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EXAMPLE OF AN URBAN FOOTBRIDGE – A SAFE WAY HOME

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Summary

Heavy car traffic is a major problem of modern cities. In order to improve safety of pedestrians and maintain the car traffic flow, a separation of the two traffic types may be sometimes desirable. It can be achieved either by building underground passageways or footbridges. This paper presents the latter solution – a safe pedestrian route from a housing estate to a sports hall of the city centre of culture and sports in Jaworzno (Poland).

Keywords: urban footbridge; pedestrian safety; cable-stayed bridge

1. Introduction

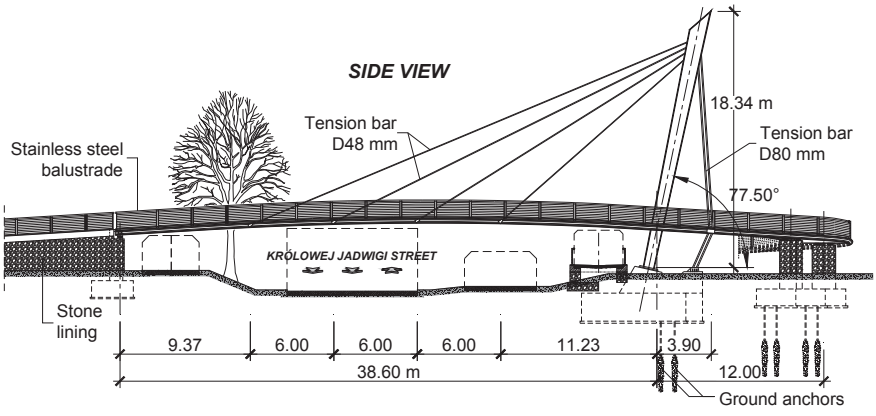
Reducing the number of road deaths has been the aim of the European Union countries for several years. The efforts concern education, changes in traffic regulations, development of vehicle safety technology and road infrastructure modernization. The fatality rate in the EU decreased from 63 dead per million inhabitants in 2010 to 51 in 2014. The highest road fatality rates are noted in Eastern Europe, also in Poland [1]. A large part of victims are the most vulnerable road users – pedestrians. Despite the special status of pedestrian crossings, they are, as data show, dangerous places, where pedestrians are not sufficiently protected. Therefore, in many cases, alternative, collision-free and thus safe ways of pedestrian communication across busy routes in urbanized areas should be considered. An alternative solution may be footbridges, located in places where it is justified. In addition to ensuring safe communication, pedestrian bridges can be attractive architectural elements of urban space.

2. Footbridge design

The sports hall of the city centre of culture and sports in Jaworzno (southern Poland) is an attractive destination for many residents, especially children and young people, located in the city centre, separated from the largest housing estate area by a busy street. Several cases of traffic accidents involving pedestrians, including children took place on the route to the hall during the past few years. Due to these

facts, the city authorities decided to build a footbridge enabling a collision-free safe access to the hall from the interior of the estate.

The design assumes a five-span beam structure with the main cable-stayed span of 38.60 m (Fig. 1). The side spans (10.26 + 2 x 7.78 + 9.19 m) have a curved shape. The main span support is a 18.34 m high steel column-shaped pylon connected with the deck, located in the footbridge axis. It has a variable box cross-section and is inclined from the main span at an angle 77.5°. Anchorages of the main stays and back stays are located in the top part of the column. The pylon is fixed in a massive 2.0 m thick shallow foot foundation.



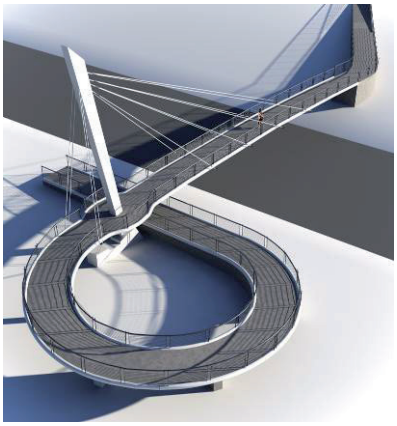


Fig. 1. Side view and visualisations of the footbridge in Jaworzno

The deck is a steel grillage consisting of two Ø355.6/25 tube girders braced by crossbeams made of HEB 200 beams (in the spans) and 2 HEB 240 or 2 HEB 260 beams (over the supports and near the pylon). The stays are anchored on both sides of the deck to short cantilevers made of steel tubes (in the main span) or to a box-section cantilevers (back stays). The steel grillage is composite with a 0.14 m thick reinforced concrete deck plate with use of headed shear studs welded to the crossbeams and longitudinal beams. Width of the deck plate varies from 3.50 m (typically) to 4.80 m (near the pylon).

The deck in the main span is suspended by stays spaced every 6.00 m. All stays are steel grade S460 system tension bars with a diameter of 48 mm (main stays), 80 mm (upper backstays) and 90 mm (lower backstays). The tension bars are anchored in the deck, pylon and foundation with use of fork heads.

3. Conclusions

The problem of safety of pedestrians, most vulnerable road users in urbanized areas, is very important in the era of a growing car traffic. This paper presents an example of a footbridge designed to connect a large housing estate with a sports hall, which will enable convenient and safe crossing of a busy urban street. This solution can be, under certain conditions, a good alternative to traditional pedestrian crossings that may not provide the right level of pedestrian safety.

4. References

[1] “Road safety in the European Union. Trends, statistics and main challenges, March 2015”, European Commission, Mobility and Transport DG, Brussels, European Union, 2015.