ROAD BUILDING WITH CONVICT LABOR IN THE SOUTHERN STATES.

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INTRODUCTION.

The principle which obtains in the punishment of the criminal is the prevention of crime, both by reforming or permanently confining him and by deterring others from following his bad example. In the accomplishment of this purpose it has come to be generally admitted that during the infliction of punishment the physical health of the prisoner should not be impaired; and that everything possible should be done looking to such improvement of his character as may fit him for better citizenship.

EMPLOYMENT OF CONVICT FOR BENEFIT OF COMMUNITY INJURED.

Another principle, in no sense out of harmony with the first, and which, in this connection, is worthy of more general acceptance, is that the prisoner who has injured a community through the commission of crime, and whose capture, conviction, and punishment have added to its financial burden, should, if possible, in connection with his punishment, do something to benefit the community which he has injured. The correctness of this principle is coming to be widely accepted in the Southern States, where the belief prevails that perhaps the best way in which a criminal can benefit the community he has injured is in helping to improve its public highways. And in doing this work without compensation and at a cost actually less, in many cases, than that of his keep in the county jail, he is benefiting his community without imposing on it an additional tax burden; he is not in the ordinary sense competing with hired labor, and he is doing work which hired labor does not care to do unless paid such wages as will prove a too serious drain on the public treasury.

This method of employing convict labor in a majority of the Southern States may be fairly said to have passed the experimental stage, and to have become a part of the accepted practice.

SOUTHERN STATES EMPLOYING CONVICT LABOR ON ROADS.

The following table illustrates the extent to which this method of employing convict labor has already been adopted in a number of the Southern States:

Details of employment of convict labor on roads in the Southern States.

State.	Number of counties in the State.	Counties reporting.	Counties using convicts on public roads.	Average number of convicts employed on public roads during 1900.	Average cost of guarding and maintenance per convict per day on the roads.	Average cost per prisoner per day for keeping in county jails.	Number of prisoners usually kept in county jails, and not employed on roads.	Average cost of hired road labor per day.	Yearly value of labor of convicts employed on public roads during 1900.[a]	Yearly value of labor of prisoners usually kept in county jails, and not employed on roads.
Alabama	66	66	2	25	[b] $0.81	$0.30	789	$0.90	$6,187	$195,387
Arkansas	75	70	21	62	[b] .85	.75	320	.95	16,197	83,600
Florida	45	44	11	106	.46	.40	437	.92	26,818	110,561
Georgia	137	129	27	946	.26	.35	1,073	.60	156,080	177,045
Kentucky	119	109	42	419	.52	.50	583	1.00	115,225	160,325
Louisiana	59	57	9	67	.50	.40	337	1.00	18,425	92,675
Mississippi	75	74	12	113	.25	.30	397	.60	18,645	65,405
North Carolina	97	97	24	643	.24	.30	607	.75	133,508	125,193
South Carolina	40	36	32	579	.18	.30	404	.75	119,418	83,325
Tennessee	96	88	37	722	.26	.40	888	.80	158,740	195,360
Texas	229	214	65	672	.30	.45	1,197	1.15	211,520	378,551
Virginia	100	95	5	23	.38	.30	329	.80	5,060	72,380
Total or average	1,138	1,079	287	4,377	[b] 0.33⅓	[c] 0.35	[d] 7,361	.85	985,823	1,739,807

[a] In estimating the value of this convict labor the per diem paid ordinary laborers in the respective States as shown in the column giving the average cost of hired road labor per day is taken as a basis; and it is assumed that 275 work days may be reasonably counted upon for these States.

[b] In determining this average the figures for Alabama and Arkansas were omitted, owing to the probability that certain expenses connected with the maintenance of the teams have been, by mistake, included in the figures reported from these States.

[c] In determining this average the figures for Arkansas have been omitted as being abnormally high.

[d] Concerning this total number of prisoners in the county jails of these 12 Southern States, it should be stated that an unknown proportion, probably in some States at least 50 per cent, of these are persons awaiting trial and unable to give bond. This situation may continue for from a few days to several months. The remainder of these prisoners have already been tried and convicted, but remain in jail idle, at the expense of the county, for the reason that no employment is provided for them.

As will be seen from the table, the use of convict labor in public-road building is most largely practiced in the States of Georgia, Tennessee, Texas, North Carolina, South Carolina, and Kentucky, in the order named. In Virginia, where only twenty-three convicts are reported as having been used on the public roads of the State, and these confined to four counties, and in Alabama, where only twenty-five convicts are reported as being used on the public roads in two counties, the system is still in its infancy. In Arkansas, Florida, Louisiana, and Mississippi the system has been more largely adopted, but in these States only short-term convicts are used, and in most of

the counties the number so employed is small; consequently the per capita expense is large, which is also the case in Alabama. Hence, even in these States, the custom has not yet been established on a satisfactory basis.

CLASSES OF CONVICTS EMPLOYED ON THE PUBLIC ROADS.

Laws of the different States on this subject usually specify that only able-bodied male convicts sentenced for short terms are to be assigned to work on the public roads. In the States of Virginia, West Virginia, Kentucky, Tennessee, Louisiana, Mississippi, Texas, Florida, and Georgia prisoners convicted of misdemeanors only may be assigned to work on the public roads, and for these the sentence does not usually exceed one year, which, when the costs are added, may be thereby extended to nearly two years in extreme cases. In Alabama, in a few cases, all able-bodied male prisoners whose terms of sentence do not exceed two years may be assigned to work on the public roads. In South Carolina this limit is extended to five years, and in North Carolina to ten years.

The experience in North Carolina during the past ten years has shown that all the able-bodied male prisoners whose terms of sentence do not exceed ten years may be successfully employed at the ordinary work of highway improvement. Many such prisoners in different Southern States whose terms of sentence range between one and ten years are now employed under either the lease or contract system, or under State control, and are working on farms or in mines and factories. All of these might be employed in improving the public highways. The expense entailed would not be great; the difficulties which seem to stand in the way would disappear in practice, and the result would be of incalculable benefit in helping along industrial and educational development in each of these States.

The experience in California has shown also that even the longer-term convicts can be employed to great advantage by the State in quarrying and crushing stone at one or more central points for use in permanent road building. Stone is being extensively crushed in this way in California at less than half what it costs to do this work with hired labor in other States. The quarries used for this purpose are surrounded by a strong stockade, which also incloses the convict quarters, and the escape of prisoners under such conditions is not greater than that from the State prisons. Such a system is applicable, and could be adopted to advantage in each of the Southern States, except in Mississippi, Louisiana, and perhaps Florida.

The captured, but as yet unconvicted, prisoners who are unable to give bail often constitute a considerable portion of the inmates of Southern county jails, such as are shown in the seventh column of the table on page 320. Under judicious management and an arrangement

involving the mutual consent on the part of the prisoner and the county authorities this additional class of prisoners will be found, in large measure, available for highway improvement. This arrangement should provide in each case that when the court's judgment is finally passed, if the prisoner be acquitted, he is to be paid by the authorities a fair compensation for his services already rendered; or if he be convicted, in the carrying out of the sentence of the court the time during which he has already rendered service shall be credited to his account. Under this plan, which has not as yet passed beyond the experimental stage, the acquitted prisoner is set free in possession of a small capital for his support while seeking honorable employment; on the other hand, the prisoner who, for example, five months after his capture, is convicted and sentenced "to the roads" for a period of one year, has, at the time of his sentence already served his county usefully for five months. His sentence will now require of him only seven months additional service before he is set free.

THE NORTH CAROLINA LAW GOVERNING THE EMPLOYMENT OF PRISONERS ON ROADS.

The North Carolina law of 1901, controlling the assignment of convicts for public-road building purposes, is perhaps the most sweeping to be found in any of the Southern States, and may be quoted as follows:

SEC. 8. That all prisoners confined in the county jail, under a final sentence of the court for crime, or imprisoned for nonpayment of costs or fines, or under final judgment in cases of bastardy, or under the vagrant acts, all insolvents who shall be imprisoned by any court in said county for nonpayment of costs, and all persons who would otherwise be sentenced in said county to the State prison for a term of less than ten years, shall be worked on the public roads of the county: *Provided*, That in case the number of such persons in any county, at any time, be less than ten, the commissioners of the county may arrange with the commissioners of any neighboring county or counties for such exchange of prisoners, during alternate months or years, as will enable each such cooperating county to thereby increase the number of prisoners at work on the public roads at any given time. And upon application of the said road superintendent of the county, or that of the chairman of the board of county commissioners, the judge of the superior court, or the judge of the criminal court, the justices of the peace and the principal officer of any municipal or any other inferior court, it shall be the duty of the said judge or justice of the peace, or said principal officer, to assign such persons convicted in his court to said road superintendent or road supervisor in any township making provision for the same, for work on the public roads of said county or township; all such convicts to be fed, clothed, and otherwise cared for at the expense of the county or township, as the case may be: *Provided further*, That in case of serious physical disability, certified by the county physician, persons convicted in said superior, criminal, or inferior court may be sentenced to the penitentiary or the county jail.

SEC. 9. That when the commissioners of any county shall have made provisions for the expense of supporting and guarding, while at work on the public roads of the county, or any township thereof, a larger number of prisoners than can be supplied

FIG. 1.—PORTABLE CONVICT QUARTERS ON WHEELS, USED FOR THE CONVICT FORCE WORKING ON THE PUBLIC ROADS IN DAVIDSON COUNTY (ABOUT NASHVILLE), TENN.

[This arrangement is applicable when a small number of convicts are employed.]

FIG. 2.—SLEEPING QUARTERS FOR CONVICTS USED ON THE PUBLIC ROADS IN MECKLENBURG COUNTY, N. C.

[This house accomodates 50 persons. Its sides and ends are of boards bolted together in sections. The roof, of corrugated iron, is also in sections, so that the structure can be easily taken down, transported, and set up again. It can also be lengthened or shortened according to number of prisoners to be accommodated.]

from that county, upon application of the commissioners of said county to the judges of the superior and criminal courts, the justices of the peace and the principal officers of any municipal or other inferior court presiding in any other county or counties which do not otherwise provide for the working of their own convicts upon their own public roads, shall sentence such able-bodied male prisoners as are described in section 8 of this act from such other counties to work on the public roads of said county or townships applying for the same, in the order of their application; and the cost of transporting, guarding, and maintaining such prisoners as may be sent to any such county or township applying for the same shall be paid by the county or township applying for and receiving them out of the road fund of each such county or township: *Provided*, That any and all such prisoners from such other counties may at any time be returned to the keeper of the common jail of such counties, at the expense of the county or township having received and used them.

MANAGEMENT OF THE CONVICT ROAD FORCE.

As a rule, it has not been found economical to work convicts on the public roads when the squad consisted of less than eight or ten men. It is customary to have one guard for each ten or fifteen men, and, of course, this one guard would be necessary even were there only one or two men in the squad. In addition to the guards, there is usually a superintendent of the work; consequently this work is carried on most efficiently when the road force or camp contains from thirty to fifty men. When the number of convicts to be employed on the roads in any county is more than fifty or sixty, it has been found better to divide the force into two squads or camps, each having its own local superintendent and guards, and both squads managed under the general supervision of the county superintendent of roads, he in turn being responsible to the county court or board of county commissioners.

It is usually urged against this system of road building that it offers too many opportunities for the escape of prisoners. Experience in many counties, however, has shown that the average annual escapes amount to less than 2 per cent, and the few who do escape are usually recaptured within a day or two. Often the prisoners assigned to the roads are men who live in the community and have families and some property there, and consequently do not care to leave permanently; hence they rarely attempt to escape. Such prisoners as show a desire to escape, or who, in the judgment of the superintendent, are men liable to make an effort in that direction, are usually required to carry a ball and chain, which, while it makes it impossible for the prisoner to run rapidly, does not seriously hamper his movements in the regular road work. On the other hand, the convict who does his work faithfully and shows himself worthy is often rewarded by receiving generous treatment.

Morning and evening the prisoners are marched along the road from and to their temporary quarters, which consist usually of either heavy, large tents, portable houses on wheels (Pl. XXVII, fig. 1),

or structures either of wood or corrugated iron, built in sections so they can be easily taken to pieces, removed, and set up again (Pl. XXVII, fig. 2). In order to facilitate their being safely guarded during the night without too great risk and expense, each prisoner, when he goes to bed, has either one foot or one hand fastened loosely to a chain or rod, from which he can be easily released the following morning. The beds or bunks for these prisoners are easily and cheaply made comfortable, and the comfort of their temporary quarters is improved during the summer by ample ventilation and during the winter by the use of stoves.

The cooking and washing at the camps is usually done by some trusty male convicts, especially experienced in these directions, or by the female prisoners, or in still other cases by hired labor. The carrying of water, along with other similar errands, is usually assigned to the younger prisoners, or such as may not be sufficiently strong for the regular work on the roads. Isolated jobs are usually assigned to certain prisoners who, from their associations and generally good characters, are considered safe for carrying on such work without the immediate supervision of guards, and such prisoners are commonly known as the "trusties" of the camp.

The work of road building is usually extended to a distance of 1 or 1½ miles in each direction from the camp, and the camp is then moved a sufficient distance, so that 2 or 3 miles of additional road may be built before a second removal becomes necessary. The work done by these convict road builders includes almost every variety of manual labor necessary in this connection (Pls. XXVIII and XXIX). Thus, in counties like Mecklenburg, N. C., where considerable efficiency has been reached in macadamizing, they drive the teams, handle the shovels and picks, ride the road machines, quarry stone, run the engines, and operate the stone crushers (Pl. XXVIII, fig. 2), and occasionally the great steam rollers. They spread the gravel or broken stone (Pl. XXIX, fig. 1), and in still other counties they mix the sand and gravel or clay, and give shape to the road surface (Pl. XXXI).

EFFICIENCY AND COST OF CONVICT ROAD LABOR.

The cost of convict labor in road building, as might be expected, varies greatly with the efficiency or inefficiency of the management and the number of prisoners employed in any squad. The cost per convict per day in this work, including the cost of his food, tobacco, clothing, washing, medical attendance, and guarding, as reported for the year 1900 from representative counties in each of the several Southern States, is given on the next page.

FIG. 1.—CONVICTS GRADING A PUBLIC ROAD IN SHELBY COUNTY, TENN., ABOUT 15 MILES NORTHEAST OF MEMPHIS.

[The soil cut from the top of the hill is brought by the dump carts to the flat below, where it is being used in making a fill 4 feet high.]

FIG. 2.—CONVICTS OPERATING THE ENGINE AND STONE CRUSHER, USED IN ROAD BUILDING IN MECKLENBURG COUNTY, N. C.

FIG. 1.—CONVICTS BUILDING A MACADAM ROAD IN MECKLENBURG COUNTY, N. C.

FIG. 2.—DOUBLE TRACK MACADAM AND EARTH ROAD, BUILT BY CONVICT LABOR IN MECKLENBURG COUNTY, N. C.

Cost of labor per convict per day in road work.[1]

	Cost per day.	
Florida	$0.30 to	$0.50
Georgia	.16 to	.32
Kentucky	.50 to	.60
Louisiana	.50 to	.60
Mississippi	.15 to	.45
North Carolina	.15 to	.40
South Carolina	.17 to	.22
Tennessee	.20 to	.40
Texas	.20 to	.40
Virginia	.25 to	.50

A comparison of the figures given with similar figures for hired labor shows that the cost of convict labor in several States ranges from one-third to one-half that of the hired labor employed on the public roads in those States. In the two Carolinas and Georgia, where the road work is carried on with great efficiency, the cost of maintaining and guarding the convicts at work on the public roads ranges in many counties from 20 to 30 cents per convict per day, and is even considerably less than the cost of feeding them in the county jail. In explanation of this fact, it may be said that during the stay of convicts in the county jail the jailor is paid so much per day for feeding and caring for each; but that while they are employed on the public roads provisions are purchased at wholesale and competitive rates; that the convicts do their own cooking and washing; and that, owing to the usually healthy condition of the convict camps, the cost of medical attendance is almost nothing.

As to the efficiency of convict labor on the public roads, compared with that of ordinary labor, the general testimony from the many counties in the Southern States is highly in its favor. It must be borne in mind in this connection, however, that the hired labor which can be secured in the Southern States for work on the public roads does not belong to the most efficient class, and also that it can not be easily held longer than a few days or a few weeks at a time; consequently, it is often unsatisfactory. In the case of convict labor, on the other hand, the labor is entirely under the control of the guard and superintendent, and, especially in the case of long-term prisoners, it can be managed so as to reach a considerable degree of efficiency, both in ordinary work and in the handling of road-building machinery. Convicts thus not only make fairly efficient laborers while engaged in this work, but receive that training and experience which enable them to earn a better living, and hence become better citizens after the expiration of their terms of service.

[1] The figures for Alabama and Arkansas are omitted, owing to the probability that certain expenses connected with the maintenance of the teams have been, by mistake, included in the figures reported from these States.

It has been, therefore, the general verdict from the various counties in the Southern States where convict labor is employed in road building to any considerable extent, that in both efficiency and cheapness it is decidedly superior to such free labor as is ordinarily available there for this work.

INFLUENCE OF ROAD WORK ON THE CHARACTER OF THE CONVICT.

It is often urged against this mode of employing convict labor, that the very publicity of the work in exposing the prisoner to the view and to the remarks of the travelers along the highway would have a tendency to harden the criminal and make him less amenable to other beneficent influences. But careful inquiry concerning this point, made in many counties, has failed to elicit evidence in favor of this supposition. On the other hand, a considerable amount of evidence has been collected which goes to show that this out-of-door work not only improves the physical health of the convicts, but that their experiences as road builders have actually improved their general character and prepared them for better citizenship. Moreover, there are in these different States hundreds of cases where prisoners connected with the road camps have behaved themselves properly and labored efficiently, have been trained and trusted by their superiors, and have secured at the expiration of their terms of sentence fair positions in or near the communities where they had previously lived.

It is, of course, as true of convicts as it is of other persons, that fair and just treatment by superiors tends to develop the better qualities, whereas harsh and unfair treatment tends to develop the meaner side of their nature, and the latter treatment should never be permitted. As a rule, the treatment of the prisoners at the various road camps in the Southern States is fairly humane, though there is need of improvement along this line. Religious services are usually provided for them on Sundays, and an earnest effort is made to develop these convicts into better men as well as more efficient laborers. There are, of course, some exceptions to this, and it should be the constant purpose on the part of those in authority to see that these exceptions disappear. While a convict must be punished as he deserves, he must also always be treated with that uniform kindness and fairness which lead him, even as a prisoner, to realize that justice prevails, and that it pays to do right.

Every effort should be made by the proper authorities to educate a prisoner to a realization of his indebtedness to society (especially to some particular community) and the justness of his punishment. The acknowledgment and fulfillment of this obligation on the part of a criminal should be as helpful to his character as is the payment of an honest debt helpful to the character of an ordinary citizen. The circumvention of justice has an injurious influence as well in the one case as in the other.

EXAMPLES OF ROAD BUILDING BY CONVICT LABOR.

The nature and extent of the work done by convict labor in the improvement of highways in the Southern States can be best illustrated by a brief statement of what has been accomplished in a few counties selected out of a large number that have adopted this system.

GRAVEL ROADS AND SAND-CLAY ROADS IN RICHMOND COUNTY, GEORGIA.

Prior to the year 1879 the public roads of Richmond County, Ga., were in a state of neglect. Over a portion of them the surface was a deep sand, the dread of all travelers during dry weather, while the surface of the other portion was of clay, which became a quagmire during the rainy season. Meanwhile the authorities were at a loss to know what to do with their county prisoners, and the lack of a definite policy in this regard resulted either in keeping all the prisoners in the county jail, at considerable expense, or else employing them at miscellaneous jobs about the city of Augusta, the county seat. In January, 1879, the county judge inaugurated a definite policy for the improvement of the public highways of the county, and placed every available county prisoner at work with a view to the accomplishment of this end.

The work of improving and keeping in repair 350 miles of public roads and 3 miles of bridges was begun with a force of thirty prisoners and ten mules, and with funds but little more than sufficient to maintain this force upon an economical basis. Fortunately, the work has been pushed continuously to the present date. While naturally these efforts at first met with considerable opposition, the results have proved so eminently satisfactory to the people of the entire county that to-day the system meets with practically unanimous support.

The first work undertaken was the grading and draining of the roads. This was followed by the spreading of a few inches of sand over the clay roads and a few inches of clay over the sandy roads, the cost of this work being but little more than the expense of the labor and hauling, as the material was usually found close at hand. For the country roads where the traffic was light, the surface prepared in this way proved eminently satisfactory, often requiring little or no repairing for several years. On the main thoroughfares, nearer the city, where the traffic was heavier, the sand-clay surface proved less satisfactory, and it was found advisable to spread a layer of gravel on top of it. These roads have a width of 30 feet, and the gravel has been spread over the center to a depth of from 6 to 8 inches, for a width of 20 feet near the city and 16 feet farther out in the county. On the sand-clay roads in the one case the sand is spread over the clay surface to a depth of 2 to 6 inches; in the other case the clay is spread over the sandy surfaces to a similar depth. The cost of the gravel roads has averaged about $1,600 per mile, while that of the sand-clay roads has ranged from

$100 to $500 per mile, this variation being due to the amount of grading to be done and the nature of the materials used, and the distance it was necessary to haul them. The force at work on these roads at the present time consists of one hundred convicts, thirty-two head of stock, and a thorough equipment of machinery.

As a result of this well-directed policy, there are now in Richmond County 100 miles of sand-clay roads and 100 miles of gravel roads, all well graded and drained (Pl. XXX, fig. 1). The old wooden culverts have been replaced by larger ones of brick and smaller ones of vitrified pipe, and the old wooden bridges are being replaced by more modern structures of iron and steel. This accomplishment is the result of a well-directed continuous policy inaugurated and pushed by an intelligent, determined public official, whose efforts have deservedly won and now continuously receive the support of an intelligent public opinion.

THE SAND-CLAY ROADS IN RICHLAND COUNTY, SOUTH CAROLINA.

The sand-clay roads in Richland County, S. C., are worthy of special consideration, not only as a product of convict labor, but also as an illustration of how much may be accomplished in many localities in highway improvement at small cost, by treating the road surface with a simple admixture of sand and clay. This county, with Columbia as its county seat, is located where the hill country merges into the lowlands, and where the beds of coarse sand and clay are in close proximity. After constructing 2½ miles of ordinary macadam road, at a cost of from $2,000 to $3,000 per mile, the county supervisor (who in all South Carolina counties has charge of the public roads) wisely decided to try the simpler and cheaper plan of spreading sand over the clay roads and clay over the deep sandy roads (Pl. XXXI, fig. 1.), and he has carried forward this work to an extent and a degree of efficiency perhaps equaled nowhere else in the neighboring States. It was not easy to determine the amount of sand in the one case, or of clay in the other, which would give the best final result. Consequently, it has been necessary to watch the resulting road surface for several months, in some cases adding more sand where the surfaces showed a tendency to give way under traffic in wet weather, or in other cases adding more clay where the tendency was for the surface to break up during the dry season. First, the roads were cut to a grade of from 2 to 3 per cent, then the surface was given the proper cross section for shedding water, this surface slope being kept sufficiently gentle to permit the water to run off slowly and not to carry the sand with it. The clay or sand was then hauled in wagons or carts, usually short distances, and spread over this surface for a thickness of from 2 to 6 inches. The mixing of the sand and clay was done by the ordinary travel, which was never stopped, and the surface was finally packed by the wide-tire wagons and carts or a horse roller. Where the supply of sand needed

FIG. 1.—GRAVEL ROAD NEAR AUGUSTA, RICHMOND COUNTY, GA.

[Wagon loaded with 72 bales of hay.]

FIG. 2.—GRAVEL ROAD, SHELBY COUNTY, TENN., ABOUT 12 MILES NORTHEAST OF MEMPHIS.

[A thin deposit of gravel, such as is used in road building, is exposed in the ditch on the left side of the road.]

FIG. 1.—HAULING AND PULLING DOWN CLAY ON SAND-HILL ROAD.

FIG. 2.—A SAND-CLAY ROAD BUILT BY CONVICT LABOR IN RICHLAND COUNTY, S. C.

for spreading over the clay road is not found near by, pockets are made in the ditches for catching sand, which is later taken out and spread over the surface.

This work has been in progress during the past four years. Everything, even to the construction of the culverts and smaller bridges, except the guarding and supervision, has been done by convict labor. The size of the force has varied from forty to seventy prisoners, whose terms of sentence ranged from a few days to five years. During the year 1901 there have been on an average sixty prisoners, divided into two camps. The cost of their maintenance, including the guarding, feeding, clothing, and medical attendance during the year, has averaged 20 cents per convict per day, as compared with a cost of 30 cents per day per prisoner for feeding and guarding while confined in the county jail prior to sentence and assignment to the road force.

As a result of this work during the past four years this county now has (out of a total of about 650 miles of public roads) about 125 miles of improved sand-clay roads, 25 to 30 feet wide, which cost for grading and surfacing about $300 per mile, and 75 miles of similar roads, which, built under more favorable conditions, cost about $200 per mile (Pl. XXXI, fig. 2). In a few places, where the materials were close at hand and little grading was necessary, it is said that this work has been done at a cost not exceeding $150 per mile. The oldest portions of these roads have borne the traffic of three winters and three summers in a highly satisfactory manner, and the annual cost of repairs has not exceeded $10 per mile.

It would be a manifest error to suppose that similarly cheap and satisfactory sand-clay roads can be built in all other portions of the coastal plain region of the South Atlantic and Gulf States, for it must be borne in mind that the character and distribution of the sand and clay deposits of Richland County makes the road-building conditions there exceptionally favorable, and the management of the work has been very efficient. But the success in this county and the measure of success which has followed experiments on a smaller scale in other less-favored localities, certainly suggests a line of policy and experiment which promises cheap and fairly satisfactory results at small cost over much of the area of the South Atlantic and Gulf States.

THE GRAVEL ROADS IN SHELBY COUNTY, TENNESSEE.

Modern road building in Shelby County, Tenn., began about fifteen years ago with the construction of the gravel turnpikes which now radiate from Memphis, the county seat, toward the north, east, and south. Since that time the county has built some 350 miles of these excellent turnpikes, and is said to have expended in their construction and maintenance approximately $800,000. The grading for these roads

has been done largely by the county convict force (Pl. XXVIII, fig. 1); but the larger part of the quarrying, hauling, and spreading of the gravel has been done by hired labor under the contract system, only a limited portion of this work having been done by the convicts.

The management of these roads is vested in a turnpike commission consisting of three members, with the chairman of the county court as its head. The management of the convict force is vested in a workhouse commission or board, both commissions being appointed by and being responsible to the county court, which decides as to the tax to be levied for the support of the convicts and the general road-improvement policy to be followed. The turnpikes as constructed have a right of way of 50 feet. On this roadway gravel has been spread over its central portion to a width of 14 feet near the city and 12 feet farther out in the country (Pl. XXX, fig. 2).

The gravel used in the construction of these turnpikes is found in deposits varying from 5 to more than 20 feet in thickness in many portions of the county. It consists mainly of small, well-rounded pebbles of quartz, chert, and flint, cemented together with oxide of iron and a limited amount of clay. When these beds are broken down by blasting, and this gravel is spread on the road with care, so as not to separate from the pebbles the cemented material, it re-forms a hard, firm surface, which makes an excellent roadway. Where the distance does not exceed 2 or 3 miles, it is hauled by wagons from the pits to the road, but for longer distances it is hauled by rail to the nearest station, whence it is carried by wagons to the roads on which it is to be spread. Large quantities of the gravel used have been hauled by rail for a distance of more than 100 miles.

These gravel deposits are usually owned by private individuals, and the road authorities pay for it at the pit from $2 to $3 per car of 14 cubic yards. When spread over the roads for a thickness of from 6 to 8 inches, it has usually cost from $1,000 to $2,000 per mile.

The convict force during the year 1901 has included from 120 to 140 men, of which from 80 to 100 have been employed on public roads during the months of May to November. During this work season the prisoners have occupied temporary quarters in the country, traveling each day a distance of from 1 to 5 miles to and from their work. During the winter season, from November to April, the entire force of convicts is kept in their permanent quarters on the workhouse farm near the city, being used partly for farm work and partly for road and street improvements near by. The cost of employing these convicts on the public road is said to average about 40 cents per day per prisoner. The force has already rendered a most important service to the county by helping in the construction of its present turnpikes; but there will doubtless be a decided improvement, both in the efficiency and economy of operating this convict force for road-building purposes,

when the management is the same as that for the turnpikes, and when a better system of movable stockades or quarters is adopted, so that the prisoners may camp at night near to their place of work, and continue their road-building operations throughout the entire year.

MACADAM ROADS IN MECKLENBURG COUNTY, NORTH CAROLINA.

Modern road building in Mecklenburg County, N. C., and indeed modern road building in the State of North Carolina, may be said to have begun with the adoption of road laws nearly twenty-five years ago, which authorized each township in the county to levy a special tax for the maintenance and repair of its public roads, and permitted the commissioners to levy a special tax for the support of its convict labor in the permanent improvement of the county highways. This work has now been in progress for two decades on an increasingly large scale and with growing efficiency. At the present time this county maintains in connection with its public-road work two convict camps of from fifty to sixty prisoners each (Pl. XXVII, fig. 2).

The road-building equipment at each of these camps includes a quarrying outfit, a steam road roller, a stone crusher and engine, a road machine, scrapers, carts, wagons, mules, shovels, picks, etc. In the management of these convicts there is a guard for each ten or fifteen prisoners, and a local superintendent who has charge of the camp and the road work done by it. The entire road work of the county, including the management of both these convict camps, is under the control of the county superintendent of roads, who is also an engineer, and who reports monthly, and oftener if need be, to the board of county commissioners, which board decides upon the amount of road tax to be levied each year and exercises a general control over the work.

The county being situated in the hill country, the old roads with their steep grades have had to be relocated at certain points, and they have been graded by cutting through hills and building up intervening depressions until this grade work as seen to-day resembles that along a railway line (Pl. XXIX). These roads radiate out from Charlotte, the county seat. They have a width in the central township of 40 feet, of which 12 feet in the center has been macadamized, and a dirt road has been arranged on each side of this. In the rural portions of the county the width of the road has been contracted to 30 or 35 feet; the macadam track has in many cases been reduced to a width of 10 feet, and has been placed on one side of the road. This gives a double track—one, the macadam, to be used almost exclusively during the rainy season, and the other, the earth road, to be used generally during dry weather. This double-track system, which is much preferred by the farmers, prolongs the life of the macadam road by relieving it from traffic during dry weather (Pl. XXIX).

All of this work is being done by convict labor, and the long period

(five to ten years) for which many of the prisoners have been sentenced permits their being trained for expert work in the way of handling machinery and grading and macadamizing the roads. In connection with the cost of this work, it may be added that the maintenance of the convict force (including salaries of the guards and camp superintendent, and the clothing, board, tobacco, and medical attendance for the convicts) averages for the entire force for the year from 28 to 30 cents per convict per day. These convicts are housed throughout the year in comfortable portable structures, made of wood and corrugated iron, framed in sections, so that they are easily taken down and moved by a small portion of the squad from one point to another along the road (Pl. XXVII, fig. 2).

During the past twenty years, and largely during the past decade, 104 miles of such macadam roads have been constructed in Mecklenburg County by convict labor. At first, as might be expected, the progress made was slow and the work not always well directed, but year by year the county authorities have profited by their own experience and that of others, and during the past few years there has been a decided improvement both in the rate of progress and efficiency of management. During the year 1901, 12 miles of road have been graded and macadamized, at a cost ranging from $2,000 to $3,500 per mile, including the grading and macadamizing, the construction of culverts and abutments, and the materials for new bridges. The county is now expending annually something more than $40,000 on the improvement of its highways; and the proposition that this expenditure is the best-paying investment the county could possibly make is accepted by every class of citizens, and even by the convicts themselves, who seem to feel a genuine pride in the excellent highways they are building.