

AIRPORT PLANNING AND DESIGN – LEGAL AND PROFESSIONAL COMPETENCE REQUIREMENTS

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Abstract

Airport design and planning considerably differs from the design of other transport infrastructure. The reasons are the wide scope of regulation in civil aviation and the lack of links between the Civil Aviation Act and the Building Act. The effect is that the sequence of procedures, negotiation, and/or document approval is not clearly defined. The situation is further complicated by the fact that an airport is a unique construction both for the investor and for the local building authority.

The paper is an outcome of our research, building on long-term experience in airport planning and design, and the elucidation of planning and approval processes with experts from the Transport Authority and the Ministry of Transport and Construction of the Slovak Republic.

Keywords:

Airport planning;
Airport design;
Approval processes and
commissioning;
Designer authorization.

1 Introduction

Airport planning is a complex discipline involving a number of key elements. All these elements are to be dealt with caution since any of them can represent a tipping point for the success or failure of an airport project. Each of the elements might have a specific, and different, impact on the airport planning process, and carries a specific risk. For medium-sized and small airports, as well as heliports, they usually involve [11]:

- Legal frame and regulations,
- Land use and compatibility planning,
- Surface access,
- Future market forecast,
- Impact on local communities,
- Airport operation requirements.

Airport planning is usually outlined in a master plan document. The goal of a master plan is to provide guidelines for future airport development which will satisfy aviation demand in a financially feasible manner, while at the same time addressing the related the aviation, environmental and socio-economic issues existing in the community (FAA, 150/5070-6B [5]).

Airport planning practices differ significantly between countries and reflect historical experience, methods of airport financing, legal framework, political system and many other factors [7].

Somebody may argue that new airports are not being built in Slovakia, so there is no need to address the airport planning issue. The opposite is true. It is necessary to emphasise that an aerodrome includes also airfields for general aviation and heliports, not only large public airports. The legal framework and the procedures for airport designing, approval, and commissioning are practically identical in all cases. Similar procedures are applied for airport protection zones design, hearing procedures, approval and declaration.

In addition, working out airport documentation requires specific knowledge of international and national standards, recommended practices and other regulations not only directly relating to a particular type of airport and its operation, but also on aircraft characteristics, performance, meteorology, aerodynamics, navigation, flight procedures, and interactions between all of them. Airport planning demands not only formal qualification – i.e. authorisation, but also experience. Unfamiliarity with, or failure to adhere to required procedures may result in delay, suspension, or even cancellation of a project resulting in increased costs or losses. The issue was researched last year

(the research was conducted from May 2016 until June 2017, and consulted with the Transport Authority, Ministry of Transport of Transport and Construction and the Slovak Chamber of Civil Engineers.).

From the above-mentioned aspects of airport planning this study focuses on the scope of legal and regulatory framework for airport planning, design, and approval processes in the Slovak Republic, but also requirements for civil engineer authorisation and their professional competence for airport design.

2 Legal framework

A set of laws, international and national standards and recommended practices, other regulations, documents, and manuals specify the legal framework for airport and heliport design, negotiating, and airport technical documentation. In the Slovak context, they are in particular:

- The Civil Aviation Act (Aviation Act), No. 143/1998,
- Building Act (Law on Town and Country Planning and Building Code), No. 50/1976,
- Law on Environmental Impact Assessment, No. 24/2006.

The basic standards and recommended practices for design and assessing airports is the national standard L-14 Airports, Volume I. Design and operation of airports of 20th June 2009. The limitation of the national regulation is that it was issued in 2009 on the basis of the 4th edition of Annex 14/I. of July 2004 and has not been updated since then (the latest issue of the Annex 14/I is the 6th edition of July 2013). Some of the parameters, for example for general aviation airports, need to be discussed "ad hoc" in cooperation with the Transport Authority. For an aerodrome which is open to public use, serves commercial air transport, and where operations using instrument approach or departure procedures are provided, and:

- has a paved runway of 800 metres or above; or
- exclusively serves helicopters.

This airport is considered to be in the EASA scope if it meets the criteria provided by Article 4(3a) of Regulation (EC) 216/2008 [10]. For these aerodromes, the Competent Authority designated by each Member State is responsible for the implementation, certification and oversight in accordance with provisions of Regulation (EU) 139/2014 [2]. Furthermore, for these aerodromes it is necessary to consider EASA Certification specifications (CSs) and guidance material (GM) for Aerodrome Design [3] of RMT.0591 — 14 June 2016.

For an aerodrome that does not meet the criteria provided by Article 4(3a), the decision to follow or not the provisions of Regulation (EU) 139/2014 is subject to the national policy.

The national standards and recommended practices L 14 Volume I. defines the basic parameters of airports, but does not include technical solutions and justifications. For example, requirements in relation to the runway orientation, assessment of obstacles, lightning systems, drainage systems, approach and take-off procedures, operating restrictions etc. Those can be found in the ICAO Doc 9157 AN/ 901 Aerodrome Design Manuals Parts 1-6 and ICAO Doc 9184 AN/ 902 Airport Planning Manual Part 1-2. To be able to evaluate runway take-off length it is necessary to consider critical aircraft performance contained in the airplane manual or, nowadays, in special computerised programmes provided by the airplane manufacturer.

Standards and recommended practices for heliports are contained in the L 14 Volume II., Heliports of 01-JAN-2005. Guidance material for heliports could be found in the ICAO Doc 9261 Heliport Manual and FAA AC No. 150/5390-2C, Heliport Design.

3 Procedures for airport designing, building up and certification

The process of designing and establishing an airport begins with the airport site selection and assessment. It continues with an application for approval to establish the airport, the preparation of the planning permit documentation, obtaining planning permit, preparing building permit documentation, getting building permit, construction of an airport, final building approval, obtaining the permit to operate, proposal of the airport protection zones (compulsory for public airports), public hearing on protection zones proposal, and declaration of the protection zones.

These steps involve a number of follow-up technically specific and administrative follow-up tasks, which are time-consuming even with an outstanding knowledge of the issue. An added challenge is that the Civil Aviation Act and the Building Act are not interconnected; therefore the

sequence of procedures, negotiation and/or document approval to be carried out is not clearly defined. After years of experience and consultations with the Slovak Transport Authority, sequence of steps (procedures) which are shown in the Fig. 1 was specified and is described below.

Sometimes it is possible to continue with the next step without closing the previous one, merge some of the procedures or parts of the documentation (building permit and carry-on documentation), or carry out some steps in parallel.

Depending on the circumstances and based on previous negotiations, the local building authority may not require, in some cases, planning permit (land-use permit) procedure. If a runway is located in an enclosed space of an existing conformation, there is no change in the external ground boundary and height arrangements, Building Act (No. 50/1976) does not require planning permit approval (§ 39a para. 3 d of the Building Act No. 50/1976). However, this decision is fully within the competence of the local building authority.

Nevertheless, the Ministry of Transport and Construction (here and after Ministry) may require, in order to issue the consent for an establishment of an airport, an environmental impact assessment, which is usually a part of the planning permit documentation.

Therefore, each case needs to be assessed and evaluated individually and the risks of possible additional project changes, or negative standpoints of the authorities have to be considered.

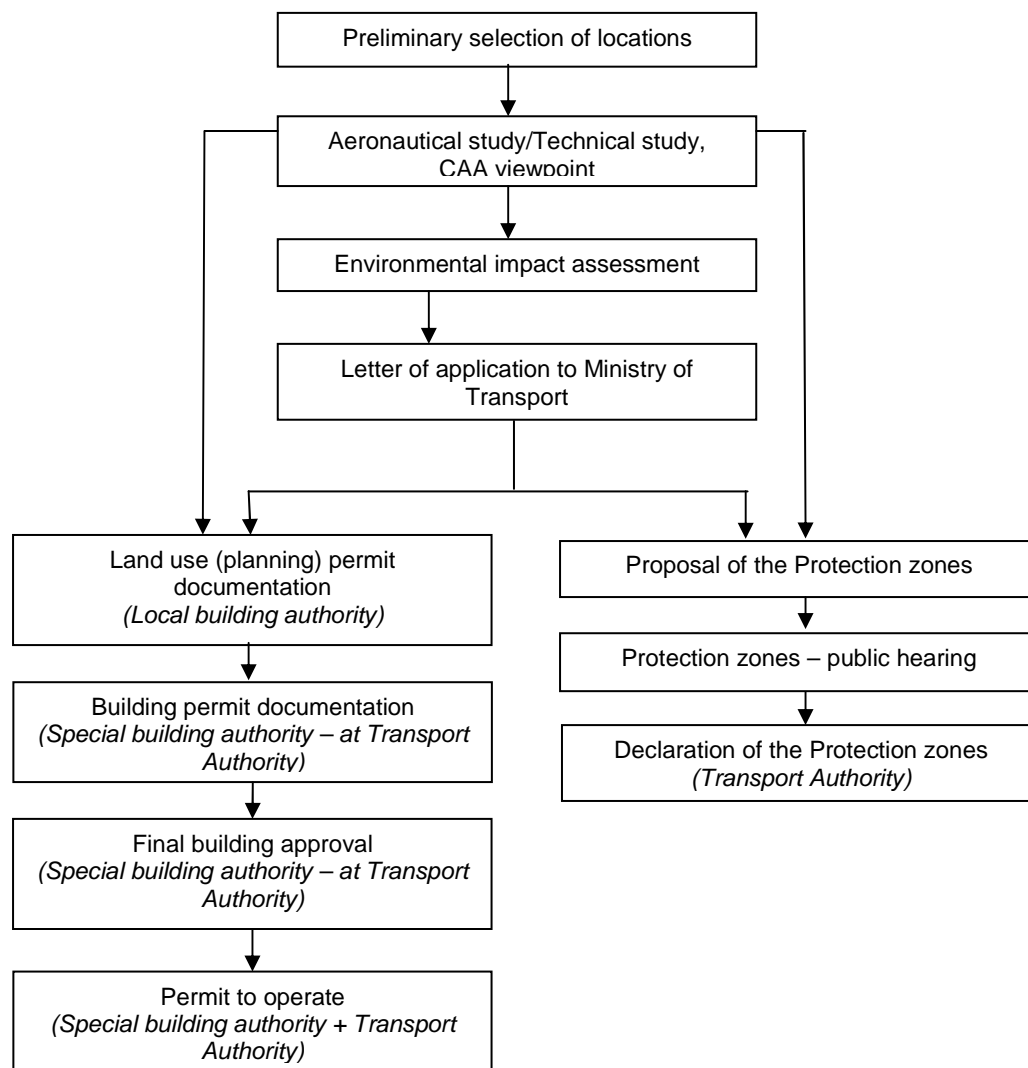


Fig. 1: Design and approval process of an airport.

The process of selection of a suitable site for a new airport, or for development the capacity of the existing one, should start with an assessment of any existing aerodrome and its location. Modifying an existing airport is usually easier than creating a new one on land previously destined for a different land use. In the process of airport development planning, forecasting the trends in the

number of passengers and air cargo volume in the airport catchment area are crucial. Assessment of the existing airport and site should therefore consider factors such as the potential passenger market, current and predicted changes of in this market, and any constraints to its expansion, due to, for example, demographic shifts.

After a preliminary study has approximately determined the size and layout of a proposed airport, potential sites for airport development are evaluated in aeronautical and technical study. The main steps of this assessment are [8]:

- approximate determination of the required land area,
- assessment of the factors affecting the airport location,
- preliminary selection of possible localities from maps,
- survey of individual sites,
- revaluation of the selection of possible sites,
- production of site layout drawings,
- estimate of costs, revenues and discounted cash flow,
- final selection and assessment of the preferred site,
- a final report and recommendations.

After a preliminary study has approximately determined the size and layout of a proposed airport, potential sites for airport development are evaluated in aeronautical and technical study. The main steps of this assessment are [9]:

- the availability (the usability factor) of the runway system should be acceptable, considering the losses which would result from the unavailability of the airport,
- obstacle restrictions defined by the obstacle clearance limits should be respected,
- ideally, the final capacity of the runway system should meet the predicted demand in the typical peak hour traffic in the far future,
- the site selected for the airport should be considered not only from the viewpoint of obstacle clearance limits and environmental requirements but also from the viewpoint of achieving a functional layout of the aerodrome facilities,
- the airspace capacity and procedures assessment with respect to type of airport operation and to other airports in the vicinity,
- the ground transport access to the airport and the urban development plans in the airport vicinity should be efficient and sustainable,
- the site should be in accordance with local and regional land use plans.

Linked to the aeronautical and technical study, Environmental Impact Assessment (EIA) study must be carried out. After receiving positive standpoint view from the Transport Authority on the aeronautical, technical study and EIA, the investor submits a request the Ministry for consent to establish airport. For heliports and airports with runway up to 2,000 m the EIA screening assessment is required, while for those airports with runway longer than 2,000 m full EIA study must be prepared and approved, including public hearing procedure.

After approval of the aeronautical and technical study, and parallel to EIA, land use (planning) permit documentation has to be prepared. The land use permit documentation forms a basis for the planning permit on the building/construction positioning and a basis for the documentation for the building permit. The land use documentation has to demonstrate compliance with the land use plan, binding regulations, and compliance with any conditions specified by the building authority [1]. The approval of land use permit documentation and issuing of the land use permit are the responsibility of the local building authority. In case "a building is located in the enclosure of existing buildings and the external ground boundary and height arrangement of the space are not changed" a land use permit may not be required in line with the Building Act No. 50/1976 (§ 39a, art. 3, d) of the Building Act No. 50/1976). However, the final decision on the issue is in full competence of the local building authority.

The next step is preparing a building permit documentation. The competent authority to issue the building permit for airports is the Special Building Authority at the Transport Authority (§ 28 of the Civil Aviation Act No. 143/1998).

With respect to the overall scope and nature of the project, it is possible to join the building permit documentation with the carry on documentation in so-called one-stage project. The carry on documentation provides sufficient base for the preparation and implementation of the project, in particular the specification of construction costs. It is also a basis for procurement of supplier. The investor may decide whether the carry on documentation will be a part of the construction contract. In that case, the basis for the procurement and selection of a supplier is a tender documentation. What is a building permit documentation complemented by a budget proposal and item lists.

All special products used in the design and construction of an airport (lights, signs, electrical systems, radio navigation aids) must have a certificate for the usage in the civil aviation, or a certificate from other recognised authority of a foreign state, or international organization must be presented.

After the project completion, the building contractor requests the final building approval, which is in the responsibility of a special building authority.

After finalisation of the building approval process, the final step for the airport operation authorisation is an airport certification and issuance of a permit to operate. The basic document for an airport certification and commissioning is an airport operation manual. The airport operation manual contains all important data, facilities and services description, airport equipment, procedures, and management. The future airport operator must prove to meet all the requirements for airport operation license and demonstrate that there are no major deficiencies that could adversely affect aviation safety.

To avoid endangering the airport investment by other constructions in the vicinity of the airport, which may penetrate obstacle limitation surfaces and endanger airport operations, a proposal of an airport protection zones should be designed (§ 29 of the Civil Aviation Act No.143/1998). The proposal of the protection zones is subject to public hearing procedure and must be approved by the Transport Authority. After receiving consent from all organisations and authorities, the protection zones are declared by the Transport Authority.

The declaration of protection zones is a prerequisite of airport operation certificate of a public airport or heliport. The investor should provide that the protection zones are incorporated in the land use plans of the neighbouring communities.

4 Requirements for the professional competence

According to the standpoint view of the Slovak Chamber of Civil Engineers, the persons who has prepared the documentation of airports and heliports must have the professional qualification of an authorized engineer with authorization for category A2 – Comprehensive architectural and engineering services with a focus on traffic structures (original designation 2-1); respectively, authorized engineer with authorization for category I2 Engineer for construction of civil engineering structures focusing on designing of civil engineering constructions.

These qualifications cover a very wide range of technical constructions. Therefore, Slovak Chamber of Civil Engineers recommends requiring proof of practical experience. This can be done by presenting a reference list of documentation of similar projects for a certain period and presenting a letter of approval from the Transport Authority on the referenced projects. To avoid problems with airport documentation preparation and approval, it would be an advantage to specify the legal and professional competence requirements more precisely. In this respect, discussion and cooperation between the Transport Authority and the Slovak Chamber of Civil Engineers would be appropriate.

It should be emphasized that designing airports and heliports requires not only knowledge of relevant standards and recommended practices, regulations and laws and standards, but also related and complex knowledge of aircraft or helicopter operations, aerodynamics, meteorology, flight procedures, air flow, turbulence, fire extinguishing systems, approach and take-off procedures, operating restrictions, noise limitations, radionavigation and security systems, air traffic management, as well as European regulations on Air Navigation Services and interoperability of the systems supporting those services, especially with regard to navigation aids, surveillance aids and meteorological systems which are normally part of the airports. All this has to be taken into account in interrelationships and contexts.

5 Conclusion and further research

In researching the topic and in dialogue with our partners in EU we found they have to face similar problems. We appreciated open discussion on the problem in particular with the Transport Authority. This contributed to success of the study. In the next stage we will benchmark the practices in other EU states, in particular the Czech Republic and Germany. We will also focus on new area of requirements for professional competence for airports and heliports operation and airport certification procedures.

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