

# Operation Planning



for  
**BUGSAS Ankara Metro**

**Wolfgang Sievers, LRTC GmbH**  
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# ***Scope of Work***

Status Quo / Current Situation / Demand

System / Design Capacity

Corridors / Routes / Lines / Track Scheme

Vehicles / Capacity

Headway / Time Table / Fleet Size / Cycle Plans

Operation Procedures / Organization / Staff

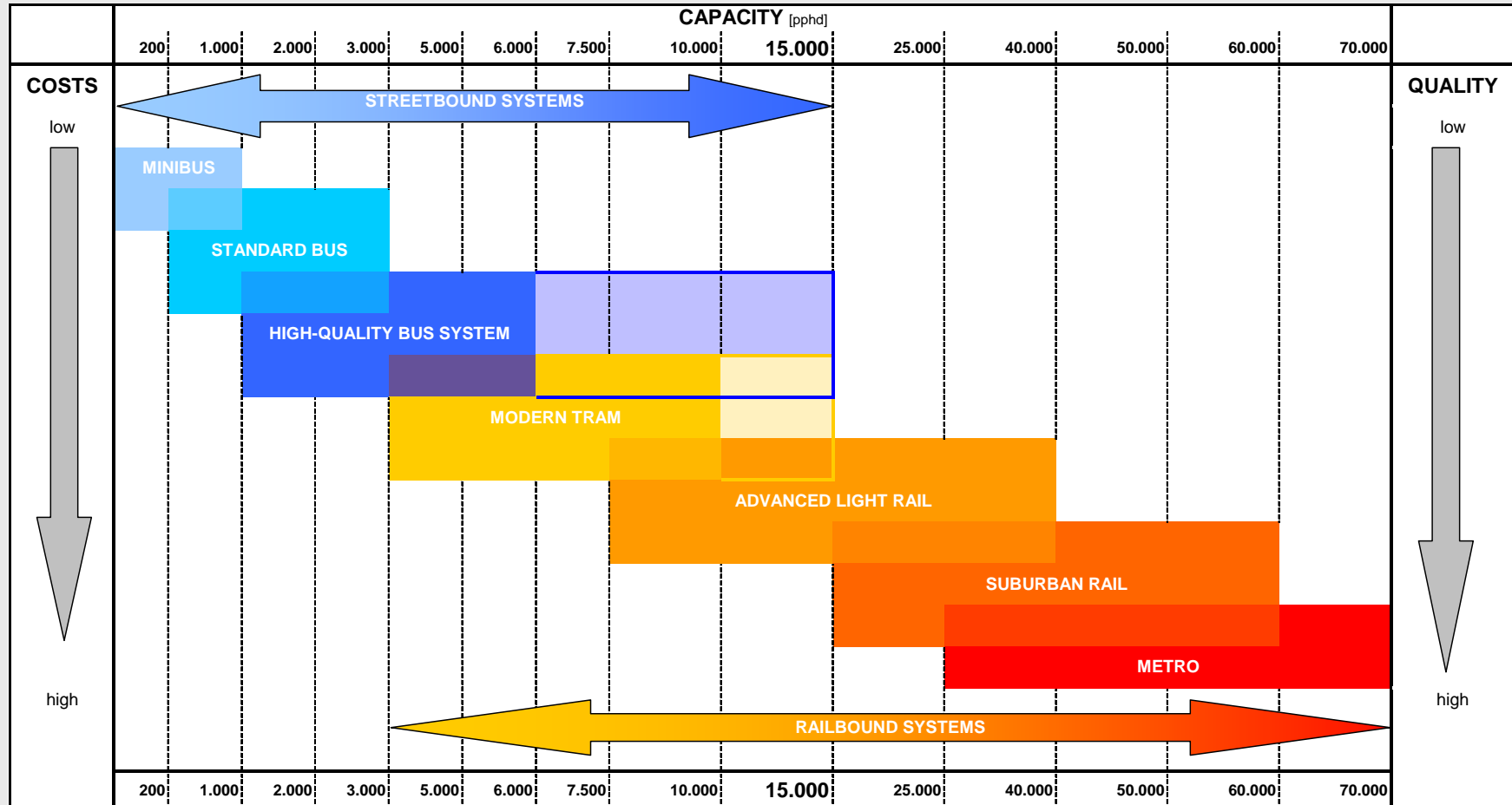
A black and white photograph of a train at a station platform, with people waiting and the train's headlights on.

# ***Status Quo / Current Situation / Demand***

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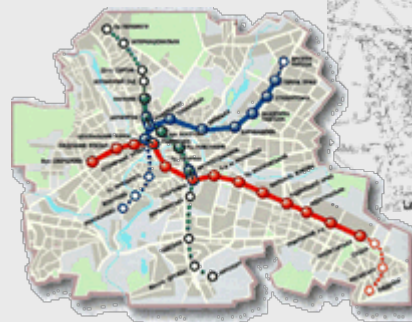
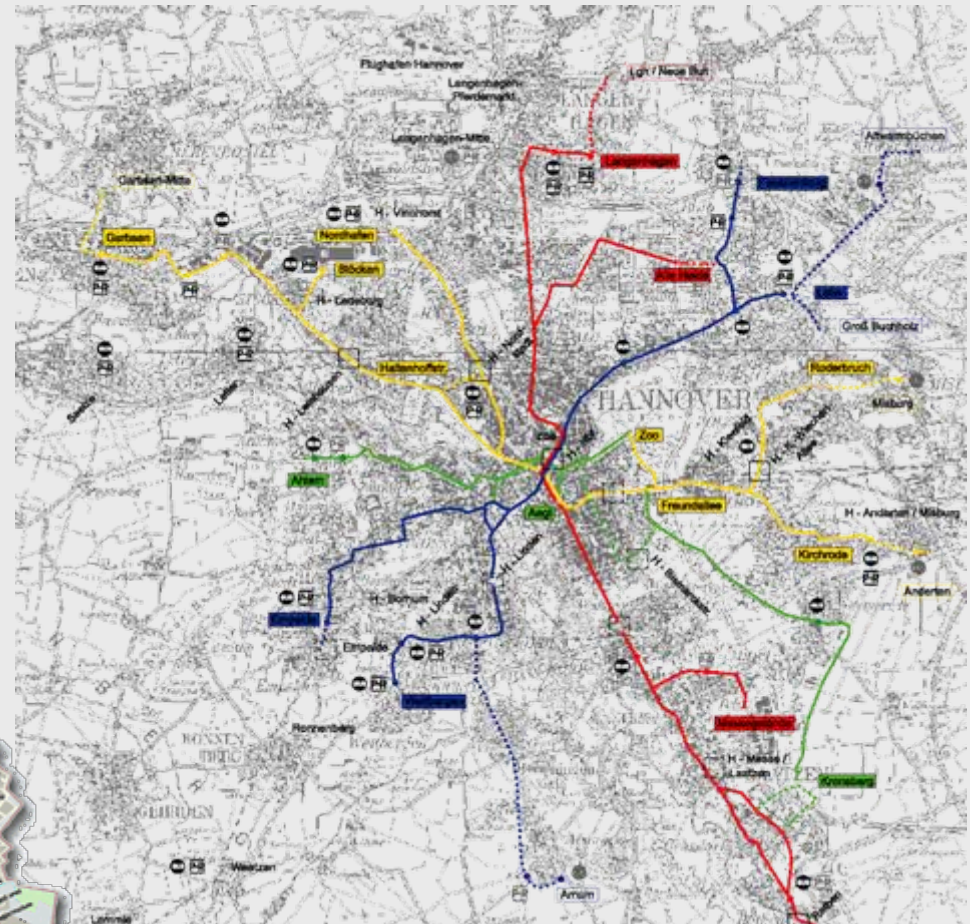
- Existing Transport Modes
- Prognosis / Planning of Urban Development
- Climatic / Topographic Situation
- Political / Social Aspects
- Existing Demand Analysis / Prognosis
- Existing Passenger Flows / Points of Interest
- Survey

# System / Design Capacity

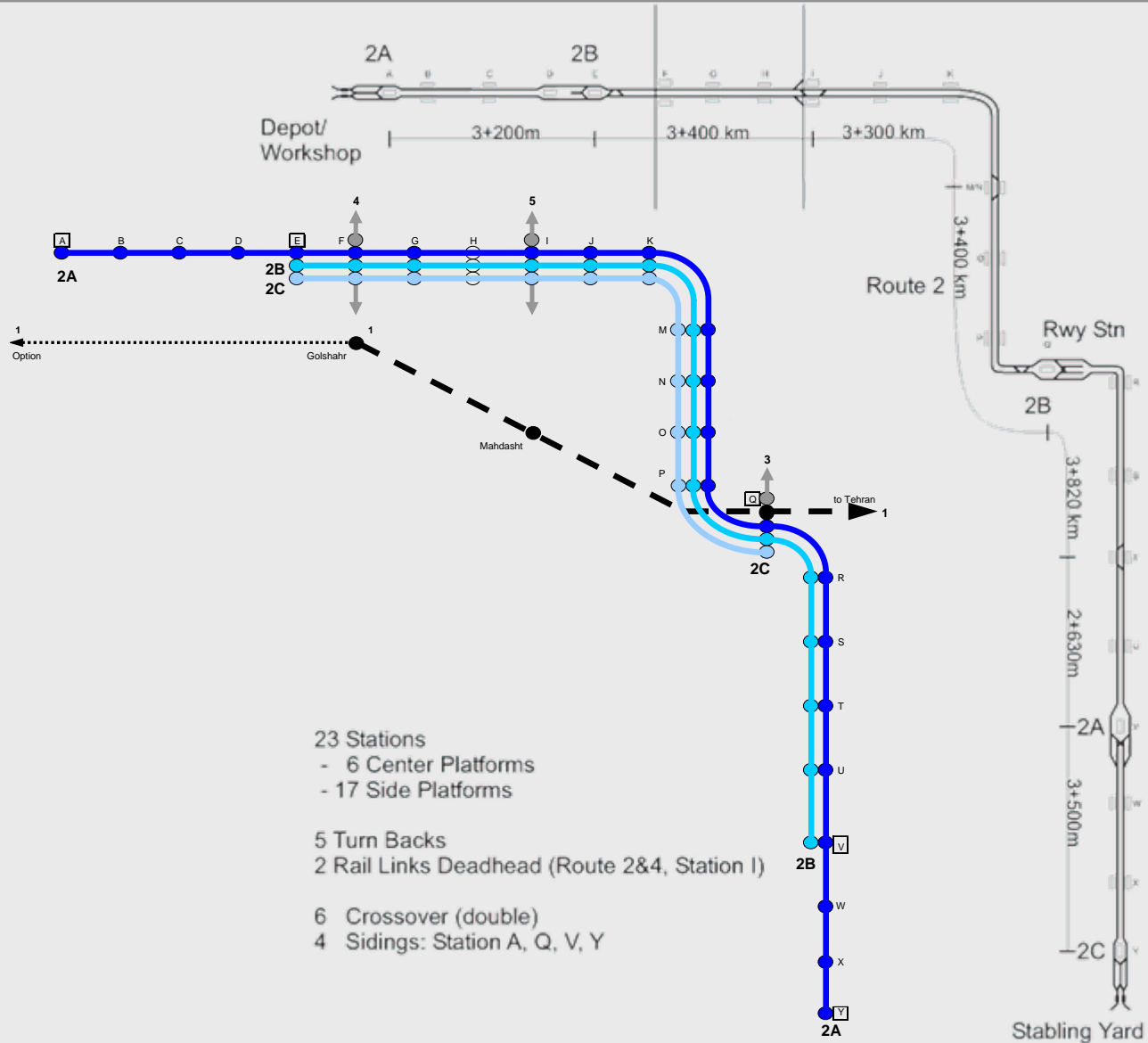


# Corridors / Routes / Lines / Track Scheme

- Connect all major traffic generators
- Connect all major transfer centers
- Follow the main lines of demand



# Corridors / Routes / Lines / Track Scheme



# Vehicles / Capacity

45-m uncoupled  
(e.g. Dresden/Leipzig)



60-m uncoupled  
(e.g. Budapest)



2x 30-m coupled  
(e.g. Cologne)



30+37m coupled  
(e.g. Karlsruhe)



2x 37m coupled  
(e.g. Saarbrücken)



30+30m back-to-back  
(e.g. Düsseldorf)



3x 25m coupled  
(e.g. Hanover)



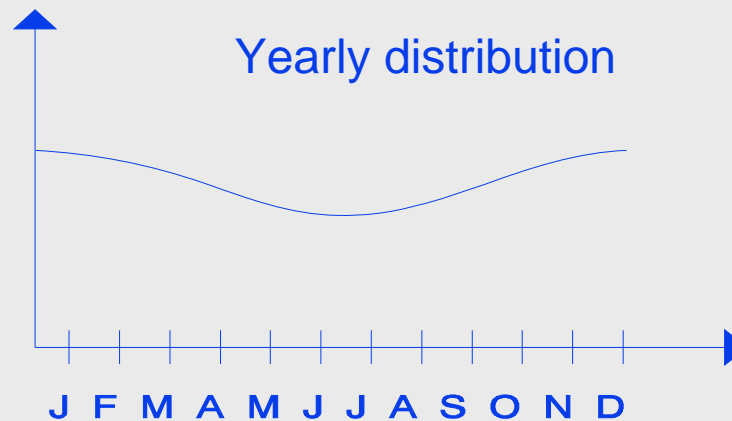
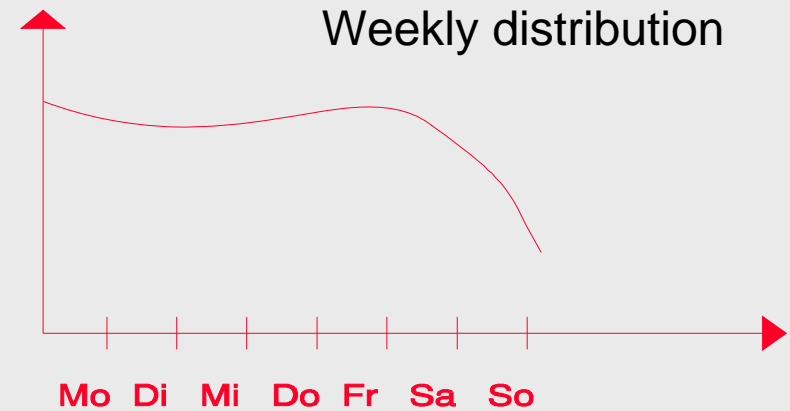
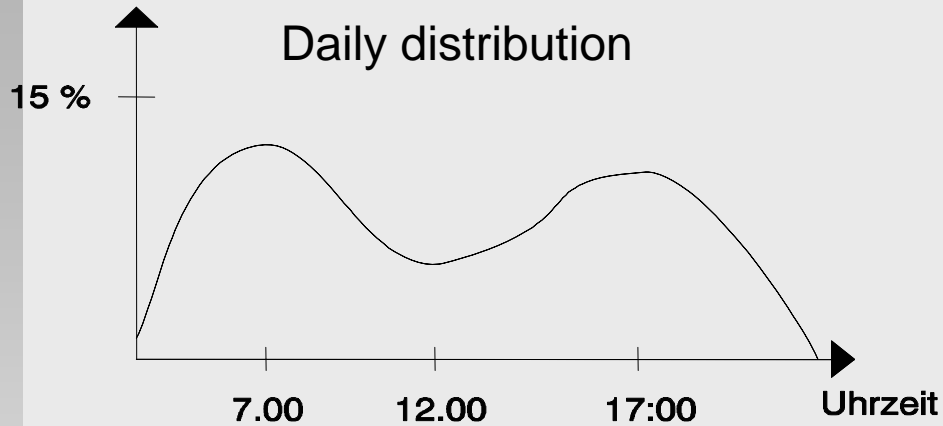


# *Planning of Timetables*

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- Attractive service offer
  - High service frequency
  - Easy to remember headways
  - Good timing of trips
  - Economic use of resources
- = Adaptation of offer to demand
- locally (intermediate termini)
  - timewise by different headways, different time-tables (eg. Summer and winter)

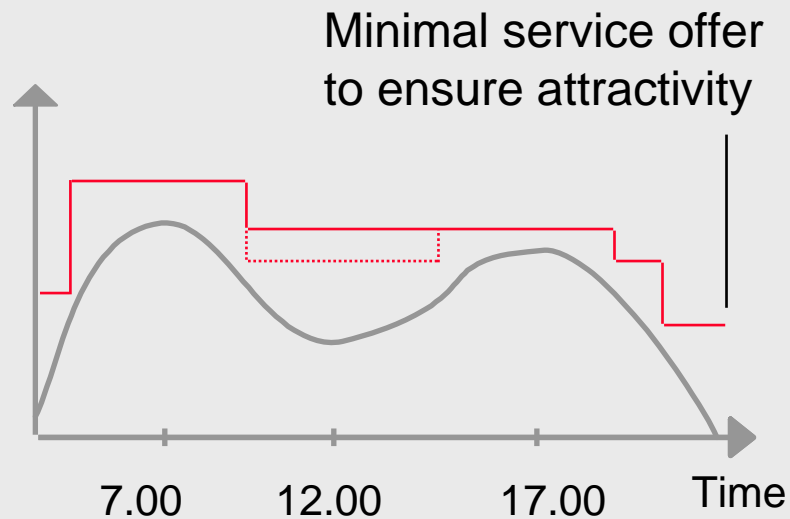
# Distribution of Demand according to Time



# Planning of Timetables - Dimensioning

## Adaptation of time-table by

- Different headways
- Additional vehicles
- Additional lines



# ***Basic Operational Regulations***

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- Distance between trains
- Driving on sight or on signal
- Driving on double track sections
- Driving on single track sections
- Operation at stations
- Establishment of rule book for drivers

A black and white photograph of a train station platform with tracks and a train in the background, located at the top left of the slide.

# ***Distance between Trains***

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- Distance so that even under unfavourable circumstances a following train can be stopped in time
- Guarantee of adequate distance by driver (driving on sight) or signalling system (ATP)

A black and white photograph of a light rail train in motion, with its headlights on, traveling along a track. The background shows a station platform with some structural elements.

# ***Driving Modes***

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- On sight
- On signal
- Automatic operation

# *Driving on Signal*

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- Independent railways (metros, heavy railways)
- LRT, tramway
  - Speed > 70 km/h
  - In tunnels

A black and white photograph of a railway track with a train in the distance, located in the top left corner.

## ***Driving on Sight***

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- Responsibility of driver
- Keeping distance
- Taking part in street traffic
- In tunnels braking distance can be seen by driver
- Shunting movements
- Disturbances



A black and white photograph of a railway track with a train in the distance, located in the top left corner of the slide.

# ***Driving on Sight***

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## ■ Signals

- Signals for driving on sight
- Dispatching indicators
- Vehicle indicators
- Speed restrictions
- Protection signs
- Shunting signs
- Switching signs
- Other signs and indicators

# *Automatic Operation*

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## ■ Preconditions

- Exclusive right of way
- Detection system in stations or station platform doors

## ■ Effects and advantages

- Fast and direct adaptation to passenger patronage

## ■ Costs

- Higher costs for technical systems
- Lower costs for staff (depending on concept)

## ■ Examples

- Paris (Meteor), Lille (Val), Lyon, Nuremberg

# *Regulation of Driving*

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- Operation on double track section
  - Driving on right hand side
- Operation on single track sections
  - Regulation by dependently controlled street signals (driving on sight)
  - ATP system (driving on signal)

A black and white photograph of a train at a station platform, showing the train's front and the platform structure.

# ***Common Operation Rules***

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- Departure when doors closed
- Opening of doors only in stations
- Acceleration and braking without endangering of passengers
- Announcement of stations
- Information about disturbances
- Use of communication systems only for operational purposes
- Documentation of use of vehicles and trains

A black and white photograph showing a train platform with a train arriving. People are visible on the platform, and the train's headlights are on.

# ***Operation and Service at Stations***

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- Operation by special personal
- Operation by driver

# *Operation at Construction Sites*

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- Signals
- Information of drivers
- Information of construction companies
- Regulations
  - Driving carefully
  - Warning of workers
  - Keeping distance to vehicles in construction sites

A black and white photograph of a light rail train in motion, with its headlights on, traveling along a track. The background shows a station platform with some structural elements.

# ***Book of Rules for Drivers***

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- Common rules
- Handling of the vehicle
- Vehicle operation
- Scheduled services
- Passenger service
- Disturbances and accidents
- Special regulations

**THANK YOU FOR YOUR ATTENTION**

**Questions?**

**Wolfgang Sievers, LRTC GmbH**  
Düsseldorf, 28th October 2008