

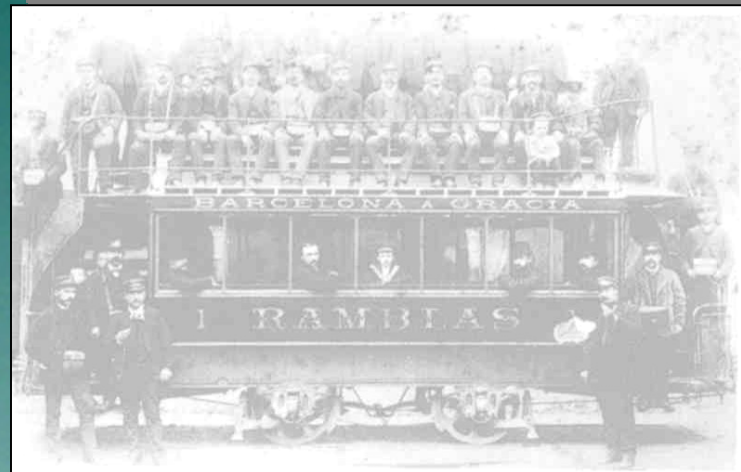
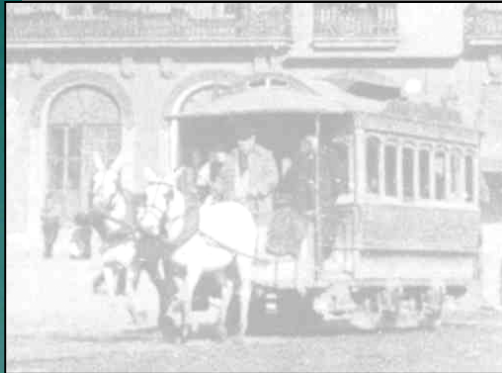


TRAMVIA METROPOLITÀ_{S.A.}

*“AN INTEGRATED APPROACH TO TRAMWAYS:
THE BARCELONA EXPERIENCE”*



History of Tramways in Barcelona



1872 – First tramway powered by horses

1877 – First line steam-powered tramways in Sant Andreu district

1899 - Beginning of tramways electrification

1911 – Union of all tramway companies

1925 – Constitution of the company “Tramvies de Barcelona, SA”

1971 – Close the last tramway line (except the “tramvia blau” – the blue tramway- a tourist’s service)



Recovery of tramways in Barcelona



1987 – TMB MAKE SEVERAL STUDIES ABOUT IMPLANTATION OF ONE LINE ON THE “AVDA. DIAGONAL”, A MAIN AXE OF BARCELONA.

1989 – STUDIES MADE BY EMT SHOW THAT DEMAND FLOWS ARE PERFECT FOR A TRAMWAY’S IMPLANTATION.

1991 – EMT MAKES AN INTERNATIONAL CALL FOR TENDERS FOR PURPOSES OF A LIGHT RAILWAY LINKING BARCELONA WITH OTHER VILLAGES IN BAIX LLOBREGAT REGION.

1993 – THIS PURPOSE IS ADDED IN THE ADVANCE OF THE INTERMODAL PROGRAMME OF TRANSPORTS (PIT)

1996 – CONSTRUCTION OF A TRIAL SINGLE TRACK (640 m long) ON THE AVDA. DIAGONAL OF BARCELONA.



Recovery of tramways in Barcelona



1997/1998 – TWO DIFFERENT MODELS OF ROLLING STOCK RUN ON THAT TRIAL TRACK.

1999 – INTERNATIONAL CALL FOR TENDERS FOR THE PROJECT, THE CONSTRUCTION AND THE OPERATION OF A TRAMWAY/LIGHT RAILWAY SYSTEM BETWEEN THE DIAGONAL AND THE REGION OF BAIX LLOBREGAT, IN BARCELONA'S METROPOLITAN AREA.

2000 – ATM GIVES THE CONTRACT TO TRAMVIA METROPOLITÀ ON 27th APRIL FOR AN OPERATION PERIOD OF 25 YEARS.



The tramway of the Metropolitan Area of Barcelona

(Two independent networks)



Tramway Diagonal
(Francesc Macià) – Baix Llobregat
- TRAMBAIX -

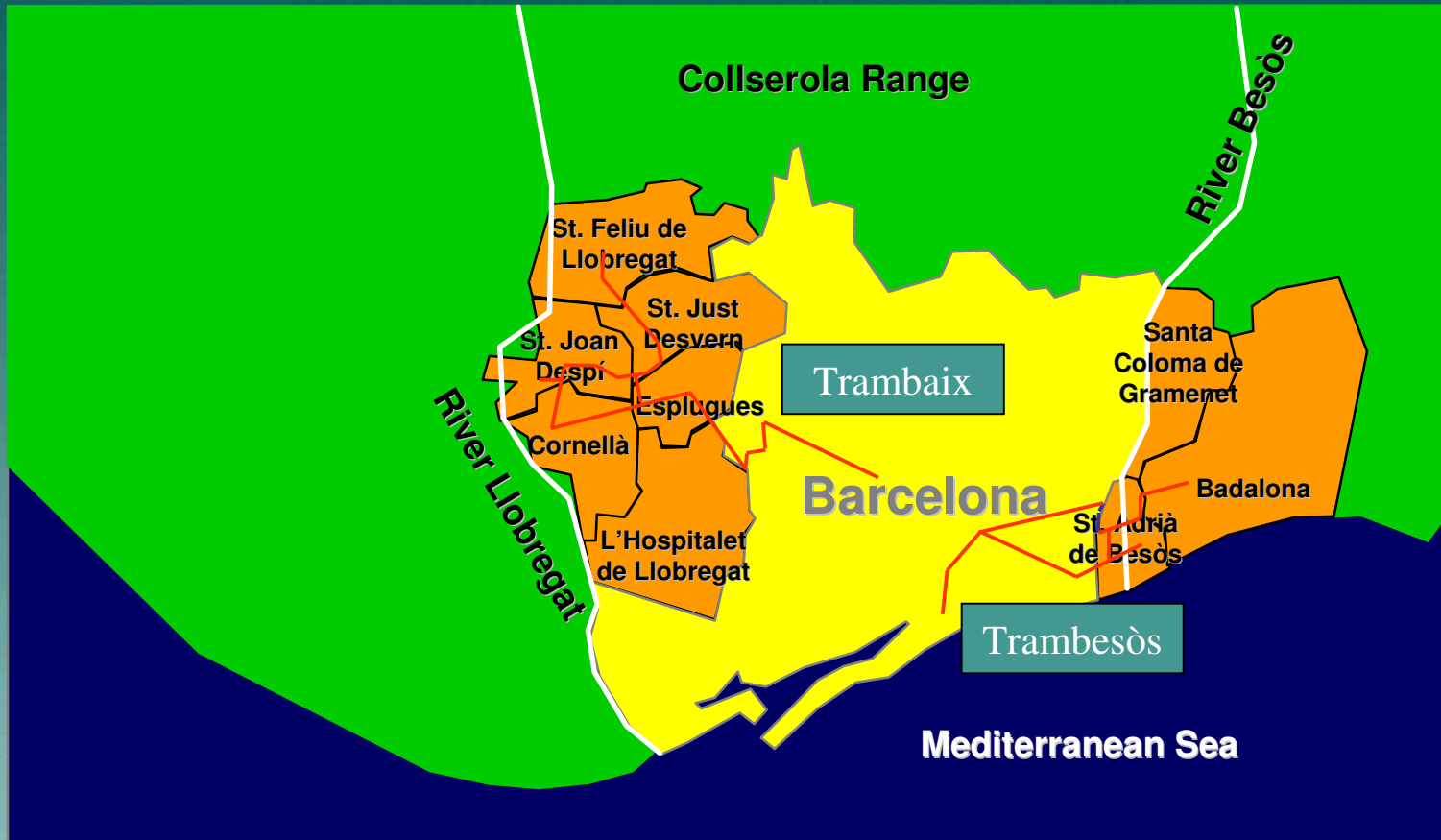


Tramway Sant Martí – Besòs
- TRAMBESÒS -



Public transports' Management in Barcelona

Urban fabric of Barcelona



- Municipalities: 9
- Territory Surface: 180 Km²
- Population: 2.447.308 (2006)



OUR INFLUENCE AREA COVERS **450.000** PEOPLE
LIVING INTO A RANGE OF **500** METERS
CLOSE TO THE TRAMWAY



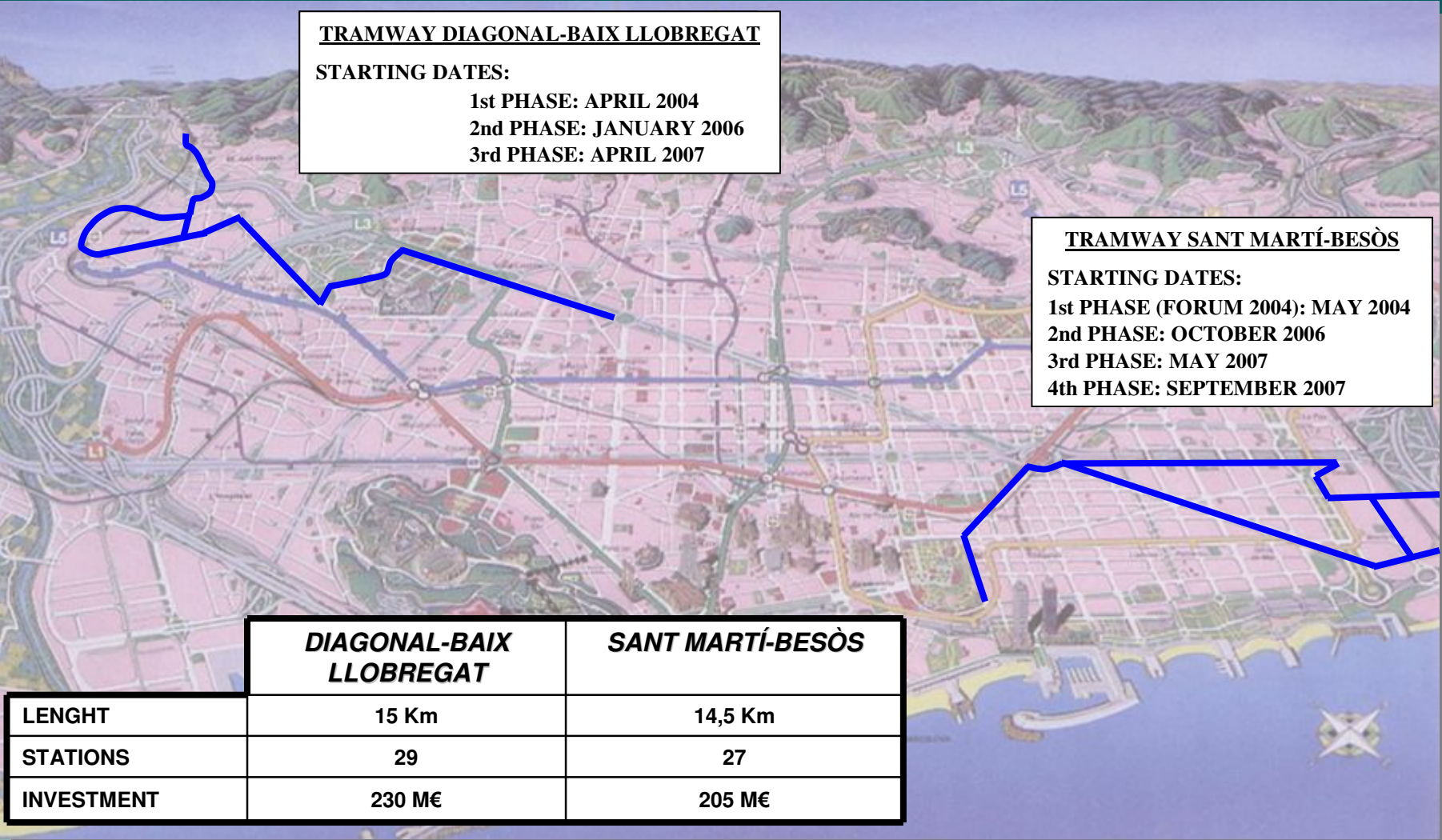


The TRAM's Tracks



TRAMWAY DIAGONAL-BAIX LLOBREGAT
STARTING DATES:
 1st PHASE: APRIL 2004
 2nd PHASE: JANUARY 2006
 3rd PHASE: APRIL 2007

TRAMWAY SANT MARTÍ-BESÒS
STARTING DATES:
 1st PHASE (FORUM 2004): MAY 2004
 2nd PHASE: OCTOBER 2006
 3rd PHASE: MAY 2007
 4th PHASE: SEPTEMBER 2007

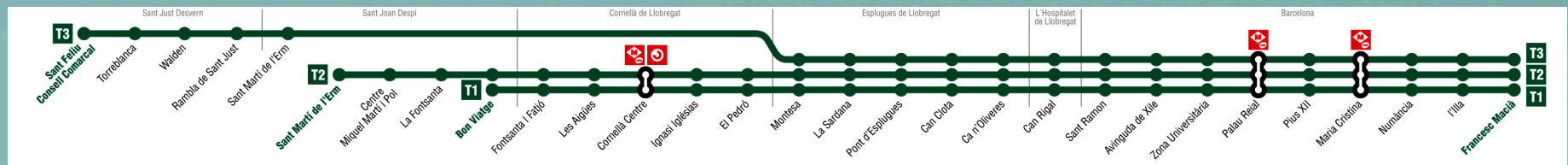
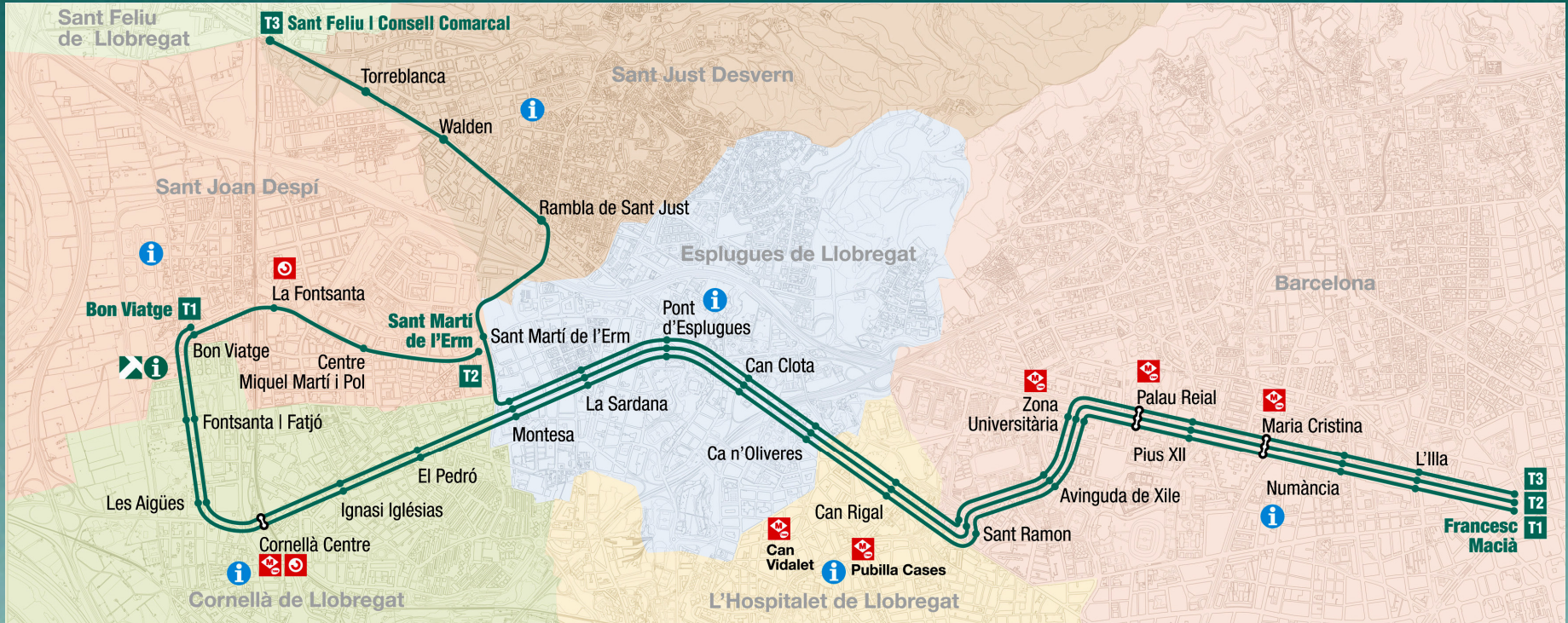


	DIAGONAL-BAIX LLOBREGAT	SANT MARTÍ-BESÒS
LENGHT	15 Km	14,5 Km
STATIONS	29	27
INVESTMENT	230 M€	205 M€



TRAMBAIX NETWORK

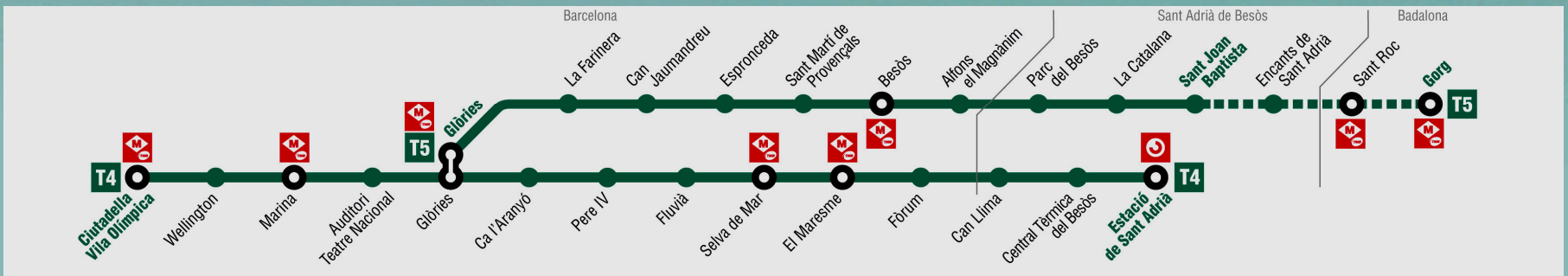
Lines: T1 – T2 – T3





TRAMBESÒS NETWORK

Lines: T4 and T5





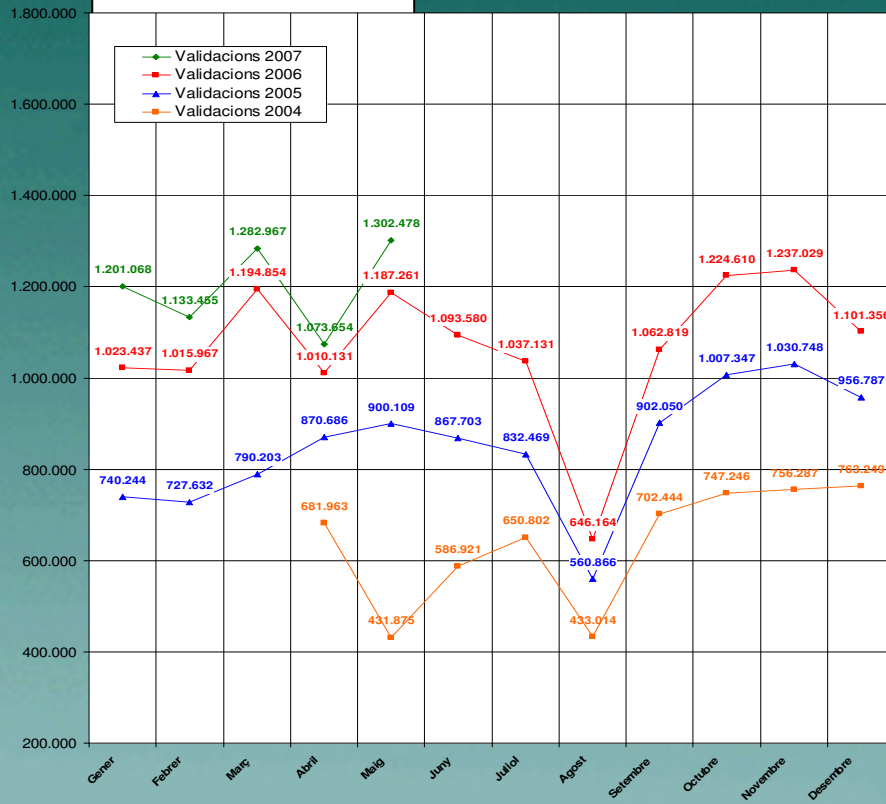
Operation Data



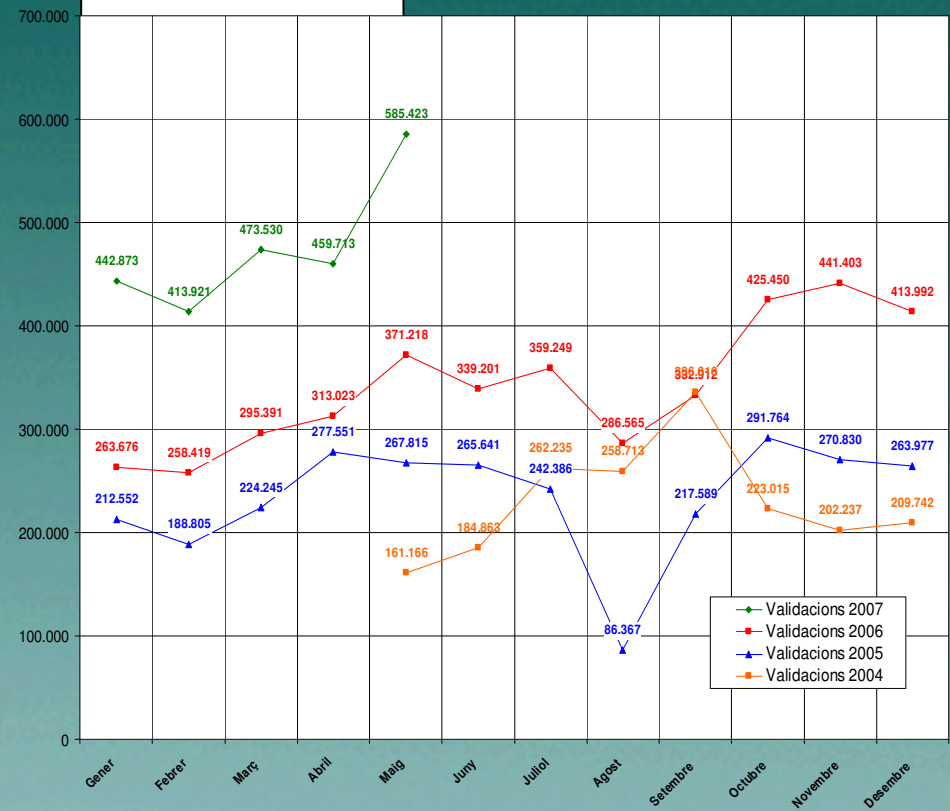
Passengers - Monthly value par years



TRAMBAIX

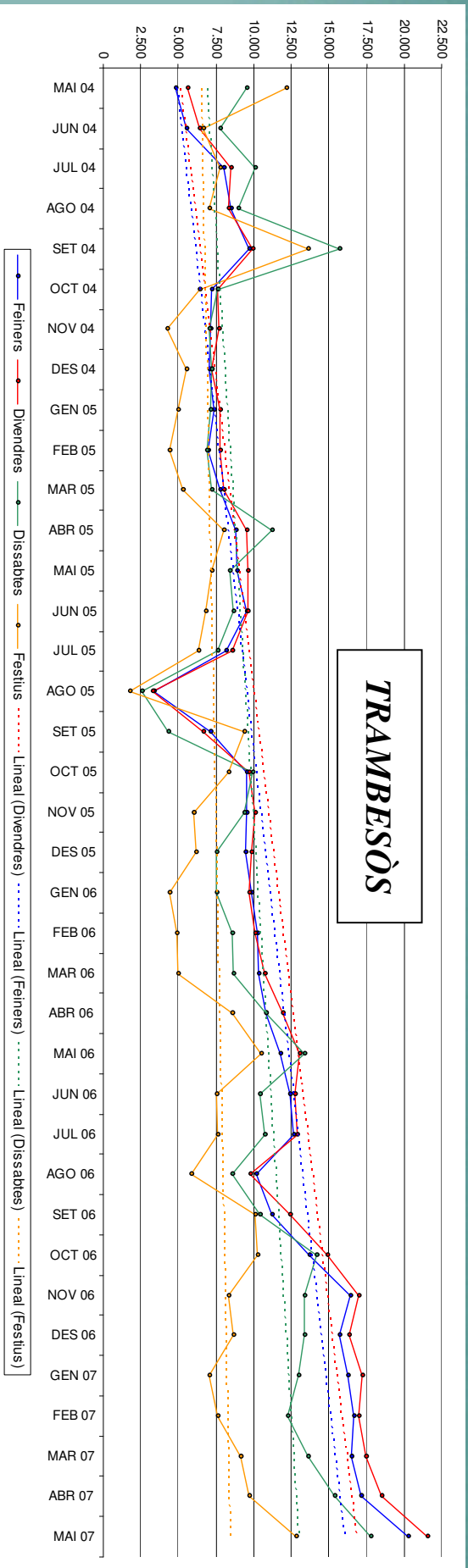
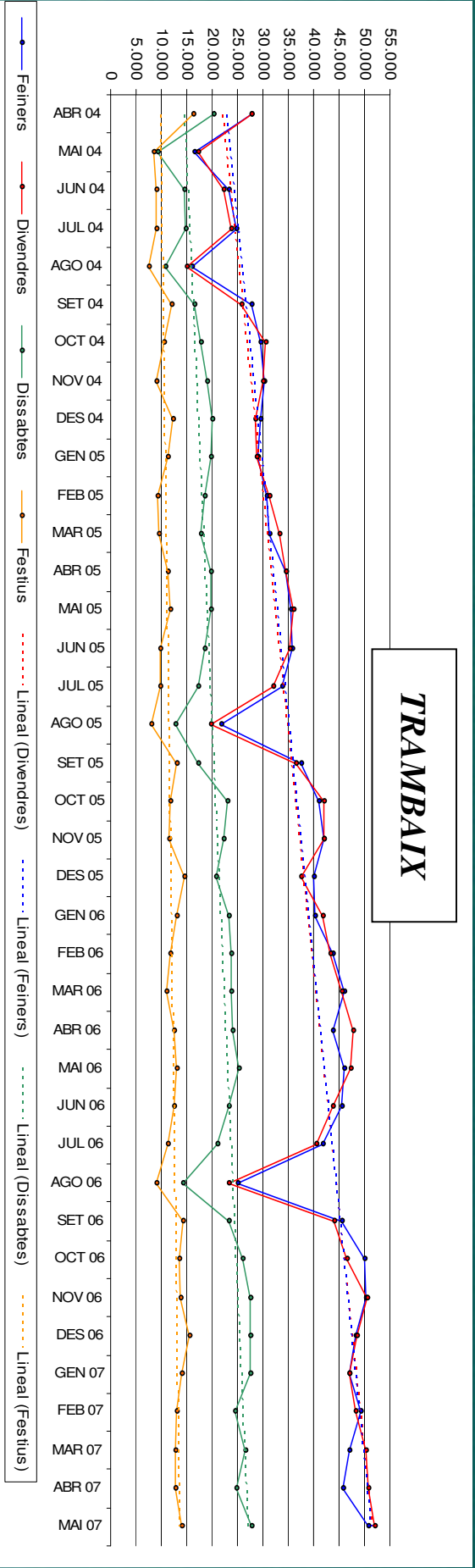
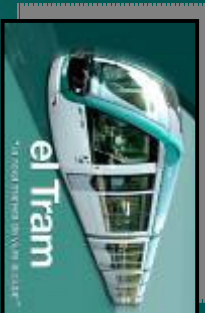


TRAMBESÒS





Validations - Evolution of Daily Average Value

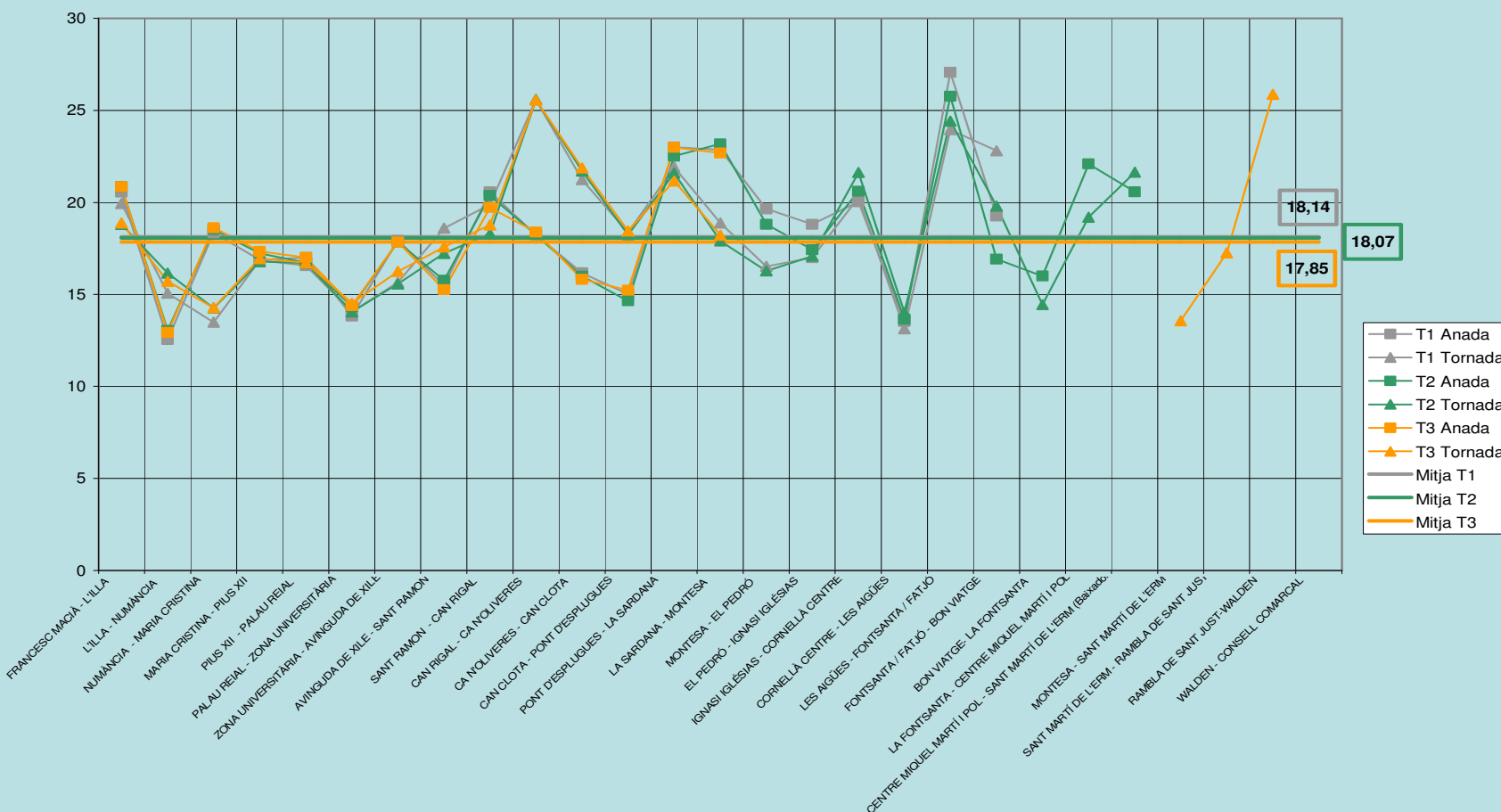




Commercial speed by track segments



TRAMBAIX

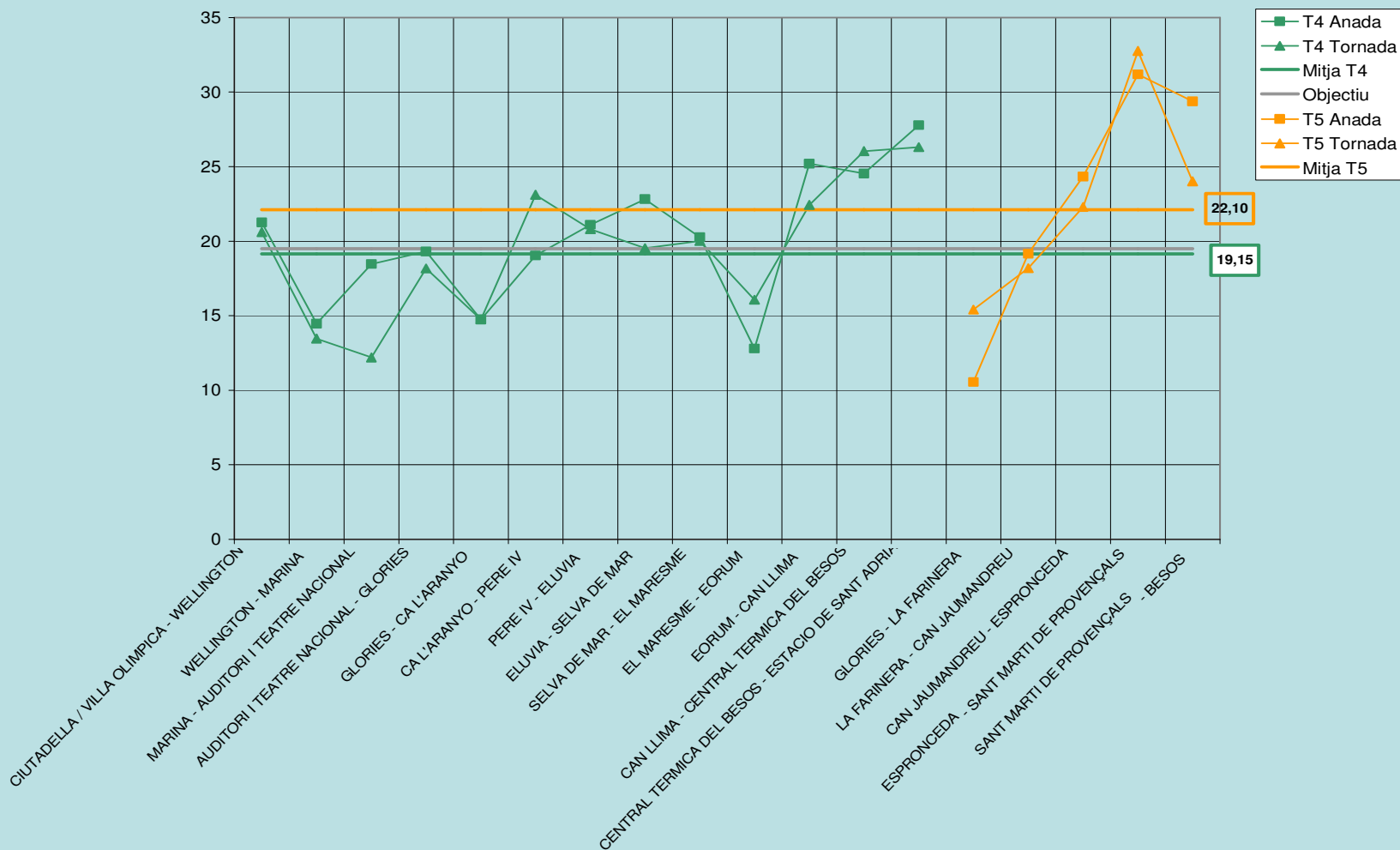




Commercial speed by track segments



TRAMBESÒS





Urban Integration



System General Characteristics



LINE

- Double track (some stretches in single track)
- Minimum line radius: 25 m (20 m in depot). % max: 7,5 %
- Platform length: 70 m (ramps) / Platform height: 28 cm
- Double and single platform stop typology

OPERATION

- 100% Reserved platform
- Traffic signal priority
- “by sight” driving, Automatic Vehicle Location and positioning by beacons

ACCESIBILITY AND PAYMENT SYSTEM

- Integrated fare (within central, 1st, fare zone)
- Accessible to persons with limited mobility, easy access for bicycles, baby trolleys, etc...
- Open ticketing payment system with validators on board



Design approach



- **Tramway platform as a part of the urban environment**
 - **Combination of traffic segregation and urbanistic integration**
 - **Minimization of environmental impact**
- **Minimization of mast number:**
 - **Combination catenary / street lighting**
 - **Road and tramway signaling integration**
- **Stops design:**
 - **Neither intrusive nor dominant**





Urban Integration





Urban Integration





Urban Integration





Urban Integration





Urban Integration





Urban Integration



INTERVENTIONS ONTO A HIGH-DENSE TERRITORY

	<i>DIAGONAL-BAIX LLOBREGAT</i>	<i>SANT MARTÍ-BESÒS</i>
Surface of road's renovation	102.500 m ²	155.000 m ²
Surface or pavement's renovation	162.500 m ²	89.000 m ²
Surface of gardening areas	135.000 m ²	110.000 m ²
Total surface of intervention	400.000 m ²	354.000 m ²
Number of planted trees	2200	207





Vehicles and pedestrians adaptation



Traffic Signals (I)

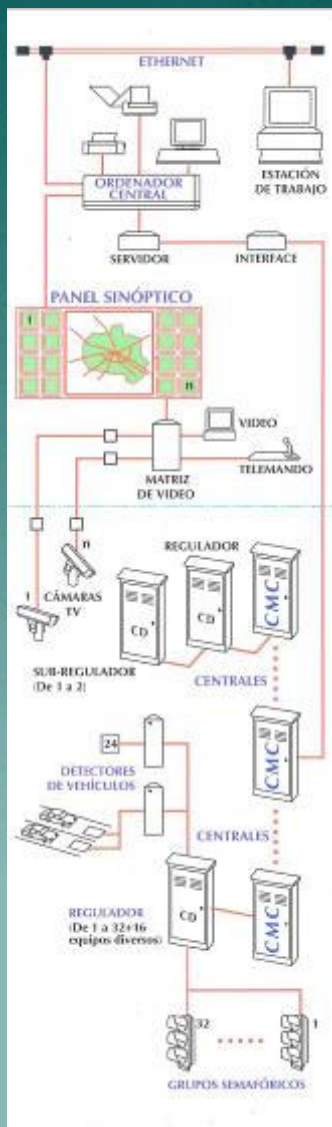


- Number of Intersections: 80
- Number of pedestrian crossings: 118





Traffic Signals (II)



- Traffic's lights regulation must allow the tramway to run without stopping in each intersection.
- Maximum coordination for the two ways.
- All intersections should be redesigned and updated with tramway's introduction.
- Intersections works with portable equipment during the construction period.



Traffic Signals (III)



SEMÀFORS 'INTEL·LIGENTS' PER AL TRAMVIA

Cada intersecció està regulada per una centralita que rep informació dels detectors, prepara les fases semaforiques i comanda els senyals per al tramvia, els cotxes i els vianants

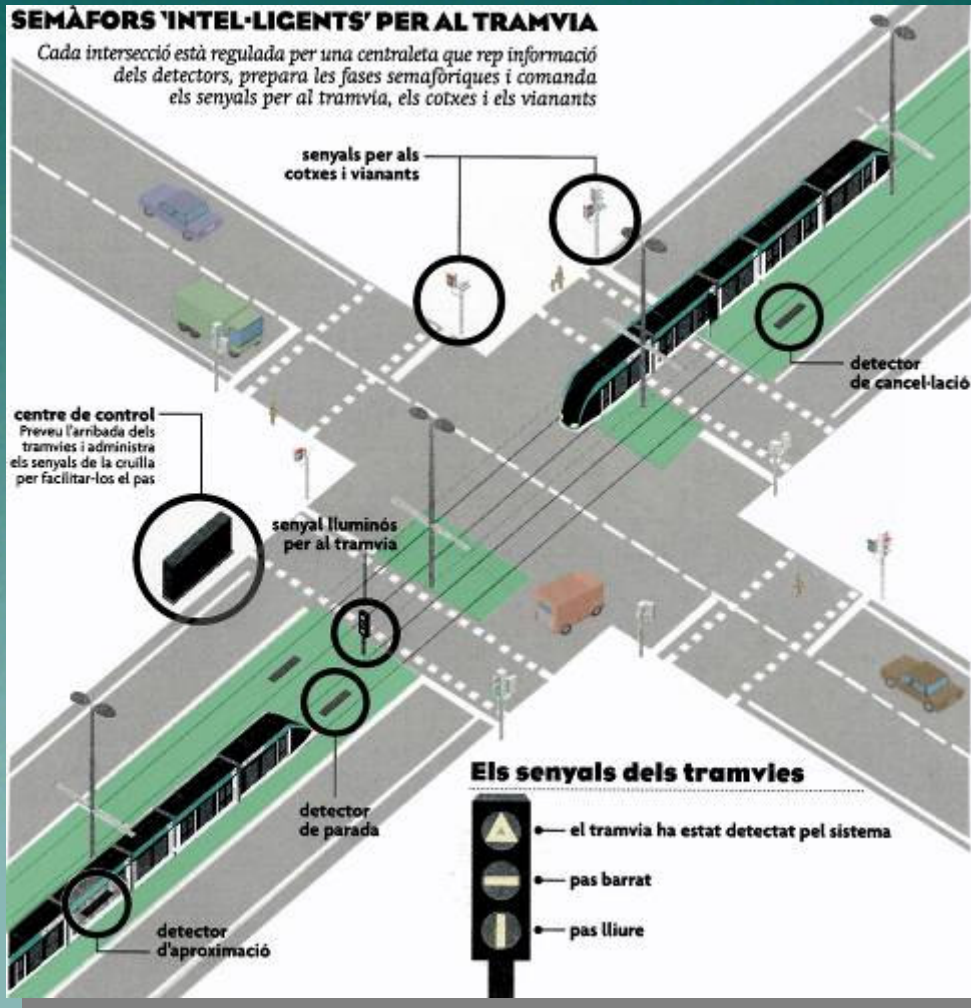


Imagen cedida por Albert G. F. (Avui)



Integration with other vehicles





Turns to left





Roundabouts





Rolling Stock



“CITADIS™ 302” for BARCELONA



TRAM VIA METROPOLITÀ S.A. → 19 tramways

TRAM VIA METROPOLITÀ DEL BESOS, S.A. → 18 tramways

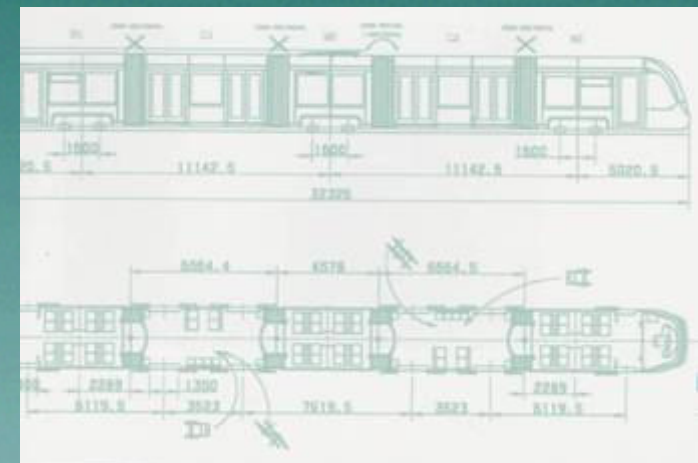




Characteristics (I)



Passengers Capacity (4 pax/m ²)	218
Length	32.517 mm.
Large	2.650 mm.
High (pantograph included)	3.470 mm.
Floor's high	350 mm.
Door's large (single/double)	800 / 1.300 mm.
Wheel Diameter (new/used)	590 / 530 mm.
Empty Weight	40.000 kg.
Load Weight (4 pax/m ²)	56.650 kg.





Floor level accessibility





TRAMVIA METROPOLITÀ S.A.

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