

Benefits to Utilities from Rural Highway Locations in Oregon

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The recent emphasis on economic impact studies and the need for determining non-user as well as user benefits from highway improvements has resulted in the Oregon State Highway Departments, having the University of Oregon, Bureau of Business Research, prepare a study on electric utility benefits resulting from free use of rural highway right-of-way. The economic study measured the extent of utility use of rural highway right-of-way, the approximate benefits received, and the cost incurred from such use. Use of rural highway right-of-way by utilities benefits the utility by eliminating the necessity to acquire easements from private property owners, providing easy access and inspection, and reducing maintenance costs. Disadvantages to the utility result from the necessity of paying for relocation resulting from highway changes and damages to utility equipment by vehicular accidents.

The study showed net monetary benefits to utilities, with the advantages generally outweighing the disadvantages. The existence of utility lines on the highways seriously affects the highway user when their presence (a) decreases safety, (b) increases cost of highway construction and maintenance, (c) reduces flow of traffic, and (d) interferes with the aesthetics of the landscape.

• THE MANDATE by Congress in Section 210 of the Highway Revenue Act of 1956 requiring the Secretary of Commerce to study and investigate "...any direct and indirect benefits accruing to any class which derives benefits from Federal-Aid Highways..." resulted in a request to all State highway departments to assist by conducting studies of the economic impact of improved highways. The importance of these studies, the diverse area of study, and the relatively short time for their completion required that existing highway department personnel be augmented by utilizing universities and research agencies to provide as much useful data as possible.

The Oregon State Highway Department, in cooperation with the Bureau of Public Roads, contracted with the University of Oregon, Bureau of Business Research, for a study of non-user benefits from Oregon highways (1). The many possible combinations of non-users and their benefits and the limited time and personnel available for the study required a limitation of the study to electric power lines on Federal-aid highways in the rural areas of the State.

USE OF HIGHWAY RIGHT-OF-WAY BY UTILITIES

The rural Federal-aid highway system in Oregon is composed of 640 mi of interstate road, 2,971 mi of primary, and 5,230 mi of secondary, for a total of 8,841 mi. Information on the extant utility use of the Federal-aid highways was not readily available from records of the utility companies nor the Oregon State Highway Department; therefore, a sampling procedure was used to determine the extent of its use. The basic sample was 5 percent of the mileage obtained by selecting every twentieth 2.5-mi section of the interstate mileage and every twentieth 5.0-mi section of primary and secondary mileage.

Each of the selected sections was inspected in the field for utility use. Information on the type and miles of lines on and adjacent to the highway right-of-way was obtained

and the adjacent land was classified by general land use groups. All field information was verified with each utility company represented to fix the exact location of their facilities with respect to the highway right-of-way.

From the sample data, it was estimated that there were 3,212 mi of electric power lines located on Federal-aid highway right-of-way and 1,514 mi of electric power lines located immediately adjacent to the highway on private land.

The estimated mileage of electric power lines by type is given in Table 1. The table shows distribution lines that serve the customers directly account for the largest part of lines on or adjacent to the highway, and twice as many lines are on the highway as are adjacent to it. Three times as many miles of subtransmission line are on highways as are adjacent, whereas twice as many miles of transmission line are adjacent to highways as are on them. Statistical tests indicate that the data concerning the extent of use of the highway right-of-way by utilities are reasonably reliable; however, this applies to the total only and may not reflect the condition for subgroups. For instance, the probability of error in the expanded mileage of transmission lines could be appreciable because of the very small size of the sample.

The subtransmission line which was a blanket intermediate category between distribution and transmission has about 80 percent of its mileage serving a dual purpose; that is, it has both distribution and subtransmission lines. This predominate combination feature may reflect the location selected for the distribution lines and not the subtransmission line. The 20 percent of the mileage composed entirely of subtrans-

TABLE 1
ESTIMATE OF MILEAGE OF ELECTRIC POWER LINES

Type of Estimate	Mileage	
	On Highway	Adjacent to Highway
By line:		
Distribution	2,420	1,136
Sub-transmission	752	273
Transmission	40	105
Total	<u>3,212</u>	<u>1,514</u>
By land use:		
Industrial, commercial, residential	471	73
Intensive agriculture	1,244	421
Extensive agriculture	1,209	838
Timberland	288	182
Total	<u>3,212</u>	<u>1,514</u>
By company:		
Private	2,399	466
Public:		
Cooperatives	346	966
Public utility districts	206	32
Bonneville Power Admn.	---	50
Municipally owned	261	---
Total	<u>3,212</u>	<u>1,514</u>

mission line was derived from a sample that indicated more than three times as many miles adjacent to the highway as on the highway. Because of the sample size, extreme care should be exercised when using the subgroup data.

The distribution of electric power line mileage by broad land use types is also given in Table 1. The data show the preponderant agricultural nature of the rural highways in Oregon. The percentage of the lines that are on the highway right-of-way, as compared to those adjacent to it, is highest for roads through populous areas, and falls as the value of the land declines.

The location of electric power lines appears to be affected by its ownership. Table 1 gives the location distribution of mileage by private and public owners. Private utility lines are usually on the highway right-of-way, as are the public utilities operated by municipalities and utility districts, whereas public cooperative utilities consistently locate on private property adjacent to the highway. The differences in location practices are caused primarily by the differences in easement costs. The cooperatives typically make no payment for private easements for any line other than a transmission line, whereas any other public or private utility will normally have to pay for any easement.

BENEFITS TO UTILITIES FROM USE OF HIGHWAYS

Advantages

The principal advantages to public utilities from location on highways were determined and evaluated in general terms by considering the possible alternatives and their effect on utility operations and costs. Although the benefits to public utilities from free use of highways can be thought of in terms of the net added cost utilities would be required to incur if they could not use highways and were forced to use the next best alternative, considerable difficulty was encountered in attempting to estimate a monetary value of these benefits. Estimates were made for savings in easement costs, but other advantages, although important, were not quantifiable.

Public utilities must obtain easements from property owners to place power lines on private property. The cost of these easements is the most easily measurable of the expenses of locating lines off highway right-of-way. The study investigated these costs and obtained estimates from the utility companies for the use of acquiring private easements for all lines reported as being on highway right-of-way. The results of these investigations are given in Table 2, which shows that the estimated easement costs per mile are higher in areas of heavy development, and decrease as the use of the land and value of the land decreases. The total estimated cost of easements for utility lines found on rural Federal-aid highways in Oregon was approximately \$2,800,000. This is a capital cost, and being a land cost it is not subject to amortization; however, it can be converted to an annual cost in terms of the return on the capital invested. Using 7 percent as the rate of return, this total cost converts to an annual cost of approximately \$200,000 which represents the annual easement cost saved by free use of highway right-of-way as estimated by the study. To this should be added the costs of negotiating easements and the costs of condemnation proceedings, which would in turn be partially offset by the cost of negotiating for permits for use of highway rights-of-way.

Cost data with respect to easement cost, for the most part, are based on individual cost estimates made by company officials. These company officials were generally very reluctant to give any specific cost estimates; therefore, considerable caution is suggested in the use of these values. In addition, the use of historical costs to represent future costs may not give a true reflection on conditions as they currently exist.

As mentioned earlier, the data for public cooperatives (Table 2) would indicate that they have not been required to pay any easement cost, whereas all other public and private utilities have paid substantial amounts for easements. The cost of private easements represents a financial fact, and when it can be avoided by free use of highway right-of-way, a definite benefit results, one whose monetary value can be approximate

TABLE 2
ESTIMATED EASEMENT COSTS

Type of Easement	Miles on Highway	Cost (\$)	
		Per Mile	Total
Total	3,212	866	2,799,860
By company:			
Private	2,399	929	2,229,600
Public:			
Cooperative	346	0	0
Other	467	1,178	550,260
By land use:			
Industrial, commercial, residential	471	2,366	1,114,200
Intensive agriculture	1,244	983	1,223,440
Extensive agriculture	1,209	196	236,560
Timberland	288	714	205,660
By line:			
Distribution	2,420	782	1,893,260
Sub-transmission, transmission	792	1,119	886,600

Other advantages to public utilities from free use of highway right-of-way which are not easily measured in monetary terms also exist.

The location on highway right-of-way normally places the utility in the most favorable position for serving its customers who typically locate immediately adjacent to the highway. The necessity of locating elsewhere than on the highway or immediately adjacent to it normally requires additional expenditure for the utility to provide service to its customers.

Many utility officials indicated that ease of inspecting lines for maintenance purposes and to locate outages was a definite advantage in favored locations on or immediately adjacent to highway right-of-way. The importance of the advantage in this case was not so much the man-hours of labor saved but the increased ability of the utility to provide continuous service and the quick elimination of outages.

The ease of access to utility lines when placed on or adjacent to the highway right-of-way is an advantage to the utility. The difficulty of access to construct and maintain lines on private property varies significantly with the distance from the highway or other road and the type of land use. A line on private property immediately adjacent to the highway shares most of the advantages of the highway location. Lines across cultivated areas present a distinct problem, and many times maintenance must be delayed until after crops are harvested, or heavy damage payments must be paid to offset resulting damages.

Another advantage to the highway use cited by most utilities is the savings on clearing land of timber and brush and trimming trees threatening to interfere with service. Though the importance of these factors varies from one locality to another, there are few places where trees or brush do not constitute a serious obstacle to utility service. This problem increases with an increase in the voltage and importance of power lines. In addition, where it is necessary to clear timberland, clearing expenses may exceed the cost of right-of-way easements.

Disadvantages

There are some disadvantages to utilities in placing lines on highway right-of-way. The most important is the cost of relocating lines as a result of highway improvement projects. The utilities considered the relocation costs the most important disadvantage of locating on highways, and some companies, particularly cooperatives, avoided highways because of the potential cost. The cost of relocating the utility lines on highway right-of-way was considered as a cost offsetting the benefits from the use of highway rights-of-way.

An estimate of utility relocation costs incidental to highway construction was made using data compiled by the House of Representatives (2). Because the figures needed for this study did not appear directly in the report, the estimate was derived. This estimate indicated that the net relocation costs to electric utilities on rural Federal-aid highways in Oregon was approximately \$47,000 in 1953. Adjusting for price increases and changes in the mileage of utility lines on highway right-of-way subsequent to 1953, it was estimated that for the current year (1958) relocation costs would approach \$100,000. Attempts to obtain the information from utilities with respect to recent relocation costs elicited varying responses indicative of the opinion of utility officials concerning the subject of relocation, but little in the way of concrete information. However, on this subject, it was not intended that the study should represent an exhaustive treatment.

The possibility of being forced to relocate the utility facilities has not been a strong deterrent to utility use of highway right-of-way, except where a relocation seemed likely in the foreseeable future. A direct question to utility representatives indicated that the possibility of relocation might cause the utility to build on private right-of-way. The fact that utilities do use highway right-of-way as extensively as they do is witness to the strong presumption that relocation is not a really serious disadvantage.

Other disadvantages to location on highway right-of-way mentioned by utility company representatives included the occasional higher cost for trimming trees when located on highway right-of-way. In some instances, it becomes advantageous to use private easements where easement costs are low and concentrations of trees can be avoided. The required trimming and the need for permits for trimming on highway rights-of-way sometimes increased trimming costs on lines located on highway right-of-way as compared to lines located on private land.

Another disadvantage was the possibility of damage to poles and lines and power company vehicles by vehicles on the highway. This disadvantage, however, did not seem to be very significant.

Net Benefits

To the annual savings from easement cost of \$200,000 should be added an estimated monetary value for the other advantages. These were estimated to be approximately \$100,000, giving a total benefit of \$300,000. From this must be subtracted the relocation cost of \$100,000 resulting in a net monetary value somewhere in the neighborhood of \$200,000 per year.

These benefits are distributed very unevenly among utility lines. They are relatively low for lines subject to relocation expenses and for lines passing through land areas of low value, and relatively high in areas of high values, in timber territory where clearing and trimming are expensive, and on highways where relocation expenses are unimportant.

In addition to benefits to public utilities, the utility users benefit from the utility use of highway right-of-way to the extent that savings to utilities were passed on to their customers. They benefit by paying lower rates for electric service by expanding their consumption of electricity.

The highway user would be adversely affected by the existence of utility lines located on the highway right-of-way, if they in any way increased highway costs. However, the evidence indicates that such additional costs are virtually non-existent, and that the location of utilities on highways does not represent a serious disadvantage. The highway

user may also be harmed from the safety point of view to the extent that the utility poles and utility vehicles create a potential accident hazard. The placement of utility facilities and the parking of utility service equipment on highway rights-of-way and the provision of access rights from highway to utility facilities can result in restrictions to the normal flow to traffic which not only reduces practical capacity but causes an accident hazard as well. However, the frequency of accidents involving the utility equipment is quite minor.

Another disadvantage to the highway user is the loss of aesthetic value of the landscape marred by the existence of utility facilities. One has become used to utility lines, and the fact that lines not on the highway are located on private land near the highway suggests that few net aesthetic disadvantages derive from the placement of lines on the highway.

In summary, there is a balance of net monetary benefits to utilities, a significant combined utility and non-utility benefit from utility use of the highways. The advantages outweigh the disadvantages generally with exceptions where the existence of utility lines on the highways seriously affect (a) the safety of highway users, (b) the costs of highway construction or maintenance, (c) the flow of traffic, or (d) the aesthetics of the landscape.

ECONOMIC IMPLICATIONS

The finding of a significant non-user benefit to utilities from free use of highways has obvious economic implications which bear on policy alternatives of a financial nature. Some consideration of these implications was a desirable part of this study, particularly with reference to the mandate in the Highway Revenue Act of 1956 (3) to "make available to the Congress information on the basis of which it may determine what taxes should be imposed. . . in order to assure. . . an equitable distribution of the tax burden among the various classes of persons using the Federal-Aid Highways or otherwise deriving benefits from such highways." Within the context of this directive, the study explored the economic implications of the alternative policies which could be applied to utility use of highways.

Perhaps the most controversial aspect of financial policy pertaining to utility use of highways is that of reimbursement or nonreimbursement for relocation expenses. There can be little doubt that the benefits utilities receive as a whole from free use of highways exceeds the relocation cost. However, the reverse may be true on individual sections of highway, and it is these situations which are the real cause of the problem. In general, equity considerations would indicate a policy of nonreimbursement, because the utility would presumably have weighed the possible costs of relocation against the benefits of free use of the highway before making the decision of placing them on or off the highway right-of-way.

There is also the question as to which policy would be the more conducive to efficiency in highway and electric utility development. Considering the impact of potential relocation costs on both the utility companies and highway departments, the stronger case can clearly be made for nonreimbursement. A nonreimbursement policy would have more effect in causing utilities to avoid highways where relocation is imminent or highly probable in the near future than a reimbursement policy would have in causing highway departments to avoid highway improvements where relocation costs would arise. In other words, utilities are in the best position to weigh the relocation cost factor in their planning, and they will be much more inclined to do this under a policy of nonreimbursement.

As to the broader question of under what conditions utilities should be permitted to use highways, one possibility and perhaps the most obvious would be to impose a tax or fee on utility use of highways. That public utilities as a group would be willing to pay a significant amount to retain the privilege of using the highways is evident from the benefits demonstrated in this study. By the same token, the equity of such a tax could not be challenged. However, there is a considerable range of savings to utilities between one section of highway to another, depending on adjacent land use, type of company, and likelihood that relocation expenses would be incurred at some time due to highway improvements. Because of this, the study suggests ". . . that administratively it would be virtually impossible to devise a workable tax system." Unless the tax precisely

equaled the benefits for each section of power line, the tax would be inefficient because some lines would be driven off the highways, whereas others would retain benefits in excess of the tax. However, although this difficulty is a formidable one, it is no different from that experienced in any user tax application; for that reason alone, further consideration might be justified.

A second alternative would be drawing on general funds to finance highway improvements in an amount approximately equal to the demonstrated non-user benefits. It is generally conceded that if the benefits to non-users are so general and diffused as to make a direct tax unfeasible or impracticable, the use of general tax funds would be justified. It has in the past, however, been very difficult to come to grips with the policy implications inherent in this solution.

Finally, the question arises as to what extent and under what circumstances utilities should be flatly prohibited from placing lines on highway right-of-way. In concept, the answer is relatively simple; whenever the benefits to utilities from such use are less than the costs incurred in the use (the highway users and others are well), prohibition is proper. Where the costs are appreciable in terms of traffic safety or restrictions to traffic flow (such as on freeways and probably on most major highways) or in terms of impairment of scenic values, outright prohibition of utility use is clearly justified.

In summary, it can be demonstrated beyond question that benefits to utilities from free use of highways are substantial on the whole, but that considerable variation in the magnitude of the benefits exists between one highway location and another. Because of these variations, the problem of attempting to allocate a portion of the tax burden to the utilities would be formidable. Also, with regard to relocation costs, it can be concluded that in general a policy of nonreimbursement is preferable from the standpoint of efficiency as well as equity, although exceptions involving individual cases do occur.

POLICY IMPLICATIONS

Information on the extent of utility use of highways, the advantages and disadvantages to utilities resulting from such use, and the net benefits accruing from free use of highways as brought out in the Oregon study was supplemented by similar research in Utah (4) and Georgia (5). These studies also explored the problems and economic implications resulting from such use and by so doing brought into clearer perspective important aspects of utility use of highways which impinge on public policy. The far-reaching effects and increasing significance of these policy implications strongly suggests that they warrant additional study.

At the heart of the problem is the need for attaining greater efficiency in land use. There is a growing awareness that concerted efforts must be made to improve on present practices not only with respect to the economy of land use but the compatibility and harmony among various land uses. In this respect, the dimensions of the highway construction program in which the United States is now engaged and may anticipate during the next 15 years, at least, will have a far-reaching impact on all aspects of the economy especially through its effect on land use. With the large mileage of freeways and expressways projected and with wider rights-of-way required in other types of roads as well, the conflict with other land uses is much more evident, and is in some areas becoming critical.

The significance of this problem in terms of the use of highway rights-of-way is due largely to the fundamental difference in the function of a superior type of traffic facility such as a freeway or expressway, and the traditional concept and use of a public way. In the case of the former, the movement of large volumes of vehicular traffic efficiently and without interference is the primary, if not exclusive function, whereas in the latter land access and service is the principal function and multiple use is implicit. As stated by Lemly (5), "The freeway design of today is approaching the ultimate in evolution away from the city 'street.' In essence, these freeways are single purpose facilities which, in reality, are quite similar to a tunnel or bridge over local areas which connect points relatively widely separated." And along with city streets, he might well have included rural roads.

Assuming that certain minimum rights-of-way are required for such facilities under single purpose use, would joint use be physically possible and economically justified? And if not, would wider rights-of-way be justified if joint use were feasible?

The element of cost in acquiring necessary rights-of-way for highway construction cannot be ignored in considering this problem. If joint use of rights-of-way can be justified in certain instances, considerations of equity would demand that right-of-way costs be fairly allocated between the various users. The problem then would be one of devising an equitable and efficient method of allocating costs.

The imposition of a tax or fee on utility use of highways was considered by the authors of two of the studies. Koplan and Watson (1) concluded that such a tax would be undesirable because it would be conducive of inefficiency and difficult to administer. The authors of the Utah study (2) concluded that a tax would have an undesirable effect on resource allocation through its effect on the price-cost relationship of the utility service. In fact, the authors of the Utah study concluded that a policy of free use of highways by utilities would be economically desirable, "if a complete evaluation of the benefits vs. costs vs. equity considerations for highway users, utility stockholders, and consumers, and society as a whole favor the multiple-use concept for the rights-of-way."

All the studies referred to have concluded that benefits to utilities from use of highway rights-of-way significantly exceed any additional costs incurred as a result of such use. In other words, concrete savings accrue from joint use because the total cost to all users combined is less when utilities make use of highway rights-of-way than when they use separate rights-of-way. Though this strongly supports the case in favor of utility use of highways, it does not necessarily imply that such use must be on a free basis.

The expense of providing rights-of-way for new highways is becoming a more and more significant element of cost even in rural areas and in urban areas it has in certain instances exceeded the construction cost. Because this cost is almost universally borne from road user tax funds, it is part of the price paid by road users for the availability and use of highway facilities. Thus, if right-of-way costs were allocated among multiple users not only would there be more funds available for highway construction, but such a policy would tend to encourage efficiency in the use of economic resources; in particular, land use. In effect, then, the pricing system would be used in the allocation of resources as between the highway user and the utility user. Of the alternatives, free use of highways by utilities implies a subsidy, varying with the circumstances, but clearly so when abutting land has no access rights to the highway right-of-way. And absolute prohibition of use, by forcing utilities to other locations, results in inefficient land use.

As for the problem of devising a method of cost allocation, a rental or franchise charge based on a simple proration of costs or some more sophisticated method such as the alternative justifiable expenditure method might be feasible. The studies referred to suggest that sufficient data on easement costs are available for this purpose.

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