

ing should be heated and have a concrete floor. The shop equipment, besides small tools, should consist of a drill press, a cutting and welding torch, a large anvil, a heavy vise, and a forge. With this outfit, many useful things can be made at the shop for much less than the price asked at retail stores. Among the things we have made, besides all repairs, are a steel gravel bin with screen, snow plows, a high-pressure press, sewer extensions, motor stands, a sliding track for a chain hoist, wrenches, gear pullers, chisels, and punches. When the county has its own shop, it also gets the advantage of wholesale prices on all hardware, parts, and repairs.

Each operator is required to work on his own repair job with the mechanic, because he knows what has happened and why the job is in the shop. Sometimes this information is very valuable to the mechanic. In turn the operator learns some of the adjustments and various details about his piece of equipment from the mechanic. This may be of value to him and the county in keeping the equipment moving instead of bringing it back into the shop for all minor repairs.

#### MANAGEMENT

We have an assistant superintendent in each of the outlying townships, and the manager of our truck division is in charge of the central township. These men are directly responsible to the superintendent for the condition of the roads. We also have divided the county into two districts. The first three days of the week the western district is in charge of county equipment, and the assistant superintendents in that district are not allowed on the roads. The last three days the eastern district is handled in like manner. Thus we never have any overlapping of authority, but we get the advantage of operating as a county unit and having a local man in direct control.

Therefore we repeat, the better balance a road superintendent can keep in his personnel and equipment, the more successful and economical his operations will be.

#### GARAGE PROBLEMS

By K. M. Dimmich, Benton County Highway Superintendent

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This subject could be handled in many different ways; however, I shall limit my discussion to why and how Benton County secured a highway garage.

Conditions in our county are quite favorable to a central garage. The county is approximately square, being eighteen by twenty-three miles in dimensions; and Fowler, the county seat, is situated near the center. For several years I had

visions of a garage, and in my annual report to the county commissioners for at least two years I had recommended that the county should own a plot of ground and a garage, which would provide a place to store and house our tools, materials, and equipment, and serve as a central starting place for each day's operations. The county commissioners would read these reports and approve them, but we failed to get a garage. The recommendation was apparently forgotten as soon as the meeting ended. I suppose I was partly to blame for the plans not being carried out, for I have a habit of recommending a thing and letting it go at that. I don't like to be nagging the commissioners for a particular thing which I have recommended, for I feel that if the board sees the necessity for such a thing they will act as they see fit.

We had gathered up quite an assortment of bridge material, old tools, etc., and had them parked along the road just out of town. One Sunday night in 1925 two cars met along this miscellaneous assortment of tools and equipment rather late, or early the next morning, the drivers being young men who apparently had been out late. The lights of one car blinded the driver of the other and he ran into this assortment of equipment. In the end the county paid a repair bill of some \$128 and also agreed to provide storage for this material and the county trucks. Before this time we had been keeping our trucks in a garage and paying \$5.00 per month for each truck and buying our gasoline and oils from the proprietor.

Up to this time the oil and gas men had refused to give the county any direct price on their products. We bought our own gasoline pump and a 550-gallon tank. Now we buy direct and not only make quite a saving on our gas, oil, etc., but save the storage charges and do a part of our minor truck repairs. We saved \$577.55 on our gasoline alone in 1931.

Since the board of commissioners had agreed to build a garage, the next thing to do was to find a suitable location and prepare plans. I was told to get up some rough plans for what I thought the county needed, and I did. The board, however, turned down my specifications because the cost was too high.

The board bought one-half block of ground, well located, for \$700, and finally let a contract for a garage to be built of brick, costing as follows: building, \$3,608.65; heating plant and wiring, \$632, total of \$4,240.65. The building together with the lots made the total cost \$4,940.65. We moved in October 1, 1925. (Fig. 1.)

This garage is 84 x 26 feet with a door for each of four stalls, and a door to an unheated room of 26 x 24 feet. I was glad to get even this kind of garage, although I could see that we were short of space and, as the building was planned, there was too much lost space. We started off, however, ap-

parently feeling well satisfied. You know, it is a good idea at least to appear satisfied in some of our work. I still felt that I was right in the size and type of garage originally recommended, which included a floor space of 80 x 60 feet with one door in each end. This would call for only two doors to keep up, instead of five as is now the case, with a driveway through the center of the building, a heating plant in the basement, and a stock room and an office on the main floor. In the present building we have the four stalls, a small office, a coal bin, and a hot-water heating plant for the office.



Fig. 1. Benton County garage with additional storage space in frame building at right.

We got along with this storage space until 1930, when our crowded condition became quite a problem, since we had been purchasing more trucks and equipment all during this time. We had had four trucks and one pick-up to start with, and in 1930 we had six trucks, four tractors, and a concrete mixer to house. Early in 1930 I recommended building a shed or garage with a work shop in it where we could house our tools and do repair work without having to leave a truck outside to complete the job or without moving an unfinished repair job out to put a truck inside. Our board did nothing until their November meeting when I brought the question up again and they told me to hire carpenters and build what we had agreed upon, which was a shed similar to one the State Highway Commission had built the year before. They agreed to let me build it with my own men and I soon found it was a bigger job than I had anticipated. I had six men, none of whom knew very much about carpentering. We went at it, however, and took care of our roads besides.

At the December meeting of the board, I was rather proud of the fact that we had the building erected, painted, and

ready to show to them. It measured 84 x 24 feet. It pleased the board so well that they let me put a concrete floor in the whole building, instead of just the work shop as at first planned. The cost of this building without concrete floor was about \$900.

This new garage has four 10-foot stalls, two 12-foot stalls, and a work room 20 x 24 feet, with a stove for heating. In the work shop we have a bolt rack with a good assortment of bolts, etc.; also angle irons, rods, and other materials for the repair of drags and snow plows; an electric drill; a forge; an anvil and a fair assortment of small tools. We repair our drags, graders, snow plows, etc. We built one snow plow this winter that we think will meet almost any situation to which it can be subjected, but have had no snow to try it out as yet.

Most of our truck repair work is done at a first-class garage in Fowler, as we do not yet keep a mechanic in our own garage, but I believe there could be some plan worked out whereby it would pay the county to keep one.

## USE OF SANDSTONE IN HIGHWAY BASE COURSE

By B. F. English, Pike County Highway Superintendent

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The construction of improved roads resolves itself into two distinct component parts involving the base or foundation course and the top or wearing surface. The efficiency and durability of each depends to a great extent upon the other. The rigidity of the base must be sufficiently adequate to withstand the weight of the loads that the road is expected to carry. The construction of an adequate base is affected by the firmness of the subgrade, which varies with the moisture in the soil. The ground-water level must be kept at a safe distance below the base by either a raised grade or adequate side-ditch drainage. The top or wearing surface should be kept as nearly impervious as practical, a condition which aids in securing a firmer subgrade.

In all public improvements, a good governmental policy is to get the best results possible for the amount of money expended. With county and township road funds woefully limited, it behooves us to inspect the materials we have locally, to determine their economical usefulness. Any kind of stone in the locality of the proposed road that can be obtained and placed as base material at relatively cheaper cost than other shipped material, should be used.

We have in Pike County approximately 60 miles of sandstone telford base roads. It is specified that the stone shall be one-man size, of certain dimensions, laid by hand transversely with the road, then sledged down and made compact