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# Subject: Draft Feasibility Study of rail link Brno-Přerov, May 2014

**Reference: 2013 258 CZ AMT RAL**

**Introduction and starting point**

The following document presents JASPERS’ main comments on the approach and outcomes of the draft Feasibility Study of the Rail Link Brno-Přerov which looks at a number of options to improve the rail infrastructure on this section. It follows on from general methodological guidance provided in December 2014 near the beginning of the study. JASPERS recommendations are presented in *italics*.

**Current situation and context of the project**

The project section is part of the Baltic-Adriatic passenger core TEN-T corridor (Katowice-Ostrava-Brno-Vienna, according to Regulation 1316/2013/EU). Within SŽDC’s rail network, the line is shortcutting the network link between Ostrava/Olomouc-Přerov and Brno, located within the triangle of the TEN-T corridor lines:

* (Prague)-Česká Třebová-Břeclav (Orient/East-Med corridor)
* Břeclav-Přerov (Baltic-Adriatic corridor, freight priority) and
* Přerov-Olomouc-Česká Třebová (Rhine-Danube corridor)

The existing railway line Brno-Přerov (Czech Republic) is a normal gauge, electrified mainly single-track main line with a length of about 90.1 km; it runs from Brno to Holubice, Nezamyslice and Kojetín to Přerov. There is a double-tracked section from Brno to Blažovice, whereas the remaining majority portion from Blažovice to Přerova is single-tracked. Adjoining sections towards Olomouc and Ostrava are double-tracked and electrified.

Due to the curvy alignment and bad condition of the track, the currently operated speed amounts to 80-100 km/h only. According to SŽDC, the line is almost used only by passenger trains; the traffic load shall decrease due to the low attractiveness of services.

The D1 motorway entering Brno as a funnel from the direction of the major towns Olomouc/Ostrava/Zlín is highly loaded with traffic, already with over 40,000 vehicles per day and a high proportion of freight traffic as it reaches Brno. It also acts as the Southern by-pass around Brno in the directions of Prague, Bratislava and Vienna.

The current modal share of rail transport on profiles along the project corridor ranges from 10 % (coming into Brno) to 30 % (near Přerov) whereas the remaining portion is covered by road transport (dominated by car traffic). Due to the existing (to be completed) D1 highway part of E50, E462 and the low service level of the rail link, the modal share of road is expected to increase further.

The Brno-Přerov line currently represents a bottleneck:

* for achieving a higher level of regional rail transport mainly in terms of capacity (current requirements for long-distance transport leave little room for regional transport on the single track line and only 1 all stopping train (Os) and 1 fast train ® per hour near Brno is currently possible in the peak) and to a lesser extent speed.
* for achieving a competitive long-distance rail travel time with car transport mainly between the main towns Brno and Ostrava/Olomouc/Zlín where travel times by train are currently significantly longer by train.

**Key issues of concept and option assessment**

1. **Process of short-listing of** **options for more detailed assessment**

Out of sixteen project options, 4 options O2, M2, K3 and S5 have been selected as preferred ones for economic/more detailed analysis based on a decision of the client that these are representative of all the others and can be combined if necessary.

*JASPERS recommendation: This way of short-listing is not understandable as presented and does not reflect any analytical work that may have gone on in the background; reasons for exclusion of options should be demonstrated, using evidence and arguments for example in terms of relative cost, planning feasibility, demand/capacity ratio considerations, actual time savings potential etc. A comprehensive table could be used to summarise the arguments for exclusion.*

1. **Final recommendations on short-listed options**

A good DETR analysis has been prepared assessing the short-listed options by use of six principal criteria (environment, readiness of the project, technical solutions, organisation of operation, transport performance, and economic evaluation) and a set of further 32 sub-criteria.

*JASPERS recommendation 1: The outcomes of this DETR table can be used as the basis for formulating any recommendations rather than isolated perspectives*[[1]](#footnote-1)*.*

*JASPERS recommendation 2: The B/C ratio and net additional ENPV provided by successively more expensive options are the best basis for assessing relative economic performance of options which we recommend to use (if additional ENPV is negative, it should be considered a problem from the CBA perspective).*

1. **Suggestion for extra representative short-listed options for economic analysis**

The presented set of short-listed representative options is in the end quite limited in terms of options that meet the agreed mid-term train requirements with a whole range of line speeds, which is the key driver of cost and benefits.

*JASPERS recommends that, unless there are good reasons (which would need to be well documented in the analysis), there might be two further short-listed options addressing the above issue:*

***O2+:*** *fully double-tracked with the speed profile of O2 allowing the required IC trains to run to Ostrava. This might replace option O2 depending on cost differences.*

***M1*** *(as described in the FS): fully double-tracked (allowing the required IC trains to run to Ostrava) with a full speed profile of 160 kph (or with minor speed drops for economic/other planning feasibility reasons).*

1. **Station concepts**

In a concept for a major upgrade such as this, JASPERS recommends to review the station/stop concept along the line, based on the demand analysis:

* analysis of current and future station turnover at existing station locations and locations where a station/stop might be beneficial,
* potential rationalisation of existing stations, reducing the sidings, separate passenger and freight functions, transform stations to stops, possible relocations, new stations, need to address accessibility, changes to timetable concepts etc.

**Key issues of justification and documentation**

1. **Revision and justification of planned train numbers**

There is no evidence presented in the study that train numbers have been clearly derived (or national/regional requirements verified) based on the future passenger and freight demand volumes.

Nevertheless during the study, the high total long-term train requirements (over 500 trains per day) of the various orderers of transport (MoT plus 2 regions) have been put aside (based on a decision taken during the study). The study and minutes of meetings imply that the medium-term train requirements were verified and adjusted in order to dimension the project to require no more than double-tracking of the line and reasonably respond to the forecast demand. This analysis is not presented though.

*JASPERS recommends providing a traffic demand based train requirements justification (based on demand analysis) for the medium-term, and also commenting on the potential utilisation of the proposed longer term train needs. JASPERS recommends to clearly present the required (pax/freight) train numbers for handling the predicted traffic volumes (using the transport model) in the different options and the passenger utilisation assumptions behind this. Further analysis of the presented train number analysis and relevant demand figures can be found in Annex 1.*

1. **Utilisability of line design speed**

It is not clear from the study how well and when the increased design speed can be used related to planned train programmes within the integrated timetable concept and with expected rolling stock. Obviously, if this is not the case for the M2/S5 option, then the benefits of such an option need to be better explained (e.g. in the case of M2 as a substitute for a future high speed line segment?).

*JASPERS recommends providing/utilising information on actual speed profiles of expected trains of different market segments in the different options reflecting the planned (integrated) timetables. The conditions for ensuring the required rolling stock to utilise higher speeds than 160 kph should also be described in detail. This may help when assessing the most suitable option or when reviewing the proposed operating concept.*

1. **Environment**

*JASPERS recommendation 1: as a minimum the FS should include substantial baseline information and a comparative analysis of the foreseen impacts from each considered short-listed option to the environment (as mentioned in the text: Natura 2000, specially protected areas, water and groundwater, land, noise etc.).*

Emphasis should be given to issues such as:

Expected impacts to protected species and conservation objectives within the Natura 2000 area crossed, with reference to the differences (if any)

Extent of population exposed to high/higher noise levels and extent of mitigation measures

Land use impacts and land uptake

Land and habitat fragmentation

*JASPERS recommendation 2: Climate Change resilience issues should be considered within the Feasibility Study. Such as: vulnerabilities and risks associated with the development covering all areas of feasibility: project inputs (availability and quality), project location and site, financial, economic, operations and management, legal, environmental and social. The necessary alternatives (adaptation measures) should be identified in order to manage climate risks to acceptable levels.*

1. **Risk analysis**

In a major project of this nature there are a number of potential risks for success (e.g. planning risk, demand development risk including general growth and project generated rail demand, rolling stock risk, cost risk, environmental risk) that need to be considered.

There are also a number of key related infrastructure dependency risks which need to be considered such as:

* Related (as yet unproven concept) of HS lines Brno-Prague and Brno-Ostrava
* Link to concept of upgrading of Brno node (not yet stabilised)
* Relationship to planned developments of the competing road network

The sensitivity analysis which is carried out in the study is quantitative and does not address the potential scale and likelihood of such risks or deal with risk mitigation.

*JASPERS recommends that both quantitative risk analysis (for inclusion in the CBA) and qualitative risk analysis are carried out for the short-listed options (in line with recommended best practice) including proposals for risk mitigation. The risk analysis carried out can be used in the economic analysis, the DETR analysis and final recommendations.*

1. **Assumptions of building high speed lines Praha-Brno and Brno-Ostrava in 2041**

The assumption of building these high speed lines is made for all options in the transport model only 15 years after the Brno-Přerov line comes into operation and impacts the overall demand and benefits of this project. Neither of these lines yet has a positive decision to go ahead based on a sound (pre-)feasibility study and the design of the Brno-Ostrava line may be related to the design of Brno-Přerov.

Building a high speed line on the short section Brno-Přerov would be a fragmentary measure without embedment into a national and transnational HSL concept. In addition, a new HSL in parallel to the upgraded 200 kph conventional line might represent a heavy redundancy of capacity generating insufficient extra benefit/demand.

Moreover, the technical description explains that all variants are compliant with future high-speed development. This technical compliance needs extra investment cost now, while its benefits will be realised later once (if) high speed operation can start. It should be possible to identify in each project variant what will be its investment cost with and without compatibility of high speed development (also including e.g. cost for construction of a maximum speed higher than 160 km/h).

*JASPERS recommendation 1: provide clear arguments on how the high speed line concept is expected to be implemented in the future for the different options of conventional line Brno-Přerov (on the section Brno-Přerov) as it is perhaps not realistic to have an invariant parallel HS solution for all conventional options. The demand model might be used to support this analysis.*

*JASPERS recommendation 2: calculate the investment cost difference with and without compliance with high speed operation, for each individual variant.*

*JASPERS recommendation 3: include the above calculated investment cost difference and a low/high-end demand forecast as an input to a risk analysis. Considering these two major and any other eventual effects, demonstrate the impact if the connecting (and depending on variant, the parallel) high-speed lines are not built and a full long distance high-speed service will not be started.*

1. **Transport demand (and supply) analysis**

The level and clarity of presented information is appreciated. However for a project of this scale and scope of options, there is still significant further information and analysis that needs to be presented in our view.

*JASPERS recommendation 1: relevant data and arguments from the demand analysis should be presented in the introductory analysis and train requirements parts of the study (in particular in chapters 1 and 2) and when justifying option design, shortlisting, decisions etc.*

*JASPERS recommendation 2: the following further information should be provided in the study to enable understanding and assessment of the assumptions and project impacts in its various options:*

1. Development of high and low rail traffic development scenarios related to various uncertain background assumptions (to feed into the risk analysis) as an input to risk analysis.
2. Document and justify (sources) the assumed time development of parameters of traffic forecast in graph or tables (GDP growth, population, prices, car ownership etc.).
3. A specific description of exactly how the national transport model has been further elaborated (especially) in the Brno area relevant to the corridor including
   * additional data collected/used
   * additional calibration performed
   * further network details added, additional zoning
   * scope of model used for this task (whole national model, part of it etc.)
   * modelling of peak time travel effects for cars and buses in Brno
   * changes to the generalised cost model and the following calibration – e.g. inclusion of interval impacts
4. An explanation of how travel time and travel time changes for mode shifted traffic have been calculated in the mode shift model and the economic analysis for the different modes :
   * description of the (perceived?) travel time model used
   * based on model O-D outputs, separate non-model estimates for car travel times etc.?
   * inclusion of access time, waiting/convenience time etc.?
   * inclusion of congestion impacts on car/bus travel time in Plzeň?
5. A clearer explanation of the composition and method of calculation/sensitivity calibration of the induced traffic calculation (longer trips, more frequent trips, other types, traffic entering from outside the model scope?).
6. Diagrams showing the current network of and volume of bus transport offer for long-distance and regional transport separately and showing the revised bus offer in the various project options (as assumed in the economic analysis).
7. Diagram showing future development of the road network in and around Brno and for long-distance.
8. Station turnover in the without project and project options in future years and not just current state (a number of stations now have very low utilisation possibly partially due to the lack of regional Os trains).
9. A breakdown table for the key (aggregated) O-D movements without project and per option used in the economic analysis (including key regional commuting movements, long-distance movements etc.):
   * without project O-D volume and modal share (bus, car, rail), modal shift per option, volume of induced traffic per option
   * travel times” used in the economic analysis for the different modes
   * “travel times” (or generalised costs) used for the model mode shift calculations per mode if different from above
10. Traffic cartograms (with numbers in them) showing train, bus and car passenger flows in the current state, without project, and with project options covering the whole (significantly) impacted network including wider long-distance movements.
11. Graph showing section by section traffic in future year split into regional and long distance transport.
12. Analysis of the line demand patterns/functionality and corresponding train timetable plans, market segments and station locations with respect to points vii) and viii). Potential new station locations, potential scope to move stations closer to demographic centers etc.
13. Analysis of the impact of the options on mode share of key O-D relations, line utilisation, station utilisation etc.
14. Further vehicle utilization analysis required for point e) above on justifying/setting planned train timetables.
15. The national model technical documentation could be attached as an annex to make the document understandable for those who are not familiar with it.
16. **Economic analysis**

Much of what is unclear in the economic analysis will become clear once the transport supply and demand analysis is completed as above and the assumption of travel time estimates is made clear.

There are, however, a few issues of methodology which JASPERS recommends to be addressed:

1. Price and other growth forecasting parameters should be consistent with those used for transport modelling.
2. Reduction of regional bus transport costs should correspond to planned reductions of numbers of buses (or rearrangements of the bus operations concept) after strengthening the rail backbone which is part of an integrated system) and not be estimated directly based on reduced demand, although they might coincide.
3. The method used to calculate mode shift time savings should be stated (linked to the demand documentation).
4. A qualitative risk analysis should be carried out (see point h) ).

**Other issues**

1. **Summary presentation of main data**

The presented Study includes many data and details that are useful but can complicate the understanding of the project concept and the justifications for proposed measures.

*JASPERS recommends that it would be useful for the quick reader to add a simple table showing essential parameters of the project variants, such as line length (conventional and HSL), train numbers, line load (passenger and freight) per time period (today, medium term, long term), maximum line speeds and travel times, economic analysis results, total investment cost and cost per km of double track line.*

1. **DETR annex**

*JASPERS recommends that it would be very useful to include the without project case in this as a reference base for comparison with the options.*

1. **Investment costs**

The calculation of investment cost in an EXCEL work map titled "Modernisation of the Brno-Přerov Overview of costs by items - basic budgetary costs CA 2014” largely complies with rules of transparency and JASPERS’ previous recommendations.

*JASPERS comments/recommendations:*

1. Investment costs should, however, also be presented by profession for each section of the line (station or open line section).
2. The designation of items was given in Czech language; although Google translation was corrected, there are some items and abbreviations needing clarification. The main item 1 “Tracks” should be divided into “Earthworks” and “Tracks”. A complete list of items is shown in the Annex 2 of this note. The source of unit cost should be mentioned, lump sums e.g. for telecommunication equipment should be specified.
3. Contingencies amounting usually to 10 % of works and deliveries could not be found. The supplementary cost of 25 % for services are quite high and should be broken down into e.g. services for detailed design, tendering and contract conclusion, approval of construction documents, project management, site supervision and acceptance etc. Depending on the implementation of works, such cost may vary from 5 % to 10 % of construction cost. Rates for “design-built projects” may be even higher.

*After clarification/completion of open items, the realism of the investment cost of preferred project variants could then be confirmed.*

1. **Maintenance and repair costs**

Maintenance and repair (M&R) cost for the Variant BP were shown in detail under item 3.1 on page 109 of the Study.

*JASPERS recommends that, as the EC is putting emphasis on sustainable operation of infrastructure projects, a possible chapter or sub-chapter “Future M&R System” should briefly describe the future organisation of maintenance and repair works in the project area. M&R cost development for other project variants being used for calculations in the FA and CBA should be listed. Typical M&R cost in similar projects were ranging at the order of magnitude 30 TEUR/year for one double-track line-km. This is a general value which may vary, depending on the line load and environment conditions.*

1. **File naming**

JASPERS recognised that lot of background information is available in the appendices. Nevertheless, it is hard to recognise the content of these files, since the title includes accent characters which do not display correctly on the computers using other sets of characters than Czech.

*JASPERS recommends therefore avoiding special Czech characters in file names as far as possible.*

**Annex 1**

**Derivation of train numbers**

Based on the evidence provided in the study, the predicted traffic volumes and planned train numbers seem to have been set separately based on the starting requirements of orderers of transport and not verified by the demand analysis. The following description of what can be found in the study illustrates this point as well as some inconsistencies in the study.

**Current state**

The report “Analysis of the transport market - the concept” shows the current No. of passengers per day between Brno hl.n. and Přerov hl.n. Obviously there is a high urban/regional traffic demand between Brno and Blažovice (Slavkov) and at lower level between Přerov and Nezamyslice. The current regional traffic in between seems to be rather low.

|  |
| --- |
| FIG. 3.1- Transport loads Brno - Prerov, 2011 passengers / day |
|  |
| Source: SUDOP Prague according to the CD data |

According to GVD 2010/2011, 14 pairs of long-distance passenger trains are offered per day operating in hourly cycle in the section Brno-Bohumín. In the section of Brno-Přerov, express trains[[2]](#footnote-2) stop at stations of Brno hl.n., Vyškov n.M., Nezamyslice (selected) Kojetín and Přerov. Regular travel time between Brno and Přerov amounts to 82 minutes.

On the second link from Brno to Olomouc, 8 pairs per day are running in a two-hour interval. These trains are forwarded from Olomouc to Šumperk, every other continues to Jeseník. Within the investigated section of these trains stop at stations Brno hl.n., Vyškov n.M., Ivanovic n.H. and Nezamyslice. Regular travel time between Brno and Olomouc amounts to 95 minutes.

A better overview of the current scheduled train numbers can be found in the “Transport Technology” chapter’s scheme at Annex No. 2 “The current state of number of regular trains per 24 hours depending on the type and direction”.

The predicted train numbers are shown in chapter 2.5 of the FS. According to item 2.5.1 of the FS, the “prospective range of transport” was determined by RIA authority GR Prague and is consistent with the size and structure of the Brno railway junction. The predicted train numbers were defined for three time horizons: 2016, 2025 and 2040. Figures in tables 30 to 35 are presenting these train numbers per section for time periods of 24 and 2 (rush) hours. Train numbers were used for design of infrastructure capacity.

The following table is showing a summary comparison of figures found. Train Numbers of tables T42 and T30-T36 are not consistent and should be reviewed.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No of trains per 24 h on the railway line Přerov-Brno | | | | | |  |
| Reference table (T) of the FS | T 42  current/medium/long term | T36 | T30 | T32 | T34 |  |
| Přerov-Brno | All together | 2014 | 2016 | 2025 | 2040 | Increase |
| Přerov-Kojetín | 86/86/220 | 86 | 95 | 86 | 220 | 156% |
| Kojetín-Nezamyslice | 86/86/292 | 81 | 91 | 86 | 256 | 216% |
| Nezamyslice-Vyškov | 89/158/400 | 89 | 96 | 158 | 382 | 329% |
| Vyškov-Blažovice | 72/184/418 | 72 | 80 | 184 | 418 | 481% |
| Blažovice-Brno | 131/274/506 | 209 | 296 | 518 | 540 | 158% |

Source: tables No.30, 32, 34, 36, 42

The predicted volume of transport was separately presented and explained in the chapter “Analysis of the transport market - the concept”. The following graphs are showing the forecasted transport performance in passenger-km/year and ton-km/year from 2025 until 2054.

|  |  |
| --- | --- |
| FIG. 3.13 - OD Transport performance, comparison of alternatives, 2025-2054, mil.pkm / year | FIG.4.12 - Transport performance ND, comparison of alternatives, 2025-2054, mil.ton-km / year |

Further traffic figures are shown in following tables for the time horizon 2030.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Tab. 3.4 - Aggregate output indicators forecasts, 2030 | | | | | | |
| Criterion | Unit | BP | O2 | M2 | K3 | S5 |
|
| Average occupancy of Ex, IC, EC trains | % | 0% | 26% | 32% | 31% | 33% |
| Average occupancy of R trains | % | 44% | 30% | 38% | 37% | 39% |
| Average occupancy of Os trains | % | 17% | 31% | 20% | 20% | 20% |
| Traffic performance | vlkm / day | 4648 | 8921 | 11987 | 11987 | 11987 |
| Transport performance | pkm / day | 433320 | 690199 | 945341 | 936592 | 947733 |
| Occupancy rate | Persons / train | 107 | 84 | 85 | 84 | 85 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tab. 3.5 - Loading in individual modes, 2030 (passengers/day?) | | | | | | | | | | | | |
| Profile | var. 2013 | | var. BP | | var. O2 | | var. K3 | | var. S5 | | var. M2 | |
| BUS | train | BUS | train | BUS | train | BUS | train | BUS | train | BUS | train |
| Blažovice | 6118 | 8552 | 5935 | 10258 | 2486 | 16784 | 1969 | 21333 | 1864 | 21443 | 1901 | 21782 |
| Rousínov | 3849 | 5366 | 4192 | 6690 | 1070 | 11582 | 468 | 16110 | 449 | 16187 | 469 | 16432 |
| Vyškov | 3869 | 5366 | 3814 | 6690 | 1070 | 11232 | 468 | 15725 | 449 | 15829 | 469 | 16005 |
| Nezamys-lice | 1250 | 5732 | 858 | 6889 | 567 | 10955 | 159 | 15288 | 137 | 15452 | 151 | 15594 |
| Přerov (South) | 332 | 5035 | 547 | 5477 | 203 | 8028 | 305 | 10424 | 226 | 10676 | 237 | 10330 |

Different time periods were used for planning, e.g. the operation plan counts from 2016 till 2040, the traffic plan from today till 2030, and from 2025 until 2054. Different traffic performance units were used, e.g. passengers/day passengers/per rush hour, passengers/train, passenger km/day. Traffic figures of peak time periods were not converted into train numbers under assumption of reasonable train loads.

The evaluation of train numbers shown in tables No. 30, 32, 34, 36 resulted in growth factors ranging from +153 % / 158 % Přerov-Kojetín and 478 % / 483 % in the section of Vyškov Moravia-Blažovice. The transit traffic, which would be important for a TEN T corridor project, has not been separately shown.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Reference / Table | No.36 | No.30 | No.32 | No.34 | Incr. |  |
| Prerov - Brno | 2014 | 2016 | 2025 | 2040 | 25/40 | p.a. |
| Přerov - Kojetín | 43 | 48 | 42 | 109 | 153% | 6% |
| Kojetín - Přerov | 43 | 47 | 44 | 111 | 158% | 6% |
| Kojetín - Nezamyslice | 40 | 45 | 42 | 127 | 218% | 8% |
| Nezamyslice - Kojetín | 41 | 46 | 44 | 129 | 215% | 8% |
| Nezamyslice - Vyškov Moravia | 44 | 47 | 78 | 190 | 332% | 13% |
| Vyškov Moravia - Nezamyslice | 45 | 49 | 80 | 192 | 327% | 13% |
| Vyškov Moravia - Blažovice | 36 | 40 | 91 | 208 | 478% | 18% |
| Blažovice - Vyškov Moravia | 36 | 40 | 93 | 210 | 483% | 19% |
| Blažovice - Odb. Brno-Černovice | 65 | 88 | 136 |  |  |  |
| Odb. Brno-Černovice - Blažovice | 64 | 80 | 138 |  |  |  |
| Odb. Brno-Černovice - Brno main station | 43 | 64 | 122 |  |  |  |
| Brno main station - Odb. Brno-Černovice | 37 | 64 | 122 |  |  |  |
| Křenovice H. N. - Sokolnice-Telnice | 21 | 20 | 20 |  |  |  |
| Sokolnice-Telnice - Křenovice H. N. | 20 | 21 | 21 | 1 |  |  |
| Sokolnice-Telnice-Brno main station | 29 | 36 | 36 |  |  |  |
| Brno main station - Sokolnice-Telnice | 28 | 37 | 37 |  |  |  |
| Blažovice - Šlapanice |  |  |  | 252 |  |  |
| Šlapanice - Blažovice |  |  |  | 254 |  |  |
| Šlapanice - Odb. Brno-Černovice |  |  |  | 269 |  |  |
| Odb. Brno-Černovice - Šlapanice |  |  |  | 271 |  |  |
| Odb. Brno-Černovice - Brno os.n. |  |  |  | 234 |  |  |
| Brno os.n. - Odb. Brno-Černovice |  |  |  | 234 |  |  |
| Křenovice H. N. - Sokolnice-Telnice |  |  |  | - |  |  |
| Sokolnice-Telnice-Brno os.n. |  |  |  | 67 |  |  |
| Brno os.n. - Sokolnice-Telnice |  |  |  | 68 |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table No. 42 |  |  |  |  |  |
| Přerov - Brno | All together | 2014 | 2016 | 2025 | 2040 |
| Přerov-Kojetín | 86/86/220 | 86 | 95 | 86 | 220 |
| Kojetín - Nezamyslice | 86/86/292 | 81 | 91 | 86 | 256 |
| Nezamyslice - Vyškov | 89/158/400 | 89 | 96 | 158 | 382 |
| Vyškov - Blažovice | 72/184/418 | 72 | 80 | 184 | 418 |
| Blažovice - Brno | 131/274/506 | 209 | 296 | 518 |  |

**Annex 2**

**Cost break down items to be clarified**

|  | Works per item | Questions or remarks |
| --- | --- | --- |
| ***1*** | **Earthworks and tracks** |  |
| ***1a*** | **Earthworks** |  |
|  | Platform | To be placed under engineering structures? |
|  | Booster. layer of mineral mixture |  |
|  | Excavation |  |
|  | Embankment |  |
|  | Podkl.vrstva aggregate? | Underlying layer of aggregate = formation or subgrade? |
|  | Slope | = ramp? |
|  | Improvements of geosyntetikum | Geosyntetikum=protection layer? |
|  | Sewer, příkop.žlab | Sewer and what? |
|  | Treatment communications | Please specify. |
|  | Remediation bottom axis | Consolidation of ground? |
|  | New cut for 2 tracks - width 2 m |  |
|  | New cut for 2 tracks - width 4 m |  |
|  | New cut for 2 tracks - width 6 m |  |
|  | New cut for 2 tracks - width 8 m |  |
|  | New cut for 2 tracks - width 10 m |  |
|  | New cut for 2 tracks - width 12 m |  |
|  | Infill for 2 tracks - width 2 m |  |
|  | Infill for 2 tracks - width 4 m |  |
|  | Infill for 2 tracks - width 6 m |  |
|  | Infill for 2 tracks - width 8 m |  |
|  | Infill for 2 tracks - width 10 m |  |
|  | Infill for 2 tracks - width 12 m |  |
|  | The bottom of new body 1 track - width 2 m | What shall be done here? |
|  | Bottom-new body 1 track - width 4 m | What shall be done here? |
|  | Bottom-new body 1 track - width 6 m | What shall be done here? |
|  | Bottom-new body 1 track - width 8 m | What shall be done here? |
|  | The bottom-applies to doubling 2 m | What shall be done here? |
|  | The bottom-applies to doubling 4 m | What shall be done here? |
|  | The bottom-applies to doubling of 6 m | What shall be done here? |
|  | The bottom-applies to doubling of 8 m | What shall be done here? |
|  | The bottom-applies to doubling 10 m | What shall be done here? |
|  | **Subtotal cost of earthworks** |  |
| ***1b*** | **Trackwork** |  |
|  | Establishment of the superstructure - UIC60 | = UIC 60 tracks with ballast |
|  | Establishment of the superstructure - S49 | = S49 tracks with ballast |
|  | Removing the upper track bed/ ballast layer |  |
|  | Turnouts r = 190 |  |
|  | Turnouts r = 300 |  |
|  | Turnouts r = 500 |  |
|  | Turnouts r = 760 |  |
|  | Turnouts r = 1200 |  |
|  | Turnouts r = 500 PHS ? | What is the meaning of PHS? |
|  | Turnouts r = 760 PHS ? |  |
|  | Turnouts r = 1200 PHS ? |  |
|  | **Subtotal cost of trackworks** |  |

|  |  |  |
| --- | --- | --- |
| ***1c*** | **Trackwork for High Speed Line (HSL)** |  |
|  | Track UIC60 on concrete sleepers (1 track) |  |
|  | Track UIC60 on concrete sleepers (2 tracks) |  |
|  | Trackwork - switch V160 PHS |  |
|  | Trackwork - switch V100 PHS |  |
|  | Trackwork - switch V50 | What is the meaning of V50? |
|  | Trackwork - zarážedlo | Buffer stop? |
|  | Substructure - kční layer | kční layer? |
|  | Substructure - drainage (drains) |  |
|  | Substructure - Kicking + repository | = transportation and storage? |
|  | Substructure - spreading |  |
|  | **Subtotal cost of HSL trackworks** |  |
| ***2*** | **Bridges, engineering structures** |  |
|  | Bridge reconstruction |  |
|  | Bridge rehabilitation |  |
|  | Bridges extension and rehabilitation of single track |  |
|  | Tunnels |  |
|  | Subway |  |
|  | Culverts station |  |
|  | Culvert (1 track) |  |
|  | Culvert (2 tracks) |  |
|  | Walkways |  |
|  | Flyover |  |
|  | Viaduct |  |
|  | Walls |  |
|  | Demolition | of structures? |
| *3* | **Engineering objects** |  |
|  | Protection and relocation of gas pipes |  |
|  | Protection and relocation of water mains |  |
|  | Protection and relocation of sewerage |  |
|  | Sewer and water main railway station | Why two items? |
|  | Sewer and water main railway station |  |
|  | Sanitary installations in railway stations |  |
|  | **Subtotal Engineering objects** |  |
| **4** | **Other engineering objects** |  |
|  | Cutting down |  |
| ***5*** | **Civil Engineering works** |  |
|  | Raceway = walkway |  |
|  | PHS | Please specify |
|  | Buildings | Please specify |
|  | Building-construction work |  |
|  | Technol. house | Please specify |
|  | Sheds |  |
|  | Coverings |  |
|  | IPO | Please specify |
|  | Demolition | of buildings? |
|  | Fencing v.2m |  |
|  | SpS ? | Please specify |
|  | NS ? | Please specify |
|  | TM ? | Please specify |
|  | NW ? | Please specify |
|  | TT TT building ? | Please specify |
|  | EPZ ? | Please specify |
|  | Adjusting the loading device companies Soufflet | Does this measure concern private equipment or plant? |
|  | Service building, warehouse |  |
|  |  |  |
| ***6*** | **The power lines** | **= Overhead catenary?** |
|  | Traction Management - new railway station in v.č.provisional conditions UKK and dismantling | Please explain. |
|  | Traction Management - new railway station in v.č.provisional conditions UKK and dismantling (for v = 350 km / h) | Please explain. |
|  | Traction Management - new in t.ú. incl. temporary conditions, UKK and dismantling | Please explain. |
|  | Traction Management - new in t.ú. incl. temporary conditions, UKK and dismantling (for v = 350 km / h) | Please explain. |
|  | Connecting the TS 25/0, 4 kV for the EOC and ZZ on TV | Please specify. |
|  | Connecting the TS 25/0, 4 kV for EPZ on TV | Please specify. |
|  | Connecting SpS on TV | Please specify. |
|  | Connecting EPZ on TV | Please specify. |
|  | TT Vyškov (connect to TV) | Please specify. |
|  | TT Vyškov (return) | Please specify. |
|  | TM Nezamyslice (connect to TV) | Please specify. |
|  | TM Nezamyslice (return) | Please specify. |
|  |  |  |
| ***7*** | **ASDŘ (DRT)** | Please specify. |
|  | Equipment DRT in the railway station | Please specify. |
|  | Equipment DRT in TNS Nezamyslice, Vyškov | Please specify. |
|  | Adding DRT in ED Přerov | Please specify. |
|  |  |  |
| ***8*** | **Strong currents** |  |
|  | The addition of TNS Černovice, technological equipment | Please specify. |
|  | Power Distribution and zařízení.žel. station | Please specify. |
|  | High-voltage lines and equipment, line segments |  |
|  | Power Distribution and equipment - stop |  |
|  | Power Distribution and equipment - new track |  |
|  | TNS Vyškov | Please specify. |
|  | TNS Nezamyslice - Treatment | Please specify. |
|  | TNS Nezamyslice TT | Please specify. |
|  | TNS Nezamyslice TM | Please specify. |
|  | SpS Přerov | Please specify. |
|  |  |  |
| ***9*** | **Heavy - relocation of LV, MV and HV** |  |
|  | Relaying MV line |  |
|  | Relocation of EHV lines | Please specify. |
|  | Relocation management 2x HV (t.ú.) | Please specify. |
|  | Relocation management 2x HV (railway station) | Please specify. |
|  | Relaying leadership nn | Please specify. |
|  |  |  |
| ***10*** | **Interlocking/signalling equipment** |  |
|  | Electronic SFE (2-9 VJ) | =Electronic interlocking 2-9 units? |
|  | Electronic SFE (10-15 VJ) | Does unit mean – field element, such as |
|  | Electronic SFE (16-25 VJ) | point, signal, track vacancy device, balise? |
|  | Electronic SFE (26-50 v.j) | Please specify. |
|  | Electronic SFE (more than 50 v.j) |  |
|  | Electronic TZZ | =bidirectional double-track automatic block? |
|  | Electronic TZZ | = bidirectional automatic block single track? |
|  | MPCs with KO monorail | Please specify. |
|  | MPCs with KO multitrack | Please specify. |
|  | ETCS | Which level? |
|  |  |  |
| ***11*** | ***Telecommunication equipment*** | Communication equipment - please specify! |
|  |  |  |
|  | Cost of preparing a comprehensive security structures + overall cost = 25% | Please specify |

1. For example, an issue is the apparent late recommended disqualification of the variant O2 under item 7. Conclusions and Recommendation. Although it was selected as a promising one, which achieved the best CB ratio of 6.44 %, it was classified as not “meeting the basic requirements of a modern railway line, which should be built at the core TEN-T network. Its parameters would suit perhaps in the 90s, but not today. In addition, it does not meet basic the methodological requirements of CR MD of December 5, 2013, that does not comply with the connections from Brno to Ostrava and Brno to Zlín and has no operational reserve.” If this is the case, this line variant should have been excluded in the short-listing stage of the study or a more suitable version proposed (such as a fully double tracked O2, which would meet the train requirements, see point c). [↑](#footnote-ref-1)
2. According to CD’s train schedule only R trains are currently serving the link from/to Brno-Přerov/Olomouc. The search of EC and Ex trains under “international links” didn’t find any long distance train. [↑](#footnote-ref-2)