

GOVERNMENT'S ROLE TOWARD AIRPORT-RELATED RESEARCH
AND COMPATIBILITY (Luncheon Remarks)
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As background for my comments on airport research, let me briefly overview the scope of FAA's airports program.

The airports mission of the FAA is to foster and promote the development and maintenance of a safe and efficient national system of airports. In addition to dealing with issues and constraints like noise and capacity, our mission encompasses responsibility for several programs and functions. These include developing standards for airport planning, design, construction, safety, and operations; developing and publishing the national airport system plan; administering the airport development and planning grant programs; processing airport environmental actions; administering the airport safety and certification programs; ensuring airport compliance; collecting and maintaining airport facilities data; conveying or leasing of Federal land and surplus property for airport purposes; and, representing FAA interests in international aviation. In addition, we are responsible for the operation, maintenance, and development of Washington National and Dulles International Airports.

Research is required to support our standards for airport design and construction at the airports which provide the terminals in our national air transportation system. That research is of primary interest to you. I will, therefore, concentrate my remarks on that facet of the FAA's airports program.

As we pursue the construction of a national system of airports, we have found few, if any, airport sponsors able to undertake their own research. Some state aviation organizations have limited capability to undertake or participate in airport research. State departments of transportation and universities are slightly better off in terms of resources and capability to conduct airport research. This, however, still leaves the primary responsibility for airport research to private industry with input from the Federal government.

Aircraft manufacturers have large and fruitful research and development programs. Most industry elements, and aircraft manufacturers in particular, are normally restricted, however, in terms of research and development to a single product or a few related products. These organizations rarely consider questions relating to optimization of combinations of alternative products or airport construction practices. That means the questions regarding standards and practices to improve transportation safety, reduce construction costs, and/or increase operational efficiency remain unanswered. The research needed to answer these questions is therefore normally left to the level and agencies of government with resources to support these substantial research requirements.

I am concerned that in our R&D efforts, we remain ever more aware of the requirement for team effort between the private operators, industry and government. The various levels of government, the aircraft manufacturers, the military, and the pavement industry have a great challenge ahead to work toward accomplishment of our overall research needs. Academia, the private sector, and foreign airport research organizations must interface with our research programs to provide, as a minimum, advice but more probably answers to some of our pressing compatibility questions. I know the Transportation Research Board will help us to maintain awareness and coordination on all research conducted by the various organizations which are part of the U.S. and foreign government airport research team, as well as

foreign R&D. It will take us all to assure that the most pressing needs are emphasized and there is no duplication of research effort.

FAA has a long-term commitment for improvement in the capacity of the nation's airports. Our own R&D organization has published some 200 reports relating to airport problems. This achievement has been buttressed by the support of the Transportation Research Board and the industry working group. Your help in obtaining required resources was significant. You are well aware of the competition to obtain airport R&D funds.

Today, funds are very constrained for research. We are continuously examining our airport research needs or initiatives to identify and prioritize our requirements. I am pleased to inform you that an FAA medium- and long-range airport research needs and initiatives document was released recently. A number of you reviewed the draft. We appreciate all the constructive comments you sent us. This plan provides the philosophy behind our needs for airport R&D, i.e., to assure airport-aircraft compatibility. It also prioritizes our requirements. That is the good news. The availability of resources to fulfill our needs is limited. The entire FAA research budget has been trimmed. The airport share has been no exception. For this reason, more and more dependence must be placed on research efforts by our partners in airport research.

Even as resources become more and more scarce, we recognize we must continue to look for new ideas or improved techniques to assure our continuing world leadership in aviation and airport design. A few of the newer areas being considered for research, or for which research has been started in the U.S., include:

- Simulating, with computer models, possible changes in an airport's configuration which, when coupled with aircraft operational characteristics, such as vortex generation, and requirements, such as the need for triple or closer parallels, will improve capacity.
- Keeping aprons and bridge structures free of ice and snow by utilization of waste heat from the terminal building.
- Providing either a substitute for, or an extender of, asphalt.
- Improving on landing aids for identification of airports without a paved runway.
- Adopting a new noncorrosive chemical for ice control.
- Reducing the cost for maintaining good frictional characteristics on pavements.
- Finding more effective fire extinguishing agents or procedures.
- Electronically monitoring runway surface conditions inclusive of water depth.

As long as FAA has its role in the design and construction of airports, we must continue to pursue airport research. This is absolutely essential to assure all users that our standards are safe, efficient, and provide for technologically advanced airport development.

Our largest single research effort for airports is the airport pavement program. It reflects the fact that paving is the largest single construction

cost item. Improved paving techniques, therefore, provide the greatest potential for savings. More than one-half of the airside construction aid money is spent on pavements. One high intensity edge light will cost roughly the same as one yard of pavement concrete. For that reason, we received widely varying answers from different people on R&D priorities.

To assure aircraft-airport compatibility, airport operators and airport design engineers are going to have to continue to keep up with aircraft development and airspace utilization progress. They must at the same time keep abreast of the latest technology in construction practices. The challenge of keeping up, however, applies even more to the managers and implementers of research. The FAA and the international aviation community look to the products of U.S. research for the basis of standards, and the planning for each airport. To solve the mixed problems of compatibility between aircraft, airports and communities must be a number one transportation priority. Obviously this will require substantial research efforts.

Airport-aircraft compatibility must be approached from both directions. Let me illustrate the "must" in terms of the required bilateral participation required to reduce or resolve airport capacity, approach clearance, and pavement strength compatibility problems.

As we look at trends in aviation, it is obvious that new aircraft are larger. Existing aircraft are being stretched, sometimes with appreciable increases in wingspan. Oftentimes the gross weight increases; and if it is not technically and economically feasible to avoid it, the gear, tire weight and tire pressure will increase. The FAA looked at the current and future economic impact of aircraft growth versus airport growth in 1973. This was published as our R&D report "Aircraft Pavement Compatibility." Not only has considerable time passed since that study but the trends of today's economy suggest the work being undertaken here is the appropriate beginning for a revision of our 1973 conclusions. A pavement is only a foundation for the aircraft wheel. It transmits the applied energy to the subgrade as evidenced by deflection, and, unfortunately, deformation and cracking. Heavier loads accelerate deformation and cracking. They reduce pavement life unless a balance in pavement bearing capacity versus strength is reestablished by increasing the strength of the pavement. Increases in tire pressure and, to a limited extent, increases in individual aircraft loads can be provided for by overlays. Substantive increases in gross weight and gear loads involve the deeper layers of the pavement, the drainage requirements, and foundation characteristics. An overlay is often only a temporary solution and in many cases is a questionable approach to solving the increased weight. On the other hand, a reworking of the foundation by the airport sponsors may not be possible. The alternate, which is a redesign of the landing gears, is probably even less feasible. My answer to this dilemma is at best only a partial answer. We must depend on improved two-

way communication and cooperation between aircraft manufacturers and airport operators and their designers.

Advanced planning for research to resolve these compatibility problems, as we are exploring here, is absolutely essential; the final element of the solution or solutions will then come from carrying out the research to resolve those pressing problems.

A similar situation applies in terms of the configurations of our nation's airports. The standards for layout of an airport, the runway lengths and the obstruction clearing of the approach surfaces have been modified to reflect aircraft requirements. Trade-offs are again involved. Longer wings mean less fuel but may require increased taxiway clearance. Increased landing gear spacing means improvement in pavement flotation but requires larger fillets. Wide bodies mean more efficient transportation but may require changes to our lighting and marking to maintain visibility from the flight deck. I believe that in the past R&D has been an extremely productive tool and will continue to have a constructive role in the analysis of these conflicts. If we have a good analysis, I know we will find the optimum solution.

Finally, we have been using an airport delay simulation model to study air traffic delay causes and potential solutions at a number of major hub airports. These have been team efforts with the airport owner, the using airlines, and the FAA, that will allow the user to evaluate alternative airport designs, proposed improvements, and possible changes in operational demand, aircraft mix, and ATC procedures for their incremental effect on the capacity of the airport.

In working with the model, the FAA has recently developed a number of refinements and would like to undertake a project to consolidate these refinements. It will result in a user document which would allow the model to be released and used by the public. Assembling the input data and running the model to produce meaningful results is just one example of the requirement for team cooperation and meaningful dialogue between the airport operator, the users, and the FAA. If we achieve an increase in the airport's capacity, it is through joint participation by several parties and an open and candid approach to both the problems and alternative solutions.

Airport-aircraft compatibility problems have been with us and will remain with us. FAA feels it has a major responsibility for work, including research, to help in resolving these problems. The Transportation Research Board also recognizes both the need and a share in the responsibility. I know we all represent areas where there is intense competition today for limited resources. But, I am convinced, that compatibility is an area where we are working together and can minimize the resources required for research. To that end, I am confident the problem identification and research proposed as a result of this meeting will achieve a high payoff and contribution to a great aviation system.