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Nebraska Green Quartzite - An Important Future Industry

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AN IMPORTANT FUTURE INDUSTRY

BY

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NEBRASKA GREEN QUARTZITE AN IMPORTANT FUTURE INDUSTRY

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In southern Harlan and Franklin counties, there occur many acres of green quartzite which must be of commercial consequence when made available. It is a neglected resource upon which important industries are sure to be based. With the development of this bed in view, the Nebraska Geological Survey has examined this area, and through this leaflet wishes to place the results before possible investors.

The green quartzite of Nebraska is a rock of firm texture, great hardness, and enduring quality. Its pleasing green color, probably due to silicate of iron, is intensified by angular bits of reddish feldspar. Geologically, it is a late Tertiary rock; probably Pleistocene, since a tooth, and certain bones of *Mastodon americanus* have been found in these quartzite beds.

Numerous broad patches of this rock are exposed about four miles south of Bloomington, and great talus blocks lie everywhere upon the surface. The layer seems to vary in thickness from 10 to 15 feet, and an almost continuous bed runs in a southwesterly direction across southern Franklin and Harlan counties. From Franklin County, the bed extends in a northeasterly direction to Knox County, and to the Bijou Hills in South Dakota. It has been found at several intermediate points, but is generally covered by deep overlying soils. It occurs along the Verdigris River in northeastern Nebraska, where it has been used to some extent for foundations and underpinning, and in the construction of walls and dams. The quartzite here seems to be of a darker green than that found at Bloomington. In the vicinity of Fullerton it is a light greenish-gray.

The southern extremity of this quartzite bed, just across the State line, in Kansas, is known as the Woodruff Quarry, and is situated a few miles south of Alma, Nebraska. Large quantities of crushed rock, paving blocks, and riprap were formerly produced there by the Atwood Company of Lincoln, but the quarry was worked out some years ago. Just north of the Atwood Quarry, the formation grows sandy but contains certain irregular patches of quartzite. However this condition improves until there are several beds of good thickness, extent, and quality near Bloomington.

There are but two kinds of quartzite in Nebraska: the native green quartzite under discussion, and the reddish or Sioux quartzite of eastern Nebraska brought here by the glacial drift. The reddish quartzite occurs in the form of boulders, generally rounded and water-worn, and frequently of large size. These boulders have been quite extensively used as underpinning for cribs and barns, for curbs of wells, in the construction of porches, cellar walls, lawn vases, chimneys, fireplaces, rockeries, ornamental foundations for residences, and the like. Our native green quartzite could be employed to equal advantage and in as diverse ways, but it has been put to little more than local use for the foundations of buildings and the construction of a few simple stone houses. Fortunately for art's sake, this rock is too hard to be dressed. It can be roughly shaped by the hammer, which gives a desirable pebbled effect.

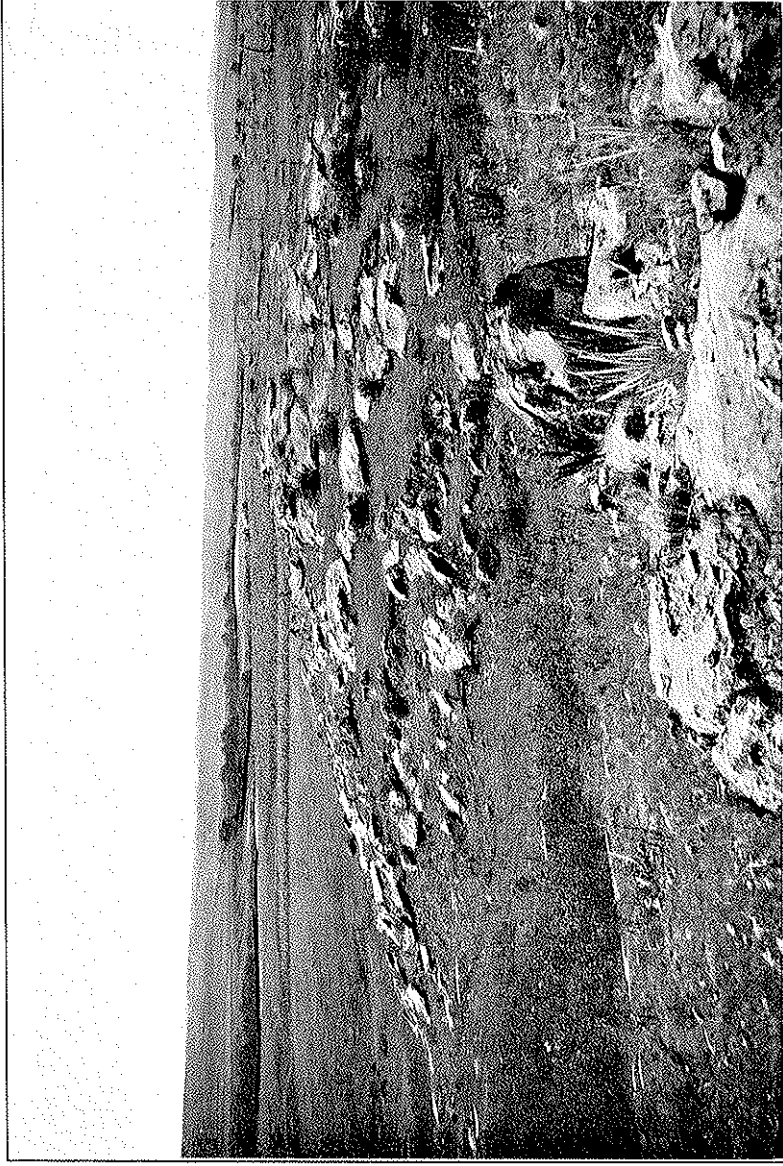
In the Road Laboratory of the University of Nebraska, Mr. A. C. Smith made tests of the quartzite from the Woodruff Quarry, with the following results:

Hardness, average of two tests.....	18.76
Toughness	5.
Abrasion test, per cent of wear.....	6.96
French coefficient of wear.....	5.75
Crushing strength.....	6800 lbs. per sq. in.
Cementing value, average of three tests.....	16.

These figures will apply equally well to the Bloomington quartzite since it is practically identical with that of the Woodruff Quarry.

Our Bloomington quartzite may be used for crushed rock, ballast, riprap, and dimension stone. In cement work, the crushed quartzite is counted superior to granite chips. As ballast, it is the equal, if not the superior, of the well-known Sherman gravel. As dimension stone, there is no rock in Nebraska which will compare with it in strength and beauty. It is admirably suited to use in walls, chimneys, foundations, artistic bridges, bungalows, and the like. It is equally useful for alleys where enduring paving blocks are needed.

In spite of the excellence of our native prairie roads, the time must come when large amounts of macadamizing material will be demanded. In the case of the main approaches to our cities and towns, there can be little doubt that conditions should be bettered. Proper draining, grading, and dragging will insure a good average country road, but as traffic increases, these improvements must be of a more permanent nature.



AN EXPOSURE OF BLOOMINGTON QUARTZITE.

During rainy seasons, and immediately after sudden thaws, the unpaved streets of some of our villages, especially in the more clayey regions, as well as the main highways leading into our larger cities, become sloughs, which are practically impassable for a week or two at a time. This is an intolerable condition, and sooner or later must be remedied. Muddy roads stand in restraint of trade, and check rural and urban intercourse and traffic. They levy upon agriculture an excessive tax for transportation. It is an economic waste for farmers to haul millions of bushels of grain over miles of muddy road.

Years ago, Omaha showed commendable public spirit by macadamizing, and even paving, certain important thoroughfares some fifteen to twenty miles beyond their city limits. This stimulated traffic, and helped to make Omaha a metropolis. Such enterprise naturally stimulates the growth of cities and towns, and lack of it dwarfs and retards development. The small town should have its civic pride kindled against slough-like business streets, and should improve its approaches.

In road-building, much importance is attached to the cementing properties of the rock. By this alone are the coarser particles bonded and cemented together to form and protect the road bed. A cementing value below 10 is counted low; from 10 to 25 fair; 26 to 75 good; 76 to 100 very good. Our Bloomington quartzite ranks about 16, and will constitute a fair road-building material.

Nebraska has very little rock suited to the above mentioned uses. During the paving season, the demand for crushed rock exceeds the supply, and many tons of flint are shipped from Missouri for purposes to which our green quartzite is perfectly adapted. The attention of the Government architect has been directed by the Survey to this rock as a suitable building material for United States post offices in north-central Nebraska, and the samples submitted have received his approval. Engineers of various railroads have examined samples, and have expressed the opinion that for use as ballast the excellent quality of our green quartzite would insure a steady demand. Much of the Bloomington quartzite is available for quarrying without stripping. Considerable quantities lie on the surface ready for the crusher; enough, it is believed, to last for several years. As quarrying progresses, choice rock for dimension stone will undoubtedly be exposed.

An examination has been made of the field, and two engineering students have assisted in working out certain quarry problems. They have gone over the ground and estimated the amount of rock, and have made detailed drawings, blue prints, and specifications for the installa-

tion of crusher, elevator, screen, storage bins, and machinery, as well as that of a bridge, and spur track. While a detailed report on this subject is in preparation, the following brief statements may aid those interested.

Messrs. Toney and Phares have summarized their estimate for building and operating a plant at these outcrops, about as follows:

COST OF PLANT

Machinery, cartage, and installation.....	\$13,000
Buildings and foundations.....	5,000
Office equipment.....	165
	<u>\$18,165</u>

They estimate that the cost of two or three hundred acres of quarry land would not exceed \$9,000, making the total cost of the plant and land a trifle more than \$27,000.

COST OF OPERATION PER YEAR

Labor	\$18,480
Miscellaneous	2,650
Depreciation	717
Grand total	<u>\$39,712</u>

The foregoing estimate does not include the salary of an engineer during the installation of the plant, the cost of selling the product, or the salary of a superintendent.

The means and costs of transportation are important factors in the problem. The right-of-way must be purchased across the Republican Valley, and a bridge must be built over the Republican River. It is believed that the proposed quarry fully justifies the building of a bridge and the laying of four or five miles of spur line. In fact this opportunity for investment would not now exist were there a railroad on the south side of the river.

The minimum width of right-of-way allowed by the Burlington is 17 feet. A pile bridge across the Republican is wholly ill-advised, and a steel bridge should be figured in the estimates. It has been suggested that a narrow gauge road be built, and that light cars be used. In this event, advantage might be taken of a bridge now spanning the Republican, providing it were properly reinforced.

The Nebraska Geological Survey considers this the opportune moment for developing the beds of Bloomington quartzite. As already stated, we are importing large amounts of structural material from other states. Why not develop our own resources, and employ our own people? The development of such resources are beneficial alike to the producer, the laborer, and the consumer, and ought not to be neglected.

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