

PRAGUE 2

**TRANSPORT ENGINEERING REFERENCE DOCUMENT FOR ARCHITECTURAL TENDER - RAILWAY BRIDGE AT VÝTOŇ**



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Client** | **Prepared by** | **Approved / project manager** | **Contract number** | **Date** |
| Institut plánování a rozvoje hlavního města Prahy, příspěvková organizace, Vyšehradská 57, 128 00 Prague 2 | Jana Jíšová | Ing. Josef Filip, Ph.D. | 19-054 | February 2021 |
| Petr Ivasienko |  |  |  |
|  | Josef Filip |  |  |  |
|  | Petr Vopalecký |  |  |  |
|  |  |  |  |  |



**TRAFFIC PROJECTION**



1

PRAGUE 2

**SUMMARY**



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Client** | **Prepared by** | **Approved / project manager** | **Contract number** | **Date** |
| Institut plánování a rozvoje hlavního města Prahy, příspěvková | Jana Jíšová | Ing. Josef Filip, Ph.D. | 19-054 | February 2021 |
| organizace, Vyšehradská 57, 128 00 Prague 2 | Petr Ivasienko |  |  |  |
|  | Josef Filip |  |  |  |
|  | Petr Vopalecký |  |  |  |
|  |  |  |  |  |

**1.** **IDENTIFICATION DATA Chyba! Záložka není definována.**

[1.1. Basic Project Data 1](#_Toc68629146)

[1.2. Client Data 1](#_Toc68629147)

[1.3. Data of the Author of the Documentation 1](#_Toc68629148)

[**2.** **INTRODUCTION** 2](#_Toc68629149)

[**3.** **CURRENT STATUS** 5](#_Toc68629150)

[**4.** **BRIEF DESCRIPTION OF THE SELECTION OF THE MAIN VARIANT FOR THE COMPETITION** 6](#_Toc68629151)

[**5.** **TRAFFIC ENGINEERING VIEW AND THE PREFERRED VARIANT** 8](#_Toc68629152)

[**6.** **DISCUSSION OF VARIANTS, RECOMMENDATIONS FOR THE COMPETITION** 9](#_Toc68629153)

**ANNEXES:**

LAYOUT OF THE PREFERRED TRAFFIC ENGINEERING SOLUTION

PART 2

VISUALC ANNEXES TO PART 2

# **IDENTIFICATION DATA**

## **Basic Project Data**

|  |  |
| --- | --- |
| Name: | Finalising the Transport Solution of the Streets at Výtoň |
| Place: | City of Prague |
| Cadastral area: | Nové Město, Vyšehrad |
| Nature: | Transport Solution |

## **Client Data**

|  |  |
| --- | --- |
| Client: | Institut plánování a rozvoje hlavního města Prahy, příspěvková organizace |
|  | Vyšehradská 57 |
|  | 128 00 Prague 2, Czech Republic |
|  | Company ID No.: 708 83 858 |
|  | VAT No.: CZ 708 83 858 |

## **Data of the Author of the Documentation**

|  |  |
| --- | --- |
| General designer: | Projekce dopravní Filip s.r.o. |
|  | Švermova 1338 |
|  | 413 01 Roudnice nad Labem, Czech Republic |
|  | Company ID No.: 287 14 792 |
| Authorised entity: | Ing. Josef Filip, Ph.D., Kollárova 2776, 413 01 Roudnice n. L., Czech Republic |
|  | Authorization No. 0401915 (ID00 traffic construction; II00 urban engineering) |

# 

# **INTRODUCTION**

The purpose of this study as such is to provide a draft transport concept for how to design the streets, signals and overall functioning of the area. Both road and tram transport need to be accounted for, and also cycling and pedestrian connections in the area. The conclusions of this study can serve as a basis for further stages of documentation.

The aim is to find a suitable arrangement of the Výtoň transport hub, which improves passability of the area for cyclists and pedestrians, creates prerequisites for the establishment of the new train stop Prague-Výtoň and its connection to the street network and also ensures sufficient capacity for all types of motor transport. The aims of this study do not include the design of the entire street profile, including materials and the design of the public space, but only the examination of transport concepts and their optimisation based on capacity calculations and preliminary discussions concerning traffic aspects with key actors in the permitting process. Due to the fact that the study is elaborated at the level of the transport concept without detailing materials and exact locations of curbs, tree lines and other elements of public space, this study was not discussed with other actors in the permitting process who also consider non-transport aspects (such as monument care). The transport concept must therefore be advanced in the next stages into a specific proposal for the street space design.

The aim of the study is to optimise the extent of car traffic and at the same time create a friendly space for cyclists and pedestrians that will ensure a quality connection between train and tram transport. At present, the area concerned is mainly a node for passenger vehicle traffic without any clear links to other modes of transport. Vehicles are routed under the individual arches of the bridge without a clear concept and turns are often indirect. Our designs explore several layout variations. When developing individual variants, we found out that it will be necessary to find a compromise solution that will be acceptable to all parties. The monument protection of the bridge does not lend itself to interventions that would clearly help to better design direct routes on Rašín Embankment.

The main qualitative requirement for improving the functioning of the area after the railway project will have been implemented has been the creation of a dignified space in front of the new Prague-Výtoň train stop in Svobodova Street. The variant that best meets the above requirements, is adequate in terms of capacity and is preliminarily acceptable (more details below) according to talks with key actors in the area is **option 4, hence the city recommends this option as a key reference basis for the architectural competition**.

Although the railway company is currently preparing to announce an architectural competition for the capacity-reinforced railway bridges, including their front zones, this document was prepared as a reference for the planned competition. The proposed design of the Výtoň area is principally shaped by the capacity limits of the road network and tram traffic, by the fact that 5 relatively busy streets open into the area and that several junctions and intersections are located close to each other here, making it in terms of a transport solution a relatively challenging task, which is additionally complicated by the condition of sufficient capacity for all modes of transport. Finding the optimal variant that is functional, offers sufficient capacity and is acceptable to key actors in the permitting process is a time-consuming task that strains the resources of participants. Due to this, the city opted to have this reference document prepared, with which participants can work further and advance it as a reference basis in developing a solution that is functional and meets the capacity requirements.

The presented summary document is a basis for the planned architectural competition for the design of the railway bridge at Výtoň and its surrounding areas. The document is chronologically divided into 2 parts.

Part 1 - contains the final preferred variant of the possible layout of the site including traffic engineering conclusions, and provides a summary perspective for how to approach other documents.

Part 2 includes the original variants tested. It also contains the most input data, including descriptions of abandoned variants. A total of 7 variants were proposed in the process, of which one variant has been selected.

The core aspect of traffic, meaning all types of traffic in the area concerned, is based on the assumption of removing (motor vehicle) traffic from Svobodova Street between Vyšehradská Street and Rašín Embankment and so creating a zone in front of the railway station. Under this condition, there is no other way than to add to the node of the current traffic lights SSZ 2.022 (see the diagram in Chapter 3) junction routes that make the node a junction with six-phase control as compared to today's three phases. The requirements for the new route directions, of course, remain the same in uncontrolled variants as well as in the resulting variant 4.

The summary document presented here is purposefully divided into the 2 chapters as specified above. Part 1 represents the conclusion of the effort as a whole, and because it summarises all the findings and recommendations, it is included first. It is also where variant 4 is selected and described. Part 2 provides an overview of possible layouts. The part explores initial considerations for all nodes with a view to different layout options - a comparison of options with controlled and uncontrolled intersections. Comprehensive analyses and inputs for the traffic engineering study are provided. It also includes a capacity assessment of possible traffic arrangements, which were prepared by Ing. Arch. Tomáš Cach.

The basis for reaching the conclusions of the entire traffic engineering study was the traffic survey of the area and the main thesis of the assignment, under which a sufficient capacity variant should be sought so that there can be a complete or partial exclusion of road vehicle traffic in the area of Svobodova Street between Vyšehradská Street and Rašín Embankment.

*Note: Part 2 contains in its document pool references to possible layouts of the bridge structure, which though do not principally impact the traffic concept. However, these are referential documents only for capacity assessment, as opposed to binding references for the competition itself. Any questions regarding individual parts must be explored with the Contracting Authority, which can then coordinate with the author of this document.*

# 

# **CURRENT STATUS**

In the introduction, we have provided a brief and concise description of the entire history of development of this traffic engineering study. Now in the next subchapters, the current status is to be outlined in terms of traffic.

* 1. **Rašín Embankment x Svobodova Street Junction**

This is a light-controlled junction with combined tram and road traffic. In the direction from Palacký Square, the road broadens into two directional lanes (straight and left turn) before the junction. Further also in this arm, there are boarding islands of the Výtoň stop. The width of the platforms is about 2.0 m. Neither the length nor width of the platforms is adequate to the needs of traffic. There is one lane in the direction of Palacký Square. Track used by tram lines 2, 3, 17 and 21 runs in a straight direction. Track used by tram line 7 turns left to Albertov. In the direction from Albertov, there are two turn lanes for left and right turns. The south arm of the junction (from Podolí) has only one joint turn lane for straight ahead and for a right turn. In the opposite direction, there is also one lane for straight ahead.

Access to tram stops and over the tram line on the northern arm of Rašín Embankment is provided by means of light-controlled crossings. Pedestrian connection at the other end of the platform is only for the Podolí direction, by a crossing behind Na Hrobci Street. In Svobodova Street, there is a light-controlled crossing of the tram track and turn lanes. The length of the crossing is at the limit of what is permitted by standards (17 metres).

The traffic lights SSZ 2.021 that control this junction are the main traffic lights in the Výtoň area. The junction is controlled dynamically with a preference for tram traffic and a variable cycle length. Command signals from these traffic lights coordinate the adjacent traffic lights SSZ 2.020 on the Rašín Embankment x Libušina Street intersection and SSZ 2.022 on the Svobodova x Vyšehradská Street intersection.

* 1. **Rašín Embankment x Vnislavova Street Junction**

There is a light-controlled junction between Rašín Embankment and Vnislavova Street. Vnislavova Street is partly one-way traffic in the current state. It is possible to turn right from the street into Rašín Embankment. The tram track is used by lines 2, 3, 17 and 21. In Vnislavova Street, there is a light-controlled pedestrian crossing, which is about 11 m long. Considered that this is a crossing over a one-way street with vertical parking, this is quite excessive. In the south arm of Rašín Embankment, there is another controlled crossing over the tram line and turn lanes about 15 m long.

* 1. **Rašín Embankment x Libušina Street Junction**

A further light-controlled junction is between Rašín Embankment and Libušina Street. From the side street (Libušina Street), there are two turn lanes for right and left turns. From Palacký Square it is possible to drive only straight ahead - in the Podolí direction, and it is not possible to turn left into Libušina Street. From the south it is possible to drive straight ahead or turn right (separate turn lanes). The right turn is separated by a protective island that divides the pedestrian crossing. Tram traffic on Rašín Embankment includes lines 2, 3, 17 and 21.

All crossings at this junction are light controlled. On the northern arm of the embankment, there is a crossing about 12 metres long. In Libušina Street, the crossing is divided by an island into two parts with lengths of 5 m and 15 m respectively. The second part exceeds in length the standard-based limit of 12 m for controlled crossings that do not pass a tram line.

The traffic lights SSZ 2.020 are controlled dynamically with a preference for tram traffic and a variable cycle length. The traffic lights are coordinated with SSZ 2.021 using command signals.

* 1. **Libušina x Vratislavova Street Junction**

This is an uncontrolled junction. In this case, Vratislavova Street is a side road with a routing island. Movements in all directions are allowed at the junction. There is only one lane on all arms. Pedestrian crossings in Libušina and Vratislavova Streets are not controlled by traffic lights. However, the length of the crossing in the street is almost 11 m (over two driving lanes and two parking lanes). The crossing in Vratislavova Street is even longer at around 18 m due to vertical parking. The pedestrian connections at this intersection are not very well arranged.

* 1. **Vnislavova x Libušina x Vyšehradská Street Intersection**

This light-controlled intersection has from Vnislavova Street in the direction from the embankment a single lane for both driving straight ahead and turning right. This means that it is not possible to turn left at the intersection into Vyšehradská Street. There are two turn lanes from Vyšehradská Street under the railway bridge, one for driving straight ahead and turning right and the other for turning left. Vnislavova Street in the direction from Albertov also has two driving lanes - one for driving straight ahead and the other for turning right. From this direction, it is not possible to turn left into Libušina Street. From Libušina Street there is one joint turn lane for driving straight ahead and turning right. East of this intersection, it is possible to turn into Neklanova Street, which is a one-way lane (in the direction of Albertov).

Pedestrian crossings are at all arms of the intersection except the road under the Výtoň Bridge. These are light-controlled crossings and their length in all cases is about 11 m.

The intersection is part of traffic lights SSZ 2.022 that control the intersection together with the Svobodova x Vyšehradská Street intersection. The traffic lights are coordinated with the traffic lights SSZ 2,020 at the Rašín Embankment x Svobodova Street intersection.

* 1. **Svobodova x Vyšehradská Street Intersection**

This is a light-controlled intersection, with a single lane in Svobodova Street for both turning right and driving straight ahead. There are two turn lanes from Vyšehradská Street - one combined for straight direction and for turning right, and one for straight ahead only. In the direction from Albertov, road traffic partly uses the tram line. There is a single lane for driving straight ahead and for turning right. Under the railway bridge there is a single lane for driving straight ahead and turning right. All left turns are restricted at the intersection. The tram track traversing Svobodova Street is used by line 7.

Here as well, pedestrian crossings are at all arms of the intersection except the road under the bridge. They are light-controlled and the length in the western branch of Svobodova Street across the tram line is about 17 m, which is at the limit according to applicable standard for designing local roads (ČSN 73 6110). In Vyšehradská Street, there is a crossing about 11 m in length and the crossing in the western branch of Svobodova Street is about 9 m long.

The intersection is part of traffic lights SSZ 2.022 that control the intersection together with the Vnislavova x Libušina x Vyšehradská Street intersection. Dynamic control with a preference for tram traffic is coordinated with traffic lights SSZ 2.020 at the Rašínovo nábřeží x Svobodova Street intersection.

* 1. **Svobodova x (under the bridge) x Vnislavova Street Intersection**

A short section of road under the railway bridge interconnects Svobodova and Vnislavova Streets. These are two non-light-controlled junctions located next to each other. Movements in all directions are allowed at the intersection of Svobodova Street and ‘under the bridge’. The second junction is limited by the one-way part of the street, which begins with the road under the bridge towards Rašín Embankment. This means that under the bridge, it is possible to turn both left and right. From the two-way part of Vnislavova Street, it is possible to drive straight ahead or to the right under the bridge. There is a bent road with driving priority that leads from the eastern arm of Vnislavova Street under the bridge. The one-way section of Vnislavova Street is designated as a side road. The tram track in Svobodova Street is used by line 7.

Pedestrian connections in the form of pedestrian crossings are on both sides of the bridge at the junction between Vnislavova and Svobodova Streets. They are not light controlled and their length is about 10 m each.

* 1. **Rašín Embankment x Na Hrobci Street Junction**

In the area concerned, there is also the possibility of turning from Rašín Embankment into the one-way Na Hrobci Street. The tram track is in this section is used by lines 2, 3, 17 and 21. The pedestrian crossing in this street is 6 m long.



# 

# **BRIEF DESCRIPTION OF THE SELECTION OF THE MAIN VARIANT FOR THE COMPETITION**

In preparing Part 2, individual variants of transport solutions were sequentially developed and assessed. This was always done with a view to maximum possible attention to improving the conditions for movements of cyclists and pedestrians in the area of the future interchange hub.

The variants were identified numerically in ascending order and from these, the sc. most suitable variant (which is variant 4) was selected. In our effort, we proceeded so that any solutions could be combined with each other.

We also proceeded in Part 2 to the assessment of a new alternative variant, the author of which was Ing. Arch. Tomáš Cach. Since its original version did not meet the capacity requirements (due to crossing placements), we proceeded to calculations with the crossings removed in a one-by-one approach. However, the complexity of the two close nodes A and B and their close proximity to each other finally led to the exclusion of the variant from the point of view of capacity needs. The design only was sufficient in terms of capacities with absent pedestrian crossings. Such variant would actually match the current state.

After elaborating part 2, therefore the design direction towards the sc. variant 4 was confirmed. This variant has nodes A and B not light controlled. Furthermore, the roundabout significantly reduces the extent of the areas for vehicles.



|  |  |
| --- | --- |
| Legenda - inženýrské sítě: | Description - utilities: |
| Plynovodní řad STL - stávající | STL gas pipeline - existing |
| Sdělovací kabel - stávající podzemní (CETIN) | Communication cable - existing underground (CETIN) |
| Sdělovací kabel - stávající podzemní nezaměřený (CETIN) | Communication cable - existing underground, non-surveyed (CETIN) |
| Sdělovací kabel - stávající optický, podzemní (CETIN) | Communication cable - existing underground optical (CETIN) |
| Sdělovací kabel • stávající optický, podzemní neprovozovaný (CETIN) | Communication cable • existing underground optical, not in use (CETIN) |
| Elektro NN - stávající podzemní (PRE) | Low-voltage power cable - existing underground (PRE) |
| Elektro NN - stávající podzemní vyřazený (PRE) | Low-voltage power cable - existing underground, decommissioned (PRE) |
| Elektro VN - stávající podzemní (PRE) | High-voltage power cable - existing underground (PRE) |
| Elektro VN - stávající podzemní vyřazený (PRE) | Low voltage power cable - existing underground, decommissioned (PRE) |
| Sdělovací kabel - SDK metalický, stávající podzemní (PRE) | Communication cable - existing underground SDK metallic (PRE) |
| Sdělovací kabel - SDK metalický, stávající podzemní vyřazený (PRE) | Communication cable - existing underground SDK metallic, decommissioned (PRE) |
| Sdělovací kabel - OPTO, stávající podzemní (PRE) | Communication cable - existing underground OPTO (PRE) |
| Sdělovací kabel - stávající optický podzemní (T-Mobile) | Communication cable - existing underground optical (T-Mobile) |
| Sdělovací kabel - stávající podzemní (ČD Telematika) | Communication cable - existing underground (ČD Telematika) |
| Vodovod • stávající | Water mains • existing |
| Kanalizace bez rozlišení druhu - stávajíc | Sewerage system without distinction of type - existing |
| Kanalizace dešťová - stávající | Sewerage system for rainwater - existing |
| Kanalizace jednotná - stávající | Joint sewerage system - existing |
| Veřejné osvětlení podzemní - stávající | Public underground lighting - existing |
| PROJEKCE DOPRAVNÍ | TRAFFIC PROJECTION |
| Zakázka | Order |
| DOPRACOVÁNÍ DOPRAVNÍHO ŘEŠENÍ NA VÝTONI | FINALISING THE TRAFFIC SOLUTION AT VÝTOŇ |
| Jméno přílohy | Annex designation |
| SCHÉMA UZLŮ | LAYOUT OF NODES |
| Měřítko | Scale |

The reasons for choosing variant 4 were the following:

* Intersection areas are not as large as would be for light-controlled intersections, roads do not pose such a major barrier.
* Crossing roads involves smaller delays compared to light-controlled variants.
* A high-quality transfer link is proposed from the train stop to key tram stops (Rašín Embankment).
* The area of Svobodova Street between Vyšehradská Street and Jaroš Embankment can be designed as a motorless road, i.e., a zone without motor vehicle traffic. Its use though does not necessarily have to be as a pedestrian zone only. The space in front of the train stop naturally connects to the area around the former customs office house and the Prague embankments.
* The variant allows in terms of space for possible interconnection of nodes A and C via Svobodova Street, should there be such need in the future.
* The roundabout design of the Vnislavova intersection allows in contrast to light-controlled intersections movement in all directions.
* Passenger vehicle traffic is smoother as nodes A and B are not controlled by traffic lights.
* Alternatively, the tram line can lead to Rašín Embankment outside a classic intersection with traffic lights. This can also be replaced by classic control with traffic lights.
* The variant meets the capacity requirements.

Details of the selected variant and its comprehensive description are included in part 2. The status description provided to the participants is the final and completed variant 4 that accommodates inputs from the series of discussions that have taken place. The key points from the final discussions are:

* The main street is in the axis of Svobodova Street.
* The beginning of the area with restricted motor traffic is shifted so that at the junction of Vyšehradská and Svobodova Streets, an intersection is created that will allow undisturbed tram traffic from the viewpoint of driving priorities.
* The roundabout has been reduced in size to accommodate a cycling path around its perimeter to route cyclists in the connected traffic area.
* Node C1 will be controlled in accordance with the conclusions of the discussions with PKD by traffic lights.



|  |  |
| --- | --- |
| Legenda: | Key: |
| Navržená hrana - obruba | Proposed edge - curb |
| Hranice řešené oblasti | Limits of the area concerned |
| Osa tramvajové koleje | Tramline axis |
| Vodorovné dopravní značeni | Road surface markings |
| Vozovka - asfaltobeton | Roadway - asphalt concrete |
| Parkovací stáni - kamenná dlažba | Parking space - stone paving |
| Dlážděné chodníkové plochy | Paved sidewalks |
| Nástupní ostrůvek tramvajové trati | Boarding island of the tram line |
| Nezpevněné plochy | Unpaved surfaces |
| Ochranné ostrůvky - dlážděné Prostor tramvajové trati v pěší zóně Rozhledové trojúhelníky - přechod | Protective islands - paved Area of the tram line in the pedestrian zone Sight triangles - crossing |
| Střed OK | Tramline axis centre |
| Srpovitá krajnice | Sickle-shaped curb |
| Dopravní režim | Traffic mode |
| Křižovatka světelně řízená | Light-controlled junction |
| POSUN SLOUPŮ VO A ZELENĚ PRO VYTVOŘENÍ SAMOSTATNÉHO JÍZDNÍHO PRUHU OD ALBERTOVA | SHIFTING STREET LIGHT POLES AND GREENERY TO CREATE A SEPARATE LANE FROM ALBERTOV |
| SCHEMATICKÉ ZOBRAZENÍ VDZ PŘECHODU PRO CHODCE PŘES TRAMVAJOVOU TRAŤ | SCHEMATIC VIEW OF PEDESTRIAN CROSSING WITH ROAD SURFACE MARKINGS OVER THE TRAM TRACK |
| NÁVAZNOST ÚPRAV NENÍ SOUČÁSTÍ STUDIE | THE SEQUENCE OF THE EARTHWORKS IS NOT PART OF THE STUDY |
| PŘÍMÁ VAZBA TRAM X VLAK | DIRECT LINK TRAM X TRAIN |
| PROSTOR MOŽNÉ VYUŽÍT PRO HDV/ZELEŇ | SPACE CAN BE USED FOR HDV / GREENERY |
| ZÁSAH DO STROMOŘADÍ | INTERVENTION IN TREE LINE |
| ROZŠÍŘENÍ NÁSTUPNÍCH OSTRŮVKŮ | EXTENSION OF BOARDING ISLANDS |
| VÝJEZD CYKLISTŮ Z NÁPLAVKY | EXIT OF CYCLISTS FROM THE EMBANKMENT |
| POJÍŽDĚNÍ TRAMVAJOVÉ TRATI SMĚR CENTRUM | MOVEMENTS ON THE TRAM LINE IN THE DOWNTOWN DIRECTION |
| ZVÝŠENÍ PODJEZDNÉ VÝŠKY MOSTU (SAMOSTATNÁ PD) | INCREASE OF BRIDGE UNDERPASS CLEARANCE HEIGHT (SEPARATE PD) |
| schemATIckÉ ZobrazenÍ vdz přechodu PRO CHODCE PŘES TRAMVAJOVOU TRAŤ | SCHEMATIC VIEW OF PEDESTRIAN CROSSING WITH ROAD SURFACE MARKINGS OVER THE TRAM TRACK |
| VEDENÍ CYKLISTŮ V HDP | ROUTING CYCLISTS IN HDP |

# 

# **TRAFFIC ENGINEERING VIEW AND THE PREFERRED VARIANT**

* 1. **Brief Traffic Engineering View**

The current state with a system of light-controlled intersections is conducive to both motor traffic and tram public transport. By using traffic lights, we are able to prefer tram traffic. At the same time, however, more nodes and underpasses under the existing track allow the division of traffic flows so that they do not interfere with each other and do not reduce the passability of the section as a whole. The division also reduces the length of tailbacks. A clear and negative aspect of the current status as a whole is the need to wait in order to cross the road and the absence of more transverse connections for pedestrians across the area. As for cycle traffic, there is an obvious lack of interconnected cycle paths across the area. This state though cannot be accepted into the future, not only because of the barrier effect for cyclists and pedestrians, which is due to a system of roads optimised for motor vehicle traffic, but precisely because of the construction of the new train stop, an integral part of which is providing logical and quality pedestrian connections.

As regards the current situation, we would like to point out the absence of a crossing in the area of the underpass under the track in the section of Vyšehradská Street. Specifically the presence of another underpass closer to the waterfront would facilitate this as is, and it is therefore a great pity that this is not already the case. By confining traffic to fewer nodes - in any considered variant (i.e., to nodes A, B, C - with the absence of an underpass in the middle of the Vyšehradská Street- embankment distance), we cancel this possibility of creating a crossing for good and provide only for the possibility of a protected road crossing, in the form of an island in the preferred variant.

Thus precisely for the above reasons, a traffic engineering view is necessary in order to best improve the conditions of pedestrian and cycle traffic and public transport while at the same time not compromising the capacity of individual nodes for motor vehicle traffic. For this reason, this study was prepared in order to examine a variety of possible transport concepts and select the best one in terms of both the capacity it offers and functionality of pedestrian and cycle links.

* 1. **Preferred Layout Variant and Its Transport Layout Aspects**

Compared to the current status, the chosen variant improves the situation for pedestrian and cycle traffic and for the potential train-tram transfer link. From the viewpoint of passenger vehicle traffic and tram transport, however, the benefits are not so clear-cut. The chosen variant is definitely more suitable compared to light-controlled variants. There are no traffic delays at low hours, the junctions are smaller in size and allow movements in all directions from a smaller area. At the same time, however, due to the closure of Svobodova Street, the tailback may temporarily swell up to the passable part of Svobodova Street, towards Albertov. The tailback length aspect thus also must be taken into account in future proposals.

As for arrangement in the zone with restricted motor traffic, we suggest placing the boarding edges of the stops in both directions. The edge of the stop is sufficiently offset so that the whole zone can be made passable via the sc. Vienna-style stops. In node C1, however, allowing this passage can lead to difficult movement of pedestrians and the need to control the entire node C (including Vnislavova Street) via traffic lights, which impairs pedestrian movement when accessing the train stop and changing to trams. The PKD requirement to control node C1 with traffic lights is mentioned for all variants.

# 

# **DISCUSSION OF VARIANTS, RECOMMENDATIONS FOR THE COMPETITION**

When preparing the studies, they were discussed on an ongoing basis with the selected bodies concerned. The meetings were always conducted separately with the selected representative concerned. A summary meeting with all the authorities concerned was not held. Comments were acted upon and the resulting preferred variant thus is a proposal that partly accommodates the comments made. Non-inclusion of some comments in the proposal does not have an effect on the capacity calculation and capacity certificate of individual nodes.

* 1. **Conclusions from the Discussion**

Both Part 1 and Part 2 were discussed on an ongoing basis. Due to the pandemic situation, most meetings were held remotely, using online conferencing tools. In the meetings, the participants were sent the reference documents and also layout drawings and conclusions from capacity calculations were shared.

The meetings were held with the following organisations (without distinction of Parts).

* Traffic Inspectorate of the Police of the Czech Republic - mentioned the issue of routing the tram line in Svobodova Street from a place off the road, requirement for the location of the island. This requirement has been incorporated into the recommended variant.
* Městská část Praha 2 (district municipal authority) - draws attention to possible tailbacks in the proposed roads, but joins the opinion that this effect concerns the whole road network without being causally linked to the area concerned. Points out the proximity of a school and vital safety aspects.
* Regionální organizátor pražské integrované dopravy, p. o. (coordinator of Prague Integrated Transport) - mentions possible delays in tram traffic and also the possibility of moving the zone with restricted motor traffic to Vnislavova Street.
* Dopravní podnik hl. m. Prahy (DPP; Prague public transport provider) - requires that the tram does not leave the zone with restricted motor traffic in Svobodova Street as an offroad place but as a vehicle on the main road (driving priority). Therefore, the design was modified so that the part at least 20 m long before connecting to the intersection will be led as a road. The intersection thus will be four-way, with a ban on entering the dead-end way in Svobodova Street. DPP further also requires that the main road be led in the axis of Svobodova Street. The risk of a possible tailback in the exit from the roundabout will be tested by microsimulation. DPP further requires to lead passenger vehicle transport also in the Svobodova Street section between Vyšehradská Street and Rašín Embankment. This requirement was not incorporated, as the capacity calculations proved the functionality of the proposed solution without this bypass road, which would significantly reduce the quality of the space in front of the new train stop.
* PKD MHMP - after separate negotiations with PKD MHMP, they pointed out the need to control node C1 with traffic lights. This recommendation should be accepted in the follow-up stages. The disadvantage of the solution is the need to control the transfer links from the sidewalk to the tram stops on Rašín Embankment. We point out that the non-controlled variant of this option is implemented on Palacký Square.
  1. **Recommendations of the Traffic Engineering Study for Finalising Aspects**
* The position of the axes of the tram tracks in the front zone of the future train stop should be chosen so as to facilitate a potential vehicle traffic in the Svobodova Street section from Vyšehradská Street to Rašín Embankment.
* When vehicles from Svobodova Street cross the tram line, it is necessary to account for necessary measures to be proposed in order to prevent parking of vehicles on the tram line.
* Change the routing of the tram line up to Vinařického Street so that tram traffic is not obstructed by vehicles parking in the tram line.
* For accessing light-controlled intersections in nodes A and B, it is necessary to account for six-phase control, due to the very close proximity of the two nodes and also due to the increase in the number of movements at the intersections. For this reason as well, the roundabout option is the more suitable alternative, although it generates a tailback at peak times.
* Purely from the point of view of the developer, notwithstanding the opinion of the Contracting Authority, we would like to recommend exploring the possibility of interconnecting Na Slupi and Vnislavova Streets in the place of the existing underpass. This measure would make it possible to move the main traffic flow from the Nusle area, which is currently routed to the embankment via Svobodova Street. By merging these traffic flows outside the area concerned, they could be moved distinctly away from Na Slupi Street to Rašín Embankment.

.



|  |  |
| --- | --- |
| Legenda: | Key: |
| Navržená hrana - obruba | Proposed edge - curb |
| Hranice řešené oblasti | Limits of the area concerned |
| Osa tramvajové koleje | Tramline axis |
| Vodorovné dopravní značení | Road surface markings |
| Vozovka - asfaltobeton | Roadway - asphalt concrete |
| Parkovací stání - kamenná dlažba | Parking space - stone paving |
| Dlážděné chodníkové plochy | Paved sidewalks |
| Ochranné ostrůvky - dlážděné | Protective islands - paved |
| Prostor tramvajové trati v pěší zóně | Area of the tram line in the pedestrian zone |
| Střed OK | Tramline axis centre |
| Srpovitá krajnice | Sickle-shaped curb |
| Dopravní režim | Traffic mode |
| Křižovatka světelně řízená | Light-controlled junction |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| **TRAFFIC PROJECTION** | Order | Annex designation | Scale | Annex No. |
| **FINALISING THE TRAFFIC SOLUTION AT VÝTOŇ** | **LAYOUT OF THE PREFERRED TRAFFIC ENGINEERING SOLUTION** | **1: 1,000** |  |
|  |  |  |