

TRANSPORT INFRASTRUCTURE AS A PART OF CRITICAL INFRASTRUCTURE

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Abstract: *Importance and parts of state's infrastructure. Sectors and elements of critical infrastructure, criteria of their selection. Structure and elements of transport infrastructure. Basic functions of transport infrastructure as parts of national infrastructure. Elements of critical transport infrastructure.*

Key words: *infrastructure, national infrastructure, critical infrastructure, sector of critical infrastructure, and element of critical infrastructure, transport infrastructure, critical transport infrastructure.*

INTRODUCTION

Existence and functioning of any system or organization are conditioned by creation of the necessary infrastructure. That is why a complex of sectors providing economic and social system functions, which form its infrastructure, has to be established. State's infrastructure represents mutually interconnected system of specialized infrastructures, which support all state's functions, as well as valid interests of social structures. When examining any state's infrastructure various criteria of its division can be used. Mostly mentioned infrastructure parts are:

- ◆ technical,
- ◆ social,
- ◆ economic.

Failure or malfunction of various infrastructure parts can have various consequences. It is necessary to categorize individual infrastructure parts according to the range of these consequences. A subset of specialized infrastructures limiting in terms of health, life or property hazard and basic state's

functions is included within **critical infrastructure.**

NATIONAL INFRASTRUCTURE AND ITS PARTS

Critical infrastructure issues, which include its definition, determination of measures for its protection and actual material, personal, financial, organizational parts of this protection, exceed borders of an individual state. Mutual interconnection of national infrastructures urges countries to solve problems and take protection measures jointly. Concurrently it is necessary to permanently evaluate risks severity for individual parts and elements of critical infrastructure.

The Slovak Republic (SR) as a part of Euroatlantic space pays permanent attention to the issues of critical infrastructure and its protection. One of the latest activities was acceptance of new „Security Strategy of the SR 2005“. On its basis „Proposal of Critical Infrastructure Conception in the Slovak Republic and Methods of its Protection“ has been worked out. These documents and consequent measures are in context with papers published by the EC.

One of the main reasons for earnest attention to these problems is insufficient legislative modification in the SR. In present legislation only defence infrastructure in relation to the state's defence protection has been discussed. A new critical infrastructure conception solves also other elements and considers non-military risks, too.

Basic specific parts of critical infrastructure are represented in Fig.1.

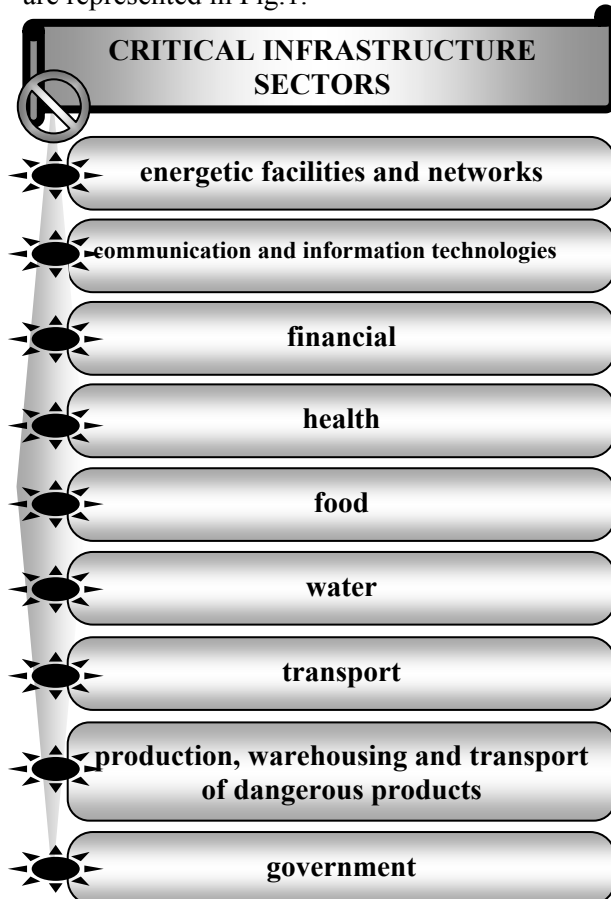


Fig.1 Critical infrastructure sectors

Critical infrastructure is divided into several sectors. Every country performs their selection according to its own conditions. In the SR conception proposal there are defined altogether 41 sectors, which follow the structure of central authorities:

- ◆ in the sphere of activity of 14 Slovak ministries 31 critical infrastructure sectors are suggested,
- ◆ in the sphere of activity of other 10 state administration central organs 10 critical infrastructure sectors are suggested.

In every sector it is necessary to define critical infrastructure elements. Every state defines its own determination criteria. Proposed criteria system is in Fig. 2.

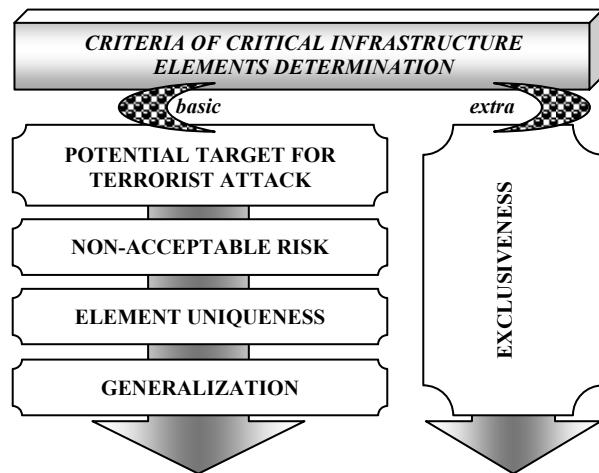


Fig. 2 Determination of critical infrastructure elements in the SR

According to these criteria a legal subject from already defined sectors can be a subject of critical infrastructure if its activity significantly influences basic state's functions or society interests.

TRANSPORT INFRASTRUCTURE AS A PART OF CRITICAL INFRASTRUCTURE

Transport infrastructure forms a technical basis of every transport system and transport network en bloc. *Transport infrastructure* concept meaning is defined differently in various sources. In the broadest sense, transport infrastructure consists of:

- ◆ transport routes (*line and node elements necessary for transport means' movement*),
- ◆ transport facilities (*detect safety of transport means' movement and their maintenance*),
- ◆ transport means (*mobile elements of transport infrastructure*).

By analogy to the above-mentioned part there is also used a division into:

- ◆ land transport infrastructure (*including overground and underground parts - tunnels, bridges, etc.*) non-track (*land communications*) and track,
- ◆ air transport infrastructure,
- ◆ water transport infrastructure (*overground as well as underground section*),
- ◆ special transport infrastructure (*non-conventional transport means - pipelines, air and magnetic cushions, etc.*).

Transport infrastructure should ensure these basic functions:

- ◆ provision of transport requirements,

- ◆ ensurance of necessary transport serviceability of the territory,
- ◆ security provision of all transport processes participants,
- ◆ maximum regardness of environmental aspects,
- ◆ minimisation of energetic and territorial claims.

Assessment of transport infrastructure as a part of national critical infrastructure has to be based upon specific position, importance and tasks of the whole transport sector. Among these specialties belong mainly connections with other sectors of the state's economy, direct influence on their economy, economy integration in multinational benchmarks, influence on living standard changes due to satisfaction of inhabitants' needs, etc. Public and state defence interests apply when building transport infrastructure.

Relation of transport and national infrastructure is in Fig. 3.

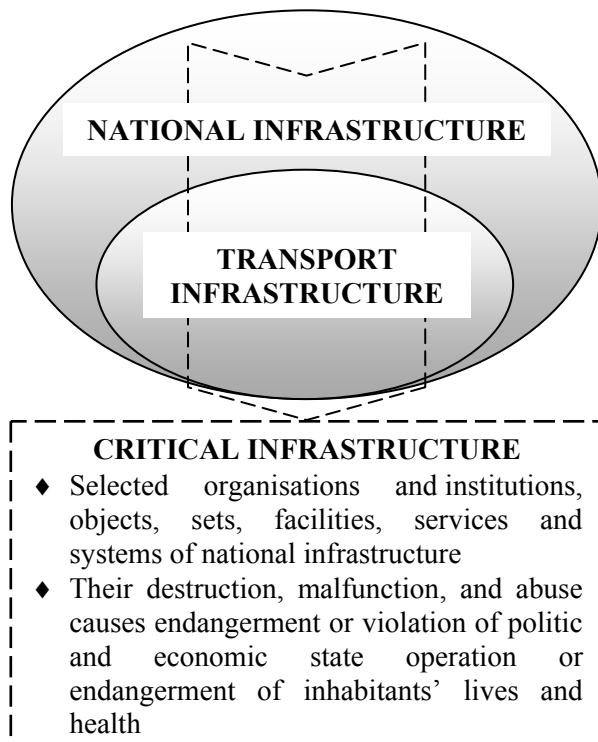


Fig. 3 National and transport infrastructure

However, specific position of transport cannot be the reason for building its infrastructure with no restrictions. It is necessary to respect mainly high energetic dependency of transport, security, and environmental as well as aesthetic aspects. At the same time, selection of sectors and elements of critical transport infrastructure has to include only authorised objects and

facilities. Frame survey of possible elements of critical transport infrastructure is in Tab. 1.

Tab.1.
Possible elements of critical transport infrastructure

means of transport	critical line stavby	critical objects
road	selected land communications of higher categories (highways, class I. roads)	crossroads, bridge objects, terminals, garage objects, places of land communications' maintenance, fuel stations
rail	selected railway lines, important railyards, traction mains, lines of communication and security technique	rail junctions, railway stations, bridge objects, tunnels, operation objects (depots, service garages, tranship centres)
air	access and frontage airport communications	airports, air operations centres, land air-navigation aids and radars
inland water	navigable streams, canals	harbours, lock chambers, docks, berths, canal bridges and tunnels

Main trends and tasks of the SR transport development are specified in the document „Transport Policy of the Slovak Republic until 2015“. Increasement of transport security and safety protection are specific targets besides modernisation and transport infrastructure development. According to this document, transport infrastructure includes those transport objects, elements and facilities, which directly influence:

- ◆ security of the state and economy,
- ◆ health, lives and security of inhabitants,
- ◆ state administration functioning,
- ◆ functioning of other dependent sectors.

Protection of critical transport infrastructure implies preparation and realisation of measures, which reduce all the risks (physical, social, transport networks' congestion) and which minimise transport dependence on other sectors, mainly on power industry. These measures have to lead to continuous fulfilment of functions by transport objects, facilities, means and staff in case of any risks and threats.

CHARACTERISTICS OF THE SLOVAK REPUBLIC TRANSPORT INFRASTRUCTURE

The SR transport infrastructure does not fulfil mainly qualitative parameters of developed

European countries. This is, besides historical reasons, mainly result of limited financial sources used for its development. Yet arrangements for proportional development of individual kinds of transport infrastructure, its charging and usage of existing potential of some means of transport are being realised. The basis for further development of transport infrastructure is usage of advantageous geographic location of the SR, high density of existing transport infrastructure and its interconnection with European transport networks.

Road transport infrastructure requires increasement of higher category roads' proportion on total density of land communications. It is necessary to provide adequate maintenance and repairs of roads and road objects at all levels of road network administration and development. Reduction of negative impacts of road transport on the environment has to be preferred in case of all measures.

The SR road infrastructure basic data are listed in Tab. 2.

Tab.2.

Road transport infrastructure of SR

<i>object</i>	<i>data</i>
road communications – total length	ca. 17 900 km
local communications – total length	ca. 25 220 km
road bridges – total number	7 704 pcs.
road bridges - total length	151 367 m
road tunnels - total number	4 pcs.
road tunnels - total length	7 344 m
trucks - total number	ca. 176 500 pcs.
cars - total number	ca 1 304 000 pcs.
buses - total number	cca 9 100 pcs.

Rail transport infrastructure significantly falls behind real transport market structure. Corridor tracks construction delay and general low level of technical base promote unfavourable trend to shift form rail cargo service to road transport. Current modernisation of the railways has to lead to higher competitiveness, safety of operation and to the expansion of intermodal transport.

The SR rail infrastructure basic data are listed in Tab. 3.

Tab.3.

Rail transport infrastructure SR

<i>object</i>	<i>data</i>
railway lines – total length	3 658 km
electrified lines – total length	1 577 km
railway bridges – total number	2 287 pcs.
railway bridges – total length	46 240 m
railway tunnels – total number	76 pcs.
railway tunnels – total length	43 389 m
railway stations – total number	316 pcs.
locomotives – total number	ca. 1 100 pcs.
freight cars – total number	ca. 16 300 pcs.
railway cars – total number	ca. 1 600 pcs.

Air transport infrastructure has higher potential than its present usage. Number and location of international and regional airports in the SR create appropriate conditions for development of air transport. Little by little sources for necessary modernisation of terminal buildings at the most frequently used international airports are being found. Further development of the infrastructure is subordinate to the fulfilment of measures of the national program of civil aviation protection against abusive interference.

The SR air infrastructure basic data are listed in Tab. 4.

Tab.4.

Air transport infrastructure of SR

<i>object</i>	<i>data</i>
public airports - total number	15 pcs.
non-public airports - total number	12 pcs.
heliports - total number	8 pcs.
other landing areas - total number	65 pcs.
lighting columns - total number	21 pcs.
ground radars - total number	7 pcs.
airplanes (up to 9000 kg) - total number	ca. 590 pcs.
airplanes (over 9000 kg) - total number	ca. 25 pcs.

Inland water transport infrastructure is adequate to this transport means' position in the conditions of the SR. Despite smaller importance of water transport a better usage of existing connection with the network of West European water routes is desirable. Modernisation and completion of current Slovak water routes and public harbours will be of higher importance than realisation of long-term projects to make other Slovak rivers navigable. Broader usage of already built infrastructure will lead to the development of intermodal transport.

The SR water infrastructure basic data are listed in Tab. 5.

Tab.5.

Water transport infrastructure of SR

<i>object</i>	<i>data</i>
waterways – total length	ca. 260 km
DANUBE water route - total length	172,5 km
VÁH water route - total length	78,85 km
BODROG water route - total length	8,2 km
public harbours - total number	3 pcs.
floating channels - total length	38 km
lock chambers - total number	12 pcs.
cargo ships - total number	ca. 280 pcs.
passenger ships - total number	ca. 20 pcs.

The data presented describe transport infrastructure in the Slovak Republic. They were obtained from various sources in the years 2005 and

2006. Many data in these sources differ. However, they definitely provide actual view on the objects from which preferred parts of critical infrastructure have been chosen. For example, railway transport in terms of striking power counts on selected railway lines of stated railway network, which represents approximately 60 % from the total railway lines length and on approximately 75 % of railway stations. Accordingly, approximately 35 % higher category automobile roads from their total length are assigned for the needs of the armed forces. Probably substantial part of existing air transport infrastructure objects fulfils critical transport infrastructure criteria. On the other hand, in water transport infrastructure mainly objects, which fulfil multipurpose water economic functions, will be selected to be critical transport infrastructure elements.

CONCLUSION

Every country pays attention to the protection of crucial infrastructure objects. Risks and measures applied were mostly assessed in terms of military crisis situations. Changes in the forms of infrastructure violation, mainly caused by terrorist attacks, require re-evaluation of actual procedures in the protection of selected objects. To the full extent this is the task of transport infrastructure. It is necessary to precisely distribute responsibility for the protection of critical transport infrastructure among public

administration, owners and operators of individual elements.

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This article has been worked out with the support of Slovak Research and Development Agency, Agreement No. APVV-20-002805 and Project number SK-BUL-01506.

ТРАНСПОРТНАТА ИНФРАСТРУКТУРА КАТО ЧАСТ ОТ КРИТИЧНАТА ИНФРАСТРУКТУРА

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СЛОВАКИЯ

Резюме: Разглеждат се значението на част от държавната инфраструктура, секторите и елементите на критичната инфраструктура, критериите за избора ѝ, структурата и елементите на транспортната инфраструктура. Посочени са основните функции на транспортната инфраструктура като част от критичната инфраструктура, както и елементите на критичната транспортна инфраструктура.

Ключови думи: инфраструктура, национална инфраструктура, критична инфраструктура, сектор на критичната инфраструктура, елемент на критичната инфраструктура, транспортна инфраструктура, критична транспортна инфраструктура.