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STATE HIGHWAY RIGHTS-OF-WAY AND THEIR IMPORTANCE TO AVIATION

STEDMAN SHUMWAY HANKS*

Wider rights-of-way for state highways are advocated. As these highways may be developed for the future, the additional rights-of-way can be used for runways or emergency landing strips. These runways, at 50-mile intervals, would be outside the city limits, and would be used primarily for airplanes doing interstate and international flying, or for military purposes in a national emergency.

This subject is new in its presentation. It has, however, been brought to the attention of experts in the aviation and allied industries, such as rail and motor transportation. As far as I know, no articles were written on this subject prior to 1935, and therefore I feel the few comments which I have received from those interested in this subject may be of special value at this time and I have included some of them in this paper.

Major Roy D. Burdick, of the U. S. Army Engineers, who was formerly on duty in the Planning Branch, Office of the Assistant Secretary of War, has the following to say:

During the past several years national attention has been focused on the need for better coordination between our various modes of transportation. Indeed the question of how to accomplish such coordination has assumed the magnitude of a major national problem. . . . Furthermore, it is universally accepted that the maximum benefit will accrue to the public not through overdevelopment of one form of transportation at the expense of others but rather by means of a rational development of all forms, each operating in its appropriate field and in cooperation with instead of in opposition to the other forms.

This statement should impress us with the importance of the early establishment of a carefully planned *system* of ground facilities for aviation. As this paper deals only with one of these facilities, namely, state highways, I shall leave the other many important ground facilities relative to aviation to other speakers and to other occasions.

In all the various types of transportation, such as air, rail, bus,

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and water, valuable experience has been gained which should be applied to the individual problems of transportation. Unfortunately, however, there is a great lack of proper coordination today between our air transportation and our rail and bus transportation. In aviation, one of the greatest problems is the "pick-up and delivery" of passengers and goods. A reduction in the ground handling time of passengers and goods could result in a marked saving in total transportation time on any trip by air in excess of 400 miles. As the close coordination of air, rail, bus and water transportation facilities is most important, it is hoped that, by bringing the common air carriers in closer proximity to the state highways, one means of shortening the ground handling time may be accomplished for the "pick-up and delivery" of passengers and goods.

Roadside Improvements:

Many state and federal officials are advocating a 100 ft. to 400 ft. right-of-way instead of a 60-ft. right-of-way, wherever possible. The great use of our highways has made all communities interested in attractive planning arrangements on both sides of the road. They are also interested in obtaining proper parking space along these highways.

If proper zoning ordinances are passed, many sections of our highways of today can have rights-of-way 100 feet or more in width. These would be part of the general landscaping plan of the highway or park departments, and would fit into such developments as parks, bridle paths, etc. The added width for our rights-of-way along the state highways should be placed on one side of the highway or the other, so that *at least* a clear 40-ft. strip will be added, on one side, to the present existing 60 feet, and made available for further development.

In our city planning and other architectural developments we are making our roads and lighting systems as attractive as possible. In many cases we do not now even see any telephone or telegraph wires, and it may be only a short time before many of the ungainly telephone wires along our state highways are either put underground or are placed in one cable. However, no matter how this development may occur, it is advisable that all telephone and telegraph wires should be placed on the same side of the road wherever possible, and that these wires be on the opposite side of the road from these extra rights-of-way.

In planning, developing, and constructing state highways, the state engineers, park commissioners, and other government offi-

cials should always consider zoning regulations in the future. This means that filling stations will be properly located near the additional rights-of-way, and provision made for telephone, telegraph, or teletype facilities at convenient locations. These communication lines would be easy to install for use at our runways, due to the existing telephone and telegraph wires.

In order to condense this paper as much as possible, and to make the matter one on which discussion can be carried on, I make the following brief recommendations:

Recommendations:

(1) Wherever possible an additional right-of-way from 40 to 340 feet be obtained parallel to a state highway, provided such a right-of-way is adaptable for a runway. The minimum width of the highway plus the additional right-of-way should be 100 feet, and wider wherever possible.

(2) It is obvious that it will be difficult to obtain a right-of-way in a straight line, and therefore it is not expected that very many rights-of-way of 40 feet or more can be obtained for stretches of 3,000 feet in length in some of our States. The minimum length should be 2,500 feet, and a runway even as long as 5,000 feet would be of value.

(3) As these additional rights-of-way will require maintenance and be part of the general landscape plan of the state highway departments, it is recommended that they be not closer together than every 50 miles, at the present time.

(4) As in many instances there are telephone and telegraph poles on both sides of the present highways, and also in many instances lovely trees border these highways, it is recommended that the right-of-way be obtained now for parking space or general landscaping only, and that no attempt whatever be made to change the telephone or telegraph poles, or to destroy any trees. However, all new poles should be installed on the same side of the road, away from the right-of-way areas.

(5) This paper is written as a program for the future, and before its recommendations can be put to practical use the public demands must call for such additional runways along state highways.

By taking this additional 40 to 340 ft. right-of-way on one side of a 60 ft. highway, the road traffic can continue at all times except for the immediate take-off or landing of large airplanes. Furthermore, the pilots and passengers will be near automobile traffic if and when they desire to use it.

When a large airplane is about to land or about to take off, signals can be given at either end of the highway, adjacent to the runway, to hold up the traffic, in the same way that traffic is held up for a drawbridge to open to allow a steamer to pass. When the smaller airplanes wish to use these runways, it would, of course, not be absolutely necessary to stop the traffic as these airplanes would have room in the additional space reserved for them if it is 100 feet or over in width.

No hangars or repair shops should be installed, but the ordinary service station and repair shop, used for automobiles, would be all that is required, for the present.

It is not recommended that a hard surface be installed at the present time, but merely that this additional right-of-way be obtained, and also maintained, by the state highway departments, in accordance with their general landscaping and zoning plans, until the authorities recognize the demand for its use for airplanes. The state highway departments have the necessary personnel and legal bureaus for condemning property, and also have in their maintenance divisions the necessary trucks and other equipment to do the work.

Let me now remind you of a few essential facts which cannot be ignored, and which require us to provide long, hard-surfaced runways for the common air carriers of the future. The facts are:

Hard-Surfaced Runways:

(1) The size of an airplane that can be used in certain localities will be controlled to a large extent by the length of the runway.

(2) The pay load for an airplane at an airport is increased with the length of the runway. Where only short runways are available, smaller airplanes will have to be used, in proportion to the length of the runway. In the same way as large steamships can go only where there are deep channels, so we must use small boats where there is only shallow water.

(3) With the increased flying radius of large airplanes, runways can be outside the city limits in many instances. For instance, it will pay the passengers to motor 50 miles to reach an extra long runway, if the airplane they plan to use is going to fly 3,000 miles. In other words, the minimum amount of time required to get to an airport is often in proportion to the time saved in arriving at your ultimate destination. This is also true in

shipping, where passengers will take a train or motor to a large harbor in order to board an ocean-going steamer.

(4) Although retractable landing gears increase the drag at take-off, they will continue to be used on account of the increase of speed in flight. This means we need longer runways even for our present large airplanes.

(5) Although "tabs" and "slots" increase the efficiency of the airplane's performance, these new devices will also encourage manufacturers to construct larger airplanes in order to obtain greater pay loads. This also means that the size of the new airplanes will be controlled to a certain extent by the length of the runways where they can be used.

(6) As the modern airplane is heavier than the earlier airplanes, they are not so subject to sudden gusts of cross winds, and can therefore be landed or taken off by an experienced pilot, when the wind is not directly ahead. Small buildings along one side of the runways are also not a serious handicap when the airplane is handled with care.

(7) This country is now growing from the small airport which is used by an airplane with a small crew to the large runways outside the cities, for large airplanes with a crew of five to ten men. In the same way that highways and channels have preceded the development of automobiles and ships, so will the location and construction of long runways precede the use of long radius airplanes.

(8) The building of our highways by state highway departments, and the dredging of our harbors by the Army Engineers, have been a progressive development rather than an attempt to force the public to make all the improvements at once. In making these general observations I am merely suggesting that the state aviation officials and state highway or park departments recognize what they have to contend with, and asking them to plan to take care of the demand when it occurs. It is much wiser to be ready for the demand for long hard-surfaced runways than to hold up a program on account of a lack of plans.

Besides the purely commercial uses for long, hard-surfaced runways, there is also a real necessity for such runways in case of a national emergency, when our Air Force will use them.

National Requirements:

The Bureau of Public Roads gives certain priorities to the development of one highway instead of another. They are not

only interested in the scenic development of these highways, but are also concerned with their proper construction, because they feel that one highway might become more important than another for our transcontinental traffic, or for our national defense in making our army more mobile. These highways which are important in case of a national emergency have therefore an added advantage, and will receive priority.

President Roosevelt on July 12 approved regulations to govern the \$200,000,000 work relief road program and at the same time ordered that at least 25% of the money so allotted be used for streets in metropolitan areas and an equal percentage for farm-to-market roads. The President said that all State road programs must originate with State Highway Departments, which in turn must submit their programs to the district engineer of the Bureau of Public Roads, whence they will be forwarded to Washington.¹

To understand clearly this phase of my subject, may I first recall that the Air Corps makes a distinction between airdromes and airports, just as the Bureau of Air Commerce makes the same distinction between airports and airdromes. From the point of view of the Army an airdrome, an airport, a landing field, and real estate in general are facilities, in the same way as is a factory for engines, airplanes, trucks, ammunition, etc. Airdromes and airports can be owned by a corporation with a financial set-up, just as are factories. It is therefore of interest to note that any airport, landing field, or suitable piece of flat real estate may become an airdrome in an emergency, and that these essential parts of our aviation industry are now classified as a facility in the same way as would be a large ammunition factory. In fact, a main air base for the G. H. Q. Air Force might even be more important, because the cost of constructing such a fortified base as recommended in the recent so-called Wilcox Act is estimated at over \$7,000,000 apiece, without including the purchase price of the site.

Although this paper is not primarily concerned with the small landing strip which is only used in an emergency for a small plane, it is necessary to note that these small and large strips may become airdromes at any time. In fact, a wartime airdrome may be as large as a peacetime airdrome, which often covers several hundred acres, or may be a strip of concrete 100' x 2500'.

The wartime airdromes may be used when the pilots want to "duck in" for gasoline and oil, to have the airplane serviced, or to

1. Highway Departments and Planning Boards are advocating that 200 foot rights-of-way be reserved on primary roads where costs are reasonable.

exchange places with other pilots. These wartime airdromes are also "hide-aways" from the enemy air force, preparatory to an offensive attack against the enemy's air bases, etc. Telephone and radio stations will be made available in the immediate vicinity of such airdromes.

No one can deny that rights-of-way along state highways are aptly suited for military airplanes in a national emergency. Moreover, under the Wilcox Act we see the possible establishment of primary air bases in six major areas of the United States and its possessions. This act is part of a general air program for the concentration of the General Headquarters Air Force in any one of six areas. These air bases will be used in peace time for our air manoeuvres, and may be considered as super-airdromes, in that they may be made as safe as possible against destruction by enemy aircraft in case of war.

The location of these air bases will, of course, be known, and they will therefore be subject to attack at the outbreak of hostilities. As it would be folly to leave our main air force at these bases in a national emergency, the attack, pursuit, and bombardment squadrons will take to the air at once; and, after executing their missions, will either return to the air base or to various unknown, undesignated, and obscure landing fields. In fact, to confuse and hamper the enemy, a squadron may disperse and land at many of these runways which are reserved as additional rights-of-way along the highway system of our country. These runways will be taken over by the Army or G. H. Q. Air Force and used as airdromes if military airplanes are operating in that particular area.

It is needless to point out that if such runways are properly located, the greater will be the radius of operation of our G. H. Q. Air Force. If these additional rights-of-way are at least 3500 feet long, they will accommodate bombardment airplanes, which need long runways on which to take off with their heavy loads. The length of the runway may determine the amount of ammunition each airplane can carry.

Besides developing these runways for commercial aviation, we are also planning for our national defense by providing additional airdromes for the defense of each section of our country.

Comments by Others:

There cannot be any hard and fast rule as to the length and width of the rights-of-way which should be reserved. Naturally,

if you were going to use a large heavily loaded transport airplane or a heavy airplane, loaded with ammunition, in a bombardment squadron, the length of a hard-surfaced runway is most important.

In cases where the terrain makes it impossible, or too expensive, to extend these runways, it would not be necessary that they receive a hard surface, but should be known merely as emergency landing strips. If, however, they are shown on any air strip maps as emergency landing fields, they should naturally be maintained by the state highway departments, so that no obstructions or ditches will be found there in case a pilot should need to use them.

For an example, we find that in Connecticut the practice of developing these small emergency landing strips has been studied. In that State, as in the State of Ohio, the territory is thickly populated, so that condemnation costs for the acquisition of the land has added to the difficulty of obtaining these landing strips as runways. But this does not mean that Connecticut has discontinued the surveying of the State for the establishment of such landing strips. One of the interesting comments on this subject is from the Hon. Clarence W. Whealton, of the State Aviation Commission of Maryland, who has given this matter considerable thought and feels the plan an excellent one for Maryland. Mr. Whealton has expressed himself on this subject as follows:

I would suggest that each State that has an Aviation Commission be advised of the plan and asked to strongly recommend the same to their highway department. This plan would be very feasible on the Eastern Shore of Maryland where the country is unusually flat, and I would think that with the recommendation of the State Aviation Commission the State Roads Department should cooperate in this long term planning for future needs.

I believe any subject of this nature should be discussed from all sides, and the opinions of those who have had experience in road construction should be given careful consideration. I quote the following two short extracts from published statements from Mr. Charles A. Clark, Assistant Manager of the Highways and Municipal Bureau of the Portland Cement Association, and from Mr. Bernard E. Gray, Chief Highway Engineer of The Asphalt Institute.

Mr. Clark has said:

I would hesitate to say that your suggestions may not be possible of practical development, although it occurs to me that there are a number of questions involved which are not touched upon in your discussion. It seems to me that airplane landing fields on the highway right-of-way might con-

stitute such hazards of traffic as to make them undesirable. It is true that your plan if carried out would provide more facilities for aviation sooner than adequate landing fields will be provided by municipalities. However, I feel that the development of adequate airports with due attention to the matter of accessibility—provisions for handling motor traffic to and from the town—is the proper solution.

Mr. Gray has made this interesting comment:

We have received copy of your article which deals with state highway right-of-ways for aviation purposes, and believe that there is a great deal of merit in regard thereto. Something like eighty per cent of the paved airports of this country have been constructed with asphalt, and for the intermediate airports and landing fields such type of construction offers the most economic procedure because of the fact that almost any type of aggregate may be treated with asphalt in one form or another to produce a durable surface at low cost. . . .

In regard to your own plan, it is of the greatest importance that a start be made even on a small scale, and I believe that by keeping after it the state highway departments will gradually become sold on the idea and plan for it as a definite part of highway improvement.

Among some of the other opinions which I value is one from our President, Mr. Fred L. Smith, Director of Aeronautics in the State of Ohio. I read an extract from a letter which expresses his views, and also the views of Mr. G. E. Strauss, right-of-way engineer in the Bureau of Location and Design for the Ohio State Highway Department:

I am not sending this along to discourage you, but merely to give you an idea of the problems which would arise in the State of Ohio if we were to attempt to follow your suggestions. I know that you realize that this does not mean that your program would be impractical everywhere. I have not given the matter a great deal of thought from the standpoint of other states, except that I have felt that such a program would fit in admirably in some of our western states and, possibly, in many of our eastern and southern states in which the highway building program has not progressed quite so far as ours has. . . .

Approximately ten acres of land are involved in a landing strip such as you describe and the cost per acre, reasonably adjacent to the smaller communities, would be approximately \$250.00.

The average set of buildings encountered in such a location would cost approximately \$1500.00 to move if they consisted of a residence and garage; farm buildings, if encountered, would average in the neighborhood of \$2500.00; the removal of a pole line for that distance would cost on the average of \$30.00 a pole; fencing and necessary items ordinarily encountered such as wells, etc., would cost approximately \$1500.00. In summation:

Ten acres of land at \$250.00.....	\$2,500.00
Two residence properties removed.....	3,000.00

Two farm properties removed.....	5,000.00
One pole line removed.....	1,000.00
Fence, etc.	1,500.00
	<hr/>
TOTAL	\$13,000.00

This figure takes no account of local opposition, court action in acquiring property, and only the simplest set of physical conditions to be encountered. Unfortunately, for some reason we have never been able to figure out, people in this State insist on building their homes, garages, and even farm buildings, close to the highways, so close that in securing strips of this kind the majority of the buildings on any given property would have to be moved or be so damaged in the taking of the frontage that the cost would be equivalent to moving.

Among others who have also expressed their views on this subject is Honorable R. S. Boutelle, State Coordinator in the Bureau of Air Commerce, Washington. I was especially pleased to have Mr. Boutelle advise me that he believed "the idea is perfectly practicable and that if the preliminary work that you suggest can be accomplished now, it will prove to be of great value in the future. . . . If there is anything further we can do to assist you, please advise me." This statement from a high official in the Bureau of Air Commerce is worthy of our consideration and that of all state officials interested in the advancement of aviation.

State Landing Fields:

This brings us at once to the question of whether we shall have state airports, or will continue to use municipal airports as is the general practice today. It is hard to know by which governmental agency air terminals will be developed. I do feel, however, that the municipal airport, supported by local taxpayers, should be reserved for the benefit of the local community. In the case of air line common carriers doing an interstate business and requiring a large field, they should have special places to land and to take off if they interfere in any way with the activities at the municipal airport.

We all realize the advantages as well as the necessity of proper constant maintenance of runways if they are to be used. The state highway and park departments are fully prepared with their present organizations and equipment to do this work. The regulation of motor and air traffic at these runways, however, does not come under their jurisdiction. This is properly the duty of a law enforcing agency with statewide power, such as the State Police or

State Highway Patrol, who would work in close cooperation with existing Federal and municipal aviation officials.

I realize that the question of air traffic control is a complicated and separate problem in itself. I feel, however, that it is a subject which should be considered in connection with the use of state highways as an aid to aviation, and, therefore, consider it is entirely appropriate to record the following published statement by Colonel Paul G. Kirk, Commissioner of Public Safety of the Commonwealth of Massachusetts. Among the divisions of his Department is the Division of State Police. Colonel Kirk's remarks were written in reply to two articles which outlined reasons why state police and highway departments were important to aviation. Colonel Kirk states:

The articles by Colonel Hanks visualize some of the concrete problems which soon must be faced in connection with aviation. Aviation certainly has left the infancy stage and now at least may be said to be in the stage of adolescence. Particularly at this time, when so many commonwealths are engaged upon a program of road construction, it is important that the problems which must inevitably be faced, be considered now. Aviation authorities, both in the commercial and the military field, seem to be in accord with the view that emergency landing fields must be reserved.

Subject to the rules which may from time to time be promulgated by the Interstate Commerce Commission, state laws necessarily will be enacted. The interstate character of air traffic makes it essential that control and regulation within a state should be on a state-wide basis rather than local or municipal. Such laws and rules should be uniformly enforced as a matter of safety. Conceivably such enforcement should properly be delegated to a law enforcing agency with state-wide power, such as the State Police.

To defer consideration of the problems which Colonel Hanks discusses is to store up trouble for the future. Careful thought should be devoted to them now so that the progress of aviation will not be retarded by haphazard solutions.

Relative to the use of state police who assist airport managers and state aeronautical officials in the enforcement of air regulations, an interesting article on this subject by Colonel Floyd E. Evans, Director of the Department of Aeronautics in the State of Michigan, was published in the July issue of the *JOURNAL OF AIR LAW*. In this article Colonel Evans stated:

The Michigan State Police cooperate in many ways with the Aeronautics Department. They report and investigate aircraft accidents, provide ground transportation for aviation inspectors, and are on the alert at all times for air traffic violations. Aviation instruction is given to the State Police annually at their Police school.

This State has always been a leader with excellent laws. As an example it is necessary for all state departments in Michigan to coordinate their activities for the advancement of aviation. I have particularly in mind the Michigan law also referred to by Colonel Evans whereby

The State Highway Commissioner is directed . . . to cooperate with the Aeronautics Department and render all aid and assistance possible in their work. Further, a recent law authorizes the State Highway Commissioner to close roads in the vicinity of airports for a temporary period upon recommendation of the Board of Aeronautics. This latter provision, we believe, is going to make it possible to conduct air shows, dedications, etc., at a profit and help materially in reducing the cost of airport operation to communities.

This cooperation among the state highway departments, state police, and state aviation officials should exist in all states. In Massachusetts, for instance, there are many members of the State Police who hold aviation pilot's licenses; and Colonel Kirk, Commissioner of Public Safety in that State, together with Captain James P. Mahoney and Lieutenant Edward J. Gully of the State Police, are in constant touch with air transportation activities. In an emergency the police cruiser cars, motorcycles, teletype machines, radio transmission sets, and all such equipment is put at the disposal of the local aviation officials whenever there is any necessity.

Conclusions:

A vast amount of money, both federal and state, will be saved if additional rights-of-way along state highways for runways can be reserved at the present time, and zoning ordinances protect these areas outside the city limits, wherever a right-of-way at least 40 ft. wide can be obtained alongside a highway with a present right-of-way of at least 60 feet in width on a straight flat surface.

These areas should have a minimum width of 100 feet and a minimum length of 2500 feet. The maximum width should be 400 feet and the maximum length 5000 feet. The width and length of the runways will often be determined by the cost of obtaining the additional rights-of-way. On the other hand, the width and length of the runways will determine the size of the airplanes that can use them.

Runways would be of the greatest use if and when they could be located at the crossroads of our highways, because in such cases we would have a 4-way flying field.

As flying becomes more popular in the United States, the municipally owned airports will become more crowded. The long, hard-surfaced runways outside the city limits recommended in this paper may be used eventually for only the large airplanes doing interstate and international flying. If these long runways can be reserved for the interstate and international air transportation lines for the future as well as for emergency landing fields, the municipal airports will be saved for the local flyers, base operators, and for dual city taxi service. This will also permit the taxpayer to enjoy to the full his own municipal field without continual interruption by transport airplanes, which often require a "clear field."

In straightening our highways and developing rights-of-way, the state aviation authorities should cooperate very closely with the state highway and park departments, in order that this problem of obtaining longer and more effective runways for their states may be solved.

The establishment of more long hard-surfaced runways are essential for the effective operation of our G. H. Q. Air Force. The proper location of such landing strips for future airdromes is a national necessity in order to give our Air Force an adequate radius of operation for all its component units.

Although it may be somewhat unusual to have spoken so informally before such a distinguished gathering of state officials, I have done so purposely in the hope that this subject might lead to further discussion by some of the other delegates.