



MUNICH TRANSPORT NETWORK, GERMANY

Munich is the capital of Bavaria and is the third largest city in Germany. The city is home to 1.3 million people and has one of the most comprehensive metro and suburban train networks in Germany. The Munich metropolitan area has a population of 2.9 million people. Population densities vary from 16,000 inhabitants per km² in the centre to 2,000 per km² on the outskirts. Car ownership levels are 530 cars per 1,000 inhabitants. There has been a shift of population toward the metropolitan areas since 1972, which meant greater commuter traffic. However, between 1997 and 2001 due to positive public transport initiatives the trend was being reversed and the number of public transport trips increased from 533 million per year to 561 million per year. Munich city now has an urban development strategy called the Munich Perspective, which has two objectives:

- Improved mobility, to increase the attractiveness of the city to business
- Reduction of land and energy use, and reduction of emissions

The perspective of the city of Munich is towards expanding the U-bahn, and S-bahn networks, relieving traffic congestion hotspots in the city by road widening schemes, increasing park and ride schemes, increasing the cycle path network and tighter traffic management and parking controls. In addition, a new Maglev project has been proposed in Munich to run as a fast link from Munich Central Station to the airport.

U-BAHN AND S-BAHN NETWORKS IN MUNICH

The metro (underground) was built for the 1972 Munich Olympics. The underground train service is called the U-Bahn and is operated by Muncher Verkehrsgesellschaft (MVG). The lines (U1 to U8) serve only the central areas of the city. Services run every five minutes in the rush hour and then every ten minutes during the rest of the day.

The Suburban train service, or S-Bahn, is operated by Deutsche Bahn (DB). The services of the S-Bahn run to the more outlying areas of the city including Flughafen airport (S1 and S8). The services S1, S2 and S4 to S8 run through a central tunnel in the middle of Munich, running from Ostbahnhof to Hauptbahnhof. The tunnel area is a single stretch of track running through the city, which can form a bottle-neck at certain peak travel times during the day. At either end of the tunnel services branch off to cover the S-Bahn network.

The city of Munich also has a well developed bus and tram network run by MVG. The Munich Transport and Tariff Association (MVG) is a transport association that has centralised the ticket and pricing system in Munich. The ticket system is integrated with only one type of ticket required for all of the services in the city, although the price paid is based on a zoning system.

U-BAHN UPGRADES AND EXTENSIONS

Although the Munich U-Bahn network is highly successful and well integrated the MVG still needs to inject capital for maintenance and capital projects leading to extension of the network. The first of these is the U1 line where construction work has been going on since 1999 for an extension to Olympia Einkaufszentrum (OEZ); there will be two stations and the section will be 1.3km long. The project should be finished by autumn 2004; the first section to Georg-Brauchle-Ring station has already been finished and was opened in October 2003. The OEZ will eventually form an important transfer station to the U3 line. This section is also under construction from



A map of Munich's S-Bahn and U-Bahn networks.



Old style U-Bahn train.



Maglev train.



Maglev train.



Map of intended route for Maglev.

Olympiazentrum station to OEZ and the section should be finished by 2007.

There are further plans for an extension from OEZ to Moosach S-Bahn-station; an estimated time for the completion of this section is 2010. An extension to the U6 line is being constructed from Garching Hochbrück station to Forschungsgelände. The work on this project began in May 2001 and completion is expected for 2006.

FURTHER U-BAHN EXTENSIONS

There are other extensions planned or still in the design and consultation stage. These include the extension of the U4 line toward the east to link up with the S-Bahn station at Engelschalking (S8). The line is expected to be 1.9km long but plans may be changed and the line might be established as an extension to the tram network.

There are also plans to extend the U5 toward the west by 3.6km to interchange with Pasing station on the S4 line. The U6 line may also undergo a 1.3km extension from Klinikum Großhadern to Martinsried. The new extensions to the U-Bahn network in Munich will mean that the network will become 110km long. It seems that there is a policy towards more connectivity and integration between the U-Bahn and S-Bahn networks.

NEW METRO TRAINSETS FOR MUNICH U-BAHN

The MVG placed an order in 2003 with a consortium comprised of Bombardier Transportation and Siemens Transportation systems for eight six-car metro trainsets. These are of a new type C design, which is already running on the Munich metro. The new order is expected to be filled by 2005 to 2006. The type C design was ordered in 1997, when ten trainsets were ordered from the same company. The last of the 1997 upgrade were delivered in July 2003 and are now in service on the U-Bahn in Munich.

S-BAHN TUNNEL CONSTRUCTION

The existing S-Bahn tunnel between Ostbahnhof and Hauptbahnhof is a weak point in the S-Bahn system; to cross the city all the trains have to pass through it. Tunnel maintenance frequently causes disruption. A second tunnel has recently been proposed for construction parallel to the old tunnel. The new tunnel will be started in 2005 and will enter service in 2008. It is estimated that the 8km tunnel will cost €600 million to construct.

TRAFFIC CONTROL AND PARK AND RIDE

The greater volume of traffic through the city of Munich in the mid-1990s led to a traffic control system being set up. This was the Munich COMFORT (Cooperative Transport Management Munich project) scheme. Under this scheme tighter traffic control was introduced and park and ride schemes were adopted to try and reduce the flow of traffic into the Bavarian capital.

TECHNOLOGY IN PARK AND RIDE

A success story is the Park and Ride centre, which was opened in Fröttmaning in 1994. It is located directly next to the A9 Nuremberg - Munich motorway. It has dedicated motorway access and can accept 1,270 cars and 80 coaches. The U-Bahn leaves for the city centre every 5 to 10 minutes and the trip to Marienplatz takes 15 minutes.

In a development of the Munich COMFORT scheme in 2002 three freely



A view of the Maglev guideway running alongside an Autobahn.

EXPAND IMAGE

An S-Bahn train.

EXPAND IMAGE



A U-Bahn ticket.

programmable matrix displays were installed on the A9 motorway to display park and ride information. These indicate the number of free parking spaces for cars and buses and provide additional information such as public transport departure times and congestion further along the motorway and in the city. At the Park and Ride motorists are guided to the nearest free parking space by a dynamic control system. The information is provided by scanning laser detectors at the entrance and exit barriers and ultrasound detectors fitted to each of the parking spaces.

PROPOSED MUNICH MAGLEV AIRPORT LINK

A new Maglev project has been proposed in Munich to run as a fast link from Munich Central Station to the airport. The Maglev is a system in which the train runs levitated from the tracks by using electromagnetic forces between super-conducting magnets on board of the vehicle and coils on the ground. Between Hackerbrücke and Olympiapark the train will run in a tunnel area and then on an elevated guideway. It will run parallel to the Autobahn A92 and then pass through a short length of tunnel into the airport.

A trip between the airport and city centre will take only 10 minutes over the 37km route. The project is due to start in 2009 if more funding is approved.

There has been a move to just introduce an Express-S-Bahn instead of the Maglev, however without major track upgrade the high speed trains will not be able to run at their full capacity. The trains will have wide bodies to allow good access (3.70m wide). The trains will have quiet running without wheel noise even at 250mph. Munich airport opened its second terminal in June 2003. The premier of Bavaria, Edmund Stoiber, has confirmed that the new Maglev Metrorapid project will go ahead because the rapidly expanding airport needs a new fast link to the city. A similar Maglev-type line constructed by a German company was recently inaugurated in Shanghai and will come into service in 2004.

