

# CHALLENGES IN THE DEVELOPMENT OF AIRPORT INFRASTRUCTURES

LISBON – CIVIL  
ENGINEERING SUMMIT  
2019



# INDEX

- WHO WE ARE
- FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F
- LISBON REGION AIRPORT CAPACITY- HUMBERTO DELGADO AND MONTIJO AIRPORTS

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## WHO WE ARE

# WHO WE ARE

GROUP VINCI



## CONTRACT

- VINCI Energies
- Eurovia
- VINCI Construction



## CONCESSIONS

- VINCI Autoroutes
- VINCI Airports
- Other concessions

# WHO WE ARE

GROUP VINCI

○ Key numbers VINCI Airports



# WHO WE ARE

GROUP VINCI

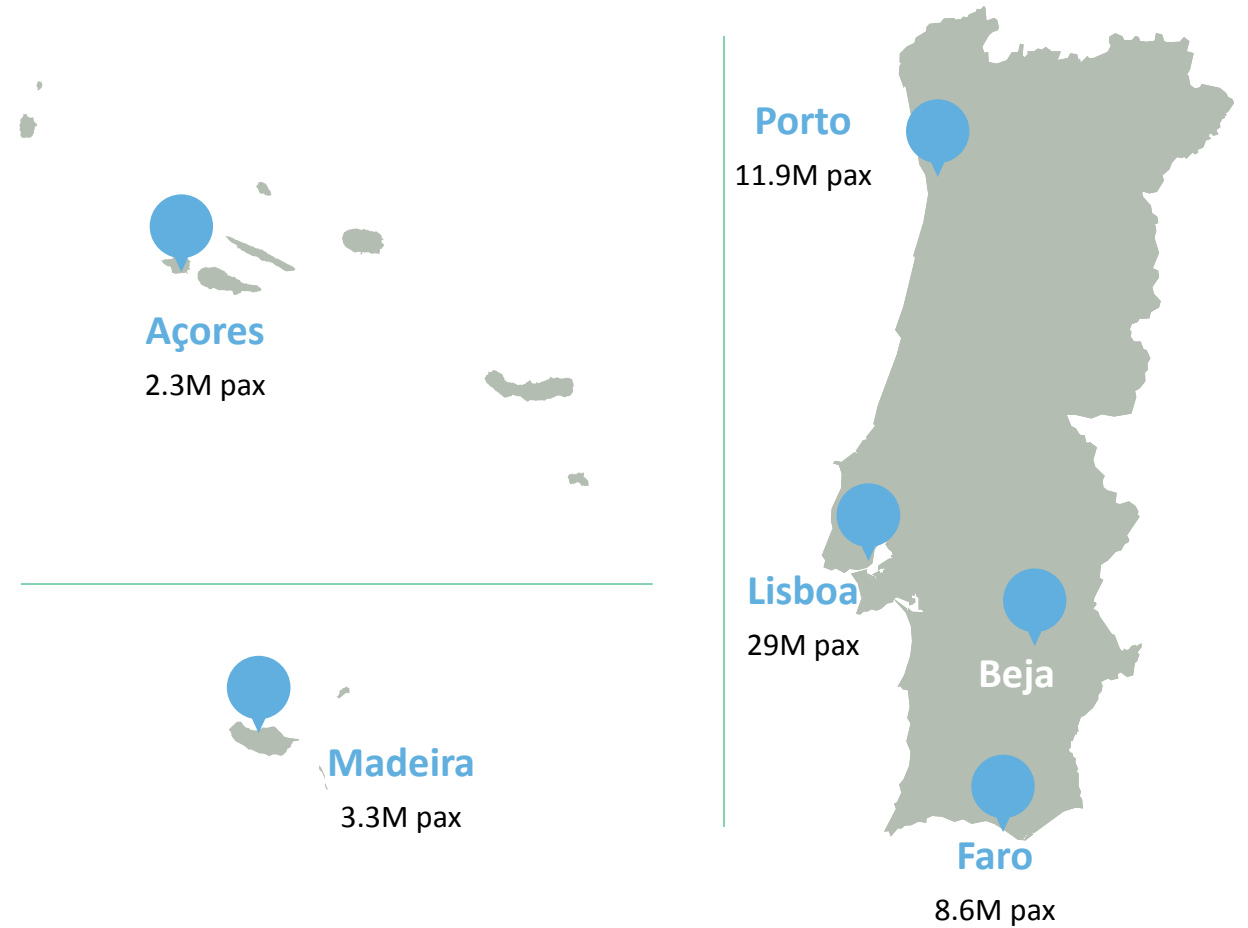
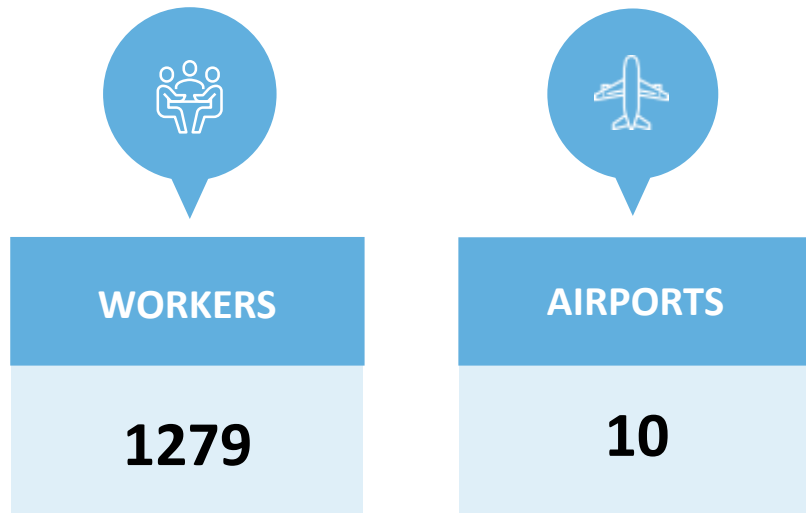
○ A growing Airport Network



# WHO WE ARE

ANA – AIRPORTS OF PORTUGAL

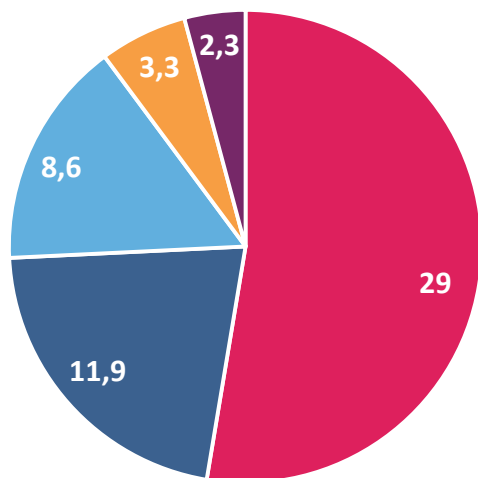
In 2013, VINCI purchases ANA from Portuguese State.



# WHO WE ARE

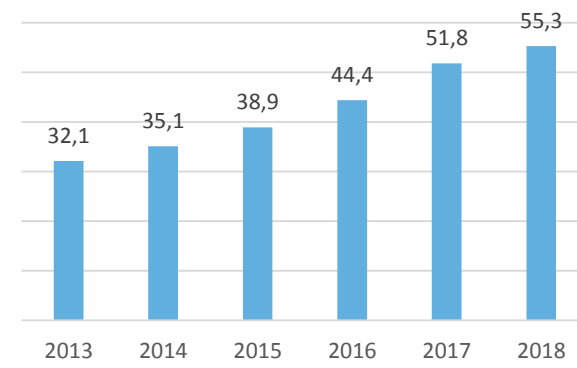
ANA – AIRPORTS OF PORTUGAL

2018 – 55,3 MPax

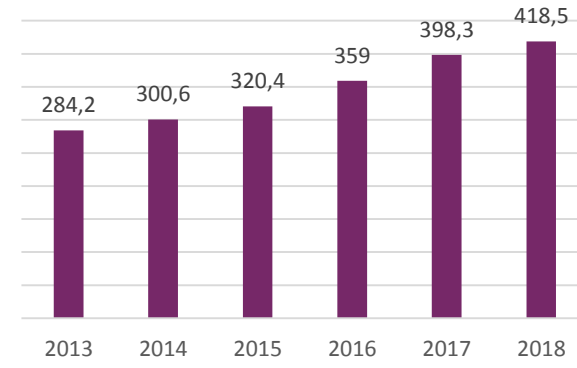


■ LISBOA ■ PORTO ■ FARO

Pax  
(millions)



Mov  
(thousands)





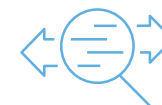
# WHO WE ARE

ANA – AIRPORTS OF PORTUGAL

ANA BUSINESS



AVIATION



NON AVIATION



AIRLINES AND PASSENGERS



DEVELOPMENT OF COMMERCIAL  
ACTIVITY



70%



30%

# WHO WE ARE

ANA – AIRPORTS OF PORTUGAL

○ The growing business

2018 – The new Routes





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## FRANCISCO SÁ CARNEIRO AIRPORT- EXTENSION OF TAXIWAY F

# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F

## GOAL

- Improve the operational efficiency
- Minimize the Runway Occupancy Time (ROT)
- Increase the capacity of the airport from 20 Mov/h to 32 Mov/h to accommodate the traffic growth

## MAIN WORKS

- Extension of the taxiway F
- New Rapid Exit Taxiway

# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F



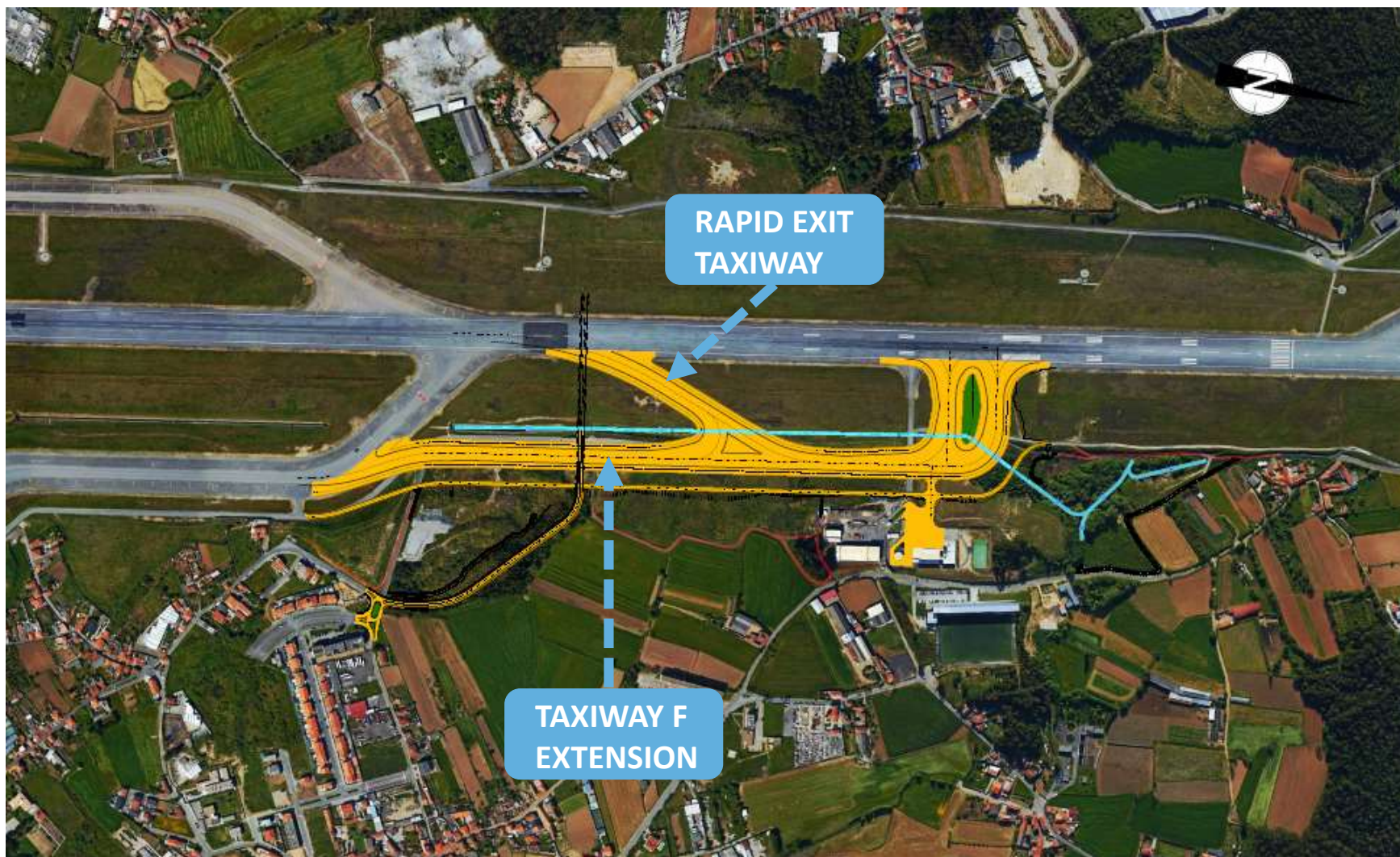


# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F

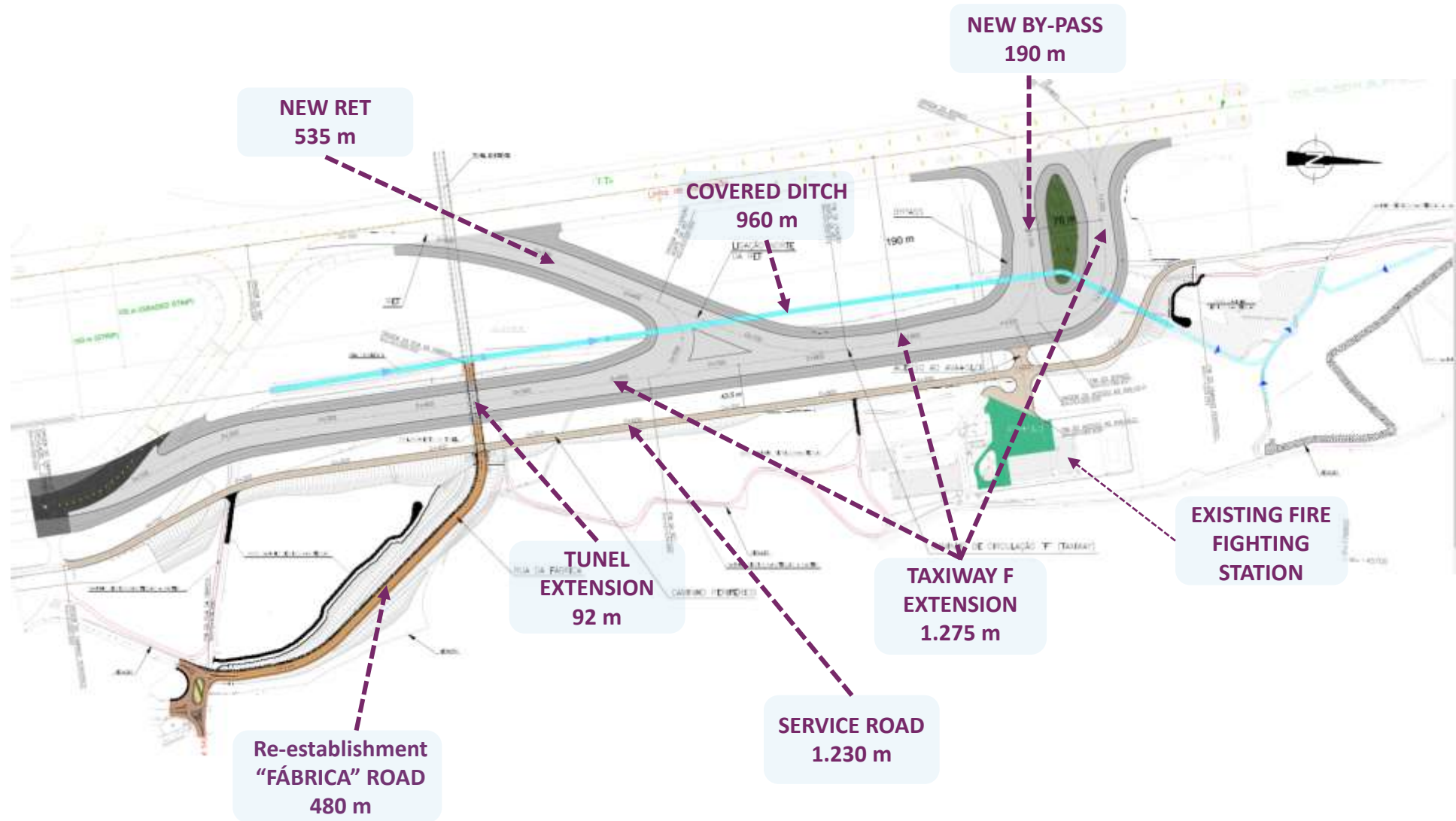




# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F



# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F



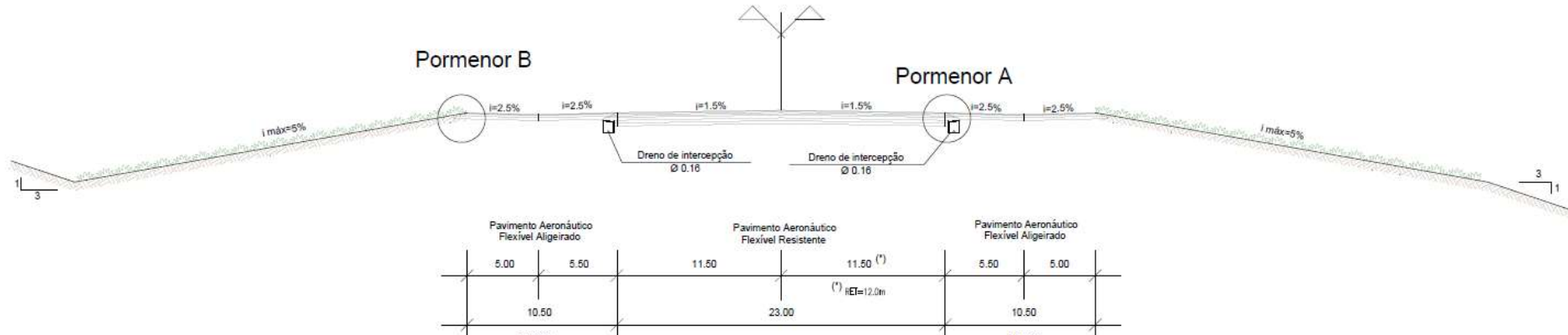


# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F



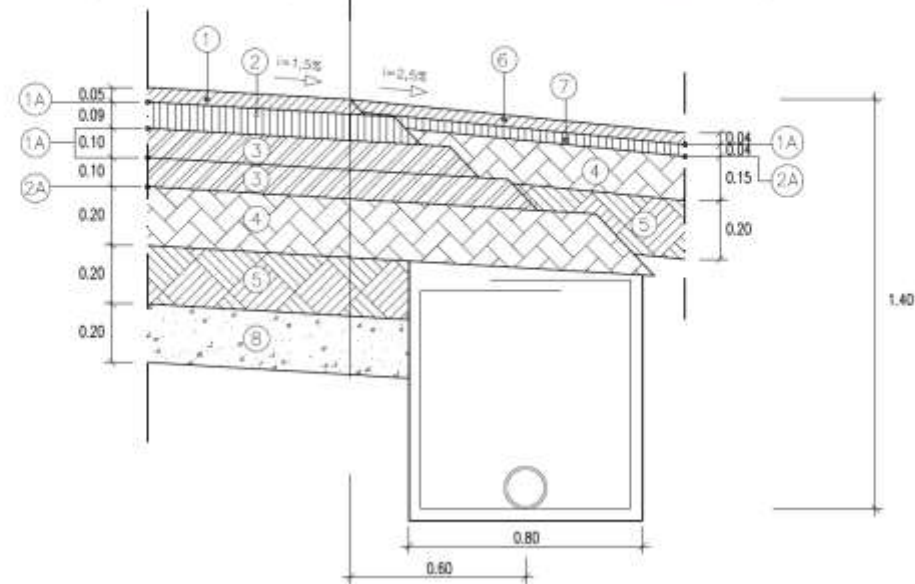
# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F

## TYPICAL CROSS SECTION – TAXIWAY F, BY-PASS AND RET



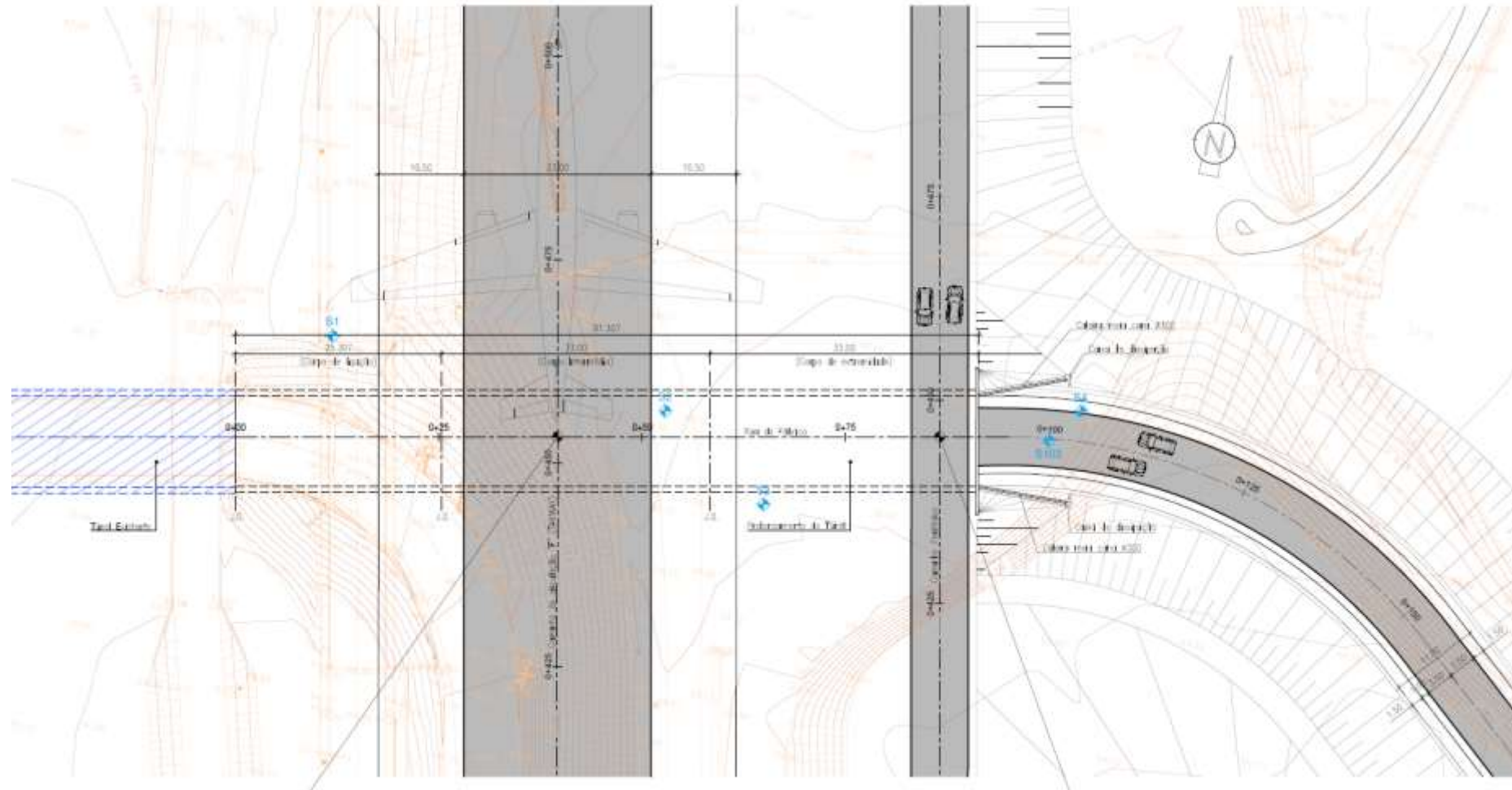
### Pormenor A esc: 1/25

PAVIMENTO FLEXÍVEL RESISTENTE (C.CIRCULAÇÃO "F") ← → PAVIMENTO FLEXÍVEL ALIGEIRADO (Berna C.CIRCULAÇÃO "F")



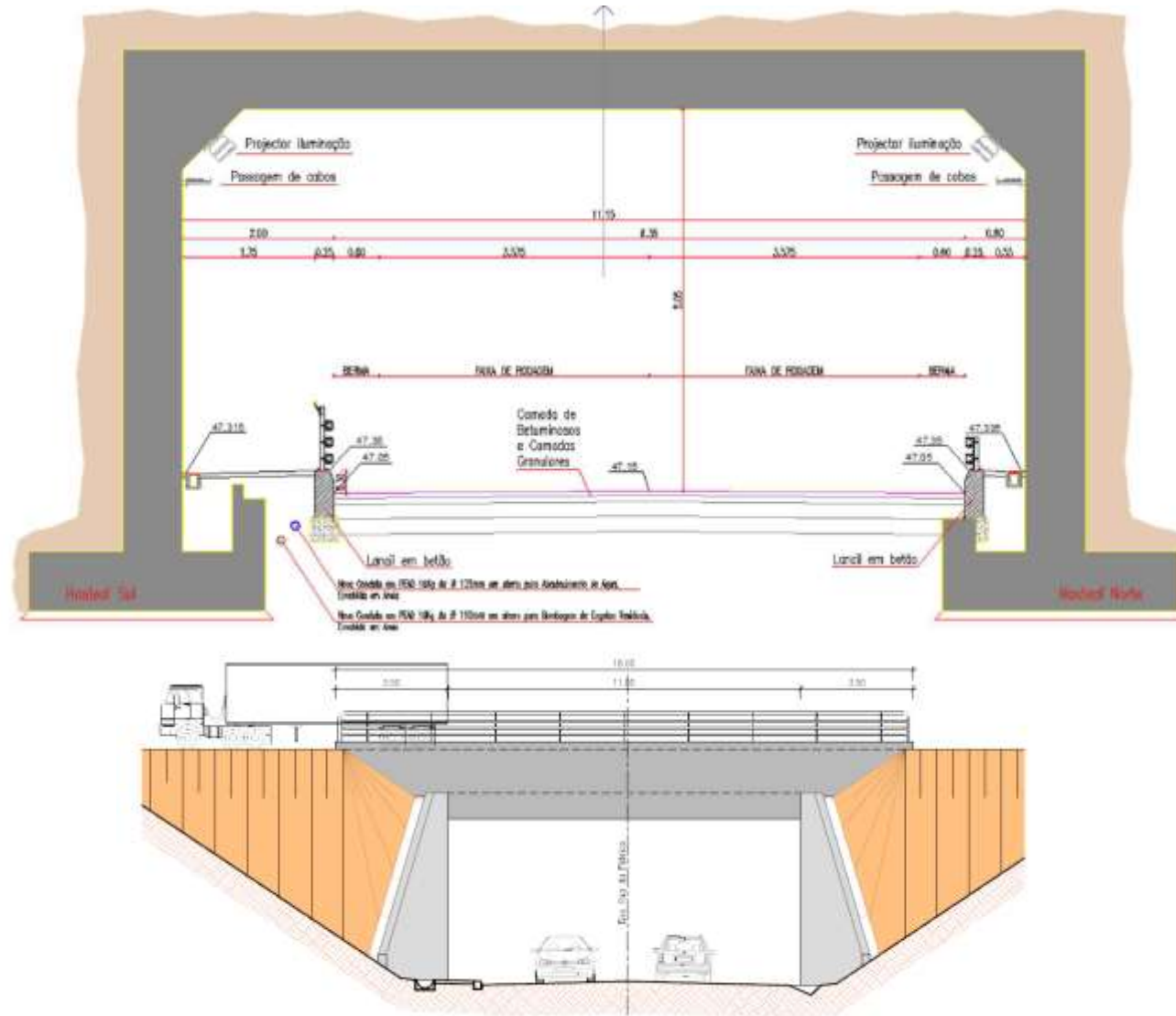
# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F

## TUNNEL GENERAL LAYOUT



# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F

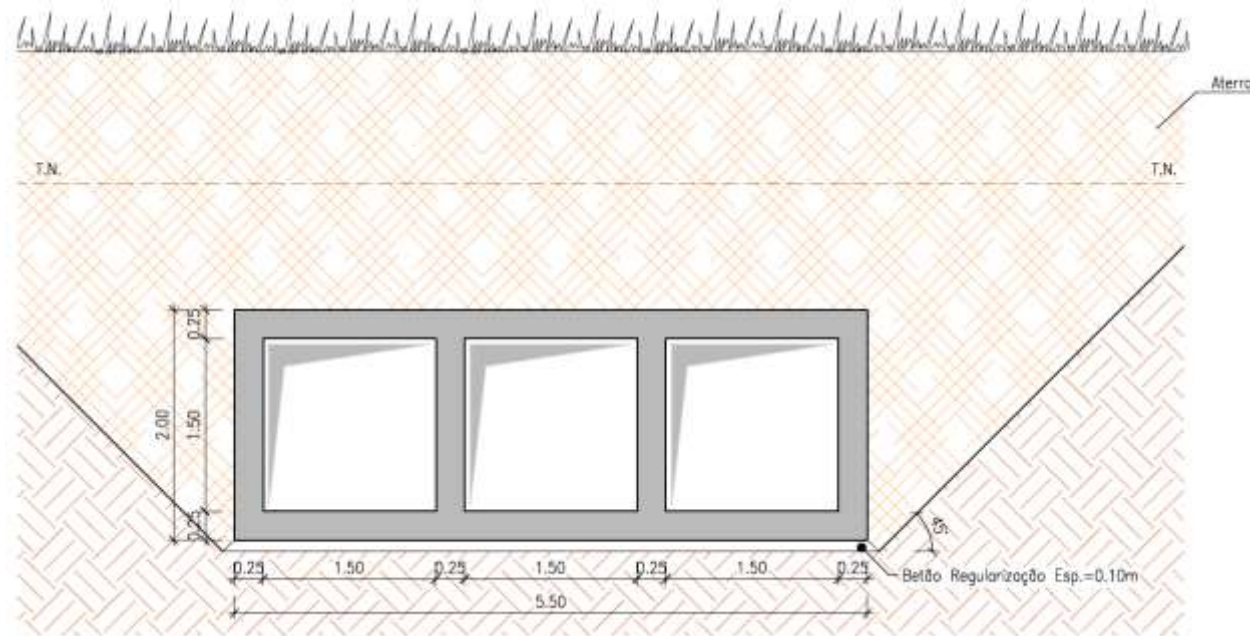
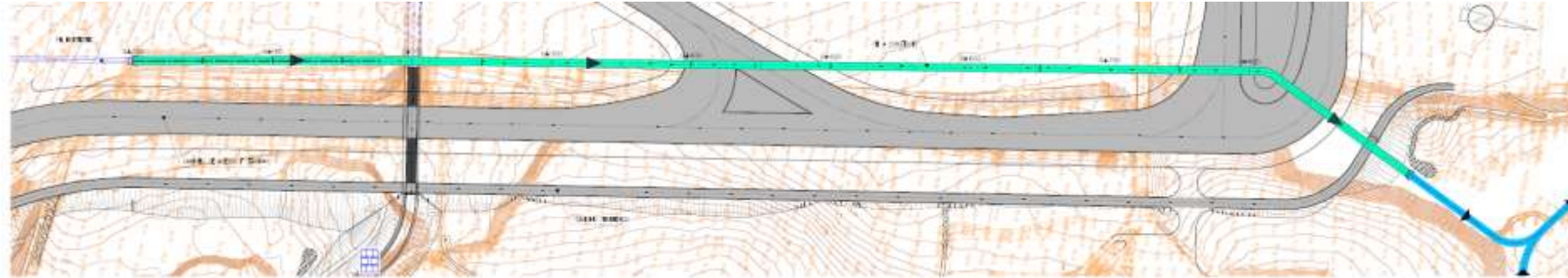
## TYPICAL CROSS SECTION - TUNNEL





# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F

## GENERAL LAYOUT AND TYPICAL CROSS SECTION – COVERED DITCH



# FRANCISCO SÁ CARNEIRO AIRPORT – EXTENSION OF TAXIWAY F

## MAIN WORKS

- Demolitions
- General earthworks – Deforestation, Cut and fill
- Storm water drainage
- Pavements
- Landscaping
- Jet blast deflectors
- Fences and airside perimeter road
- Markings
- AGL network
- Road markings & signage
- Foundations and concrete structures – (Tunnel and Covered Ditch)

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**LISBON REGION AIRPORT  
CAPACITY  
– HUMBERTO DELGADO AND  
MONTIJO AIRPORTS**

# LISBON REGION AIRPORT CAPACITY

## HUMBERTO DELGADO AIRPORT



### TRAFFIC MPax

2014	2015	2016	2017	2018
18,1	20,1	22,4	26,8	29

+ 50%



MAX  
CAPACITY



# LISBON REGION AIRPORT CAPACITY

## LISBON AIRSPACE CAPACITY

### Airspace Capacity

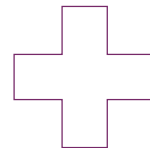
Lisbon current Airspace Capacity  
38-40 mvt/h at Humberto Delgado Airport



NATS / NAV /Eurocontrol /  
FAP Studies

Maximum Airspace Capacity of Lisbon in the Final Phase of  
the Concession (2062)

Humberto Delgado  
48 mvt/h



Montijo  
24 mvt/h

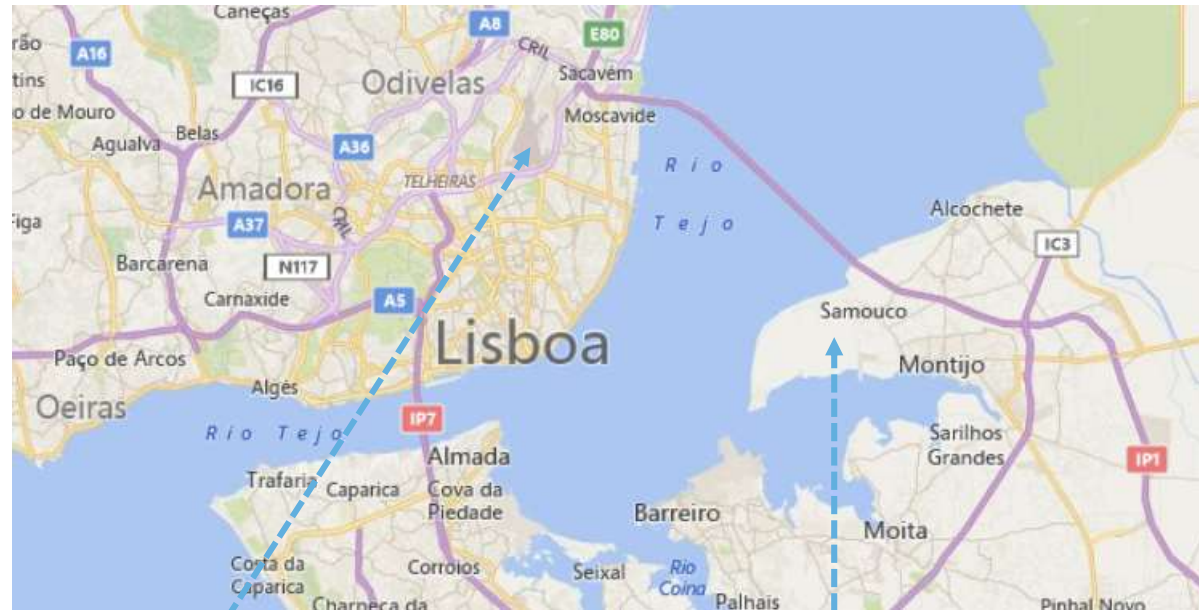
# LISBON REGION AIRPORT CAPACITY

## LISBON AIRSPACE CAPACITY

15 Fev 2017 : MoU

ANA responsible for 2 Airports solution for Lisbon Region Airport Capacity

### DUAL OPERATION SYTEM



Humberto Delgado  
"Hub" Traffic  
48 Mov/h

Montijo  
"Point to Point" Traffic  
24 Mov/h

# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT



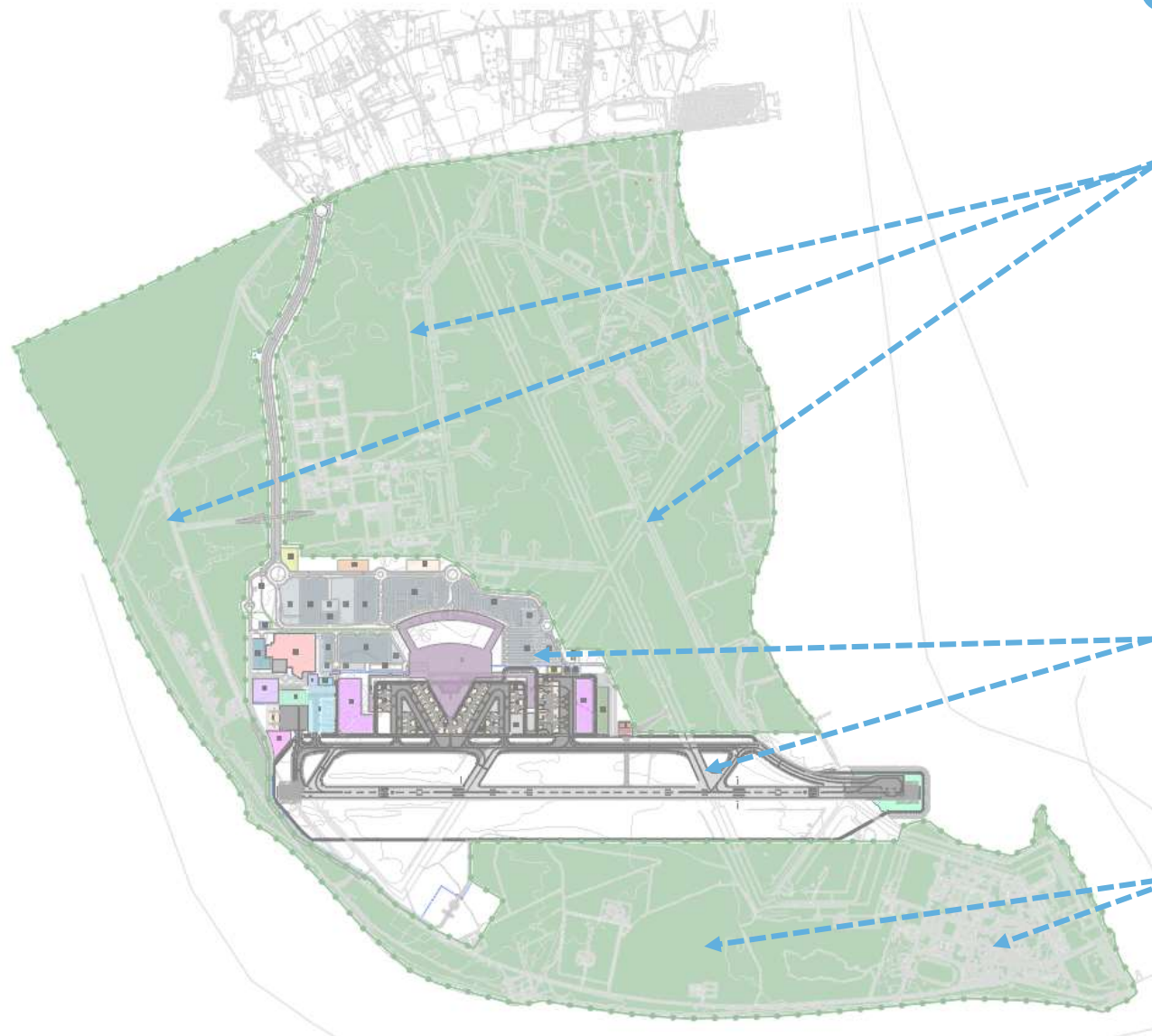
DESCRIPTION	2022	2032	2062
PAX (MPA)	7,8	10	17.4
MOV/H	18	21	24
STANDS	20	24	36

### STRATEGY:

- OPERATIONAL EFFICIENCY (25 MIN TURNAROUNDS)
- NEW GENERATION TERMINAL (NEW TECHNOLOGY)
- ENVIRONMENTAL SUSTAINABILITY
- ECONOMIC EFFICIENCY
- PASSENGER EXPERIENCE (REINFORCING THE PASSENGER WELFARE DURING THE AIRPORT JOURNEY)

# LISBON REGION AIRPORT CAPACITY

MONTIJO AIRPORT



INTERVENTION AREA

MILITARY AREA

FUTURE CIVIL AIRPORT AREA

MILITARY AREA



# LISBON REGION AIRPORT CAPACITY

MONTIJO AIRPORT

YEAR 2022

## THE MASTERPLAN CONSIDERED:

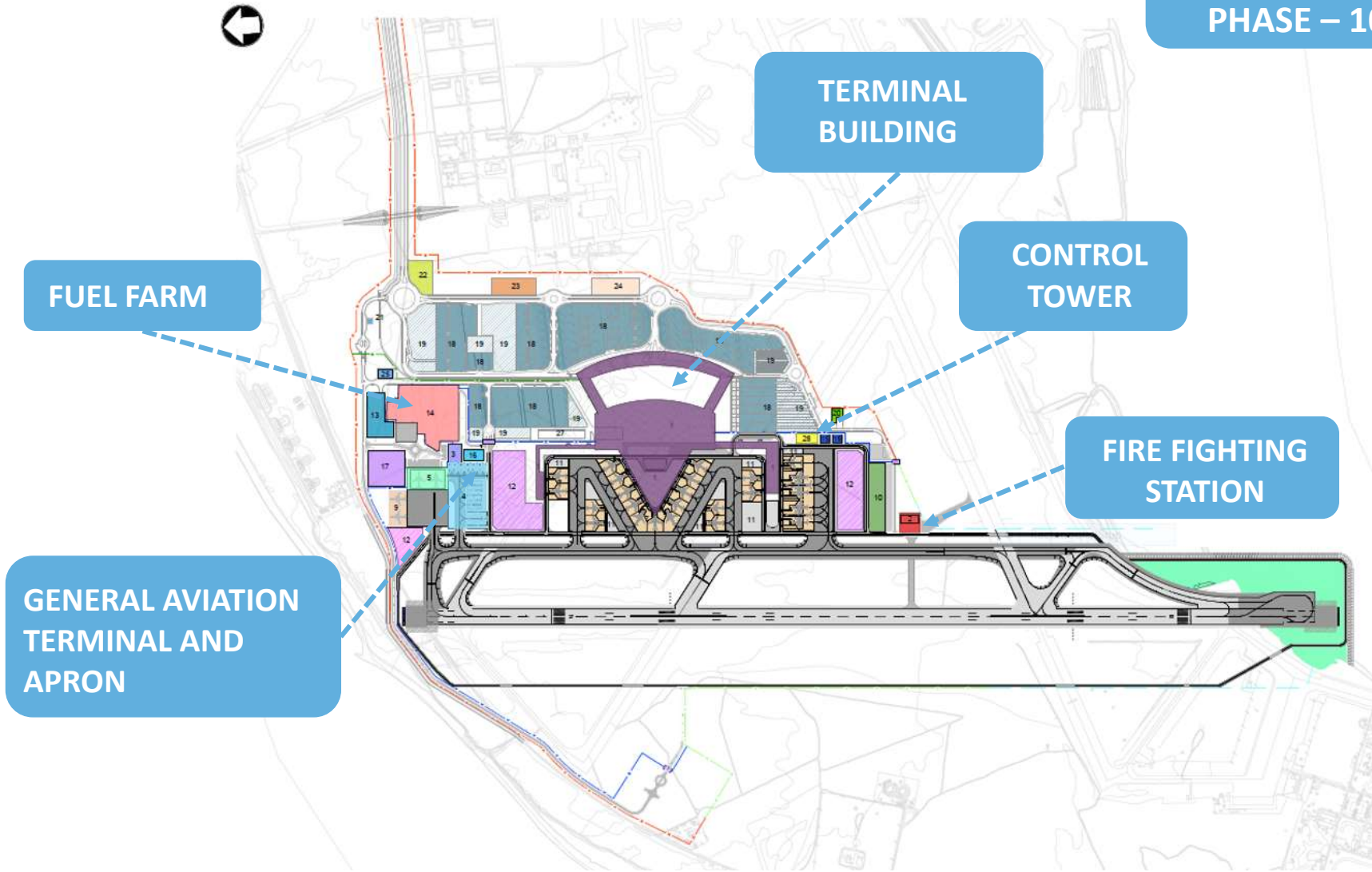
- “POINT TO POINT” TRAFFIC
- CODE “C” AIRCRAFTS OPERATION
- FUTURE EXPANSION UNTIL 2062
- SUPPORT OPERATIONS BUILDINGS
- CODE “E” AIRCRAFT OPERATION IF NEEDED (EMERGENCY OR DIVERGENCE CASES)



# LISBON REGION AIRPORT CAPACITY

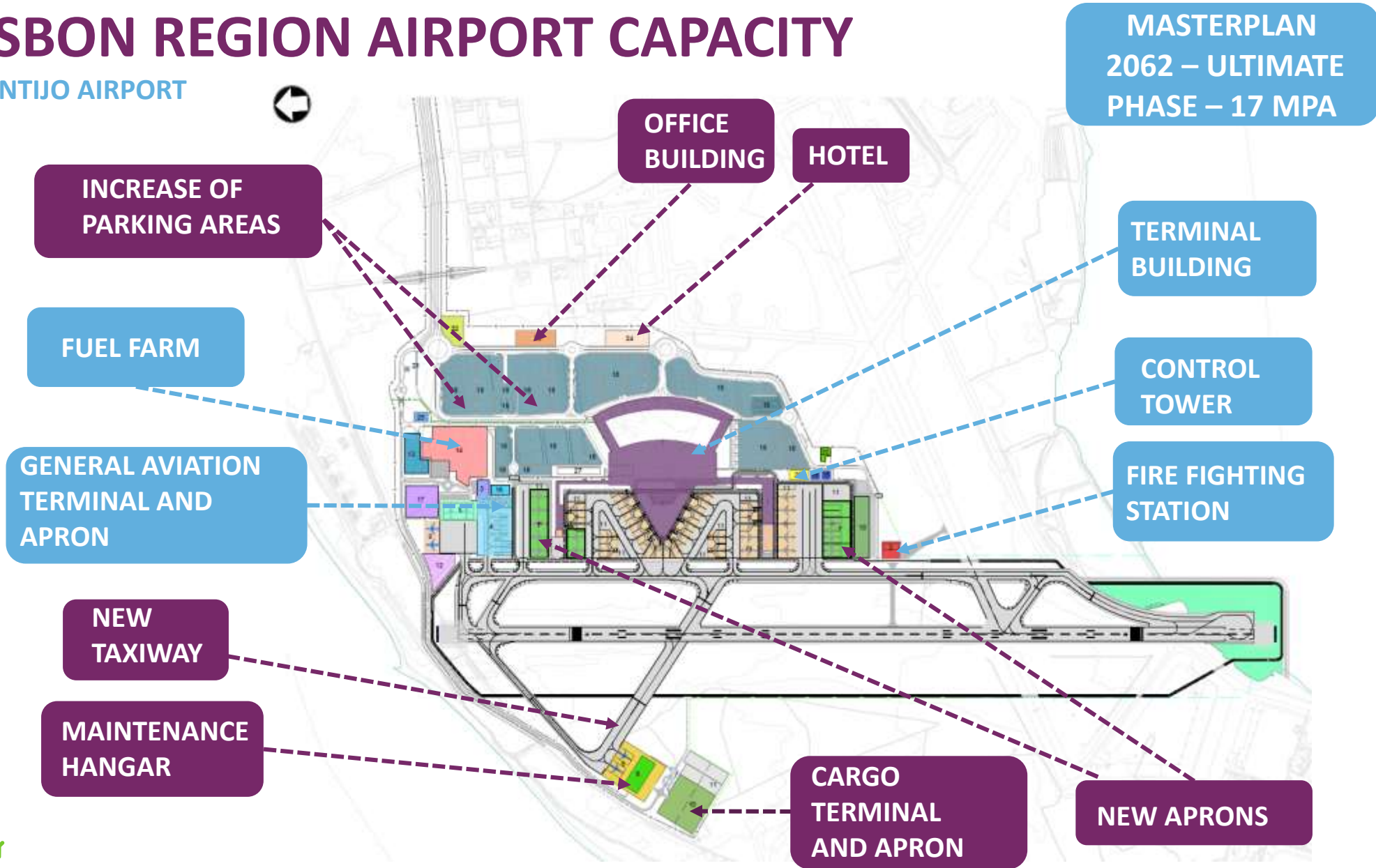
MONTIJO AIRPORT

MASTERPLAN  
2022 – OPENING  
PHASE – 10 MPA



# LISBON REGION AIRPORT CAPACITY

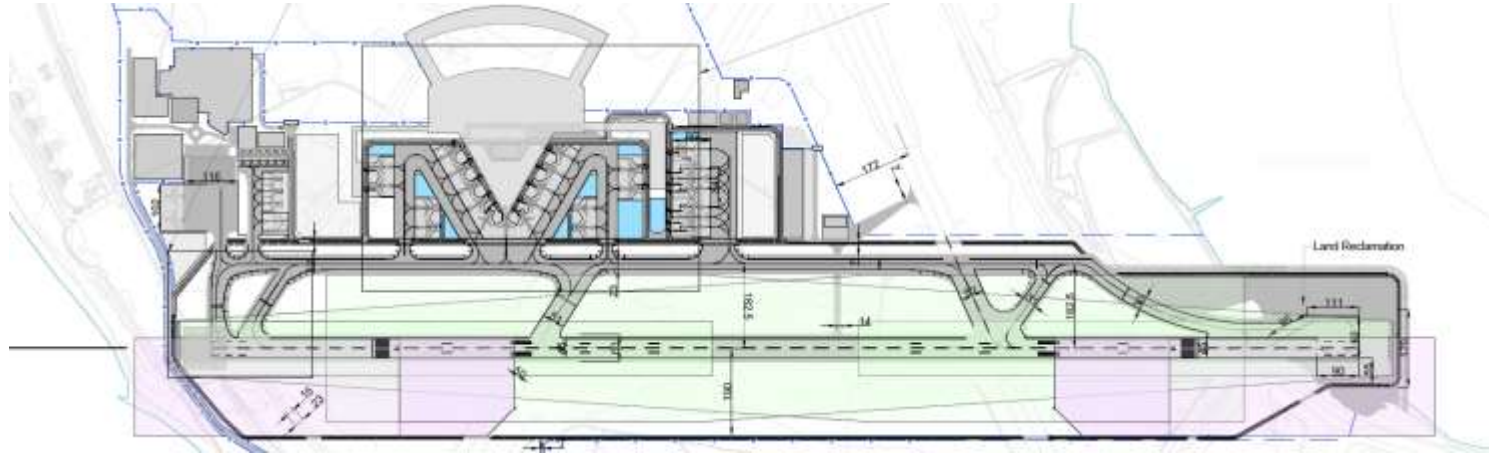
MONTIJO AIRPORT



# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### GEOMETRIC LAYOUT - AIRSIDE



Item	Descrição
<b>RWY Commercial/civil</b>	Runway 01/19 (Existing) – 4 E (Aerodrome Reference Code)
<b>Declared Distances</b>	TORA: 2400m, LDA: 2050m, RESA: 90x90, STRIP: 2430m x 300m
<b>ILS System and approach lighting</b>	Cat II/III
<b>Taxiway</b>	TWY prepared for CODE E aircrafts
<b>Contact and Remote Stands (%)</b>	70/30 (17 contact and 7 remote/2032; 25 contact and 11 remote in 2062)
<b>Operation</b>	“point to point” airlines
<b>Apron Stands</b>	CODE C, A319, A320, A321, B737, and 2 CODE E in MARS stands

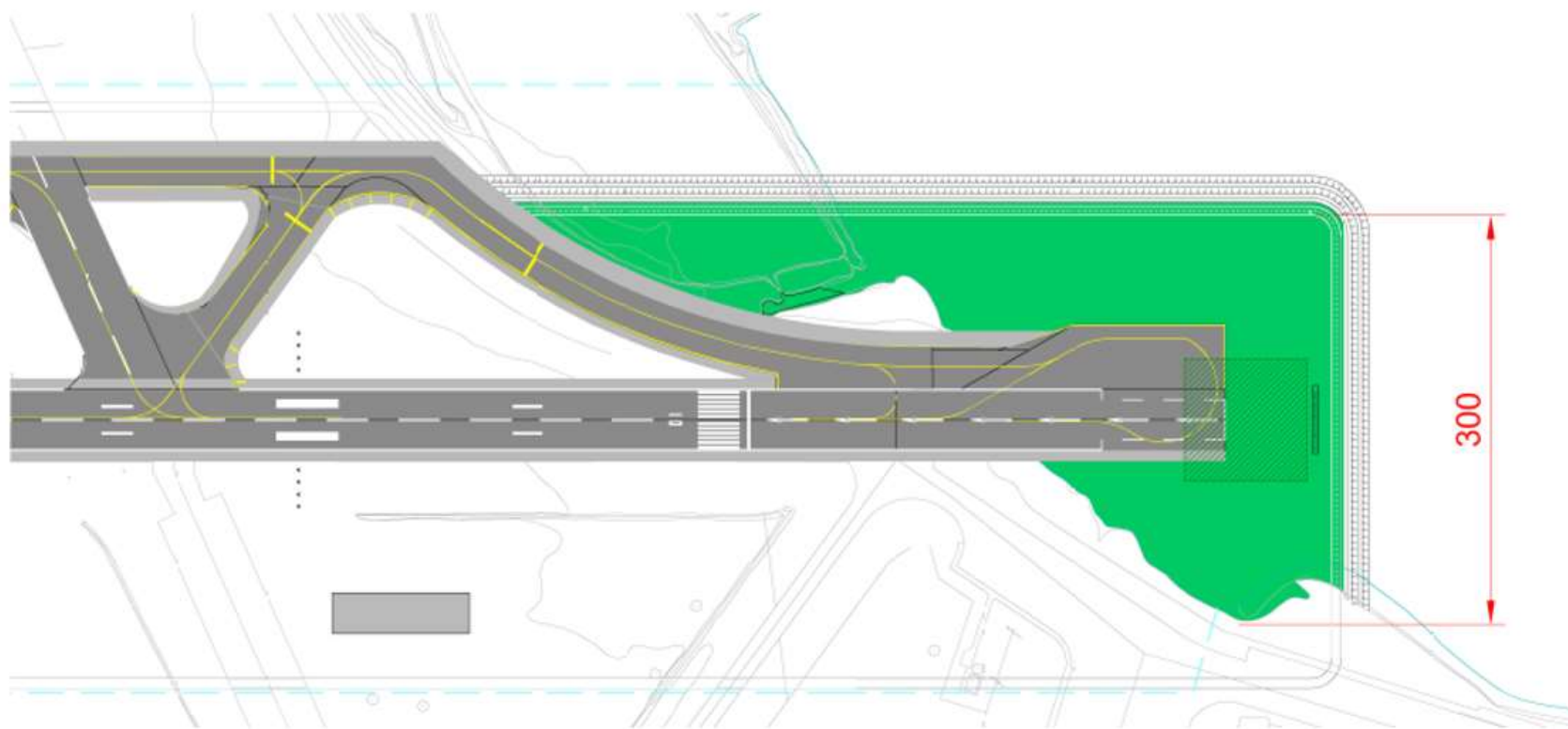


# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### RUNWAY EXTENSION

EXISTING RUNWAY 01-19 EXTENSION  $\approx$  (330 x 300m)



# LISBON REGION AIRPORT CAPACITY

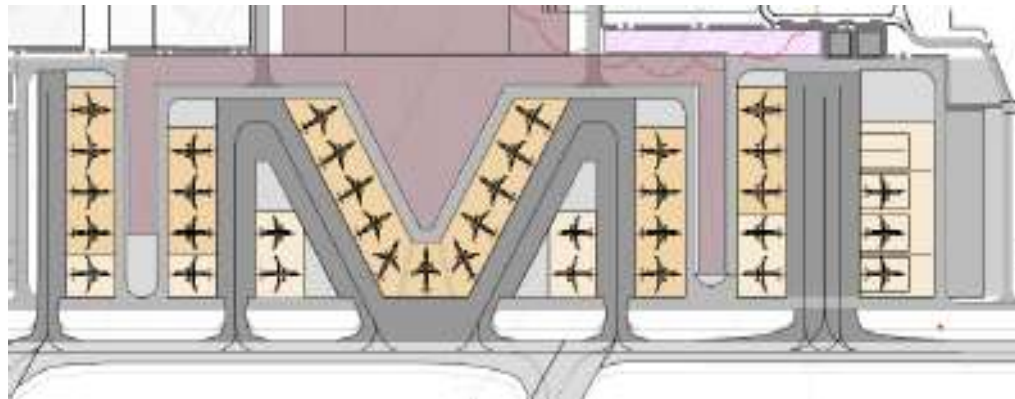
## MONTIJO

### “M” SHAPE OPTION WITH CENTRAL PROCESSOR

- OPERATIONAL EFFICIENCY (BHS location + Aircraft easy circulation)
- HIGH QUALITY PAX EXPERIENCE
- MINIMUM DISTANCES + CLEAR FLOWS
- THE SIZING WAS BASED ON THE PEAK HOUR FOR 2032:

DEPARTURES: 1965 PAX/h  
ARRIVALS: 1949 PAX/h

N ← S



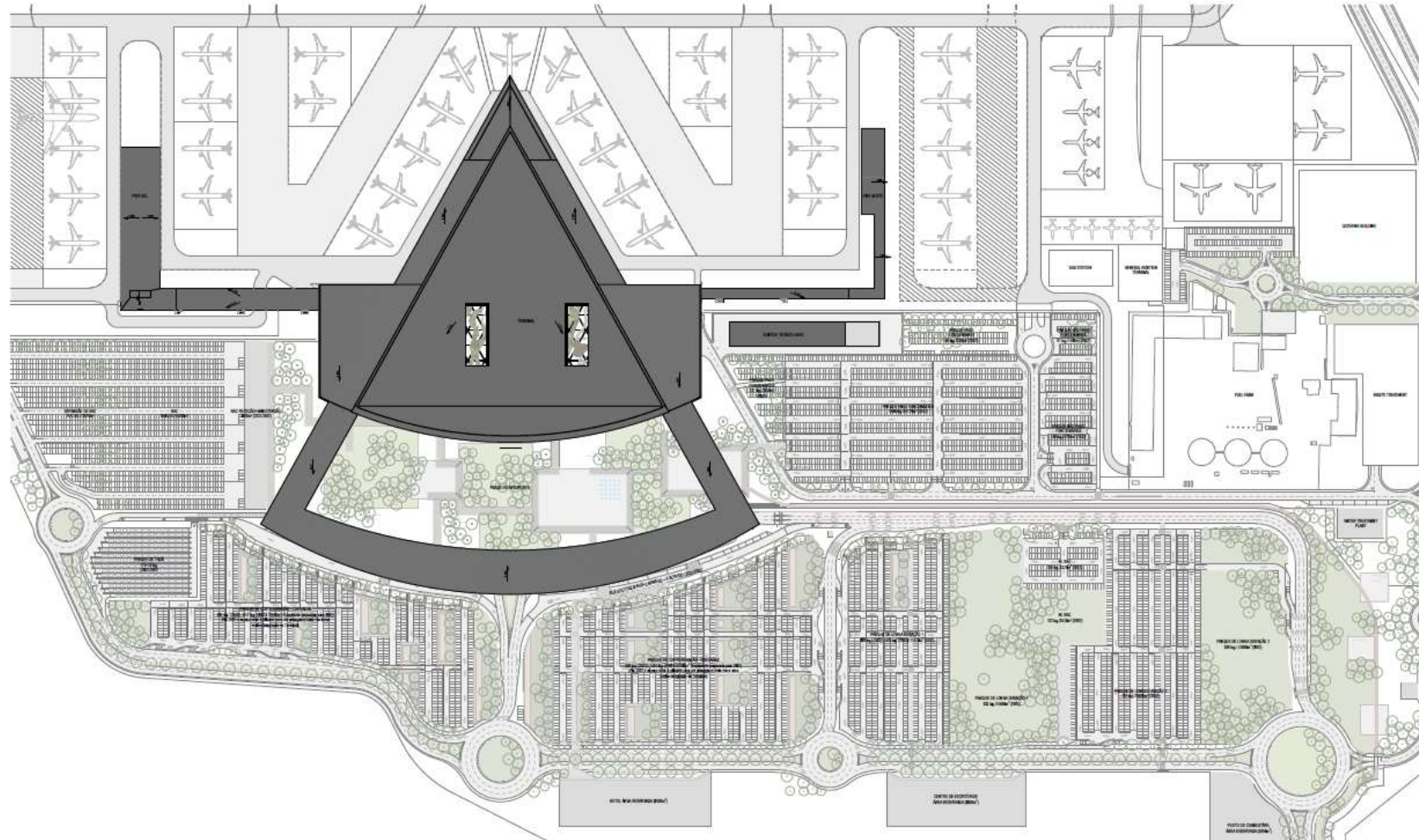
### 3 LEVEL TERMINAL:

- Level 0 (Pax Processing)
  - Mezzanine (Storage and Technical Areas)
  - Level 1 (Pax Processing)
- 
- **CENTRAL AREA:** Retail + F&B + SCHENGEN Pre-boarding rooms
  - **NORTH PIER** – SCHENGEN Pre-boarding rooms
  - **SOUTH PIER** – SCHENGEN and NON SCHENGEN pre-boarding rooms (Flexible Pier)

# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### ○ General Layout (2022)

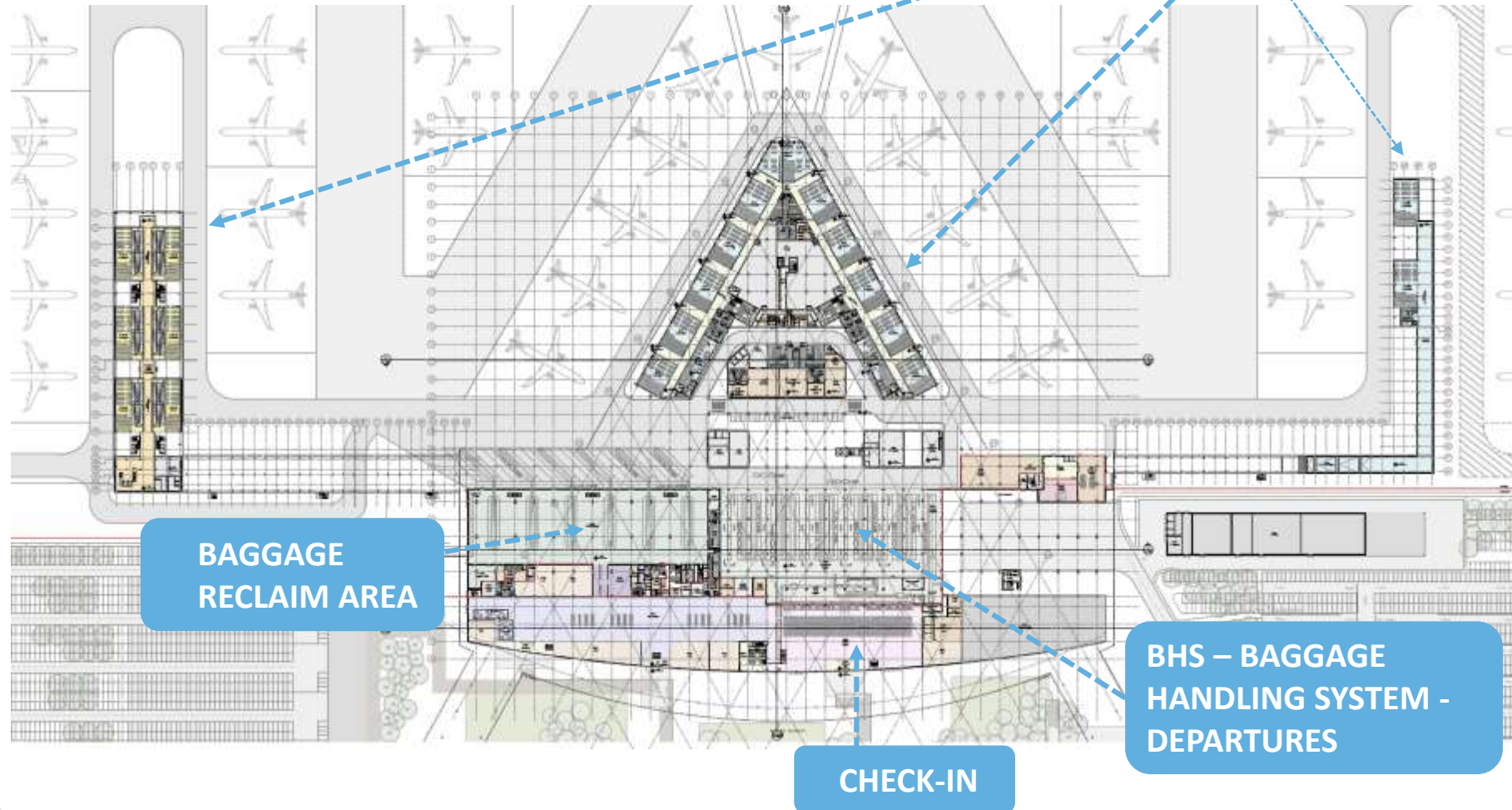




# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

○ Terminal – Arrivals – Level 0 (APRON LEVEL)



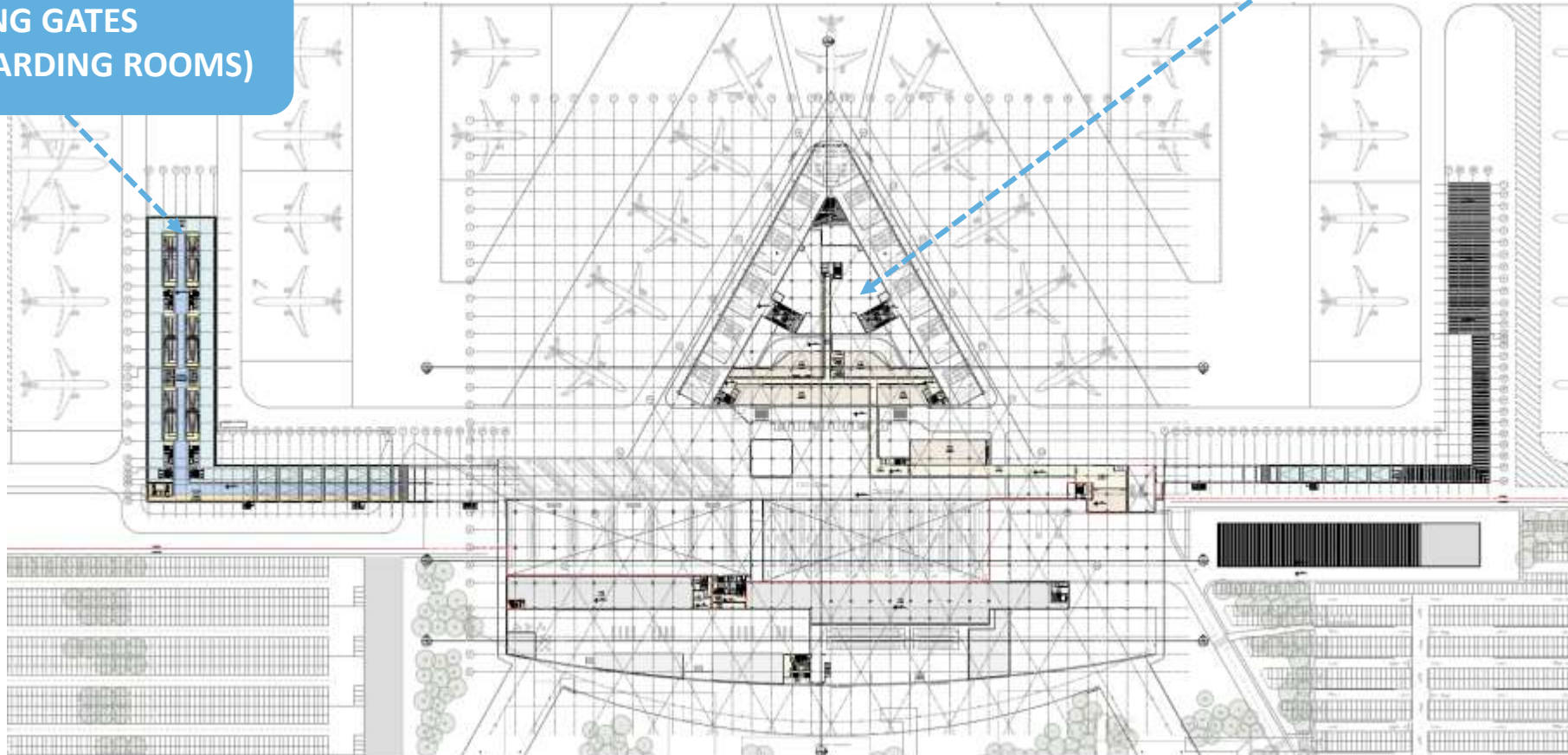
# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

○ Terminal – Mezzanine – Intermediate Level

RETAIL + F&B SUPPORT  
STORAGE AND  
TECHNICAL AREAS

BOARDING GATES  
(PRE-BOARDING ROOMS)

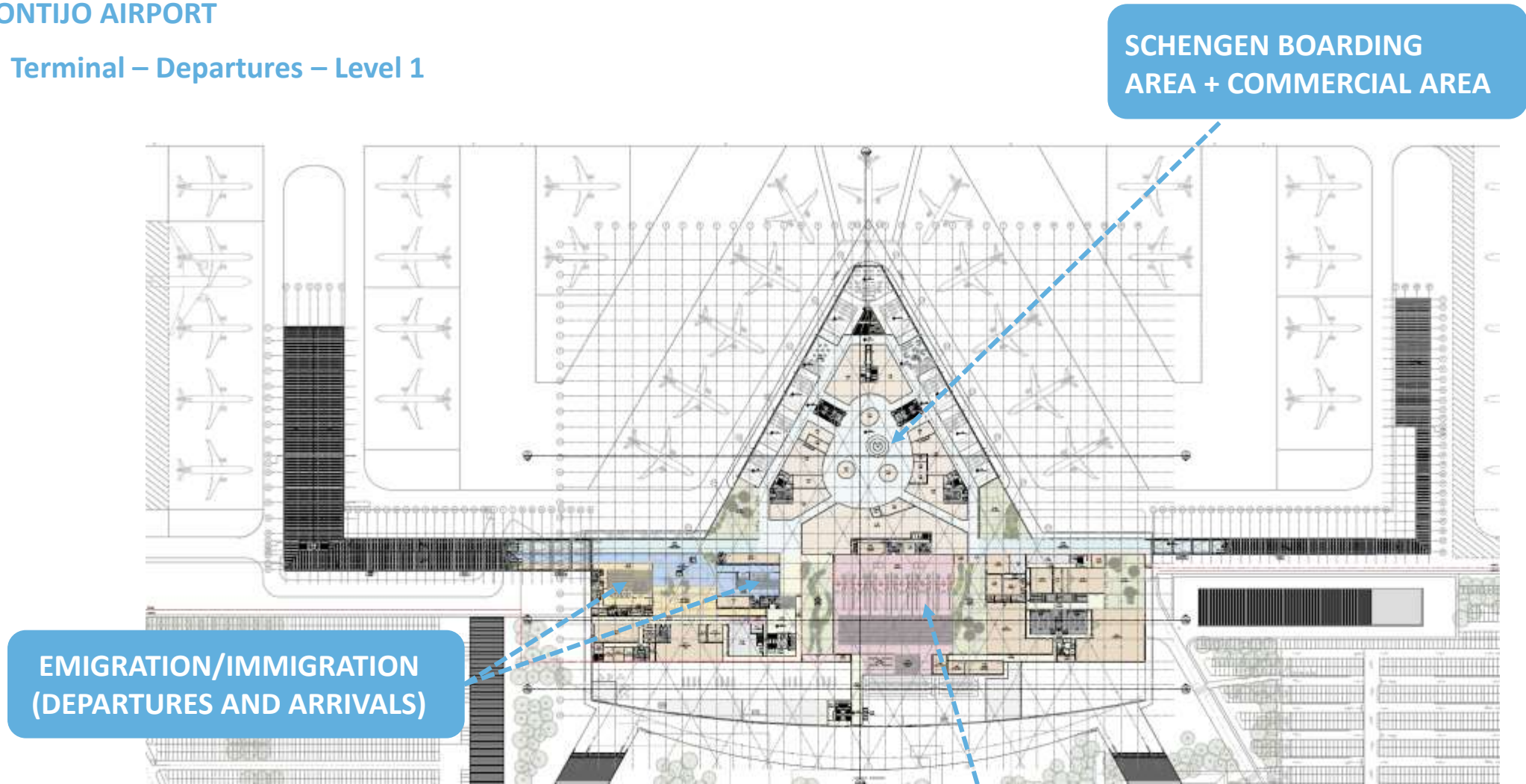




# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

○ Terminal – Departures – Level 1

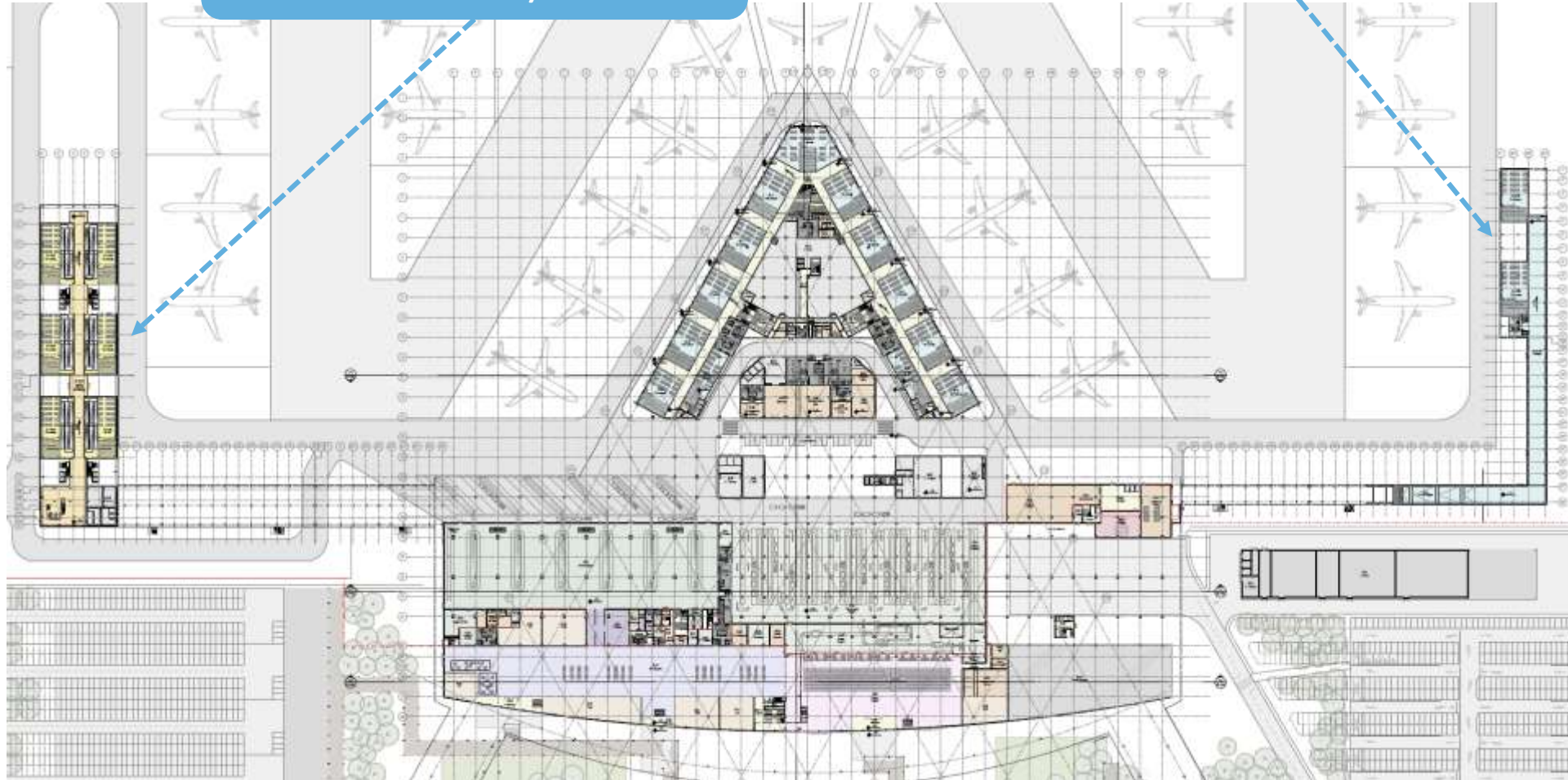


# LISBON REGION AIRPORT CAPACITY

MONTIJO AIRPORT

SOUTH PIER – FLEXIBLE (SCHENGEN AND NON SCHENGEN)

NORTH PIER – SCHENGEN

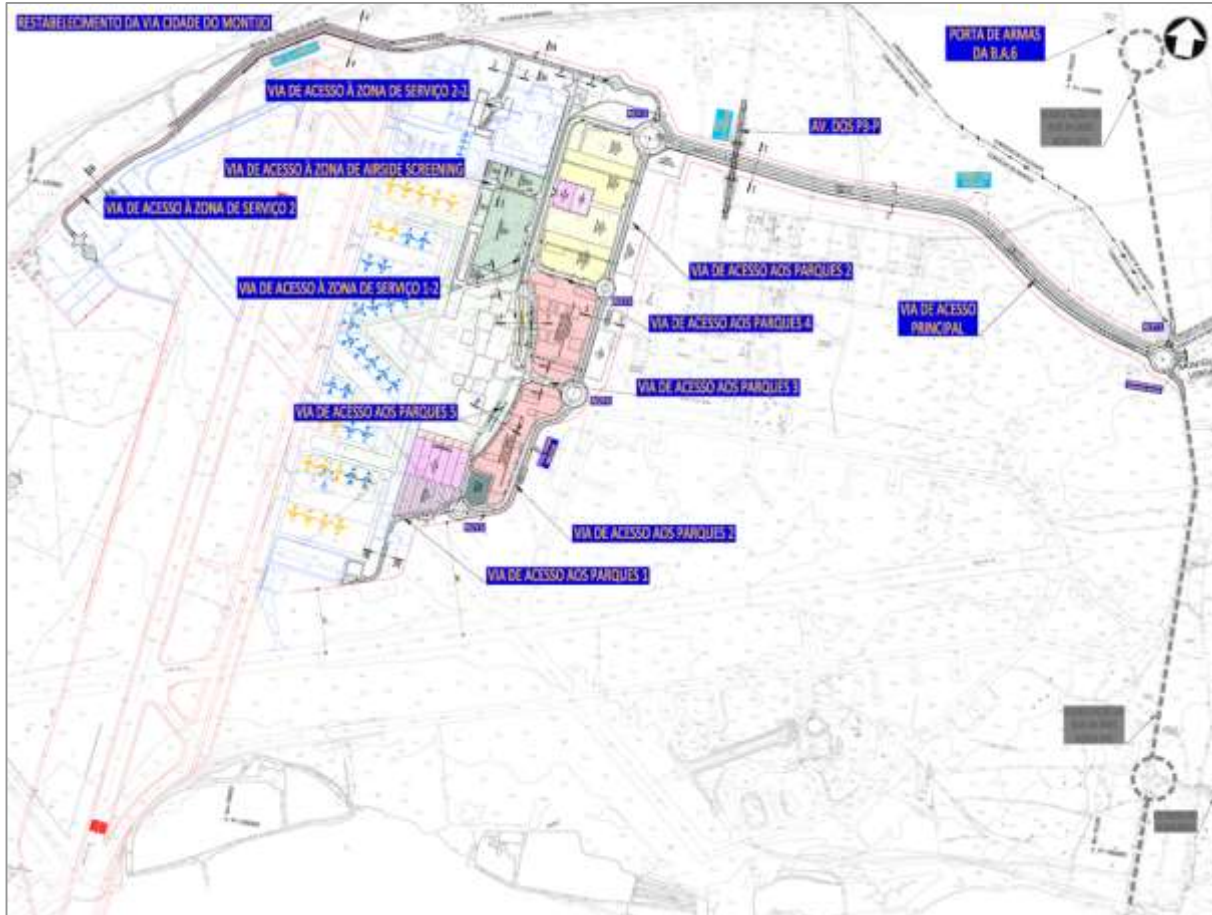




# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### ○ Landside



MAXIMIZE THE EFFICIENCY OF VEHICLE AND PEOPLE FLOWS CONTRIBUTING TO THE PAX QUALITY LEVEL OF SERVICE

- **ROAD NETWORK** (main access road, distribution, secondary and return routes)
- **PARKING LOTS** (Pax, Staff, Service, etc)
- **DEPARTURES AND ARRIVALS CURBSIDE** (Táxi, Kiss & Fly, Bus + Shuttle to connect to Cais do Seixalinho)
- **EXTERNAL INFRASTRUCTURES CONNECTIONS:** Water, Electricity, Gas, Telecommunications

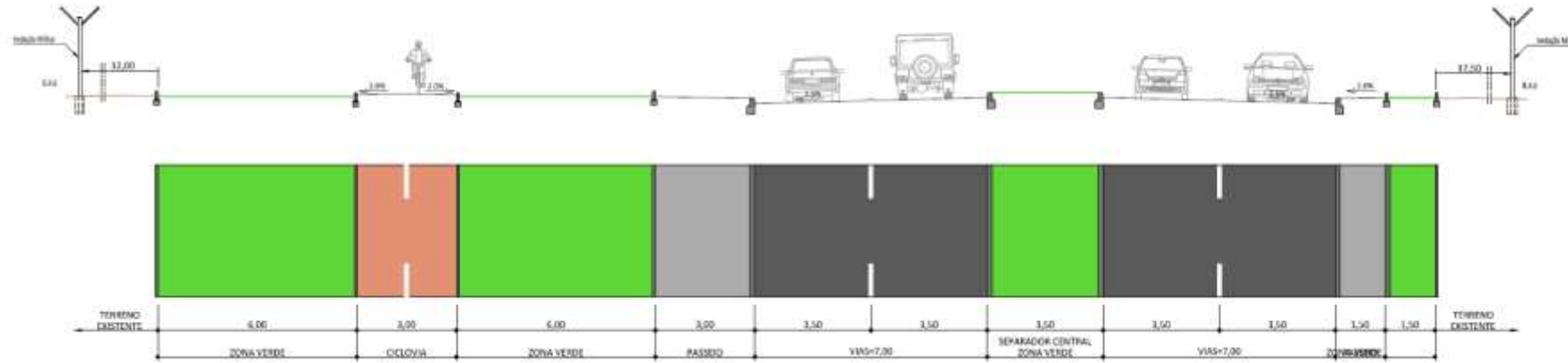


# LISBON REGION AIRPORT CAPACITY

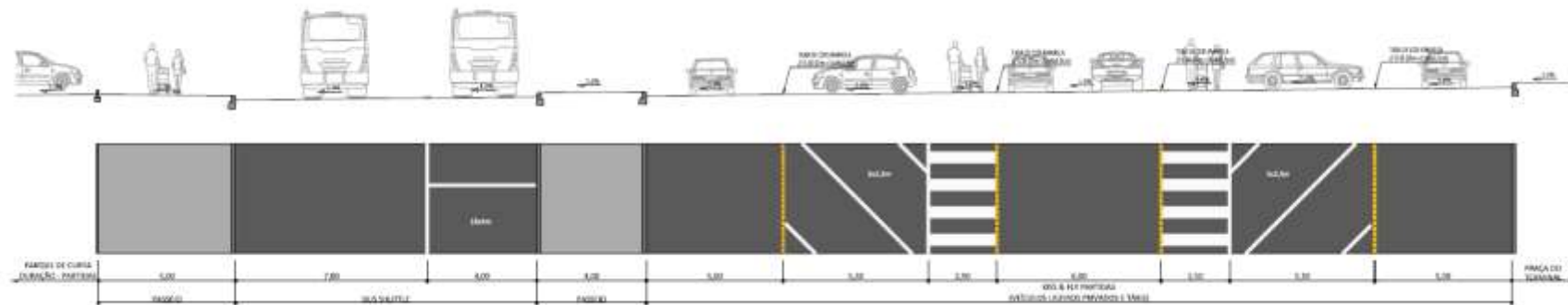
## MONTIJO AIRPORT

### Landside – Road Network

Transversal Profile  
Main access road



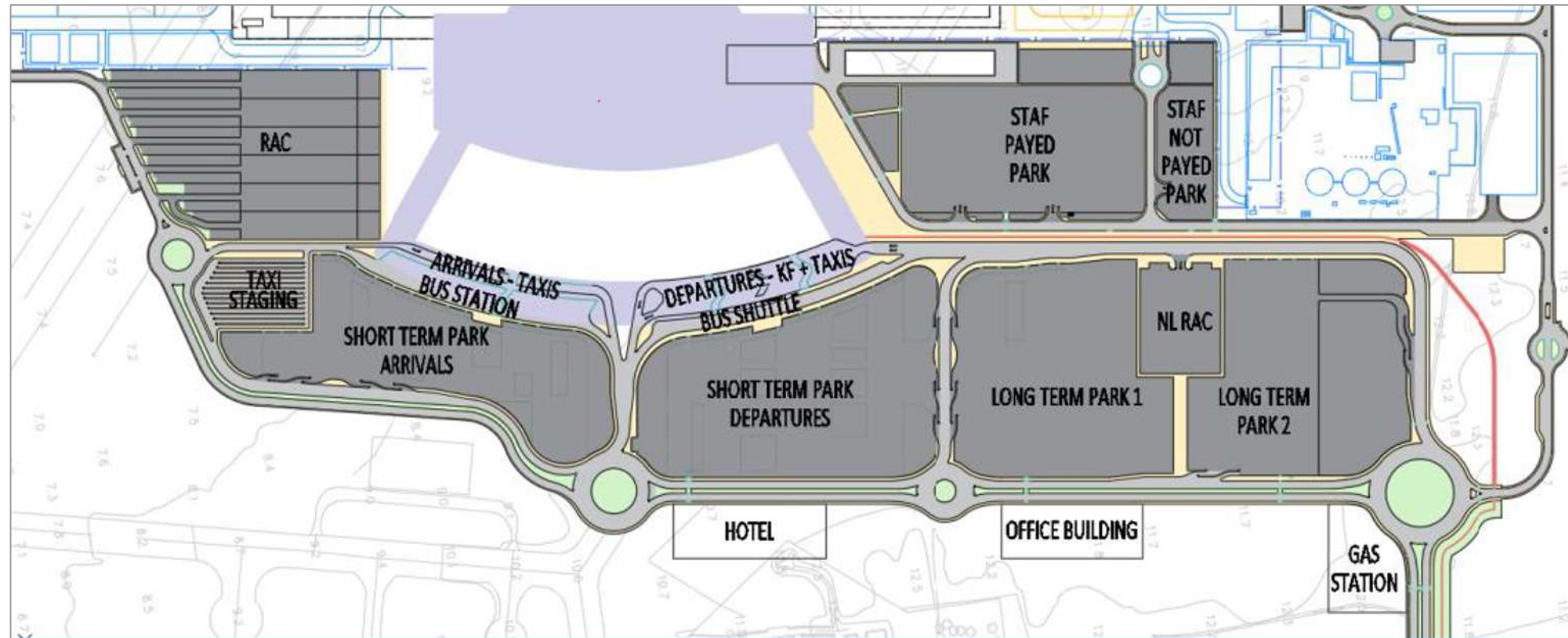
Transversal Profile  
Kiss & Fly



# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

○ Landside – Parking



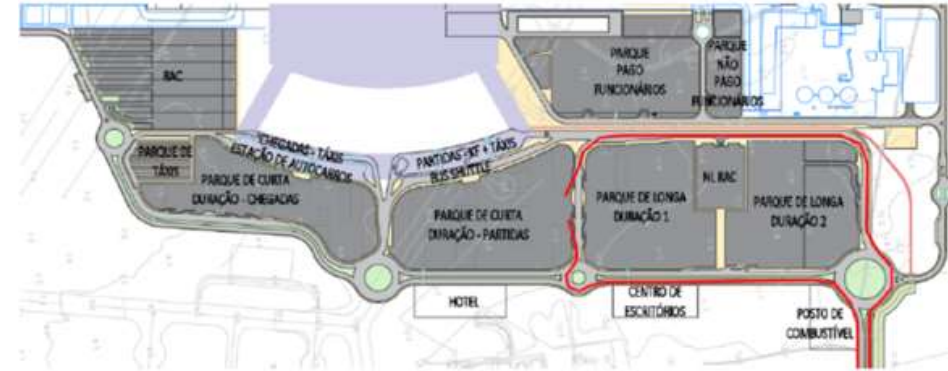
# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### Landside – Road Network - Flows



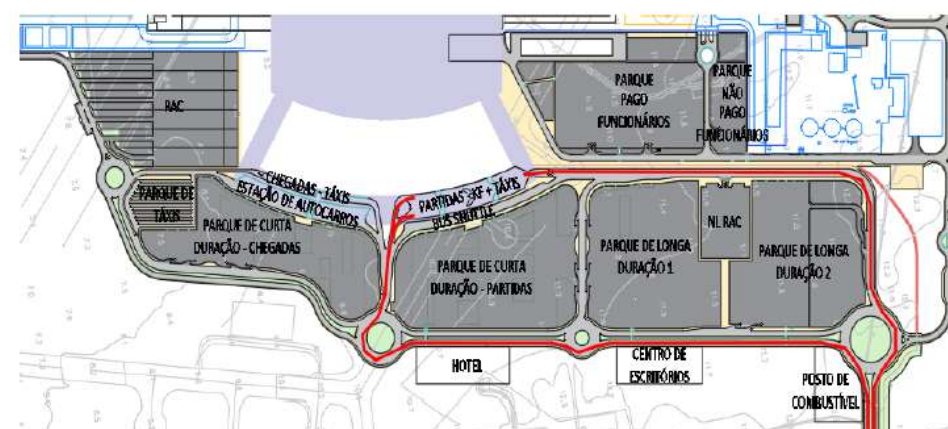
Circulation flow of private vehicles using the very short stay passenger drop off zone in the departures area (“Kiss & Fly”)



Circulation flow of private vehicles inbound and outbound to/from the long and short stay parking lots in the departures area



Circulation flow of the “shuttle” bus



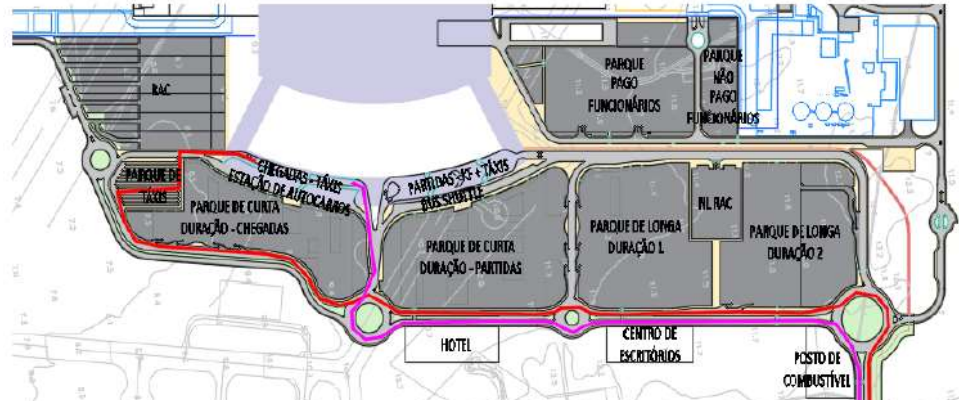
Circulation flow of the taxis inbound and outbound to/from the departures area



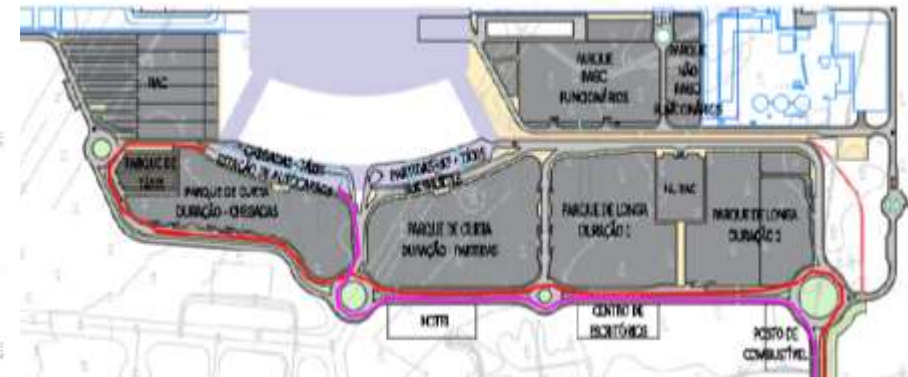
# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### Landside – Road Network - Flows



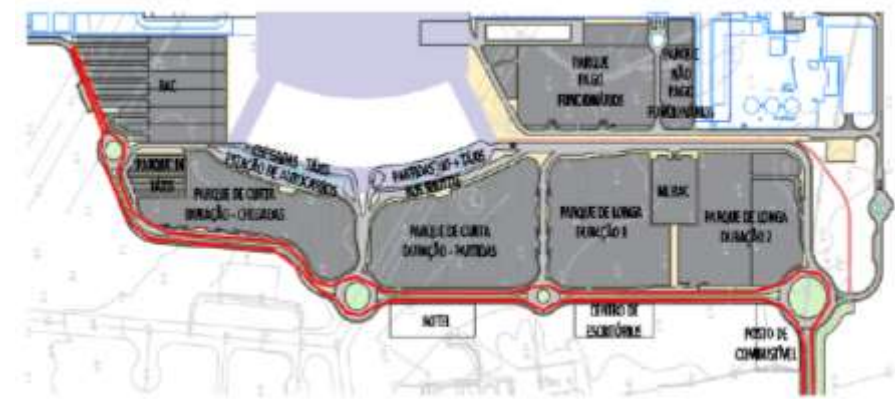
Circulation flow of Inbound and outbound taxis in the arrivals area (passing through the taxi parking facility)



Tourist buses circulation flow



Circulation flow of private vehicles inbound and outbound to/from the short stay car park in the arrivals area



Circulation flow of the taxis inbound and outbound to/from the departures area



# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### ○ Montijo - Accessibilities

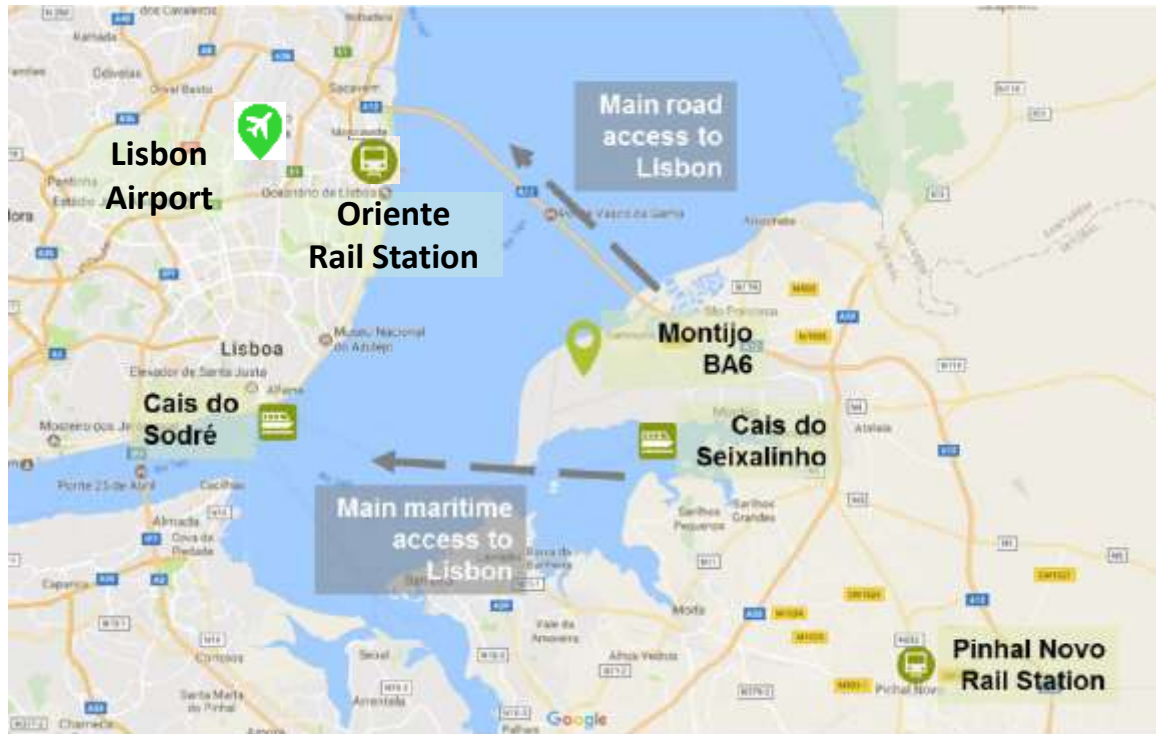


# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### GOAL:

- TO GUARANTEE AN EFFICIENT PASSENGER EXPERIENCE, WITH REDUCED TIMES AND COSTS
- ROAD CONNECTION
- FLUVIAL CONNECTION



THE DEVELOPED STUDIES FOR ACCESSIBILITIES INVOLVED THE FOLLOWING ENTITIES:

IP, MUNICIPALITIES OF ALCOCHETE AND MONTIJO, LUSOPONTE AND TRANSTEJO

MAIN POINTS TO BE DEVELOPED:

- DIRECT CONNECTION TO LISBON THROUGH THE VASCO DA GAMA BRIDGE
- NEW ACCESS ROAD CONNECTION BETWEEN A12/PI1 AND MONTIJO AIRPORT
- SET OF COMPLEMENTARY ROAD INFRASTRUCTURES CONSTITUTED BY THE LOCAL AND MUNICIPAL NETWORK
- REFURBISHMENT OF THE CURRENT CONDITIONS AT CAIS DO SEIXALINHO TO ASSURE THE FLUVIAL CONNECTION BETWEEN MONTIJO AIRPORT AND LISBON (CAIS DO SODRÉ)



# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### ○ Montijo – Road Connection

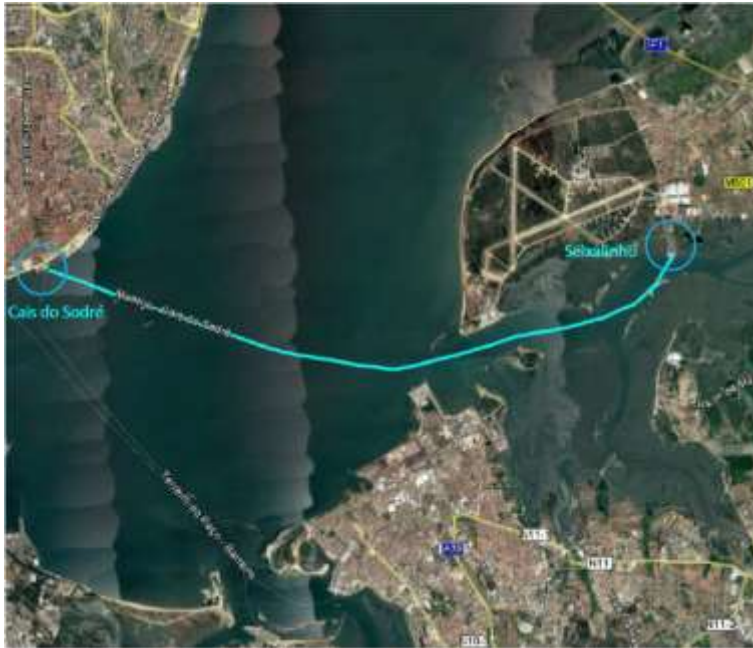


- NEW DIRECT CONNECTION TO THE VASCO DA GAMA BRIDGE
- IMPROVEMENT OF THE LOCAL NETWORK
- IMPROVEMENT OF THE CONNECTION ROAD TO CAIS DO SEIXALINHO

# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

### ○ Montijo – Fluvial Connection



## PRELIMINARY STUDY OF THE FLUVIAL CONNECTION TO THE MONTIJO AIRPORT

### MINIMUM OPERATING CONDITIONS TO MAKE A COMPETITIVE CONNECTION:

- 3 CONNECTIONS BY DIRECTION – PEAK HOUR WORKING DAYS
- 2 CONNECTIONS BY DIRECTION – PEAK HOUR WEEKENDS
- CONNECTION TIME: 20 MIN
- CONNECTION POINT IN LISBON – CAIS DO SODRÉ FLUVIAL TERMINAL



# LISBON REGION AIRPORT CAPACITY

## MONTIJO AIRPORT

3D Images



# LISBON REGION AIRPORT CAPACITY

HUMBERTO DELGADO AIRPORT





# LISBON REGION AIRPORT CAPACITY

## HUMBERTO DELGADO AIRPORT

### GOAL:

- TO INCREASE COMPETITIVENESS AS A HUB AND ENSURE THAT THE INFRASTRUCTURE HAS CAPACITY TO SUPPORT THE GROWTH OF AIRLINES AND INCREASE THEIR OPERATIONAL EFFICIENCY



### CURRENT SITUATION

- NUMBER OF CONTACT STANDS: LESS THAN 30%
- NON-OPTIMIZED TRANSFER FLOWS – HIGH DISTANCES AND HIGH TIME PATHS FOR PAX – *MTC – Minimum Connecting Time*
- LARGE DISTANCES AND TRAVEL TIMES OF BAGGAGE TRANSFERS
- PASSAPORT CONTROL WITH WAITING TIMES INCOMPATIBLE WITH AN EFFICIENT HUB OPERATION
- VERY SMALL WAITING AREAS NEAR THE BOARDING ROOMS
- LOW FLEXIBILITY TO ACCOMODATE DIFFERENT TYPES OF AIRCRAFTS
- LIMITED FLEXIBILITY FOR SIMULTANEOUS PUSHBACKS
- LACK OF OPTIMIZATION OF THE AIRSIDE FOR TRAFFIC FLOODING

# LISBON REGION AIRPORT CAPACITY

HUMBERTO DELGADO AIRPORT

○ Masterplan – Ultimate Stage (2062)



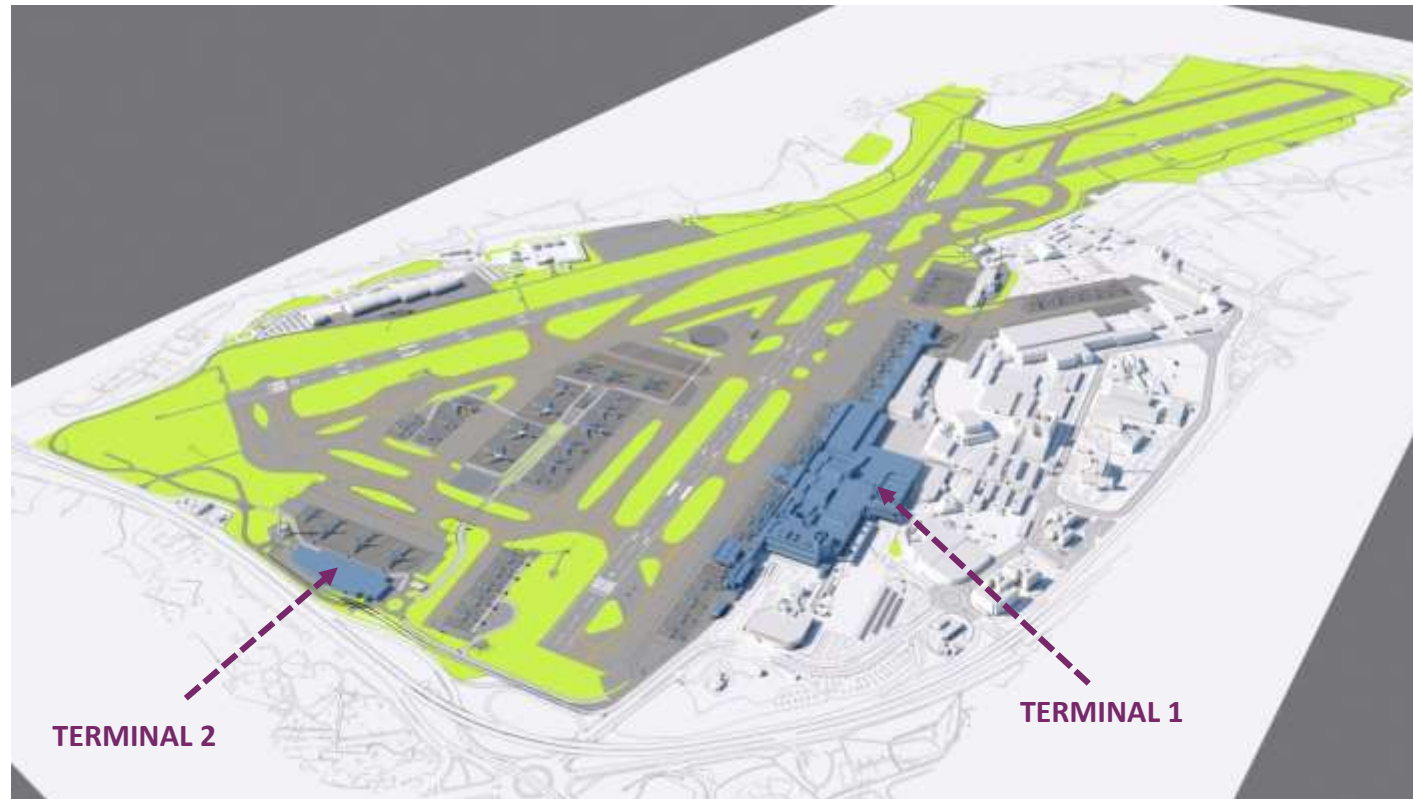


# LISBON REGION AIRPORT CAPACITY

## HUMBERTO DELGADO AIRPORT

### Humberto Delgado Airport Development

#### PHASING



CURRENT LAYOUT

### Ultimate Stage – Until 2062

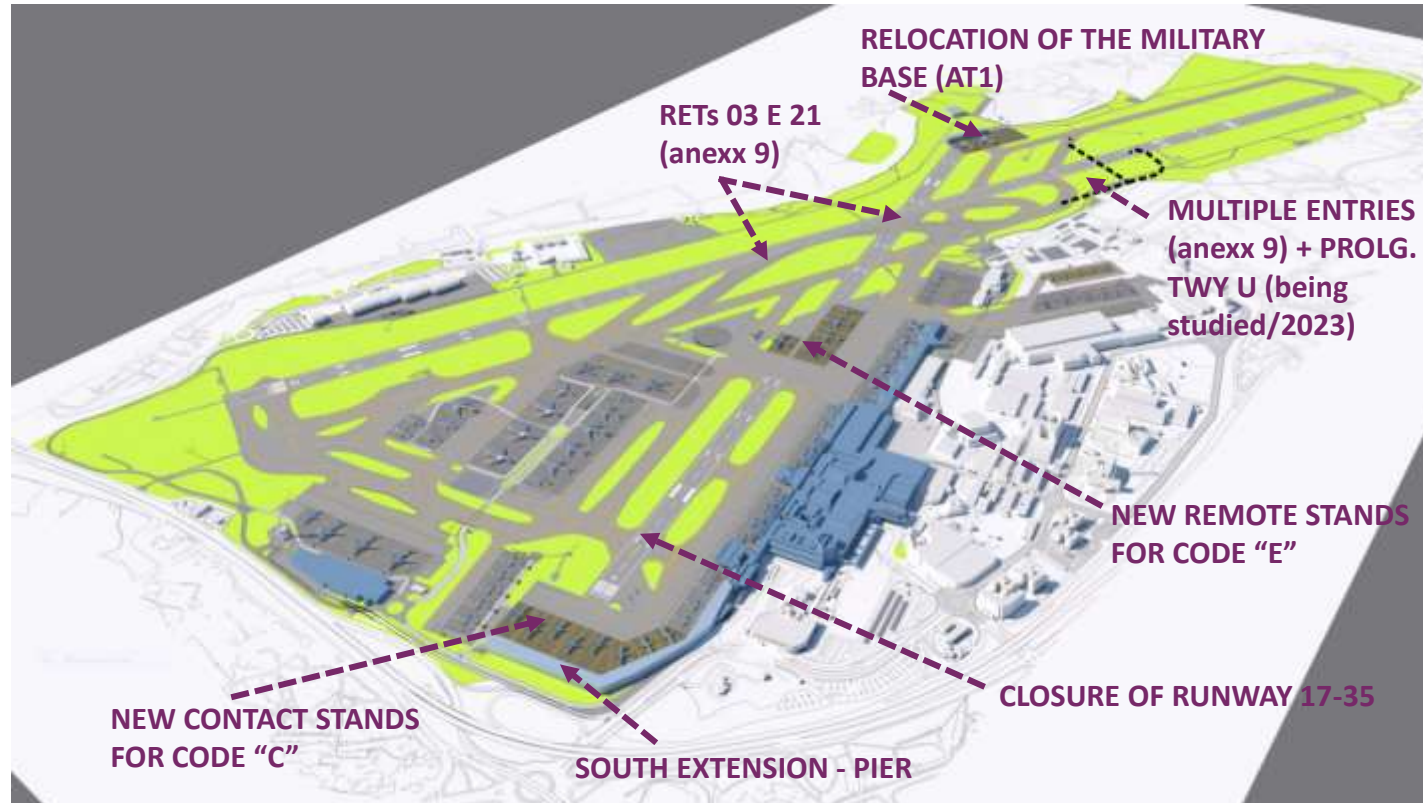
TOAL STANDS	72
CONTACT	24
REMOTE	48
RACIO	33/67

# LISBON REGION AIRPORT CAPACITY

## HUMBERTO DELGADO AIRPORT

### ○ Humberto Delgado Airport Development

#### PHASING



PHASE A – 2019-2021

#### Ultimate Stage – Until 2062

- CLOSURE OF THE RUNWAY 17-35
- CONSTRUCTION OF THE TERMINAL SOUTH EXTENSION
- CONSTRUCTION OF NEW CONTACT STANDS FOR CODE “C”, TO SOUTH
- CONSTRUCTION OF NEW STANDS IN FRONT OF THE NORTH PIER FOR CODE “E” AIRCRAFTS
- RELOCATION OF AT1

# LISBON REGION AIRPORT CAPACITY

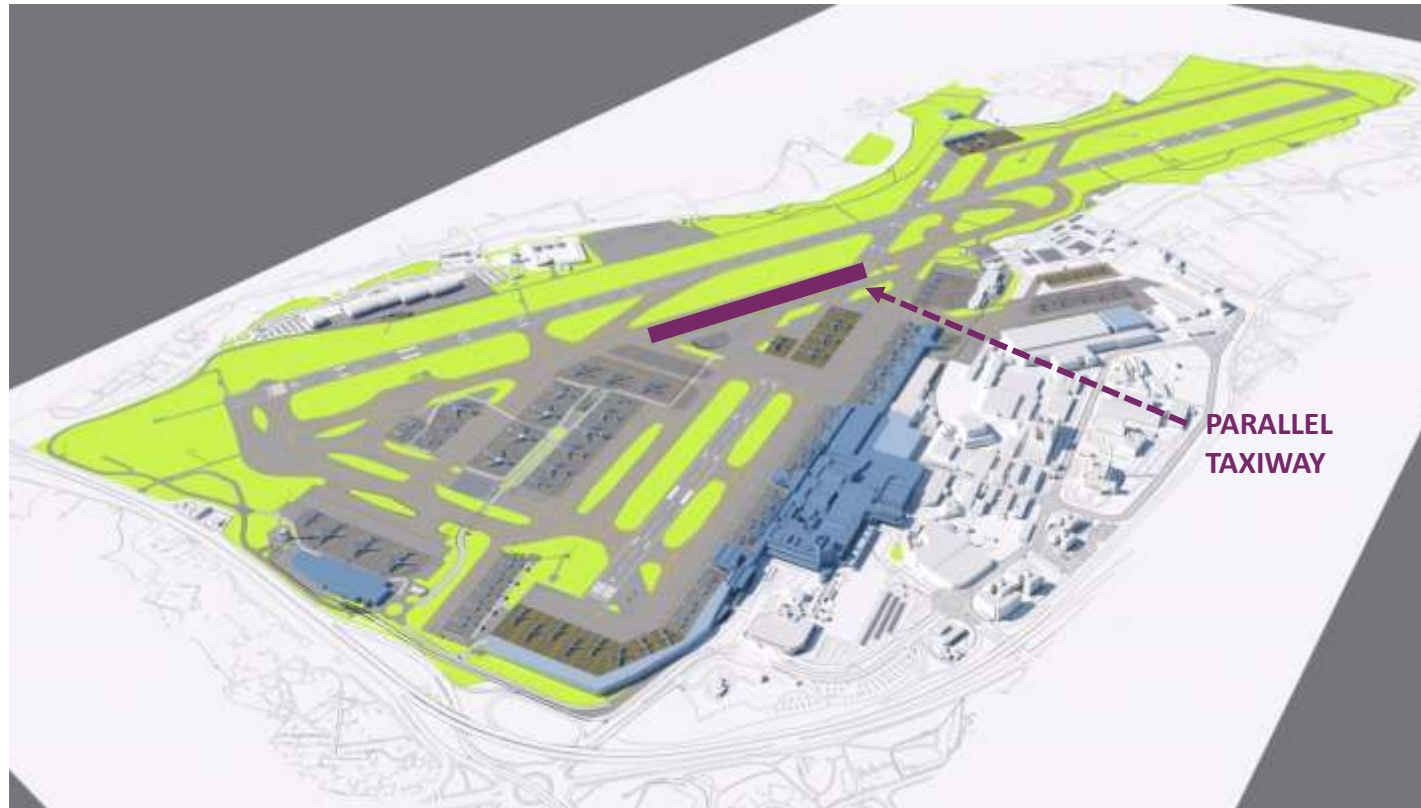
## HUMBERTO DELGADO AIRPORT

### ○ Humberto Delgado Airport Development

#### PHASING

Ultimate Stage – Until 2062

- CONSTRUCTION OF THE NEW PARALLEL TWY (1st PHASE)



PHASE B – 2022-2025



# LISBON REGION AIRPORT CAPACITY

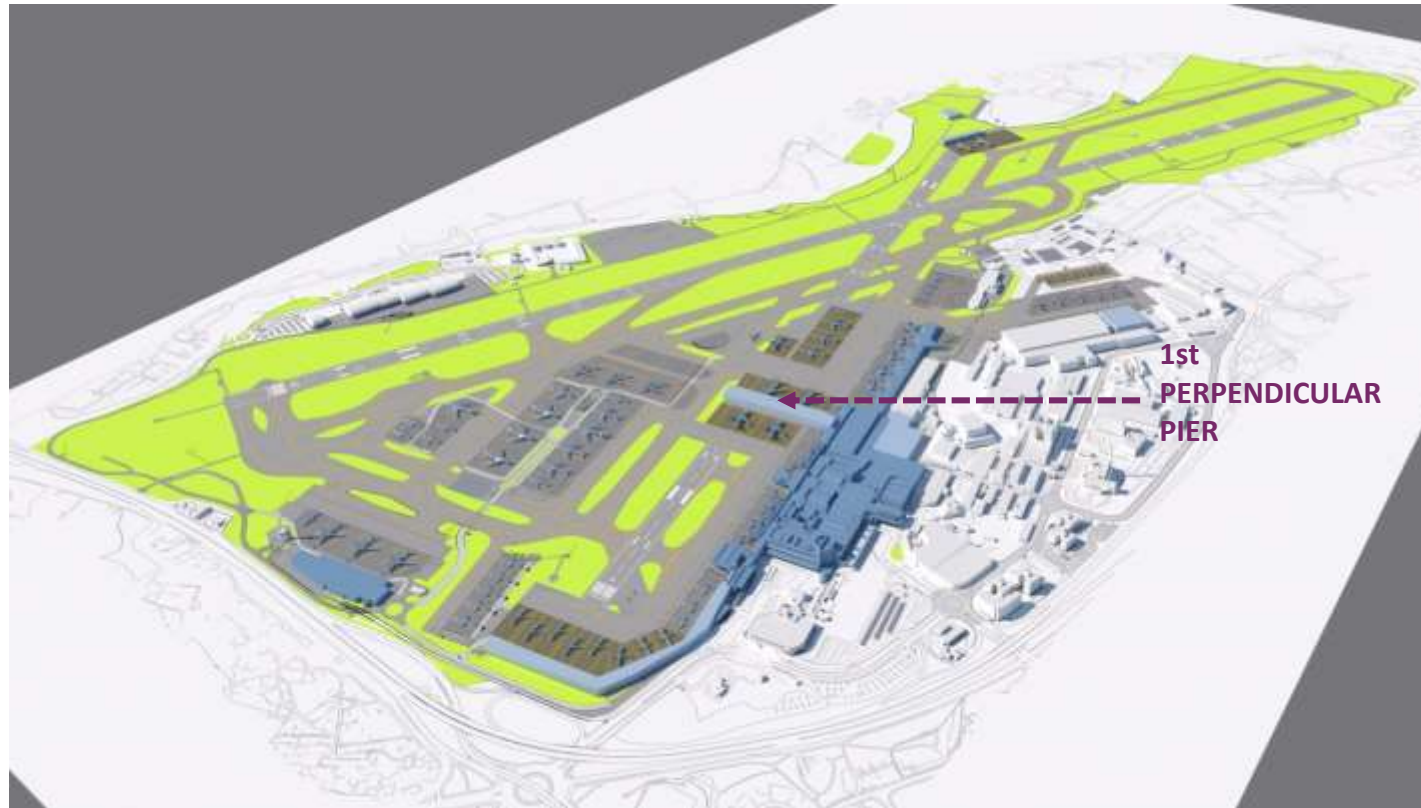
## HUMBERTO DELGADO AIRPORT

### ○ Humberto Delgado Airport Development

#### PHASING

#### Ultimate Stage – Until 2062

- BEGINNING OF THE CONSTRUCTION OF THE FIRST PERPENDICULAR PIER



PHASE C – 2026-2032

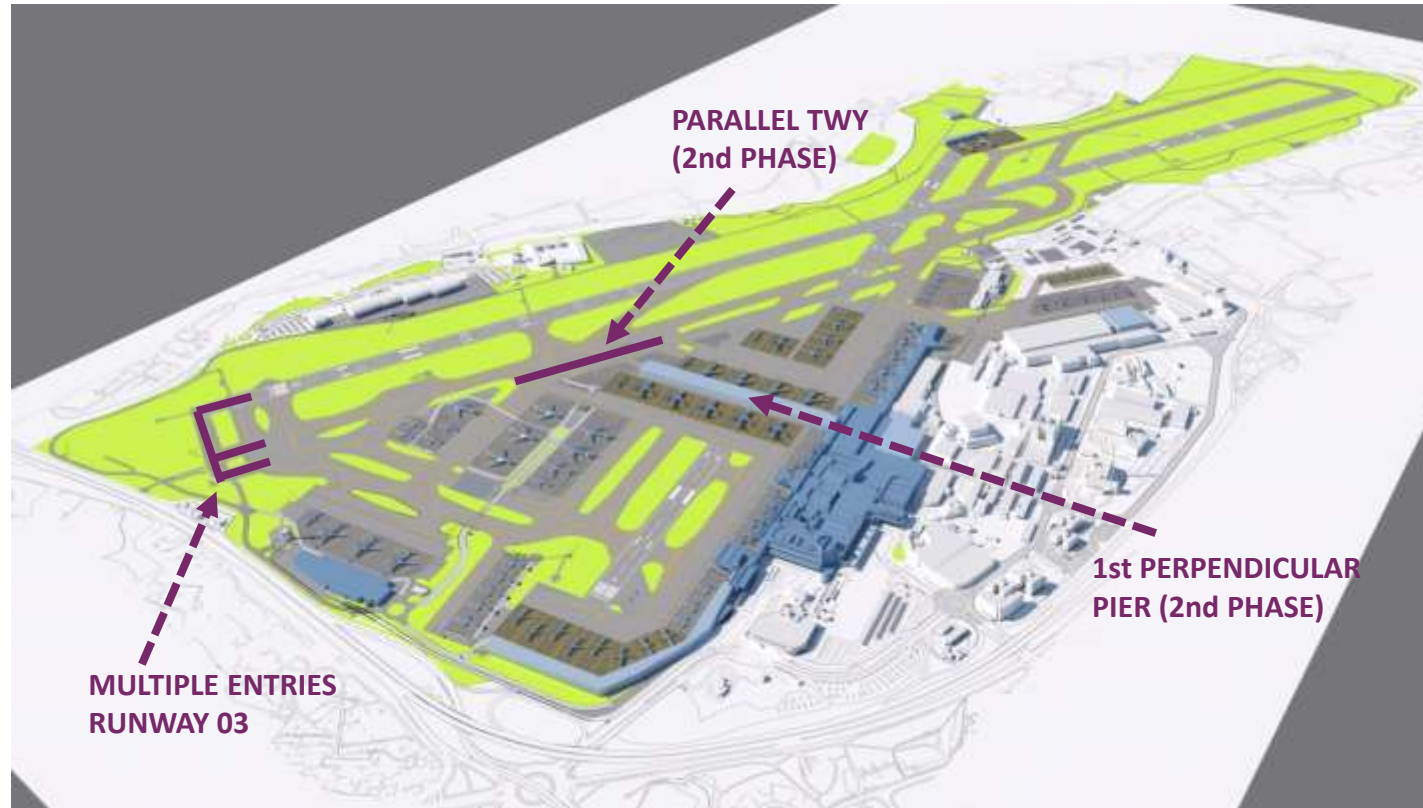


# LISBON REGION AIRPORT CAPACITY

## HUMBERTO DELGADO AIRPORT

### ○ Humberto Delgado Airport Development

#### PHASING



PHASE D – 2033-2041

#### Ultimate Stage – Until 2062

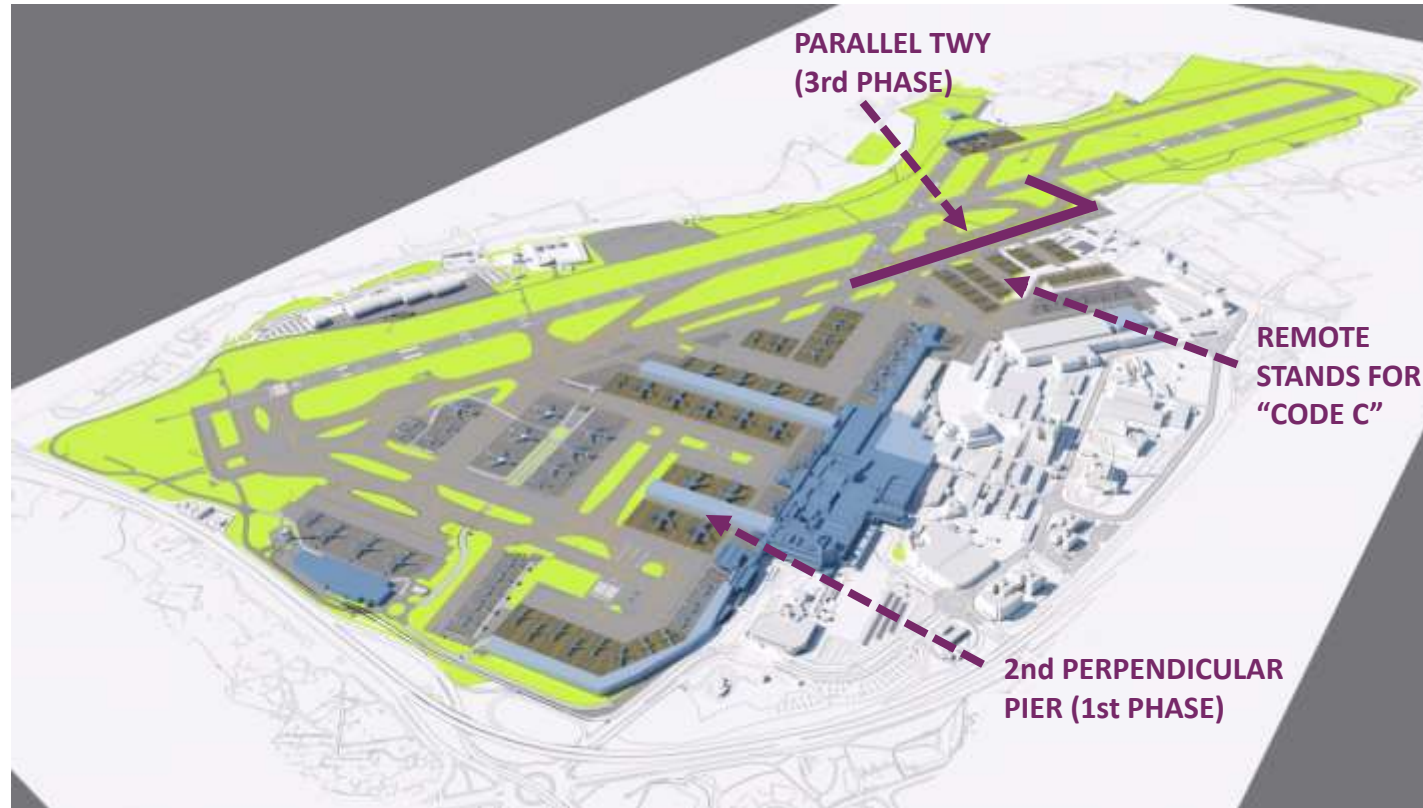
- MULTIPLE ENTRIES IN RUNWAY 03
- PARALLEL TAXIWAY (2nd PHASE)
- FIRST PERPENDICULAR PIER (2nd PHASE)

# LISBON REGION AIRPORT CAPACITY

## HUMBERTO DELGADO AIRPORT

### ○ Humberto Delgado Airport Development

#### PHASING



PHASE E – 2042-2048

#### Ultimate Stage – Until 2062

- BEGINNING OF CONSTRUCTION OF THE SECOND PERPENDICULAR PIER (1st PHASE)
- NEW APRONS FOR AIRCRAFT PARKING
- CONSTRUCTION OF THE PARALLEL TAXIWAY (3rd PHASE)

# LISBON REGION AIRPORT CAPACITY

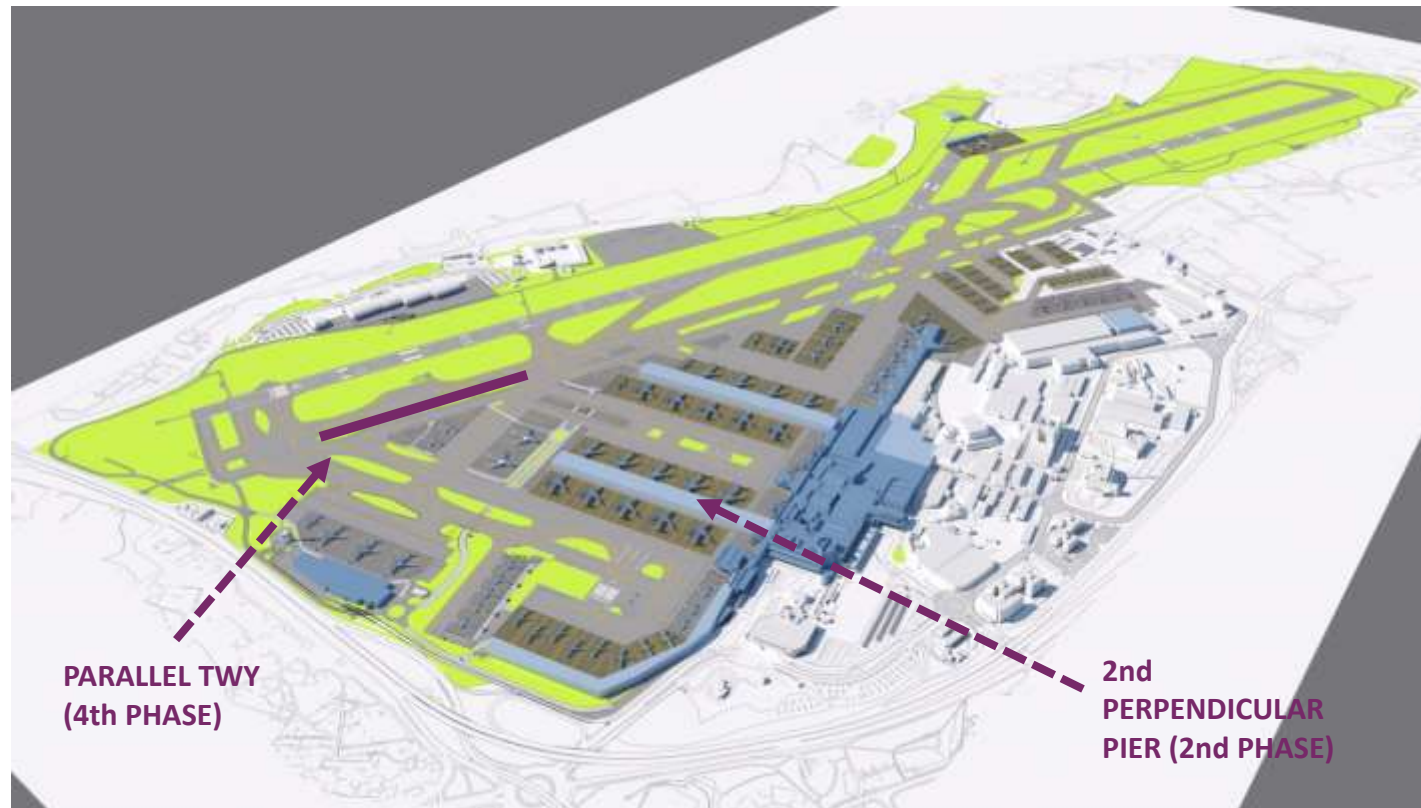
## HUMBERTO DELGADO AIRPORT

### ○ Humberto Delgado Airport Development

#### PHASING

Ultimate Stage – Until 2062

- CONSTRUCTION OF THE PARALLEL TAXIWAY (4th PHASE)
- CONSTRUCTION OF THE SECOND PERPENDICULAR PIER (2nd PHASE)



PHASE F – 2049-2054

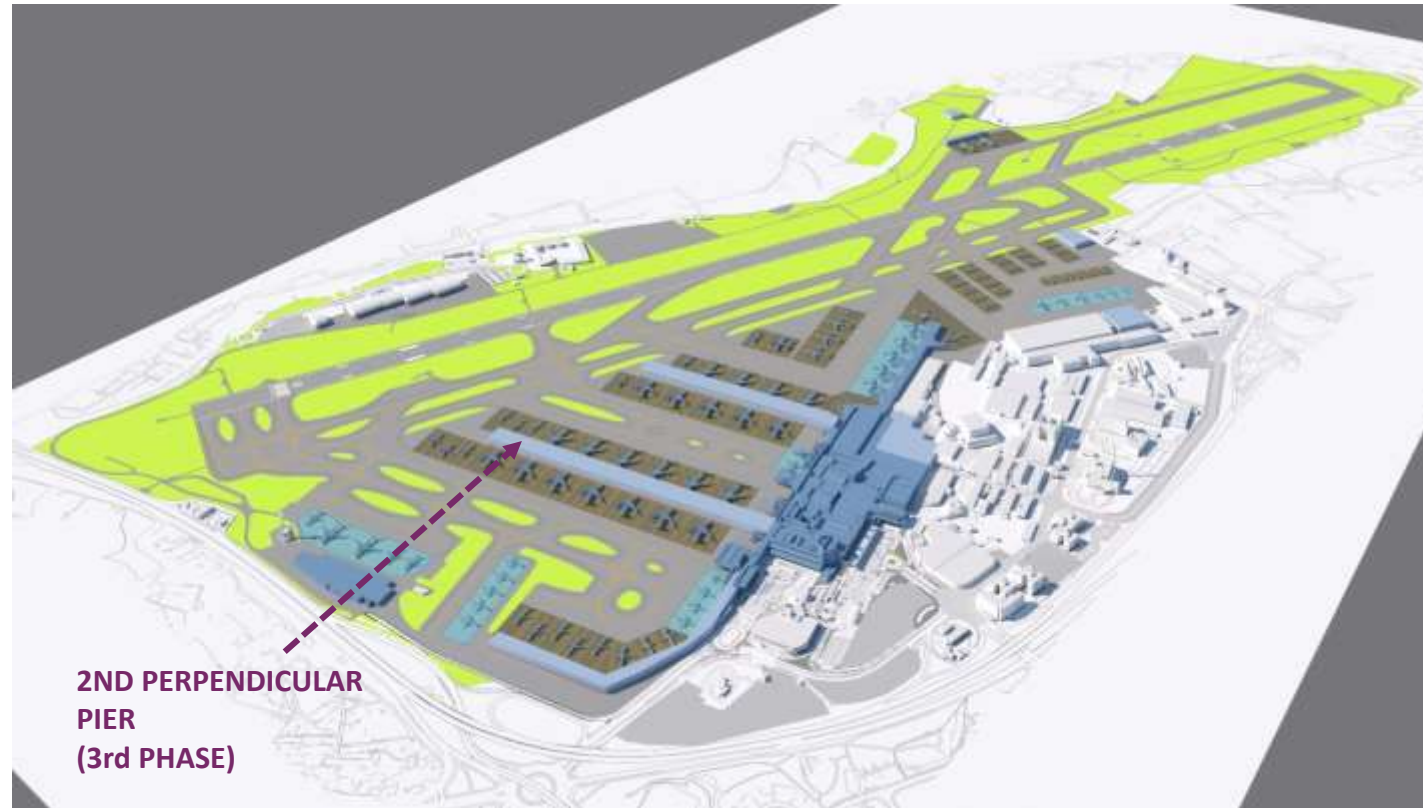


# LISBON REGION AIRPORT CAPACITY

## HUMBERTO DELGADO AIRPORT

### Humberto Delgado Airport Development

#### PHASING



#### Ultimate Stage – Until 2062

- CONSTRUCTION OF THE SECOND PERPENDICULAR PIER (3rd PHASE)

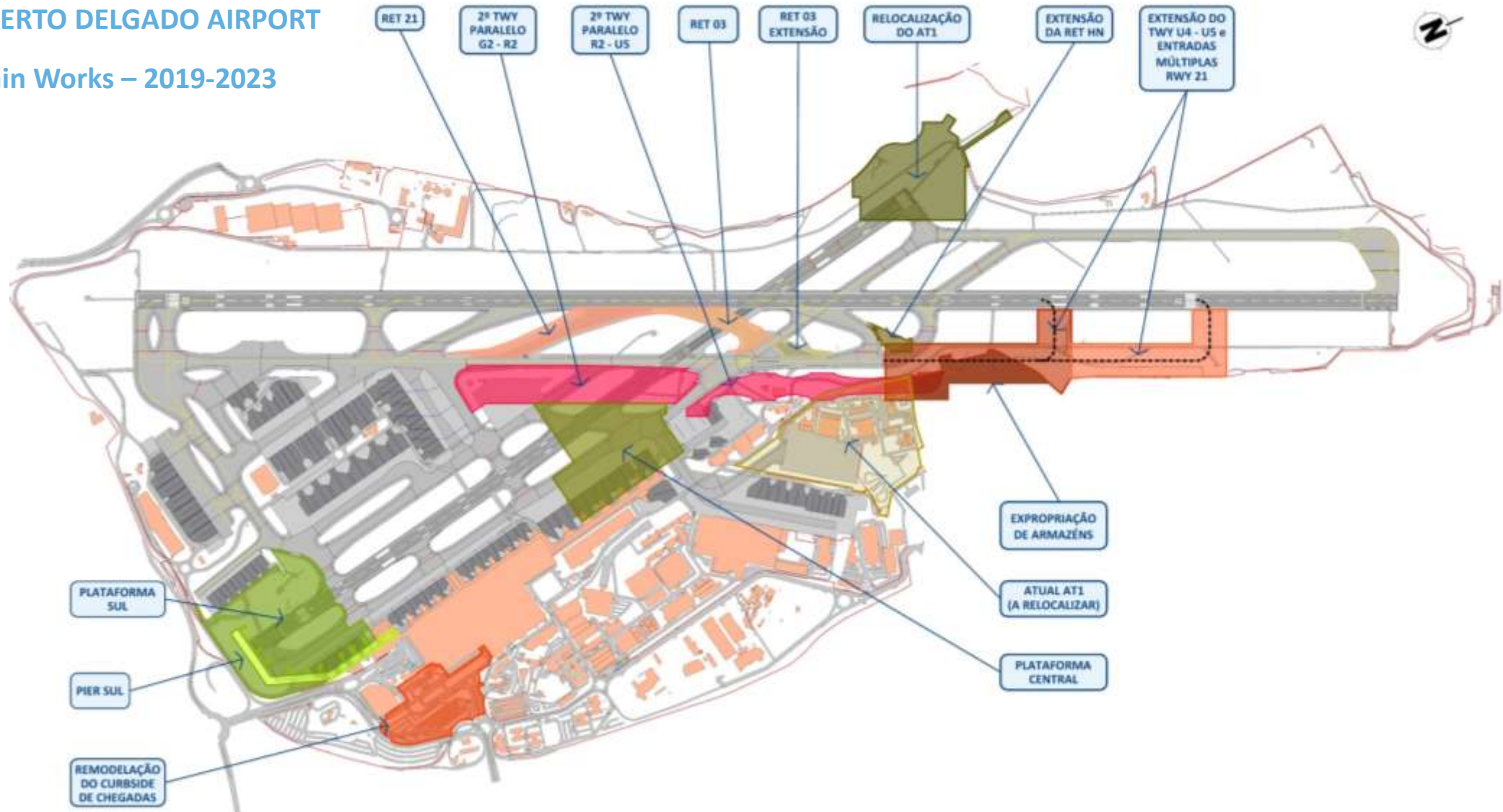
TOAL STANDS	95
CONTACT	56
REMOTE	37



# LISBON REGION AIRPORT CAPACITY

HUMBERTO DELGADO AIRPORT

○ Main Works – 2019-2023





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**THANK YOU  
FOR YOUR  
ATTENTION**  
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