XXII. BUILDING MATERIALS OF OKLAHOMA

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From the Oklahoma Geological Survey.

There is a very close relation between the geology of a region and its housing problems. The early settlers made their dugouts where geological processes had made the digging easy and the drainage good. They biult their cabins where tree growing formations outcrop. Good limestone gave a community stone houses while the lack of a more suitable material gave rise to the sod house.

Timber being a light-weight material, it has been shipped great distances so that the tree bearing formations have extended their influence far and wide, causing extreme uniformity among American houses.

Now that the timber is rapidly nearing exhaustion, the local formations will exert their latent influence. Since stone, cement, gypsum, etc. are all relatively heavy the result will be that each community will have its own type of house, and individuality will be the rule where uniformity now prevails.

To bring up to date the Survey's information on the present development of the state's resources in building materials, David Hedley and the writer made an extended inspection trip during the past field season. In the course of this trip we visited in the order named the following places: Pauls Valley, Davis, Sulphur,

Mill Creek, Troy, Tishomingo, Bromide, Wapanucka, Coalgate, Atoka, Caddo, Limestone Gap, Kiowa, Pittsburg, Blanco, Arch, Hartshorne, McAlester, Wilburton, Wister, Poteau, Ft. Smith (Arkansas), Sallisaw, Stilwell, Wauhillau, Welling, Tahlequah, Scraper, Kansas, Jay, Grove, Vinita, and Miami. At Miami Hedley left the party to resume his work in Oklahoma University. The writer continued the work alone, visiting the following points: Welch, Bluejacket, Centralia, Nowata, Lenapah, Bartlesville, Ochelata, Ramona, Collinsville, Avant, Dawson, Tulsa, Lost City, Garnett, Muskogee, Fort Gibson, Wyandotte, Pawhuska, Fairfax, Burbank, Kaw City, Apperson, Uncas, Newkirk, Ponca City, Alva, Freedom, Moorland, Quinlan, Belva, Fairview, Homestead, Southard, Watonga, Thomas, Custer City, Butler, Clinton, and Weatherford. We collected information as to general character of the equipment at each place, the quarry methods, the demand, the capacity of the plant and the number of people employed. We also collected samples for chemical analysis and for mechanical testing.

The fall rains stopped the work at Weatherford but since then the writer has made short trips to the lime plant at Fort Towson and to the cement works at Ada.

Just before the beginning of the World War there were several promising building stone developments in Oklahoma, and it seemed that stone was coming into its own in the state. The slump in building activities during the war found these enterprises really unestablished and too weak, financially, to weather the dull times. All of them were abandoned, the plants were dismantled, and now only the quarry pits remain. Among these abandoned enterprises are the following: the granite quarry in Ten-acre rock near Troy, Johnston county, from which came the granite for our state capitol; the oolitic limestone quarry in the oolitic Wapanucka near Bromide, Johnston county, whose stone was once specified for all Federal buildings in this section of the country; and the marble quarry near Marble City, Sequoyah county, which supplied marble for the Pioneer Telephone building in Oklahoma City, as well as much ornamental stone for interior decorations in buildings all over Oklahoma and adjoining states. Besides these, several small building stone quarries were once worked actively but are now abandoned.

The sand, gravel, and crushed stone works also suffered from the dullness in building due to the war. Now, however, they are well on their road to recovery and during the summer of 1922 all were busy, the only complaint being that against the poor shipping service given by the railroads. There are several reasons why they have recovered more quickly than have the building stone quarries.

(1) The material enjoys a good demand because it requires less skilled labor to pour concrete than to cut and lay stone. (2) Form builders are more plentiful than stone masons. (3) The work in the quarry or the pit is largely common labor, which can be drawn from other industries as occasion demands. (4) Building stone quarries require many specially skilled men and these must be developed within the industry, they cannot be drawn from the outside.

The unlimited supply of limestone suitable for crushed rock which exists in the Arbuckle mountains is too well known to require description. Ten-acre rock, near Troy in Johnston county is, as its name implies, a great mound of massive granite from which blocks of any size can be secured. In the vicinity of Tishomingo the weathered granite fills the stream channels with a mixture of granite gravel and sand which is used for concrete, it being necessary to add only the cement. In places the granite is deeply altered in place giving a material having excellent wearing and binding qualities which is used for hard-surfacing the roads.

The oolitic Wapanucka is remarkable for its extreme purity and for its great thickness, uniformity, and freedom from bedding seams and cracks. In the quarry at Bromide there is a thickness of sixty feet without a bedding seam. However, the Wapanucka limestone from Limestone Gap to Hartshorne is thin bedded, contains shale seams, and is so cracked and flinty that, in most places, it is suitable for crushed stone only.

The St. Clair marble, near Marble City, Sequoyah county, is really a crystaline limestone, but in places it yields stone that serves well for marble. While it is very flinty in places, there are large bodies suitable for building stone and for marble. A sample from the quarry pit near Marble City was very pure calcium carbonate, the only impurity present in appreciable quantities being magnesia, which might make it unsuitable for cement manufacture. Be that as it may, it is an excellent material for lime-making and, fortunately, wood for fuel is plentiful. The sandstone from the Winslow formation, which outcrops near by, has been used to build a school house in Marble City. The brown standstone and white marble trimming make a striking combination.

From Tahlequah northeast to the Missouri line we were on the Boone formation. It is flint, for the most part, which breaks up by mechanical weathering so that every slope resembles a pile of crushed stone. These flint chips are used in making concrete and for road metal. The scenery, by the way, is beautiful, but the tourist should be prepared to buy new casings frequently. There

are few beds of crystalline limestone in the Boone which are used locally for building stone. In the vicinity of Grove, Delaware county, the basal bed which is about twenty feet thick has been used for making lime. The Short creek oolite, a member of the Boone which outcrops near Wyandotte, Ottawa county, is remarkable for its purity, but, owing to the fact that it is only four to ten feet thick and is usually covered by a great thickness of chert, it will probably be used but little.

In the country around Miami, Ottawa county, the dumps of the lead and zinc mines supply an abundance of crushed rock for road surfacing and concrete work. It is commonly known as "Joplin chat."

The triangular area bounded by Lenapah, Nowata, Tulsa, Ponca City, and Newkirk, and by Kansas on the north is blessed with many limestone outcrops, most of which supply fairly good material for crushed rock, some of which, like the Dewey limestone at Dewey, Washington county, are excellent for making Portland cement, but none of which so far as the writer knows, is suitable for making lime. There are no very large rock crushing plants in the area, but small plants and portable rigs make crushed rock available every where.

The stone at Uncas, Ponca City, and Newkirk is too soft for first class concrete material but is good enough for most kinds of work. It makes a good building stone as any one may see by noticing the buildings in those towns.

In western Oklahoma, west of Oklahoma City, gypsum is the most conspicuous building material. It has great potential importance. When ground and calcined properly it makes our best wall plaster. Calcined gypsum is a cement which can be used in making building blocks or solid poured walls much as portland cement is used. It can be prepared for a fraction of the cost of portland cement, and, though it has neither the strength nor the excellent weather resisting properties of portland cement, it is a good material for all inside construction above ground. It is particularly useful where a light-weight fireproof material is needed. It has been used with cinders for making outside walls at the plaster plant of the Oklahoma Portland Cement Company near Homestead, Blaine county. After about twelve years it is only slightly pitted. Where it has been protected by a wash of portland cement and water it has suffered practically no weathering. There are at present four gypsum mills in Oklahoma. Those that have been visited by the writer report that the demnd is good.

There is but one lime plant operating in Oklahoma, and much

of the lime used in the state comes from Texas and Missouri. Our one plant is at Fort Towson in the southeastern part of the state where much of its output finds its way into adjoining states. This lack of lime plants is not caused by any lack of suitable limestone within the state. There are several localities where both the stone and wood for fuel are well situated with regard to transportation.

Such brick plants as the writer has visited were doing a better business in 1922 than they did in 1921. The brick-making industry is handicapped by high fuel, high freights, lack of cars, and the high cost of brick laying as compared with the cost of pouring concrete.

The portland cement plants now operating in the state have a combined capacity of 250,000 barrels a month, or 940 000 sacks a month. It would require 1,175 large freight cars to move the month's output. At the height of the season the demand was greater than the capacity.