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## Article Title: Nebraska Flour Mill Buildings, Structure and Style, 1854-1936

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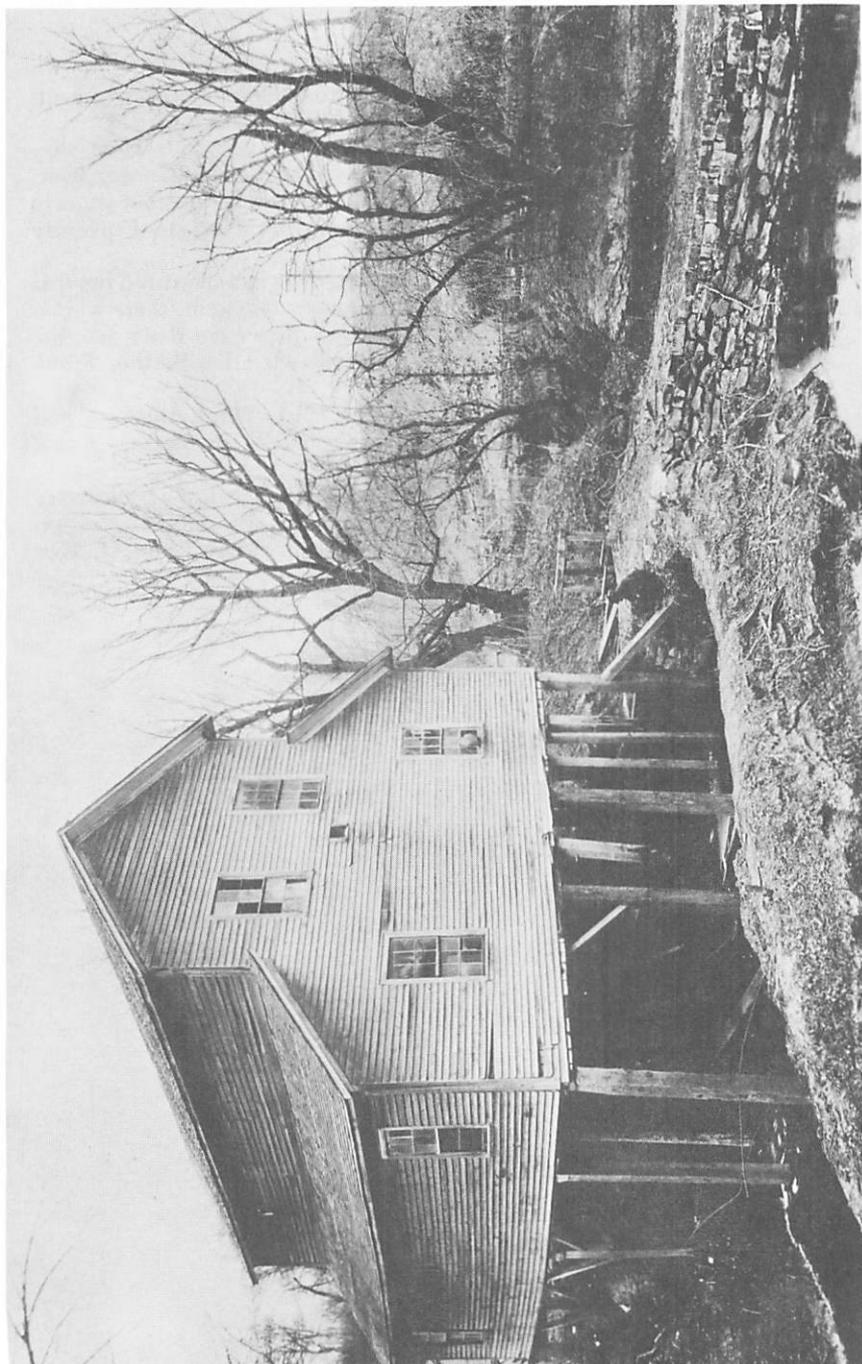
Article Summary: The first United States territorial census of 1860 reported 19 mills operating in Nebraska Territory. By the 1900s, the number had grown to 260. The designs and architecture found in Nebraska's flour mills reflected trends in mill design originating in the East and is summarized within this article. The author presents information gathered from the mill file, Neligh Mills Historic Site, Neligh. The Neligh Mill, built in 1873, is the last complete 19th century flour mill remaining in the state and is operated as a branch museum of the Nebraska State Historical Society. This study compares mill buildings to determine a pattern in the application and utilization of the various structures and styles of Nebraska flour mills.

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Photographs / Images: The Kruse Mill, built in the 1860s, just west of Omaha, a small exchange mill; the Wells Abbott Nieman Mill at Schuyler, from *American Miller*, September 1, 1903; Schminke Mill at Nebraska City, built in 1876; Jensen and sons Mill at Nelson, built 1904, from *American Miller*, June 1, 1907; Black Brothers Mill about 1870, at Beatrice, Nebraska; Oakdale Mill, with belt housing on the left; York Roller Mill, steam powered roller mill built in 1880s; Mickey Milling Company at Elkhorn in 1909, from *American Miller*, June 1, 1909; the old McKee Mill, near Syracuse in Otoe County, one of the few stone mill buildings in the state; daylight construction evident in the Gooch Mill, 1923, in Lincoln, from *American Miller*, February 1, 1923;



*Figure 1. The Kruse Mill, built in the 1860s just west of Omaha, was typical of small exchange mills.*

# Nebraska Flour Mill Buildings, Structure and Style, 1854-1936

*By Thomas R. Buecker*

One of the earliest and certainly one of the most important industries in 19th century Nebraska was flour milling. Settlers needed mills to process cereal grains into flour and other millstuffs, and as a result, hundreds of mills were built and put into operation by 1900. Flour mills were found throughout the cultivable regions of the state where settlement developed and prospered. Mills provided an economic boost, bringing commerce and a limited job market to new communities.

The progress of mill building coincided with basic settlement patterns in the state. Originating in the southeast along the Missouri River, both spread along inland waterways, gradually moving west, halted only by the Sandhills region, then thought worthless for agricultural production. Most early territorial period mills were water powered, harnessing the flow of rivers and larger streams. With the expansion of railroad routes, the availability of steam power gave impetus to mill building. At many sites small mill communities soon developed. Some (such as Factoryville, Cass County, and Meridian, Jefferson County) flourished briefly but ultimately died out. Other mill communities, such as Norfolk, soon grew into important communities and centers for settlement. Because of the importance of mills to the growth of new towns, bonds and bonuses were offered to encourage their construction. Settlers coming into town visited the mill and brought trade to other local merchants.

The first United States territorial census of 1860 reported 19 mills operating in Nebraska Territory. By 1870, this number had increased to 60, with flour milling decidedly the leading industry of the new state. Ten years later, the 1880 census listed 177 mills, indicating the population growth and development of the state. From the most reliable figures

available, the largest number of operating mills in Nebraska for a single year was 260 mills in business during 1900. However, the new century brought consolidation and growth of the larger milling companies and the decline of the small mills.<sup>1</sup>

Between 1909 and 1925, the number of operating flour mills in the state was decreased by half, from 203 mills to 110. But at the same time, the production of flour grew from 2,268,000 to 2,870,000 barrels, an increase of over 22 percent.<sup>2</sup> Through the next 50 years, the number of mills steadily dropped until today there are only six active mills remaining in Nebraska, and three of them are owned by the same milling corporation.<sup>3</sup> Mill buildings, as can be expected, disappeared after milling activities ceased. Today only 45 mill buildings survive out of the hundreds that were built.

Because of the significant contribution of flour milling to the history of the state, and the development of the Neligh Mills Historic Site by the Nebraska State Historical Society, interest has grown in the study of this once vital industry. A survey was started to locate and record mill sites. Many have long since disappeared, making site identification difficult. Sites of some 453 mills have been recorded of the 553 known to exist, and a mill file was developed to gather materials on all mills, with a separate file for each individual mill.<sup>4</sup> Large numbers of historic photographs of non-extant mills have been found. By comparing photos with standing structures, similar features of building shape and style soon became apparent. The present study is an attempt to compare mill buildings to determine a pattern in the application and utilization of the various structures and styles of Nebraska flour mills.

The designs and architecture found in Nebraska's flour mills were not conceived in the state, but reflected trends in mill design and construction methods originating in the East. These concepts were brought to Nebraska and tested as the milling industry grew. The mill structures and styles in Nebraska were common in other midwestern and eastern states, following the trends and development of the industry as a whole.<sup>5</sup>

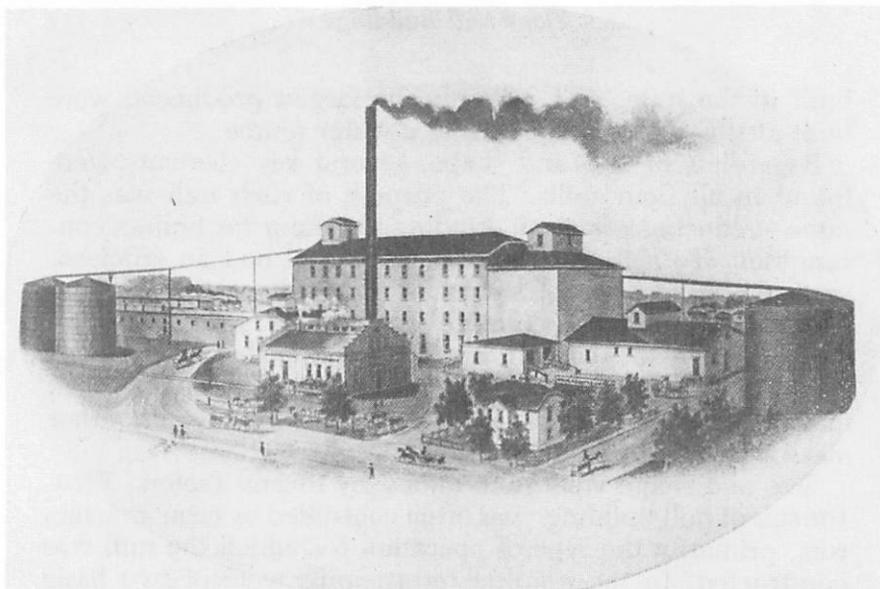
Nor were mills completely limited to sites "down by the old mill stream," as is commonly believed. With the development and utilization of alternate power sources, a majority of mills

built in the state, and certainly the largest producers, were built at sites long distances from a water source.

Regardless of size and shape, several key elements were found in all flour mills. The purpose of each mill was the same—reducing wheat by grinding into flour for human consumption. To achieve this end, every mill had an efficient, vertical arrangement of sifters on floors above the grinding machinery, either stone burrs or steel rollers. In addition, all mills had basements to house drive shafts that transmitted power to the grinders and sifters. To power the drive shafts, all mills needed a power source—water, steam, or some other means.

Size and shape were determined by several factors. First, the size of mill buildings was often controlled by economic factors, primarily the type of operation for which the mill was constructed. In the simplest terms, mills were of two basic types: exchange mills or merchant mills. Exchange mills were small, local operations serving only a neighboring area. Here a farmer brought wheat to be ground into flour for his own use, with the miller charging a toll for the services of his mill. These small grist mills were first built in the southeastern portion of the state, beginning in the territorial period of the 1850s and 1860s (Figure 1). As settlement spread through the state, exchange mills were established to serve the needs of the settlers. During the 1880s and 1890s, small exchange mills were built in the newly developing regions of north-central and western Nebraska. A few small exchange mills grew into larger operations, but most disappeared after a comparatively short period of use.

The second type of mill operation was the merchant mill. This type was the most commonly found mill business in the state during the 19th and early 20th centuries. Merchant mills were intended to be larger operations than exchange types, and were built by men of means or by organized milling companies. Merchant mills produced flour for commercial sale, both on the local level and for shipment to out-of-state and foreign markets. Because operations were on a larger scale than in the small exchange mills, they needed larger quantities of wheat. Consequently, most merchant operations were located in towns and along the growing network of railroad lines. Here the miller did not have to depend on the local



*Figure 2. The Wells Abbott Nieman Mill at Schuyler was for many years Nebraska's largest flour mill. It was destroyed by fire in 1933. From American Miller, September 1, 1903, p. 721.*

wheat crop as did the exchange miller but could ship in wheat from distant sources. A number of merchant mills grew into large operations equalling dozens of smaller exchange mills (Figure 2).

A related factor governing mill size was capacity, or how much flour the plant was able to produce per 24 hours of operation. Capacity of flour mills was usually rated by production in barrels, a unit of measure weighing 196 pounds. Although flour was generally put up in cloth sacks rather than in wooden barrels, the barrel remained the regular output unit. Whereas a small grist mill might produce only 5 to 15 barrels per day, a merchant mill on the average produced 75 to 150 barrels per day. Historically, the largest flour mills in the world were at the great milling center of Minneapolis.<sup>6</sup> Here the immense Pillsbury Mill was capable of manufacturing 10,500 barrels of flour per day just after 1900. The largest flour mill in Nebraska at the time was producing something over 1,000 barrels per day.<sup>7</sup> Capacity ruled size by determining the amount of milling machinery needed in the building. Obviously, the more machinery to be installed, the larger the physical structure needed to be.

The third factor determining mill size was the mechanics of the basic grinding process employed. For centuries round burrstones were used for grinding in flour mills. A burr mill needed only a set of stones and a sifter. The wheat was ground between two burrstones, one lower stone remaining stationary while the upper stone was turning. The ground wheat was then taken to crude sifting machines on an upper floor for removing the flour. The simple technique and machinery gave rise to the building of many small exchange mills in the early period of Nebraska milling. The early merchant mills were developed by the simple installation of additional runs of burrstones to increase production. However, the 1880s brought the revolutionary steel roller process, whereby more flour could be produced more efficiently than with the stone burr method. Although the roller process was more expensive, scores of millers, particularly merchant millers, removed their stone burrs and installed rollers. Burrstone use declined after 1880, following the demise of the small exchange mill and the rise of the merchant mill.<sup>8</sup>

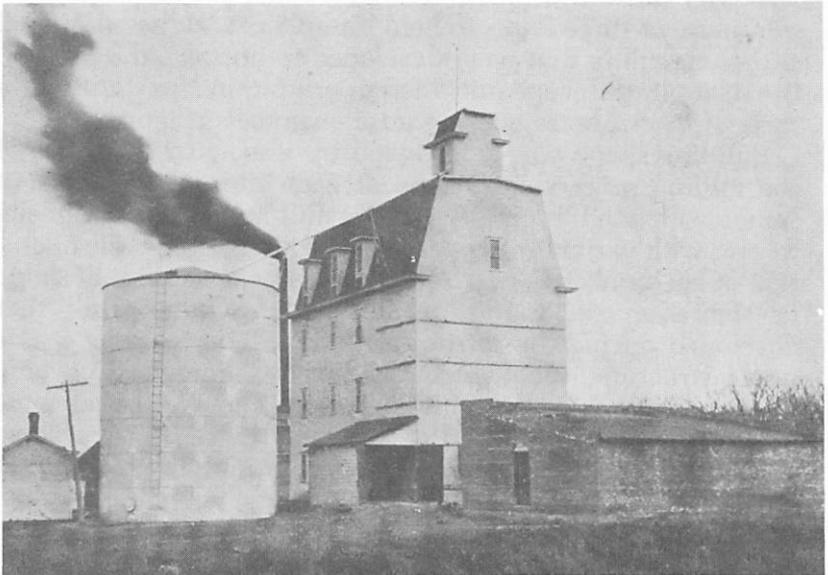
This affected the number of stories or floors a mill had to contain to house the milling machinery. Most grist mills using the stone burr process required only two floors to house the necessary burrs and sifters. The steel roller process required a minimum of three floors to hold the rollers and the additional sifting machines that were developed to improve the process. By 1900 almost every mill then operating in the state was a three-story structure housing a roller process (Figure 3).

Building shape was determined by associated functions of the milling process carried on at each site. Those different functions tended to greatly modify mill appearance from site to site, with variants of appearance, although the basic operation of each mill was much the same. The simplest mill shape in Nebraska was found in the small exchange mill that developed during the territorial period. The building was a single structure, usually rectangular in shape, holding only basic machinery for the milling process. The wheat that came in during a day's business left as flour the same day. These small mills had no need for the structural additions found at larger milling complexes.

The development and availability of improved milling machinery, plus the growth of wheat production and railroad



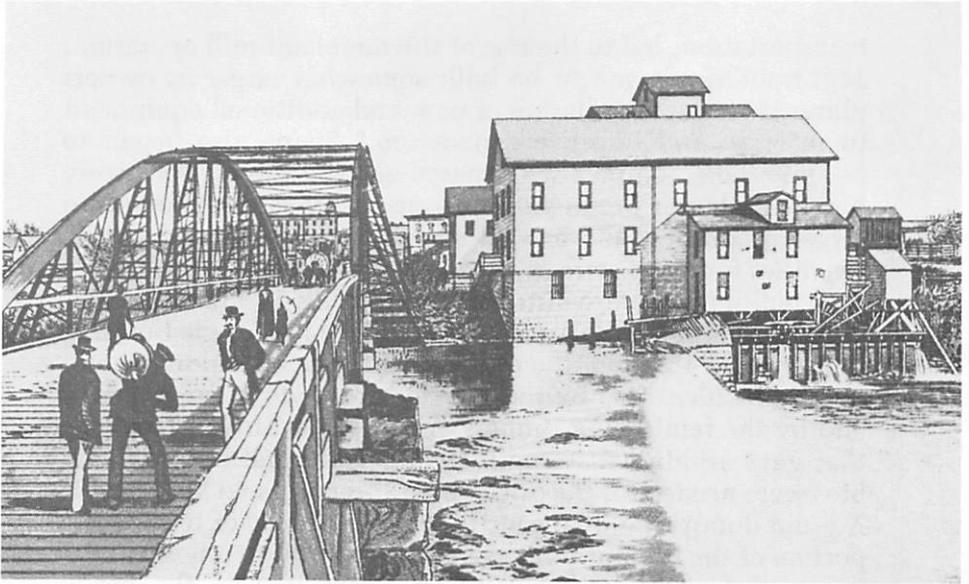
*Figure 3. The Schminke Mill at Nebraska City, built in 1876, was later enlarged. . . . (Below) Figure 4. Jensen and Sons Mill at Nelson was built in 1904. From American Miller, June 1, 1907, p. 441.*



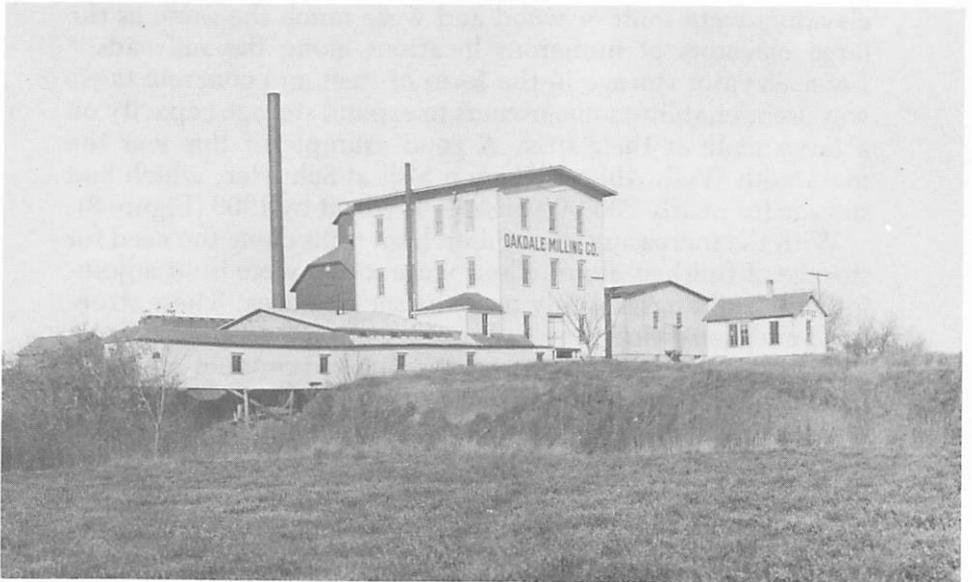
transportation, led to the rise of the merchant mill operation. Mill buildings began to be built somewhat larger as owners planned for the installation of new and additional equipment to increase and improve production.<sup>9</sup> Shape also began to become more complex with merchant operations. Mills were built with larger production capacities. Wheat was bought in larger quantities, and a need arose for on-site grain storage. Facilities for grain storage appeared in two basic forms. Many mill buildings were constructed with built-in grain storage, enabling milling and storage to take place in a single building unit (Figure 4). From the outside, this type of building could usually be identified by the absence of windows on one end, and by the reinforcing timbers evenly spaced to hold tie rods that gave additional strength to large, internal bins. Several bins were needed for the different grains processed by the mill. A grain dump would be constructed on the side of the storage portion of the mill, or built as a drive-through to unload arriving wagons (and later trucks). Elevator legs on the inside would move grain to specific bins for storage.

In other instances, separate grain storage structures or elevators were built at mill sites (Figure 7). This practice gave mill owners more latitude for increasing storage capacity without greatly modifying mill structures. The earliest elevators were built of wood and were much the same as the large elevators at numerous locations along the railroads.<sup>10</sup> Later elevator storage in the form of steel and concrete tanks was used, enabling some owners to expand storage capacity on a large scale at their sites. A good example of this was the mammoth Wells Abbott Nieman Mill at Schuyler, which had storage for nearly 200,000 bushels of wheat by 1909 (Figure 2).

With the increasing size of merchant mills came the need for storage of finished flour. Flour warehouses were built adjoining mill buildings, usually near the sacking area. These structural additions were simple, one-story affairs, with solid floors and substantial roofs to protect the finished product and with size corresponding to the capacity of the milling plant. When built at mills along railroad lines, warehouses paralleled the tracks to facilitate loading into boxcars. On other sides, large loading doors were built for loading flour into wagons and trucks for local delivery. The building and utilization of elevators and warehouses added great variation to Nebraska



*Figure 5. Black Brothers Mill, about 1879, was located at Beatrice. From Beatrice, Nebraska, The Queen City of the State (Adolph Witteman, Publisher of Souvenir Albums, New York, undated). . . . (Below) Figure 6. The Oakdale Mill had its belt housing to the left.*

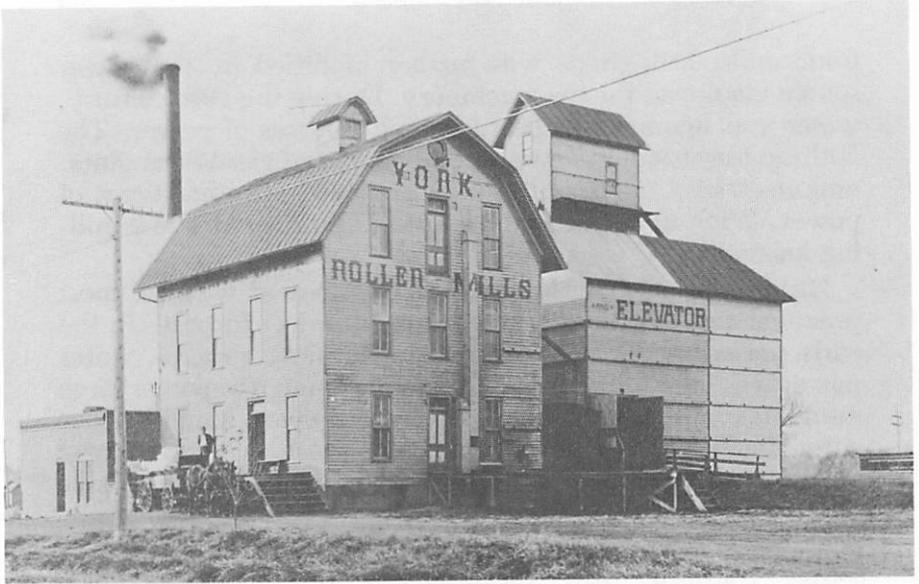


flour mills. Mill shape was further modified by the power source employed for the machinery. During the 19th century, water and steam were the two major sources of power. The 20th century brought new sources: diesel and gasoline engines, and electricity, which ultimately replaced all other types of power. Wind and draft animals were also used at a few milling locations.<sup>11</sup>

Historically and traditionally, water power was the most practical and commonly used source of power for mills in the early period of the state.<sup>12</sup> In 19th century Nebraska, water power was fairly abundant and reliable enough to power large numbers of mills. With the use of water power, a mill builder entered a different realm of construction techniques to harness and maintain water for motive power. Outwardly water mills appeared much the same as other mills, but part of their appearance was significantly modified by the use of this power source. Naturally water powered mills had to be built near streams and rivers. Dams were needed to divert water through flume runs into penstocks housing water turbines. Several mills, such as the Seward City Mills and Black Brothers Mill at Beatrice, had the penstocks built along the river side of the building (Figure 5). This appears to be the case where mill sites were along solid, rock-bottomed stream beds. At sites where streams had less reliable beds, mills were erected on banks high above the flow to avoid damage and washout or long mill races. The power from the turbine was then transmitted by belts or rope drives into the mill basement. In this case, long wooden sheds were built over the drives to protect them from the elements (Figure 6). This gave the mill an appearance distinctly different from other water mills, although from the land side all would look much the same.

When considering the mill complex as a whole (dams, flumes, and penstocks), the main elements of water power were all necessary to the function of the mill. The way water power was harnessed and transmitted into the mill building greatly affected its structure and appearance.

Due to a lack of fall and general application of the more efficient water turbine by the 1860s, usage of water wheels (overshot, undershot, or breast wheels) was rare. Several early



*Figure 7. The York Roller Mills was typical of steam powered roller mills built in the 1880s. . . . (Below) Figure 8. The Mickey Milling Company was located at Elkhorn in 1909. From American Miller, June 1, 1909, p. 465.*

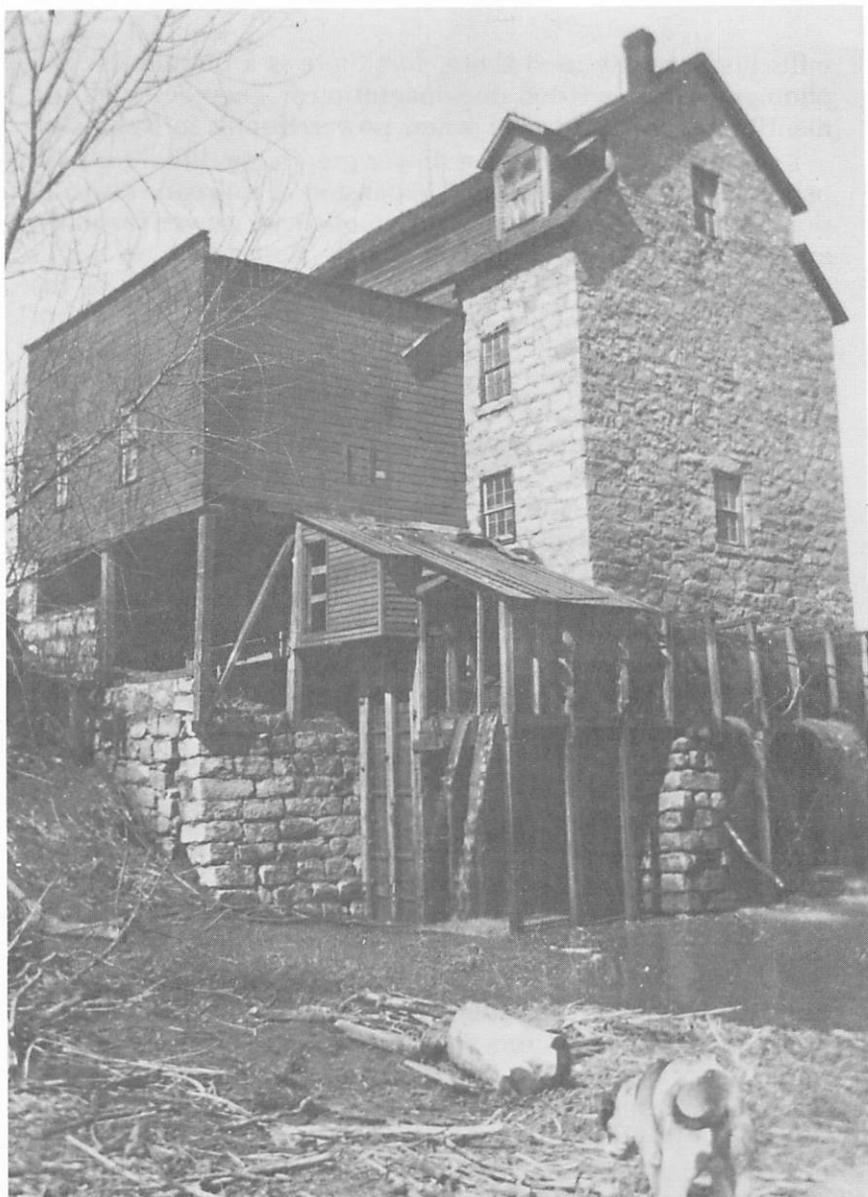


mills undoubtedly used them, but there is a definite lack of photographic or written documentation.<sup>13</sup> They deserve little mention when speaking of water powered mills in Nebraska.

Likewise, the use of steam power greatly modified mill appearance and style. The rapid expansion of railroad construction led to a surge in the utilization of steam power for mills, and operators were no longer totally dependent on water powered sites. By 1900 steam power surpassed water as the chief motive power used in Nebraska flour mills. The use of steam required a boiler and engine to power drive shafts. Power rooms housing those elements of steam power were built on one end of the mill building, in order to attach the engine to the main drive shaft. Power rooms were usually constructed of brick or some other fireproof material (Figure 7). Smoke stacks and storage for coal were also needed and erected, further modifying appearance. With the developing use of steam power roughly paralleling the introduction of the roller process, the steam mills utilized three-story buildings, which then became a basic utilitarian structure. Several mill architects of the period were critical of the plainness and lack of ornamentation of steam-powered mills.<sup>14</sup> But they were flour factories with proprietors more interested in production than aesthetic appearances. Steam mills became the most commonly built mill structure in Nebraska. "This type of mill was later readily converted to more modern power sources by the removal of steam power components without need for great alteration to the mill building itself.

Roof styles used on all flour mills added variety to the building's outward appearance, but were utilitarian in purpose. Monitors were found on most structures (Figure 8). Running the length of the building and looking like a miniature additional story, monitors added light and ventilation to the mill. They also housed top floor drive shafts and elevator heads and therefore were an important part of mill structure.<sup>15</sup> Mills having internal grain storage needed a small head house protruding above the roof line to house incoming grain elevator legs.

Roof lines were governed by the size of the mill building, with slightly greater pitch used on narrower structures. However, most Nebraska mills had gable roofs with medium



*Figure 9. The old McKee Mill, near Syracuse in Otoe County, was one of the few stone mill buildings in the state.*

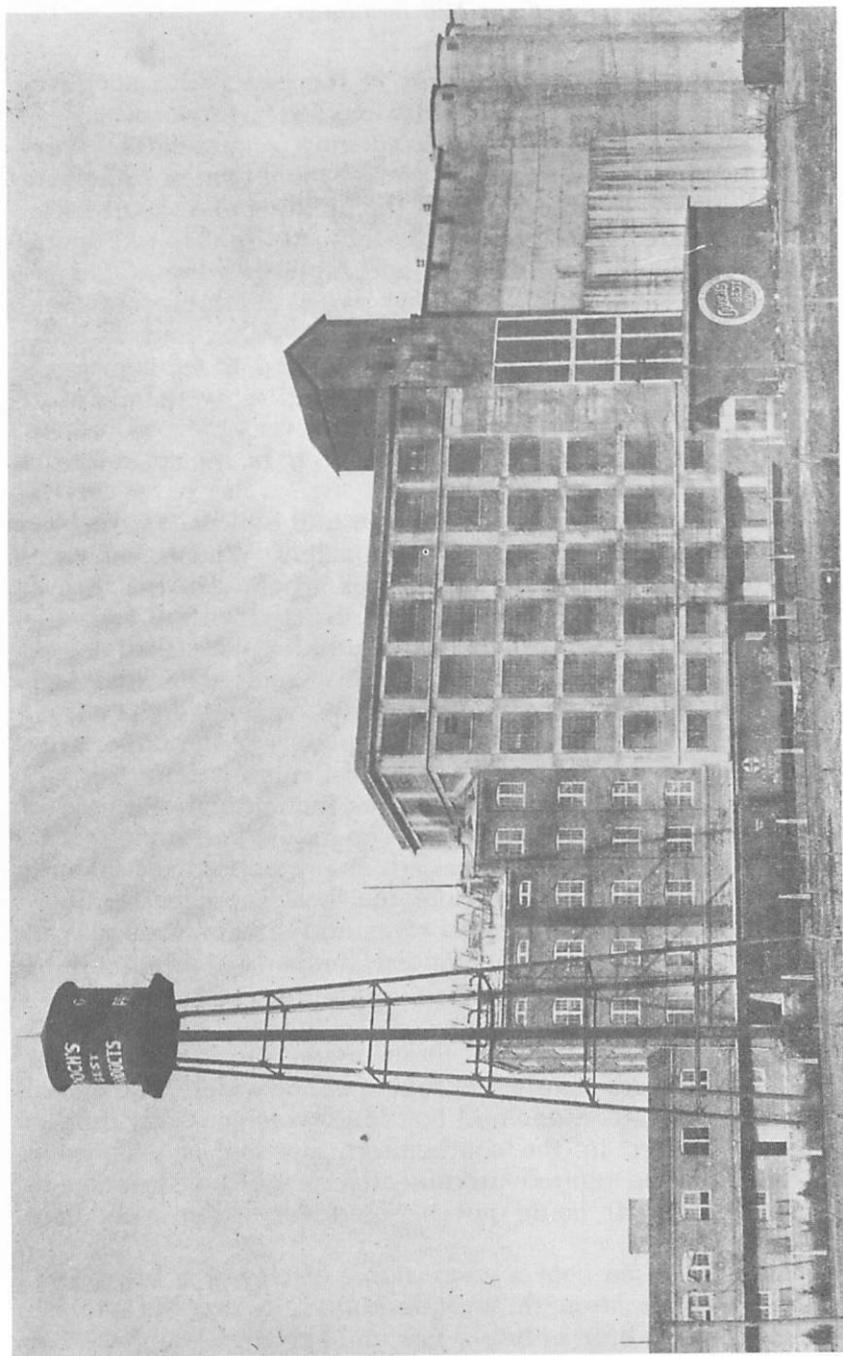
to shallow pitch. Mill designers of the period did not favor high, steep pitched roofs, but also avoided flat roofs because of possible damage from leaking and snow accumulation. Very few mills in the state had flat roofs. Probably most important to mill builders were the size of the building and the distribution of windows for letting in natural daylight to aid operations. Like monitors, cupolas and lanterns were added for light and ventilation. Buildings with gambrel roofs and dormer windows were built during the 1890s, and an occasional hip roof can be identified. Mansard roofs, commonly used in large eastern mills of the 19th century, were built on at least 14 structures in Nebraska. However, the medium or shallow pitched, single gable roof seems to be the norm for the state's mill buildings (Figure 6).

The construction methods used in mill buildings varied according to milling processes and capacities. When speaking of structures, an 1884 *American Miller* article stated, "A mill building should be designed and constructed with reference to the machinery it is to contain, and for convenience and economy in transacting business and of such material as will render it sufficiently strong and with the least danger from fire."<sup>16</sup> The above statement speaks plainly of the importance of the mill structure to the success of the operation.

Wood was the most common construction material used in Nebraska mill buildings. Because operators had some sort of motive power already harnessed, many carried on sawmill businesses at their sites. Here the local supply of lumber, though somewhat limited to river and stream valleys, was utilized. As railroad lines expanded, lumber was brought in by train, making it readily available to mill builders.

Stone was used for building construction and dams where it could be quarried locally. Stone made sturdier and more lasting structures than wood, but was not widely distributed through the state. Stone mill buildings were generally limited to a few sites in the southeastern portion of Nebraska. Although stone figured prominently in mill construction in eastern states, it could not be used very extensively here (Figure 9).

Brick was used near a good source of clay or a brickyard. Because of its strength and durability, a number of mill buildings were built of brick. The mill at Neligh was construc-



*Figure 10. Both the earlier and later styles of daylight construction are evident in the Gooch Mill, 1923, in Lincoln. From American Miller, February 1, 1923, p. 155.*

ted from the first brick made at that location. The Hastings Mill was completely rebuilt of brick in 1917 because of the several nearby brickyards in operation at that time. Like stone, brick was used when available. Several references have been found to a sod mill built in Custer County in the late 1870s, where sod was then the common construction material.<sup>17</sup>

Three major structural types are found in Nebraska flour mills from the earliest territorial period to the 20th century. The first small exchange mills were simple frame structures, due to the minimal amount of equipment needed for milling. Exchange mills were small and somewhat crude operations when compared to the later merchant mills.

The rise of merchant operations led to more strongly built structures. By the early 1890s mill architects became more sophisticated about building structure and design. All realized the need for more substantial buildings, with frame structures described as "an expensive luxury."<sup>18</sup> With an increase in machinery and production, mill buildings had to be more solidly built to withstand (1) the vibrations and stresses of larger amounts of machinery in operation, and (2) stresses on the structure because of the weight of larger amounts of grain, either in machinery and legs, or in storage. Mills were built with heavy beams and posts and extra floor supports, utilizing a building technique known as "mill construction." In addition, reinforcing tie rods were added for extra strength. A mill-constructed building was stronger and would have a longer survival time in case of fire than the earlier frame buildings. Because of this, mill construction was also known as "slow burning construction."<sup>19</sup> Fire was a constant danger to millers, a problem compounded by the installation of additional machinery and the need for artificial lighting for night operation. A chief cause of fire was improper lubrication of the numerous bearings and journals that increased with the installation of more machinery. Heavy internal supports and joists were more resistant to fire and took longer to burn, giving firefighters additional time, particularly in the case of fires in brick or stone buildings.

The third type of construction method used in Nebraska was the so-called "daylight construction," which began about

1910. Because of the need for efficient mill machinery arrangement, the ever-present danger of fire, and a desire for increased production, a new structural style was needed after 1900. In his 1923 book, *The Development of the Flour Milling Industry*, Charles Kuhlman wrote, "Lastly, there was an improvement in mill architecture as a result of which, light, flimsy, wooden structures were replaced by structures of brick, stone, or concrete, and square, heavy lines of the older structures were abandoned for buildings of a new type, which, in spite of their obviously utilitarian character, are not without a certain dignity and impressiveness."<sup>20</sup> Kuhlman wrote of mills of brick, with steel and reinforced concrete used for internal support. The new mills were built with an eye for good ventilation, fire-proof construction, an abundance of space, and use of natural daylight through large windows—all of which were essential for best results in milling.

The first daylight plants were designed by the large Indianapolis milling machinery firm of Nordyke and Marmon. Their mills were large, spacious brick buildings with high ceilings, but were often built with wooden floors and internal supports (Figure 10). After 1910 daylight mills began to utilize steel and reinforced concrete for supports and floors. The newer daylight mills were considered to be technically more advanced than earlier styles and were the most substantial and fire-resistant type of mill building. In addition, new developments in dust collecting and humidity control were installed in daylight plants, making them safe, convenient, and efficient to the point of reducing labor and speeding the movement of materials through the plant. Paralleling the development of new mill structures was the growing use of reinforced concrete for grain storage facilities. By using tall, cylindrical bins, concrete elevators could be built strongly enough for even the largest holding capacities. Concrete quickly became the normal construction material for elevators at larger mill complexes. Along with wooden mill buildings, small wooden grain elevators became obsolete.

The major drawback to daylight construction, except to the largest mill companies, was cost. Because of the decreasing number of flour mills in the 20th century, few daylight plants were built in Nebraska. Several companies used daylight construction to replace structures destroyed by fire or for addi-

tional milling facilities to increase production capacity. After the prosperous Lexington Mill was destroyed by fire in 1914, the mill was entirely rebuilt as a daylight plant in 1915. The Gooch Mill in Lincoln added a new 1,250 barrel unit of daylight construction to an existing plant of the earlier daylight style. The new construction was expensive. The daylight plant for the Gibbon Mill Company had a projected cost of \$80,000 when construction started in 1919. However, when completed, the new mill had cost \$125,000. Profits from flour sales during World War I enabled the Crete Mill to build a modern daylight plant. A number of daylight construction mills were built across the United States from 1910 to 1940, but only 10 daylight plants were ever built in Nebraska<sup>21</sup>

During more than a century of existence, the flour milling industry in Nebraska has undergone dramatic change. From the hundreds of small operations of the latter 19th and early 20th centuries the industry has contracted to a few yet significant plant locations. Likewise mill buildings evolved from a multitude of structures, employing a variety of machinery and power sources, to the modern, efficient buildings of the present. Buildings, like the industry, were designed to serve the demands exerted by the millers' changing needs. In 1923, the editor of the *American Miller* magazine wrote, "A modern flour mill could never have been built but for the generations of mills that have preceded it. Evolution of an industry consists of adapting the best of the past and adding the inspiration of the present."<sup>22</sup> Future technological advances will undoubtedly alter the mill structures of today, but the once-familiar local mill buildings will remain an integral part of our heritage.

## NOTES

1. *The Flour Milling Industry in Nebraska*, Nebraska Studies in Business No. 23 (Lincoln: University of Nebraska Extension Division, 1929).
2. Arthur H. Croft, "The Milling Industry in Nebraska" (Masters thesis, University of Nebraska, 1928), p. 30.
3. Operating flour mills in Nebraska today: two ConAgra mills in Omaha and one in Fremont; the Gooch Mill in Lincoln; Humboldt Flour Mill in Humboldt; and the Wauneta Roller Mills in Wauneta.
4. All information on Nebraska flour mills presented here is found in the mill file, Neligh Mills Historic Site, Neligh. The Neligh Mill, built in 1873, is the last complete 19th century flour mill remaining in the state and is operated as a branch museum of the Nebraska State Historical Society.
5. Popular milling trade journals such as the *Northwestern Miller* and the *American Miller*, both founded in 1873, carried numerous articles on mill construction, structure, and machinery arrangement. In addition, mill machinery manufacturers made available plans and diagrams of model mills to prospective builders. Robert M. Frame III, "Mills, Machines, and Millers," *Minnesota History* 46 (Winter 1978), pp. 154-156; W. D. Gray, *Plans, Diagrams, and Estimates for Model Roller Mills* (Milwaukee: Edward P. Allis Co., 1884).
6. Robert M. Frame III, "The Progressive Millers: A Cultural and Intellectual Portrait of the Flour Milling Industry, 1870-1930, Focusing on Minneapolis, Minnesota" (Ph.D. dissertation, University of Minnesota, 1980).
7. This was the Wells Abbott Nieman Mill at Schuyler, by 1920 the largest flour mill west of the Missouri River. It was destroyed by fire in 1933.
8. More on the change in the milling process and its impact on the industry can be found in John Storck and Walter Teague, *Flour for Man's Bread* (Minneapolis: University of Minnesota Press, 1952), chapters 15, 16.
9. "Studies about the Mill," *American Miller*, 7 (July 1879), p. 209. Robert Church, "A Successful Money-Making Mill, Pt. II, Mill Building and Appearances," *American Miller*, 12 (May 1884), pp. 235-236.
10. Robert B. Riley, "Grain Elevators: Symbols of Time, Place, and Honest Building," *American Institute of Architects Journal*, 66 (November 1977).
11. Wind powered mills were built near Bennet, Wisner, Hooper, Boelus, and one in rural Clay County during the 1870s. Draft or animal-powered mills were operated at Fort Atkinson (1821) and near Fort Calhoun (1879), both sites in Washington County.
12. More information on the use of water power in Nebraska can be found in Thomas R. Buecker, *Water Powered Flour Mills in Nebraska* (Lincoln: Nebraska State Historical Society, 1983).
13. In the early 1900s, two water powered mills were using factory-made iron water wheels, then common in eastern states. The mills were at Callaway in Custer County and Spring Branch Mill in Thayer County. The latter wheel remains today partially buried at the site.
14. *The Northwestern Miller*, 11 (May 1881), p. 344; Louis H. Gibson, "Mill Architecture," *The Holiday Northwestern Miller*, 28 (Holiday Number 1889).

15. Louis H. Gibson, "Mill and Factory Building," *Wood and Iron*, 3 (December 1882), pp. 1, 21-22.
16. Church, "A Successful Money-Making Mill," p. 235.
17. Francis J. Alberts, ed., *Sod House Memories, Vol. I-III* (Sod House Society, 1972), pp. 213-219; Berwyn History Book Committee, *Muddy Creek Meanderings* (Callaway: *Loup Valley Queen*, 1979), p. 14.
18. Untitled article on mill construction, *The Weekly Northwestern Miller*, 20 (July 7, 1893), p. 36.
19. Gibson, "Mill Architecture."
20. Charles Kuhlman, *The Development of the Flour Milling Industry in the United States* (Clifton, N.J.: Augustus M. Kelley, 1973), p. 229.
21. Daylight constructed mills built in Nebraska were the original Gooch Mill in Lincoln, 1908; Maney Mill, Omaha, 1910; S. F. Gilman Mill, Pierce, 1914; Lexington Mill, Lexington, 1915; Hastings Mill Company, Hastings, 1917; Gibbon Mill, Gibbon, 1919; Crete Mills, Crete, 1919; new Gooch Mill, 1920; Nebraska Consolidated Mills, Omaha plant, 1932; and Nebraska Consolidated Mills, Grand Island plant, 1936.
22. "An Innovation in Mill Construction," *American Miller*, 51 (November 1923), p. 1,155.