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Geologic Walking Tour of Downtown Winona, MN

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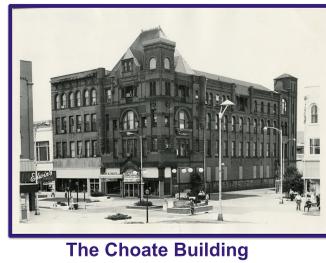
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The Choate Building

Geologic Walking Tour of Downtown Winona, MN

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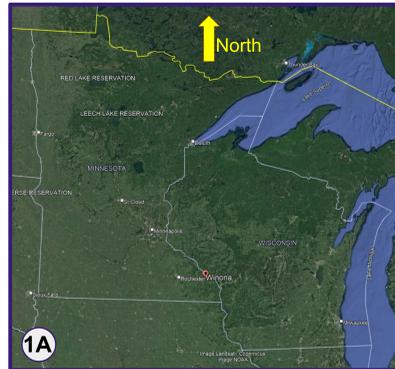


Figure 1. (A) Winona, MN is located on the Mississippi River between Minnesota and Wisconsin. (B) Europeans built the city on a sandbar with the main channel to the north of the city. We suggest that visitors first stop at Garvin Heights Overlook for a view of our local geology from 700 ft above the river.



Overview of Winona, Minnesota. A city built on a sandbar in the middle of the Mississippi River.



Figure 2. General geology of Winona as viewed from 700 ft above the river at Garvin Heights Overlook (Gigapan Image © W. Lee Beatty and Candace Kairies-Beatty). View is looking Northeast toward Wisconsin bluffs in the far distance (about 2 miles away). The foreground lakes are the western extent of the Mississippi River Valley. Main channel can be seen in the distance. Winona, MN, is part of the "Driftless Region" where there was minimal glaciation during the last glacial periods.

Geologic Walking Tour Lab Activity

We are designing an introductory lab assignment to utilize this geologic walking tour as part of our introductory geoscience courses. This activity could also be used in 9-12 Earth Science courses.

Students will:

- Follow the tour and complete "field notes" (Figs. 7&8) at each stop to observe and identify the various "outcrops."
- Identify where the various building stones fall within the Rock Cycle.
- Consider the properties of the various stones in terms of why a particular rock type (and location) would be more suitable for a building stone in a given region.

Welcome to Winona, MN!

Winona, MN, has a storied and rich history. Nestled in the driftless region of Minnesota, its time as a landmark along the heavily traveled Mississippi river has influenced the city's history from its Native American roots to today. Sediments deposited in the Ordovician (470 Mya) record the inland seaway through North America and make up the stunning dolomite bluffs with which much of our town was built. A busy lumber town throughout the 1800s, downtown Winona is host to 47 buildings in the National Register of Historic Buildings [1].

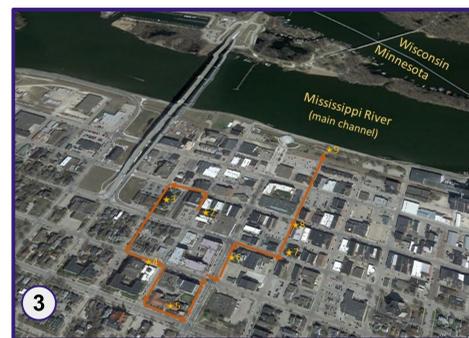


Figure 3. Our Geologic Walking Tour of Downtown Winona walking route. Round-trip distance is 2 km.

A Geologic Walking Tour of Downtown Winona

The goal of this research project is to develop a walking tour of geologically and culturally important buildings in Winona where visitors and residents can learn about the types of rocks that make up the city's downtown streets. Working with the Winona County Historical Society we are creating a self-guided walking tour, including two optional "field trips" (one reachable in a car (Figure 2) and the other a hike up to the top of the bluffs). Visitors will learn about the region's geologic history, a building's history and architecture as well as information on the stones used in its construction, such as rock type and age, where and how the rock formed, and the location from where it was quarried. From nine historic buildings in our downtown, we have identified 12 different rocks to showcase on this tour each with their own story to tell that combines human history with that of the Earth..

Winona County Courthouse Geoscience Education Goals:

- To highlight the importance of the Earth Sciences to Winona citizens and visitors by exploring the geology visible in our downtown historic buildings. We will make this tour available in a flyer as well as a GIS StoryMap.
 - We are creating a Spanish-language version of the tour to connect to our Spanish speaking citizens, a group whose population jumped from 1.6% in 2009 to 3.1% in 2019 [2] making it the largest minority group in Winona County.
- To utilize these building stones as an educational tool in our introductory geology courses and high school Earth science courses in the Winona area by creating a lab activity associated with the Geologic Walking Tour.

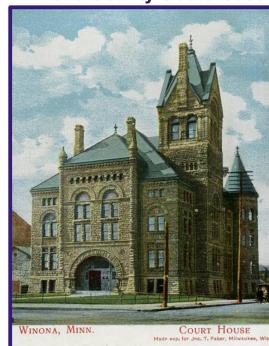


Figure 4. Winona National Bank. Note the 30 ft tall monolithic granite columns flanking the front entrance.

Winona National Bank

Designed in 1916 by architect George Maher, and opened in 1917. Originally called the Winona Savings Bank and owned by J.B. Watkins, founder of the Watkins Company producing home and kitchen products since 1868. Winona National Bank's exterior edifice is home to many carved grotesques and notably two monolithic granite columns which were quarried in Vermont, carved in Virginia, and brought to Winona via train [3].



Figure 5. Installation of the massive granite columns in April 1915 [3].

Diseñado en 1916 por el arquitecto George Maher, e inaugurado en 1917. Originalmente se llamaba Winona Savings Bank y era propiedad de J.B. Watkins, fundador de la empresa Watkins, que fabricaba productos para la casa y la cocina desde 1868. El edificio exterior del Winona National Bank incluye muchas grotescas tallas y, en particular, dos columnas monolíticas de granito que fueron extraídas en Vermont, talladas en Virginia y llevadas a Winona en tren.

Exterior Columns: Black Mountain Granite

The Black Mountain Granite is a light-colored crystalline rock that formed from the cooling of a magma chamber beneath the forming Appalachian Mountains over 380 million years ago. This stone was quarried in Dummerston, Vermont, from the Devonian Black Mountain Pluton.[4]

El granito del Black Mountain es una roca cristalina de color claro que se formó a partir del enfriamiento de una cámara de magma bajo los Montes Apalaches jóvenes hace más de 380 millones de años. Esta piedra fue extraída en Dummerston, Vermont, del plutón devónico de la Montaña Negra.



Figure 6. Interior of the Winona National Bank highlighting the Tinos Green Marble.

Interior Counters: Tinos Green Marble

Tinos Green Marble [5] is a dark green opicalcite made from serpentinite breccia with crosscutting calcite veins. Quarried on the Greek island of Tinos.

Mármol verde oscuro procedente de una brecha serpentina con vetas de calcita transversales. Extraído de la isla Griega de Tinos.

Field Notes for Stop #5: Winona National Bank

Outcrop #1: Exterior Columns	Rock Name:	Outcrop #2: Interior green countertops	Rock Name:
Is this rock crystalline or clastic? How large or small are the crystals or grains?	Crystalline medium grained	Is this rock crystalline or clastic? How large or small are the crystals or grains?	Crystalline Very small crystals
Is this rock layered in some way? Do you see any bedding or foliation?	No layering	Is this rock layered in some way? Do you see any bedding or foliation?	No layering
Can you identify any minerals in this rock?	Quartz and biotite	Can you identify any minerals in this rock?	
What else do you see in this rock? What are your observations?	intrusive rock felsic	What else do you see in this rock? What are your observations?	Green background and white veins, polished
Is this rock igneous, Sedimentary, or Metamorphic?	igneous	Is this rock igneous, Sedimentary, or Metamorphic?	Metamorphic
If the rock is IGNEOUS , A. What type of texture does it have? B. What is its composition?	A. Coarse texture B. Quartz, biotite, k-feldspar	If the rock is IGNEOUS , A. What type of texture does it have? B. What is its composition?	A. Non-foliated B.
If the rock is SEDIMENTARY , A. Is it a Clastic, Chemical, Biochemical, or Organic sedimentary rock? B. In what environment did this rock form?	INSERT PHOTO HERE:	If the rock is SEDIMENTARY , A. Is it a Clastic, Chemical, Biochemical, or Organic sedimentary rock? B. In what environment did this rock form?	INSERT PHOTO HERE:
If the rock is METAMORPHIC , A. Is it foliated or non-foliated? B. If it is foliated, is it an example of low-, medium-, or high-grade metamorphism? OR If it is non-foliated, what is its composition?		If the rock is METAMORPHIC , A. Is it foliated or non-foliated? B. If it is foliated, is it an example of low-, medium-, or high-grade metamorphism? OR If it is non-foliated, what is its composition?	
TAKE A PHOTO of this outcrop.		TAKE A PHOTO of this outcrop.	

Putting It All Together...

- What rock properties are important in deciding what material to use as a building stone?
- Are crystalline or clastic rocks more commonly used as building stones? Why?
- Why might sedimentary rocks be used for building stone in Southeastern Minnesota?

Acknowledgements

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References [1] National Parks Service, "National Register Database and Research", U.S. Department of the Interior, <https://www.nps.gov/subjects/nationalregister/database-research.htm>. [2] US Census Bureau, "Population Estimates Program" for Winona County, MN (accessed Sep 16, 2021). [3] "Engineering Problem Was a Difficult One." *Winona Republican Herald*, 17 Apr. 1915, pp. 9-9. [4] Ratcliffe, N.M., Stanley, R.S., Gale, M.H., Thompson, P.J., and Walsh, G.J. (2011) Bedrock Geologic Map of Vermont: U.S. Geological Survey Scientific Investigations Map 3184, 3 sheets, scale 1:100,000. [5] Mavrogenatos C., Magganas A., Kati M et al. (2014) Mineralogy and Petrography of the NW Tinos Island Opicalcites, Cyclades, Greece. *Bul. Shk. Geol.*

Central Methodist Church

