

# **CAPACITY GROWTH AND INFRASTRUCTURE ENHANCEMENT TO FACE INCREASING DEMAND SÃO PAULO METRO**

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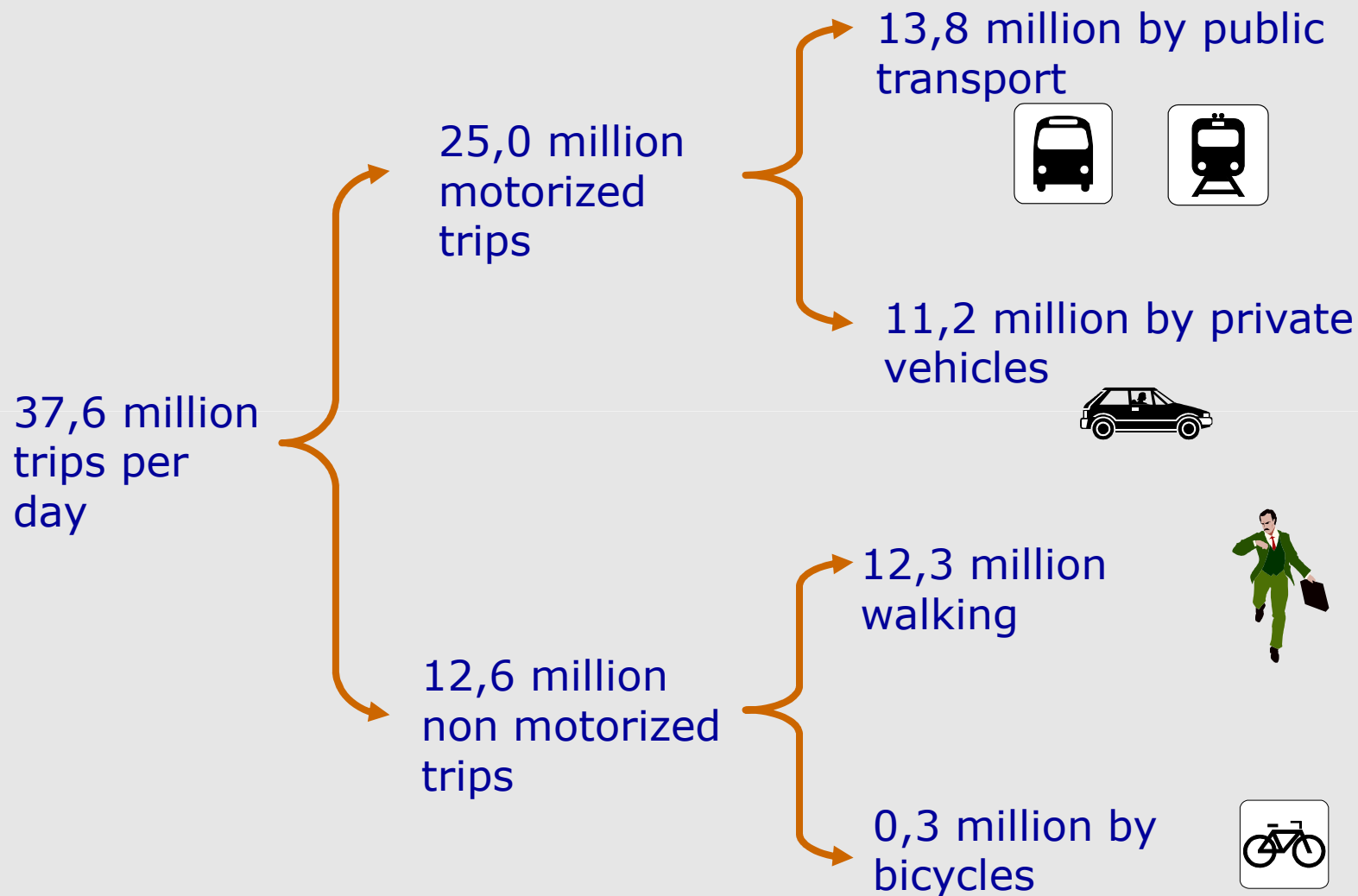
## METROPOLITAN REGION OF SÃO PAULO



- 39 cities
- 8.051 km<sup>2</sup>
- 20,5 million inhabitants
- 1 out of 10 Brazilians live in the RMSP
- 30 new people per hour

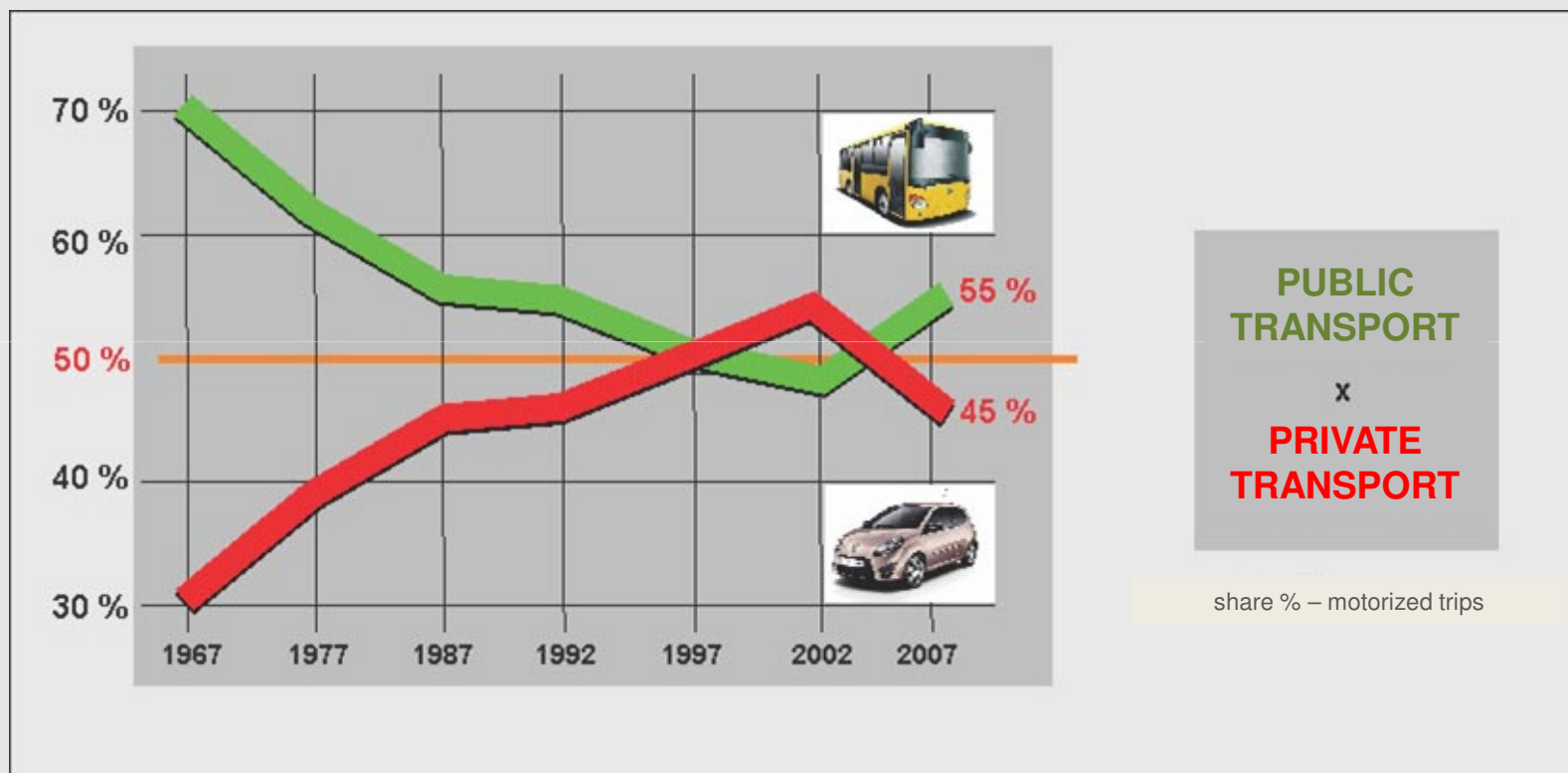


## DAILY TRIPS MODAL SHARE IN RMSP - 2007





## MAIN MODE





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# **METRO RAILWAY NETWORK SÃO PAULO**

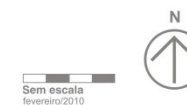


## METRO RAILWAY NETWORK – SÃO PAULO



### Legend

- 1 Line 1 - Blue
- 2 Line 2 - Green
- 3 Line 3 - Red
- 4 Line 4 - Yellow
- 5 Line 5 - Lilac





## METRO NETWORK

- 1,268 million of boarding passengers in 2012
- 4.3 million boarding passenger per working day – 2012 average
- 5 lines
- 74.2 km
- 64 stations





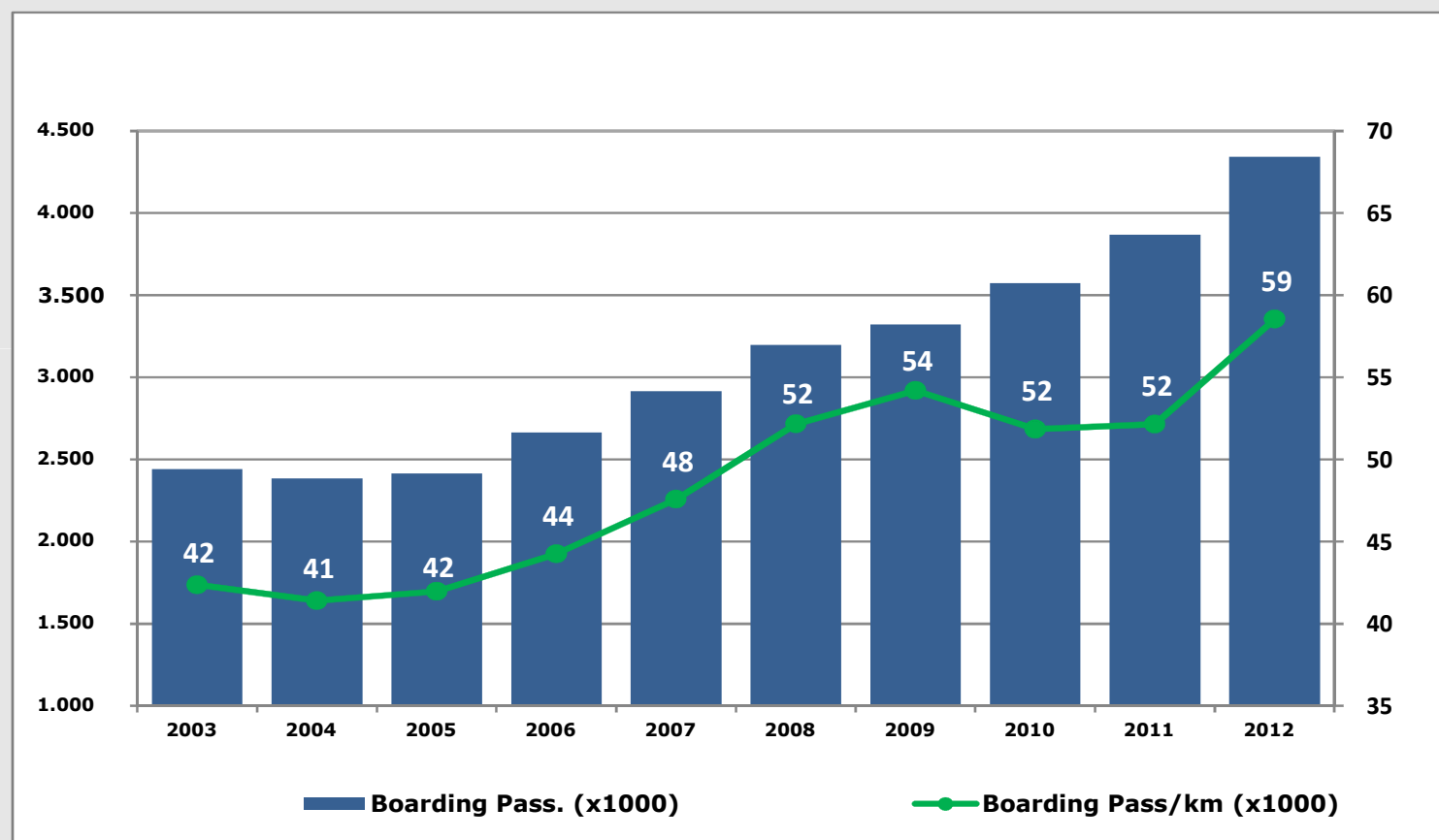
# **OUR MAJOR CHALLENGE**





## DEMAND EVOLUTION x NETWORK EXTENSION

Transported Passengers – Working day average





## **HOW TO FACE THE DEMAND GROWTH**

- **PHASE 1: OPERATIONAL STRATEGIES**
- **PHASE 2: NETWORK MODERNIZATION**
- **PHASE 3: NETWORK EXPANSION**



# OPERATIONAL STRATEGIES



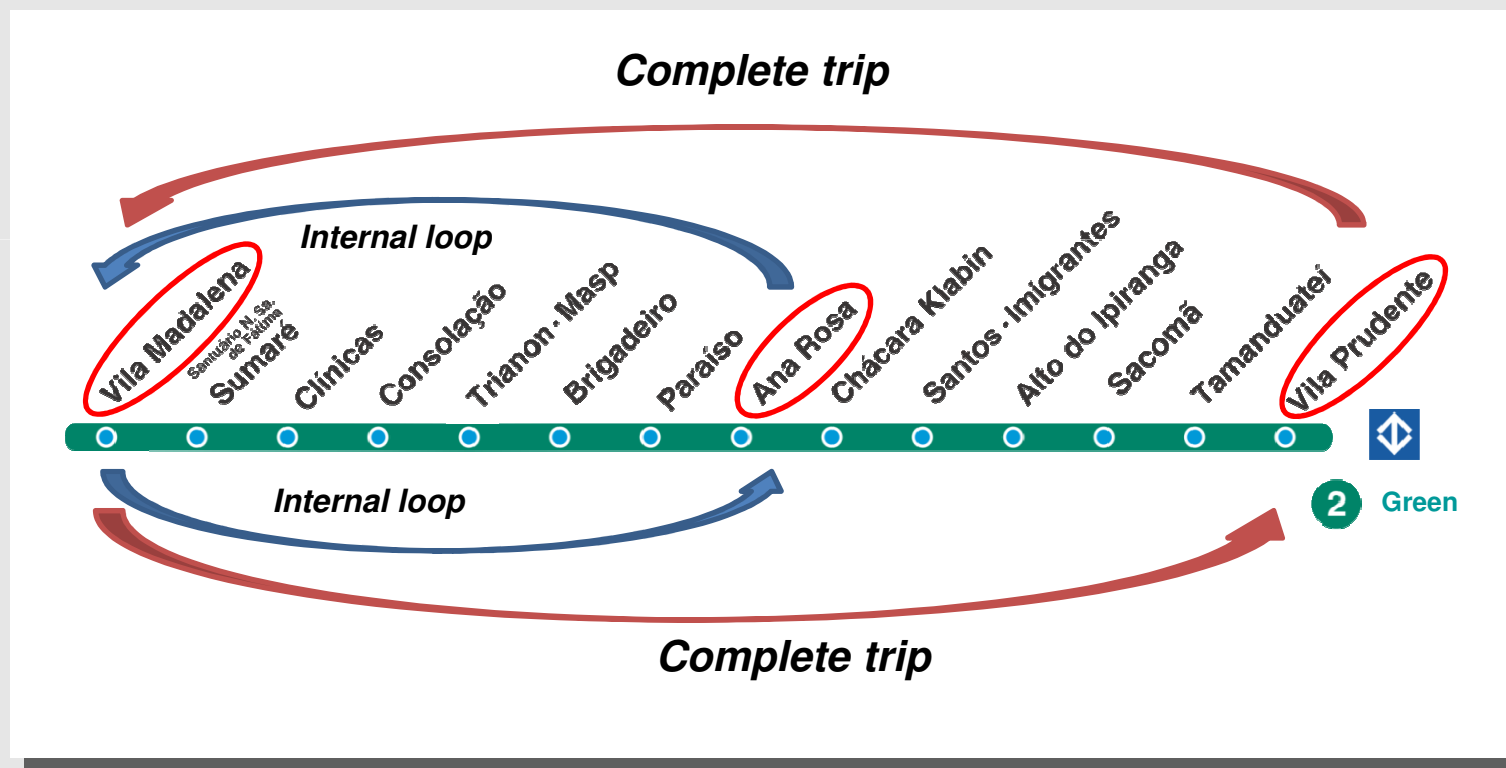
## ENHANCEMENTS - TRACKSIDE AND CONTROL SYSTEMS

- Increase of speed code to values near the track plan allowances
- Line 3 – Red: installation of track equipment to allow closer proximity between trains in Sé station area
- Line 3 – Red: sectioning of a speed restricted stretch on wet (rain) track condition



## INTERNAL LOOPING

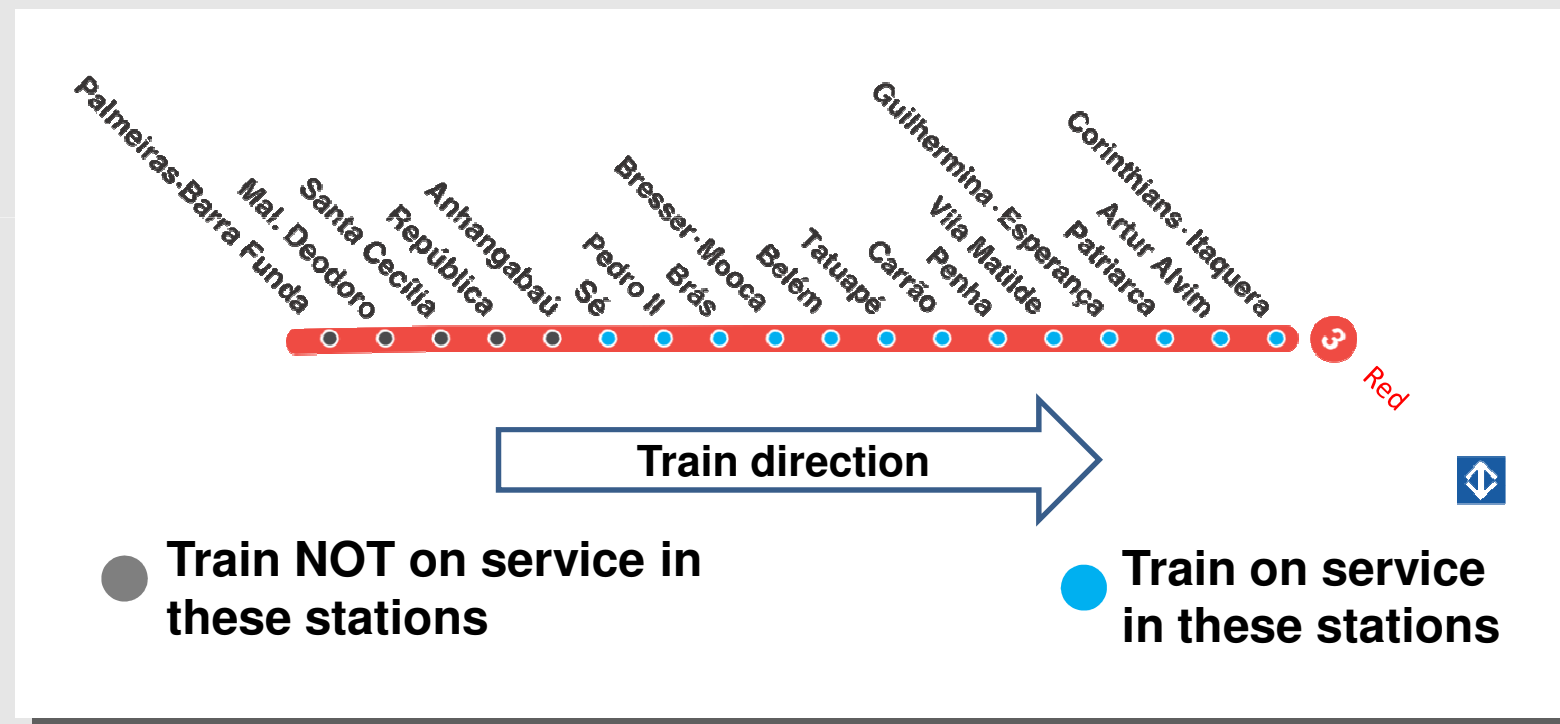
Internal loops to support the most crowded line stretches





## EMPTY TRAINS

Empty trains to increasing capacity at the most crowded stations





## OPERATION PLATFORM

Skilled staff on the station platforms to guide the passengers on boarding and alighting to assure door closure within the scheduled time and thus aiming to avoid delays.





## BOARDING GUIDE ELEMENTS

This device aims the organization of the boarding passengers flow in the most crowded stations.





## PASSENGERS FLOW CONTROL AT THE ACCESS GATES

Control of the entrance flow of passengers through the access gates, mitigating passengers agglomeration on platforms.





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# **NETWORK MODERNIZATION**



## NEW TRAINS ALREADY DELIVERED

- 16 new trains for Line 2 – Green
- 07 new trains for Line 1 – Blue
- 10 new trains for Line 3 – Red
- 14 new trains for Line 4 – Yellow



Train for Line 2 - Green



Train for Line 3 - Red



Train for Line 4 - Yellow



## TRAINS TO BE DELIVERED

- 26 new trains for Line 5 – Lilac
- 54 new trains for Line 15 – Silver (monorail)
- 24 new trains for Line 17 – Gold (monorail)



Monorail



## TRAIN MODERNIZATION

- 51 trains of Line 1 – Blue
- 47 trains of Line 3 – Red

**30 TRAINS  
MODERNIZED  
MARCH 2013**



Modernized train for Line 3 – Red  
(Fleet K)



Modernized train for Line 3 – Red  
(Fleet L)



## MAIN FEATURES OF THE NEW AND MODERNIZED TRAINS

- Air conditioning
- Larger doors (1.60 m) – new trains
- Security cameras
- CBTC and ATP/ATO
- Failure detection system
- New internal layout
- Accessibility
- Fire detection system



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## MODERNIZATION OF THE EXISTING NETWORK

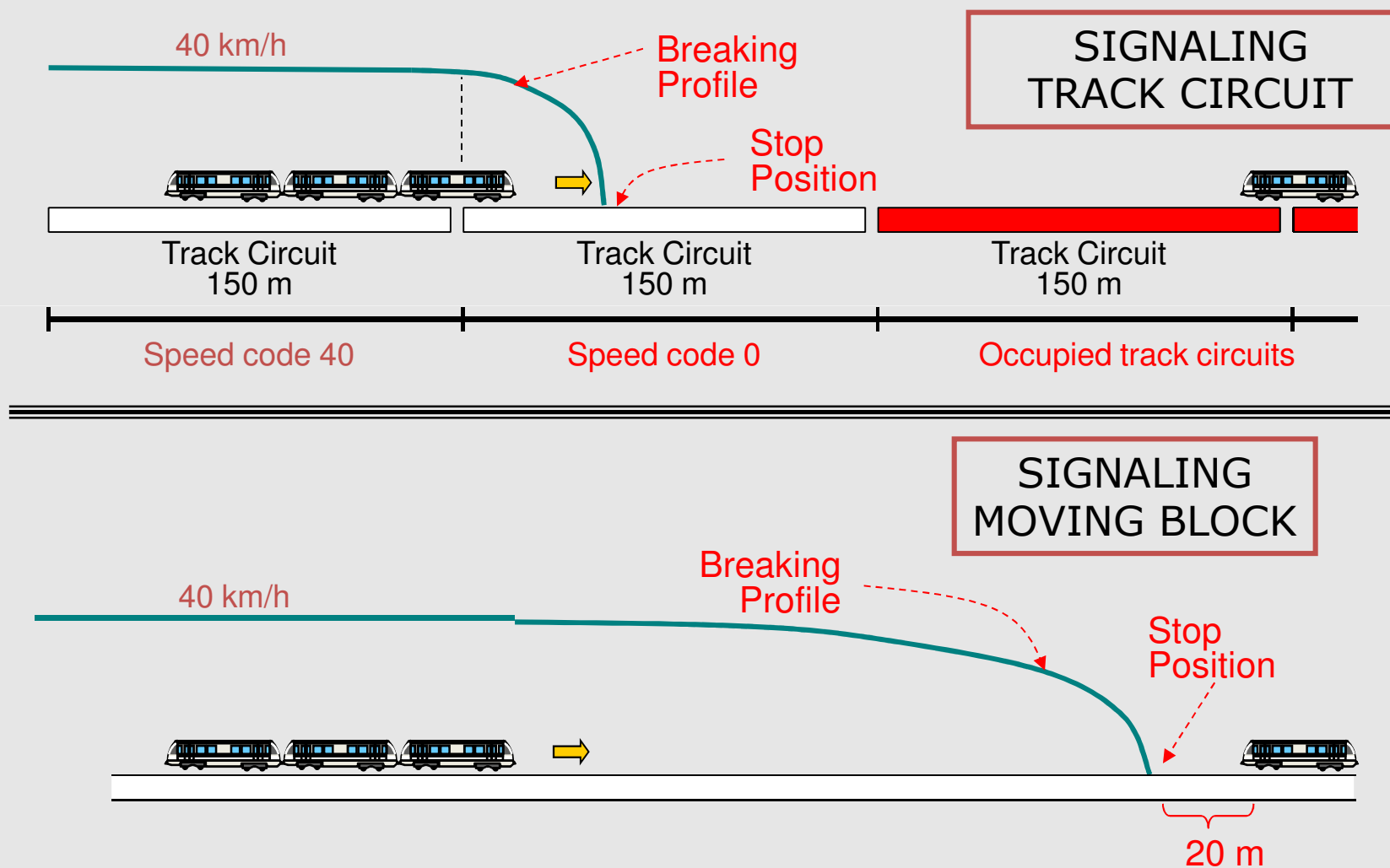


INTERNAL LAYOUT OF NEW TRAIN – LINE 2 GREEN



## MODERNIZATION OF THE EXISTING NETWORK

### CBTC - COMMUNICATION BASED TRAIN CONTROL





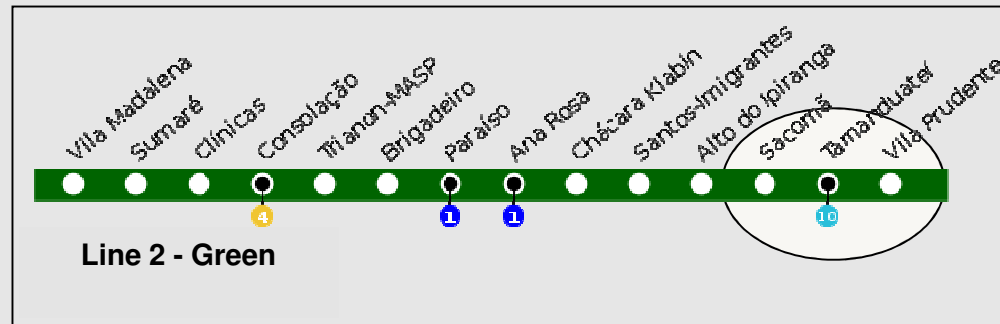
## CBTC - COMMUNICATION BASED TRAIN CONTROL

- New technology installed on board of trains and on the track level
- Radio frequency communication
- It is expected to reducing headway and thus increasing capacity
- Duplicated real time communications



## CBTC - COMMUNICATION BASED TRAIN CONTROL

- Operational in part of Line 2 - Green



- Operational in Line 4 - Yellow



- Commissioning Line 2 - Green
- Installation on Lines 1 - Blue and 3 - Red



## TELECOMMUNICATIONS – METRO

### Multimedia

- Public address, fixed panels, multimedia displays for time, operational and institutional information
- Ready for commercial announcements
- Audio: voice and music
- Video: text, time and graphic images
- Multimedia: audio e video
- Live voice and pre-recorded messages





## SECURITY OCC MONITORING SYSTEM

- Video monitoring at OCC, station control rooms and Security Center
- Video cameras in all elevators
- Special video cameras for night vision and for vision through smoke to be installed in the tunnels emergency exits
- Coverage of all operational areas, depots, stations and permanent way sites for attending the operational and property security needs





# **NETWORK EXPANSION**



## FUTURE METRO NETWORK



**EVOLUTION OF THE METRO NETWORK 2012 - 2015**

Parameter	Unit	2012	2015
Total Extension	km	74,3	134,6
- Conventional Metro	km	74,3	89,5
- Light Rail	km	-	45,1
Number of stations*	Unit	62	123
Connection points	Unit	5	21
Fleet	Trains	164	296
Demand per working day	Million pass./day	4,4	7,0
Social benefits	R\$ Billion/year	6,4	13,3

\* The interchange stations are counted just once, except for Consolação, Paulista e Higienópolis-Mackenzie stations



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