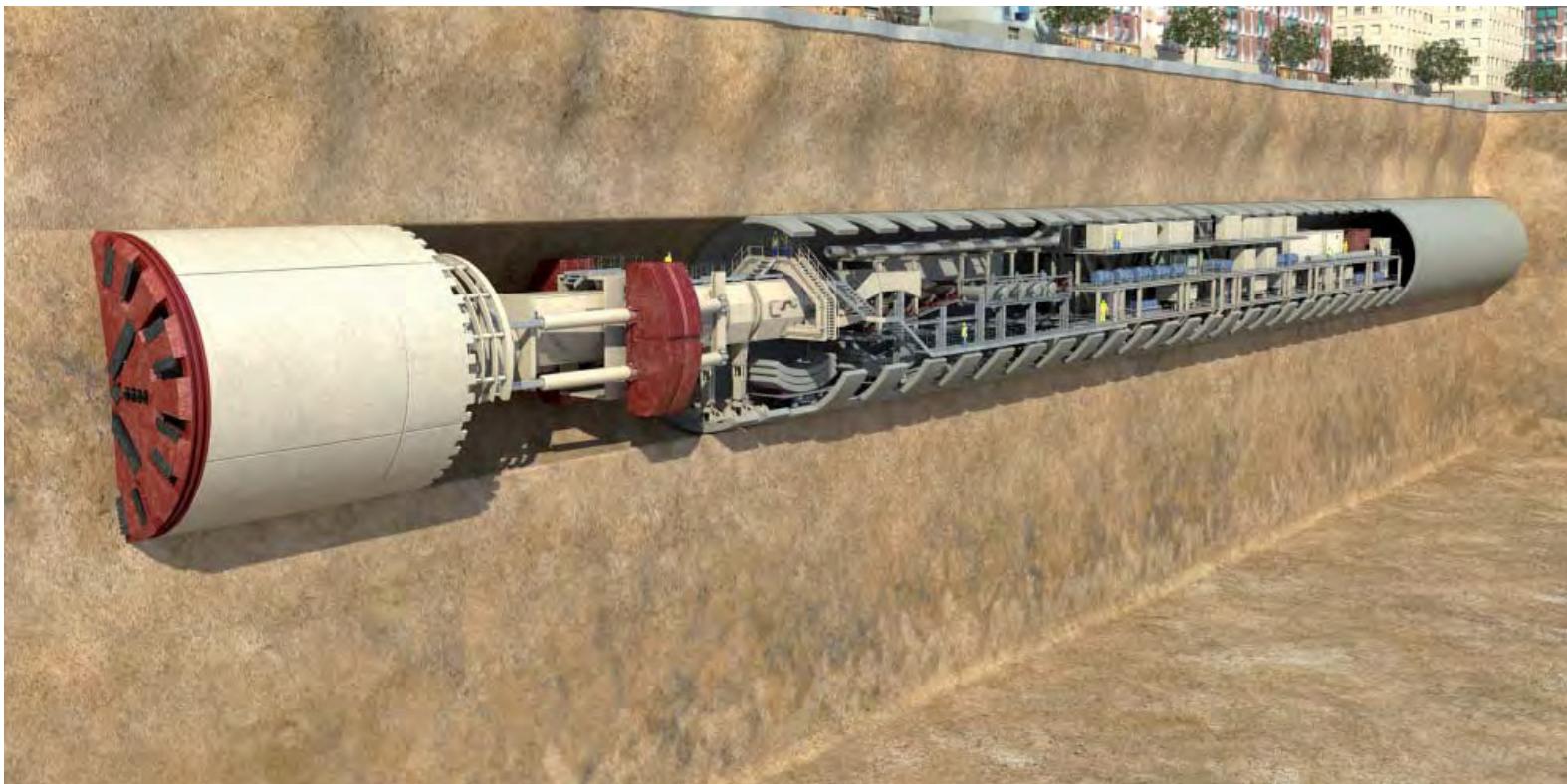


## TUNNEL BORING MACHINES (TBMs)

TWO BRAND NEW EPB TYPE TUNNELING MACHINES



# Tunneling Machine



P d ió 3D



METRO  
DE PANAMA

## PUBLIC UTILITES

**18.7** kms Relocation of existing Electrical Lines

**5.7** New Electrical Lines

**9.8** kms New Potable Water Lines

**6** kms Sewers

**70** kms Phone Lines

**98** kms FIBER OPTIC





Sustainability





## PROJECT FINANCING Cost 1.5 billion + City Works and options





## PROGRESS PHOTOS

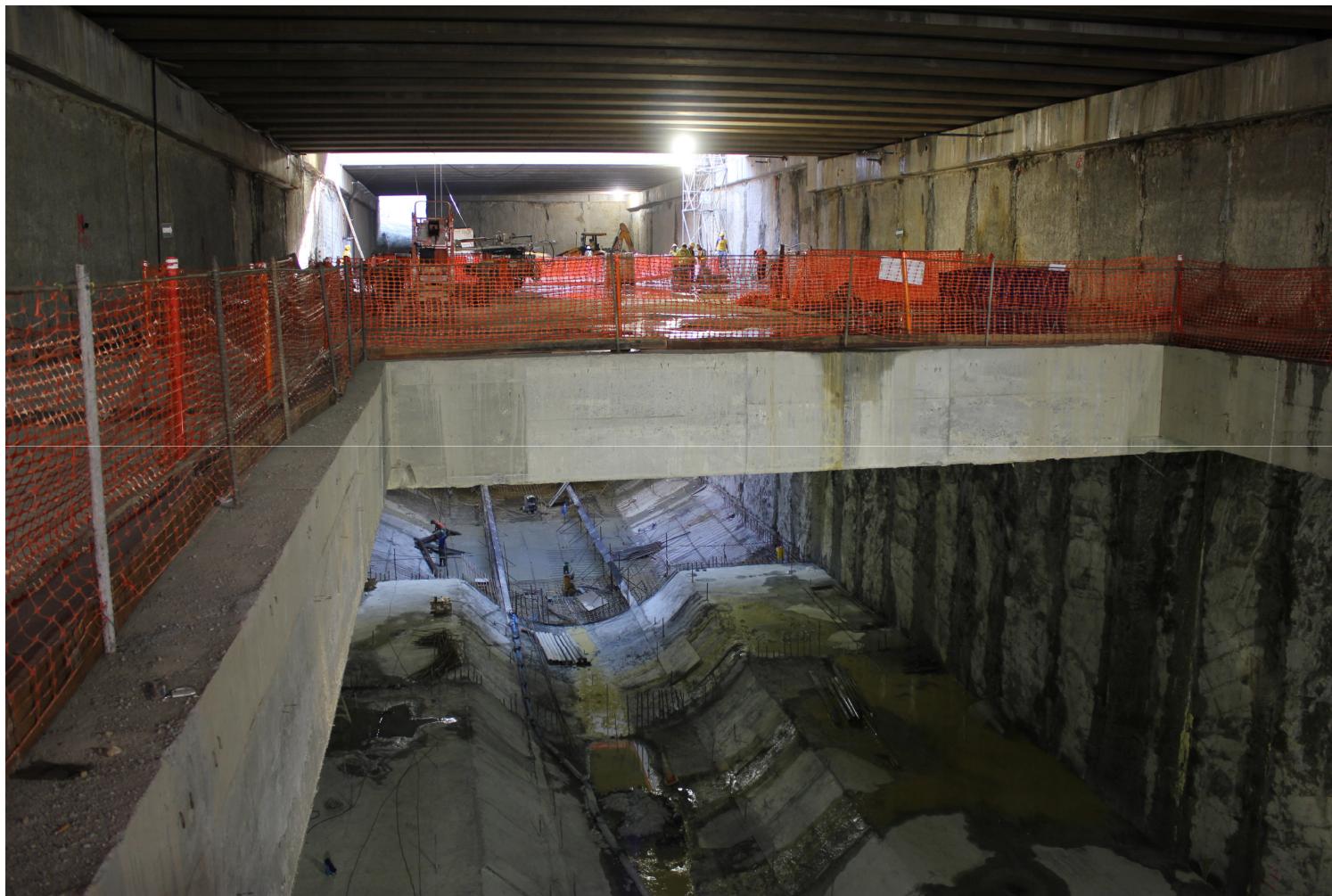
- RELATED WORKS
- UNDERGROUND STATIONS
- TUNNEL
- ELEVATED TRACK





# CORDOBA STATION







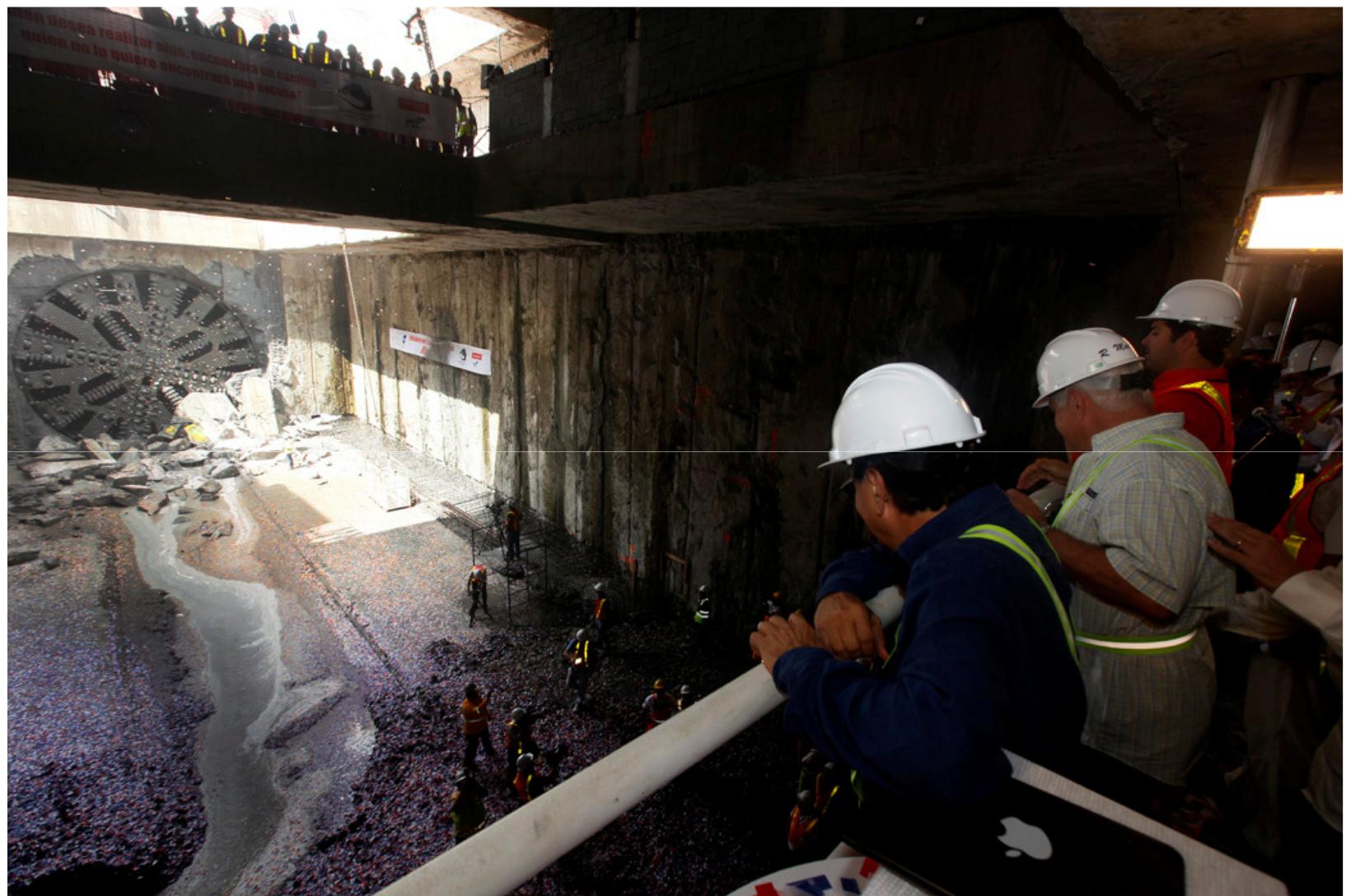














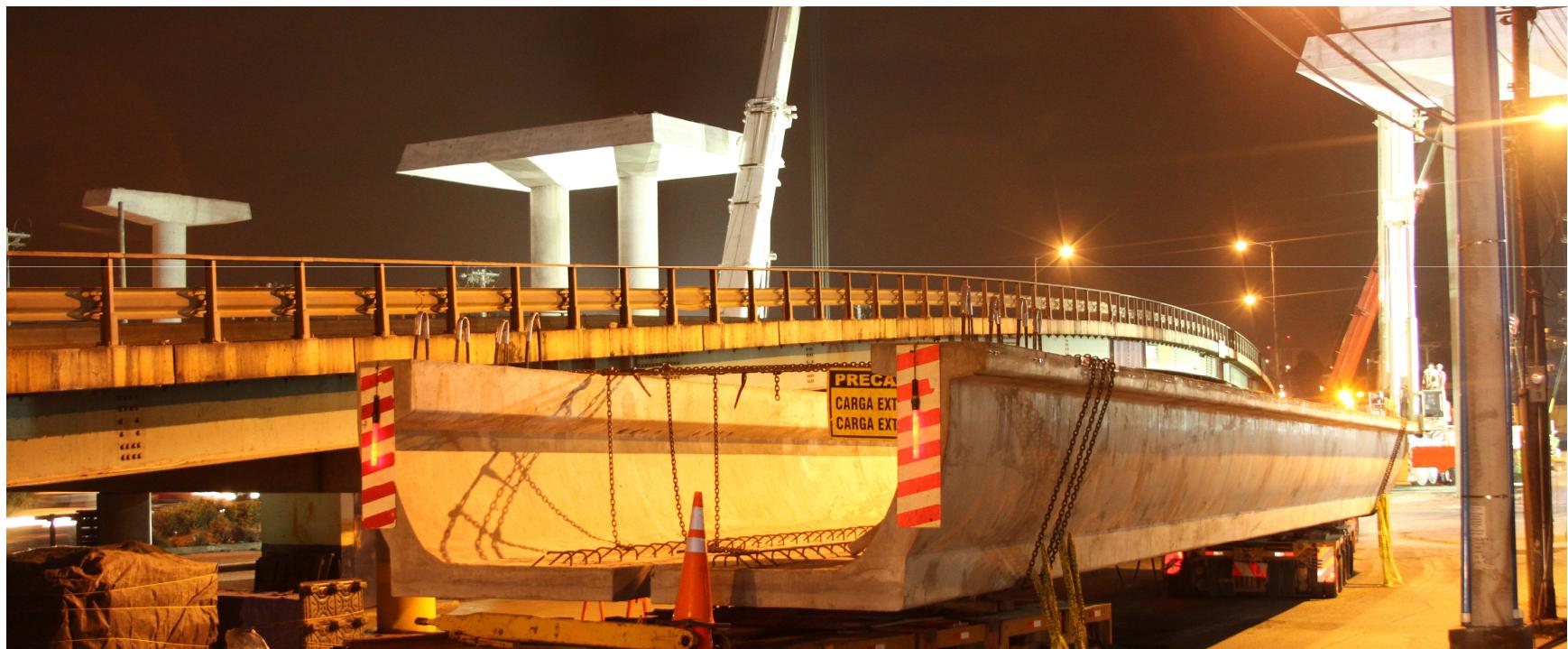








# Beam Installation



# Beam Installation

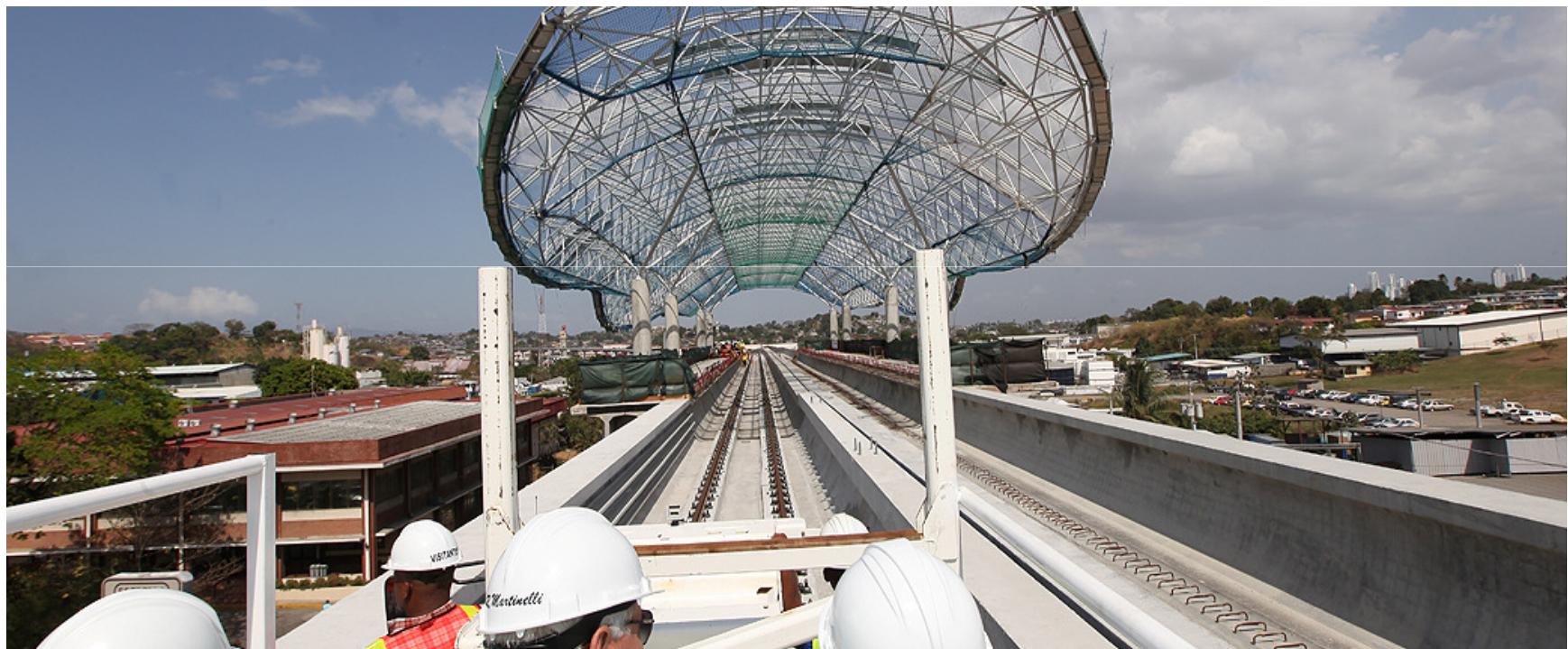


# COMPLETED ELEVATED TRACK













# Station Structure



# SYSTEM SUMMARY

ALSTOM METROPOLIS

ATP-ATO

CBTC Signaling. Int. System by THALES

14 km line (8 km underground, 6km viaduct)

19 TRAINS (57 Cars)

Contractors: Odebrecht + FCC

Project Managers: TMB +AYESA+Inelectra



## RECIPE to build NEW METROS IN SMALL COUNTRIES, FAST

- POLITICAL WILL !
- NEW ENTITY WITH NO PREVIOUS BAGGAGE
- EMPOWERED LEADER with UNIFIED COMMAND
- SMALL , COMMITTED, GUERRILLA TYPE TECHNICAL TEAM THAT INCLUDES FOREIGN ADVISORS AND EXPERT PM
- ONE TO THREE CONTRACTS AT BEST FOR LINE 1 more later
- EIA AND CLEAR RIGHT OF WAY, IMMEDIATELY
- COMPENSATE THE PEOPLE AND MERCHANTS FAIRLY
- FINANCING TEAM APART FROM TECHNICAL TEAM



**Metro heads the transportation of the future**

**Panama City of the  
21<sup>st</sup> Century**

**Thank you!**

