THE NEW EXIT OF EXPRESSWAY S-7 FROM WARSAW TO GDANSK: ITS TECHNICAL, SPATIAL, ENVIRONMENTAL AND SOCIAL ISSUES

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SUMMARY

This paper presents the results of last studies on the project of new exit of expressway S-7 from Warsaw to Gdansk and is leaning on technical – economical – environmental study, which was elaborated in design and consulting office DHV POLSKA, where the author is currently employed and where he was the head of author's team. Above-mentioned study, obtained in result of public order, was worked out for General Directorate for National Roads and Motorways (GDDKiA). One has elaborated ten variants of the new exit from Warsaw to Gdansk. Optimal variant was selected as a result of multicriterial analysis.

Development of motorways and expressways network is a great transportation problem in Poland, especially between outside urban roads and areas in great agglomerations. New exit from Warsaw to Gdansk, in standard of expressway, is necessary. Presently, merely one national road exists (R.N. N^{o}7), which is already saturated. Problems concerning development of road networks in great agglomerations are very large and linked with numerous and strong conflicts of various nature. New exit to Gdansk is a part of program of expressway network development in the agglomeration of Warsaw (in frames of Varsovian Transportation Node), which was worked out and co-ordinated by GDDKiA Division in Warsaw and The City of Warsaw during last several of years.

Formation of new arteries in dense urban structure in Warsaw is difficult because of very high environmental requirements. New exit passes nearby protected areas such as: The Kampinoski National Park and area of of Central Vistula River Valley ("Nature 2000"). North-western part of Warsaw is covered by dense inhabitant and industrial zones. A part of the S-7 expressway corridor crosses by the infrastructure of airport of general, medical and sport aviation as well as airport for VIPs, which do not have possibility to change their locations. Neighbourhood of dense inhabitants zones and the necessity of protection of existing urban structures cause that the new course of expressway will be consensus between different analysed conditionings. Project of new exit from Warsaw to Gdansk as well as particular sections of expressway that local communities protested against was commented by the mass-media. It should be noticed, that the participation of society in the procedure of choosing variants of investment is guaranteed by the law. Current procedure of planning expressways in Poland is compatible with the obligatory procedures in European Union. This is an expression of changes, which were effected in Poland from the 1989' transformation period. All the above mentioned problems concerning the project of S-7 expressway construction are presented in this paper.

1. INTRODUCTION

This paper presents the results of last studies on the project of new exit of expressway S-7 from Warsaw to Gdansk and is leaning on technical – economical – environmental study:

section Czosnów[1] – Armia Krajowa Road[2], which was elaborated in design and consulting office DHV POLSKA [1], where the author is currently employed and where he was the head of author's team. Above-mentioned study, obtained in result of public order, was worked out for General Directorate for National Roads and Motorways (GDDKiA). One has elaborated ten variants of the new exit from Warsaw to Gdansk. Optimal variant was selected as a result of multicriterial analysis.

The first aim of this study was to choose an optimal corridor of new exit of S-7 expressway and to define connections with highway network of the agglomeration of Warsaw. The second aim was to elaborate the materials in order to obtain the decision on environmental conditionings, which is an initial stage in investment process in Polish conditions.

Highways and especially motorways and expressways are most durable elements of spatial structures in cities and agglomeration. They are elements of urban structures and also elements that create urban structure. By this one understand that they influence in significant manner into creation of space and into their development. Therefore, the designers and decision-makers stand before a huge responsibility of rational delimitation and choice of the corridor of such roads, so that these solutions will be evaluated well by the descendants and elaborated in accordance to the principles of engineering and town-planning art. These solutions should also testify well about the level of civilization of the times, when this road was build. Construction of new exit of expressway from big cities is uncommon undertaking. Effects will be felt by inhabitants and users of this way through many centuries.

Construction of modern road networks with large capacities is a national task of Poland's development to equalize the disproportion of road network state in comparison to state of road network in European Union.
Program of motorway and expressway network's development in Poland to 2013, according to official national sources is foreseen totally 1244 km of motorways and 1800 km of expressways [2] (figure1)[3]. It will be a significant increase of length of roads of high parameters in comparison to the state of year 2006 (673 km of motorways and 280 km expressways) [2].

One from most important elements of national motorway and expressway network in Poland is Varsovian Transportation Node, where the road traffic cumulates from main national road about joint daily average traffic carrying out more than 28000 veh./d [3]. In present state - highways are about 1 or 2 way sections, which are saturated, and traffic charges near the capacity. What is more, the road sections cannot to be extended. This national road network is introduced into urban areas. There is no ring road in Warsaw, which would intercept interurban traffic road transit - and would improve the connection between each two parts of the city. Warsaw, the capital of 38 million country, where about 1.6 million inhabitants are living now and together with 2.5 million inhabitants in the whole agglomeration of Warsaw, demands efficient road system with large capacity. Therefore, program of development of motorway and expressway network in Varsovian region consists of urban ring road, with junctions to motorway A-2 and expressways in courses of international expressways from most important inhabitants' centres of Poland. One of task of this program is to construct of new exit of expressway S-7 from Warsaw to Gdansk.

[1] Czosnow is one village situated nearby 20 km from Warsaw.
[2] Armia Krajowa Road is one arterial road crossing of Warsaw from West to East districts (2 carriage-ways x 3 lanes. In close future will reconstructed to S-8 expressway (north part of Warsaw ring road).
[3]

Most important planning and design aspects on example of section of expressway S-7 between Czosnow and Warsaw are presented below.

2. CONDITIONING OF CONSTRUCTION OF S-7 EXPRESSWAY NEW EXIT FROM WARSAW TO GDANSK

2.1. Planning conditionings

Construction of new exit of expressway S-7 from Warsaw to Gdansk is strongly settled in documents of spatial planning and transportation policy [2,4,5]. Expressway from Warsaw to Gdansk is one of very important elements of national transportation policy on years 2006-2013 in road-sector.
Development of motorway and expressway network provides an improvement of road transport conditions in the most important road corridors in Poland and its connections with trans-european motor- and expressways (figure 1). New exit from Warsaw to Gdansk improves transportation and road conditions in one of the most important corridors in Poland, as well as transportation conditions in Metropolitan Warsaw Area, where significant streams and problems of traffic are cumulated.

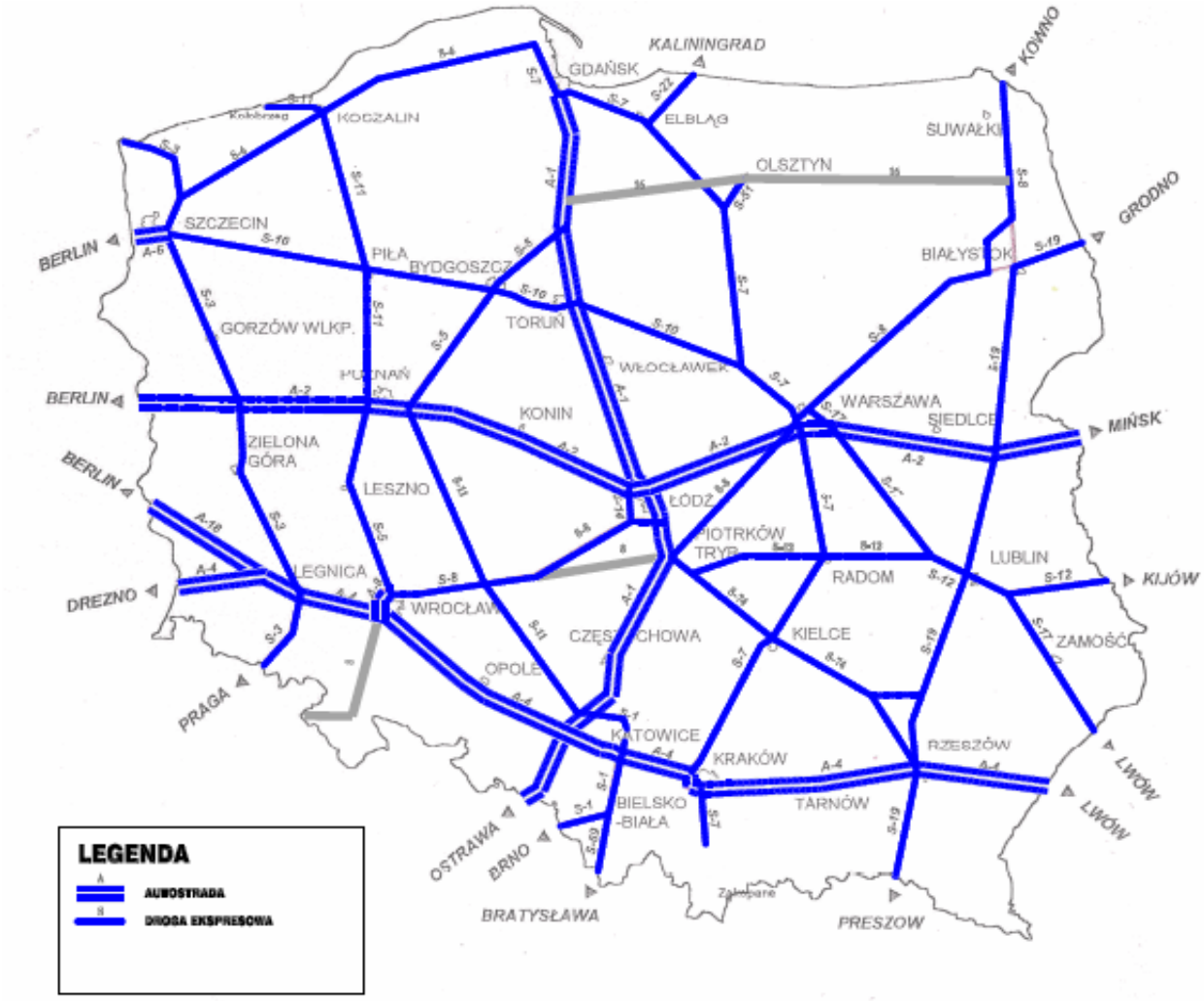

Figure 1. Projected expressway S-7 on background planned of motorways and of expressways network in Poland

Program of transportation development of Mazovian Voivodship [5] has been written into the frames of country plan. This program accepted by The Regional Parliament of Mazovian Voivodship (07. 06. 2004) takes itself into account among other things the realization of external ring in aim to enlarge cohesion of space of province (figure 2)[4].
GDDKiA Warsaw Division together with Warsaw Municipal Authority in May 2003 co-ordinated connection between expressway network and Motorway A-2 in Konotopa Interchanger.
The course of new exit of expressway S-7 was an object of many studies and project elaborations, ordered by: GDDKiA Warsaw Division, City of Warsaw and as well as Municipality of Lomianki [6-14]. The results of these studies, especially executed on order GDDKiA did not introduced to further project phases, in consequence to legal changes in procedure of investment process [15].

Figure 2. New projected exit of expressway S-7 from Warsaw to Gdansk on background of planned expressway network in Warsaw

First of all: new regulations in environmental law [16] made after Poland's entry to European Union, which introduced duty of obtainment of decision about environmental

[4] External ring will be formed mainly by high speed traffic roads: S-8, S-17 Eastern Bypass and S-2 South Bypass of Warsaw, a tie to motorway A-2. In this manner, traffic road transit, this does not profit from so-called, "Great Ring Road of Warsaw" (national roads No 50 and no. 62 Gora Kalwaria – Grojec – Sochaczew – Wyszogrod – Wyszkow – Minsk Mazowiecki) will become led out outside the centre of Warsaw. Extension of Varsovian Node for external connections eliminating road traffic transit is the most important task of road network development program in Mazovia Region.
Supplementary to The Warsaw Ring will be the new exits from Warsaw with parameters of an expressway. New exit to Gdansk – expressway S-7 – is also an element of this program.

conditionings. However, the course of expressway S-7 on section Czosnow - Armia Krajowa Road in Warsaw, according to these of studies, was introduced to local urban planning documents of cities and communes situated along the new corridor.

2. 1. Transportation conditioning

In present state exit of national road No 7 from Warsaw to Gdansk is a two carriageway road of class of way of main accelerated traffic about section 2/3. This road drives through districts of Warsaw about intensive build-up areas - Zoliborz and Bielany, farther by city and commune of Lomianki and commune of Czosnow. Special difficulties and limitations step out on passage through Łomianki - town, where existing road divides the urban area into two parts. This road is conducted in intensely built-up. It makes impossible to extend the section. Average daily traffic through Lomianki is carried out more than 37000 veh./d according to investigations from 2006 year, instead of Warsaw's border - 49475 veh./ d [3]. National road No 7 serves Northern part of country and Northern zones of Warsaw Metropolitan Area, inhabited by 150 thousand people. Moreover, one should notice that it is unique road connection of high class in direction to Northern Mazovia, Gdansk, Eastern Pomerania, Warmia and Mazurian Region along the left bank of Vistula River. There is other possibilities of taking alternative road on section about 40 km from Warsaw in northern direction.

The course of projected expressway through areas in Varsovian District of Bielany is greatly influenced by other municipal investments, i.e. planned course of Northern Bridge Road connecting Northern parts Warsaw at the bank of Vistula River and prolongation of this itinerary under airport of Babice (Bemowo) in south direction (so-called Nowolazurowa Street). They cause, that the project of expressway S-7 should be taken into account with connections with new design elements of municipal road network- and their influence on urban traffic distribution.

On the base of forecast of traffic worked out for year 2030, traffic flow will increase about 80%, and in relation to projected variant of greatest stream of traffic in section of projected expressways will carry out from 3700 veh./h to 5100 veh./h. Profile of 3 traffic lane in each direction, in perspective 25 of years, permit to suppose, that level C of traffic of level service (HCM 2000) at interchangers sections will be hold.

2.2. Functional - technical conditionings

Construction of expressway in intensive build-up areas of agglomeration of Warsaw and where numerous areas are embraced of environment protection is a very difficult problem from technical regards. Endeavour to assurances of technical standards – with geometry of expressway adapted to project – design speed 100 km/h - requires using large horizontal curves (min. R = 800m) [15]. It causes difficulties of formation of road in horizontal lay.

Construction of ways in horizontal lay is determined in large measure topographical form and existing urban sprawl, as well as transportation system, which should keep its own functional connections after construction of expressway, and also with technical underground infrastructure served these areas..

2.3. Spatial conditionings

New exit of S-7 expressway will be driven through densely build-up or environmental protected areas. In north - western parts of Warsaw agglomeration, in districts of Warsaw (Bielany and Bemowo) and in neighborough of Warsaw (Czosnow, Lomianki, Izabelin and Stare Babice) lives together about 350 thousands of inhabitants. Non built-up areas in existing state are situated only in commune of Czosnow, however in local plans of urban

sprawl is reserved zone of width 250 m, along two sides provided for business function. In all inhabitant units considerable part are intensively built-up areas. Multifamily housing function, which is in majority in Bemowo and Bielany, Warsaw districts, where is supplemented for concurrent buildings of education and commerce: numerous schools and nurseries and as well as multisurface commercial centres. One-family Inhabitants zones are situated in Northern parts of district Bielany, communes of Izabelin, Stare Babice, as well as in city and commune of Lomianki and Czosnow. Housing build-up zones mentioned above are developing. On border of districts of Warsaw Bemowo and Bielany is situated Airport Babice (Bemowo), which is an international airport to*:* general, sports and medical aviation and as reserve airport for VIPs. Maintenance of existing air – function is required in reference to airport. On border of Warsaw and commune of Izabelin large base greatest of Polish fuel company ORLEN is situated. It requires good accessibility for heavy traffic cars[5].
Nearby of fuel base is situated closed dumping ground of garbages and compost manuring field. In close neighbourhood of The Kampinoski National Park is situated one from greatest active communal cemetery, which is inviolable and demand also efficient accessibility. In commune of Lomianki, inside of The Kampinoski National Park is situated a regional child hospital.

Along existing track of national way No 7 in commune of Czosnow and commune and city of Lomianki are situated numerous wholesale firms and service – institutions, which are accessible through service carriageways. Other important elements of urban sprawl of this part of Varsovian agglomeration are:

- industrial areas steelworks Arcelor - Warsaw occuped of tens of hectares of area between communal cemetery and inhabitant areas.
- campus of Stefan Cardinal Wyszyński University and Warsaw Academy of Physical Education together with sports areas are situated in Forest of Bielany, that is also nature reserve.

Such urban sprawls demand an efficient transportation network.

2.4. Environmental conditionings

The North - Western parts of agglomeration of Warsaw were during former ages ground of Forest of Kampinoski, which are now:

- considerable fragments of The Kampinoski National Park,
- numerous protected area situated in its lagging, which are in all administration and settlements units, where the corridor of S-7 expressway is situated.

Total protected area is occupied about 30% and they are situated along bank of Vistula River or in The Kampinoski Park National or in its lagging. Considerable part these protected areas are numerous zones of „Nature 2000". Belong to them first of all:

- Kampinos National Park – Area “Natura 2000” PLC 140001, with Special Protected Area of Birds and Special Protected Area of Habitations, where one's own habitations have protected sorts of plants and nests of birds,
- Area “Nature 2000” – “Valley of Central Vistula River” PLB 14004 with Special Protections Area of Birds,
- Kepy of Kazun - fauna reservation - protection and maintenance of rare zones of marshy meadow and dying of sorts of birds,
- Lawice of Kepin - fauna reservation - protection of nests water’s – muddys’ of birds
- Lake of Kepin – fauna reservation,
- Reservation of Bielany Forest

[5] Liquid fuels (dangerous materials) are distributed by heavy cars on all region of Mazovia.

- Ecological Corridors, junctive The Kampinoski National Park with naturalistic precious areas:
  - Forest Park Mlociny - Valley of Vistula River / Nature 2000,
  - Park - Wood of Kazun - Valley of Vistula River,
  - Parks - Meadows of Kazun and Czosnow - Valley of Vistula River/ Nature 2000,
  - Park Pienkow/ Mountain of Dziekanow - Valley of Vistula River,
  - Forest Park of Bemowo in region of Klaudyn, Lipkowo and Bemowo.

Besides in protected areas nests has tens of sorts of animals and several hundred of sorts of plants being under legal protection in Poland.

Construction of expressways through or in neighbourhood of protected areas carries behind oneself following threats:

- irreversible destruction of habitations protected sorts of plants and animals,
- beginning of barrier of natural unities KPN with its lagging and increase of isolation with Vistula Valley,
- crossing of tracks of migration of animals, with limitation of possibility of their migration, increase of their mortalities, possibility of penetration of strange foreign sorts.
- natural degradation forest - complexes of crossed with expressway,
- change of water relations - threats of change of water relations of assemblages of meadows and of rushes.

Total surface above-mentioned.of protected areas carries out according of variant average near by 143 ha.

Numerous forest areas in north-western zone of Warsaw agglomeration determine place to recreation of inhabitants all Warsaw and of neighbouring communes.

2.5. Social conditionings

Designing of expressways through compact buildings housing and green areas about recreational function is subject on social conflicts - protests of inhabitants, which will be to opposite construction of these ways. Inhabitants are afraid of arduousness flowing from road traffic - enlarged emissions of pollutions, noise, vibrations and cutting off their residential zones from natural recreational areas, which are nearby forest and parks. Areas with most abrasive protests are following:

- Inhabitants zone of Chomiczowka (Warsaw – Bielany Distric) – nearby 17 thousand. inhab. where expressway crosses through Forest of Bemowo,
- limits access to everyday natural recreation place of inhabitants of these areas as well as housing estate Dabrowka (Lomianki), where passage of expressway between housing build-up areas and The Kampinoski National Park, creates a spatial barrier and make difficult pedestrians' connections to forest.

Significant conflict areas are housing build-up intensive multifamilliary zones in Warsaw Bemowo District. Elimination of expected environmental arduousness in this area needs to use of special technical measures: constructing of expressways in tunnel or in excavation with light covering.

Other area of very strong social conflicts is a city and commune of Lomianki. Inhabitants of Dabrowa (part of Lomianki) protest against cutting off settles from The Kampinoski National Park, that isn't quite true. Other abrasive place is a reserved area for construction of future interchanger(s), that it is surrounded with build-up housing zone. This place is contested by local populations, too. Inhabitants are afraid, that planned junction(s) will cut-

off functional connections between part of Lomianki Town and will cause effect of barrier, what is in large measure groundless.

Inhabitants protesting against this solution, propose taking expressways along bank of Vistula River after flood - ram part. It cuts - off river from adjoining urban sprawl. In effect river wouldn't be accessible for inhabitants and animals migrating from The Kampinoski Forest.

Local lobby for this solution don't take into consideration, that it's a solution colliding with protected areas ("Nature 2000"). Lobbyists claim that construction of expressway at the flood - ram part would protect town of Lomianki before flood.
Corridor of expressway with simultaneous assurance of service of adjoining build-up areas requires of construction of parallel service roads and several transversal viaducts, as well as acoustic screens and terrestrial ram parts to protection of environment in all section crossing build-up areas. It needs of occupations of belt of nearby 50 - 80m. Traffic in expressway S-7 will enlarge emissions of pollutions of airs and noise. It happens cutting-off of functional connections between areas situated along sides of road. It means necessity of construction of system of service ways and road - connections under or over projected expressway.
In effect areas of greatest social conflicts on section of designing expressways are following: residential areas Bemowo Airport, Chomiczowka, Radiowo, Dabrowa of Lomianki and Lomianki - Kielpin. Private persons and non-governmental organizations from these localities was presented most of all of protests.

3. PROJECTED VARIANTS OF EXIT OFEXPRESSWAY S-7

In result of analyses of earlier elaborated projects - and presented above of planning and designing conditionings were worked out 5 of basic variants project- and 5 subvariants (figure 3). These ten of variants were elaborated in similar accuracy and care. Projected variants one can characterize as follows:

Variant I - length of 21,44 km (in this section after existing Wislostrada[6] 3,6km). It's a variant using existing road infrastructure - and his realization would rely on adaptation of existing exit of national road n^{o} 7 from Warsaw to Gdansk and of section of Wislostrada between projected Northern Bridge Road and Armia Krajowa Road to parameters of expressway.

Variant II - length of 22,21 km (with segmental variants of itinerary – IIA (length 22,84 km) and IIC (length 22,21 km) in Warsaw Bielany district) is variant recorded from many years in different urban planning documents. Variant IIB (length 22,82 km) to entries in Airport Bemowo is driven in accordance with variant II, In zone Airport Bemowo leaves from variant II in direction western and in Forest Bemowo joins to variant III.

Variant III - length of 21, 87 km, is variant driven common trace with variants II on section between Czosnow and with housing areas in Radiowo (part of Warsaw Bielany District), where is going in south direction, After passage through Bemowo Forest, in housing area Blizne - Laszynskiego to join to projected North part of Warsaw express ring road (S-8).

Variant IV - (with segmental variants IVA, IVB and IVC, of lengths properly - 26,15 km, 27,04 km, 26,95 km) is variant using idea of taking projected expressway along ram part flood - rivers of Vistula in area of city and commune of Lomianki. In Radiowo and

[6] Wislostrada is a arterial road (2x3) conducting along of left bank Vistula River.

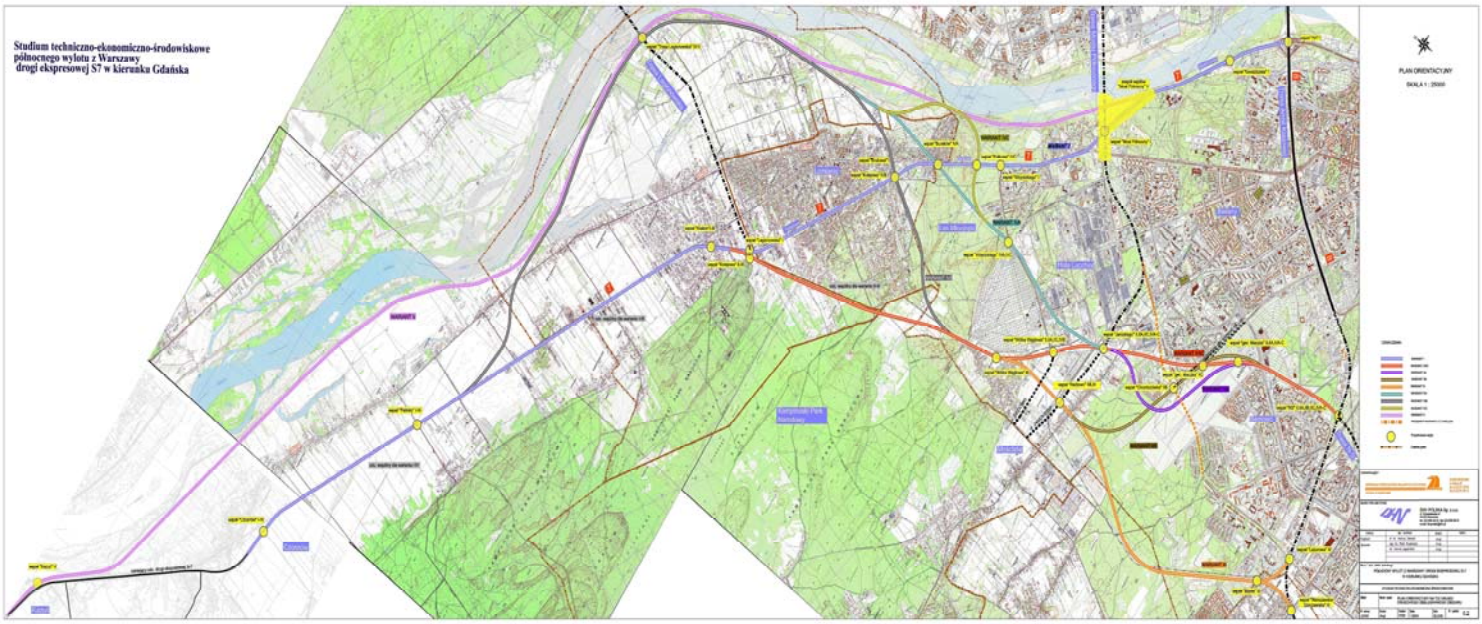

Figure 3. Planning variants of new exit of expressway s-7 from Warsaw to Gdansk section: Czosnow – Armia Krajowa Road (Warsaw)

Chomiczowka (Warsaw Bielany district) and in Warsaw Bemowo district variants are driven traces of variant II.

Variant V - length of 28, 05 km, in this section after existing Wislostrada 3,6km) is variant transferred from Study “Autonomy Overvistula Road - study of expressway S-7 on section Kazun - junction of Northern Bridge Road with North - South Road in Warsaw" executed from initiatives of Commune of Lomianki. Functional technical solutions, in accordance with flying of GDNRM in Warsaw Division, with according to study mentioned above. This variant propose earlier departure from existing trace of National Road No 7 - in Kazun and continuation on extended and strengthened flood - ram part to projected team of 6. of road interchangers in region of entry of projected Northern Bridge Road in left-bank parts of Warsaw road network. In this variant only one interchanger is foreseen on connection with other projected Legionowska Road, but without connections with road network of Lomianki Town.

All variants on section of passage through commune of Czosnow, outside of variant V, which already in Kazun goes to rampart of Vistula River, are driven common trace and using existing corridor of National Road No 7. Variant II and III have a common course in town and commune of Lomianki until of settlement zone of Radiowo, similarly as variants IVA and IVB. On section Varsovian variants, these became introduced in itinerary of variant II. In all projected variants outside of variant V, connections with road network and service arrounding areas are planned through 5 ÷ 8 interchangers in relation to variant.

4. SOCIAL CONSULTATIONS

Projected variants were consulted with local in technical – informational meetings and inhabitants’ meetings with and as well as non – governmental organizations working in districts of Warsaw and neighborough communes.
Many co-ordinating meetings with authorities of different institutions and municipal were performed. Presented solutions greatest interest, and also most of all of controversy have been excited in commune of Lomianki, in housing areas of Warsaw Bielany district - Chomiczówka and Radiowo. In commune of Lomianki group of advocates of expressway after flood - rampart argued with group of advocates of variant II - expressway conducted between The Kampinoski National Park, and with inhabitant zone Dabrowa. Already after end of project, in commune of Lomianki, municipal referendum concerning of course of new north exit from Warsaw to Gdansk was effectuated.
Its results were not deciding, from regard on low attendance. In housing estates in Warsaw Bielany district were very active associations of inhabitants, which protested against arduousnesses of road traffic expected after implementation of expressways. Meetings with members of these associations gave to designers precious awareness, regarding projected of variants and their of corrections, in aim of diminution their arduousnesses.

5. EVALUATION OF VARIANTS

10 projected of variants was surrendered of multicriterial analyses concerning different planning - project aspects functional, traffic, technical, safety of road traffic, economic, spatial, and environmental, which together with weights and with manner their evaluation are presented in table 1.

In result of worked out variants of exit of S-7 expressway can be evaluated as follows:

Variant I - does not realize of basic condition, which one is will come into being alternative of new exit of expressway S-7 in direction to Gdansk; there are difficulties in gaining over of grounds under extension of section; greater depth of effect „spatial barrier" on passage

through Lomianki is expected; requirements of capacity on certain sections aren't obtained. There is a lack of possibilities of realization of technical standards on passage through centre of Lomianki; distances between some interchangers will not realize technical conditions. From environmental point of view variant is admissible.

Variant II, IIA, IIC - solutions according to these of variants are alternative in relation to solutions of existing exit National Road No 7 from Warsaw to Gdansk; variants does not very well enroll in road network of Warsaw, because they will demand unnatural bends of Northern Bridge Road in western direction to projected interchanger in connection with projected expressway. In other wise, it's not profitable from point of view of accessibility and services of main generators of traffic; difficulties in realization of required distances between some from interchangers; variants are not accepted by Authority of Babice (Bemowo) Airport. Variant II and IIC are admissible from environmental point of view, and Variant IIA – in opinion of ecologists "not should be constructed". There are necessity of use maximum possible measures of protection of environment to mineralize of traffic arduousnesses in inhabitants zones (among other things: construction of tunnel in Bemowo, covers of excavation on Chomiczówka, acoustic screens and belts of protective green).

Variant IIB - is an alternative solution in relation to existing exit National Road No 7; very well enrolls in road network of Warsaw, directly related with Northern Bridge Road and projected Nowolazurowa Street; Variant realizes all technical conditions for expressways and assures best conditions to traffic; is appears to be possible to accept by authority of Babice (Bemowo) Airport, at hols present standards useful airfields; assures convenient connections with served urban sprawl; according to opinion of ecologists variant „not should be selected" - however it does not mean - not should be eliminated. This variant in multicriterial analysis was considered as the best.

Variant III - solution is alternative in relation to existing solutions of exit NR No 7; from point of view connections with Warsaw's road network - significant faults are: more yet pushed in direction western connection with Northern Bridge Road than in variant II and there is necessity of inclusion from node Blizne to node from NS Road in S-8 projected expressway, that create also very unprofitable connections with main generators of traffic in Warsaw districts; variant is accepted through Authority of Babice (Bemowo) Airport and local societies of Chomiczowka and Bemowo and contested by authorities of commune of Babice; according to opinion ecologists variant „should not be chosen".

Variant IVA - solution is alternative in relation to existing exit NR No 7; In areas of Warsaw, in range of evaluation of spatial connections and services of urban sprawl to this variant are the same attentions as to relation to variant II, IIA and IIC. Variant does not fulfil conditions of capacity and traffic on one from internode sections; will cause drastic losses in ecological system about large range, in the face what under no circumstances should not to be chosen.

Variant IVB - functional - spatial evaluation is very nearing to variant IVA; this variant fullfill generally criteria of capacity and conditions of traffic; ecological evaluation is more gentle, because variant is rated as „ should not be chosen". It should be noticed, that this variant in evaluation of conflict with nature precious areas (at regard of weights for surface of areas about suitable values was proved the best.

Variant IVC – functional - spatial and traffic evaluation is very nearing to variant IVB; variant does not fulfil technical conditions in range of distance between certain sections between nodes; realization will cause drastic losses in ecological system about large range. In opinion of ecologists, under no circumstances this variant "should not be chosen".

Variant V - variant is an only indirect alternative of new exit of expressway S-7; connection with Warsaw road network would enter in neuralgic site, as will be connection of Pulkowa Street (existing exit), Wislostrada and Northern Bridge Road; section of Kazun - Czosnow

doubles existing section of expressway S-7; This variant changes hitherto existing decision of localization of node Northern Bridge Road; very unprofitable from regards of reliability - large distances between nodes; does not fulfil criterion of capacity on section between projected interchangers Legionowska Road and Northern Bridge Road; breaks the continuity of expressway and extorts her implementation on section Wislostrada and Armia Krajowa Road (S-8); in ecological aspect: fixedly cuts off zone of Mlociny in Warsaw Bielany district, Lomianki and Czosnow from Vistula River; variant of lowest cost of construction from investment - variants, in opinion of ecologists will cause drastic losses in nature environment, in the face what under no circumstances ”should not to be chosen”.

Table 1. Criteria and their weights

		principal criterion and weight	Name of partial criterion	Internal weight
1.	1.1	Functional I – road network – 25%	Accordance with form of road network	60
	1.2		Number of exits and entrance from/to Warsaw	20
	1.3		Necessity of changes In construction project of S-8	5
	1.4		Necessity of changes in expropriation of area to construction of North Bridge	5
	1.5		Putting of traffic into others roads	10
2.	2.1	Functional II – capacity and traffic conditions – 10%	Maintenance of road capacity and of level of traffic service	100
3.	3.1	Technical 10%	Distances between nodes	70
	3.2		Completeness of cross section	15
	3.3		Limits of speed (horizontal curve)	15
4.	4.1	Traffic – 10%	Transportation work of network [thous.veh.km/h]	40
	4.2		Travel time in road network	60
5.	5.1	Road traffic safety – 7%		100
6.	6.1	Economical – 20%	Rate of benefits to costs B/C	40
	6.2		Net present value NPV	5
	6.3		Internal rate of return EIRR	40
	6.4		Costs of investment	15
7.	7.1	Spatial - 4%	Number of habitable buildings in good technical conditions to demolishing	60
	7.2		Surface of area to expropriation	40
8.	8.1	Environmental - 14%	Protection of values of natural vegetable environment	50
	8.2		Protection of values of natural animal environment	50

Taking into account necessary criteria to fulfil, choice of variant can be done from among variants II, IIA, IIB, IIC and III. Team author's recommended choice of variant IIB, and as alternative variants II and IIC. Choice of variants by Committee of Investment Projects Evaluation (CIPE) of General Directorate for National Roads and Motorways, presented in

official record, was very nearing to proposal of authors. Instead variant IIC, as alternative variant was proposed variant III[7].

6. FINAL REMARKS AND CONCLUSIONS

Problems relating of planning and designing of exit of S-7 expressway from Warsaw to Gdansk in section Czosnow – Armia Krajowa Road in Warsaw (expressway S-8) presented in this paper, show difficult conditions of designing of high classes roads in great urban agglomerations and compact build-up areas.
Development of road network in Warsaw, construction of high classes roads and of ring road is indispensable condition for effective functioning of city and agglomeration. Construction of new exit of expressway S-7 to Gdansk in section mentioned above is one from these of exercises. Most difficult problems in designing in biggest Polish agglomerations are environmental conditions and existing obligatory law in this range and European program "Nature 2000".
Very serious problems in effective design are necessity to fulfill technical conditions in very densely build-up areas, where possibilities to implement of expressways are very strong limited. Implementation of corridor of expressway in urban sprawl and connected from this indispensable functional - spatial transformations areas create also numerous conflicts and social protests caused these with changes and road traffic arduousnesses. At designing of new course of expressway in agglomeration should be look complexity on road network as whole, which should assure efficient transportation service of urban sprawl, inhabitants and visitors.

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