TRAMWAJE WARSZAWSKIE Sp. z o.o.

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FEASIBILITY STUDY FOR A PROJECT: Modernization of "TRASA W-Z" Tram Link Section: Pętla Cm. Wolski–Dworzec Wileński

(Modernizacja trasy tramwajowej W-Z od pętli Cm. Wolski do Dworca Wileńskiego)

SYNTHESIS



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The synthesis presents results of the Feasibility Study for a project entitled **"Modernization of Trasa W-Z Tram Link"** ("Modernizacja trasy tramwajowej W-Z od pętli Cm. Wolski do Dworca Wileńskiego"), excuted by FaberMaunsell Ltd. and FaberMaunsell Polska for Warsaw Tramways Ltd., 20 Siedmiogrodzka St, 00-099 Warsaw.

Tramway route analysed in this Study is a task of high priority for the local government of Warsaw and was put on a list of urgent tasks within Warsaw's "Strategy of Sustainable Development of the Transport System of Warsaw for years 2007 – 2013 and beyond"(*Strategia Zrównoważonego Rozwoju Systemu Transportowego Warszawy na lata 2007-2013 i dalsze*).

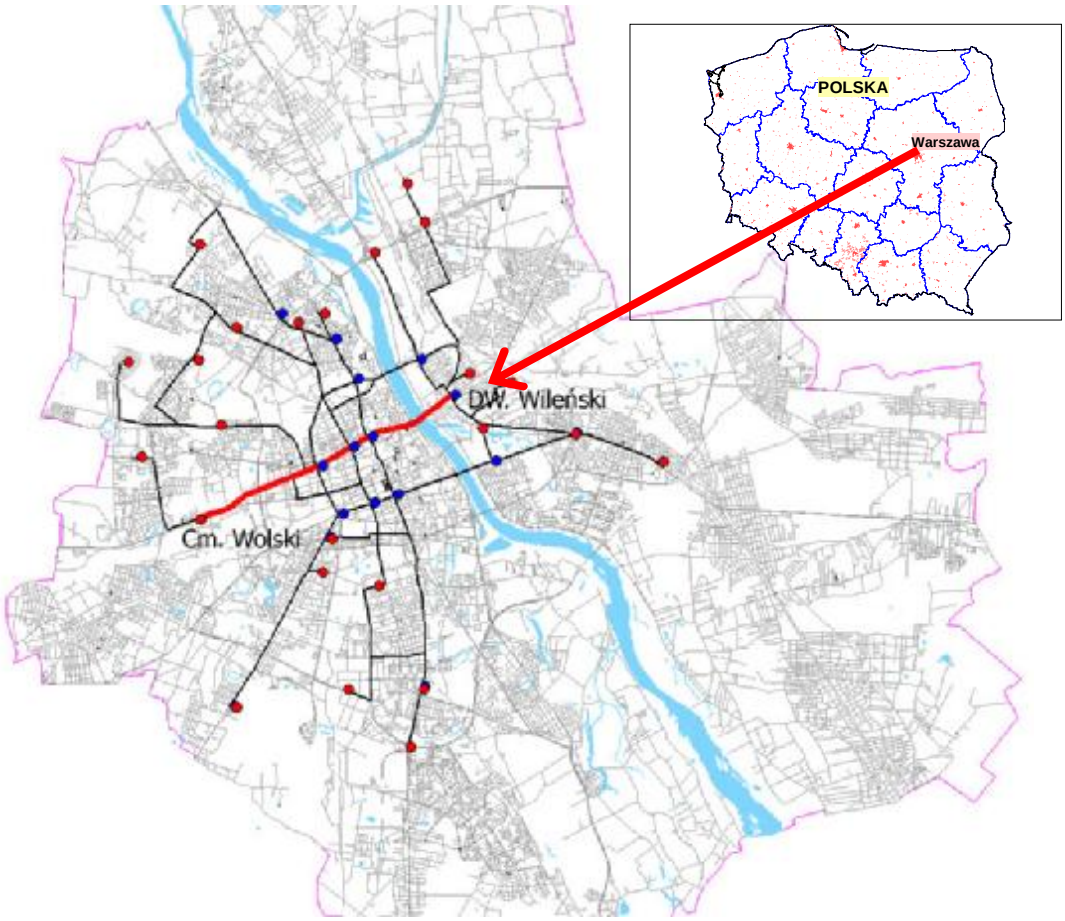
Feasibility Study was prepared in order to apply for EU financial support for tram link construction.

A SUMMARY OF THE RESULTS

In the study 4 modernization variants of Trasa W-Z tram link were analysed. The results of the analysis confirmed that link improvement would increase reliability of Warsaw urban transport system, by reducing travel times and by improving quality of passenger changes on stops. In addition, due to the location of tram link and its final stops with possible efficient connection to the regional public transport (commuting railways and buses – Wileńska Station), improved tram will also play an important role in improving the quality of public transport travels on the scale of Warsaw city and agglomeration.

Thus the project foresee possible new passengers for public transport, those travelling within the city of Warsaw as well as commuters from the suburban communes and from the Mazovian region. The project will generate a huge alternative for travels by car for all these groups of transport system users.

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Pic.. 1. Location of Trasa W-Z in Warsaw.

Proposed tram improvement program

Considering passenger traffic forecasts, investment costs, possible collisions with the road network, pedestrian traffic and the underground city infrastructure, social cost-benefit analysis and the possibilities of creating construction stages, **the following variant of a two-track tramway route was deemed to be the most beneficial**:

Track infrastructure

It was assumed that Trasa W-Z tram link improvement program will include modernization of the existing ballast & sleeper structure and exchange the existing structure into ballast-less structure with concrete substructure and varied track-way fill depending on track-way location (separated, in the carriageway, bus and tram track-way) – used along reconstructed track stretches at:

- switch nodes,
- track-ways built into carriageway and track-ways adapted to used by both trams and buses (Pl. Bankowy – Targowa St.),
- separated track with grass track-way fill.

The total length of track improvement will be 15 190 mtp, including:

- truck silencing with grass track-way fill – 640mtp;
- truck silencing with rubber profiles -– 5580mtp;
- new ballast and sleeper structure with MUT fill - 30mtp;

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- new ballast-less structure with asphalt concrete fill – 1510mtp;
- new ballast and sleeper structure filled with broken stones and rubber profiles - 650 mtp;
- new ballast-less structure on vibro-izolation mat with asphalt concrete fill – ERS or Rheda City type – 6780mtp.

Power supply

Traction energetic system will ensure reliability of power supply and full use of modern trams with onboard high-end propulsion systems. The improvement will require:

- extension of three existing energetic substations,
- overhead wire network improvement,
- improvement of traction posts, specially along Śląsko-Dąbrowski bridge over Wisła river.

Bus and tramway traffic setup

The tram link will be served by:

- The existing tram lines: 8,10,13,20, 23,24,26,27,32 will ensure the desired headway of trams with 2.minutes headway on the Śląsko-Dąbrowski bridge.
- A common use of track-way by trams and buses on the stretch from Pl. Bankowy to Targowa St (2,6 km) and the construction of 4 common bus & tram stops: Metro Ratusz/Arsenał, Stare Miasto, Park Praski and Targowa (direction Pl. Bankowy).

Traffic organisation and control

Apart from collision points with road and pedestrian network (intersections, property entrances and pedestrian crossings), the route will be in general located as a separated track-way or a track-way with allowed bus traffic. Good conditions for trams movement will be possible thanks to modern traffic control. The requirements are as follows:

- an installation of 5 new traffic lights on intersections, pedestrian crossings and car crossings,
- a modernisation of traffic light control systems on the 13th existing intersections and pedestrian crossings in order to apply traffic light priorities for trams.

Stops for passengers

There will be 15 passenger nodes located along the route with a total number of 31 platforms, each almost 66 metres long, and 3.5 metres wide.

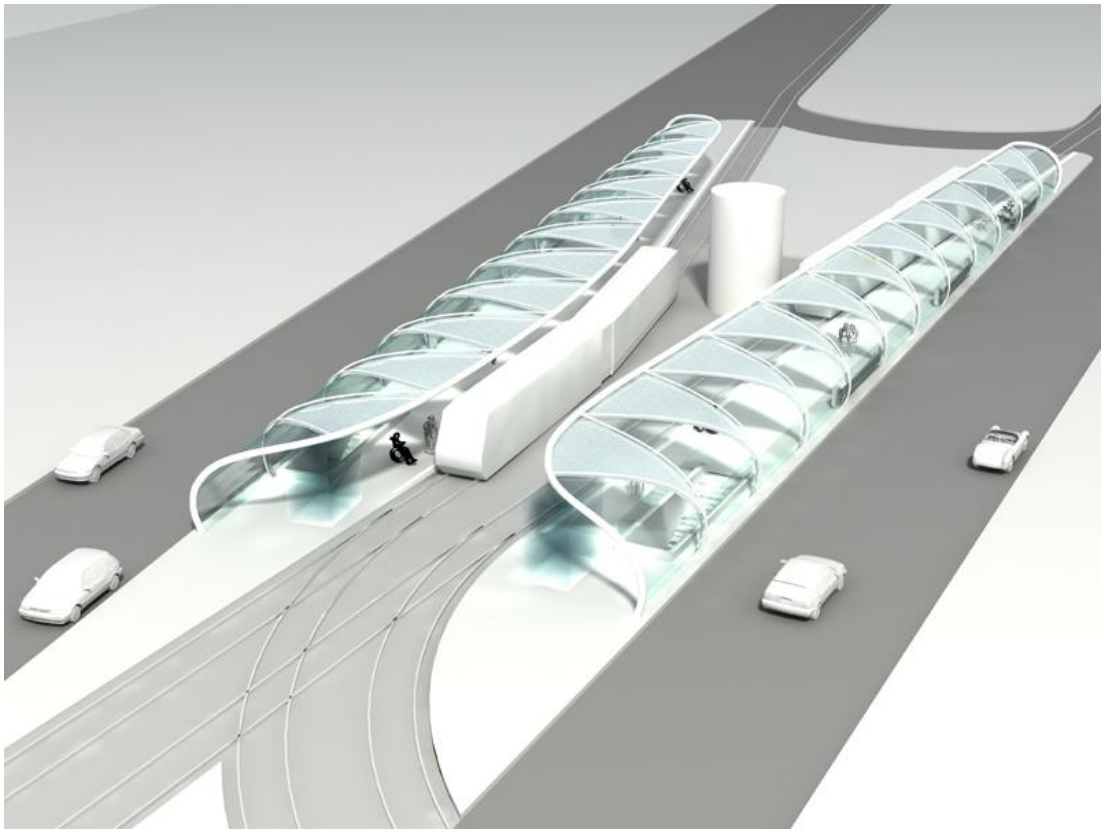
In addition:

- there will be a common standard of materials, colours, passenger equipment set and its placement,
- all the platforms will be tuned to the needs of the handicapped (for example: platform height of 26 cm).

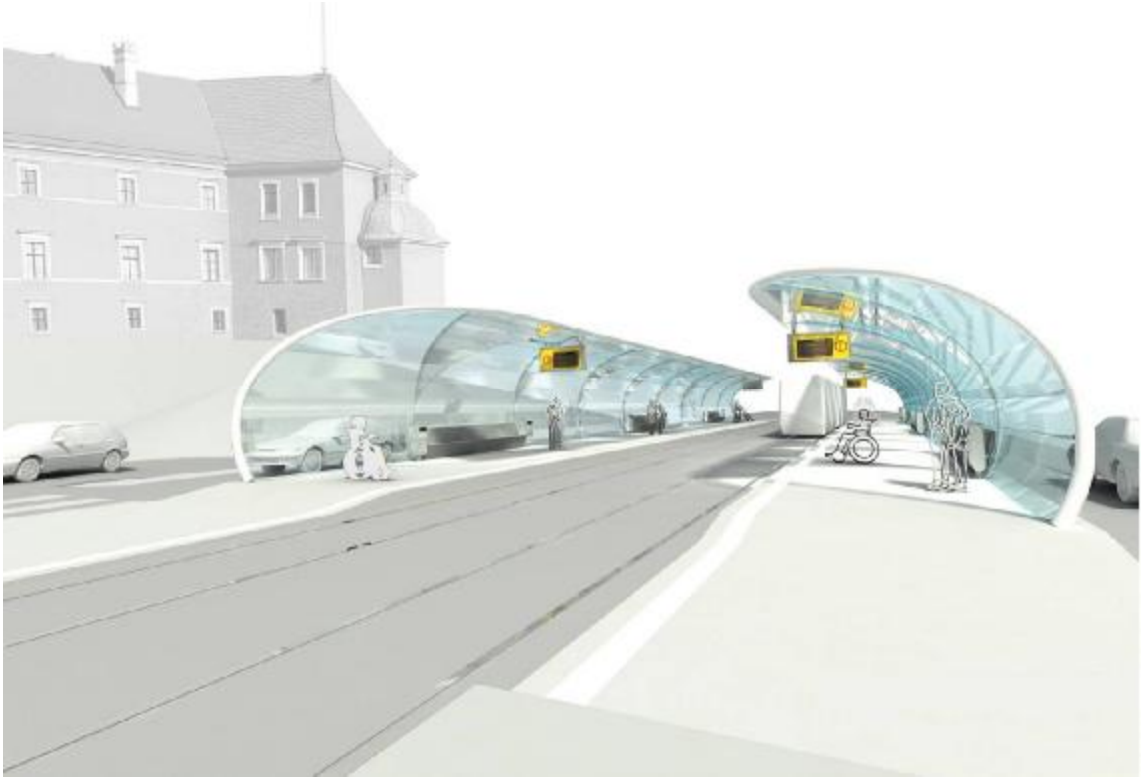
In selected main interchange nodes ticket machines and information panels will be mounted, with an access to the public transport information database. All stops (except one) will be equipped with CCTV cameras connected to the route's monitoring system.

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A proposal of architectonic solutions on selected tram stops was made with total platform fencing. See pictures 2 and 3.



Pic. 2. Architectonic conception of Metro Ratusz-Arsenał bus-tram stop.



Pic. 3. Architectonic conception of *Stare Miasto* bus-tram stop.

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Passenger information system

Passenger Information System of the Trasa W-Z tram link will include both traditional means of providing information and a dynamically updated system using electronic displays (in tramways and on platforms). It is planned to install::

- 4 large platform information displays, and
- 31 standard platform information displays.

Communication system will meet the needs of the elderly and disabled people by providing vocal information in both automatic and triggered modes.

Rolling stock

The project will require purchasing of 20 new low floor articulated tram cars. The purchases were tuned to passenger carriage forecasts (travel time, number of passengers).

Other actions

The project assumes that there will be 10 interchange nodes in operation, created by appropriate platform location and by providing passengers with information on possible changes. This information will be provided onboard at trams and on stops.

Investment costs

The investment cost of the project will be at the level of 276,1**, mln zł** (without VAT) including:

- tramway route construction costs – 116,1 mln zł,
- rolling cost purchases – 160 mln zł.

Results of economic and sensitiveness analysis

The economic analysis was carried out for three time stages: 2010, 2015 i 2035. It included a calculation of economic indicators: NPV (Net Present Value), Benefit-to-Cost ratio (B/C) and an IRR (Internal Rate of Return). These indicators allowed for a comparison of project's benefits with costs in the assumed period of analysis. The discount rate was assumed on a level of 6%. **The resultant economic indicators (IRR = 28,2%; NPV = 790,3 mln zł) are a proof of a high economic value of the project. The sensitiveness analysis of the project** to changes in investement costs and the number of passengers flows **has also confirmed this.** The sensitiveness analysis was calculated for all the combinations of the following parameters:

- investment costs decreased by 20%;
- investment costs increased by 20%,
- passenger carriage forecasts decreased by 20%,
- passenger carriage forecasts increased by 20%.

In case of investment costs increased by 20% and passenger carriage forecast decreased by 20%, the internal rate of return of the project equals **17,8%**.

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