Considerations in Rating Urban Streets

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THE PRESENT method of rating sufficiencies was developed to cover the needs of the state highway departments. Across the nation the state highway departments have always devoted the major part of their effort toward the rural sections of the state. Only in the recent past have their obligations been broadened to include the problems found on arterial streets in the incorporated communities.

The Connecticut experience, despite the fact that the major portion of the population resides in builtup areas, has paralleled that of many other states. The system for which the department is responsible comprises 3,000 mi. of which only 400 mi. are classified as urban. That this urban mileage, which is state-maintained, does not include all of the roads of state importance can be shown by the fact that in establishing the federal-aid systems, regardless of road ownership, it was necessary to include an additional 160 mi. of locally-maintained traffic routes, 75 percent of which were major city arterials.

With our responsibility to the motorists of the state to provide as suitable a transportation system as their contributions, through road user imposts, will allow we have been obligated to consider the adequacy of the city-maintained arterials which are used by the majority of our motorists in reaching their predominantly urban destinations. Having devoted a great number of years to the elimination of rural mud, we are now faced with the obligations to do something about the urban muddle.

As was natural, the sufficiency-rating procedures were pointed to the evaluation of rural routes. The factors rated in Connecticut have included surface and shoulder width, maintenance costs, accident experience, alignment, and sight distance. The use of these items in rating rural highways has been well established. However, when the roadway is in an urban place with frequent intersecting streets, traffic control devices of various types, vehicular and pedestrian crossings, and curb parking, one can readily see that some different elements should be evaluated.

Our interest has been in the provision of safe and efficient transportation facilities. In rural places efficiency has been tied up with consistently high operating speeds influenced by consistency of alignment and availability of passing sight distance. In the urban places I think it has come to be recognized that efficiency obtained through higher speeds should be minimized in order to reduce the likelihood of accident occurrence. Efficiency in urban places must not be acquired at the sacrifice of safety, but rather, by whatever measures will provide that consistent modest pace and which will reduce the frictions which are annoying to all users of the street. Those measures most likely to be accepted will result in a regimentation so that vehicle and pedestrian habits may follow predictable patterns without the annoyances of “stop and go.” It seems that, in order to attain the objective of safe and efficient transportation through urban areas, we must resort to all the ingenuity which the traffic-engineering profession has been able to contribute to the street-and-highway engineering ideas.

The rating of our existing streets must be based on the comparison of the features of the existing facility with those which would be provided by the facility which attains the ideals set forth above. The ideal which many highway departments have adopted for the solution of these arterial difficulties is the expressway on new location to divert the traffic from the existing arterial. Unfortunately, this type of facility is so costly that its use must be restricted to those locations where the traffic volumes, congestion and hazard have reached such proportions as to support the administrator’s decision to provide the expressway facility and to provide him the funds for its construc-
tion. For each mile of such location there are probably 5 or 10 mi. slightly less congested where the motoring public must continue for many years to compete with the parkers and the pedestrians for space on the streets.

The design standards of urban expressways have been well-developed. To a large extent these have been merely compromises of rural standards because of limitations imposed by urban right-of-way and construction costs. Only a few states, to my knowledge, have established standards for arterial street reconstructions. Indeed, the roadside features and the width available or procurable for rights-of-way almost require that each such project be a hand-tailored job. Our skills have not progressed to the point where we may be sure that the design proposed will provide the conditions desired. In our own state there are several locations where arterial reconstructions, within the last decade, have proved so deficient in operating characteristics that we already have plans well-advanced for superseding these with expressways on new locations.

The fallacy may have been based on a parallel to the Sherwin-Williams Paint motto: "Save the surface and you save all." The provision of smoother, wider and straighter pavements has not produced the safe efficient travel desired.

If we should go through the list of items presently used for rural rating, the inappropriateness of their use in an urban rating might be pointed out in this manner: What good is greater surface width that leads to higher speeds and less frictions with vehicles in the stream if it increases the friction with vehicles crossing, turning, parking, and with pedestrians? Of what value is greater shoulder width if it is permitted to become parking stalls that create more friction by vehicles parking and unparking? Of what value is maintenance cost if that cost, as in Connecticut, is only the cost of keeping the surface, shoulders, and drainage facilities in sound structural condition? The costs omitted, namely, those for removing snow and ice, clearing up roadside litter and mowing grass areas, in Connecticut at least, rise to much greater figures. Of what value is straightness of alignment if that straightness is conducive to speeds which are un-safe considering the other roadway and roadside uses? Sight distance has no place in an urban rating because as used in our rural work it is sight distance along the road in question. In urban work the important sight distance is that around each street corner encountered in one's travel.

The other element used in the Connecticut sufficiency rating, accident experience, appears to be the only one having a direct and important bearing on urban sufficiencies. For urban sufficiency ratings it is believed that we must weight those elements which reflect or influence the four frictions which McClintock made famous years ago: intersectional, medial, marginal, and internal stream. The ratings must contain measures of the number of vehicles entering, leaving or crossing the arterial stream either from side roads, driveways or parking spaces. Some measure of pedestrian crossing should be evaluated. The spacing and frequency of intersecting streets, the presence or absence of driveways and curb parking should be considered. The volume and time consumed by crossing traffic at the major intersections is important to the evaluation. The quantitative measure of the elements mentioned above would be influenced by the existing regulations on traffic entering from side streets whether this is by stop signs or traffic lights. If the major intersections are signalized, what is the percent of time available for travel on the artery? Are there any turn prohibitions? Are the successive signals progressive, synchronized, or just uncoordinated? What is the effect of bus operation? Should busses be included as just so many more vehicles parking and unparking? Or if parking is eliminated, do not the busses stopping create a turbulence in the traffic stream which is more undesirable? Actually, what we should be seeking is a measure of congestion and all elements which are envisioned in that term and are appropriate for consideration in an urban-rating system. The objective should be to obtain a congestion index. Unfortunately, the development of such an index is a major undertaking and few authorities have developed data with which they are satisfied.

At last year's Board meeting, we were shown in the paper by Carmichael and Haley that the instrumentation developed
by the General Motors proving ground, when driven over a number of Connecticut rural highways, provided a close correlation between the average speeds and the independently developed rural sufficiency ratings. The paper by Alexander J. Bone of the Massachusetts Institute of Technology on "Travel Time and Gasoline Consumption Studies in Boston" is based on the same equipment. The synopsis of his report includes the statement that the average speed obtained on different routes serves as a measure of the relative congestion on these routes. It may be that, because of the complexity of obtaining congestion indices, we may have to rely upon average speed ratings, which may be easier to obtain. Because the average speed provides an index of the ability to move through an artery, it would be indicative of the efficiency of that artery. However, because most people associate speed with unsafe operation, one hesitates to recommend its use as a major factor in an urban rating system without considering accident experience of equal or greater importance.

The objective of an ideal urban arterial may well be the attainment of the highest uniform speed with the lowest accident experience. The final urban rating would, of course, have to include traffic volumes or else be developed for each traffic-volume group.