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AIRPORT QUESTIONS 1939

By A. B. McMULLEN*

One year has passed since I had the opportunity to speak before you at your last annual convention on the subject of airports. It has been a year of much activity on the part of everyone in aviation including the Civil Aeronautics Authority. These activities have been fruitful. So fruitful, in fact, that increases in all kinds of flying this year and vividly in prospect for next year have developed a situation almost entirely new. So that this year, instead of again *telling* you more about airport and airway planning I have decided to ask you some questions.

State Initiative

My principal question to you at this time, as one of your old colleagues, is, what have the States done to keep up with the present rate of progress in aviation and to match the activities and expenditures of the Federal Government on airports?

Let us assume, for instance, that a possible future airport program financed partially by the Government should be patterned to some degree after the Public Roads Statute. How many of the 48 States would be in a legal position to accept financial assistance from the Federal Government? How many States have aeronautical commissions or similar organizations to plan, direct, and protect the States' interests from an aeronautical standpoint, and to function cooperatively with the U. S. Government. (See recommendations 10-11-12, CAA Airport Survey Report to Congress, March 24, 1939.)

May I outline briefly what we in the CAA have attempted to do to assist you in solving not only this problem but many other problems which I would like to call to your attention. I am speaking only for the Airport Section in this instance and not of the work done by other divisions, particularly by Mr. Elwood Cole, State Coordinator for the CAA who will speak to you later on about his functions. Reducing to a minimum the many details involved let me itemize some of the studies now being conducted by the Airport Section.

A study has been initiated to determine which States have satisfactory enabling legislation and what action is necessary in others to permit participation in a Federal airport program. It is evident that the necessary state machinery should be set up and ready to go ahead on time and that progressive aeronautical policies should be studied and adopted in advance. This is a matter which should be receiving the study and consideration of everyone interested in the airport problem—and particularly of every State Aviation Official.

National and State Plans

We are still working hard with very limited personnel in the CAA on a national airport plan. At the start of the Airport Survey conducted during the latter part of 1938, all States were supplied with a guide for the preparation of a state plan. Since then Airport Section field personnel have submitted to

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most of you, or other State officials, in an informative way suggested state plans of airport location and distribution. We are still waiting for an expression from the majority of the States as to what they consider adequate airport distribution. In most cases the state plan submitted to us covered only the major terminals. In view of the urgent need of preparing this data, in the face of the very imminent need for new facilities due to increased flying, we are now forced to get this information through the cooperation of the National Resources Planning Board and through State Planning Officials. You will realize the seriousness of this matter when, in some instances, such plans are prepared by officials entirely unfamiliar with airports and other aviation problems. Are you State Aviation Officials coordinating your activities with the State Planning Boards in your respective States?

Zoning

What is being done in your State to eliminate obstructions and protect approaches to airports? Some progress has been made along these lines in a few States during the 1939 legislative sessions which I know George Logan, your legal counsel, will cover in his report. The problem of zoning has been of considerable concern to us in the past and extensive missionary work has been done along this line through Airport Section field personnel and its Legal Unit under the direction of John M. Hunter. I need not emphasize the importance of such legislation, particularly in view of the early installations of instrument approach systems, the probable need of early expansion of existing airport facilities and the protection of these new investments which would be wasted without safe and adequate approaches. Tentative standards prepared by the Airport Section for the location of overhead power lines have prevented in many cases the erection of transmission lines which would have been a hazard to aerial navigation. For the benefit of those who are not familiar with the background on this work I shall briefly explain its early stages of progress. The Federal Government was spending money for airports as well as on power line installations and our objective was to coordinate and control the construction of such facilities where they might conflict. After several conferences with representatives of the offices within the Authority interested in the matter, a preliminary draft of standards for the location of overhead transmission lines in the vicinity of airports and radio range stations was prepared. A conference of 20 Federal agencies concerned with the installation of overhead transmission lines was then called by the Authority for the purpose of discussing these proposed standards and determining to what extent such agencies would cooperate in conforming to standards of this Authority in future installation of transmission lines. This conference was held on January 26, 1939, with extremely gratifying results. Not only were the various Federal agencies glad to cooperate in this matter but there was considerable interest evinced by the many representatives of public utilities who were present. As a result, the proposed standards are now followed by the three Federal agencies directly engaged in the most extensive programs of power line installation, the Rural Electrification Administration, the Bureau of Reclamation of the Department of Interior, and the Tennessee Valley Authority, while the Federal Power Commission refers all cases over which it has jurisdiction to this Authority for recommendations and advice. As a matter of fact, the REA has organized an airport section specifically for the purpose of coordinating this type of work, and has recently taken the initiative in obstruction-lighting its cross country

high tension lines. In addition, as soon as the present standards are revised in accordance with the many helpful suggestions received at, and since, the conference of January 26, and in accordance with a study of airplane performance recently completed by the Airport and Aircraft Sections of the Technical Development Division, on the basis of motion picture flight tests, it is planned to request formation of a committee of representatives of the public utility interests in accordance with a suggestion made by them at the conference. As a result of conferences between such a committee and representatives of this Authority and other Federal agencies, it is hoped that a mutually agreeable arrangement can be made for installation of overhead transmission lines in the vicinity of airports by private as well as public interests. These standards although not mandatory have had an extremely desirable effect on public and private service agencies. We have received numerous calls from such agencies or firms desirous to have their long range planning programs conform with these standards.

Many questions pertaining to the location of power lines should come to your attention before they reach Washington and you can assist materially in many cases over which the Federal Government has no jurisdiction.

Airport Power Supply

Black-outs due to power supply failures such as recently occurred at Chicago and Buffalo airports, cannot be tolerated if we are striving for 100% scheduled operations. Standby equipment at either the city's power plants or at airports is important. The CAA is interested in securing detailed information regarding the emergency power supply at terminal airports and we believe that all State Aviation Officials should become familiar with the power supply at all airports within their respective States.

Airport Lighting

The CAA has set up standards for airport lighting equipment after consultation with all interested industries and an attempt is now being made to simplify the procurement of lighting equipment under approved type or rating certificates.

Airport Planning and Size

The problem of present and future traffic control as far as airport sizes, layouts, and building designs is concerned has been a vital question confronting all of us. The CAA has tabulated traffic densities, etc., and prepared tentative layouts of landing areas, buildings, and control towers, but we often find it difficult to convince the local communities of the necessity of preparing a master airport plan at the present time. Should we not be concentrating on what may be confronting us 5, 10, or 15 years from now when discussing or planning airports? None of us may be psychic or crystal gazers, but there should be a way to approach an approximate answer to such questions. Other industries are doing it, why not our own?

As already mentioned in connection with approach standards, a study of the correlation of aircraft take-off and landing characteristics with airport size, involving some 20,000 man hours expended over a period of two and one-half years, has recently been completed by the Aircraft Section of the Technical Development Division, and a 250 page report is now in the process of being printed.

The purpose of this study is to determine airport dimensions that safely will accommodate the different types of aircraft. These airport dimensions should remain within reasonable geographical and financial limits and should be determined so that no increase in requirements will be necessary for many years to come. As far as possible, airport and runway dimensions should be founded upon factual data rather than upon personal opinion and theory. Accordingly, this study is based mainly upon photographic records of day-in and day-out operations of a number of representative airplanes, obtained on airports at various altitudes.

In addition to these performance data, this study includes a large number of accident records and meteorological observations.

The study of accident records seems to lead to the establishment of the following conclusions:

- (a) Runways should be long enough to permit aircraft to be brought safely to a stop in the event of an engine failure occurring during the take-off up to the point where the wheels are just leaving the ground.
- (b) The cleared areas on either side of the runways should be wide enough to provide reasonably smooth surfaces on which the aircraft can come to rest, should some unforeseen contingency cause them to swerve from their original take-off or landing directions.
- (c) Obstacles should not project up into the flight paths.

A study of meteorological observations has led to general conclusions concerning possible airport temperature and barometric pressure conditions that will be encountered in actual operation. It appears that, at any airport, allowances should be made for a density altitude several thousand feet greater than the geographical altitude of that airport to provide for temperatures above normal. All observed data are corrected to zero wind velocity and to specification gross weight of the aircraft concerned.

These studies have resulted in the attainment of two broad objectives:

1. The establishment and application of a basic and practical method for correlating the take-off and landing characteristics of any airplane with any airport at any altitude so as to insure safe operations.
2. The determination of definite dimensional requirements for four classes of airports at any altitude.

The grouping of airport requirements into four classifications, as mentioned above, is based upon the types of airplanes that can be safely accommodated. These are as follows:

Class I: Low powered private owner type.

Class II: Medium powered private owner type.

Class III: Higher powered private owner type and smaller airline type.

Class IV: The largest of airline and military aircraft.

Conclusions as concern dimensional requirements for the four classes of airports are presented in two sets of curves. The first shows runway length requirements for each class of airport up to 10,000 feet elevation. The second shows obstacle zoning ratio requirements for each class of airport and at any altitude up to 10,000 feet. The obstacle zoning ratio is obtained by dividing the distance from the obstacle to the near end of the runway by the height of the obstacle.

Data from which the total width of the runway plus the cleared areas on either side of the runway may be determined are far from adequate. They indicate, however, that for each class of airport an effort should be made to

provide the following minimum widths :

Class I (At any altitude).....	300 feet
Class II (At any altitude).....	600 feet
Class III (At any altitude).....	900 feet
Class IV (At any altitude).....	1200 feet

As indicated by this study, runway length and obstacle zoning ratio requirements at *SEA LEVEL* are as follows :

<i>Airport Class</i>	<i>Runway Length</i>	<i>Obstacle Zoning Ratio</i>
I	1800 feet	13
II	2800 feet	18
III	3800 feet	23
IV	4800 feet	28

At any airport at any altitude, radio instrument landing systems require an obstacle zoning ratio of 43.

The above conclusions represent our interpretation of the factual data available and are not the final regulations. They will, however, be incorporated in our final airport standards unless shown to be incorrect. Your advice and recommendations will be welcomed.

Seaplane Bases

The seaplane landing float program, the objective of which is the establishment of at least docking facilities on all waters that may be used by this type of aircraft, is progressing satisfactorily through the splendid cooperation of the NYA. The latest reports indicate the following results during the past eight months :

Number of approved locations where installations can be made....	119
Number of installations definitely under construction.....	25
Number of installations actually in service.....	19

The C.A.A. has depended upon your cooperation to make this program a success. With your continued cooperation we can make it an outstanding example of cooperation between States and Federal agencies. We already have taken steps to chart existing water areas in the United States suitable for seaplane operations not listed on existing maps. It is a difficult task due to the absence of complete information in Washington. We are compelled to obtain much of this data directly from the States. Complete information is essential to determine the suitability of inland water areas for the operation of seaplane equipment.

Have the States given any thought to the effects of the Civilian Pilot Training Program or to the rapidly increasing number of private pilots? Are the present airports in your respective states adequate to take care of 40,000 pilots, a goal anticipated within a short space of time?

Our attempts to solve all of these and many other problems would be ineffective without the cooperation of the States.

Speaking of the National airport problem and all its technical and legal ramifications, have you ever considered how far reaching, how important our problem is? There can be no private flying activity unless we have airports and landing areas, no scheduled operations under certificates of convenience and necessity unless there are airports serving such routes. The wisdom of the late General Westover's statement to the press that "a national system of commercial airports is the backbone of national air defense" has been proven by experience in the present European war.

The airport problem is international in scope. This very day representatives of the Airport Section are assisting in the planning of airports in Alaska and the Hawaiian Islands, in the planning of transoceanic seaplane bases and terminals in the Pacific Isles and elsewhere. We have answered requests from nations all over the world for recommendations as to airport sizes, drainage, paving, and lighting specifications. Your Association and many of its members have been of great help to the C.A.A. in the past and we need the advice and cooperation of your organization in the future. We are all interested in solving, in the most efficient manner, the airport and other problems which confront us. We are also desirous of seeing America maintain world leadership in aviation. Men with imagination and vision—men such as yourselves—have made aviation what it is today, and in order to attain our mutual objectives in the future the C.A.A. and the N.A.S.A.O. must continue to work hand in hand.