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INVESTIGATION OF QUARRY SITES IN THE VICINITY OF FOND DU LAC

by

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11-30-36

This investigation was made at the request of Page A. Johnson, City Engineer. He and Mr. Heath assisted in the study. This survey was merely a reconnaissance, but considering what was already known about the rock formations in the vicinity, I believe that all of the promising sites were visited. We set up the following requirements for a quarry:

1. There must be a considerable proportion of good building stone.
2. The remainder of the stone must be suitable for concrete aggregate or for black top roads.
3. It is highly desirable that the quarry be on a surfaced road from which snow is removed in the winter.
4. Stripping, height of face, and area available for quarrying are all important but more or less interdependent.
5. In order that work may be started this winter, it is important that a site be selected where the minimum of preliminary investigation and preparation is required.

The recommendations below represent a balancing of all five of the essential requirements.

We believe that the city should purchase at least 8 or 10 acres of quarry ground in order to assure themselves of a supply of stone ample to complete a large building program. A 20-foot face has 32,000 cubic yards to the acre.

Assuming a 20 per cent recovery of building stone, such a face would net 6,400 cubic yards per acre. This would be sufficient to build a wall one foot thick and 100 feet high around a 432 foot square.

Two formations of the Niagara dolomite were considered - the Mayville and the Byron. The Mayville is the lower bed. It contains a good deal of chert and does not have well defined bedding planes. The fractured surface is rough. The Byron beds overlie the Mayville and have well defined bedding planes. The stone breaks readily with a smooth surface, making it possible to produce stone with square corners. The quality of the Byron stone is excellent, with one objectionable feature in the fact that many of the beds are thin. The use of thin beds in building increases the amount of mortar joints, and thus increases the cost of construction and maintenance. By careful quarrying, a considerable amount of 6", 8", 10", and 12" stone can be produced. The stone is hard and therefore expensive to dress. The city could produce (1) building stone; (2) crushed stone; (3) riprap; and (4) agricultural lime, all of excellent quality. Numerous buildings in the city prove the quality of the building stone, and indicate that such stone is a good investment. Before final decision is made, it is recommended that a tabulation be made of the source, quality, and thickness of bed for each of the larger local limestone buildings in the city. Crushing cost may run somewhat higher than would cost for a softer rock, but the aggregate is worth more. The chemical analyses and calcium carbonate equivalents show that the rock is practically a pure dolomite and therefore an excellent stone for agricultural purposes.

The various sites are recommended for consideration in the following order:

Numbers 8, 4, 5, 6, 2, and 3.

Mayville Beds

1. Railroad quarry near Peebles in SE $\frac{1}{2}$ NW $\frac{1}{4}$ of Sec. 32, T.16N., R.18E. The upper 15 to 18 feet is massive with rows of cavities and some chert. Not suitable for building stone. The underlying bed has a series of layers of weathered chert which makes this unit useless for concrete aggregate. Cannot recommend this quarry.
2. Abandoned quarry east of highway. Either in NW NW of Sec. 5, T.15N., R.18E. or SW SW of Sec. 32, T.16N., R.18E. 15 feet of fairly well bedded stone. Some cavities. Stripping 2.5 to 4 feet. Would require considerable exploration to determine stripping and structure of the rock. Recommend only as a fifth choice.
3. Old quarry north of road east of Peebles. Low face in fairly well bedded stone. Some chert and cavities. Stripping 2 to 4 feet. Cannot recommend this for primary consideration, as the stone will be hard to quarry.

Byron Beds

4. "Titus" quarry east of U.S. Highway 41 in the SW $\frac{1}{2}$ NE $\frac{1}{4}$ of Sec. 10, T.14N., R.17E. In upper 12 feet there is considerable stone 12 inches or more in thickness. Stripping 5 to 7.5 feet. Probably 5 acres available for quarrying. CGE of quarry waste - 105.5%. Advantages of this site are proximity to a good highway and well bedded stone of good quality. The disadvantages are the general thinness of beds, the heavy stripping, and the fact that the quarry is in operation. The latter fact might result in the owner asking a high price per acre. It might pay to investigate the possibility of developing a quarry on the west side of Highway 41 opposite the upper part of the Titus quarry.
5. Old quarry back of farm house in NE NE of Sec. 11, T.14N., R.17E. 10 foot bed of good quarry stone overlain by 8 feet of exposed rock plus 10 feet of ledge partially concealed by stripping. The building stone in this quarry

is very attractive. The disadvantages are (1) necessity for building about $\frac{1}{2}$ mile of road; (2) extensive trenching is necessary to determine thickness of stripping and quality of upper stone; (3) part of the haul would be on a town road.

6. Quarry on the east side of the road in NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Sec. 12, T.14N., R.17E. General thinness of bedding and billowy bedding planes make this quarry undesirable. Could produce some 6 to 8 inch stone.

8. Quarry at Marblehead east of highway and north of town road in NW NW of Sec. 8 or NE NE of Sec. 7, T.14N., R.18E. This quarry is connected by tunnel with main quarry to the west and has not been worked for some time. Could work a 20 to 25-foot face above the water table and below the quarry floor. The exposed face west of the road indicates that considerable 6" stone and some 8" and 12" stone could be produced. The advantages of this site are (1) location on a good highway; (2) absence of stripping; (3) the fact that work could start immediately; (4) presence of a fair proportion of building stone estimated at 25 per cent of the total; (5) easily accessible to town road by a road that is partially developed; (6) this quarry would be fairly well protected from the wind and therefore a good one for winter operation. If necessary the 25-foot face above the quarry floor could be worked to produce some building stone, as well as concrete aggregate.