"The acquisition of tracts of land adjacent to highway rights-of-way should be planned collaboratively by the State landscape engineer and the right-of-way engineer, or by a consulting landscape architect technically qualified for such a land survey, who will consider the needs of State-wide traffic for rest, recreation, and the enjoyment of scenic and other special landscape values for which the areas are to be acquired. No such tracts should be acquired along highways scheduled for future relocation.

"Projects for the acquisition of tracts of land adjacent to highway rights-of-way with Federal-aid funds shall be programmed and plans, estimates, and project agreements submitted in the regular manner."

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DISTRICT 8 GROUP MEETING – ATLANTA, GEORGIA

R. V. GLENN, *Coordinator*

(Alabama, Florida, Georgia, Mississippi, Tennessee)

JUNE 23-24

The following highlights of pertinent interest in District 8 are excerpted from the stenographic record of the group meeting of nine representatives, including Public Roads Administration, Forest Service, Soil Conservation Service, and local, city, county, and State highway officials.

Trends in roadside development: It is difficult to express in a brief report the many new and interesting trends in roadside development brought out in the open discussion in our meeting in Atlanta. Off the record comment proved as pertinent and interesting as that of record.

One-percent fund used for research and laboratory studies: The highlight of the conference was centered in the unanimous opinion that roadside development can no longer be considered as a special feature * * *; it has become so definitely a part of the original design. It was the opinion of the conference that by incorporating basic landscape and roadside features in the original P. S. & E., a great deal of the extra work involved in preparing special papers, wording contracts, etc., for landscape projects would be eliminated. A natural saving could be anticipated through this procedure as it would reduce cost of those items which can be handled by equipment already on the project; eliminating the duplication of plans, publications, etc. The conference believes that the 1-percent fund as an allotment is definitely out of the picture as it is so totally inadequate. However, in showing the way for development, it has served its purpose and it could be well used in the future for research and laboratory studies.

Maintenance: The question of maintenance cost is still unsettled. No definite figures are yet obtainable. Alabama, Florida, and Mississippi believe that they are unquestionably l wer, due directly to the prevention of erosion, but Georgia contends that they are definitely higher on account of the increased area to be maintained. This may to some extent be due to the fact that the ground cover procedure has not been sufficiently developed on existing projects.

Rights-of-way: The conference was still of the opinion that rights-of-way are entirely inadequate. Georgia is apparently the only State in this district that can legally condemn for all purposes. The others have been somewhat successful in securing necessary rights-of-way through maintenance operations. Apparently a most favorable reaction from the public to this method of demonstrating roadside development was found in Mississippi. Additional rights-of-way were easily obtainable thereafter, and this procedure was strongly recommended for other States. The conference went on record in recommending that no arbitrary widths for right-of-way be set up; that each project should be studied to determine the width necessary for a satisfactory section and that engineering considerations be the controlling factor.

Safety factors: The question of safety to the traveling public was repeatedly stressed throughout the meeting. There is no doubt but what the flat four-to-one slopes adopted as a minimum have prevented and will continue to eliminate all hazard to the car forced off a roadway.

Strategic network system: Mr. Headley's comments on military highways gave the conference a clear picture of what must be expected in the development of the strategic highway system. The necessity of cooperating in this procedure was thoroughly understood.

Planning coordination: The conference was unanimous in its belief that no future highway development should be attempted without a thorough working arrangement with the planning divisions of the several States. The vast amount of information available from this source will greatly facilitate the preparation of plans and designs for all roadside development.

Flight strips: The question of flight strips on existing highways was a matter for the individual handling of each highway department. All existing emergency landing fields should be oriented on a State-wide map and a study made by the highway department itself of the necessity for emergency landing strips between these fields. It was the thought that these flight strips be taken care of as individual projects submitted and recommended by the State highway departments.

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ANALYSIS OF GRADED SECTIONS BY

MR. J. B. RUTLEDGE, ASSISTANT ENGINEER - PLANS AND SURVEYS - ALABAMA

"Experience has shown the desirability of establishing an economic balance in the design of projects. Quotation from May *Civil Engineer* letter by L. V. Sheridan of Indianapolis: 'Highway development has passed through a transition period, and, in many parts of the country, has risen to a high plane of aesthetic achievement. Older roadways, often little more than railroad grades have been succeeded by main highways and secondary roads which follow attractive alinements, skillfully adjusted to grades, and have side slopes, artistically blended into the surrounding terrain. This improvement has come entirely through realization that such design makes highways more efficient for the movement of traffic and safer for those using the roads.'

"We may credit this present conception of roadway design, in large part to the influence of roadside development projects * * * necessity to use a large amount of hand labor (in early '30's) as required by Labor Regulations on all contracts for Federal projects is largely responsible for this development * * * furnished a means for meeting a need which was being recognized in low-cost road development * * *. Observation of results of widening shoulders and flattening slopes over a period of several years convinced us that we had added measurably to the safety of traffic, and made it possible to control erosion to a greater extent than was possible with the old narrow shoulder, *V*-ditch type section. The incidental improvement of general appearance was likewise gratifying. The abundance of labor which had to be used created a tendency to extend slopes and landscaping beyond the bounds of utility * * *. Time has not come to establish such limitations as will economically justify the incorporation of the essential features of roadside development (*i.e.*, safety, economy of maintenance, and appearance) in the design of all highway construction. It is now common practice in designing cross sections to provide wide shoulders, front slopes as wide and flat as consistent with adequate drainage of base, and backslopes to blend with contours of the surrounding terrain. There has been progressive improvement * * *.

"We have now reached the point where standard design for roadway and roadside * * * should be practically synonymous. There is a tendency on the part of designers, which is entirely praiseworthy, to make plans for each succeeding project an improvement over the design of its predecessor. In too many cases, however, this has taken the form of increasing length of inslopes, widening of ditch sections, and flattening backslopes, all to a greater extent than previously. There is a point, therefore, beyond which a greater extension of the section is not economically justifiable. That point is reached when (a) wide shoulder and flat front slopes provide a reasonable opportunity for the motorist who momentarily loses control of his car, or is forced off the roadway, to recover; (b) moderate slopes and flat ditches (gutters) thoroughly protected with sod checks, and covered with a good growth of grass or other selected vegetation, which will reduce maintenance costs on the areas

outside the limits of the pavement to a minimum; (c) a pleasing appearance by the blending of the lines of construction with natural contours * * * when these purposes are served, any widening of the area to be developed beyond these (basic) needs, goes beyond the province of highway service and enters the field of parkway development."

Mr. Rutledge (Alabama) then discussed (a) roadway widths and shoulders; (b) front slope sectioning; (c) flat bottom ditches; (d) cuts and fills, and (e) right-of-way width (not to exceed the roadway width plus 100 feet except where special conditions govern).

Safety turn-outs (and maintenance): "Occasional widened parking areas - an expansion of shoulders, justified for safety - at reasonable cost * * * areas often expanded, to include features that not only increase cost of project, but involve costly maintenance which will unduly burden a budget which is usually stretched to the breaking point, in the maintenance of strictly normal, necessary operations. Failure to properly maintain so conspicuous a feature as a parking area is, of course, more noticeable than normal items of maintenance, and is particularly subject to unfavorable criticism. In the design of such areas it is well to keep in mind the consideration of subsequent cost, and not attempt an unduly ambitious lay-out for this feature."

Front slopes to gutters: Design influenced by factors of soil and drainage - use of roadbed topping on plastic clay subgrade is not standard practice - normal subgrade being lowered by depth of topping - varies from 4 inches to 12 inches or more - * * *. Satisfactory drainage requires ditch elevation shall be at least 0.5 feet lower than bottom of roadbed topping * * *. Allowing for base course on bituminous pavement, or depth of pavement on other types of paving, a ditch is indicated having a flow line elevation from 18 inches to 26 inches (varying with the depth of topping) below the elevation of the shoulder line. A 6:1 front slope would thus have a length of from 9 feet to 13 feet. This provides a surface beyond the edge of pavement from 15 feet to 19 feet wide, which may be used by a vehicle in case of emergency. A greater width than this does not appear necessary.

Gutters: Widths should be such that the maximum flow will not come higher than the bottom of the roadbed topping - means depth of water in ditch should not be much in excess of 6 inches, thus a 3-foot flat bottom ditch having a 6:1 front slope and 1:1 backslope would have a capacity of 2.75 square feet, when running 6 inches deep - or almost the carrying capacity of a 24-inch pipe. Widening of the flat section would accommodate larger flow of drainage.

Embankment slopes: To 6 feet or less, slope ratio not to exceed 4:1. Where height is greater than 6 feet, comparative cost of using 4:1 as against use of guardrail should be considered and 4:1 slopes used to the balance point * * *. On slopes 4:1 or flatter, a vehicle may park comfortably with

one wheel over the shoulder line; where the slope is steepened * * * the wider (8 feet) shoulder is needed to accommodate parking.

Backslopes: Cuts 6 feet or less, need not be flatter than 4:1 unless appearance of cut can be practically eliminated by the use of a flatter slope.

Right-of-way width: In line with above - a satisfactory section can be fully developed within 40 feet of the shoulder line. It therefore seems unnecessary to provide a right-of-way extending more than 50 feet outside the shoulder line, except where special conditions have to be taken into account. Hence, a right-of-way width of 100 feet plus the normal roadway width between shoulders, appears ample and may be reduced somewhat without detriment where disturbances of large buildings, or excessive property damage of any kind is involved.

Under existing conditions, when all available highway funds should be used only for work essential to the needs of transportation, it is imperative that true economy be exercised in all phases of the work. The principles of roadside development have become so much an integral part of all highway design that I believe the continuation of such projects through this emergency may be justified, if they are subjected to reasonable limitations as suggested above.

COMMENTS BY MR. MASSIE OF FLORIDA

Right-of-way is a most important item because you cannot accomplish good design on minimum right-of-way. Good engineering is primary reason for 200-foot right-of-way through open country. * * * would like to see 300 feet in flat woods areas to be preserved.

MR. DUDLEY COLLINS of Mississippi reported that from the director down to the maintenance patrolmen, every employee has become interested in preservation of natural landscape, proper methods to control soil erosion, and the elimination of construction scars. * * * have had interested support of Garden Clubs - educational use of roadside pictures to create a better understanding of aims to improve roadsides * * * astonishing results in acquisition of added right-of-way by maintenance. For example, on U S 51 south of Jackson - built in 1927 with 60-foot right-of-way - a section of this was relocated to meet standard design into the 4-lane U S 80. The cost of the right-of-way naturally was high. Then the maintenance crew began sloping backslopes, providing proper drainage. No one wanted to give additional right-of-way to the State, but after one property owner consented and others saw the finished results, all the property owners consented and now a demand for this work is being made, when only a few years ago it was prohibited by right-of-way costs. Opinion that use of easements on roadside projects would make easy getting of additional right-of-way, at a nominal fee. * * * flattening all slopes as fast as possible - determined to have ground cover on entire right-of-way, wherever possible. Using straw, pine needles, and grass mulch to secure this cover.

Grass mulch experiments: Successful - now in use in Mississippi - place 2-inch to 4-inch topsoil with grass roots on new graded slopes - then run a light tractor over this treatment * * * best results found on 3:1 slopes - work on roadsides developing from standpoint of maintenance - public not satisfied with anything other than right-of-way maintenance in a front yard maintenance manner.

MR. ALDERMAN - Engineer of Plans - Georgia: We do not use any fills over 2:1 slopes - agreed with government 3 or 4 years ago to build no fill slopes steeper than 2:1 - has not worked any hardship on anybody * * *. On 2:1 slopes grass grows better and stays better.

Each State has individual problems and individual conditions. Projects on old roads always involve widening and regrading - actually a reconstruction job. Georgia has not tried to put roadside improvement on anything but a paved road - has adopted policy of grassing every project, from one end to the other - including area between edge of pavement and the shoulder.

Brought out in discussion that slopes be modified so that they can be incorporated in all our primary road construction - made a part of original construction - go ahead and grade projects on regular Federal aid * * * and then put the 1-percent strictly in the planting. Florida uses 1-percent on active Federal work in doing little refinements that fund is for. * * * Alabama, also in Georgia - grassing, finishing and dressing, mulching, topsoiling, etc.

EXCERPTS FROM ADDRESS BY H. C. HEADLEY
HIGHWAY ENGINEER, PUBLIC ROADS ADMINISTRATION

"Military Highway" - strategic network.

" * * * believe that all of the design that has been developed in roadside improvement (demonstrations) will be used in the design of the strategic network, and the only difference will be in width of roadbed. * * * may be forced to pave a lot of these roads 5 or 10 years ahead of what we normally would expect to do under our stage improvement."

Standards: Strategic network - 11-foot and 12-foot traffic lanes - 10-foot shoulders - 160 feet right-of-way for 2-lane service and 200 feet for 4-lane service. The 42-foot roadbed, which is the two 11-foot traffic lanes plus 10-foot shoulders, is developing rapidly - even faster than was anticipated. The States are sold on it. In this district, one or two States now do not want to build a width of roadbed less than 42 feet on their main State system. Tennessee is one; they made the jump from 32 to 37, and then went up

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Note: (On 2-lane or 4-lane - get a width of roadway that is indicated by studies of your State-wide planning survey and width will take care of traffic conditions - then get right-of-way necessary to give an easy margin.)

to 42 feet. In a 42-foot to 44-foot roadbed width, with a little bit of police control, civilian traffic could be kept on the shoulder and allow the military traffic to use the pavement (in an emergency).

Maintenance: One of the greatest problems in planning survey studies is to get any sort of accurate maintenance cost data.

All States should continue the routine of regular roadside operations under their own organization (as a normal activity). Through agreements as to typical sections which would involve roadside development features on regular Federal-aid projects, and possibly more extensive roadside development features on reconstruction projects so as to fix the lessons learned from the 1-percent fund *** standard practice *** a small fund is desirable for experimental projects each year in each State - a Federal fund. * * * We have a lot yet to learn on erosion control - every State has some little problems which need to be worked out and in which it is very difficult for the State to become interested and justify to the public unless the Federal Government is willing to participate. They may not even be situated legally to do it unless the Goveroment is willing to participate. *** protective preventive work, with a view to saving cost in future maintenance. (Applied research on small-scale demonstration test projects thus may pay large benefits and dividends to the public on a large-scale construction of modern highway mileage.) On secondaries - roadside development - the idea of sodding and grassing slopes to prevent erosion and to put in slopes that would stand up - also needed as an everyday practice. (These fundamentals should be used on every mile of new construction everywhere for common-sense economy and traffic safety - flat slopes, wide right-of-way - adequate shoulders, one primary motive for safety.

Second, provision for future widening of pavement when the time comes. Appearance is the last benefit but it is an important feature. State use of WPA forces for betterment in roadside development.

Maintenance on roadside improvements: Georgia claimed costs tripled on their demonstration projects.

Alabama has made no special effort for special maintenance of roadside projects; have applied sodding and planting of slopes on all projects and with the same expenditure for maintenance we have so much less erosion than we had previously. We have not increased the cost of maintenance in Alabama by these roadside development projects.

Florida maintained that the better designing decreases maintenance costs. Maintenance engineers are of the opinion that such costs are substantially decreased, when everything (before) was erosion. You cannot produce any figures to justify it except that a well-built article of any kind is apt to be the lowest in maintenance cost.

Alabama - Feature of safety greatly increased with prevention of "washes" which the system of roadside treatment has done. Much the same figures are

spent as in previous recent years on maintenance but we are getting better results - largely due to planting of grass to prevent erosion.

Florida feels they are really gaining on maintenance - by getting to the point where they do not have to repeat and repeat it. In the long run, it pays.

MR. W. P. KING - Associate Bridge Construction Engineer - District Office, Public Roads Administration, presented paper on "Roadside Development in Connection with New Construction."

" * * * by planning roadside improvement work in this manner, better value can be gotten from 1-percent funds and encouragement will be given to improved design on all new construction so that eventually a comprehensive roadside improvement will be obtained on all completed new work, regardless of what funds are used."

GENERAL DISCUSSION

Mr. Glenn, Coordinator, called on Mr. Danielson, Federal Manager, Highway Planning, and Mr. Danielson offered the following comments:

"After listening to all this discussion, I think to obtain roadside development comes right back to planning, just as we are trying to do on the planning surveys - that is, to plan ahead for the administration of highways over a period of years, at least 10 and possibly 20 years. I think roadside improvement should be considered at the start of the project and come on through with route inspection, location survey, preparation of plans, and P. S. & E., so that when we start a job we know what we want in location and design to fit the needs of traffic. We should consider the facts obtained by the Highway Planning Survey - that is, the volume and character of traffic anticipated, use the county base maps and straight-line diagrams showing culture and improvements, type of soil, and topography. All of this data may be made available for a joint route inspection before any work on surveys or plans is started. This will crystallize ideas so that the location engineer and road designer will be able to develop a highway suitable to the needs of traffic, giving consideration to grade line from minimum cover over structures, maximum percent of grade, minimum passing and stopping sight distance, roadside development, width of right-of-way, pleasing cross sections, erosion control, adequate drainage, safety factors, all considered to obtain a road satisfactory over a period of years."

Mr. Alderman of Georgia, and Mr. King of the district office concurred with the statement made by Mr. Danielson and proposed that the Committee work out a plan whereby the roadside development features could be incorporated in the original grading contract and the State still be given credit for the 1-percent expenditures.

"The coordinator for District 3 recommended that projects be divided into two divisions, but let as the same contract; Division One to include the normal grading and structure items, conservation of topsoil, cut slope treatment, etc.; Division Two to include roadside development features, such as replacing topsoil, incidental (finish) grading, completion of turn-outs, parking areas, vantage points, and seeding, planting, etc.; Division Two to receive credit for 1-percent expenditures.

Mr. Rutledge of Alabama, offered the following, which was agreed upon: "That no arbitrary width for right-of-way be set up - each project should be studied to determine the width to accommodate satisfactory section - engineering considerations to be the ruling factor."

Mr. Alderman of Georgia remarked that: "By giving more thought and attention to the highway in our maintenance work as is being done in Mississippi we can improve our roads."

Also that he agreed with Mr. Headley's statements that fore slopes in cut sections should be changed from 4:1 to 6:1; that fill slopes should be 4:1 up to a height of 6 or 8 feet; that flat bottom ditches be used and back slopes be constructed flat enough to assure the growth of vegetation.

Mr. Danielson, Federal Manager, Highway Planning, stressed the need for incorporating the principles of roadside development in the location, design, construction, and maintenance of all projects.

Mr. Alderman of Georgia and Mr. Massie of Florida also agreed that roadside development principles should be incorporated in all projects.

* * *

With the exception of climate which cannot be changed, topography is the critical factor in establishing plant growth in the dry region. Where slopes are flat, vegetation can be and is being established by simple natural methods, but where highway slopes are steep, establishment of vegetation is generally impracticable and often impossible. The use of structural methods may be necessary to control erosion where ground cover will not grow. The flatter slopes permit the establishment of vegetation at a reasonable cost through the large-scale use of machine equipment during construction operations.