Final Report
History 201 E 59
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Historic Harmony Grain Elevator
Limestone Foundation

Junction of U.S. Highways 52, 44, and 139
Harmony, MN 55939
**Introduction**

The 1800s grain elevator in the small farming community of Harmony, Minnesota, has been a focal point of the town for over 100 years. The structure is an important remnant of the community’s rich agricultural history. It not only dominates the skyline, it sits at a strategic location at the entrance to the Main Street. Many Harmony citizens are interested in conserving and preserving the historic structure - possibly renovating or rehabilitating the building.

There are many elements of the building’s materials and structure that need a thorough review and survey, but I focused on the limestone foundation on the southern exterior for this report. I studied the condition of the limestone and conclude the mortar and the stone shows signs of significant deterioration, the result of being exposed to decades of Minnesota’s cold winters and humid summers. Although it is obvious that efforts were made to replace dissolved mortar and stabilize stones, these were done without knowledge or consideration for proper conservation and preservation techniques. When deciding on future preservation for the building, steps need to be taken to assure correct conservation techniques are employed in order to maintain the historic character and integrity of the building.

**History**

The Historic Harmony Grain Elevator has been a landmark in the small town of Harmony, Minn. (population just over 1,000) for over 100 years. Harmony sits on the southeast edge of Fillmore County, five miles north of the Iowa border. As with most
rural Midwest grain elevators, its construction was due to the arrival of the railroad in the late 1800s.

A new railroad line for the area was approved in early 1879. The narrow gauge line would travel east across Houston and Fillmore Counties from Reno, Minn., along the Mississippi River, having stops in the farming communities of Caledonia, Mabel, Canton, Harmony and Preston. The rails landed in Harmony in the fall of 1879; the first trains arrived on November 13, 1879.

Currently there is some discrepancy about when this particular elevator was built. It was definitely built before 1900; however, the exact year is still being questioned. The current owners of the building claim the building was constructed in 1895. There has yet to be discovered documentation to prove this except for word of mouth handed down through the family – the same family has owned the Harmony Agri-Services (of which the elevator is part of) since 1895. It could very well refer to when the family originally purchased the elevator and other buildings in 1895. So, was it built new in 1895 when the family bought the business? Or, was it one of the earlier elevators? *The History of Fillmore County 1882* states that Harmony had two elevators built in 1879. *Let’s Have Harmony*, a compiled history of Harmony, repeats this information, stating “two grain elevators were built in the fall of 1879, one by McMichel and the other by the McCormick grain companies” (p. 14). However, *The History of Fillmore County 1912* states, “in 1897, elevators were built in Mabel and Harmony…” (p. 597). Harmony resident Anna Aaeberg Jacobson repeats this in her published *Memories of Early Years of Harmony*. Jacobson goes into more detail, stating: “the McMichel elevator was located on the west side of the street north of the depot and is still there”; this is the location of
the Historic Harmony Grain Elevator, the focus of this report. An old article clipping from the *Harmony News* in 1929 states “as soon as the railroad station was located in Harmony and the stores began to open, the village became a trading center…By 1881 the village had a number of residences, two general stores, one hardware and grocery store, a blacksmith shop, a lumber yard and two elevators with a capacity of 12,000 bushels each”. It may not be possible to pinpoint the exact date. However, a circa date can be used. This particular elevator sits across the railroad tracks from the town’s original depot (built in 1879), making it a likely candidate for being constructed before 1895. The conclusion at the writing of this final report is that the historic grain elevator was built circa 1880.

**Preservation Plans**

The Soma family approached the Harmony Area Historical Society (HAHS) about donating the structure to the organization for preservation and possible renovation and rehabilitation. Since it is a town landmark, sits at the junction of three highways at the entrance to the Harmony’s Main Street, and is located near the Harmony Visitor’s Center and the start of the Harmony-Preston Bike Trail, historical society members are excited about taking possession of the building. However, the question remains what is to be done with the building. The building maintains its original structure and materials. The original grain bins, ladders and many tools are still inside the building.

There has been debate about making it into a small agricultural museum. Funding, of course, is a major issue for the HAHS. A committee needs to be formed to research possible opportunities. Finding volunteers for this is also a challenge for a small historical society such as HAHS. As of yet there is no decision on what exactly should be done.
with the building, no goals have been formulated. First, a committee will need to be formed to decide on a plan for the building and resources that can be obtained, including grants, donations and other funding. The discussion about the building’s future is in its earliest form. A good idea may be to apply for national register status. The building has both historical significance and has maintained his historic materials and structure. The decision about the building’s use will have great influence on what conservation and preservation methods will be used. Will it be simply conserved and maintained in its current condition, or as close to it as possible? Some cosmetic work may need to be done to clean up the outside appearance since it is a focal point of the town’s tourism center and entry point into Main Street. Or, will it be renovated and rehabilitated into use as something else such as an agricultural museum? These are important questions that need to be answered for further building conservation or restoration work. Why? Because they are two different types of preservation: Conservation “means stabilizing and preventing or retarding further deterioration” while restoration “has the specific meaning of recreating their (old buildings) appearance or condition at some specific point in the past” (Weaver p. 71).

**Limestone Foundation**

The foundation on the south side of the building is made of limestone. *Webster’s Dictionary* describes limestone as “a rock that is formed chiefly by accumulation of organic remains (as shells or coral), consist mainly of calcium carbonate, is extensively used in building, and yields lime when burned.” The limestone used was most likely quarried nearby. Limestone is prevalent in the area; a local limestone quarry is located on
the northwest side of town and there was one located in nearby Fountain, Minn. In addition, since the grain elevator was constructed after the railroad arrived in Harmony, limestone could’ve been delivered by railroad, coming from other parts of southern Minnesota. However, more than likely carpenters building the elevator would’ve used local limestone because it was readily available. Southern Minnesota has a large and vast supply of Kasota, Devonian, and Trenton limestone. The limestone type that’s most prevalent in Fillmore County is Trenton. *The History of Fillmore County 1882* states that Trenton limestone sometimes called “bluff limestone” and it is a “most desirable building stone” that “in quarrying, the layers rarely exceed five inches in thickness…they (the rock blocks) are generally tough and hard, although when broken often fracture conchoidally and in unexpected directions”. Trenton limestone is tannish-grayish in color, sometimes showing a blue tinge, and during the time when the grain elevator was built, “stones 6 to 15 inches thick and 5 to 6 feet in length is commonly obtained and blocks 3 feet thick are available. This rock is sold mostly for footings of large structures, such as grain elevators” (*Mineral Resources of the United States Calendar Year 1912*, p. 761). Kasota, another dolomitic limestone, is a sedimentary rock that is part of the Oneota Dolostone Formation in southern Minnesota and is “more dense and has a higher resistance to weathering” (Nelson p. 4), making it an excellent stone for use as a building material.

Many of the stones are loose and falling away from the building. Original mortar has dissolved, leaving stones resting upon each other with nothing in between. The original mortar used would not have been Portland cement (modern-day cement). The mortar used on a building this age would’ve been “composed of lime and sand in water”
(Grimmer p. 61) and it would’ve been a “soft, high-lime content mortar” Grimmer p. 61), softer than cement and its more modern day counterparts. Mortar does have a lifespan and the length of that lifespan depends on many factors, including its exposure to natural weathering elements such as rain and humidity, snow and freezing temperature, wind, dirt and other pollutants. Generally, mortar can be expected to last between 20 and 30 years. Since the grain elevator was built around 1880/81, the original mortar has crumbled and dissolved. It is evident that at some point in the building’s history that patchy mortar repair work was applied. However, the dark gray mortar used between the stones is comprised of a cement type mixture; no effort was made to duplicate the original mortar as closely as possible.
Deterioration Mechanism

The elevator has been exposed to Minnesota weather elements for over 100 years with little maintenance done - or protective measures applied - to the limestone foundation. Rain, wind, dirt and other particles have produced timely wear on the stones and mortar. Varying temperatures have also affected the stone and mortar. Minnesota has harsh winters where temperatures drop regularly below zero degrees Fahrenheit. Summers in Minnesota can be hot and humid. “Temperature can effect rates of deterioration and (in larger stones) movement of the pieces, as well as patterns of salt migration within the stone” (U.S. General Services Administration).

One of the biggest culprits for causing the type of deterioration seen in this limestone foundation is caused by water: snow, ice and rain. This has caused erosion and crumbling of the masonry. “Water is limestone’s worst enemy. This essential substance aides and accelerates most systems of decay…Water can damage the stone on the surface, but is most hazardous when it penetrates the stone” (Olson p. 107).

The mortar used between the limestone blocks is also affected greatly because “earlier mortars tend to be based on lime rather than hydraulic cements…lime mortars are
acid soluble and tend to be very badly damaged by acidic rainwater and snow melt water if leaks and cracks are left unattended for years” (Weaver p. 64).

In addition to acidity, water contains salts and these salts affect the stability of the mortar and the durability of the stone. When the water evaporates it leaves the salts and they “crystallize within the pores of the stone. This crystallization almost always results in an increase of the volume of the salt, creating a pressure within the stone that will eventually destroy it from within” (Olson p. 108). Water that freezes within the pores of the stone is another problem, “breaking down the walls of the pore structure” (Olson p. 108).

The grain elevator’s limestone foundation has no protection from natural elements. It is exposed to the wind, rain, snow, ice, temperature changes and dirt, salt and other pollutants. Rain flows down the sides of the building and directly onto the
limestone. Snow and ice gather on the exposed stone. The stones fit flush against the soil and moisture from the ground seeps up and into the stones.

Although water makes the greatest contribution to this foundation’s deterioration, all the mechanisms mentioned can cause the stones to shift and crumble. They can also cause discoloration of the stone and deterioration of the mortar. These weathering elements work together to wreak havoc on limestone.

**Recommended Treatment**

Although a final treatment plan for the foundation will depend on the HAHS approved plans for the building – whether conserving it as is with minor cosmetic fixes to the exterior or deciding to rehabilitate or renovate it for another purpose – a general preservation treatment will be needed to prevent further deterioration of the foundation.

Since water is the main mechanism for the deterioration, it is essential to prevent its destruction or minimize its effect. It is nearly impossible to keep all water away from and out of the stones, but steps can be taken to help lessen the speed of deterioration. Understanding the drainage around the building is essential. “The ground…should have a positive slope away from the structure” (Kibbel) so rain water is directed away from the building. A gutter system may also be considered to channel water from the foundation. These treatment techniques keep water away from the foundation and can keep it from pooling in the ground beneath the limestone.
Since the original mortar has eroded and dissolved, and the Portland cement used to patch between the stones is not a sufficient conservation and preservation replacement and is harder than the limestone (therefore, not compatible), repointing is needed. Repointing “is the process of removing deteriorated mortar from the joins of a masonry wall and replacing it with new mortar. Properly done, repointing restores the visual and physical integrity of the masonry” (National Park Service). It is best to use a lime mortar instead of a mortar mixed with cement. Lime mortar is softer and far more breathable and flexible than modern cement, making it a perfect choice for limestone. When repointing, “lime should conform to ASTM C 207, Type S, or Type SA, Hydrated Lime for Masonry Purposes” (National Park Service).

Before repointing, the stones will have to be cleaned. High-pressure air may be applied to remove dirt and other buildup as well and loose mortar. Water may also be used to clean the stones. Even though the presence of water over time causes
deterioration of limestone and its mortar, it is very useful in cleaning limestone for preservation purposes. A pneumatic chisel may also be used to remove the harder cement mortar that was used in place of the softer lime mortar. Some of the stones have shifted, a few have cracked, and several have fallen away from the foundation. These stones need to be evaluated and a decision needs to be made about whether they can be reused and returned to the foundation wall or if new stones need to be acquired. If new stones are needed, similar stones should be found from the nearby quarry. These stones should be of the same limestone so the color, width, depth and durability and strength are consistent with the historic stone.

In order to help protect the stone from its biggest antagonist, a sealant may be considered after repointing. However, many sealants can be detrimental to conservation and preservation efforts. Yes, sealants keep water out, but they also keep moisture from inside the stones from evaporating. New research is being done in this field and in 2012, researchers at the University of Iowa of Iowa City, Iowa, and Cardiff University in England, worked together on creating a new type of coating that can help keep water and pollutants out of the limestone. This hydrophobic coating offers a “new way to minimize chemical reactions that cause buildings to deteriorate” and includes a “mixture of fatty acids derived from olive oil and fluorinated substances that increase limestone’s resistance to pollution” (Galluzzo). According to Cardiff University, this “new treatment for historic limestone buildings protects them from erosion by acid rain and atmospheric pollutants while allowing the stone to “breathe’”. This hydrophobic coating may be of use for protecting and preserving the grain elevator’s foundation.
Maintenance Plan

After treatment is complete on the foundation, a maintenance plan should be put in place to analyze the foundation on a regular basis. A scheduled examination of the foundation should be scheduled every 2 to 5 years to help identify early detection of deterioration such as crumbling, cracks, mortar flaking and chipping. An examination can also reveal if the employed water diversion techniques (i.e. gutters, positive slope, water-resistant coating) are working properly, continuing to keep damage caused from water and moisture at a minimum. A regularly scheduled maintenance analysis can also reveal any new deterioration mechanisms that may affect the integrity of the foundation.

Conclusion

In conclusion, the limestone foundation of the Historic Harmony Grain Elevator shows significant signs of deterioration, but repointing the masonry using a traditional lime mortar (similar to the original mortar used on the 1800s building) can help with both the stability and integrity of the foundation and the building. Repointing also gives a facelift or cosmetic improvement to the look of the foundation and the building. In addition, selecting various techniques to help detour water away from the building will help minimize the harmful effects of water and the salt, dirt and other pollutants it carries. A regularly scheduled maintenance schedule will be essential to preventing further damage to the foundation and to conserving and preserving the original materials.

To help with costs of conservation and preservation efforts, it may be worthwhile to look into submitting the building the National Register of Historic Places. Not only will it gain a permanent place in history it will also be qualified for tax benefits from
being accepted to the registry. It may qualify for a Federal Historic Tax benefit through the Preservation Tax Credit Program. In addition, as an identified Minnesota Historic Structure, there are Rehabilitation State Tax Credits available. A 20% state tax credit can be given through this program. A grant option is also available.

The Historic Harmony Grain Elevator is a significant landmark for the City of Harmony and for the surrounding area. It is a symbol of Harmony’s rich agricultural past. Many rural grain elevators are vanishing from the Midwest landscape. Some have been demolished because they’ve deteriorated beyond renovation or rehabilitation. Others have been destroyed because people aren’t aware of the historical significance or don’t understand what great contributions these old buildings can be to a community’s economic stability or Main Street revitalization. When they are removed from a rural landscape they are gone forever, and with their exit they take with them an important part of history. They are a physical remnant of a community’s roots, of its hardworking farmer heritage, and a constant reminder of what a rural farming community is, of who its people are. Every effort should be made to conserve and preserve this structure so that it will be available for future generations to enjoy and appreciate. The railroad came to Harmony because of its agriculture industry. Harmony was created because of it. The Harmony Historic Grain Elevator signifies the economic partnership between the small farmer and his grain and the railroad and the big city companies that purchased and distributed it.
Bibliography


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