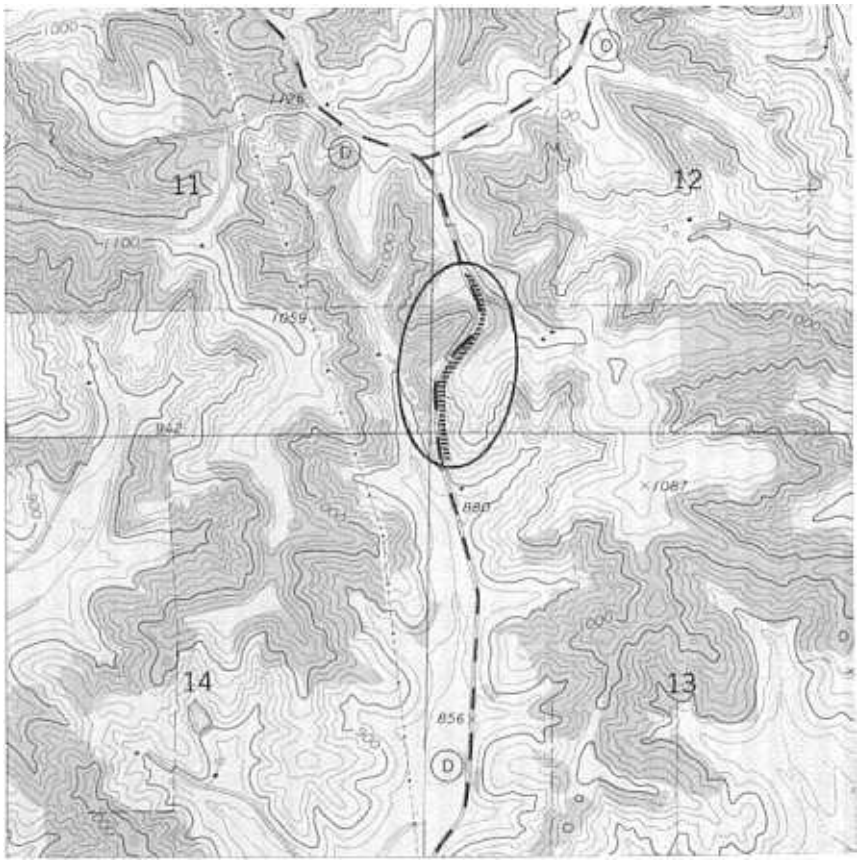
Title: Whitehall

Location: Road cuts north of Whitehall on County Highway "D" and 1.7 miles north of its juncture with State Highway 53 in the SW$\frac{1}{4}$, SW$\frac{1}{4}$, Sec. 12, T.22N., R.8W., Trempealeau County (Pleasantville 7$\frac{1}{2}$-minute topographic quadrangle, 1973).



Author: M. E. Ostrom (modified from Ostrom, 1966 & 1970)

Description: Exposure of geologic section beginning with Lone Rock Formation at top and extending downward to Eau Claire Formation at base.

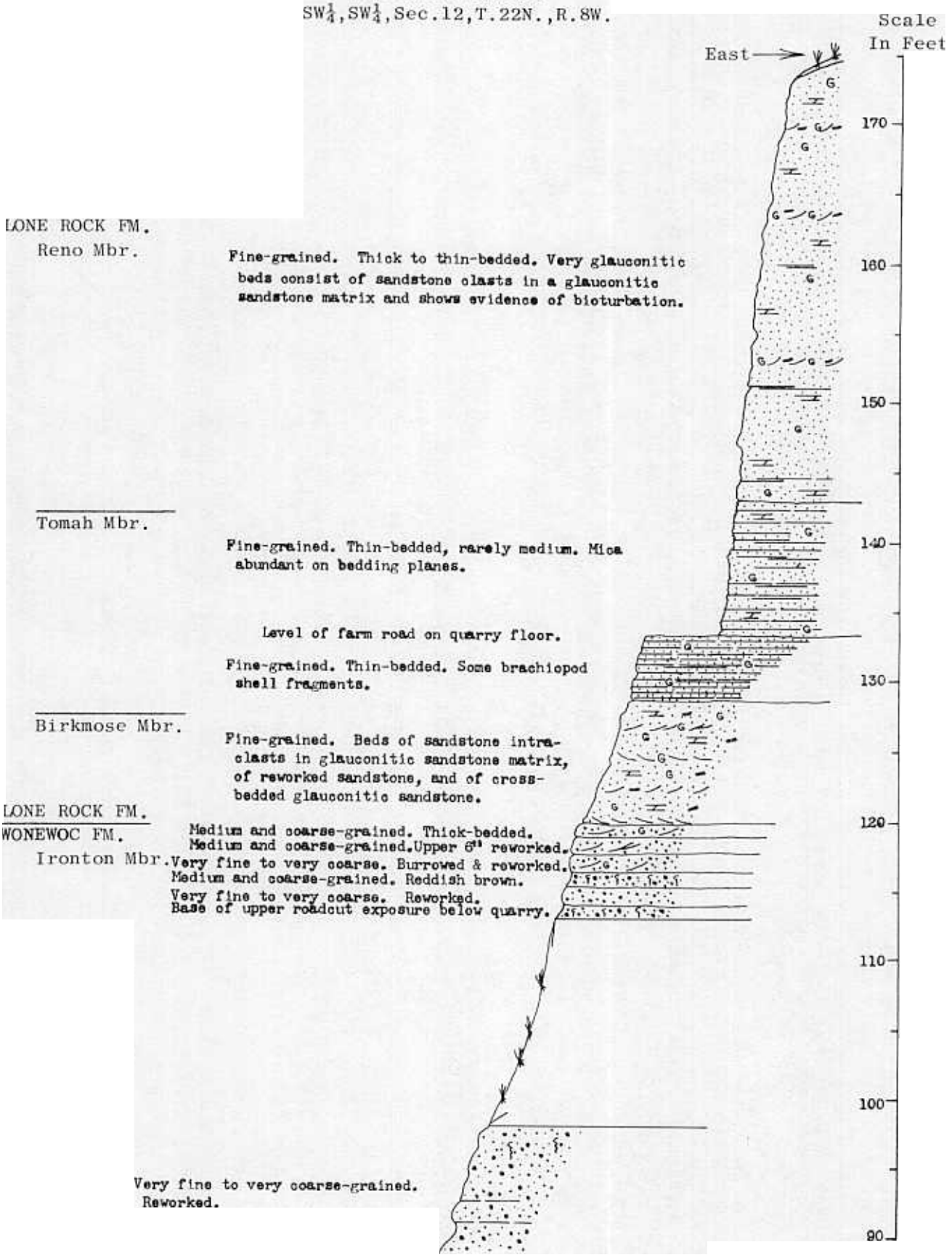
This is an excellent exposure to show the interrelationships of the various lithostratigraphic units beginning with the Eau Claire Formation and extending upward into the Lone Rock Formation. The section is complete except for about 15 feet of covered interval midway in the Ironton Member.

Beginning with the sharp and unconformable contact of Galesville on Eau Claire near the base, one can proceed upwards through the remainder of the section without evidence of major erosional break.

Regionally the Eau Claire Formation thins to the east until in the vicinity of Wisconsin Dells it is not recognized. North and northwest of the Dells what is believed to be thin Eau Claire can be seen at Friendship Mound, north of

WHITEHALL ROADCUT

SW¼, SW¼, Sec. 12, T. 22N., R. 8W.



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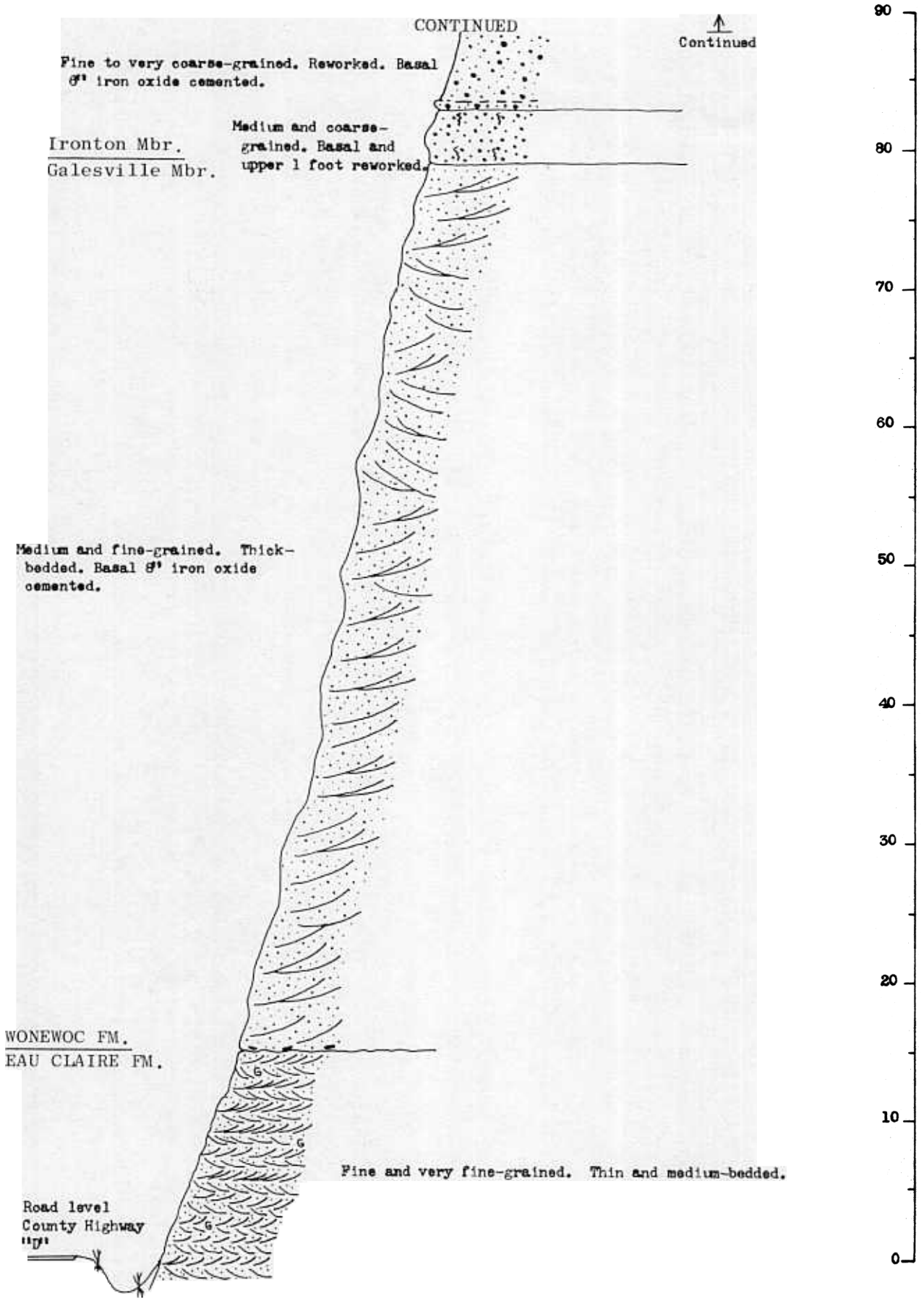
CONTINUED
Continued
Fine to very coarse-grained. Reworked. Basal 8' iron oxide cemented.
Ironton Mbr.
Galesville Mbr.
Medium and coarse-grained. Basal and upper 1 foot reworked.
Medium and fine-grained. Thick-bedded. Basal 8' iron oxide cemented.
WONEWOC FM.
EAU CLAIRE FM.
G
G
G
Fine and very fine-grained. Thin and medium-bedded.
Road level
County Highway
"F"
90
80
70
60
50
40
30
20
10
0

Friendship, and at Sheep Pasture bluff located south of Mauston.

At Friendship Mound there is a one-foot bed of fine-grained, silty, iron-oxide, cemented sandstone that separates two thick-bedded, medium-grained, well-sorted sandstone units. The upper of these two units is positively identified as the Galesville Sandstone. At Sheep Pasture Bluff the situation is similar except that the thickness assignable to the separating unit is 7 feet and it contains only minor iron exide. Also at Sheep Pasture Bluff, sandstone clasts occur in the base of the Galesville. The possibility exists that the separating unit is the Eau Claire Formation thinned by pre-Galesville erosion and that the lower sandstone unit is the Mt. Simon Sandstone.

A study of the Mt. Simon Sandstone by Asthana (1968) indicates that its feldspar content ranges from 3 percent to 40 percent and averages 18 percent. On the other hand it is known from numerous analyses of the Galesville Sandstone that it seldom contains more than 1 percent feldspar. Asthana determined that the feldspar content of the sandstone unit below the Eau Claire is higher than that above by a factor of 2 at Sheep Pasture Bluff and of 9 at Friendship Mound. This sharp decrease in feldspar content corresponds to a similar difference between the feldspar content of the Mt. Simon and Galesville sandstones elsewhere and is interpreted to indicate that at these exposures the Eau Claire is much reduced in thickness probably due to post-Eau Claire erosion. Thus, it appears that the Eau Claire thins eastward and that thinning is due to pre-Galesville erosion.

The Eau Claire-Galesville contact marks the end of one transgressive/regressive sequence and the beginning of the transgressive phase of the subsequent sequence. The Galesville Sandstone formed during transgression as the result of a process of coalescing of littoral zone deposits. Rather persistent high energy conditions are indicated by a noticeable lack of clay, silt and very fine sand and a total lack of fossils.

Above and transitional with the Galesville is the Ironton Member. The Ironton is interpreted to have formed in an environment located seaward of the beach where high and low energy conditions alternated. Whereas the Galesville is thick-bedded, the Ironton is medium-bedded and even-bedded. Silt and other fine particles are abundant in certain beds. Burrows are common and fossils are present locally. Also, there is commonly carbonate cement and glauconite in the upper few feet of the unit. Alternate beds are commonly well-sorted, clean, medium and coarse-grained, cross-bedded quartzarenite on the one hand and poorly-sorted, reworked and burrowed quartzarenite on the other. Emrich (1966) traced certain of the burrowed beds for as much as 100 miles in the outcrop area of western Wisconsin which is interpreted to signify a broad and flat shelf bottom on which the effects of storm or quiet were widely impressed.

The Ironton Member thins toward the Wisconsin Dome to the east. At this exposure the Ironton is about 40 feet thick. Traced east and south it thins to disappearance as can be seen at exposures south of Lone Rock in the south bluff of the Wisconsin River. Further to the southeast in northeastern Illinois the Ironton increases to a maximum of 150 feet in thickness (Buschbach, 1964; Emrich, 1966). The Ironton thickens westward into Minnesota. It is assigned a Franconian age on the basis of fossils.

At this exposure the Ironton is in sharp contact with and lithologically

markedly different from the overlying fine-grained glauconitic, shaly and thin-bedded Lone Rock Formation of the Tunnel City Group. The Tunnel City Group consists of two distinct facies in the Upper Mississippi Valley area, namely a glauconitic facies, the Lone Rock Formation, and a nonglauconite facies, the Mazomanie Formation (Trowbridge & Atwater, 1934; Wanenmacher et al, 1934; Twenhofel et al, 1935; Ericson, 1951; Berg, 1954; Ostrom, 1966, 1967). The Lone Rock facies intertongues with and is laterally and vertically transitional with the Mazomanie facies in the direction of the Wisconsin Dome (Ostrom, 1966). The Mazomanie facies can be seen at the Mazomanie and Lone Rock stops.

Abundant burrows and trails in the Lone Rock indicate prolific animal life. Thin bedding and fine particles suggest persistent low energy conditions. Occasional beds, up to 2 feet thick and rarely up to 8' thick, of sandstone clasts in a greensand matrix suggest occasional episodes of high energy such as storms. The environment of Lone Rock deposition is interpreted to have been located seaward of that of the Ironton in an area of deeper water and lower overall available energy as attested to by thin beds, fine sediment, abundant fossils and lateral persistence of beds.

The similarity of the lower part of the Lone Rock Formation at this site to the lower part of the Eau Claire at the Eau Claire County Highway "II" stop is believed to be significant. In both cases the upward change is from transitional beds characterized by medium and persistent beds of medium and coarse-grained quartzarenite to fine-grained, shaly glauconitic sandstone with abundant trail markings on bedding surfaces. The two units are interpreted as the manifestation of a single environment repeated by two episodes of transgression separated by a minor regression which is marked by the Galesville Sandstone and the erosion surface at its base (Ostrom, 1964).

Significance: This stop illustrates the contact relationship of the first and second "cycles" as described in the discussion of the Bruce Valley Quarry Stop. Also, it affords an opportunity to examine and compare three "lithotopes" of the second cycle equivalent to lithotopes of the first cycle seen at previous stops (Irvine Park, Mt. Simon, Eau Claire County Highway "II", Strum, and Bruce Valley Quarry).

How do you interpret the contact between the Eau Claire and Wonewoc Formation? Between the Galesville and Ironton members? Between the Wonewoc and Lone Rock Formations? What are the mineralogical and lithological differences between the various members and functions? What do they signify in terms of source of sediments and environments of deposition? What are differences and similarities of texture, bedding, sedimentary structures, and fossil content of the various members and formations? What do they signify in terms of environments of deposition?

References: Trowbridge and Atwater, 1934; Wanenmacher, Twenhofel, and Raasch, 1934; Twenhofel, Raasch, and Thwaites, 1935; Ericson, 1951; Emrich, 1966; Berg, 1954; Buschbach, 1964; Ostrom, 1964, 1966, 1967, 1969 & 1970; Asthana, 1968.