



The new station Łódź Fabryczna: west entrance

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Multifunctional hub Łódź Fabryczna

The new history of a new Łódź railway station, its functions and surroundings has few milestones – in 2007 (concept), the feasibility study (2011) and the technical documentation (2013), then implementation stages (2012-2016). Designed using the best foreign experience in the field of multimodal railway hubs. Its multifunctionality facilitates interchanges between different means of transport, contributing to the time reduction in the door-to-door journey. At the same time, the building an underground station enabled freeing a significant space for urban functions which was up till now an example of a dezurbanized part of the city center. As a result it allowed new urban investments and the creation of the New Center of Łódź. This article presents design concepts and functional solutions of the multimodal central station in Łódź.

Key words: multifunctional hub, Łódź Agglomerative Railways, innovative communications solutions.

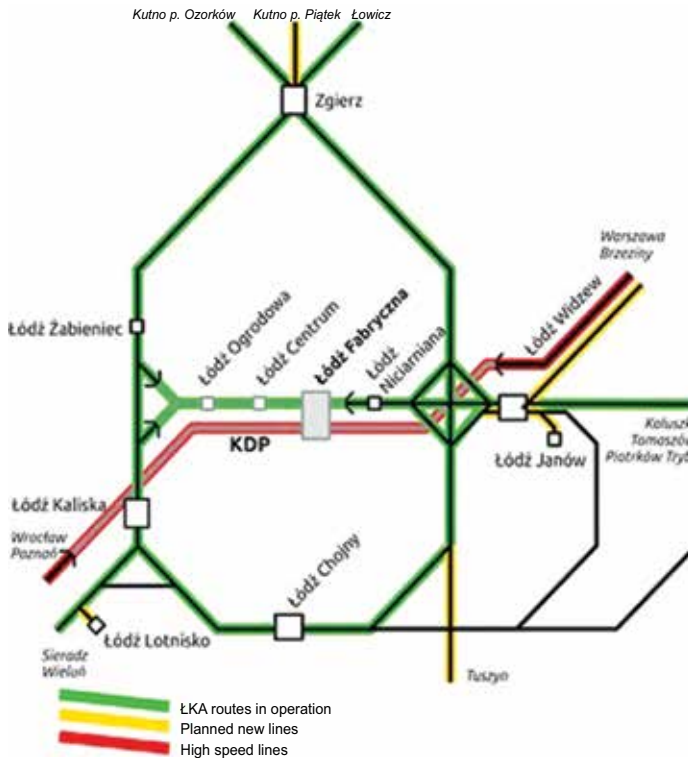
A new traffic junction integrating all public and individual services into one integrated system was put into operation in December 2016. The project is a crucial transport investment in the Łódź Province which includes the following undertakings:

- ◆ new underground railway station
- ◆ new regional and long-distance bus station
- ◆ system of tram and bus stops of public transport
- ◆ parking lots for passenger cars
- ◆ parking lots for taxis and cars for „Kiss&..
- ◆ system of an access roads to the station

Łódź Agglomerative Railways System which ultimately will be successively taking over functions of the transport frame for the region and the Łódź agglomeration is the undertaking combining the integrity.



The new station Łódź Fabryczna: east entrance



Lodz node

In the a multimodal hub project a number of innovative communications solutions was applied, in it:

- ◆ high level of integration of different means of transport by maximum shortening passages between them,
- ◆ full adaptation of the system for needs of the needs of persons with reduced mobility,
- ◆ functional and transparent passenger information systems in the real time.

Design concept

The new Łódź station and its functions and surrounding, starting from the vision phase (2007), feasibility studies (2011) and

the technical documentation (2013) throughout implementation (2012-2016) were designed using best foreign experiences in the scope of multimodal rail hubs. Its multifunctionality enables the convenient system of changes to different means of transport contributing to shorten the time in the „door-door” travel chain. Simultaneously the station’s reconstruction with its extended underground infrastructure enables to release significant railway areas which so far have exemplified non-urbanised zones in the city centre, letting for new municipal investments, for forming the New Centre of Łódź.

Functional arrangement of the Łódź Fabryczna station

In order to get the full technical-functional integration of the new station at the stage of its designing and commissioning its realization both the train and municipal parts were drawn up. The total investment included building the underground part of the Łódź Fabryczna station intended to accommodate train arrivals and departures and passenger service along with the reconstruction of the road arrangement and infrastructure around multimodal Łódź Fabryczna station, with the purpose of construction of the integrated transfer knot above and under the current Węglowa street.

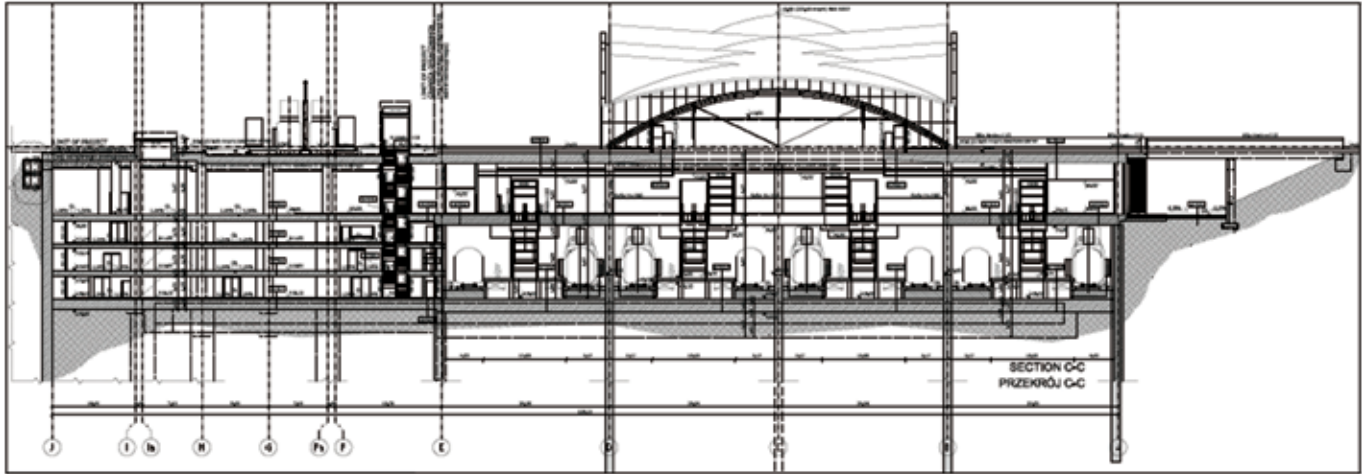
The station has three functional levels:

- ◆ **Level 0 (street level):**
 - the station main covered passage,
 - two front entries: eastern and western,
 - side entries from the north and south side,
 - 8 bus stops,
 - tram station with 4 platforms.
- ◆ **Level -1, (8 meters under the ground):**
 - railway station with the waiting room,
 - 18 ticket offices,
 - commercial objects and Central management of the station and railway station,
 - multi-station bus stops,
 - service and technical rooms,
- ◆ **Level -2, (16,5 meters under the ground):**
 - four railway station platforms,
 - 8 pairs of railway track lines,

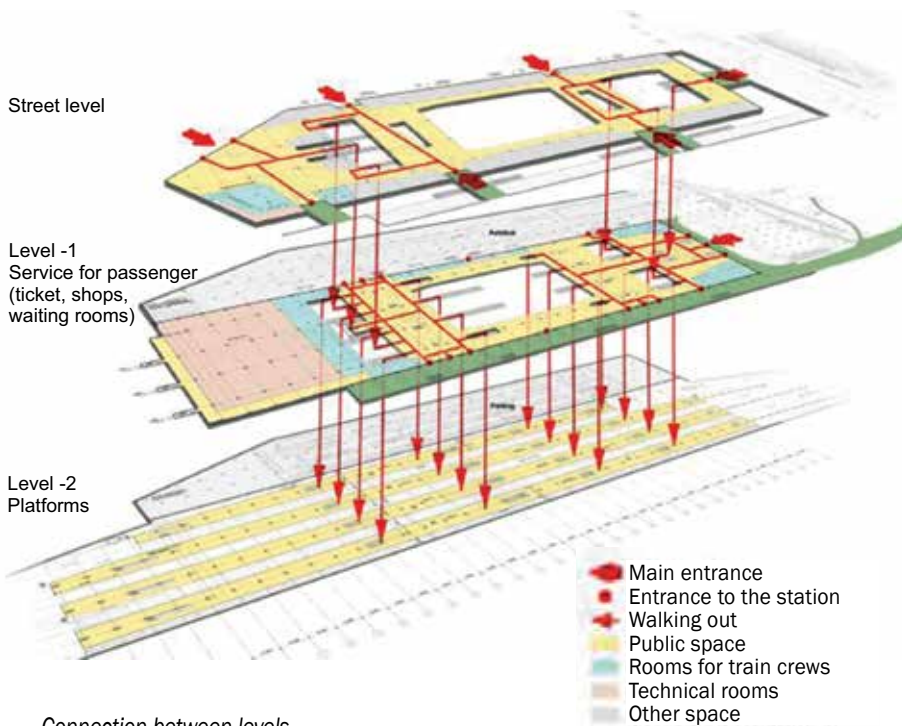


Platforms, Level -2





Cross sections of the designed Łódź Fabryczna station
Source: PKP PLK SA



Connection between levels

In the entire station area passengers receive legible information which is provided by integrated systems of vocal and visual communication. 56 electronic highlighted boards (24 on platforms additionally equipped with clocks), 14 LCD displays and megaphones enabling efficiently reach travelers with announcements and information about arrivals and departures. Special SOS pillars arranged on each of three levels allow for fast call guard service in dangers and critical situations.

The station is bright and integrated. Thanks to the innovative architectural form of the object the sunlight, through ten thousand glass roof panels, reaches the level -2, (16.5 m below the ground) illuminating platforms. Additionally nine thousand energy-efficient lamps of the LED type lighten the interior space, and outside visibility and comfort is ensured by five hundred of such illumination sources.

On the level -2 four 400 m long central platforms were designed. Width of platforms -12 m allows for the free move of pas-

sengers even when the same platform would have to operate two trains simultaneously. Entrances to platforms were designed through the system of the escalator, lifts and stairs from the level -8 m (main station level). The possible evacuation of passengers from the station is provided by a system of staircases placed every 50 m on the platforms level and every 200 m in the approach tunnel to the station from the eastern side. Multifunctional bus stop in frames of the station (on the north side), for cross-regional (long-distance) and regional buses, is a stop with a capacity designed for 72 departures and 36 arrivals in the peak hours. It has 24 stands located level -1, i.e. 8 m below the area level. Shared waiting room from the Polish State Railways – has ensured accesses to the bus waiting room directly from the main hall of the station or through lifts and staircases [10]. On the north side of the station three storey (-11.0 m, -14.0 m, and -17.0 m) underground car park for passenger cars located under multi-user bus stop was predicted.

Directions of principal pedestrians streams were provided along compositional axis: from Piotrkowska street. in the direction of 3 May Park (direction to the west) and Market Cobra – Great theater (north-south). Two main entrances to the station along with service halls were provided:

- ♦ from the western side, where the principal zone of accepting the pedestrians movement from direction of the center and means of tram and bus communication, with ramp leading directly to the station hall level is established,
- ♦ from the eastern side, where adopting the entire service of vehicles bringing passengers by private cars, taxis and other vehicle means of transport is planned (short and long-term parking lots, long-distance buses).
- ♦ and the third main entrance from the level of the area was located on the Plac Dąbrowskiego – Rynek Kobro, perpendicular towards the tracks axis.

Apart from the three accented architecturally main entrances a number of indirect accesses were located from the area level



Stops for trams and busses on the street level (north side)

to the space of a station hall, multi-user bus stop, or the underground level of the Special Art Zone.

Such clear dividing different station users let for determining two main station spaces of passengers' distribution inside the station which independently take passenger to the platforms' level. In the central part of the hall, by opening ceilings above the level -8 m and -16.5 m full lighting of platforms was created. Such significant opening, all the way to the level of the trains traffic, let not only for illuminating underground buildings, but also aims arrived passenger towards the target level that is platforms' level. Providing maximum intuitive orientation in the entire station area like cash desks, platforms, waiting rooms, toilets, commercial space was design's intention. Above solutions allows for creating right zones of the exchange of PKS and PKP passengers and lead pedestrians arrived from public transport stops to their destinations.

So the station is a place friendly for passengers, with a lot of daylight in spite of the hollow, with the light and clear communication system ensuring the minimal changing time between transport elements and means of transport. The station conform to the highest international design standards seen around the world. In the future additional commercial functions will be located above the station.

The layout of streets cooperating with the station and the public transport

The municipal transport system around the station was also rebuilt. Maximum approximation of the public transport to the station's building was the main assumption. Therefore as part of the project a system of tram routes was rebuilt. Tracks were renovated on Narutowicza and Kilińskiego streets and a new track along the northern part of the station was opened. The majority of tram lines stop on a tram stop located in front of the station main entrance. A fourfold growth of the number of passengers using the tram is forecasted, which makes it necessary to assume full exploitation of the maximum infrastructure capacity.

Capacity of underground parking lots for passenger cars, on the basis of the benchmarking results of existing facilities

of this type in Germany and France, and the fact that the journey to the station is provided mainly by the dense municipal public transport network was calculated on c 900 places. Zones for a short taxi rank (15 and 13) and passenger cars (43 disembarkation places and 37 delivery places) were also provided.

In area around the station cycling routes forming the network of routes leading to all essential objects were predicted. The main cycling route, 4.0 m wide, is driven from the area of crossing streets of Kiliński/Traugutt through the station square to the area of the conference-office centre „the City Gate” and of main station building. Farther cycling route will be passing through the EC1 West object and Special Art Zone to the south-east corner of the station building (level -8 m) and farther to the East with the green areas put along Nowowęglowa street.

Expected for the target period (2040) participation of individual means of transport used for the journey to the Łódź Fabryczna station was shown in table 1.



Pavements and paths for bicycles

Tab. 1. The modal split of transport in journeys to the Łódź Fabryczna station – forecast 2040 [9]

Pedestrian and bicycle traffic 9%	Tax 6%	Passanger cars 24%	Busues 18%	Trams 34%	Regional Trains 9%
Cars – 30%			Public transport – 61%		

Multimodal node Łódź Fabryczna as elements of integration of the passenger transport strategy in the city, agglomeration and province

On both the City and the Province side long-term concept papers were drawn up, and then projects and implementations seeking the full integration between railways and the public transport in Łódź and Łódź agglomeration were performed. The Strategy of the Development of the Łódź Province [11, 13, 15, 20] determined the operational objective concerning the best quality and availabilities of the transport infrastructure in the following manner: „development of the ecological passenger transport, among others by structure of the Łódź Agglomerative Railway, purchase of the modern rolling stock, supporting the modernization of tram lines and the purchase of modern means of transporting, full integration of systems, including i.a. realization of multimodal nodes, with the special attention to central node by Łódź Fabryczna station and Park&Ride systems and Bike&Ride, propagating the means of transport friendly to the environment, supporting the structure of cycling routes system”. In two years later the province assembly took on „The Sustainable Development Plan for Łódź Public Mass Transit System” [8] of which is to improve accessibility, effectiveness of functioning and safety on defined transport network of public service obligations. Development Study of the Łódź Metropolitan Area [2, 14] has based its action on speeding up metropolitanisation of the structure of Łódź Metropolitan Area integrated transport system in which three key activities were specified: the friendly municipal public transport, the bus system and the Łódź Agglomerative Railways system, as well as i.a. integration nods (structure of the multimodal nod in the center of Łódź about domestic and international meaning by the Łódź Fabryczna station, construction of the Centre tram station), main signaling and movement



Stops for regional and long-distance buses (level -1)

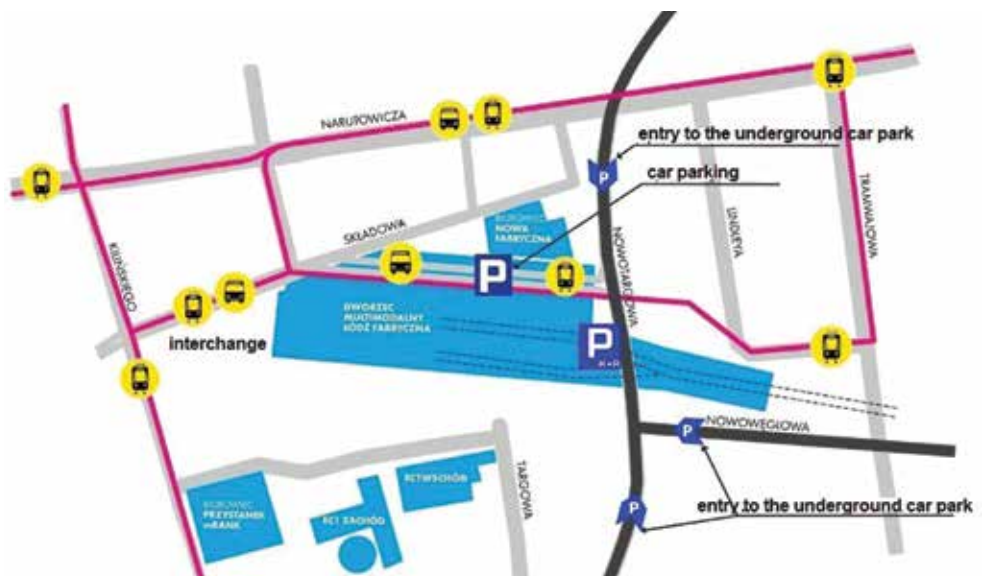
control center, the travel planning system, the cycling routes system and the municipal bicycle system, integrating and initiating the cooperation of the public transport authorities. Development strategy of Łódź Metropolitan Area, based on the Study is now based on „creating the integrated metropolitan public transport network” on the basis of the cooperation of individual communes and distinguishes main actions, of which „comprehensive Łódź Metropolitan Area transport integration program” is opening the list.

In the integrated public transport system railway-local public transport following forms of integration on which we should put emphasis are:

- ♦ spatial integration consisting in the unification of quality standards in facilitating changes through integration of stops in transfer nods; increasing the territorial range of direct connections on Łódź public transport with the suburban and sub-regional zone;

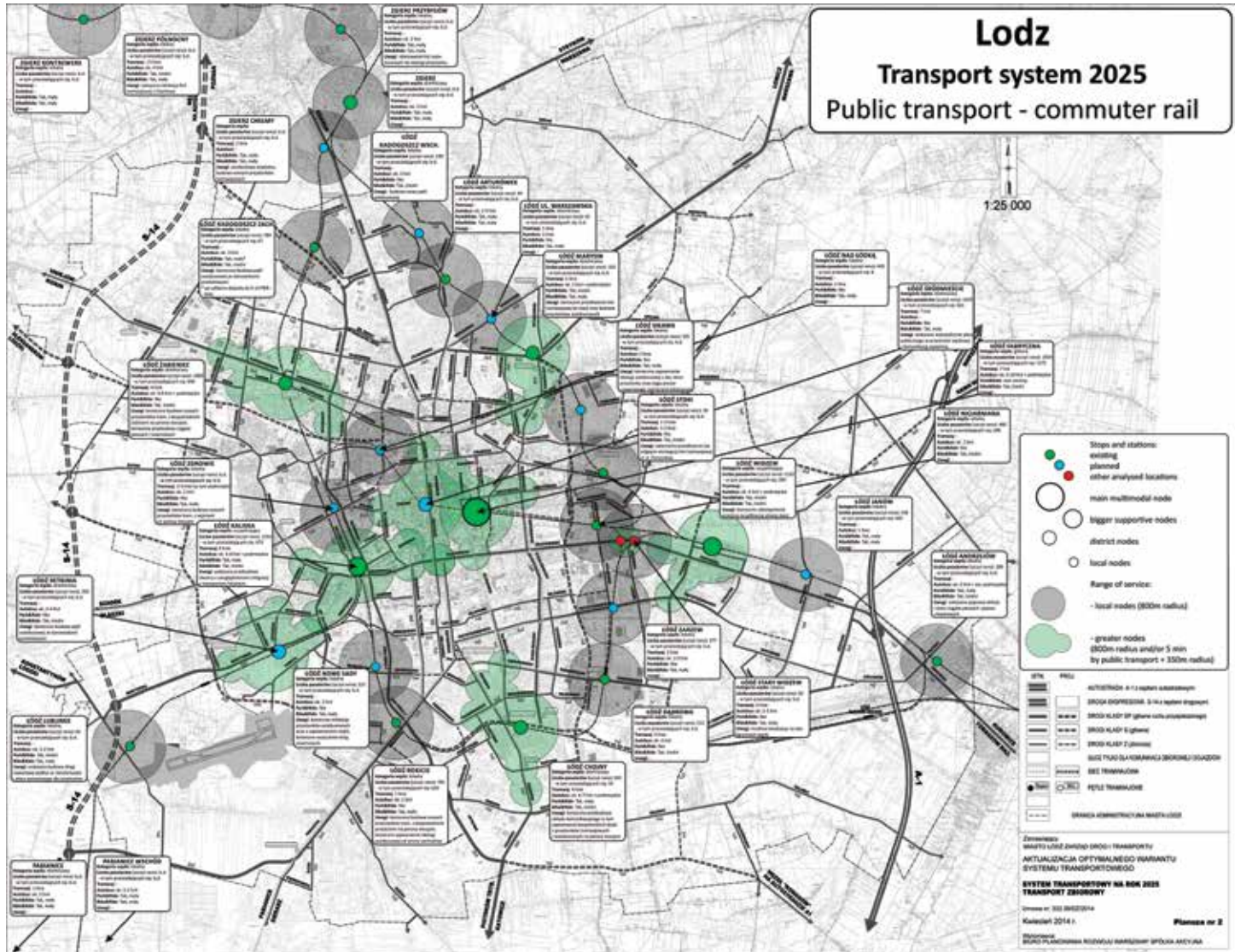


City bicycle station



Stops both trams and buses parkings arrangement of the Łódź Fabryczna station

Source: Zarząd Dróg i Transportu in Łódź.



Transport system in Lodz with multimodal stops
Source: Zarząd Dróg i Transportu in Łódź.

- ◆ intermodal integration concerning on: maximum use of railways in urban and agglomerative travels; structure of transfer parking lots in the P+R system; enabling the transport of bicycles in means of the public transport; and in the future for including into the integrated system e.g. taxi service, municipal bicycles rental company.

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