

Rescue and Fire Fighting on RWY 06R/24L

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Abstract— Rescue and firefighting service is an important and essential part at the Václav Havel Airport Prague and it has to follow the requirements stated in Commission regulations (EU), regulations and laws of Czech Republic. Construction of parallel runway 06R/24L influences runway and taxiway system significantly. Consequences of these construction changes are changes of access routes and new places of potential interventions originates. Safety risks of inaccessible areas at the airport and inability to follow response time come with operations of the new runway. These risks are assessed and mitigated if necessary.

Keywords- response time, firefighting service, parallel runway, safety risk

I. INTRODUCTION

Václav Havel Airport Prague is the biggest international airport in Czech Republic. Over 11 million passengers are handled at this airport every year and annual increase of number of passengers is predicted and it is needed to adapt operational infrastructure to this trend. Capacity of the airport is determined by terminal manoeuvring area capacity, passengers and aircraft handling capacity, runway system capacity, access roads capacity and parking lots capacity. All these capacities have to correspond to each other and they have to be increased dependently on each other.

All these capacities, except the runway system capacity, had been increased in the past, for example by opening of new Terminal 2 or building new parking houses in the year 2006. The limiting capacity of whole airport is nowadays the runway system capacity and it should be doubled by the planned project of construction of new parallel runway (RWY) 06R/24L, which allows independent parallel departures and arrivals.

First cogitation about parallel runway construction is from 90s of the 20 century, when the runway capacity was discussed and two possible solutions of the runway system were designed. Construction of parallel RWY 06R/24L has more advantages when considering the runway capacity [1]. A lot of acts have to be made before the beginning of construction, not only design of runway with rapid exit taxiways and connection to the current taxiway (TWY) system, but also the Environmental

Impact Assessment, EIA, safety assessment and accordance with the planning documentation.

New parallel runway has to be assessed from many different views of safety, from approaching procedures, take-off and landing, taxiing to RWY 06R/24L or interventions of rescue and firefighting service according to the construction and operation of new runway. This paper is related to the rescue and firefighting service at the Václav Havel Airport Prague (LKPR).

At first the current situation at LKPR, number of employees, buildings, vehicles and equipment of rescue and firefighting service have to be examined and the conclusion will be if the current situation follow the requirements of regulations also with the operation of parallel runway. In case of any insufficient thing is found the suitable solutions will be suggested.

Also the hazards and their consequences for rescue and firefighting service related to the operation of parallel RWY 06R/24L have to be identified and analysed. Consequences of hazards become safety risks when the likelihood and severity of consequences are determined. Severity is determined after answering how many lives may be lost, what is the extent of aircraft, property or environment damage. Tolerability of safety risks is determined by likelihood and severity of the hazards consequences. Safety risks from intolerable, undesirable and tolerable category have to be mitigated [2].

II. REGULATIONS

Rescue and firefighting service follows act no. 133/1985 Coll. Fire protection and it also have to follow Annex 14. The main target and tasks of rescue and firefighting service, aerodrome category for firefighting (LKPR category 10 – data in tab. 1) which determines minimum number of employees, minimum number of rescue and firefighting vehicles and minimum amount of extinguishing agents are defined by this annex. The kind of extinguishing agents which can be used and response times are also defined in Annex 14. This annex also determines emergency access roads, fire station and communication and warning systems. [4][5].

Doc 9137 Airport Services Manual, Part 1 Rescue and Fire Fighting Service, provides more details about information

stated in Annex 14. It focuses on minimum number of employees, criteria for proper choose of personnel, training and properties of protective clothing. Doc 9137 also provides more information about rescue and fire fighting vehicles, amounts of extinguishing agents and properties of various kinds of them, response times and design of firefighting stations. One part of this Doc specify communication and warning systems and procedures of rescue and firefighting service before, during and after the intervention [6].

According to rescue and firefighting service the Commission regulation (EU) no. 139/2014 pays attention to fire prevention, use of alcohol, psychoactive substances and medicine by the rescue and firefighting personnel and duties of aerodrome operator [9].

Current rescue and firefighting service at LKPR follows all the requirements stated in act no. 133/1985 coll. Fire protection, Annex 14, doc 9137 and Commission regulation (EU) no. 139/2014. All requirements given by Annex 14 for aerodrome category for firefighting number 10, number of employees and personnel training, number of vehicles, amount of extinguishing agents, communication and warning system and limits for response times, are followed.

TABLE I. AERODROME CATEGORY FOR FIREFIGHTING [5]

Length of aircraft [m]	Maximum width of fuselage	Minimum number of rescue and fire fighting vehicles	Minimum number of personnel
70 - 90 (included)	8	3	1+5 a 1+5
Minimum amount of extinguishing agents			
Foam meeting the minimum performance level			Complementary extinguishing agent
A	B	C	
Water [l]			Dry chemical powders [kg]
48 200	32 300	22 800	
Discharge rate foam [l/min]			Discharge rate [kg/s]
16 600	11 200	7 900	

III. RISKS AND HAZARDS

Parallel RWY construction and operation brings significant changes in runway and taxiway system and also in system of roads at the aerodrome. Due to these reasons the construction and operation of RWY 06R/24L is a hazard to rescue and firefighting service in safety consideration. Consequences of this hazard are inaccessible areas at LKPR (areas have to be accessible by all vehicles and the limiting vehicle is Panther Rosenbauer with the height 3,6 m, length 11,835 m and width 3 m - see in the figure 1) and inability to follow response time.

Assessment of inaccessible areas was divided into 2 parts, North area and South area. We focused on THR (threshold) 06L and THR 24R in North area. We analysed accessibility of areas

900 m before both THR RWY 06R/24L, which will be mainly used for landings and these areas are considered as critical.

Access routes from Satellite fire station North will not be changed after the construction of parallel RWY and the access routes from Central fire station will change only slightly. Due to these reasons the area North is considered to be accessible also after RWY 06R/24L is used. Risk of inaccessible RWY 06L/24R is acceptable, safety risk index is 1B and no safety recommendation had to be designed.

We have to first design the access routes to the areas 900 m before both THR RWY 06R/24L and then consider if the areas are accessible or not. Risk of inaccessible 900 m before THR 06R is undesirable, risk index is 3B and safety recommendation is construction of service road from THR 06R to the area 900 m before THR with the load capacity permitting exceptional use by vehicles of total weight 33 000 kg. Final risk after implementation of this recommendation is acceptable, 1B.

We designed two accessible routes to the area 900 m before THR 24L, north - approaching the area from Přední Kopanina and south - approaching the area from village Na Padesátníku. Risk of inaccessible 900 m before THR 24L when using the north route is undesirable, risk index is 3B and safety recommendation is construction of special rescue and access road from the street K Padesátníku to the area 900 m before THR 24L with the minimum width 3 m and with the load capacity permitting exceptional use by vehicles of total weight 33 000 kg. Final risk after implementation of this recommendation is acceptable, 1B.

Risk of inaccessible 900 m before THR 24L when using the south route is undesirable, risk index is 3B and safety recommendation is construction of special rescue and access road from the street Na Padesátníku V to the area 900 m before THR 24L with the minimum width 3 m and with the load capacity permitting exceptional use by vehicles of total weight 33 000 kg and ensuring clearance height 3,6 m in the street Na Padesátníku V by cutting the branches of the trees. Final risk after implementation of this recommendation is acceptable, 1B.



Figure 1. Panther Rosenbauer [10]

Assessment of inability to follow response time was examined for 6 chosen places, THR 06R, THR 24L, south end of TWY K6, Hangar E, 900 m before THR 06R and 900 m before THR 24L. We designed access routes to all these places, deputy head of fire department at LKPR Ing. Karel Moravec approved all access routes and their length was measured with Ing. Libor Kurzweil, Ph.D. in program LetGIS. We measured the deceleration in different kind of turns in cooperation with fire department. Response times from Satellite fire station North and Central fire station to chosen places were calculated from obtained data and response times were compared with the times stated in Annex 14 and the result was the risk of inability to follow response time. We designed the relation for calculating response time and checked it by calculating known response time to THR 06L.

Risk of inability to follow response time to THR 06R is acceptable, safety risk index is 1B and no safety recommendation had to be designed. Risk of inability to follow response time to THR 24L is acceptable, safety risk index is 1B and no safety recommendation had to be designed. Risk of inability to follow response time to south end of TWY K6 is acceptable, safety risk index is 1D and no safety recommendation had to be designed. Risk of inability to follow response time to Hangar E is tolerable, safety risk index is 3C and safety recommendation is construction of satellite fire station situated to the south from Satellite fire station North and to the west from Central fire station. Final risk after implementation of this recommendation is acceptable, 1C.

There is no limit for response time to areas 900 m before THR and due to it we could not determine the risk of inability. Calculated response time to area 900 m before THR 24L with using the route approaching from south (figure 2) was shorter than the route approaching from north, so we chose this route as access route. Response time was about 5 to 7 minutes and it seems undesirable, so we calculated response time of access route with a bridge above the road R7, which would significantly shorten the access route and it would avoid problematic parts of previous routes. Calculated response time was shorter than 3 minutes for the first vehicles and about 4 minutes for all other vehicles. There is a need to assess a study comparing the financial investment and benefits of access route with the bridge.

IV. CONCLUSION

We placed the satellite fire station, which was needed from the reasons of mitigation the safety risk of inability to follow response time to Hangar E, to the north of the parallel RWY 06R/24L and to the south of TWY K6. The benefits of building new satellite fire station are following the operational limits of response times to THR 06R, THR 24L and to south end of TWY K6, which were not possible without it. These benefits are proved by the calculation of response times from new satellite station to THR 06R, THR 24L, south end of TWY K6 and Hangar E. Another advantage of building new satellite fire station is increase of response times to Hangar E and to following one limit stated by Annex 14. Hangar E is not a place on the movement area, so the limits for response times are not

stated anywhere, we just examined if it is possible to follow them or not.

Construction and operation of parallel RWY does not change the aerodrome category for firefighting, because LKPR is already in the top category (10). There is no need from regulations to increase the numbers of personnel or vehicles due to parallel RWY, it only brings reallocation of them in case of building new satellite fire station.

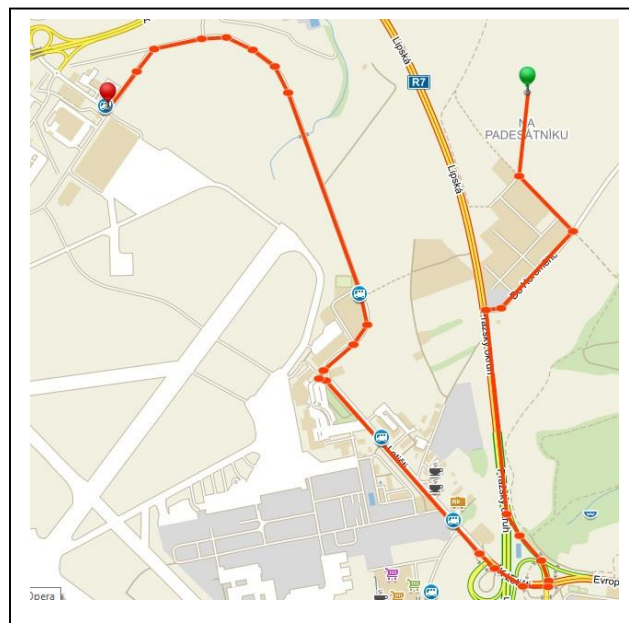


Figure 2. Access route to 900 m before THR 24L from south [11]

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