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Concept for the tram line Głębocka Street - Olszynka Grochowska Route to the North Bridge Route with crossing of Trasa Toruńska Route

CONSPECTUS

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I. INTRODUCTION 3

1. SUBJECT OF THE CASE STUDY 3
2. LEGAL BASES 3

II. PROJECT DESCRIPTION 3

1) LOCATION 3
2) BACKGROUND INFORMATION AND AIMS OS STUDY 3

III. I STAGE OF THE PROJECT 4

1) VARIANTS DESCRIPTION 4
   a) Park+Ride parking site and the transfer nodes 4
   b) Variant 1 5
   c) Variant 2 5
   d) Variant 3 5
   e) Variant 4 6
   f) Variant 5 6

IV. II STAGE OF THE PROJECT 7

2) VARIANTS DESCRIPTION 8
   a) Park +Ride parking Site and the transfer nodes 8
- OPTION 1 NORTH VARIANT 8
- OPTION 2: SOUTH VARIANT 8
- CONECTION WITH THE TRAM LINE AND OTHER MEANS OF PUBLIC TRANSPORT 9

   b) Variant1 9
   c) Variant 3 9
   d) Variant 4 10
   e) Subvariants 10
- SUBVARIANT 3/4 10
- SUBVARIANT PRZEJAZD UL. DERBY – PODŁUŻNA 10
- SUBVARIANT: PRZEJAZD UL. SKARBKA Z GÓR 10
- SUBVARIANT: ALTERNATIVE LOCATION OF THE BUS STATION 11
- SUBVARIANT ADDITIONAL BOARD IN FRONT OF THE TOG/TMP JUCTION 11
- SUBVARIANT: ALTERANTIVE LOCATION OF THE TRAM TURN LOOP. 11

V. SUMMARY 12

I. Introduction

1. Subject of the case study

Subject of this case study is concept for the tram line Głębocka Street - Olszynka Grochowska Route to the North Bridge crossing Toruńska Route.

2. Legal bases

Legal bases for this document is contract from the 12th of March 2012 for the study on Concept for the tram line Głębocka Street - Olszynka Grochowska Route to the North Bridge crossing the Toruńska Route between Capital City of Warsaw and DHV Polska Sp. z o. o. which was a result biding for public procurment.

II. Project description

1) Location

Project for the Concept for the tram line Głębocka Street - Olszynka Grochowska Route to the North Bridge crossing the Toruńska Route is located in the Capital City of Warsaw in the Targówek and Białołęka quarters.

2) Background information and aims os study

Study on the transport system for the east part of the Białołęka quarter from 2010 showed importancy of the tram line in św. Wincentego Street, Głębocka Street and Olszynka Grochowska Route for the fast developing east part of quarter. Study including technical information for the Olszynka Grochowska Route in the section from Przewodowa Street to the north boundaries of the city conducted in the 2008 confirm possibility of building a line in the Olszynka Grochwoska Route between junction for Głębocka Street /św. Wincentego Street/ S8 Raod and the North Bridge junction. Building plan for Św. Wincentego and Głębocka Street includes additional space for the future tram line in section from Matka Teresa z Kalkuty Street to the entrance of the Targówek Shopping Center. None of those plans specified the best solution for location of the tram line from S8 Road junction (Toruńska Route and Armi Krajowej Route) to Głębocka Street /św. Wincentego Steet/ and the transfer node. Tram line in Olszynka Grochowska Route will be connected with the tram line in the North Bridge Route which is planed by the Study of land use conditions and directions. This

document places the turning loop and the transfer node in the North Bridge and Ostródzka Street junction. During process of preparation of the land use plans problems with finding the solution for the intersection of the Olszynka Grochowska Route and Berenson's Street occurred. Therefore, a complex analysis was needed.

The main aims of the Study are:

Concept for the situation and height solution in the św. Wincentego Street – Głębocka Stret – Olszynka Grochowska Route in the section from Malborska Street to the planed North Bridge Route with the tram line and transfer node in the vicinity of S8 Road as well as location of the additional areas.

III.I Stage of the Project

First Stage of the Project included analysis of the 5 variants of the tram line and associated infrastructure location.

It the analyzed sections there are no collisions with buildings.

1) Variants Description

a) Park+Ride parking site and the transfer nodes

Due the undeveloped area availability there are two variants for the location of the Park+Ride parking site and the transfer node. One of them placed in the north side of the Toruńska Route between Głębocka and board to the Toruńska Route and Olszynka Grochowska Route junction (entrance and exit in Głębocka Street), second placed in the south side of the Toruńska Route east from the Głębocka Street in the allotments site (entrance and exit in Toruńska Street or Głębocka Street). Due to its functionality the first variant is preferable. This variant will reduce time of drive to the Park+Ride parking site in the morning rush hours and minimize collision between most popular transport means.

North Variant

Variant includes building of the three storey parking building of total capacity of 2 500 cars.

South Variant

Variant includes building of the three storey parking building of total capacity of 2 600 cars, except variant 5 with parking building for 2 250 cars.

Conection between tram line and other public transport means.

In the North Variant Park+Ride parking site is linked with stops located east side of a roundabout connecting Jesiennych Liści Street, Głębocka Street and Olszynka Grochowska Route.

In the South Variant location of the Park+Ride parking site is linked with tram line stops placed in the west side of the parking site in variants 1, 2 , 3, 4 or stops located in the level -1 of Park+Ride parking site in the variant 5.
There is additional area left for the future bus station in the near vicinity of the tram turning loop south side of the Toruńska Route.

b) Variant 1

Tram line begins in intersection with Malborska Street and leads in the lane divider in Głębocka Street to the intersection with the entrance to the Tagówek Shopping Center site. Futher, it crosses interaction and leads in the lane divider in Głębocka Street. In this section it is located in the -1 level and goes trough the tunnel under east roadway in Głębocka Street and by – pass board to the Głębocka and Toruńska Route intersection. In the vicinity of the Toruńska Route starts tunnel of 585 m length which leads under Toruńska Street and area north of it. Tunnel ends and tram line goes in the lane divider in Olszynka grochowska Route. In this variant there is collision of the line and a shop building. Next, the tram line lead in the lane divider in Olszynka Grochowska Route to the temporary turn loop placed in the demarcation lines of Route in the north side of the North Bridge Route junction. This variant allows realization of both locations of the Park+Ride parking side. The north location is considerd to be most preferable due to the possibility of connecting it with the uhnderground tram stop in the tunnel section. In this variant turn loop in the east side of the Toruńska Route was not considerd.

c) Variant 2

Tram line begins in intersection with Malborska Street leads in the lane divider in Głębocka Street to the intersection with the entrance to the Tagówek Shopping Center site. In the intersection it crosses east roadway and goes east side of Głębocka Street. There is possibility of turn loop localization in this section. Futher the line route overlaps variant 1. However, it is located in the +1 level which crosses Toruńska Route and areas located in its north on trestle. The tram stop is also lacated on the trestle. Other elements of the project have the same localization as in variant 1.

d) Variant 3

Route of the tram line to the vacinity Toruńska Route overlaps with the variant 2. Futher section of the line including crossing of the Toruńska Route and Głębocka Street on the trestle is modification of the variant 2 which allows omitting collision with the shopping

building. Road goes in the lane divider in Olszynka gGochowska Street and ends north side of the Berenson's Street with the temporary turn loop.

e) Variant 4

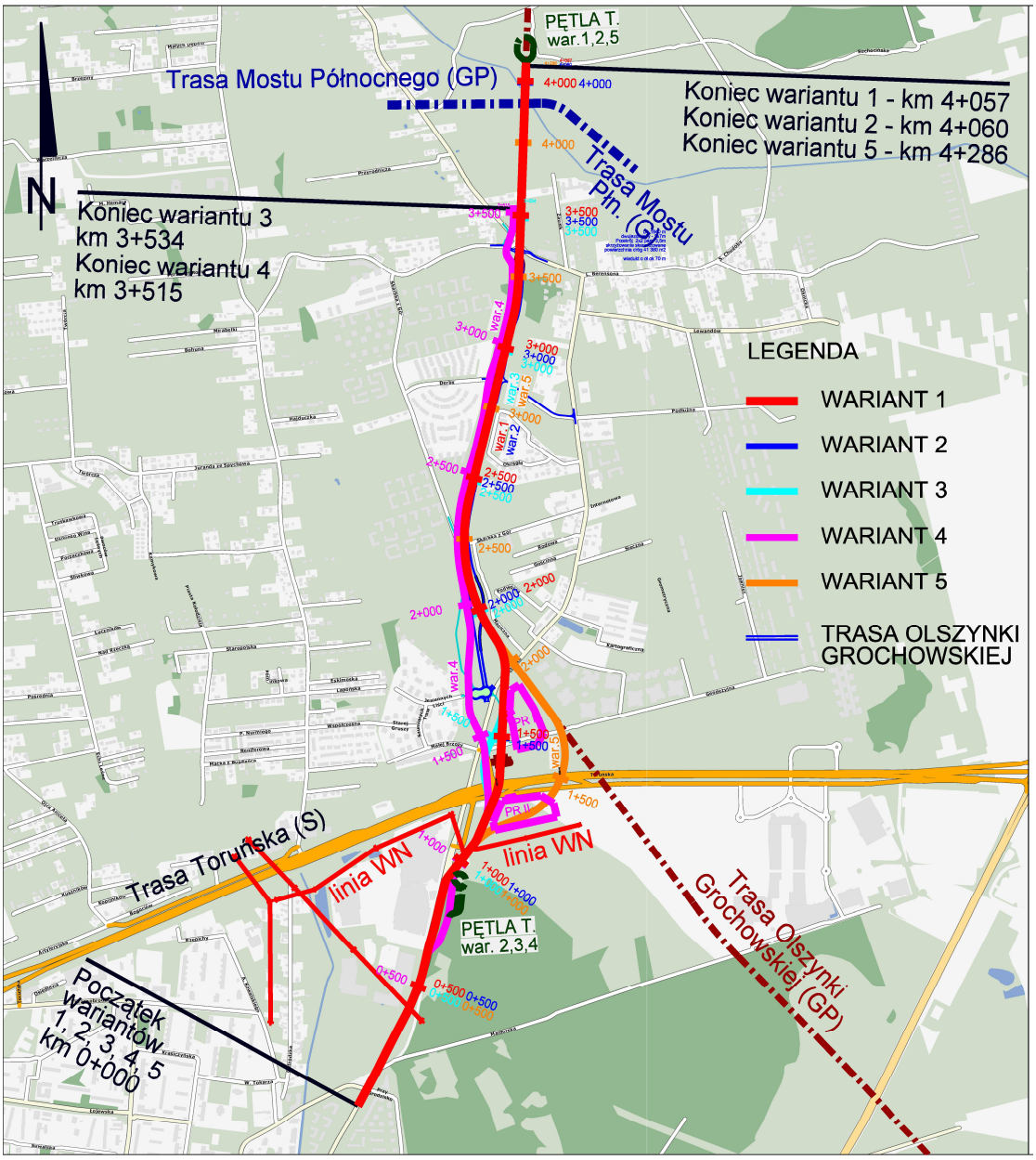
East of the Toruńska Route variant 4 overlaps with the variant 3. It crosses Toruńska Router on the trestle on the +1 level which allows omitting collision with the shopping building. Further section is modification of variant 3. Trestle goes west and crosses Głębocka and Jesiennych Liści Street. Trestle ends east side of the Oszynka Grochowska Route. Concept includes two options of location of this section. Tram line leads in the additional area for Olszynka Grochwoska Route. In the vicinity of the Bernson's Street intersection retortion of the tram line Which will allow reducing collision with the street network to one and secure area for vechicals leaving the intersection that could have been stopped by passing tram. Tram line ends in the north side of the Bernsons's Street with the temporary turn loop.

f) Variant 5

Tram line overlaps variant 1 to the crossing of the east roadway of Głębocka Street in the tunnel. Line lead to the future Toruńska Route and Olszynka Grochowska junction, crosses it in the tunnel (576 m length) and comes to the surface in the lane divider of Olszynka Grochowska Route. It goes in the lane divider to the the temporary tram turn loop located north side of the North Bridge Route junction.

This variant allows realization of both locations of the Park+Ride parking side. In the first one tram stop is located in the -1 level of the parking site, in the second one tram is located in the tunnel under Toruńska Route and Olszynka Grochowska Route linked with parking with the collisionfree crossing.

Variants of the first stage of the analysis.



IV. II Stage of the project

I stage of the Project included analysis of the 5 variants of the tam line and assisted infrastructure location. It allowed choosing three variants which were developed, modified, analyzed and evaluated in the II stage. Chosen solutions based on the I stage evaluation and included modifications resulting from the comments made by the Investor, authorities and discussion held after the presentation of the report, as well as being the result of further and

more detailed design work. In order to avoid confusion naming of the variants were left from the I Stage. In the II stage variants 1, 3, 4 design and evaluated

2) Variants description

a) Park +Ride parking Site and the transfer nodes

Due the the undeveloped area availability there were two variants for the location of the Park +Ride parking Site and the transfer node. On of them placed in the North side of the Toruńska Route between Głębocka and board to the Toruńska Route and Olszynka Grochowska Route junction (entrance and exit in Głębocka Street), second placed in the south side of the Toruńska Route east from the Głębocka Street in the allotments site ((entrance and exit in Toruńska Street or Głębocka Street). Due to its functionality the first variant is preferable. This variant will reduce time of drive to the Park+Ride site in the morning rush hours and minimize collision between most popular transport means.

- Option 1 North Variant

Park+Ride Parking Site is located in the north side of the Toruńska Route with the entrance from Głębocka – Jesiennych Liści Roundabout. Variant includes building of parking building of total capacity of 1 700 cars. Parking site can be entered by road connected with the Głębocka Street and road from Lesiennych Liści Roundabout serving Park+Ride Roundabout and Shopping Center. From the south from Olszynka Grochowska Route entre road is located in the board of Olszynka Grochowska junction to Toruńska Route and futher like to Toruńska Route.

From other directions (Głębocka Street, Jesiennych Liści Street. Olszynka Grochowska Route from north side) entrance to the parking site is provided by Głębocka – Jesiennych Liści Roundabout. On the other side of the entering road to the Park+Ride site bus station is located which will serve bus lines to and from the transfer node

- Option 2: South variant

In option 2 Park+Ride is located in the south side of the Toruńska Route with the entrance roadway located parallel to main roadway. Variant includes building of three storey parking building of total capacity of 2 500 cars. From the Toruńska Route the Parking site can be entered from the entering road and Głębocka Street (east).

From the south side of Olszynka Grochowska Route parking site can be entered by board of Olszynka Grochowska junction.
From other directions entrance to the parking site is provided by Głębocka Roundabout in the east side of Toruńska Route.

- Conection with the tram line and other means of public transport

In north variant Park+Ride is linked with bus stops located in the east side of Głębocka – Jesiennych Liści Roundabout.
South variant connection with the tram line is provided by stops located above or under Toruńska Route. Bus station is located in the east side of road to the Park+Ride parking site in option 1 creating with the tram stops transfer node. Location of the bus station provides transport from passangers from east part of Białołeka without tram connection.

b) Variant1

Tram line begins in intersection with Malborska Street leads in the lane divider in Głębocka Street to the intersection with the entrance to the Tagówek Shopping Center site. Futher, it crosses interaction and leads in the lane divider in Głębocka Street. In this section it is located in the -1 level and goes trough the tunnel under east roadway in Głębocka Street and by – pass board to the Głębocka and Toruńska Route intersection. Tunnel comes to the surface in the lane divider in Olszynka Grochowska Route and lead to the temporary turn loop placed in the demarcation lines of Route in the north side of the North Bridge Route junction. This variant allows realization of both locations of the Park+Ride parking side. The north location is considered to be most preferable In this variant turn loop in the east side of the Toruńska Route was not considerd.

c) Variant 3

Route of the tram line to the vacinity of the Bernsons's Street overlaps with the variant 1.
Variants vary in the solution chosen for crossing of the east side of Głębocka Street. In variant 3 the option with the crossing in the ground level and a trestle over Toruńska Route and Głębocka Street were proposed. Same as in variant 1 line omits shopping building. Change of height relations cause need of use of excavation (-1 level) for the Olszynka Grochowska Route which will go under Głębocka Street (0 level). This option was consider to be most preferable due to the residential building located in the close vicinity to the Głębocka. Further tram line lead in the lane divider and ends north from Bernson's Street in temporary turn loop.

d) Variant 4

East of the Toruńska Route variant 4 overlaps with the variant 3. It crosses Toruńska Route on the trestle on the +1 level which allows omitting collision with the shopping building. Further section is modification of variant 3. Trestle goes west and crosses Głębocka and Jesiennych Liści Street. Trestle ends east side of the Oszynka Grochowska Route. Similar to the variant 3, variant 4 leads in excavation (-1 level) for the Olszynka Grochowska Route.

Concept includes two options of location of this section. Tram line leads in the additional area for Olszynka Grochwoska Route. In the vicinity of the Bernson's Street intersection retortion of the tram line Which will allow reducing collision with the street network to one and secure area for vechicals leaving the intersection that could have been stopped by passing tram. Tram line ends in the north side of the Bernsons's Street with the temporary turn loop.

e) Subvariants

For the base variants as a supplementary material for further analysis subvariants were prepared.

- Subvariant 3/4

Subvariant is combination of 3 and 4 variant. South from the Głębocka – Jesiennych Liści Roundabout the tram line golas as in variant 4. In lane of Olszynka Grochowska Route as in variant 3 (in the lane divider). Combination of those two variants requires increasing the length of the trestle of 200 m. Therefore, the trestle can cross oszynka grochowska Route west roadway.

- Subvariant Przejazd ul. Derby – Podłużna

After remarks made for the I Stage a subvariant including building the passage under Olszynka Grochowska Route pursuant to the concept by BPRW in 2008 was proposed.

Allowing of passage between this two local Road creates junction with the GP Street. This junction is connected with the Olszynka Grochowska Route's in/off lane roads from Bernson's Street and characterized by imperfect geometry which is dangerous for the traffic safety.

- Subvariant: Przejazd ul. Skarbka z Gór

After remarks that there is need to communicate areas lying both sides of the Olszynka Grochowska Route it was noticed Derby – Podłużna streets are located 500 m south of the Berenson's Street. Between intersection of those roads and Olszynka Grochowska Route and Głębocka Street passage between both sides of the Route will be provided. Distance between those passages is 1110 m. In the opinion of authors of this dicument road passage in section

south of Derby – Podłużna Streets is more needed. Therfore, subvariant with the Road passage under Olszynka Grochowska Route connecting roads: Skarbka z Gór Street and Magiczna Street.

- Subvariant: Alternative location of the bus station

During anylysis of localiztion of the bus station near the Park+Ride parking site north side of Toruńska Router apart form the location on the north side of the parking site –alternative location was proposed. In this subvariant bus station is located in the area bounded by Głębocka Street and entering road to the Lidl Shopping Building partly under the tram trestle. This location increases distance between bu station Park+Ride parking site. However, it is strictly limited. Alternative location will be closer to the tram stops and good conditions of organization of traffic in the loop, Park + Ride parking site.

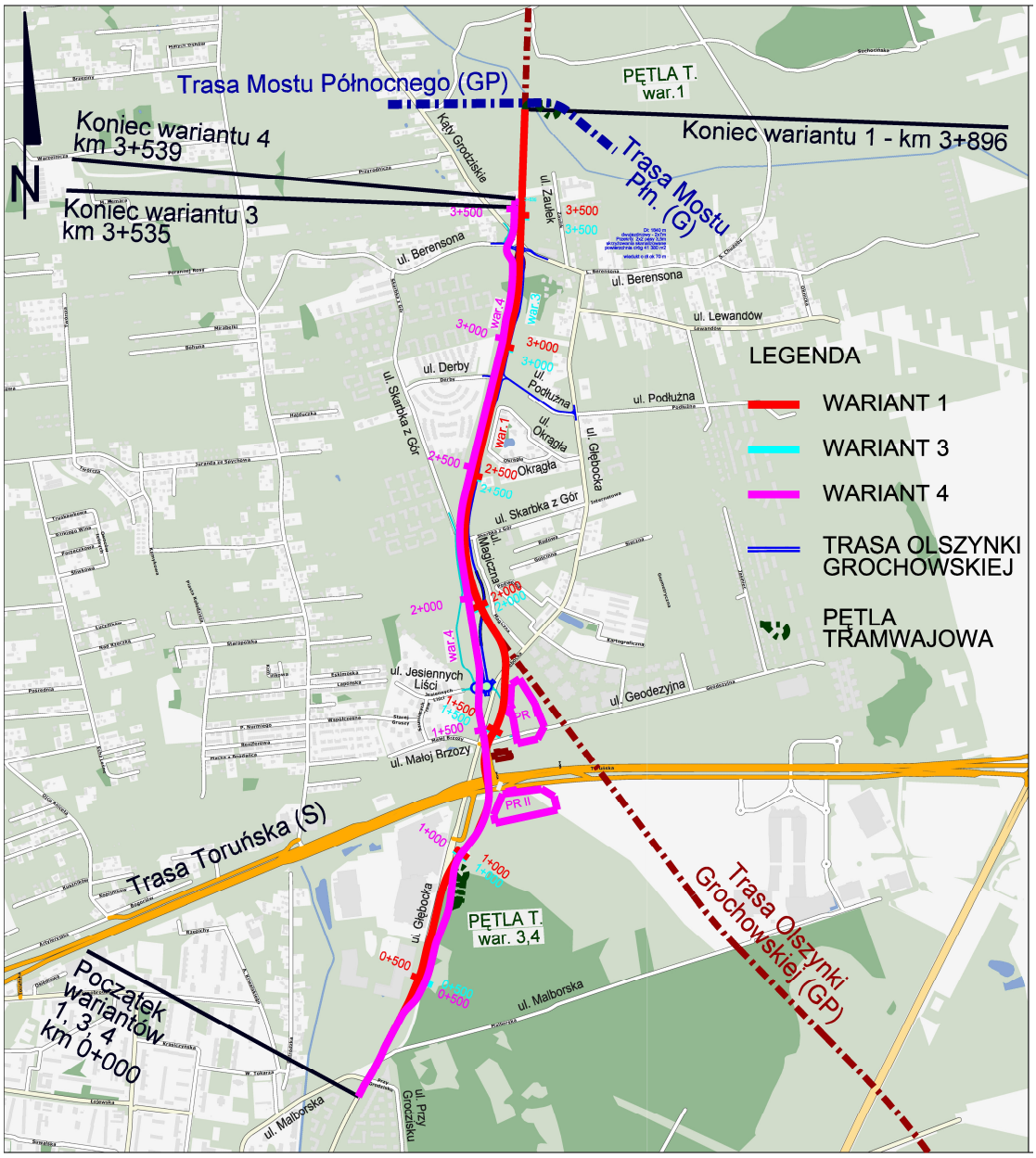
- Subvariant Additional board in front of the TOG/TMP juction

Coposite juction in Olszynka Grochowska Route linking it with Berensons Street and North Bridge Route is not eficient solution. It will require building of the longer trestle in the Lszynka Grochowska Route. Secondly cars coming from south will leave Olszynka Grochowska Route to go to the North Bridge Route trough very narrow Roundabout. Thefore, subvariant was proposed including board between two trestles in +1 level and roads in 0 level. Realization of this subvariant will cause increase of costs and moving of the planed roads about 10 m.

- Subvariant: alterantive location of the tram turn loop.

Location of the tram turn loop in the east side of the Toruńska Rout (in near vicinity of the Targówek Shopiing Center) is in collision with the Bródnowski Forest. In order to built the turn loop tree removal will be needed. Therefore, in subvariant turn loop is located in the allotments site near the Park+Ride parking site in option 2. This will allow better connection between parking site and transport node in Toruńska Route for the pedestrians.

Variants of the second stage of the analysis.



V. Summary

1. Developing optimal variant for the tram line along Głębocka Street and Olszynka Grochowskia Route is a difficult task due to a number of overlapping spatial, technical transport and budget problems, which should be included in the variant.

2. The most complicated problems are connected with area of intersection of Toruńska Route and north of it where the land use is changing very fast. Those areas need new and

innovative solutions. To find those solutions it might be necessary to resign from the assumptions made in the land use documents.

3. In order to select the optimal tram line factors determining the planned expenditures and, therefore, the construction investment ranges are very important. Financing is a key element in determining the best solution to the transport needs in the analyzed area.

4. Due to the lack of precise construction schedule for Olszynka Grochowska Route it is recommend to choose solutions that will not interfere with the future construction of a route, while meeting the objectives of this study.

5. Due to the technical and transport factors construction of the tram line one stage to the Berenson's Street is recommended without its pahased ending with trum loop south side of Toruńska Route.

6. **After careful consideration variant 3 is recommended as a basic variant for further works**. Cost of the 3 and 4 variants are similar and 1 variant is more expensive (costs increased by approximately 60%). 3 variant is better than 4 due to location of the tram stops which is more functionality (tram, Park + Ride and the bus terminus) and the favorable in terms of transport route tram line location in the lane divider of the Olszynka Grochowska Street.