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MISSISSIPPIAN SECTION NEAR WEBSTER CITY,
IOWA

LYMAN W. WOOD

Exhaustion of many of the gravel supplies in Hamilton County, and difficulty in locating others, has led recently to more careful consideration of limestone rock deposits as sources of road and concrete materials. It has long been known that Mississippian limestones and sandstones are found exposed along Boone River near Webster City, such being mentioned by MacBride,¹ in 1909. Miller and Norton,² and later, Norton³ described deep well sections at Webster City, referring the upper part of them to the Mississippian. With the proportion of limestone found in the surface exposures, and reported at greater depth in the well sections, it appeared possible that a large quantity of stone might be quarried. A reconnaissance of the territory was therefore made, and a site chosen for core drilling.

This drilling is located in SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 8, Independence Township, about 2 miles southeast of Webster City, the surface elevation being 1026.3. Following is the section:

No.	Description	Feet
11	Gravel, Wisconsin alluvial terrace.	3.5
10	Sandstone, chiefly, brown, medium to fine of grain, poorly indurated. At the top is 0.4 feet thickness of hard gray fine-grained limestone, and at the bottom 1.5 feet of a light gray silty shale.	11.0
9	Limestone, gray, partly weathered buff, granular, sandy.	3.5
8	Siltstone, gray, calcareous, varying to sandstone or to shale, with one thin layer of domitic limestone below the middle. The drillers log shows in descending order, 0.9 feet shale, 1.4 feet sandstone, 0.6 feet shale, 7.7 feet sandstone, lower part calcareous, 0.7 feet limestone, 4.8 feet shale, and 0.9 feet calcareous shale.	17.0
7	Limestone, light gray, fine-grained, hard, ostracods recognized in the top three feet, shaly zone above middle, lower portion partly brecciated and laced with thin veinlets, some shaly, and some healed with calcite.	6.3
6	Shale, sandy, soft.	2.2

¹ MacBride, Thomas H., Geology of Hamilton and Wright Counties, Iowa Geological Survey, Vol. 20, pp. 122-123, 1909.

² Miller, W. J., and Norton, W. H., Underground Waters of Hamilton County, Iowa Geological Survey, Vol. 21, p. 844, 1910.

³ Norton, W. H., Deep Wells of Iowa, Iowa Geological Survey, Vol. 33, p. 358, 1927.

5	Dolomite, brown, granular to subcrystalline, pronounced vesicular texture, hard and tough, heavily bedded.	10.9
4	Limestone, conglomeratic. The upper 8 feet is strongly conglomeratic and includes much drab subcrystalline dolomite, some rather soft light gray limestone, numerous quartz crystals, and rather frequent thin shaly veins. The lower portion is gray, rather fine-grained, harder than the above, and laced with thin veinlets of calcite or shale filling brecciation fractures. Traces of pyrite are found both above and below.	11.8
3	Shale, gray, calcareous, grading below to a soft shaly glauconitic dolomite-sandstone, and at the bottom to a gray to drab subcrystalline dolomite.	14.3
2	Limestone, light gray, fine-grained, conglomeratic, hard, with calcite veins. A soft shale 0.9 feet thick near the top may be a pocket.	4.6
1	Limestone, light gray, granular to crystalline, rather coarse-grained, oolitic, stylonitic, with a few calcite-filled cavities, upper portion thinly bedded, lower portion more massive.	26.6

The writer is indebted to the Iowa Geological Survey who have made microscopic examinations of specimens from this core, for many of the lithologic details of the foregoing section.

Physical tests run on this core at the State Highway Commission laboratory at Ames indicate that Numbers 1 and 5, and a part of Number 4, are suitable for the production of concrete aggregate or for any other purpose where a strong and durable stone is required. Other portions of the section, including Numbers 2, 4, 7, and 9, and the lower portion of Number 3, may be used for road metal or similar purposes.

Correlation of this section is rather difficult because of the almost complete lack of fossils, but can be made with some confidence on the basis of lithology by working from the bottom up. Bed Number 1 is a distinct unit, unlike anything found above. The core from it shows some evidence of weathering in the upper portion, with less below, indicating that there may be unconformity at its top. The lithologic character of this bed strongly suggests the Gilmore City stage of the Kinderhook Series, as it is exposed at Alden to the east, and in the limestone mine at Fort Dodge to the west,⁴ and the writer knows no reason for questioning its reference to that formation. This correlation is supported by Norton's⁵ tentative reference of beds at the same elevation in the Webster City deep well to the Alden (Gilmore City).

⁴ Wood, I. W., Section at the Fort Dodge Limestone Company Mine at Fort Dodge, Proceedings, Iowa Academy of Science, Volume 40, pp. 123-126, 1933.

⁵ Norton, W. H., *op. cit.*, p. 361.

Above the Gilmore City are conglomeratic limestones and dolomites, including Numbers 2 to 5 of the foregoing section, with a total thickness of 41.6 feet. These are referred without question to the lower St. Louis stage.

Higher beds are more difficult of correlation. A thickness of 40.0 feet consists chiefly of sandstones and siltstones, with a conglomeratic limestone near the bottom, all nearly barren of fossils. The lower part of this sequence might be included with beds beneath in the lower St. Louis, and the remainder referred to the upper St. Louis. However, with a thickness of 41.6 feet already assigned without question to lower St. Louis, it seems unlikely that any great part of this higher sequence should be included with it. The higher beds might then be referred to upper St. Louis or to Ste. Genevieve. Wood's studies of the section at Fort Dodge⁶ indicated a total thickness of the St. Louis there of 85 to 120 feet, overlain at one point by 40 feet of Ste. Genevieve fossiliferous marls. In view of the absence of anything suggesting the Ste. Genevieve fossiliferous marls in the upper part of the present section at Webster City, it seems reasonable to refer all of the upper beds here to the St. Louis, without attempting to discriminate between the upper and lower divisions of that formation.

The St. Louis stage is thus assigned a thickness of about 82 feet, below elevation 1023, and the Gilmore City a thickness of 27 feet or more, below elevation 941. Both the St. Louis and the Gilmore City are in general very similar to the same formations as found at Fort Dodge.

⁶ Wood, L. W., *op. cit.*

IOWA STATE HIGHWAY COMMISSION,
AMES, IOWA.