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MODERN ROAD CONSTRUCTION FOR PUBLIC PARKS

Beauty and utility achieved in the same object is a worth while accomplishment. Just at this time it is doubtful if any field offers greater opportunity to harvest richly each of these than that of park, parkway and boulevard development. It is not limited now, as has been generally true in the past, to the larger urban centers but it is coextensive with the boundaries of each State and of all of the States. Suburban and rural demands have become insistent at the same time as the increased demands from the urban centers.

The acquisition, development and maintenance for public use of a multitude of park areas, large and small, is a logical complement of the developing road improvement program. This phase alone is a most interesting and fertile one for consideration, but the pursuit of this subject would take us far afield and there are certain other phases of the general subject of a somewhat more technical character but which at the moment are of major interest and importance. Two of these will be touched upon: First, the relation of the roads of the park system to the general traffic scheme and, second, some suggestions relative to construction which have come out of the extensive program of highway research and investigations of the Bureau of

Public Roads and many of the State highway departments.

Existing, projected or possible parkways, including roadways within park areas and connecting drives or boulevards, can no longer be regarded or treated separately from the general traffic scheme. The public have seen certain relief from traffic congested streets and are making use of these roadways "to get somewhere", quite aside from the recreational uses of these same roadways. This serving of a strictly utilitarian purpose may invade violently some of the premises upon which parks and their ways have been established. It undoubtedly is causing consternation to many a park administrator. But there is another and very much more encouraging aspect. We are entering a period of park development on a scale imagined only by bold thinkers who recognize the principles which existing conditions are setting in motion. A number of big visioned parkway developments have progressed to a point where their utility as efficient fast traffic lines is already apparent. These exist both within the most congested metropolitan areas and outside in country areas where only local roads have heretofore run.

The utility of park roads is to become immeasurable once a proper coordination is established between the scheme of park roadways, planning and building, and that of the development of city streets and rural highways. The public is already demanding

correlation of effort between those responsible for each of these. The laying out of the State systems and the Federal aid system of highways has joined all of the larger cities and towns by a network of more than 170,000 miles of major rural highways. This large mileage is being rapidly improved by the States independently and by the State and Federal governments under the terms of the Federal Aid Act, cooperatively. In addition, there are many thousands of miles of important county highways which are being improved under local jurisdiction. The traffic over these roads is increasing very rapidly and is extending over a longer period of every year. At the boundary lines of the municipalities this traffic is dumped upon the city streets. It ranges from the large, slow moving freight vans down to the smallest motor vehicle. It is a miscellaneous assortment of vehicles which varies between wide limits in size, speed and service. Under the present plan quite generally this traffic as a whole continues into the towns and cities along the established traffic lanes, which lead right into the heart of the business districts. This traffic is met, joined and crossed by the city traffic itself, including many horse-drawn vehicles, street cars, motor buses, pedestrians, and every type that goes to make up the cosmopolitan assortment of traffic found on any city street on a busy day. The effect of

the whole is to slow up and prevent the functioning of the streets at any reasonable percentage of their actual capacity, and so we have the problem of congestion rapidly growing.

Some starts have been made following various theories to relieve congestion. Many of these have confused and slowed up traffic and added to the congestion in place of relieving it. Too much regulation is very much worse than too little. Much of our traffic regulation works just like cutting off a dog's tail an inch each time except that eventually the tail runs out and traffic congestion does not.

The only way traffic congestion will ever be solved is to make it easy to avoid congestion and difficult to have congestion. The human nature behind the wheel will follow the easy way.

Add to this the tremendous discharge capacity of a wide roadway which has no intersections at grade or too restrictive speed limitations.

Add the established principle that, generally speaking, traffic congestion is limited to peak periods each day of relatively limited duration.

Add the common sense plan of sorting out the fast moving passenger traffic, which composes by far the greatest percentage of all traffic, and the sum total equals the establishment of

parkways and boulevards leading from the centers of urban areas into the suburban and rural districts over roadways that have few and preferably no intersections at grade, are wide, and parked in keeping with the general scheme of the beautification of the city.

In addition to such radial roads there must necessarily be the development of outer belt lines or concentric roads, partially for the purpose of detouring traffic from outside into those sections of the city which it desires to reach, and partly for the purpose of carrying traffic entirely around the congested centers rather than through the business districts as it is now almost compelled to go.

These are the two outstanding types of development which are needed within the congested areas, and they may very logically be made a part of the park plan of the city.

Here the engineer and the architect have a common work, that is, the achievement of beauty and utility in the same object. For example, the problem of avoiding intersections at grade by separating the roadways by over or under crossings may be worked out to add to the scenic value, or be commonplace and most unattractive. Perhaps this conception of future parkway and boulevard development may seem to be somewhat at odds with the existing policies of park development, yet there is sure to

be more money available for this type of improvement for the immediate future than for any other, because of the tremendous needs existing. It may be urged that this advocates a large expenditure of funds. It is true. But it is equally true that such expenditures in the end will be real economy, because of relief of traffic congestion, which is only another term for great loss of time, plus safety to traffic, the absence of which is now causing so much concern to every municipality. That such expenditures are sane and worth while will be evidenced by traffic relief, by the added utility of the motor vehicle, by better living conditions in the suburban areas, by the beautification of the cities and towns, and in many similar ways. There will be an additional evidence which is fundamental, that is, the change in property values. We have adopted an entirely new system of transport. The effect of converting property values from higher to lower or lower to higher is only beginning. Properly handled, such improvements as here suggested will be offset many times by the increased property values, and if they are not made their cost will be many times lost by the decreased earning capacity of property now considered highly valuable. These thoughts are only intended to be indicative of the principles which have become apparent as highway traffic surveys have progressed in a number of the States, and as the planning of a

complete system of major highways for the United States has taken form.

In the field of highway building many of our long held ideas of design and construction have had to give way to new conceptions, as the fallacies and failures of the old have developed through use or have been pointed out through far-reaching research and investigations. For example, consider the macadam road. Its conception dates back a hundred years, but its construction continued without major change up to a few years ago, and it has served well. But when the heavy motor vehicle traffic units came into use its fundamental weakness developed at once. Roughly speaking, it might be said that the macadam design of old is better today if reversed, turned top-side down. This is typical of many changes that have developed in the construction field. Only one of these will be taken up. Out of the whole field that might be presented I have selected that of subgrade soils as the one to which in the development of park roadways the most attention can be given with the greatest profit. Road drainage has long been given first place as a fundamental principle in the thoughts of the road builder. But drainage meant the removal of surface water through surface construction such as building a crown and side ditches or gutters, and the removal of excess ground water

by tile drainage. If a road had both subdrains and side ditches it was considered well drained. But it is evident now that this is only a part, and on some soils perhaps not the major part. It has long been known in a general way that some soils form a good subgrade for roads, and others do not. But it is only recently that a great deal of fundamental data has been made available. The builder of highways having in mind only the construction of a substantial and durable roadway, regardless of the type of surfacing, has lifted the grade above the level of the surrounding land, has built side ditches, and altogether his type of construction has not been acceptable to the landscape architect. More or less divergence of opinion has existed between them, the one striving for permanency or durability, the other wishing for these qualities but desiring to harmonise his construction with the landscape development.

. The results of these studies of subsoils I believe point to the correlating of these view points. The engineer, in raising his subgrade as high as possible was unconsciously protecting his road against capillary water and resultant destruction by frost. Height enabled him to overcome difficulties which no other form of drainage could guard against. Research has sought out and defined much of the cause for such difficulties, and has pointed the way to overcome them intelligently. Without entering

into a long discussion of the various classes of soils, the clays may be set aside as a well recognized and commonly encountered group. This is particularly true where the grading operations remove the top soils. Clays have, according to their different classifications, different percentages of very finely divided particles which are commonly called ultra-clays. The percentage of this ultra-clay determines to a large extent the behavior of these soils when used as subgrades. The percentage of water which they will take up and hold against any type of gravity drainage increases with the increase of percentage of the ultra-clay, although a fixed ratio has not yet been found. It is this characteristic which accounts for the amount of water which the soils will hold; it accounts for the shrinking as the clays dry out in long periods of hot, dry weather, and accounts for the bulking or expansion during periods of wet weather. Cold weather has the effect of filling these soils with water so that the clay subgrades are more unstable during the fall, winter and spring months than during the summer months, a commonly observed fact. The expression common in the spring that the "bottom has gone out of the roads" means simply that the thawing out of the frozen capillary water has left the roads a veritable sea of mud and an unstable support for any type of road surface. To illustrate, a clay which in its

dry condition is capable of carrying safely a superimposed load of 3 or 4 tons per square foot when filled with water will flow under a pressure of 1 pound per square inch or say 150 pounds per square foot. Further than this, this finely divided content of the soil is so fine that it will move upward through gravel and stone roads and under heavy traffic has come clear through the road metal. Experiments have shown that the subgrade may be stabilized by placing over it a layer of fine inert material such as ashes, cinders or sand. In England the practice has long been followed of using a layer of some such material under macadam roads. The English call it smothering the clay. In park roadways where the heavy vehicular traffic is excluded, a relatively thin layer of road metal could be satisfactorily used, provided the subgrade had been excavated for some depth and a thick layer of material of the above character placed.

In fact, in the development of new park roads, it would doubtless be better economy to spend a large percentage of the available funds in removing unsuitable subgrade soils and filling with an inert material than to spend the same funds on the surface. If this practice of preparing the subgrade is followed, then the grade line can be held at a lower elevation and subdrainage used to remove excess ground water which is not held by the force of capillarity to the same extent as in the finely

divided soil. In this process of construction the requirements of durability and of fitting the construction to the landscape satisfactorily can both be met. Methods are being perfected rapidly which will allow the characteristics of the various soils encountered along the line of a highway to be determined very accurately by a study of the moisture equivalent. That is the moisture which the soils will hold against a force equal to one thousand times gravity. A large percentage of road failures in the past and doubtless a very large percentage of difficulties encountered in park roadways have come from the single source of bad subgrades. By a careful study of the developments along this line not only much better but cheaper roadways can be built than have heretofore been generally used. While freight trucks have been generally excluded from park roads and boulevards, nevertheless a utilization of park roads as links in radial or belt line boulevard developments means that heavy bus traffic will use these roads in large numbers. The problem then of meeting heavy loads is squarely up to the park roadway builder and landscape architect, and there is no single factor that will contribute more to his success than a study of the subgrade soils and their proper treatment. This is particularly true in the areas where frost penetrates deeply in the winter.