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_XX_ New Submission ____ Amended Submission

A. Name of Multiple Property Listing

Grain Storage and Processing Facilities in Western Oklahoma

B. Associated Historic Contexts

(Name each associated historic context, identifying theme, geographical area, and chronological period for each.)

Grain Storage and Processing Facilities in Western Oklahoma, 1889-1950

C. Form Prepared by

name/title George O. Carney, Prof. of Geography; ed. Cynthia Savage, OK/SHPO

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D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR Part 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. (___ See continuation sheet for additional comments.)

Bob Blackburn 1-24-2000

Signature and title of certifying official Date

Oklahoma Historical Society; SHPO

State or Federal agency and bureau

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Beth Boland 3/18/00

Signature of the Keeper Date

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Provide the following information on continuation sheets. Cite the letter and the title before each section of the narrative. Assign page numbers according to the instructions for continuation sheets in How to Complete the Multiple Property Documentation Form (National Register Bulletin 16B). Fill in page numbers for each section in the space below.

E. STATEMENT OF HISTORIC CONTEXT

Grain storage and processing facilities in western Oklahoma, as elsewhere in the state and nation, are historically and architecturally significant. Early in this century the Swiss-French architect, Le Corbusier, taught that architecture was "the masterful, correct and magnificent play of masses brought together in light."[1] Numerous structures in Europe embodied this principle, but nothing illustrated it quite so well, he thought, as the concrete grain elevators and factories in America. These, he said in 1927, were "the magnificent first fruits of the New Age" of architecture.[2] Determined by engineering and without artistic ornamentation, the great primary forms of the elevator and the factory for him bespoke functionalism and modernity. Moreover, they symbolized and embodied the Modern (International) Style that dominated architecture during the first four decades of the century.[3] So far as is known, Le Corbusier never saw the concrete grain elevators of western Oklahoma, but doubtless they would have been just as symbolic of the much proclaimed "New Age" as those further East.

On the Great Plains in general and Oklahoma in specific, grain storage and processing facilities were less a language of forms for industrial architecture than representations of human habitation. Looming well above the flat horizon, they identified and continue to identify commercial centers, agricultural settlements, and market points. They celebrate the frontiersman's historic subjugation of nature. They proclaim an ever abundant granary, an infatuation with technology, and even citizenship in the world community. Put differently, grain storage and processing facilities are to Oklahomans profound symbols of both time and place rather than classic examples of functional architecture.

However viewed, grain storage and processing facilities in western Oklahoma had their genesis in the evolution of commercial agriculture. That development came late to western Oklahoma. The Comanche, Kiowa, Cheyenne, Arapaho, Wichita and Caddo tribes, despite the efforts of their agents and Christian missionaries, engaged in little more than subsistence farming during the so-called reservation era (1867-1892). Their unwillingness to become cultivators of the land--to make nature produce more--accounted in part for demands to allot the tribal reservations in 160 acre units to individual Indians and to sell the "surplus" to land-hungry whites. Surely this explained the rhetoric of the infamous Oklahoma Boomers, C. C. Carpenter and David L. Payne, both of whom saw Indian Territory as "the Promised Land" for white agriculturalists.

With the opening of the Unassigned Lands for non-Indian settlement in 1889 and the subsequent organization of Oklahoma Territory, the demands for cheap land merely intensified. Unsupported by federal officials, the Indians could no longer resist. Between 1890 and 1894, therefore, the different Indian groups of western Oklahoma reluctantly consented to the allotment of their reservations in severalty, the termination of tribal government, and the sale of "surplus" land.

Once formal agreements were negotiated, United States officials promptly made the reservations available for non-Indian settlement. The Cheyenne and Arapaho Reservation and the Cherokee Outlet were opened by runs on April 19, 1892, and September 16, 1893, respectively. The Comanche, Kiowa, Wichita and Caddo reservations were opened by lottery during the summer of 1901, while the "Big Pasture" was opened by sealed bids in December, 1906. In the meantime, old Greer County had been attached to Oklahoma by a United States Supreme Court decision and opened to public settlement in 1896, although homesteading had occurred prior to that year. With these openings, the population of Oklahoma Territory (the western one-half of the modern state) swelled to 700,000.

In addition to dramatic increases in Euro-American population, to "open" the tribal domains in western Oklahoma meant to begin commercial agriculture. A persistent drought that gripped the Great Plains made farming primarily an act of faith during the early years, although in 1891 the harvest was sufficiently large that part of it could be shipped by special train to market in the North.[4] Abundant moisture during the winter and spring of 1896 enabled Oklahoma farmers to harvest 2,250,000 bushels of wheat from approximately 250,000 acres placed in production. The next year the harvest was 11,700,000 bushels from 650,000 acres. By 1899 Oklahoma farmers produced 20,309,000 bushels on 1,527,000 acres.[5] New production on lands opened by lottery two years later only increased the totals. By 1920, Oklahomans produced 55,905,000 bushels of wheat on 3,727,000 acres, most of which were in the western counties.[6]

Usually winter wheat was the principal cash crop in territorial Oklahoma. The amount of revenue derived from its sale determined how well, or if at all, a farmer survived on his new homestead. Accessibility to the market place, therefore, was absolutely critical. Abundant harvests had little value if they remained in the field or in the barn. Oklahoma agriculturalists were more fortunate than those in other areas of the United States when their land opened to settlement. Even before many broke sod, some access to the market was virtually assured to Oklahoma farmers.

In western Oklahoma, railroads generally preceded settlement. The Santa Fe Railroad, for example, completed two lines connecting Kansas with Texas in 1887, one across central Oklahoma and the other through Woodward in northwestern Oklahoma. At the time only Boomers contested Indian control of the area. By 1890, the Chicago, Rock Island and Pacific linked Kansas and Texas via points that two and three years later would become Enid and Chickasha. The Rock Island established another link through Hooker in the Panhandle in 1901. After 1895, the Choctaw, Oklahoma, and Gulf Railway Company (later controlled by the Rock Island) built west from El Reno via Clinton to Texas. The St. Louis and San Francisco Railroad (Frisco) as well as the Missouri, Kansas, and Texas Railroad (MKT) also built north-south lines across western Oklahoma.

Not only did railroad construction precede land openings, but it actually channelled settlement. Agriculturalists generally selected their new homesteads so that it would be within a day's wagon ride of the line, preferably a stopping point on it. Such a location had numerous advantages. It facilitated communication with family "in the states"; it gave access to a commercial center; and, it permitted interaction with a local community. Most important, being near the railroad assured access to a market for winter wheat at some terminal or mill "up the line." So critical was the railroad to the success of any given farmstead that some areas (Mangum north to Woodward, for example) developed agriculturally only after the rail line (the M.K.T. in this instance) arrived.

From the beginning of settlement, therefore, profitable commercial agriculture in western Oklahoma depended upon the railroad, primarily to transport winter wheat to market outside of the state by box car. But there was an important intermediate step between the harvested crop and its shipment to a processing plant. During it, the grain was received from the grower, graded, cleaned, dried, weighed, and elevated to the top of a structure where it was distributed by gravity to vertical storage bins or waiting railroad cars. This entire process was completed at the country elevator. The elevator and the railroad combined, the _Scientific American_ proclaimed in 1909, "enabled the United States to handle wheat with an economy and dispatch...not to be matched in any part of the world."[7]

Technically, the grain storage elevator was (and is) a facility that stored dry, small cereal grains. It had a function different, for example, from cribs and silos which stored, respectively, corn still on the ear and fermenting pieces of an entire plant. Elevators also handled grain in bulk, rather than in bags or other containers, and stored, moved and processed grain vertically.[8]

The modern grain elevator had evolved a half-century before commercial agriculture appeared in Oklahoma. As American farmers began to produce for a market economy, they first shipped their grain to customers in bags. This method kept the grain intact and identifiable all the way to the mill, where it was unloaded (as it had been loaded) by hand. Especially for mass, long distance distribution, however, such a system was both cumbersome and inefficient.[9]

Two simultaneous and interrelated developments altered the shipping process. On the one hand, a new system of grading and pricing made identification of an individual shipment unnecessary and permitted grain to be transported in bulk. On the other, new technology enabled the vertical lifting of that grain mechanically. The two together made bagging wholly unnecessary and gave birth to the elevator.

Actually the technology was not all that new. In 1785, Oliver Evans first conceived of lifting grain by a bucket conveyor, or series of scoops affixed to a belt which passed over two end pulleys. His friend, Joseph Dart of Buffalo, New York, in 1843 applied the technology, driven by steam power, to the task of "elevating" grain from the holds of large lake vessels to the top of intermediate storage bins whose outflow could be directed to canal barges or railroad cars. Loading and unloading tasks that once took several days could be accomplished in a matter of hours. Dart's application was so successful that Buffalo became the principal terminal port handling western American grain destined for eastern and European markets.[10]

By the time of the American Civil War, the vertical handling and storage of bulk grain was commonplace throughout the Midwest, in ports, mills and country elevators. The system expanded rapidly to the Great Plains and then, almost as an afterthought, to Oklahoma with its belated opening to non-Indian settlement in 1889. By then the country elevator contained a "boot" into which farmers dumped their crop, a vertical belt-and-bucket conveyor that lifted the grain from the boot to a cupola (or headhouse) from which it was spouted to a series of walled bins for bulk storage. At the bottom of the bins were openings out of which the grain emptied by gravity, to be shoveled or conveyed along a trough to the boot where it would be lifted again, but this time to chutes connected to waiting railroad cars.[11]

Storage of wheat in tall, narrow bins proved eminently functional. Small grain acted neither as a liquid nor a solid when stored. Within the mass of grain, internal friction produced an arching effect, which in turn was partly transferred by friction to a downward vertical compression in the bin walls. Consequently, there was little force exerted on the floor of the bin, and the floor could stand unsupported over an emptying trough. More important is that little outward, horizontal tension-producing force was exerted (as it was with a fluid) and the walls could be thin. This was particularly important in encouraging the early use of reinforced concrete, strong in compression but weak in tension.[12]

The first storage elevators in Oklahoma, however, were not built of concrete but of wood. As was the practice elsewhere in 1889, carpenters used a "cribbed" technique of unknown origin to construct elevator walls. Two-inch-thick planks, four to ten inches wide depending upon the height of the elevator, were laid flat and spiked through one another. The planks were overlapped at the corners and tie rods extended through the bins to add verical stability. These would be braced vertically on the exterior. To protect the exterior wood walls from natural elements and sparks from locomotives, builders usually added corrugated, galvanized iron or tin sheeting (iron clads). Strong and heavy, elevators of this type had a storage capacity of 20,000 to 40,000 bushels of wheat and cost .20 to .25 cents per bushel to build.[13] This was the model for most of the 249 elevators operating in Oklahoma in 1901.[14] Wood elevators were also constructed with lapped-board sides. These structures had balloon frames with 1 x 6 wood siding nailed to the studs, hence the term "studded" was used. Tie rods extended through the bins and were anchored to horizontal braces on the exterior walls. These elevators too were covered with some kind of tin or corrugated iron sheeting.

Whether cribbed or studded, wood elevators had distinct disadvantages. They were easily infested by insects and rodents; grain caught in cracks spoiled and rotted. They depreciated in value rapidly, and they were seldom useful for more than fifteen years. Most important was that wood elevators were susceptible to fire, an ever present concern that drove insurance rates to fantastic heights. Nonetheless, "iron clads" remained relatively popular throughout western, especially southwestern, Oklahoma with many new ones being constructed shortly after World War II and some as late as 1956.

As an alternative to wood, elevator operators nationally experimented with other materials. By 1900 in "an entirely new departure," some had turned to steel. Circular storage bins constructed of multiple quarter inch or one-half inch plate steel panels bolted together were advertised as "Fireproof Elevators

That Pay For Themselves." Presumably they were air tight and moisture proof, factors that eliminated the twin dangers of weevils and fire and worked to reduce the cost of insurance.[15] Steel was widely used in terminal elevators in Buffalo and Minneapolis, but it was also utilized by elevator operators in newly settled Oklahoma.[16] Many plate steel tanks were installed as late as the 1950s, and, of course, today most new grain storage bins (as opposed to elevators per se) are constructed of corrugated steel.

As an option to wood some operators preferred glazed, clay tile rather than steel. The circular bins were constructed of hollow tiles a foot square and approximately four inches thick. They were always reinforced with horizontal and/or vertical steel rods or straps, and their exterior walls were often coated with some kind of sealant to prevent moisture damage.[17] Less costly than steel bins but just as fireproof, these terra cotta tiles proved a popular construction material in Oklahoma farm cooperative elevators after World War I. They were relatively cheap and laying them was not beyond the skills of local farmers.

But tile and even steel were never as widely used as concrete. Horace Peavey built the first concrete elevator in North America on the outskirts of Minneapolis in 1900. It was cylindrical in shape, 25 feet in diameter, 80 feet in height (later raised to 120 feet), and had walls 12 inches thick at the base and 6 inches thick at the top. Cast-in-place with walls raised by slip-forms, the structure had a storage capacity of 30,000 bushels of wheat. When "Peavey's Folly" failed to collapse as it emptied, Peavey went on to build a cluster of elevators that had a storage capacity of one million bushels.[18]

Rapidly thereafter concrete became the material of choice for large terminal elevators such as those at Buffalo, Chicago, and Minneapolis. In country elevators the shift came more slowly. The cost of concrete construction exceeded that for wood, steel, or tile. Yet by World War I hazard insurance costs for concrete elevators was only 15 to 20 percent of those assessed on wood elevators, a fact that made it possible to recoup additional initial costs within five years of operation.[19] This, plus the fact that depreciation was much less, meant that by far the majority of all rural elevators nationwide were constructed of concrete after 1920. In Oklahoma, significantly, the shift to concrete elevators lagged behind the national schedule by at least a decade.

Not until 1914, when Sooner farmers planted 2.7 million acres of wheat, did the state become one of the major wheat producers in the nation. It enhanced its position as local growers met the international demands of World

War I, with acreage planted climbing to nearly 4.7 million acres in 1919, a level maintained on the average for the next two decades.[20] But the record yield of 66 million bushels of wheat in 1919 inundated the 17.5 million bushel storage capacity of the state's 866 elevators. The more normal harvest of 48 million bushels produced on the average between 1920 and 1940 taxed it as well.[21]

The lack of storage meant that growers had to sell their crop as it was harvested. Because of the large supply of grain nationwide at that point in time, prices were always lower. Moreover, the price per bushel of wheat went on a 25 year decline after 1920. Given the generally depressed conditions, farmers hoped to minimize their losses by holding new crops off the market until well after harvest when prices usually increased. Yet to gain this small advantage growers had to have much larger storage capacities.[22]

To respond to these market conditions as well as to accommodate Oklahoma's ever-flowing granary, elevator operators modernized and expanded their old facilities or built entirely new ones. In addition to "iron clads," among the latter were farmer-built tile elevators, the most conspicuous of which was at Imo.[23] They also entered Le Corbusier's "New Age" of modernity by building additional elevators out of concrete. This "flood" of construction activity was so profound, so widespread that by 1950 most of the nearly 500 grain elevators operating in western Oklahoma were less than 30 years old.[24] Of that number, surprisingly, probably no more than one-half had been constructed from concrete. The oldest, the Opitz Elevator at Binger which dated from 1906, was rectangular in design. Oklahoma's flour mills were the first to employ concrete circular bin construction, beginning in 1915 with Chickasha Milling. It was not until the late 1920s and 1930s, however, that concrete elevators so often identified with the wheat belt appeared with any frequency.

Beyond the skills of local carpenters who had built wood, tile and even concrete models, the new concrete structures required the talents of contractors and engineers trained in the nuances of industrial construction. Not just anyone could cast walls in place with slip-form technology! As such, specialized replaced vernacular construction. One of the more successful firms doing that kind of technical construction in Oklahoma was Chalmers and Borton of Hutchinson, Kansas (now Borton, Inc.). During the 1930s it built twenty-two elevators in Oklahoma. Other successful contractors operating in the state included Burrell Engineering, Chicago, Illinois; Southwest Engineering, Fort Worth, Texas; A. F. Roberts of Sabetha, Kansas; Johnson and Sampson Company, later just Sampson Company, Hutchinson, Kansas; and Tillotson Company, Omaha, Nebraska.[25]

Concrete country elevators constructed in Oklahoma during the 1930s and 1940s varied little in design and setting. Central to each was the so-called "main house." The heart of the grain elevator, it contained storage bins, work bins for handling and blending grain, the truck driveway and dump pit (boot), the main elevator leg and distributor for directing the grain to various storage units, and equipment to load the grain into rail cars. Externally it appeared to be a complex of four to six cylindrical bins constructed of 6 to 7 inch thick, reinforced concrete, with each bin 125 feet high and 18 feet in diameter and capable of storing 25,000 bushels of wheat. The bins were capped with a flat roof, also of concrete, on top of which was a rectangular headhouse, "Texas" or cupola with a flat concrete roof. Its verticality on an otherwise flat landscape made the main house visually striking.[26]

Concrete elevators seldom stood alone. Attached or adjacent to the bins or "tanks," operators often built a rectangular, single story office/retail facility, with either a flat or gable roof line. Scales to weigh trucks were usually connected to this building. If the elevator was a part of a cooperative or retail establishment, the property usually contained a single story warehouse with a loading dock where sack-feed was stored and dispensed. Thus, the concrete elevator was a part of a vital commercial center.[27]

In addition to storage elevators, there were also processing elevators. This type of grain elevator received grain locally or regionally and then milled it into flour or feed for distribution and sale to nearby and distant markets. Flour mills dominated the milling industry in Oklahoma. In 1898 there were 22 flour mills with a daily capacity of 3,000 barrels in Oklahoma. Three years later, the number had increased to 50 mills with a milling capacity of 7,000 barrels.[28] By 1937, there were 45 mills in Oklahoma with a daily capacity of 23,000 barrels of flour. Eighty percent of its production was sold to bakeries. During the pre-World War II period, flour milling constituted Oklahoma's third largest manufacturing industry.[29] As such, flour mill elevators were an important segment in the industrial history of Oklahoma.

Feed mills were also important economic entities within the state, albeit on a smaller scale. Although usually producing for a local market only, feed mills manufactured an important product for area farmers -- feed for their livestock. As such, feed mills were important to the evolution of agriculture in western Oklahoma. During the early decades of the twentieth century, farmers began to diversify their crops as the farming industry changed from primarily subsistence to commercial agriculture. An important component in this diversification was the development of a livestock industry. By the 1920s and 1930s, western Oklahoma farmers were expanding and upgrading their livestock operations as livestock breeds were improved, particularly poultry, dairy cattle and beef cattle. As farmers moved toward diversification, feed mill elevators emerged to satisfy the demand for livestock feed. Additionally, because feed mills usually produced for the local market, the feed mill elevator became an important componet in the agricultural and commercial life of small towns of western Oklahoma. The feed mill elevator attracted farmers to town, thereby stimulating the local economy as they purchased goods and services from local businesses.

The different variety of grain elevators that were typical in western Oklahoma operated under four different types of ownership: independent, "line," co-op, and wheat pool.[30] Probably the majority were independents, that is owned by individuals or families who lived in the local community. For profit they stored, bought, and sold grain produced in the immediate hinterland. Owners often retailed feed and implements in conjunction with elevator activity.

On the basis of volume of wheat received, so-called "line" elevators were particularly important. This type of facility was not owned by a railroad company but was one of several elevators situated along one or more rail lines that were owned by a single entity that also operated a terminal elevator and was a member of the grain and feed dealers association. Wheat, therefore, moved from the line elevator that might operate only during harvest to the terminal facility. Some of the more notable firms that operated as line elevators included the Feuquay Grain Company in Enid, Kimbell Milling Company in Fort Worth, Texas, W.B. Johnston Grain Company in Enid, and Yukon Mill & Grain Company in Yukon.

To competitors as well as grain growers, the line operators, or syndicates, took "unfair" advantage of their strong economic position. Most, they believed, were in league with the railroad company whose right-of-way they leased and upon which they built their elevators, citing as an example, the operating arrangement between Kimbell Mills Company and the MKT railroad. Presumably competing elevators had difficulty getting rail service, while line elevators cheated the producer systematically by buying his wheat at a low grade and then selling the same wheat at a higher grade. On the whole, especially with the price of wheat plummeting from $1.52 per bushel in 1866 to .49 cents in 1894, improving during World War I but dropping again below $1.00 per bushel during the 1920s and 1930s, farmers and independent elevators saw the line elevators as the incarnation of evil, the embodiment of the fabled "Robber Baron" of the Gilded Age.[31]

This view of conditions within the grain elevator industry, among other things, helped produce the famous Populist Revolt in the 1880s and 1890s. Rural discontent spawned vigorous political activity and an agenda of social and economic reform. A part of the latter was a movement for farmers to organize and operate country elevators cooperatively. That movement found a receptive audience in early Oklahoma.

Co-ops, of course, were not new. Since the mid-1870s, farmers had utilized the Rochdale cooperative idea to enhance their purchasing power. Specifically, they established consumer cooperatives that sold retail goods at standard prices to all customers. Membership in the organization was open to all interested parties, with each member entitled only to one vote. Whatever profits were generated by the retail operation were then divided annually among the membership.[32]

The cooperative idea applied to country elevators, however, was new. Tried initially in Rockwell, Iowa, in 1889, the scheme bore little fruit until after the turn of the century.[33] The first farmer's co-operative elevator in Oklahoma, the Roger Mills County Co-op, was organized in Elk City in 1905. There were 36 in 1913. A statewide organization formed the next year, and the number of associations increased dramatically between 1916 and 1922. By 1937 there were a total of 91 in the Sooner State with a combined membership of 13,500. With less than 20 percent of the total number of country elevators but with a storage capacity of 10,000,000 bushels of wheat, the farmer's co-ops handled 36 percent of the annual harvest. Most of that was then sent to market through a cooperative terminal elevator in Enid, the Union Equity Exchange.[34]

The Oklahoma Wheat Pool also embodied the cooperative principle, but with a slight twist. Organized in 1921, its 5,500 members signed contracts pledging to deliver all of their wheat to the association. The pool then hired a marketing expert to sell the crop, the cost of which was deducted from the gross proceeds and the remainder then divided equally according to quality and quantity of wheat delivered. It was essentially an effort to eliminate the middleman from the market equation. In 1928 a subsidiary of the pool organized an elevator corporation and bought or leased elevators (usually farmer built) in 52 different locations in western Oklahoma. The Wheat Pool elevators operated with a measure of success until 1936, when most were re-sold to farmers co-ops.[35]

Ironically, in the late 1930s in the depths of economic depression, Oklahoma's co-ops were surprisingly healthy. Their organizations were the first to construct a significant number of cylindrical, concrete country elevators. Strong support by the membership accounted for some of this prosperity, but most of it came from the preferential treatment the co-ops received from federal-government sponsored programs. United States Department of Agriculture loans, especially, financed much of the elevator construction in western Oklahoma during the depression and after World War II.

The cooperative movement was but one response to farmer concerns about conditions in the grain elevator industry. Another was to demand laws that would assure that elevator operators treated the grower fairly. As early as 1899 the Oklahoma territorial legislature passed a public warehouse act that placed grain elevators with a capacity of 25,000 or more bushels under territorial regulation. The purpose of the law was to assure that wheat was properly graded and that when a farmer deposited grain he would be honestly receipted. The legislators created an independent board to carry out the law.[36]

Under pressure from the Farmer's Union organization and the influential Oklahoma Farmer-Stockman, in 1923 Oklahoma's law makers acted to improve the original warehouse law. The new act brought elevators under greater public scrutiny, established the office of State Warehouse Superintendent, and made the State Board of Agriculture responsible for administering the law. The measure also authorized an appropriation of $1.25 million to invest in farmer's co-ops. This statute remained operative until 1951 when the legislature replaced it with a law that instituted a system of state and federal licensing.[37]

If nothing else, state warehouse laws, as well as the cooperative movement itself, reflected the vital importance of grain elevators to economic survival in western Oklahoma. Whatever the type (storage or processing) or class (independent, line, co-op, or wheat pool), wheat growers encountered the hard facts of real life in the grain elevators -- the fickleness of the market place, debits and credits, and profits and losses. Cooperative elevators, wheat pools, government programs and regulatory laws were culminations of efforts by the grower to eliminate some of his risks, to turn the odds more in his favor. These realities notwithstanding, the grain elevator was more than a mere, albeit important economic institution. It also spoke, and speaks, to man's understanding of himself.

By the early 1940s, events that altered the course of American history especially affected Oklahoma. The stock market crash of 1929 and resultant depression of the 1930s combined with a severe drought in the same decade almost devastated Oklahoma agriculture. Grain farmers witnessed plummeting prices as the agricultural sector of the nation's economy was among the first to be affected by the economic downturn. The Great Depression created an unemployment situation never before known in the country. Consumption of farm produce decreased resulting in overproduction and agricultural surpluses which drove market prices downward. In an attempt to solve the economic crisis, New Deal agricultural programs (e.g., the Agricultural Adjustment Act) of the 1930s forced a reduction in production. Consequently, the need for grain storage facilities declined.

Compounding the economic problem in the 1930s was the lack of rainfall that plagued western Oklahoma. Because of poor soil conservation measures, the farmers of Oklahoma watched the wind carry off their precious top soil resulting in the infamous Dust Bowl conditions of the 1930s. Farmers were forced off the land and 100,000 Oklahomans fled the state to seek employment opportunities elsewhere. As a result, grain production was curtailed and the construction of new grain storage and processing facilities waned.

In 1941, a third event in American history changed the status of grain storage and processing facilities in western Oklahoma. With the bombing of Pearl Harbor, the United States entered World War II. Construction of new grain storage and processing facilities was slowed as human and natural resources were diverted to the war-time effort. Construction companies and their workers were engaged in building defense plants rather than grain elevators. Less man and woman power was available for agricultural purposes due to the high demands in military service and work in defense-related industries. The need for grain storage facilities also lessened as farm commodities were immediately converted for use in the war to feed troops at home and overseas.

Thus, the economic, environmental, and political forces of the late 1930s and early 1940s greatly affected the patterns of land use, industrial development, and economic conditions in western Oklahoma. The region, however, survived these pivotal events in American history and none of them permanently erased the grain storage and processing facilities from the western Oklahoma cultural landscape -- visual reminders of an earlier era in the agricultural, commercial, and industrial history of the area.

Architecturally, Le Corbusier and other European interpreters saw American grain elevators, especially those in Buffalo, New York, as "touchstones of modernity." They were much impressed with the rock bottom simplicity and enormous scale of the elevator. Walter Gropius thought that they were "almost worthy of comparison with the works of the Ancient Egyptians," and that their large form was "natural" and "in harmony with universal order." Moreover, that form was dictated by a function that was "overwhelmingly clear to the passer-by." And since functionalism was a cardinal tenet of the modernist school, American grain elevators were labeled as the first fruits of the Modern, or International Style of architecture.[38]

Historian Peter Banham has argued, on the other hand, that grain elevators as "romantic symbols of an industrial promised land to the West," i. e., "a concrete Atlantis," is nonsense. The elevator was not a monument but a process. The Fathers of Modernism apparently never even saw the functional side of an elevator. They were unaware that what gave it distinctiveness was not its row of cylindrical concrete bins but its mechanical installations that moved grain to the top of the bins, then from bin to bin, and finally into rail cars, barges, ships, or trucks. This apparatus, moreover, often occupied what appeared to be a central cylinder but was in fact only an interstitial. As such, form did not follow function. Also, the cylindrical concrete tanks prevailed in elevator work not because it bore comparison with the works of the Ancient Egyptians or reminded one of the columniation of Greek temples, "but because it was cheaper." The elevator was an expression of classic Americanism, Banham concluded, rather than "the ultimate metaphysic of form."[39]

If Banham is correct, the Fathers of Modernism may well have attributed too much to the concrete grain elevator, especially those like the country elevators in western Oklahoma that "shine encouragingly in the sun as they bulk-handle their grain vertically...." Yet these Cathedrals of the Prairies do constitute powerful examples of "architectural-engineering sculpture" at a giant's scale. And they do embody a high degree of functionalism--both material and economic.[40] Or, as Le Corbusier had said, grain elevators were engineering solutions to a unique set of problems, "and they were almost invariably left unadorned."[41] Within these parameters, they have considerable architectural significance.

The grain storage and processing facilities of western Oklahoma also dominate the visual landscape. This is due in part to their simplicity of form and their verticality in relatively flat terrain. It is also because of their regular spacing. "Always in sight," architect Robert Riley has written about midwestern and Canadian elevators, "they measure the traveler's passage with a near hypnotic rhythm, marking achievement of distance and beckoning on, a slower, dramatic counter point to the quick rhythm and small scale of the telephone poles." That spacing is rationally determined. The grower wanted the elevator close to him; the railroads wanted elevators as far apart as possible. The compromise was the spacing of elevators from about six to eight miles apart.[42]

In western Oklahoma the modern traveler will predominately see two basic visual types of elevators. One, the oldest in point of time, is the wood framed, "iron clad" structure "with shed or gabled roofs capping a potpourri of rectilinear, ad-hoc looking volumes." It is a classic example of a truly vernacular architecture. Another type, more recent in date, is the familiar concrete landmark with its cylindrical bins and rectilinear headhouse. To the transient and the resident, both profoundly bespeak "settlement" across the miles of plains. Sadly, the mammoth corrugated steel bins which today are often connected to the wood or concrete main houses with a maze of belts, pipes and wires seem more abstract and less humanized, like ships passing silently in the night.[43]

Whatever the message that is communicated, grain storage and processing facilities in western Oklahoma are symbols of significance. They are hardly Le Corbusier's "first fruits of a New Age" of architecture, but they are indeed what Robert Riley has called "honest expression(s) of material and function." On a different level, they also symbolize a regional landscape, culture and history. They are, put succinctly, "a part and essence of a place," without which western Oklahoma would lose much of its visual distinctiveness.[44]

ENDNOTES

1. Robert B. Riley, "Grain Elevators: Symbols of Time, Place and Honest Building," AIA Journal 66 (November 1977): 50.

2. Quoted in Peter Banham, A Concrete Atlantis: U.S. Industrial Building and Modern Architecture, 1900-1925 (Cambridge, 1986), 7.

3. Ibid., 3 and 7.

4. "Transportation of Grain in the United States," Scientific American 66 (October 24, 1891): 258.

5. Donald E. Green, "Beginnings of Wheat Culture in Oklahoma," Rural Oklahoma, ed. by Donald E. Green (Oklahoma City, 1977), 56, 59; Oklahoma Agricultural Experiment Station, A Statistical Handbook of Oklahoma Agriculture, Agriculture Experiment Station Misc. Pub. # P-14 (Stillwater, 1949), 15.

6. Statistical Abstract of Oklahoma (Norman: College of Business, University of Oklahoma, 1956), 120.

7. "Handling and Storage of Our Huge Grain Crop," Scientific American 101 (December 11, 1909): 444.

8. Riley, "Grain Elevators," 50. See also Harry D. Fornari, "Recent Developments in the American Grain Storage Industry," Agriculture History 56 (January 1982): 265.

9. Harold Smith Patton, Grain Growers Cooperation in Western Canada (Cambridge, 1928), 14.

10. Joseph Dart, "The Grain Elevators of Buffalo," in Buffalo Historical Society Publications, 1 (Buffalo, 1979), 17-24. See also John T. Schlebecker, Thereby We Thrive: A History of American Farming, 1607-1972 (Ames, 1975), 132.

11. "Handling and Storage of our Huge Grain Crop," 444.

12. Riley, "Grain Elevators," 51.

13. Ibid.; "Wood-Frame Elevators in the Panhandle," National Register Nomination File, State Historic Preservation Office, Oklahoma Historical Society, Oklahoma City. The Armour Elevator in Chicago, constructed in 1887-88, contained 8,000,000 board feet of wood and 4,000 kegs of nails. See "Transportation of Grain in the United States," 258.

14. United States, Department of Interior, Annual Report of the (Territorial) Governor of Oklahoma, 1901 (Washington, D.C., 1902), 74.

15. "Fireproof Steel and Brick Grain Elevators at Buffalo," Scientific American 7 (December 25, 1897): 401; Steel Storage and Elevator Construction Co., Fireproof Elevators That Pay For Themselves (Buffalo, 1900), 5.

16. Banham, A Concrete Atlantis, 124-132.

17. Ibid., 133-37; Milo Smith Ketchum, The Design of Walls, Bins, and Grain Elevators (New York, 1919), 385, "Modern Grain Elevators," Scientific American 85 (August 24, 1901): 117.

18. Banham, A Concrete Atlantis, 137-141.

19. Portland Cement Association, Concrete Grain Bins and Elevators (Chicago, 1917), 10; Riley, "Grain Elevators," 52. The insurance rates assumed that the concrete elevators were virtually fireproof. Unfortunately, from time to time they did explode because of grain dust ignition. See Proceedings of a Conference of Men Engaged in Grain Dust Explosion and Fire Prevention Campaign (New York, 1920), 11, 92; and Keith E. Jackson, Grain Elevator Dust Explosions (Springfield, Ill., 1979), i.

20. A Statistical Handbook of Oklahoma Agriculture, 15; K. D. Blood & Marjorie Lee Hill, Wheat Production in Oklahoma, 1894-1938, Agricultural Experiment Station Circular #92 (Stillwater, 1941), 5.

21. John Shorthill, Management of Country Elevators (Chicago, 1922), 20. In terms of storage capacity, Oklahoma ranked twentieth nationally. Illinois was first with 148 million bushels; Kansas was fifth with 58 million bushels. Kansas also had 1,800 elevators.

22. Oklahoma Farmer-Stockman, July 7 and 25, 1920.

23. Green, "Beginnings of Wheat Culture in Oklahoma," 70. Green is mistaken when he argues that the elevator at Imo was the first concrete cylindrical elevator in Oklahoma. Despite a story to the contrary in the Oklahoma Farmer-Stockman, January 25, 1921, that structure was fashioned from clay tile. It is still in use today (1993).

24. Thomas E. Hall, New Country Elevator, Farmers Cooperative Service Circular #10 (Washington, D. C., 1955), 1.

25. Company compilation contained in a letter from Norma Branson to David Baird, March 2, 1990, Hutchinson, Kansas.

26. Heber D. Bourland, Locating, Designing, and Building Country Grain Elevators, Agriculture Information Bulletin #310 (Washington, D. C., 1966), 2-13; Ketchum, The Design of Walls, Bins, and Grain Elevators, 362; Heber D. Bourland and Lloyd L. Smith, A Small Country Elevator for Merchandising Grain, USDA Marketing Research Report #387 (Washington, D. C., 1960), 12.

27. Bourland, Locating, Designing, and Building Country Grain Elevators, 3-10.

28. United States Department of Interior, Annual Report of the (Territorial) Governor of Oklahoma, 1898, 53; ibid., 1901, 112-13.

29. Frederic T. Dines, "Quality of Wheat Varieties Grown in Oklahoma in 1938," Agricultural Experiment Station Circular No. 85 (Stillwater, 1939), p. 5; American Miller, 68 (February 1940): 81-82.

30. O. N. Refsell, "Farmer's Elevator Movement, I," Journal of Political Economy, 22 (November 1914): 872.

31. O. N. Refsell, "Farmer's Elevator Movement, I," 875-80; Gilbert Fite, Farm to Factory: A History of the Consumer Cooperative Association (Columbia, 1965), 3-4. See also Joseph B. Kenkel, The Cooperative Elevator Movement: A Study in Grain Marketing at Country Points in the North Central States (Washington, D.C., 1922), 15-21.

32. Fite, Farm to Factory, 6.

33. Refsell, "Farmer's Elevator Movement, I, 890; ibid., "Farmer's Elevator Movement, II," Journal of Political Economy 22 (December 1914): 969.

34. Harold Hedges, Operations of Cooperative Grain Elevators in Kansas and Oklahoma in Bulletin No. 30 (Washington, D. C.: Farm Credit Association, 1939), 1-7. By way of comparison, there were 271 associations in Kansas with 38,000 members. Their elevators had a storage capacity of 28,500,000 bushels and handled 24 percent of the 1936 wheat crop. See also Yearbook of the United States Department of Agriculture, 1913 (Washington, D. C., 1914), 249.

35. The Oklahoma Farmer-Stockman, June 10, 1921, and September 15, 1929.

36. United States Department of Interior, Annual Report of the (Territorial) Governor of Oklahoma, 1901, 73.

37. Statutes of Oklahoma, March 10, 1899 and March 26, 1923; Oklahoma State Board of Agriculture, Annual Report for 1951 (Oklahoma City, 1952), 7-8.

38. Peter Banham, "Catacombs of the Modern Movement," Archetype 1 (Winter, 1980): 43, 47.

39. Ibid., 44, 45, 47.

40. G. E. Kidder Smith, The Architecture of the United States, Vol. 3 (Garden City, N. Y., 1981): 337, 354, 473-74.

41. Riley, "Grain Elevators," 54.

42. Ibid, 53.

43. Ibid, 54.

44. Ibid, 55.

F. ASSOCIATED PROPERTY TYPES

INTRODUCTION:

OUTLINE OF PROPERTY TYPES:

1. GRAIN ELEVATOR FUNCTIONS
    - A. GRAIN STORAGE ELEVATORS
    - B. GRAIN PROCESSING ELEVATORS
        1. FEED MILL ELEVATORS
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    - C. SECONDARY RESOURCES ASSOCIATED WITH GRAIN STORAGE AND PROCESSING FACILITIES
2. CONSTRUCTION MATERIAL OF GRAIN ELEVATORS AND ASSOCIATED STRUCTURES
    - A. GRAIN ELEVATORS
        1. IRON-CLAD WOOD COUNTRY ELEVATOR
        2. CLAY TILE COUNTRY ELEVATOR
        3. CONCRETE COUNTRY ELEVATOR
    - B. STORAGE TANKS
        1. STEEL STORAGE TANKS
        2. CONCRETE STORAGE TANKS
    - C. MILL BUILDINGS
        1. CONCRETE MILL BUILDINGS
        2. WOOD-FRAMED MILL BUILDINGS

INTRODUCTION:

The property type analysis is divided into two major sections. The first section addresses the basic functions of grain elevators, storage or processing of grain, and the secondary resources, offices and warehouses, commonly found within the elevator complex. Of the twenty-seven nominations included in this multiple property submission, seventeen are storage facilities and ten are processing facilities. One elevator was originally a storage facility but subsequently became a processing facility. The second part of the property type analysis evaluates grain elevators and their associated structures in terms of construction material. Due to a similarity in design, the construction material is often the defining feature of the grain elevator, regardless if it is a storage or processing facility. In this multiple property submission, two elevators are constructed of clay tile, thirteen are iron-clad and eleven are concrete. Additionally, one resources has both an iron-clad elevator and a concrete elevator.

1. GRAIN ELEVATOR FUNCTIONS

The term "elevator" can be applied to both the structure and the device used to transport grain vertically into storage bins within the structure. To avoid confusion, the transporting mechanism is sometimes referred to as the "legs," and the structures themselves as "elevators." The elevator was a facility that historically stored small cereal grains such as wheat, corn, oats, and barley. More recently, it has been used for other crops such as milo and soybeans. Its function differs from cribs, granaries, and silos which stored grain on the farm in smaller quantities to be fed directly to livestock. Elevators were more commonly associated with the commercial grain form of agriculture whereas farm site structures were oriented to subsistence agriculture. Elevators handled grain in bulk rather than in sacks or other containers, serving as centers for surplus production to be marketed on a profit-making basis as compared with subsistence farming which was characterized by production to satisfy basic needs of humans and livestock.

The elevator was a technological innovation of the Industrial Revolution which occurred in the United States during the late nineteenth and early twentieth century. Like many inventions of the "machine age," it affected the economic and commercial history of the nation, especially the Great Plains "wheat belt" states. It was built to expedite and facilitate a number of bulk grain operations with a minimum of power and labor including: (1) receiving, (2) elevating, (3) weighing, (4) cleaning, (5) drying, (6) grading, (7) distributing, (8) storing, and (9) shipping.

All grain elevators are composed of several components which are variously described in the literature. The workhouse, or workinghouse, contains the lower floors while the headhouse (cupola) consists of two to five upper stories. The workhouse name is derived from the fact that much of the receiving/unloading operation takes place on the work floor or first story of the elevator. This is where the elevating (lifting) process begins. The headhouse is so-called because the head drive of the vertical conveyor system is located there. The workhouse and headhouse together are often referred to as the mainhouse.

The mainhouse is the heart of the grain elevator. It contains storage bins, work bins for handling and blending the grain, the boot pit (central dump sink that receives grain from either an internal or external receiving dump), the elevator leg (shaft which houses the vertical conveyor system), and the distributor for directing movement of grain to various storage bins. In addition, the mainhouse usually has equipment for loading grain into large trucks or rail cars including a scale to weigh grain as it is loaded out.

An annex is built as an addition to the mainhouse. The layout of the typical annex consists of two rows of connected tanks with interstitial bins between the tanks. As a rule, the only mechanical equipment in the annex is the gallery belt conveyor, a tripper, and a tunnel belt conveyor. Grain is moved from the mainhouse to the annex bins by the gallery conveyor belt which runs above the bins. The tripper directs the grain into the proper bin. Grain is moved from the annex bins to the mainhouse on the tunnel conveyor belt which runs below the bins.

Elevators may be divided into two classes according to the arrangement of elevating machinery and storage bins: (1) self-contained with all elevating machinery, distributor, spouting system, and storage bins located in the mainhouse, or (2) annex with elevating machinery, distributor, and spouting system in the mainhouse while storage is in bins connected to the mainhouse by conveyors and external spouts. In the annex arrangement, the storage bins are placed as near as possible to the mainhouse in order to reduce time, machinery, and power needed to convey grain to and from storage. In both arrangements, the mainhouse is usually rectangular in shape with square or circular internal bins while the independent storage bins are generally circular.

A common characteristic of all grain elevators is the use of reinforced concrete foundations. This provides several advantages including a substantial support system to accommodate the tremendous weight of the grain; protection from rodents, sparrows, and pigeons; ease of salvaging all spilled grain and cleaning of the basement; and eliminates the possibility of termites.

Some type of power was necessary for all grain elevators when the high elevators displaced the flat warehouse and the moving of grain by manual labor. Engine-driven equipment and machinery went through the same stages as most technology of the twentieth century with energy derived first from steam, then gas, and finally electricity.

All elevators were plagued with a dust control problem which created explosions in the structures. Grain elevator builders and contractors moved to eliminate this problem through various methods: (1) no open top bins, (2) close fitting spouts with collars to keep dust in the grain, (3) dust collectors for every machine, (4) suction hoods for dump sinks, belt trippers, and loaders,

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(5) and, ventilators for bins, legs, scale hoppers, and garners (receiving bins in headhouse). Those ventilators attached to the roof of the headhouse had a special name, "cyclones."

The internal process and the equipment used to complete the procedure were similar in all grain elevators. A hopper-bottomed bin in the boot (usually 15' to 20' below receiving area) collects the grain dumped from wagons or trucks. From there a device known as a "leg" elevates the grain to the headhouse. The leg consists essentially of two pulleys, one in the boot and the other at the head, over which runs a belt. The leg is housed in a wooden or steel shaft and is powered by the leg motor, which varies in horsepower depending on height of lift, e.g., a 60' lift required a 7 1/2 h.p. motor. The leg belt consists of a 4-6 ply canvas material approximately 10-20" wide to which are attached metal cups, or buckets, hence the term "belt-and-bucket" conveyor system is used. The cups (buckets) range in size from 5"-7 1/2" wide and 8"-14" deep and are spaced on the belt approximately 12"-14" apart. Two types of cups (buckets) were used, called DP or V cups. The cups scoop up the grain from the boot and carry it to the head in the headhouse where it is received into a bin known as a "gerber," "garner," or "throat." From this receiving bin, grain moves by force of gravity to a scale hopper below and into the distributor spout. From there it travels into one of the various spouts mounted in the floor of the headhouse. The spouts are arranged in circular fashion in the floor, allowing the distributing spout to rotate on a wheel around the circle, dumping grain into whichever spout is chosen by the spout wheel operator. The spout wheel is a heavy metal device mounted on the elevator's ground floor. On the wheel are numbers designating different bins. The operator, dialing the wheel much in the manner of a rotary telephone, controls the movement of the distributing spout and thereby determines the grain's destination to either internal bins, annex tanks, or load-out spouts to wagons, trucks, or railroad cars.

The capacity of the elevator leg (bushels per hour) is dependent on three factors: (1) size of bucket (cup) (2) spacing of bucket on belt, and (3) velocity of belt in feet per minute. The velocity of belt in country elevators ranges from 300-500' per minute and is determined by the diameter of the head pulley (30" to 72") and the revolutions per minute of the head shaft.

Two methods are used by workers to reach the headhouse from the main floor. First, one can climb ladders attached to the elevator's interior walls. Second, a worker can ride up the man-lift. The man-lift is an open-sided wooden platform, barely large enough to accommodate one person, operated on a simple system of counterweights. A brake is released by depressing an iron rod in the platform floor, the counterweight then drops from suspension high above and the man-lift, tied to the weight by a heavy rope, rises essentially through the air carrying the worker upward to the headhouse. Counterweights can be adjusted to match the weight of different workers.

1A. GRAIN STORAGE ELEVATORS

Description:

The majority of grain storage facilities in western Oklahoma were, and still are, country elevators, sometimes referred to as "local" elevators. Because of the large quantities of grain (wheat, corn, and oats) being produced in the area prior to 1950, farmers needed storage facilities in order to handle their production before shipping to both in- and out-of-state markets. Grain was brought to the country elevator in bulk and purchased directly from the producers in the immediate hinterland. Country elevators allowed local farmers to hold their grain for a better price, provided adequate storage of grain to protect against waste and spoilage, accommodated large amounts of grain during peak harvest season, and prevented farmers from having to pay higher storage rates at terminal elevators.

The country elevator in western Oklahoma is generally located in an agricultural-oriented small town with a population ranging from 50 to 2500. In terms of siting, grain elevators are typically constructed in close proximity to a highway or paved road for easy shipment from the grain producer. For access to distant markets, the country elevator is generally built on a railroad right-of-way or near a railroad line. Railroad grain cars would transport grain from the country elevator to a larger terminal/transfer elevator or milling operation either in- or out-of-state.

Significance:

All grain storage facilities in western Oklahoma are historically significant under Criterion A because they served a vital function in the agricultural and commercial history of the region. In their promotion of agriculture and commerce in western Oklahoma, they served as primary marketing centers for local grain produce and made the union between wheat producers and the railroads possible. The storage facilities made it feasible to hold the local farmer's grain until enough had been accumulated for the railway companies to make profitable runs or they stored grain to wait for a favorable price increase; thus, these properties made wheat marketing profitable for both western Oklahoma farmers and the railroads. Its historic association with the railroad made it especially important to the commercial life of small towns in western Oklahoma. The railroads often provided land (right-of-way) for the construction of these structures in order to stimulate business. Moreover, the railroads provided grain cars suited for hauling locally-produced grain to distant markets for better prices. In both cases, the local economy of small towns as well as the entire region was significantly improved. Farmers storing wheat at the local elevator also transacted business with other establishments in the community, thereby strengthening the economic viability of these small western Oklahoma towns.

Registration Requirements:

Although grain storage facilities need not be functional (i.e., working elevators and tanks), they should retain characteristic exterior features which were present during the period of significance. They must have integrity of location, design, setting, materials, feeling and association. To meet registration requirements they should have been built during the 1889-1950 time period and evoke the grain storage industry of the time of their construction. They should retain a sufficient amount of the original exterior and some of the original machinery and equipment associated with the period of significance, e.g., elevator leg, spouting system, or bins. They should retain an association with surrounding properties. To be eligible for registration, the properties should be evocative of the western Oklahoma agricultural and commercial way of life during the period of significance. Alterations may exist as long as the significant structural features remain intact.

1B. GRAIN PROCESSING FACILITIES

Description:

Grain processing facilities in western Oklahoma provide different functions than grain storage facilities. While the main purpose of grain storage facilities is to receive, store, and ship grain to a distant market, the ultimate goal of the processing facility is to process the grain within or near the facility into a finished product and series of by-products for either human or livestock consumption.

Feed and flour mill elevators as processing facilities vary little in exterior design from storage elevators. They may be rectangular or square, but many are circular. The mill building is always rectangular. Heights of feed and flour mill elevators range from 50' to more than 100' while mill building heights rarely exceed 100'. All grain processing facilities have headhouses (cupolas) where the head of the elevator pulley is located.

The distinguishing features that separate grain processing facilities from grain storage facilities are multifaceted. First, they handle a variety of grains other than wheat including corn, oats, barley, and soybeans. Second, internal and external storage is so arranged and compartmentalized to allow for a maximum number of bins of varying sizes to handle different types of grain and different grades of grain, e.g., circular tanks are constructed so as to allow for more interstice (star) and outerstice (pocket) bins. Third, the bins are used for different purposes other than storage such as holding bins and blending bins. Fourth, grain processing facilities require various types of chutes, load-out spouts and docks, and adjacent buildings and structures such as feed and flour warehouses for packed products. Fifth, grain processing facilities contain more specialized machinery and equipment than do storage facilities. In addition to vertical elevator legs and horizontal conveyors, these properties include unique machinery such as rollermills, plansifters, scalperators, and aspirators used in the preparation of feed and flour products. Sixth, processing facilities are more concerned with cleaning and testing of raw grain, therefore, they are equipped with testing labs and special cleaning equipment, e.g., dampers, washers, and driers. Finally, these properties usually require packing spouts and machines to package the finished product.

Significance:

Grain processing facilities in western Oklahoma are historically significant under Criterion A because of the vital role they played in the conversion of bulk grain into a series of consumable products and byproducts for humans and livestock. Grain processing facilities served some of the same functions as grain storage structures such as buying, receiving, and storing grain produced locally or regionally. However, the primary purpose of the processing facility was to prepare and condition the raw grain for the manufacturing process rather than simply storing it. Flour mill elevators were especially significant because flour milling constituted Oklahoma's third largest industry from the prestatehood era until ca. World War II. Many small towns in western Oklahoma had a mill elevator and mill during this period in order to grind corn into meal or wheat into flour. Feed mill elevators became increasingly important as agriculture became more diversified in western Oklahoma. Corn, oats, and soybeans slowly replaced wheat as farmers shifted from a one-crop (wheat) form of agriculture to diversification. Along with the conversion to various row crops came an increased emphasis on livestock production in western Oklahoma, especially beef cattle. Thus, the processing facility took on a new function -- grinding grain for cattle feed. The two subtypes of grain processing facilities are therefore significant because of

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the functions they performed. The flour mill elevator subtype coupled with the mill building housed the necessary machinery and equipment to process locally produced grain into a usable product for human consumption -- flour -- which was distributed and sold to nearby and distant markets in either packaged or bulk form. The feed mill subtype likewise processed grain, but for livestock consumption. It, too, was distributed and sold to nearby customers or distant markets in packed or bulk form.

Registration Requirements:

Grain processing facilities should meet certain eligibility requirements for inclusion in the National Register including integrity of location, setting, materials, feeling and association. Time of construction, size, and materials vary from property to property. Any facility built from ca. 1900 to 1950 should qualify in terms of age requirements. Size also differs from relatively small facilities to those with terminal-like proportions, therefore, this is not a mandated feature. Materials may include wood, brick, or concrete. The properties must retain sufficient physical features and historic-era machinery to convey they were part of a manufacturing process. In terms of location, the flour mill elevator should be situated near a mill building if the process does not take place within the elevator. The properties should evoke the feeling of the period of construction and displays historic character representative of the grain processing industry.

1B1. FEED MILL ELEVATOR SUBTYPE

Description:

Feed mill elevators provide a different function than do wheat storage elevators or flour mill elevators. Rather than storage, handling, and shipping of wheat or processing wheat into flour, the feed mill elevator is in the business of processing grain into livestock feed for cattle, hogs, and poultry. Construction materials (wood or concrete) and exterior design are similar to storage or flour mill elevators, however, a number of distinguishing features make the feed mill elevator a unique property type. First, the feed mill elevator handles different kinds of grain other than wheat, including corn, oats, and soybeans. Because of this factor, the feed mill's internal storage must be arranged to provide a maximum number of bins of varying sizes to handle the different types of grain, e.g., holding bins and blending bins. Circular bins, for example, are separated so as to allow for more interstice bins (space between the cylinders). Second, feed mill elevators require different types of space, chutes, and adjacent buildings and structures, e.g., load-out chutes and docks for both sacked and bulk feed, packing rooms, and warehouses for sacked feed storage. Moreover, formula-feed mixing plants are connected to the feed mill elevator if this process is not completed within the feed mill elevator. Finally, feed mill elevators contain more specialized machinery and equipment than wheat storage elevators and often include a seed cleaning operation.

Following receipt of grain, it is cleaned and graded through an elevator separator in preparation to be ground. A complex network of elevators and conveyors are used to transport the grain horizontally and vertically from the holding bins to the grinding process system. In the grinding of ear corn, the most common grain processed in a feed mill elevator, the corn first moves by conveyor through a corn sheller and crusher which removes the seed corn from the cob and crushes it into small particles. The remaining cobs are run through a cob crusher. The particles of corn are then fed into a 2-pair iron rollermill for further refinement of the stock. From the rollermill, the corn particles flow to two 16" centrifugal aspirators for additional cleaning of the product. The aspirator is a suction device to pull out impurities. It is then augered to an overhead bin fitted with a spout for sacking into 100 lb. bags (almost universal size for feed mills). If the customer has specified a formula (a common occurrence in feed mill operations), the cracked corn is channeled to a "batch mixer" where it is blended with other grains and mineral supplements according to customer specifications, e.g., corn may be mixed with oats, soybean meal, and a variety of mineral ingredients such as calcium and protein. Thereafter, it is likewise moved to the overhead bin equipped with a spout packer used to fill the 100 lb. bags. From the packing room, the finished sacked product is transported to a nearby feed warehouse. In addition to sacked feed, the finished feed product may also be sold in bulk form and loaded onto railway cars or directly into the customer's truck or wagon.

Significance:

Feed mill elevators are historically significant under Criterion A because of their importance to the evolution of agriculture in western Oklahoma from 1889 to 1950. In many areas of western Oklahoma, a mixed farming economy slowly replaced an agricultural system dominated by one or two crops -- wheat or cotton. As farmers became more diversified, a variety of crops (corn, oats, barley, milo, and soybeans) were introduced to the region. Coupled with this mixture of crops was the development of a livestock industry. By the 1920s and 1930s, western Oklahoma farmers were expanding and upgrading their livestock operations as livestock breeds were improved, especially poultry, dairy cattle and beef cattle. As agriculturalists moved toward diversification, feed mill elevators emerged to satisfy farmer demands for livestock feeds. The feed mill elevator thus became a focal point in this conversion because it could receive locally-produced grain and process it into livestock feed for local consumption. Customers brought their grain to the feed mill elevator and specified the type of feed they wanted, generally a combination of grains (corn, oats, soybean meal) to be supplemented with minerals supplied by the elevator. The customer formulas were usually based on advice from county extension agents trained in providing knowledge to farmers who desired improved feed for better quality and increased growth in their livestock. Although some of the feed mill elevators sold livestock feed in sacked or bulk form to distant markets, the feed mill operation was primarily a grain processing facility for the benefit of surrounding farmers. Because of this, the feed mill elevator was a significant segment in the agricultural and commercial life of small towns in western Oklahoma. For these small agricultural-oriented communities, the feed mill elevator attracted farmers to town, thereby stimulating the local economy as they purchased goods and services from local business establishments.

Registration Requirements:

To meet registration requirements, feed mill elevators should have been built in the post-World War I era up to 1950. They should retain sufficient exterior features and historic era equipment to identify their primary function as a grain processing facility. In general, feed mill elevators are situated in a complex of buildings and structures including a feed storage warehouse, seed cleaning plant, and formula-mixing unit. Therefore, they should retain an association with the properties around them. Design of feed mill elevators varies slightly from other grain storage and processing facilities in that they will include specialized load-out docks, chutes, and sacking space. Construction materials consist of wood for earlier versions and concrete for later structures. To be eligible for inclusion in the National Register, feed mill elevators should retain integrity of location, design, setting, materials, workmanship, feeling and association. Feed mill elevators should evoke the way of life reflective of their period of construction in agricultural-oriented small towns of western Oklahoma. Although feed mill elevators need not be working facilities, they should retain structural integrity and sufficient milling machinery to display a historic association with the period of their significance. Alterations and additions should be evaluated in terms of the property's overall integrity.

1B2. FLOUR MILL ELEVATOR SUBTYPE:

Description:

The flour mill elevator is a unique property type as a processing center for wheat because its primary purpose is to receive, store, and condition the grain for the flour mill rather than serve as only a storage and shipping facility. Additionally, the flour mill elevator classifies and blends wheat for milling purposes and is designed to transfer wheat to a nearby flour mill building where the milling process occurs.

Flour mill elevators may be built of reinforced concrete, brick, steel plate, or timber, but reinforced concrete is almost invariably used. Heights of flour mill elevators range from approximately 60' to more than 100' depending on the number of internal bins and the height of the headhouse which is rectilinear in shape.

The storage tank arrangement of a flour mill elevator consists of a variety of bin sizes to hold different grades of wheat used for processing into different types of flour. Small bins are sometimes square or hexagonal, but large bins are always circular with diameters of 12' to 40'. The bin bottoms are always hoppered and fitted with outlet valves.

The storage capacity of a flour mill elevator depends largely on the output of the flour mill with no fixed ratio between the two. An average mill needs enough storage for about six weeks of output at full capacity.

The turning over process is important in a flour mill elevator in order to retain well-conditioned wheat during prolonged periods of storage. Therefore, flour mill elevators always contain a complex network of vertical elevators and horizontal conveyors to withdraw wheat from any bin and send it to another.

In the flour mill elevator, the wheat is received into the mill elevator boot and follows the normal lifting process via the belt-and-bucket conveyor to the garner bins in the headhouse. From the garner, the wheat is weighed through an automatic scale and flows into a scalperator (a preliminary cleaning device) and a damper machine if the wheat is too dry. The wheat then moves to the revolving telescopic spout where it is distributed to the holding bins. As needed, the wheat is released from the bins and passes through the cleaning department equipped with a wheat washer and drier as well as a milling separator. The grain is then channeled to proportional feeders and weighed again in order to accurately record the amount of wheat sent into the mill. The grain is then blended and carried to the mill by means of a 9" screw conveyor.

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Flour mill elevators are historically significant under Criterion A because of their importance to the flour milling industry in western Oklahoma from 1898 to 1950. Their exteriors were little different from other elevators ranging in construction materials from wood to concrete and in size from small to terminal-like proportions. However, these properties were significantly different in their function as well as types of bins and equipment needed to carry out the grain preparation process. They elevated, conveyed, stored, cleaned, weighed, blended, and conditioned wheat that was ultimately milled into flour for local use or shipped to distant markets (approximately 80% of Oklahoma flour was sold to bakeries in bulk form). During the pre-World War II economy of Oklahoma, flour milling was the third largest industrial employer in the state. Therefore, flour mill elevators were an important segment in the industrial history of Oklahoma. During this time, wheat farmers possessed a local market for their produce without having to ship their grain to an out-of-state milling company. Thus, two different sectors of the Oklahoma economy benefited from these properties -- agriculture and industry.

The flour mill elevator coupled with the milling operation had considerable impact on the local economies of western Oklahoma communities such as Okeene, Yukon, Hennessey, Kingfisher, El Reno, and Altus. They not only furnished wheat farmers with a different marketing outlet for their produce, but also provided needed employment for the population in these towns.

Registration Requirements:

To be eligible for inclusion in the National Register, flour mill elevators should retain sufficient pieces of historic-era equipment and storage bins in order to convey their historic association with the flour milling industry. They should be built sometime between 1898 and 1950. To meet registration requirements flour mill elevators should retain sufficient structural integrity to identify them with their period of construction. Construction materials (wood to concrete) and size (small to large) may vary, however, they should retain integrity of location (proximity to a mill building) and setting (small town in western Oklahoma). Some may be individually noteworthy for stylistic reasons as those constructed of concrete embody International Style characteristics. Alterations and additions should be evaluated in terms of the structure's overall integrity.

1C. SECONDARY RESOURCES ASSOCIATED WITH GRAIN STORAGE AND PROCESSING FACILITIES

Description:

Grain storage and processing facilities require auxiliary buildings that provide support functions. The most commonly found property types in this category are the office building and warehouse. The office building is constructed of wood, brick, or concrete and has either a square or rectangular floor plan. A typical office building is 20' x 20' or 20' x 25', although sideline merchandizing may necessitate additional floor space. It is generally a one-story building with a gable or hipped roof. Fenestration includes a large bay window on the scale side of the building to give the weigher a good view of vehicles moving on and off the scales. Moreover, it must include adequate windows to allow the plant manager a view of the various operations of the facility. Internally, the office building consists of three to four rooms housing a reception room and counter, a general office for secretaries and bookkeepers, a manager's office, and a weighing and testing area. Occasionally, the office building includes a display area to showcase retail products including twine, stock salt, and animal health supplies.

Warehouses are multi-purpose buildings constructed of wood, brick, or concrete. Design and fenestration are simple. Gable roofs without trim are standard. A typical warehouse dimension is 50' x 150'. Because of the heavy weight in warehouse storage, the earliest buildings used heavy floor planks resting on strong joists supported by timber or concrete piers. Later warehouses have concrete slab flooring.

Significance:

The office building is historically significant under Criterion A because of its association with grain storage and processing facilities, especially small country grain elevators where it is the hub of operations. It houses a variety of functions related to the business component of the elevator or mill. These include weighing and recording loads of grain, testing and grading of grain, computing and analyzing sales and purchases, filing and storing records, coordinating traffic flow to and from the plant, and meeting and transacting business with customers. The warehouse is historically significant under Criterion A because of the multiplicity of functions that can be carried on within the building. Warehouses associated with grain elevators are often used as flat storage units, especially if only one or two grain segregation types are involved. Although warehouses used as flat storage units possess certain drawbacks as compared to the upright storage in elevators (wasted space at the top and higher costs of loading out grain by hand or power shovel), they serve a useful purpose in storing overflow grain during peak harvest seasons that cannot be accommodated in the elevator. Warehouses also serve as storage units for feed mill or flour mill elevators as well as mill buildings in the form of custom or commercial bagged feed or flour and, in some cases, in bulk form. Occasionally, the packing of feed and flour takes place in a warehouse adjacent to the mill which feeds the warehouse via an auger system. Warehouses are also used to house seed cleaning operations and the storage of wheat or other grain seed. Warehouses associated with co-op-type elevators are often used to store commercial fertilizer and other retail products. Finally, warehouses are often used to store plant vehicles or equipment.

Registration Requirements:

Office buildings and warehouses that may be eligible for the National Register must have a strong association with the history of grain storage and processing and must retain significant amounts of physical integrity, particularly in the appearance of their outer walls and roofline. The addition of metal sheeting as weather protection is acceptable on the roof, but the walls should retain historic materials and appearance. Doors and windows may be boarded or replaced, but the basic pattern and configuration should be readily apparent, especially the office building bay window on the scale side. Some of the historic-era equipment should be present in the office building, particularly the scale dial and testing/grading equipment. In terms of location, office buildings and warehouses must be situated near a grain storage or processing facility. Interior alterations should not be considered as destroying integrity.

2. CONSTRUCTION MATERIAL OF GRAIN ELEVATORS AND ASSOCIATED STRUCTURES

The essential design of grain elevators and their associated structures varies only slightly based on function. The primary differentiating feature of the elevators, storage or processing facilities, is the construction material. The progression from iron-clad to concrete elevators reveals the technological advances of elevator construction experienced in the first half of the twentieth century. Additionally, the construction material of the associated structures, such as storage tanks and mill buildings, also illustrates the changes in construction technology during the first half of the twentieth century.

2A1. IRON-CLAD WOOD COUNTRY ELEVATOR SUBTYPE

Introduction:

Of the elevators included in the multiple property submission, thirteen are of the iron-clad wood country subtype. The iron-clad wood country subtype is representative of vernacular folk architecture for several reasons: (1) construction by local farmers and carpenters of unknown origin, (2) use of communal labor format with no standardized plan or form followed by the builders, (3) building techniques and methods passed from community to community and from one generation to the next, primarily in oral tradition based on memories of local builders rather than from the drafting tables of professional architects ("architecture without architects"), and (4) built along simple, traditional, conservative lines with functionalism emphasized over form.

Description:

Timber (wood) was the earliest material used in building grain elevators in western Oklahoma. Because of the semiarid, grassland natural environment void of timber, milled wood had to be shipped in by rail. Specifications for lumber to be used in wood elevators called for yellow pine finished rough and thoroughly dry.

In regard to framing, the iron-clad wood country subtype is divided into two groups: studded and cribbed. In the studded elevators, the first story is generally built of heavy post and girder work to support the concentrated vertical loads of the filled storage bins. The remaining stories were of balloon frame construction in which the studs extend in one piece from the top of the first story to the top plate. Floor joists are nailed to the studs and are supported by ledger boards (horizontal boards). Shiplap siding, usually 1" x 6," is nailed to studs. Tie rods extend through the bins and are anchored to horizontal braces on exterior walls, a distinctive feature of the iron-clad wood country elevator. In the cribbing technique for walls, sawn boards 2" thick and 4"-10" wide (depending upon the height of the elevator) are laid flat horizontally atop one another so that they are secured together on their wide sides rather than their narrower edges. These form walls capable of withstanding the tremendous pressure exerted by large quantities of bulk grain. Cladding of 1" x 6" lapped boards is also added to cribbed walls.

The term "iron clad" is derived from the galvanized iron or tin sheathing applied to exterior walls of the wood country elevator. It was used to protect the wood from natural elements (weatherproofing) and from sparks discharged from passing railroad locomotives. The iron or tin covering often features some type of design (square or rippled) or simply a smooth surface.

The design and scale of the iron-clad wood country subtype includes a rectangular shaped workhouse approximately 40'-60' high surmounted by a two-three story rectangular full or partial headhouse (cupola) approximately 15-20' high.

Roof types consist of a gable on the headhouse (cupola) and gable or shed on workhouse. The iron-clad wood country subtype has either an external (side) or internal drive through/open air grain dump. External (side) dumps are usually shed roofed, one story, one bay attachments; occasionally so attached to workhouse as to form a "catslide" roof, often considered a vernacular/folk architecture feature. Whether external or internal, the dump sink is covered with wood grates.

Internal storage bins in the iron-clad wood country subtype were of thoroughly dried yellow pine sawn boards 2" thick and up to 8" wide. The "cribbing" technique of construction was also used for bin walls which had square corners. An iron-clad wood country elevator of the early twentieth century contained up to twenty cribbed storage bins of different capacities. Depending upon the size of the structure, total storage capacity ranged from 10,000-50,000 bushels.

Significance:

The iron-clad wood country elevator is significant under Criterion C because it represents the first kind of vernacular architecture applied to grain storage and processing facilities. The use of wood for framing and siding as well as the tin or iron covering marks the first stage in the evolution of construction materials used to build grain storage and processing facilities. Moreover, the iron-clad wood country elevator was often built with a unique technique known as cribbing which is of unknown origin. This method is employed in the construction of internal storage bins and for exterior walls of the structures. Finally, the steel tie rod reinforcements, which run through the internal bins and are anchored on the exterior walls by horizontal braces, make the iron-clad wood country elevator an architecturally significant subtype.

Registration Requirements:

Iron-clad wood country elevators predating 1950 and retaining substantial amounts of structural integrity are candidates for inclusion in the National Register because of their historical and architectural importance. Because a majority of these structures were constructed in the 1920s and 1930s, it is not necessary for them to be working elevators; however, certain exterior elements should be present in order to convey historical character. These include a wood workhouse and headhouse, either cribbed or studded wall cladding, exterior horizontal braces, steel tie rod reinforcements which supported internal storage bins, and gabled roofline. Tin or iron-type sheathing covering the exterior walls is almost universal and is considered an important feature of this subtype. Interior integrity should be manifested in the form of wood cribbed storage bins and at least some of the historic era equipment such as the wood leg, boot, and belt-and-bucket conveyor. Alterations and additions must be evaluated in light of the structure's overall character.

2A2. CLAY TILE COUNTRY ELEVATOR SUBTYPE

Introduction:

Only two of the elevators included in this submission are of the clay tile country elevator subtype; one of which was constructed in the 1920s and the other in the 1930s. Clay tile country elevators are vernacular in nature because: (1) they were locally constructed by farmers and masons who mixed the mortar and laid the tile, (2) they did not utilize standardized forms or plans, (3) individuality was expressed in combinations and placement of leghouse and storage bins as well as use of a variety of construction materials, and (4) functionalism of structure was paramount.

Description:

The mainhouse could be constructed of brick, wood, or clay tile, but was generally about 40' to 50' high. Regardless of construction material used in mainhouse, it was always flanked by rows of cylindrical shaped clay tile storage bins ranging in number from two to six and approximately 30' high.

Workhouses of brick or wood are either square or rectangular in shape and surmounted by a square or rectangular headhouse (cupola) with gable roof. Clay tile workhouses are circular (ca. 15' to 18' in diameter) and surmounted by a cylindrical shaped smaller diameter headhouse (cupola) about 15' to 20' high, capped with conical roof.

The mainhouse and storage bins (internal and external) of clay tile are constructed of a special semiporous hollow tile made to conform to the circular nature of the structures. The exterior walls of the workhouse are constructed of two layers of clay tile. The main wall tiles are 12" x 12" x 5" alternating with channel tile 12" x 3" x 5". The outside (facing) tile are hard burnt semi-glazed 12" x 12" x 1 1/2".

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The wall tile is set in the wall with cells running vertically and all set with full flush mortar joints sides and bottoms. The channel tile is set to break joints with the wall tile. The main walls are reinforced with vertical steel rods. Each course of channel tile contains at least two steel bands. The facing tile are laid in courses with a full mortar bed and are tied to the main wall with wire fabric. The headhouse walls are 3" hollow tile laid in the same manner as the main wall tiles of the workhouse. Exterior walls are often coated with some kind of sealant and painted to prevent moisture damage.

Roof surfaces are covered with 12" x 18" x 3" hollow tile laid in cement mortar. They are supported by subpurlins on a radial framework. On top of the roof tile is a 4-ply composition felt and gravel roofing material.

Grain dumps are always situated to the side of the circular bins, generally one story with a shed roof, and constructed with clay tile, brick, or wood.

Significance:

Clay tile country elevators are significant under Criterion C because they are unique in their use of hollow red clay tile as the building material. They mark a transition toward the use of cylindrical concrete elevators with greater storage capacities. The clay tile country elevator represents a more durable building material as well as a less combustible storage area than earlier wooden structures.

Registration Requirements:

To be eligible for the National Register, the clay tile country elevator should retain integrity of location, design, setting, materials, workmanship, feeling and association. Clay tile country elevators should be built in the early statehood period of Oklahoma, preferably in the 1920s, to meet registration requirements as they represent a transitional stage of grain elevator construction between the earlier wooden structures and the later concrete facilities of the 1930s and 1940s. They should retain sufficient physical characteristics to identify them as having been built during their period of significance and should evoke the agricultural and commercial way of life in western Oklahoma. The clay tile country elevator is important because of its unique construction material and the function it provided. Therefore, it should retain substantial amounts of clay tile materials and some of its historically significant elevating machinery, although it does not have to be a working elevator. The workhouse and headhouse may actually be built of brick or wood, but some of the internal and external storage bins must be of clay tile to meet eligibility requirements. Alterations and additions must be evaluated in terms of the overall integrity of the structure.

2A3. CONCRETE COUNTRY ELEVATOR SUBTYPE

Introduction:

Eleven of the elevators in this multiple property submission are concrete with most having some features that hearken to the later International style. The majority were built in the 1930s and 1940s, the peak decades for concrete construction in western Oklahoma. Several of the concrete country elevators were built by out-of-state engineering firms. Chalmers and Borton of Hutchinson, Kansas, were frequently the contractors in western Oklahoma. Others were constructed by local firms and still others were constructed by unknown firms.

It appears that the concrete country subtype went through an evolutionary process during the period 1889 to 1950 in terms of design, scale, construction techniques, and style: (1) square or rectangular to cylindrical, (2) one to two bins to a minimum of four and usually more, (3) height from 60' to 140,' (4) storage capacity from 10,000 to 1 million bushels, and (5) vernacular to academic architecture (local masons to specialized engineering firms).

Description:

The cylindrical shaped concrete elevators were an advanced form of engineering technology during the early part of the twentieth century when they were introduced to the grain industry. The slip form technique produces a tank in one solid and continuous piece of concrete without joints or patches. It consists of a concentric double-ring form into which concrete is poured. As concrete in the lower part of the ring sets, the forms are jacked upwards and more concrete is poured in. This process must continue without interruption until the desired height is reached. The concrete walls are reinforced with vertical and horizontal steel rods (I-beams) and thicknesses vary from 6" to 8".

The heights of concrete elevators and bins range from 60' to 140'. Factors affecting height include available ground area, weight the soil will bear, storage volume desired, cost of elevating compared with cost of conveying, type of workhouse to be used, and the number of stories needed in the headhouse. Diameters of the circular tanks range from 12' to 22'. Larger bins (height and diameter) save on cost per bushel storage space, whereas smaller bins provide better separation of grains according to grade or quality.

The elevator/tank complex is usually constructed in rows of one or two side by side to form what is known as a "block" of bins. The areas between the tall cylinders are often used for storage and called various names including interstice or interstitial, inner space or interspace, or star bins. Indentations between cylinders on the outside rows of the blocks are walled off to form additional small bins known as outerstice, outerspace, or pocket bins. These inner and outer smaller storage spaces hold varying capacities ranging from 300 to 3500 bushels of grain.

Concrete country elevators and bins may have either flat or hoppered bottoms. The hoppered are more efficient because they are self-cleaning and require little shoveling. The flat bottoms, in contrast, are cheaper to construct and provide slightly more storage space; however, they cause delays in moving grain because shoveling is a slower method.

The receiving areas of concrete country elevators may have either single or double receiving sinks, many have up to 250 bushel capacity. The sinks are generally about 5' wide x 30' long and are covered with steel grates. The grain flows by gravity from the receiving sink into the elevator leg boot pit.

The number of stories in the headhouse (cupola) of a concrete country subtype ranges from two to five depending on the capacity of the leg and separation of functions. The top story usually houses the head drive, hence the term "headhouse," of the pulley of the vertical belt-and-bucket conveyor system that lifts grain from the boot pit. The garner (receiving bin) and scales are often combined into a single floor; however, these two functions are often on separate stories with the garner story above the scale story to allow gravity to move the grain below to be weighed. The distribution story is usually above the internal bins. It houses the main distributor system and the network of direct spouts to bins and load-out spouts to railroad cars, trucks, or wagons. The earliest concrete headhouses had a cleaner story which contained a cleaning mechanism known as a "clipper." These were eliminated over time as modern combines possessed the capability to clean grain in the fields. Headhouses (cupolas) are generally rectangular in shape and capped by flat roofs of concrete. A series of openings are found in the headhouse consisting of doors leading to the roof of the workhouse and windows for ventilation of the various floors.

When additional storage is desired, an annex (addition) of cylindrical tanks is placed in single, double, or triple columns to the side of the mainhouse. The annex is connected to the elevator leghouse by two conveyor systems. The grain is moved to the annex storage tanks on a 24" to 36" 4-ply rubber belt which runs horizontally over the bins. It is housed in a concrete enclosure approximately 6' to 8' high and 15' to 18' wide known as a "gallery." The overhead conveyor is powered by a 15 to 25 h.p. motor. The grain is dropped into the proper storage bin by a machine called a "tripper," also housed in the gallery. Grain is carried from the annex tanks to the elevator on a 24" to 36" 4-ply rubber belt which runs below the bins known as a tunnel conveyor. Annex bins usually have hoppered floors in order for grain to drain to the tunnel conveyor.

Although considerable debate has occurred over the classification of grain elevators into an architectural style, many of the characteristics associated with the modern movement of the 1920-45 era are present in these structures. They embody a number of principles as expressed by the Europeans Le Corbusier and Gropius and the Americans Purcell and Grant, including: (1) a high degree of functionalism, or expressed as "function over form," (2) symbolic of austere modernity, (3) a sense of verticality based on the overwhelming height of the structures, presenting a dramatic contrast to the flat topography of the western Oklahoma plains, (4) overall use of strong geometric forms as expressed in the cylindrical shape of the bins and the rectilinear nature of the headhouse, (5) enormous scale and volume found in the storage capacities of up to a million or more bushels of grain, (6) the use of concrete and steel, favorite construction materials of the Modern movement, (7) lack of ornamentation throughout and the elimination of any nonfunctional decorative elements (the only exceptions to this cardinal tenet were the occasional minor decorative elements applied to the headhouses such as pilastered or beveled corners, parapeted rooflines, use of pilaster strips between windows, and ribbon-like banding of fenestration), including no decorative detailing at doors or windows (8) use of metal casement windows set flush to the outer walls, and (9) the ubiquitous flat roof, a common element of the International Style vocabulary. That these structures had an impact on the International Style is attested to in the contemporary literature; whether there was a conscious effort by the designers of the concrete elevators to adopt the tenets of the style is debatable.

Significance:

Concrete country elevators are significant under Criterion C because of their more durable and fireproof construction material. Reinforced concrete represents the last stage in the evolution of construction materials used in the building of grain elevators. Concrete country elevators also represent a new era in grain storage building technology because they were primarily built by specialized engineering firms equipped to use the slip form method of construction. Moreover, they are significant because of their increased storage capacities and more efficient methods of handling and shipping grain. Their enhanced capacities allowed the grain producers of western Oklahoma to unload trucks more quickly during peak harvest season and avoid delays and congestion in the handling of large quantities of grain. Furthermore, the concrete country elevators enabled farmers to store larger volumes of grain to save on storage charges at terminal elevators and await a favorable price increase during the off-harvest season. In addition, a vast majority of concrete country elevators were built during the 1930s and 1940s, the peak period of the modern age of architecture, and embody many of the features associated with International Style architecture. Among these characteristics are the dominance of cylindrical and rectilinear geometric shapes; enormous volume and mass; use of concrete and steel; surfaces void of ornamentation with a lack of detailing at doors and windows; and metal casement windows.

Registration Requirements:

To be eligible for the National Register, the concrete country elevator should retain integrity of location, design, setting, materials, workmanship, feeling and association. Although a few were constructed in western Oklahoma during the pre-World War I era, the vast majority were built in the 1920 to 1950 period. Earlier versions of concrete country elevators may be square or rectangular; however, the cylindrical shaped concrete country elevator is the most common in western Oklahoma. In general, concrete country elevators should retain a minimum of four external concrete storage bins attached to the mainhouse. Although heights and storage capacities vary, a majority of the 1920 to 1950 concrete country elevators were more than 100' tall and could hold more than 100,000 bushels of grain. The concrete country elevator should have been constructed by an engineering firm specializing in slip form concrete technology; however, local masons were capable of building small concrete elevators. The properties should retain sufficient exterior features (workhouse and headhouse) to evoke the time period of their construction as well as maintain an association with surrounding properties. They should be well-preserved intact examples of the concrete country subtype. If constructed during the 1920 to 1950 period, the properties should display some of the International style features. Finally, concrete country elevators do not have to be working; however, some of the historic era machinery should be present.

Alterations and additions may exist as long as they do not detract from the historical and architectural integrity of the structure.

2B. STORAGE TANKS

Due to ever-increasing wheat production during the first half of the twentieth century, expansion of local elevator facilities was frequently needed. Although in several cases, new, larger elevators were built, the more common solution was the construction of adjacent storage tanks. Erected of steel or concrete, these storage tanks expanded the capacity of the elevators, especially during periods of peak harvest.

2B1. STEEL STORAGE TANKS (BINS) SUBTYPE

Introduction:

During the early part of the twentieth century (ca. 1910), steel became a principal building material in the construction of grain elevator facilities. Although none of the elevators included in this submission were of steel, steel storage tanks were common in western Oklahoma during the 1920-1950 period. The storage tanks were used as annex bins to the elevator mainhouse. Used to store surplus grain, the steel tanks allowed farmers to store their grain locally and expedited the elevator operator's handling of bulk grain.

Description:

Steel storage tanks may be either circular or rectangular in shape. The most common dimensions of rectangular tanks are 14' x 18'. Circular tanks range in diameter from 15' to 45'. Both rectangular and circular tanks range in height from 30' to 80'. Both circular and rectangular tanks are set on separate concrete foundations. Construction materials consist of square or rectangular steel plates from 1/4" to 5/8" thick. The plates are bolted or riveted together and stiffened with Z-bars riveted to the sides of the bin plates. Steel plates are lapped over each other in a single, double, or triple joint depending upon the number of rows of rivets.

Circular bin roofs are covered with a conical steel plate roof supported on a radial framework. Materials consist of No. 14 steel cut radially with rivets spaced 2 1/2" to 3" apart. Rectangular bins include vertical stiffener angles placed about 5" apart in the bin walls and angle diagonal braces placed approximately 5' apart vertically. Both rectangular and circular steel bins must be grain tight. Any spaces in the bin walls should be filled with a cement grout composed of one part cement to four parts sand. Steel tanks are usually painted with two coats of paint with the first coat an iron oxide primer and the second coat of white paint mixed with linseed oil. Steel storage tanks are connected to the elevator workhouse by a conveyor gallery over the bins and a tunnel conveyor below the bins.

Significance:

Steel storage tanks are historically significant under Criterion A because they served as important grain storage facilities in western Oklahoma during the 1920-1950 time period. Steel tanks were generally used in western Oklahoma as annex bins to the elevator mainhouse. These properties were significant to the grain storage, processing and shipping industry because they provided space for surplus grain that could not be housed in smaller elevators or during periods of peak harvest for larger elevators. As such, the steel tanks furnished elevator operators with additional storage space which allowed western Oklahoma farmers to store their grain locally rather than pay higher storage rates at terminal elevators. Moreover, the steel tanks enabled farmers to store greater quantities of grain to wait for favorable price increases during off-harvest season and provided the means for elevator operators to handle bulk grain more quickly and efficiently during harvest time. These factors stimulated more commerce in the small agricultural communities of western Oklahoma, thereby helping to improve the local economy.

Steel storage tanks are significant under Criterion C because they represent one of the four major stages in the use of construction materials for building grain storage facilities. Introduced to the grain storage business in the early part of the twentieth century, steel did not become popular in western Oklahoma as a construction material until the 1920s. Few elevators in western Oklahoma are of steel (none in this multiple property submission); however, it was commonly utilized in annex structures used to hold overflow grain. Steel tanks were also significant because they could be erected by local builders, thus saving on costs to the local elevator owner, and they provided a durable, long-lasting, fireproof structure. As such, steel storage tanks represent a transitional stage in the evolution of grain storage building materials between the earlier wooden structures and the later concrete facilities.

Registration Requirements:

Steel storage tanks meeting registration requirements should retain integrity of location, design, setting, materials, workmanship, feeling and association. They should be located near an elevator mainhouse in an agricultural town of western Oklahoma. The tanks should consist of square or rectangular steel plates bolted or riveted together to form the walls. In general, steel tanks are circular and set on concrete foundations. Circular steel tanks may have either conical or flat steel plate roofs. In all likelihood, steel tanks in western Oklahoma were constructed during the 1920 to 1950 time period and should retain sufficient features to identify them as having been built during that era. Although the tanks do not have to be in use, they should display structural integrity that evokes a feeling of their period of significance. Alterations and additions should be evaluated in terms of the overall integrity of the structure.

2B2. CONCRETE STORAGE TANKS SUBTYPE

Description:

Concrete storage tanks (also referred to as bins, towers, and annexes) are circular in shape with a geometrical design similar to a cylinder. The tanks range in diameter from 15' to 25' and in height from 50' to more than 100'. They are set on concrete foundations and have flat concrete roofs. The walls are of 6" to 8" thick concrete reinforced with horizontal and vertical steel rods 1/2" to 3/4" in diameter. Concrete storage tanks contain few openings. In general, bin portals (square or circular) and one to two doors are located at ground level. Concrete storage tanks are generally topped with a 6' to 8' high concrete enclosed gallery that moves grain from the elevator headhouse on a belt conveyor and dumps it into a selected tank. Below the tanks is a tunnel belt conveyor that transports grain from the tanks to the elevator mainhouse.

Significance:

Concrete storage tanks are historically significant under Criterion A because they served as important grain storage facilities in western Oklahoma during the 1920-1950 time period. Often constructed at a later date than the elevator mainhouse, these properties served a vital role in the grain storage, processing and shipping industry because they provided space for surplus grain that could not be housed in smaller elevators or during periods of peak harvest for larger elevators. As such, the concrete storage tanks furnished elevator operators with additional storage space which allowed western Oklahoma farmers to store their grain locally rather than pay higher storage rates at terminal elevators. Moreover, the concrete tanks enabled farmers to store greater quantities of grain to wait for favorable price increases during the off-harvest season and provided the means for elevator managers to handle bulk grain more quickly and efficiently during harvest time. These factors stimulated more commerce in the small agricultural communities of western Oklahoma, thereby helping to improve the local economy.

Concrete storage tanks are significant under Criterion C because they represent the last stage in the use of construction materials (concrete) for building grain storage facilities. Introduced to the grain storage industry in the early part of the twentieth century, concrete did not become popular as a construction material in western Oklahoma until the 1920s and 1930s. Concrete tanks were also significant because they required the technical knowledge of specialized builders and contractors that used the slip form technique of construction. Furthermore, concrete storage tanks provided a durable, long-lasting, fireproof, rodent-proof structure that saved on costs for the local elevator owner in the form of lower insurance rates, less spoilage, and other aspects of grain damage. Finally, the concrete storage tanks embody many of the principles of the International style architecture. They are characterized by the use of concrete and steel, lack of ornamentation, and use of geometric forms.

Registration Requirements:

Concrete storage tanks meeting registration requirements should retain integrity of location, design, setting, materials, workmanship, feeling and association. They should be located near an elevator mainhouse and be connected to it by either a gallery or spouting system. The tanks should consist of circular walls of reinforced concrete and be set on concrete foundations and have flat concrete roofs. Concrete storage tanks were constructed in western Oklahoma during the 1920-1950 time period and should retain sufficient features to identify them as having been built during that era. Because of their association with "machine age" technology and architecture, some elements of the International Style should be present. Although the tanks do not have to be in use, they should display structural integrity that evokes a feeling of their period of significance. Alterations and additions should be evaluated in terms of the overall integrity of the structure.

2C. MILL BUILDINGS

Description:

Associated with the flour mill elevator, the mill building houses the complex network of machines and equipment necessary for the processing of wheat into flour. The two subtypes of mill buildings, based on construction material, are the wood-framed mill building and the concrete mill building. Mill buildings are either single-sided or double-sided as determined by the arrangement of machinery on the interior. In a single-sided plant, the mill elevators are arranged in a row along one wall and the machinery extends across the width of the building. A double-sided plant has the mill elevators located in a row down the middle and the machinery extends on both sides of them.

Internally, all the flour processing machines of one type are grouped together on one floor. Although wood-framed mill buildings usually do not possess as many floors as the concrete mill buildings, the milling process and associated machinery is the same.

Significance:

Flour mill buildings as a grain processing facility subtype are historically significant under Criterion A for their association with the flour milling industry of Oklahoma during the 1900 to 1950 period. Flour milling began in the pre-statehood period of Oklahoma (ca. 1900) and by 1940 was the third largest industry in the state with fifty mills in operation. Flour mills were significant to the communities where they were located as well as to the surrounding wheat farmers because they provided employment for local workers and a local market for wheat production. These factors provided a needed stimulus to the local economy, as well as affected the agricultural, transportation and industrial sectors of the state's economy. Flour mill buildings are also significant because they housed the specialized equipment needed to convert raw grain, transferred from the flour mill elevator, into a series of finished products and by-products consumed by humans locally and regionally, or shipped to out-of-state markets. Mill buildings are further significant under Criterion C for their standardized design and interior floor plans.

Registration Requirements:

To qualify for listing in the National Register, flour mill buildings should retain sufficient physical features to identify them with their period of significance, ca. 1900 to 1950. They should retain integrity of location including a proximity to an elevator, design, setting, materials, workmanship, feeling and association. The buildings should follow the typical exterior design of flour mill buildings. Sufficient historic-era machinery should be present in order to identify them with the flour milling industry and the interior layout should be evocative of the flour milling era in Oklahoma. Overall, mill buildings should convey a feeling and association with the flour milling function that was performed within the building. Additions and alterations should be evaluated in the light of their effect on the property's structural integrity and historic character.

2C1. WOOD-FRAMED MILL BUILDINGS SUBTYPE

Description:

Associated with the flour mill elevator in the pre-1920 era is the wood-framed mill building which houses the complex network of machines and equipment needed for the processing of wheat into flour. This subtype is characterized by a balloon framing system in which the studs extend in one piece from the top of the foundation sill plate to the top plate with floor joists nailed to the studs and supported by ledger boards. The walls may be covered with either shiplap or clapboard siding. Common rafters are used that extend from the ridge beam to the top plate. Foundations of the wood-framed mill building may be either brick or stone, especially limestone.

A majority of the wood-framed mill buildings have gable roofs; however, gambrel roofs may be used. The earliest wood-framed mill building roofs are covered by wood shake shingles, but may have been replaced with tin sheathing over time. A square-shaped, gable-roofed cupola (headhouse) is usually present to accommodate the mill elevator. The height of the wood-framed mill building ranges from 45' to 60' and consists of three to four stories. The greater height of the wood-framed mill building enables the elevator heads to give gravity fall to the machines they feed. Minimum heights include rollermill floors (15'), purifier floors (15'), and sifting floors (15'). The top floor has generous height to allow for installation of dust collecting machines and openings for exhaust of dust.

Wood-framed mill buildings may be either square or rectangular in shape, e.g., 50' x 50' or 40' x 60'. A wood-framed mill building may be one or two bays wide and five to six bays long. In mill building terminology, it may be single-sided or double-sided depending upon the arrangement of the machinery on the interior. In a single-sided mill, the elevators are arranged in a row along one wall and the machinery extends across the width of the building. In a double-sided plant, the mill elevators are in a row down the middle with the machinery extending on either side of them.

Decorative elements of wood-framed mill buildings are minimal and fenestration is simple, usually consisting of 1/1 wood sash windows. Compositionally, the wood-framed mill building is well-balanced and symmetrical with numerous openings in each floor for venting purposes.

Internally, all the flour processing machines of one type are grouped according to floor, e.g., rollermills on the first floor, sifting units on the second, and purifiers on the third. The milling process and associated machinery is the same as for all flour mills: breaking, scalping, reduction, division of grades, and packing.

Significance:

Wood-framed mill buildings are historically significant under Criterion A for their association with the flour milling industry of Oklahoma during the pre-1920 period. Flour milling began in the Territorial Era of Oklahoma (ca. 1900) and by 1940 was the third largest industry in the state with fifty mills in operation. Wood-framed mill buildings were significant to the communities where they were located as well as the surrounding wheat farmers because they provided employment for local workers (often they were the first industry in the town), served as a local market for wheat producers, and acted as a distribution point for seed wheat. These factors provided a needed stimulus to the local economy as well as affected the agricultural, transportation, and industrial sectors of the state's economy. Wood-framed mill buildings are also important because they housed the specialized equipment needed to convert raw grain, transferred from the flour mill elevator, into a series of finished products and by-products consumed by humans locally and regionally, or shipped to out-of-state markets.

Under Criterion C, the wood-framed mill building is significant for its standardized design and interior floor plans. Typical wood-framed mill buildings are 3-4 stories high, 1-2 bays wide, and 5-6 bays long. The exterior design is influenced by the interior floor plan layout because of machinery placement with mill elevators located either down the middle or along the walls. Therefore, the wood-framed mill building is a somewhat uniquely constructed building dictated by its interior equipment spacing. Placement of interior elevators also affects the location of cupolas (headhouses) on the roof of wood-framed mill buildings. Finally, the thickness and durability of flooring is also affected by the placement of machinery with heavier equipment located on the first floor (rollermills) and lighter equipment in the upper stories (sifters and purifiers).

Registration Requirements:

To qualify for listing in the National Register, wood-framed mill buildings should retain integrity of location, design, setting, materials, workmanship, feeling and association. They should maintain sufficient physical features to identify them with their period of significance, especially from ca. 1900 to 1920 when wood was the principal building material in Oklahoma. Brick or stone foundations should be present as well as a gable or possibly a gambrel roof. In terms of location integrity, they should be situated near a flour mill elevator and near a transportation system for delivery of products to market (road, highway, or railroad). To be eligible, wood-framed mill buildings should follow the typical exterior design of 3-4 stories high, 1-2 bays wide, and 5-6 bays long. Sufficient historic-era machinery should be present in order to identify them with the flour milling industry and the interior layout should be evocative of the flour milling era in Oklahoma.

Overall, the wood-framed mill should convey a feeling and association with the flour milling function that was performed within the building. Additions and alterations should be evaluated in light of their effect on the property's structural integrity and historic character.

2C2. CONCRETE MILL BUILDINGS SUBTYPE

Description:

Associated with the flour mill elevator during the 1930s and 1940s is the concrete mill building which houses the complex network of machines and equipment necessary for the processing of wheat into flour. The walls of the concrete mill building are constructed of reinforced concrete by means of slip form technology much in the same manner as the circular concrete elevators and storage tanks. Mill building concrete forms, however, are rectangular in nature. The slip form technique produces walls in one solid piece of concrete without joints or patches. The concrete is poured into the rectangular forms and as the concrete in the lower part of the form sets additional concrete is poured in. This process continues without interruption until the desired height is reached. The concrete walls are reinforced with vertical and horizontal steel rods (I-beams) and thicknesses vary from 8" to 10." The concrete foundation of the mill building is laid on concrete piles. A majority of mill buildings have flat concrete roofs, however, sloped roofs may be used to accommodate centralized elevator shafts.

The height of the concrete mill building, including basement floor, ranges from 80' to 100' and consists of six to eight stories. The greater height of the mill building enables the elevator heads to give gravity fall to the machines they feed. Individual floors are high enough to allow stocks to flow by gravity as possible, provide ample daylight, and plenty of headroom under the conveyors. Minimum heights include basement (16'), rollermill floors (14'), purifier floors (14'), and sifting floors (14'). The top floor has generous height to allow for installation of dust collecting machines under the roof and openings for exhaust of dust.

Concrete mill buildings are always rectangular in shape with dimensions ranging from 35' x 105' to 80' x 160'. A concrete mill building may be one or two bays wide and six to eight bays long. In mill building terminology, it may be single-sided or double-sided which is affected by arrangement of machinery on the interior. In a single-sided plant, the mill elevators are arranged in a row along one wall and the machinery extends across the width of the building. In a double-sided mill, the mill elevators are in a row down the middle and the machinery extends on both sides of them. The length of the building (six to eight bays) allows for standard spacing of sprinkler heads and enables line-shafting to be conveniently carried from main floor beams. All flooring is comprised of 3" planking while roller floors with heavier equipment are designed to carry 3 cwt. per square foot.

Decorative elements of concrete mill buildings are minimal and follow the lack of ornamentation pattern found in concrete elevators. As with concrete elevators, International Style vocabulary is present including pilastered or beveled corners, pilaster strips dividing ribbon-like bands of windows, and parapeted rooflines. The absence of detailing at doors and windows, smooth and uniform wall surfaces, use of concrete and steel, flat roof tops, and evenly spaced multipaned casement windows set flush with the outer walls contribute to the International Style characterization. Compositionally, the concrete mill building is well-balanced and symmetrical with the banding of windows giving it a sense of horizontality.

Internally, all the flour processing machines of one type are grouped together on one floor. The machines are arranged so that the stocks can flow through vertical or inclined spouts from one group to another by gravity with as little mechanical handling as possible. Nevertheless, the stocks cannot pass through all the necessary processing steps in a single journey from the top floor to the bottom without some conveying and elevating. Worm, band, and chain conveyors are used for horizontal movement while bucket elevators are used for vertical lifting. The typical 6-7 floor concrete mill building interior layout is as follows:

Basement--space for the mill elevator boots and power source (early mills were steam-powered while modern flour mills are electrically driven)
First and Second Floors - rollermills
Third Floor - plansifters
Fourth Floor - purifiers
Fifth Floor - centrifugals
Sixth Floor - sifting
Top Floor - dust collectors

The first part of the milling process is the break system in which the wheat grains are broken open and the endosperm scraped away from the bran. The machines used to complete this step are the rollermills. They consist of iron rolls working in pairs and geared together so that the upper roll runs 2 1/2 times as fast as the lower roll. The rolls are fluted with grooves of saw-tooth sections. The flutes run at a slight spiral angle along the rolls similar to the rifling of a gun barrel. As the wheat passes through the rolls the individual grains are gripped by the flutes of the slow roll while those of the fast roll shear them open and scrape off the endosperm.

After the break system process is completed, the released endosperm is sifted out of the broken open wheat grains. This process is called scalping and is completed by machines called plansifters.

Once the endosperm is sifted out by the scalping process, bran particles are removed by purifiers, machines that employ the sifting principle with the addition of air currents rising through the sieves. The purified endosperm is then ground into flour by another series of rollermills which form the reduction system. The reduction rollermills are similar to the break rollermills except the rolls are ground smooth and have a differential of 5 to 4 rather than 2 1/2 to 1.

The machines used for sifting out the flour made in the reduction process are centrifugals. They are clothed with silk bolting cloth of 100 to 150 meshes per inch. Once this step is completed, the flour is divided according to color, granularity, and baking value.

Finally, the concrete mill building contains the packing department. It handles a minimum of three products--flour, bran, and wheaten--the latter two used for cereal. Packing is accomplished through several pieces of equipment from the spout packer (the simplest form of packing) to the more sophisticated automated weigher-mechanical packers.

Significance:

Concrete flour mill buildings are historically significant under Criterion A for their association with the flour milling industry of Oklahoma during the pre-World War II era. Flour milling began in the pre-statehood period of Oklahoma (ca. 1900) and by 1940 was the third largest industry in the state with fifty mills in operation. Flour mills were significant to the communities where they were located as well as to the surrounding wheat farmers because they provided employment for local workers and a local market for wheat production. These factors provided a needed stimulus to the local economy as well as affected the agricultural, transportation, and industrial sectors of the state's economy. Concrete flour mill buildings were especially important because they housed the specialized equipment needed to convert raw grain, transferred from the flour mill elevator, into a series of finished products and by-products (flour for bakery goods and bran for cereal) that were consumed by humans locally and regionally or shipped to out-of-state markets. Under Criterion C, the concrete flour mill building is significant for its standardized design, interior floor plans, and, in most cases, stylistic features. It is characterized by its use of concrete slip form technology similar to concrete, circular elevators; however, concrete mill buildings were generally rectangular in shape so the concrete forms were different. Typical concrete mill buildings were 6-8 stories high, one to two bays wide, and 6-8 bays long. The exterior design was influenced by the interior floor plan layout because of machinery placement. In single-sided (one bay wide) mill buildings the elevator(s) was/were positioned along one wall with machinery extending across the width of the building, whereas in a double-sided (two bay wide) mill building, the mill elevator(s) was/were situated in a row down the middle and the machinery extending on either side of them. Therefore, the concrete mill building is a somewhat uniquely constructed building dictated by its interior equipment spacing. The interior layout and number of stories were likewise affected by the placement of machinery with heavier equipment located on the lower stories (rollermills) and lighter equipment in upper stories (sifters and purifiers). Because of the use of concrete and their construction by specialized engineering firms, concrete flour mill buildings of the 1930s and 1940s featured elements of the International Style vocabulary such as beveled and pilastered corners; plain, unadorned wall surfaces; ribbon-like banding of windows; and lack of detailing at windows and doors.

Registration Requirements:

To qualify for listing in the National Register, concrete flour mill buildings should retain integrity of location, design, setting, materials, workmanship, feeling and association. They should maintain sufficient physical features to identify them with their period of construction, especially during the pre-World War II period (1920-1940) when flour milling was a prominent industry in Oklahoma. Moreover, they should retain integrity in regard to construction materials (a majority were concrete in the 1930-1940 decade). Sufficient historic-era machinery should be present in order to identify them with the flour milling industry and they should be situated near a flour mill elevator in terms of location integrity. To be eligible, concrete flour mill buildings should follow the typical exterior design of 6-8 stories high, one to two bays wide, and 6-8 bays long. The interior layout should be evocative of the flour milling era in Oklahoma. If built during the 1920-1940 time period, concrete flour mill buildings should retain some elements of the Modern Age architecture, particularly International Style vocabulary. Overall, concrete flour mill buildings should convey an association and feeling with the floor milling function that was performed within the building. Additions and alterations should be evaluated in light of their effect on the property's structural integrity and historic character.

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G. GEOGRAPHICAL DATA:

The "Grain Storage and Processing Facilities in Western Oklahoma" geographical area covers 32 counties in Management Regions 1, 2, 6, and 7 as outlined by the Oklahoma Historic Preservation Comprehensive Plan. The western limits are the state's western political boundary and the eastern limits are roughly Interstate 35 which runs north-south through the center of the state. Counties included are Alfalfa, Beckham, Blaine, Beaver, Caddo, Canadian, Cimarron, Comanche, Cotton, Custer, Dewey, Ellis, Grady, Garfield, Greer, Grant, Harper, Jackson, Jefferson, Kay, Kiowa, Kingfisher, Major, Noble, Roger Mills, Stephens, Tillman, Texas, Washita, Woods, and Woodward.

H. SUMMARY OF IDENTIFICATION AND EVALUATION METHODS:

The multiple property nomination of grain storage and processing facilities in western Oklahoma is based upon a 1990 thematic survey of grain elevators in western Oklahoma conducted by W. David Baird (Department of History - Pepperdine University) under the auspices of the State Historic Preservation Office of the Oklahoma Historical Society. The survey was undertaken during the fiscal year 1989-1990 and the project director drove western Oklahoma highways and roads covering more than 5300 miles. An evaluation of the architectural significance of the properties was prepared by David Gebhard, architectural consultant from the University of California-Santa Barbara. The primary objective of the survey was to identify those individual properties and potential historic districts that warranted additional study to determine eligibility for listing in the National Register of Historic Places. A secondary goal was to identify and evaluate those properties which because of insufficient age or lack of integrity did not merit further consideration for inclusion in the National Register.

Altogether, the study documented 242 extant grain elevators constructed in the study area prior to 1951. Over three hundred additional properties were visited as the study identified a grain elevator in operation there prior to 1950 but the grain elevators were no longer extant. For each existing property, the SHPO's standard "Historic Preservation Resource Identification Form" was completed, a minimum of two B/W prints were taken, archival research was conducted, and field notes compiled. Of the 242 properties evaluated by the survey, 118 were identified with National Register potential. Forty-one of the properties were determined to not warrant further study because of loss of architectural and historic integrity or they had already been placed on the National Register under two thematic nominations completed in the early 1980s -- "Woodframe Country Elevators of the Oklahoma Panhandle" and "Clay Tile Country Elevators of Northwest Oklahoma." The remaining 83 did not meet the fifty-year mark, but possess National Register potential as they come of age over the next decade. The survey area included Oklahoma Management Regions 1, 2, and 7 (plus two counties in Region 6).

The State Historic Preservation Office evaluated Baird's list of potential National Register properties and identified forty-three grain elevators in Management Regions 6 and 7 to be included in the Multiple Property Nomination for Grain Storage and Processing Facilities in Western Oklahoma. The historic context was based largely on the 1990 thematic survey historical background; however, the multiple property nomination was expanded to include more than grain elevators. Further field investigation and additional archival research revealed that the multiple property submission should be broadened to include storage tanks and mill buildings; both of which were associated with grain storage and processing in western Oklahoma to 1950.

The property types were also drawn from the 1990 thematic survey categories; three of which were based on construction materials and setting (wood country, clay tile country, and concrete country) and two on function (flour mill elevators and terminal elevators). Staff working on the multiple property submission reevaluated and expanded the property type analysis. The analysis was divided into two major sections. The first section addresses the two different functions of grain elevators, storage or processing of grain, and secondary resources associated with grain elevators, office buildings and warehouses. Although similar in design, the primary purpose of a grain storage facility is to receive, store and ship grain to a distant market. In contrast, the main goal of a processing elevator is to process the grain within or near the facility into a finished product and series of by-products. Because the function of Feed Mill Elevators and Flour Mill Elevators are also different, one produces feed for livestock and the other flour for human consumption, they are also addressed separately within Section F of the multiple property document. The second section of the property type analysis evaluates the construction material of elevators and associated structures. Because the design of elevators, storage and processing, are similar, one of the defining differences is the construction material. Additionally, the construction material reveals the technological advances in grain elevator construction during the first half of the twentieth century.

During the course of additional field work and in consultation with the State Historic Preservation Office, five properties were deleted and one added to the original list of forty-three making a total of thirty-nine. Two of the properties were eliminated due to age requirements, one had been moved from its original site, and two had been razed since the 1990 survey. The one new property was an elevator associated with a mill building listed on the National Register in 1976. Thus, the thirty-nine nominated properties included in this multiple property nomination represent the best intact examples of grain storage and processing facilities in Oklahoma Management Regions 6 and 7 because of the continued evaluation and reevaluation completed by the initial 1990 thematic survey, the 1991-92 State Historic Preservation Office study, and the 1992-93 field work and archival research of the multiple property nomination staff.

Due to technical problems with the multiple property document and individual nominations, combined with SHPO staff shortages, the project languished for several years. However, in 1999, the Oklahoma SHPO was able to employ additional temporary staff to make the necessary modifications to the multiple property document and individual nominations. All of the thirty-nine properties were reevaluated. At this time, five of the thirty-nine were determined not eligible due to alterations. Due to additional significant resources, nominations for five other properties have been postponed until all significant features meet the National Register age requirements. All of these properties should be eligible in their entirety in the next five years. Due to proximity and historic association, separate nominations for four properties were combined into two nominations. Thus, the number of nominations now included in the multiple property submission equals twenty-seven. To determine if any modifications had been made to the resources since the original nominations were drafted, a site visit was made to all of the remaining properties. Although the properties were re-photographed, prints were not made unless the property had undergone alteration. The majority of elevators remained unchanged since the 1993 fieldwork.

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