



FACULTY OF TRANSPORT  
ENGINEERING  
25 YEARS



VII. International Scientific Conference of the  
Faculty of Transport Engineering

6<sup>th</sup> – 7<sup>th</sup> September 2018, Pardubice

## CURRENT STATE OF PRELIMINARY PROCESS OF HIGH SPEED RAILWAY LINES IN THE CZECH REPUBLIC

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### Abstract

The article is focused on current state of preliminary process of so called “Rapid Services” in the Czech Republic. The concept of “Rapid Services” and approach to high speed railway in the Czech Republic are characterized in a brief way. Current state of preliminary process as well as proposed following steps are mentioned.

### Keywords

High-speed railway, high-speed line, preliminary process of construction works

## 1 RAPID SERVICES

The concept of “Rapid Services” was defined by the resolution issued by government of the Czech Republic in May 2017. The “Development Programme of the Rapid Services in the Czech Republic” was approved. “Rapid Services” are defined as operational and infrastructural system of fast railway in the area of the Czech Republic consisted of constructions of new high-speed railway lines (HSL), upgraded conventional lines with high speed features as well as upgraded conventional lines with higher parameters including rolling stock and concept of operation. [1]

High-speed railway line (HSL) is one of many components of high-speed railway according to this definition. Individual HSL has such form and extent as it is required by the transport system. The Czech Republic going to operate an open operation concept due to this government resolution. It means that high-speed trains will take a part of a common transport system accessible to general public and for common every-day use. This system will be compatible with all neighbour countries thanks to this.

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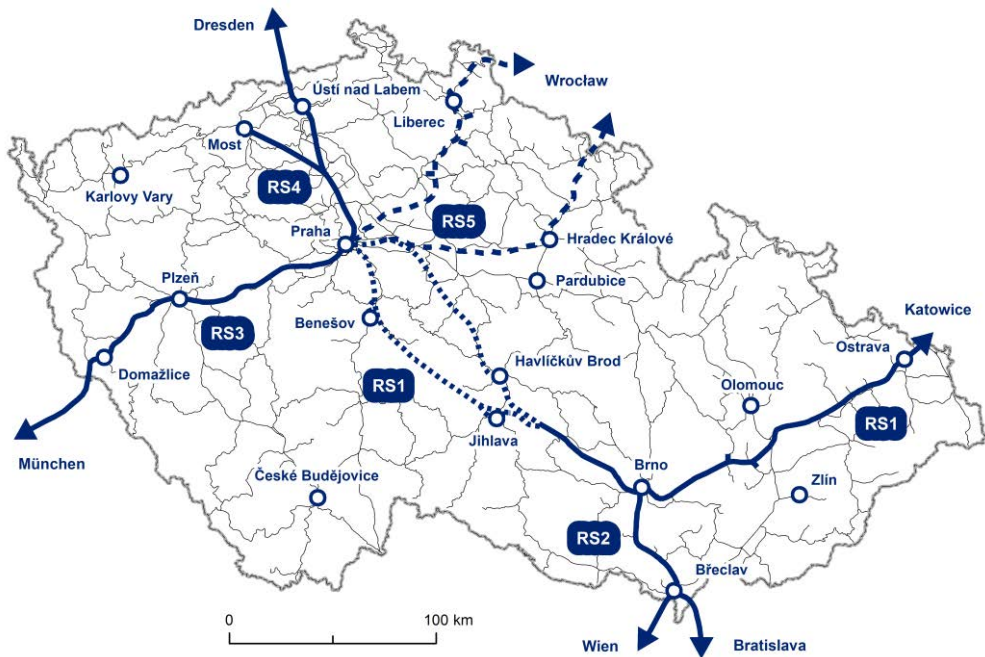


Fig. 1 Proposed network of "Rapid Services" (HSL as well as modernized conventional lines)

## 2 INFRASTRUCTURE PRELIMINARY PROCESS FOR "RAPID SERVICES"

### 2.1 Technical Studies

Elaboration of technical studies [2] was the first step by preliminary process of lines taking a part of future system of "Rapid Services". These studies have been elaborated for all directions displayed by the Fig. 1. Territorial corridors for some directions is stabilized and (at least roughly) corresponding to planning documentation (Principles of territorial development).

There are more variants of route alignment at some locations. In some cases, by the point of view of overall conception (e.g. line Praha – Wrocław or in the part of line Praha – Brno). In some cases, there are more variants on the level of detailed track alignment. There is proposed a number of possible interconnections to network of conventional lines in the frame of the conception of "Rapid Services".

### 2.2 Feasibility Studies

Feasibility studies are used to choose the final variant of infrastructure in each direction of "Rapid Services" system. Feasibility studies extend our knowledge about transport and economical parameters of intention. Technical proposal of route and verification of territorial continuity are taken from the first step.

Prognosis of passengers' transport demand as well as prognosis of freight traffic development, evaluation of direct as well as society benefits and final evaluation of intent efficiency are included. It is evaluated by feasibility study, which route is suitable for following preparation and which interconnections are needed.

Elaboration of feasibility studies for the directions RS1/2 Praha – Brno – Břeclav and RS4 Praha – Dresden is in process nowadays. The second one is in advanced processing stage. Interesting transport solutions are suggested by the study. These solutions are beneficial not only for international transport, but also for national long distance and fast regional transport.

Elaboration of feasibility study for backbone line RS1 in the segment Brno – Ostrava will be commissioned in the near future. Commissioning of the feasibility study for the direction of RS5 Praha – Wrocław will follow.

### **3 PILOT SEGMENTS**

#### **3.1 Selection of Suitable Segments**

The SŽDC made an analysis of possibilities [3] how the preliminary and construction of HSL can be accelerated. The aim of the analysis was an identification of segments of proposed HSL network in the Czech Republic, which can be incorporated into the system of “Rapid Services” and realized as pilot. Selection criteria were defined and the selection made according to them.

Criteria can be divided into 4 fields (transport, territorial, technical and process field). At least partial fulfilment of all criteria is a presumption for successful and quickly realization. If one of the criteria is not met, it has been considered whether or not it is a major barrier.

There are 3 segments potentially suitable to be selected as pilot segments. The set of segments based on criteria mentioned above is consisted of the segments: Praha-Běchovice – Poříčany (HSL POLABÍ), Přešov – Ostrava (HSL MORAVSKÁ BRÁNA) and Brno – Vranovice (HSL JÍŽNÍ MORAVA).

Construction of pilot segments as a base for future HSL network is a great opportunity in the Czech Republic. Construction of the first segment and successful setting-up into operation were a successful step in foreign countries. It reduced criticism of construction of subsequent HSL, verified positive passengers’ feedback and feedback by transport operators, and also allow infrastructure managers to prepare subsequent parts of network in higher parameters. It is an advantage to construct as pilot such segment which technical form is relatively independent on speed and capacity demands. It is for prevention this segment not to create possible speed or capacity bottleneck.

#### **3.2 Analysis of Contributions, Opportunities and Risks**

Simplified analysis of contributions, opportunities and risks has been made by selected segments. Former documents elaborated for given segment or general documents to HSL (e.g. Technical and operation study) were utilized as a base for identification and evaluation.

Creation of a space for future development of railway (incl. conventional lines in surroundings) and creation of a base for future network designed for the speed of 350 km/h are able to be mentioned as opportunities. In pilot segments, this standard does not need to increase costs compared with selection of lower speed level. It is necessary to mention risks related to construction preliminary process in process and technical points of view as a part of risk analysis. Risks related to environmental impact assessment as well as to process of obtaining a building permit must be considered as well.

All selected segments have an important contribution for current transport operated on other lines parallel in direction of considered new segments as well. New high-speed infrastructure will improve capacity of railway in given direction. It improves transport reliability and allows next development of transport. This development is limited by limited capacity nowadays. The trains can be faster due to reduction of overtaking of trains of different categories and due to reduction of slowing down of speed caused by high volume of track (line) occupation. These effects are related to capacity improvement.

### 3.3 Recommendations to Following Parts of Preliminary Process

Overview of basic steps necessary for preliminary of pilot segments in accelerated mode and brief schedule of the probably shortest possible preliminary process and realization of construction are taking part of the analysis mentioned above.

It is recommended to continue in consideration of all 3 selected and analysed segments based on all known facts. Higher probability of successful acceleration of preliminary process and of construction works is seen by the HSL JIŽNÍ MORAVA (Brno – Vranovice) and HSL MORAVSKÁ BRÁNA (Přerov – Ostrava). The advantage is higher probability of match in transport and technical solution and possibility of realization with no intervention to important railway junctions.

HSL MORANSKÁ BRÁNA (connecting central and northern parts of Moravia) is the segment of suitable length to shorten travel times. The trains can fully reach designed speed. If the connection in the area of Přerov will be suitable, a comprehensive segment minimally for the speed of 200 km/h can be created between Olomouc and Ostrava. “Fast connection” of the largest Moravian cities can be created in combination with planned modernisation of the conventional line Brno – Přerov as well.

HSL JIŽNÍ MORAVA (HSL South Moravia) is short segment with relative low costs needed for realization. The trains will not reach the maximum speed before construction of following segments due to short length of segment. Contribution in the field of improved capacity is seen as more important.

HSL POLABÍ (HSL in region of the river Elbe) has a significant contribution for improvement of capacity and for improvement of operational reliability. There is more significant risk of extension of preliminary process compared with other HSL pilot segments. It is caused by the fact that it is necessary to intervene the railway junction of Prague.

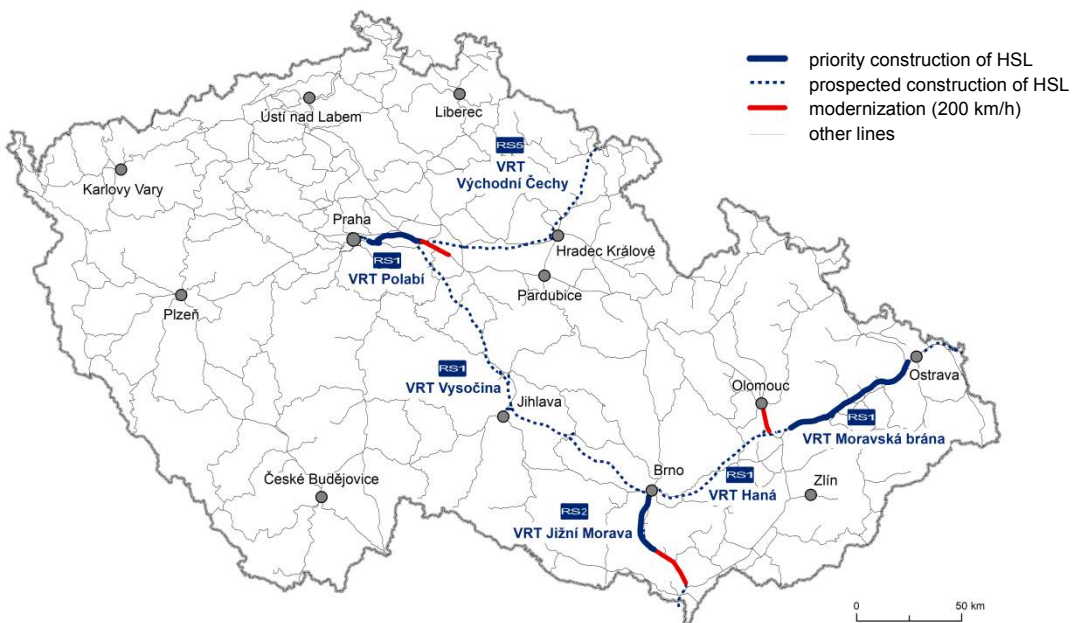


Fig. 2 Pilot HSL segments and protentional continuation in the future (there are HSL variants following-up the pilot segments only)

## 4 TECHNICAL SOLUTIONS

### 4.1 Internal Point of View as well as the Assumption of Foreign Know-How

The proposal of technical design of railway lines and following-up infrastructure is a crucial part of HSL preliminary process. Technical and operation study focused on technical and operational aspects of high-speed railway was finished in 2017. Proposal of basic features across all the subsystems incl. the preview of possible future operation is the outcome of this study.

The parameters are not defined in a flat and collective way for all the future network, but the definition follows specific requirements on individual lines according to their purpose. Possible lines are divided into 4 categories according to maximal speed and operational purpose (passenger traffic, mixed passenger and freight traffic).

Elaboration of an internal guideline of the SŽDC for designing of high-speed infrastructure follows up this study. The manual is based on the results of the study in content and in proposed parameters. It will be possible to design new railway lines minimally in range of feasibility study according this guideline. This can also be used to upgrade more detailed technical standards of SŽDC.

Possibility to implement foreign technical standards for specified type of lines is considered as well due to preliminary process of pilot segments and for refining the technical solution in short time horizon. Implementation of standards from France is in discussion nowadays. It is in relation to the purpose of pilot segments (high speed lines, passenger transport only). French approach to technical solution of lines is verified by decades of years of operation on the hundreds of kilometres of lines in France and also abroad. Technical solution of lines in other countries can be based on those standards as well. On the other hand, no standard can be applied in the Czech Republic without its locating into local conditions of the Czech Republic. The same will in this case.

## 5 CONCLUSION

Nowadays, the preliminary process of HSL and of high-speed railway as a complete set is more and more intensive in the Czech Republic. The work is coming to feasibility studies after the years of conceptual considerations. The ideas are getting a specific look. Updates of spatial-planning documentation based on the newest proposals is presupposed for next time. It is necessary for continuation of construction preliminary processes. Preparation of technical standards for design and construction of this infrastructure is lasting in a parallel way. It is a long-lasting process. It will take several years in spite of the fact that it has high support of society.



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