

Water Procurement in Nineteenth Century Illinois: A View from the Archaeological Record

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Introduction

Shelter, food, and water are the three primary needs of all human beings. Native American settlements in the mid-continent of North America generally were hindered by the availability of potable water—with most habitation sites being in relatively close proximity to a spring or stream. By the time European-Americans were settling the vast expanse of territory known as Illinois, they had adapted a strategy for acquiring water that allowed them to settle in isolated farmstead locations well removed from any spring, stream, or river environ. Nonetheless, early historic settlement was closely tied to the same streams and springs utilized by the Native American population, often with a close concordance between late Native American settlement locations and early pioneer farmstead locations.

The European American settlers who first “improved” the Illinois landscape with their farm fields, houses, and barns generally acquired their water from a nearby stream or spring during the earliest period of settlement. Carrying water from the distant stream or spring to the house was an arduous task (especially during inclement weather) that generally fell on the female occupants of the house. Often a small wooden barrel was positioned near the corner of the dwelling directly beneath the end of a simple wooden gutter that funneled rain water from the dwelling’s roof to the barrel—supplying a limited supply of fresh water to the house occupants. Natural sources of water (such as the spring and stream) were quickly supplemented by the construction (or excavation) of a well. Additional improvements at these early sites often included the construction of an underground storage facility for water—otherwise known as a cistern.¹ Unlike wells, which were constructed to allow water to flow through their walls into the shaft, cisterns were constructed with an impenetrable lining to prevent the water from flowing out of the structure. As such, masonry wells were constructed dry (without mortar between the brick or stone lining) and contrasts with cistern construction, which generally has a mortar lining

¹ Webster (1854:207) defines a *cistern* as “an artificial reservoir or receptacle for holding water, beer, or other liquids, as in domestic uses, distilleries, and breweries.” Note that this definition does not imply that a cistern has to be set into the ground—and may actually represent an aboveground feature by this early definition.

to prevent the escape of the water. Although cisterns were often constructed to store water for use during periods of drought and/or low water availability, they also supplied a product that was distinctively different from well water. Unlike well water, which contained a variety of minerals leached from the underlying substrate (and referred to as “hard” or “limestone” water), water collected in cisterns from falling rain lacked the heavy mineral content typical of Illinois well water (and is often referred to as “soft” water).² Soft water was much preferred over Illinois’ hard water for the washing of clothes—and the appearance of such features on the Illinois landscape during the early years of settlement may indicate the influence of the woman in the household, a desire for clean clothes, and/or the transition to a modern standard of cleanliness.³ The following discusses the state of knowledge regarding well and cistern construction in Illinois.

Wells

Anglo American sites occupied by the first settlers in Illinois were generally isolated affairs (rural farmsteads) often clustered in family groups. Wells were a substantial investment in time and effort. Although sites from this era that have been more-or-less completely excavated are limited in number, sufficient numbers have been excavated to indicate that the inhabitants generally did not expend the effort to dig a well—but apparently utilized the nearby natural sources of water, if available. One of the earliest Anglo American sites excavated in Illinois is the Watts Site (11MO755), which probably represents a short-term 1790s-1810s

² As *The Union Agriculturalist and Western Prairie Farmer* noted in 1841, “every housewife in this country, especially those living off from streams knows the value of soft water; and next to a well, which generally in the west gives limestone water, is a cistern needed.” The presence of early cistern use may have regional and/or ethnic significance during the initial years of settlement in Illinois. Northern settlers (Yankees) originating from the hard rock regions of New England were not accustomed to the problems associated with hard water (particularly the task of clothes washing). Many New England immigrants in Illinois quickly learned the value of cistern construction through the agricultural press or interaction with their Upland South neighbors.

Several of the primary sources used within this paper were cited from Schroeder (n.d.).

³ Miner (1843:95), in touting the beneficial qualities of his newly constructed cistern, noted that the water does not become hard in the least by long standing [and] we use it freely in the family for every purpose except cooking and drinking; and indeed for these purposes I would prefer it to many wells and springs which I have drank from in Illinois and Missouri; for the water is cold and pure—only it has that peculiar taste which all rain water has.” Although soft water from a cistern was used for a variety of purposes, it was used extensively for washing clothes. Soap has little affect in excessively hard water, and soft water makes soap more effective at cutting dirt. As noted in the agricultural press of the middle nineteenth century, the construction of cisterns was often carried out to ease the burden of the farm wife. Lifting water out of the rain barrel was harder than removing water from an underground source by way of a pump; similarly, hard water required much more scrubbing to clean clothes—thus the construction of a cistern often removed some of the drudgery associated with laundry activities. As noted by Schroeder (n.d.:5), an individual from Naperville who identified himself simply as “A Lady’s Friend” wrote in 1845 that “if [the construction of a cistern] don’t sweeten your wife’s temper, and whiten out your shirt, the lady is past cure, and the shirt dyed in the wool.” Yet another writer from rural Scott County wrote in 1843 “my wife has frequently said, were she to be deprived of the well or cistern, she would cling to the latter and give up the former.”

Cisterns also became common in urban environments where they were constructed in public thoroughfares for holding water for firefighting purposes. Additionally, cisterns were sometimes constructed adjacent to a barn to store liquid manure (*The Farm Journal* 1919:410).

occupation. No well or cistern was found at this site (Phillippe 1993).⁴ Although constructed over a generation later in the northern portion of the state, the Frakes family constructed a pioneer farmstead in rural Schuyler County during the middle to late 1830s. Similarly, no well was present and the only subsurface features noted at this site (11SC869) were two shallow cellars (Mansberger 2000). The early occupation at the Apple River Fort in rural Jo Daviess County, dating from the Black Hawk War era (1832), did not have a well present (Mansberger and Stratton 1996). Many other examples of these initial generation settlement sites could be cited.

Nonetheless, having noted the absence of wells on these early short-term sites, wells are one of the most commonly found features on historic archaeological sites in Illinois. During the initial years of settlement, most wells were constructed within close proximity to the house and/or the kitchen service wing. Nonetheless, as the settlement landscape matured, wells were constructed in both domestic and agricultural contexts, and depending on the length of the occupation, multiple wells may be located within close proximity of one another (as the earlier wells often failed and had to be replaced with a new one).⁵

Nineteenth century wells were hand-dug affairs that consisted of a lined shaft that connected the ground surface to the underground water table. The shaft lining, which was not water tight, allowed water to flow through the shaft lining into the open well shaft. The construction of wells was a tricky and difficult affair that generally required the excavation of a shaft past the level of the water table and then the construction of a lining. Depending on the location and time period of their construction, these shafts were lined with a variety of materials (including wooden barrels, wooden planks, brick, and stone). During the early years of settlement, in stone poor regions, wood lined or cribbed wells often were constructed.⁶ With the

⁴ This site is located along Palmer Creek immediately outside of present day Columbia, Monroe County, Illinois. This is the heart of the early American and/or Virginian settlement that occurred immediately after the Revolutionary War. The only subsurface features encountered were two shallow, rectangular cellars (Phillippe 1993).

⁵ Although often assumed to have been located within a rear yard activity area of the house, wells were often constructed in a variety of locations around the property—including within the front yard of the dwelling. Wells were often constructed adjacent to agricultural activity areas, such as near a barn or even isolated within a field for supplying water to livestock (isolated stock wells). Similarly, less affluent families might only have access to a single well, whereas more affluent families might utilize multiple wells each with a specific use (family domestic use versus livestock use).

⁶ Few examples of log cribbed or plank lined wells have been noted in Illinois. Examples include wells at Fort Massac excavated by Paul Maynard in 1939-1942, within the Scott Air Force project area in rural St. Clair County near the present day Lebanon-Mascoutah region (and historically known as the Looking Glass Prairie), and at the Losch Site (Mazrim 2002:72-74). Although Mazrim (2002:72-74) interprets some of the features at the Losch Site as cisterns, it seems apparent that these features are actually wells. It appears that the archaeology at the Losch Site documents the replacement of early plank-lined wells (square in plan) by later brick-lined well shafts (round in plan) (see Feature 222). Unlined wells probably were relatively uncommon, as the presence of the water in the shaft would cause the walls to become undercut and collapse resulting in an extremely short-lived facility. Although many unlined well shafts are found archaeologically, they generally represent abandoned wells that have had their lining material salvaged for reuse, or the upper portions of the well have collapsed, depositing the wall lining within the lower reaches of the well shaft.

availability of ready labor and capitol, brick became the preferred choice for lining wells in stone-poor regions. Stone-lined shafts have slightly greater diameters than brick-lined shafts due to the greater width of the stone lining that forms the wall of the well (in contrast to the uniform character of a brick lining). In either case, these shafts were generally just large enough for a man to work in, and depending on the type of material they were being excavated through, were often prone to collapse during construction. The book *Foxfire 4* contains an interesting set of articles relating to water systems and the construction of hand-dug wells (Wigginton 1977; see also *State of Illinois* n.d.). Excavating wells through sandy soils which were prone to collapse (such as those present within major river valleys), was a very difficult and dangerous task. Often deep excavations were cribbed with plank or logs to excavate, the brick or stone shaft laid up, and then the cribbed area behind the laid-up shaft was backfilled. This was a tedious operation, and produced an archaeological signature unlike most wells encountered. A correspondent of the *Prairie Farmer* from Albany (Whitesides County) wrote “Digging a Well” in 1844 and described the excavation of a well in which he used long wooden staves joined together with wood splines. The whole affair was set on end into the excavation pit, and the worker proceeded to excavate beneath the staves and drive the wood-lined shaft down from above as he proceeded down—creating a circular wood-lined shaft for protection from wall collapse. This was a great advantage in that a well could be safely excavated in any ground conditions—even quicksand. Archaeological evidence of such staved vertically lined wood shaft wells is unknown in Illinois, and the occurrence of this technique must have been limited.

Upon exiting the surface, the well shaft was capped with some form of curb, as surface water, soil, and other objects were not desirable in the well. This curb may have been of stone or frame construction. With masonry (stone or brick) well shafts, the upper few feet of the well shaft might have been laid in mortar (unlike the shaft itself) and was carried above grade to form a curb to prevent surface water from entering the well.⁷ At the surface, one of several options was employed to prevent surface water from entering the well. The curb may have been carried a couple of feet above-grade and covered with a simple trap door, or capped with a small frame structure (complete with gable roof that incorporated a pulley or windlass for raising the water bucket). Similarly, the masonry curb may have been terminated immediately above the surface and a frame structure constructed. In some cases, a simple box (with lid) was constructed over the well opening. These frame box curbs might have a windlass incorporated into them, or a well sweep may have been constructed immediately adjacent to the well to raise the water bucket. A well sweep was a long horizontal pole counterbalanced on the top of a second vertical pole set into the ground. A rope and bucket was attached to one end of the pole, and by moving the rope up or down, the bucket was easily raised or lowered into the well. Similarly, the well curb might have been terminated immediately above grade and a stone cap (with hand pump) placed over the shaft. During the 1850s, the chain pump (with a hand crank) also became common (see Thomas 1854:199; 1869:221). During the early years of the nineteenth century, the windlass, well sweep, overhead pulley, and the wooden hand pump were all common fixtures on the Illinois landscape. Although the more primitive methods of construction may have

⁷ The *St. Clair County Board Minutes* (Volume 2, page 66) recorded the specifications for a well constructed for the county in 1818. This well was “to be walled with brick, and pailed in a strong manner, and fixed with a sufficient winlass [sic] chain and iron hoped Bucket, iron bale fasoned [sic] fast to the chain with a ring, the wall of the well to be 2 ½ feet above the surface of the earth...” (IRAD, Carbondale, Illinois).

persisted in some of the more backwoods areas of the state, by the late nineteenth century, the overhead pulley and the cast iron hand pump had become the two most common methods of raising water from a well.⁸ During the middle nineteenth century, especially for stock wells (and later domestic wells), wind power was adapted to the raising of water from wells. The early windmills were large bulky wooden affairs (many of which are illustrated in the series of 1870s atlases common for the Midwest). By the latter nineteenth century, they were being manufactured with steel frames. During the early years of the twentieth century, many of these windmills were replaced with electric motors.

By the middle nineteenth century, a new form of well was being utilized. These wells, which were often referred to as “American Driven Wells” or “Tube Wells,” were formed by “merely driving into the earth a gas-pipe or similar iron tube, pointed at the lower end and perforated for the ingress of water. More or less soil is drawn up at first, leaving a cavity around the tube, which remains filled with water at once pure and cool...” (*The Cultivator and Country Gentleman* June 17, 1869; Thomas 1869:220). Although the availability of gas pipe in the mid-century made the use of this form of well more widespread, such driven wells had been around for some time. One correspondent to this same agricultural journal noted the similarity to “old French wells” and the use of this technique in New York State in the 1840s (*The Cultivator and Country Gentleman* September 30, 1869). Although hand dug wells were eventually replaced by the construction of these “driven” and later drilled wells it was many years before they became common. During the late 1860s, controversy erupted within the agricultural press within the state as to the origin of these new wells (cf. *The Cultivator and Country Gentleman*, September 30, 1869). Nonetheless, throughout the nineteenth century in Illinois, well construction remained traditional, and the American Driven Well did not become common. Future research should focus on recognizing these features at historic sites and attempting to determine the introduction of these features on sites in Illinois. By the 1880s, “patent” drive well points were being marketed in several diameters and lengths by a variety of companies (cf. Hay and Prentice 1883:4).

Besides their obvious use as a source of water, wells also had a secondary use as a cold storage facility for short-term storage of foods (such as milk, butter, eggs, and the most recent perishable leftovers from the kitchen table). These food items were often placed within the bucket and lowered into the well, suspended immediately above the level of the water where the temperature remained a consistently cool temperature. Unfortunately, there were certain risks for using the well in such a manner. Should the bucket hit the side of the well shaft on the way up or down, and tip its contents into the water below, the well could become “sour” and would require the complete emptying of the well of its contents (and a scrubbing of the shaft lining—often performed by a small child) to purify the water again. Such was a very difficult task to accomplish.⁹ Although the availability of “ice boxes” (the predecessor to the electric

⁸ Nonetheless, the more conservative methods of raising water from a well (such as the use of the well sweep) persisted through the nineteenth century. In some relatively rural and isolated areas (such as Calhoun County), well sweeps may have even persisted into the early years of the twentieth century (H. Wayne Price, personal communication 9/22/1993).

⁹ Harping back to older times, Hastings (1972:37) noted that “our well also doubled as a refrigerator during the Depression. We bought ice occasionally, but only for tea and lemonade. We put oleo, milk, eggs, and other perishables in a bucket, lowered it within a foot or so of the water level, and tied the rope to a board laid across the

refrigerator) during the nineteenth century generally put an end to this practice, the “Iceless Refrigerator” (which was marketed by the Galesburg Sheet Metal Works during the early years of the twentieth century) attempted to capitalize on this traditional practice.¹⁰ Features such as Feature 3 at the Dyer-Rathbun Site may have functioned as a short term, cold storage facility for foodstuffs.

The archaeological significance of wells—and relevant variables to consider when recording these archaeological features—is discussed in White (1994). Archaeologically, most wells are generally recognized by their circular shape and relatively consistent diameter at the scraped surface (averaging approximately 4-6’ in diameter; larger if badly slumped). Often stone-lined wells have greater size (due to their wider outside diameters associated with their thicker stone walls) than brick lined wells. If the well has been salvaged of it’s lining, or the walls have failed and/or slumped into the bottom of the well shaft, no lining will be evident upon initial exposure at the scraped surface. Both brick and stone linings were common in Illinois. Wood cribbed wells are less common and exhibit a square or rectangular plan view in contrast to brick or stone lined wells. Although few wood cribbed wells have been excavated in Illinois, they are associated with early components, particularly in stone-deprived regions. Two early wood-cribbed wells were documented at Fort Massac (Mansberger 2002:207-209, 249). Additionally, several wood-cribbed wells appear to have been present at the Losch Site (Mazrim 2002).¹¹ In extremely unstable soil conditions (such as sand), it was often necessary to excavate to the desired depth within a square cribbed caisson. In these instances, upon reaching the bottom of the well, the brick or stone well shaft was laid up, and that area between the masonry lining and wood caisson was backfilled. Such features often exhibit distinctive plan views near their surface (with a wood lined outer shaft square in plan and representing construction era fills, and an inner circle of different soils representing the slumped well shaft and abandonment activities). A well identical to this was excavated in Hutsonville along the Wabash River. This early well consisted of a central brick shaft surrounded with a square caisson held together with forged nails (J. Phillippe, personal communication 4/22/2003). Similarly, well diggers often

curb. Food kept remarkably cool that way. Of course, you couldn’t put much food in one bucket, but since we didn’t have a whole lot of food to begin with, that was really no problem.” Hastings (1972:77) further noted that “there was always the possibility of tipping the contents. So when I lowered or raised the bucket Mom’s precedent was cousin Cecil Ray Johns. ‘Now remember when Cecil Ray was drawing a jug of buttermilk out of their well and let it break against the side? That milk soured the whole well, and you remember they had to haul drinking water for two or three days, until they could get it cleaned out.’ So I remembered Cecil Ray and his broken jug of buttermilk, and retrieved ours safely every time!” (as cited in McCorvie et al. 1989:184).

¹⁰ Prior to the advent of the icebox, an alternate method of storing dairy products and small quantities of foodstuffs was in small cellars. These pit-cellars were often shallow wood lined pits. Three functionally distinct forms of these storage pit-cellars have been noted within the archaeological record and include those located 1) beneath the house proper, 2) along the wall of the house immediately outside the structure and potentially beneath a porch deck, 3) within the immediate inner yard, and 4) within an agricultural activity area. See discussion of these feature types in Mansberger (1998).

¹¹ Although several wood-cribbed features were identified as wells by the field excavators, Mazrim (2002) has argued that these features actually represent square, wood-lined cisterns. Mazrim (2002:74) notes that “square wood-lined wells (constructed with a large backfilled excavation)” would seem “less likely” than similarly constructed cisterns. As noted above, wood-cribbed wells are present in the archaeological record, and this interpretation seems unlikely. It seems more plausible in that these features represent early wood-cribbed wells that were replaced with a later masonry lined wells.

excavated within a smaller wooden caisson (similar to that identified by the correspondent to *Prairie Farmer* in 1844) excavating beneath the leading edge, which created a larger diameter circular excavation outside of the caisson. Upon reaching the appropriate depth, the caisson was set firm and backfilled around to create the well. Archaeologically, such wells would exhibit a wood-cribbed shaft with a larger circular excavation unit around its outer edge. One must be careful to distinguish between a wooden well shaft lining and a well with a wood caisson.

Well depth is solely dependent on the depth of the water table and the availability of water. As such, early wells in a region are generally shallow compared to later wells, as modern activities have lowered water tables dramatically resulting in the failure of the earlier wells and the replacement of the earlier wells with deeper new wells (and the gradual increase in the depth of wells with the passing of time). As the walls of wells often collapsed, and it was easier (and/or much safer) to excavate a new well than to attempt to repair the old one, multiple wells are usually found in close proximity at sites occupied for any length of time. At the Lincoln Presidential Library in downtown Springfield, the earliest wells at the site were relatively shallow affairs with each successive generation of well being excavated slightly deeper. Often, the soil excavated from the new well is deposited within the older abandoned well immediately adjacent to it—resulting in the nearly sterile fill found in many of the abandoned wells. If a site has been occupied for any length of time, multiple wells may be located in close proximity to one another—paired wells generally represent the original and later replacement shaft. This is a fairly common practice and has been documented at urban sites such as the Lincoln Presidential Library and Museum project in Springfield (Mansberger 2001, 2002, 2003) as well as rural sites such as at the Losch Farm Site (Mazrim 2002:53-157).

Generally, the archaeology of the wellheads—and the methods associated with the raising of the water from the well—has been poorly preserved. Well sweeps (as determined by the presence of a large post near the well) have not been documented by archaeology in Illinois. Similarly, archaeology has not contributed much to our understanding of the above-ground character of wells in the state.

Wells were recognized early for their artifact potential (I. Noel Hume 1969, A. Noel Hume 1973). The lower reaches of a well, which are often water-logged deposits, often contain a variety of well preserved items including organic materials (such as foodstuffs). In contrast, a variety of capping fills have been recognized—each representing a different site formation process and/or activity. The lower primary deposits are often capped with deep sterile fills originating from the adjacent excavation of a new well, cistern, or cellar (as noted above). In rural environments, the filling of the well shaft was often associated with the abandonment of the site, resulting in the filling of the shaft with redeposited midden and/or fill brought in for the special purpose of capping the well. Wells filled with redeposited midden often yield a low density of small artifacts. With settlement of the fills, a second (and/or third) episode of fill is often brought in to fill the depression. In urban environments, these open shafts were often used as trash disposal pits and contain a wealth of artifacts associated with the subsequent occupants of the site. These primary accretional deposits, often representing the deposition of kitchen and/or household slop buckets, contain a wealth of information about the site occupants and the activities they were conducting on site. Wells filled with everyday household trash have been found at such sites as the Abraham Lincoln Home and the Presidential Library Site (both in

Springfield), and the Rochester Log Cabin (Mansberger 1987, 1989, 2001, 2002, 2003). Similarly, excavations at the Lincoln Presidential Library has exposed (and excavated) stratified primary deposits associated with mid-century commercial structures within downtown Springfield. The wells associated with the barroom and night-life activities located behind the early commercial structures contrast dramatically with those associated with nearby domestic activities. Such artifact-rich wells (which contain primary deposits) are invaluable for understanding previous lifeways, and have been underutilized in Illinois archaeology.

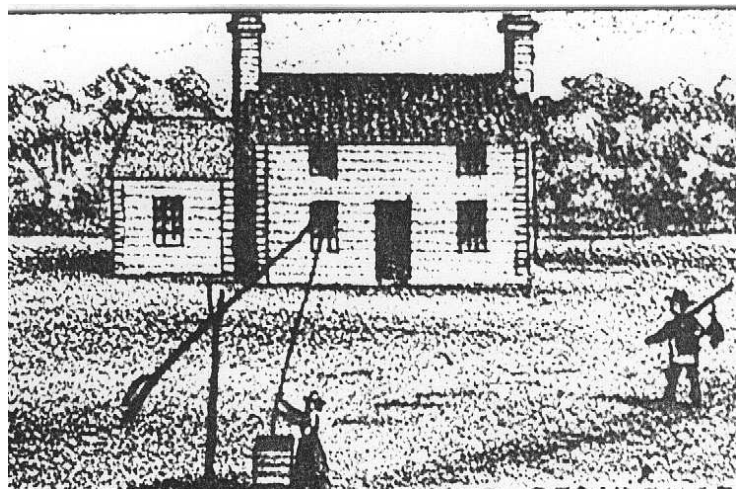
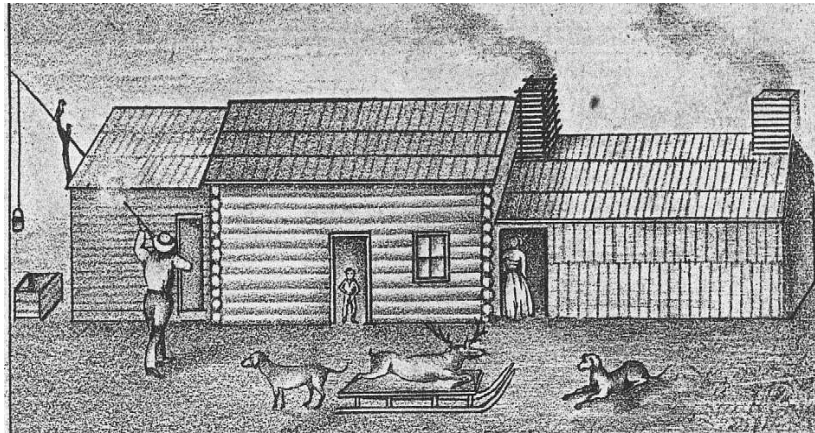
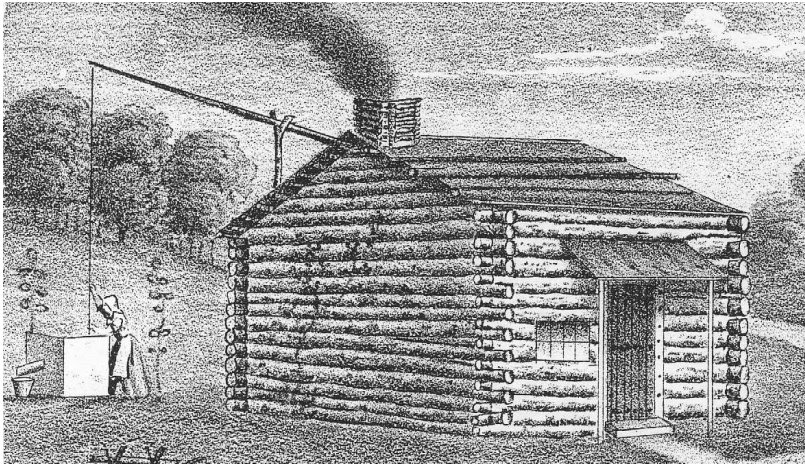


Figure 1. Three views of well sweeps in use in early Illinois. The top view is the 1822 residence of Governor Wood, which was the first house constructed in Quincy (Adams County) (Andreas, Lyter and Company 1872:32). The middle image is a view of the “First House in Sangamon Valley Prairie” which was constructed in Cass County in 1834 (Brink and Company 1874). Well sweeps were not only associated with the more primitive housing of the era as these two images might suggest. The lower image is a detail of the relatively substantial early residence of Judge Spencer in Rock Island (Biographical Publishing Company 1885:266) which also illustrates a well sweep. Similarly, the use of well sweeps often persisted into the late nineteenth century, as indicated by the presence of one in the yard of Mr. Barnard’s large Second Empire house at “Elm Hill” in Moline (Rock Island County)(1885?). This well sweep was located adjacent to a tennis court!

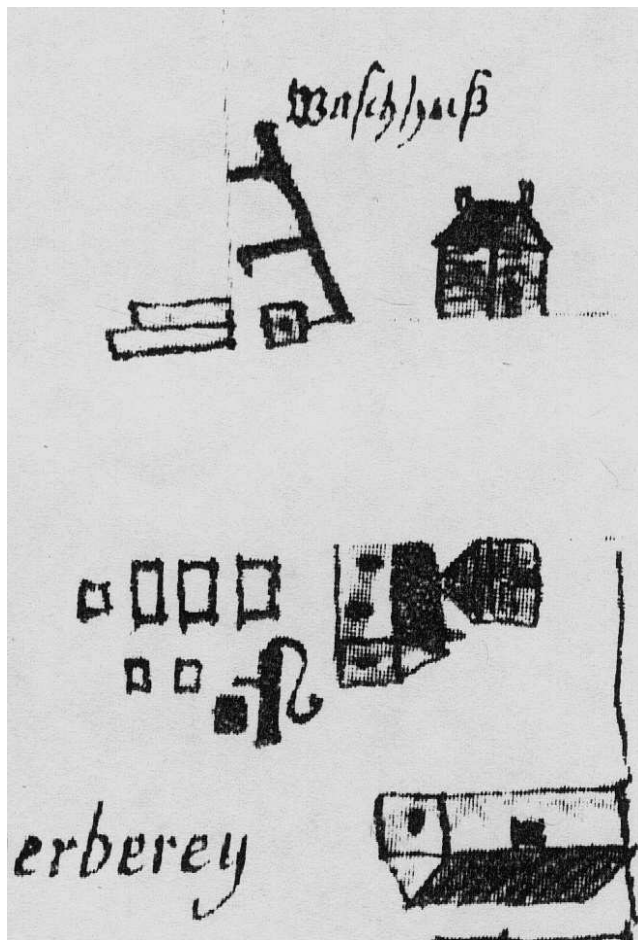


Figure 2. The presence or absence of well sweeps or hand pumps was not necessarily a factor of time—but also money. Although early sites in Illinois were often associated with well sweeps, more affluent families often made use of hand pumps. The contemporary character of well sweeps and hand pumps are illustrated in this circa 1832 illustration of the Wabash river community of New Harmony, Indiana (immediately across the river from White County, Illinois) (Weingartner 1832). Note the presence of both wells with well sweeps and hand pumps within this community at that early date. Most hand pumps during this era were of wood construction. It was not until the middle nineteenth century that cast iron pumps became more common. Also indicated on this map (but not shown here) are features that probably represent frame well houses (which incorporated a windlass and/or pulley system for raising the bucket of water similar to the image on the right).

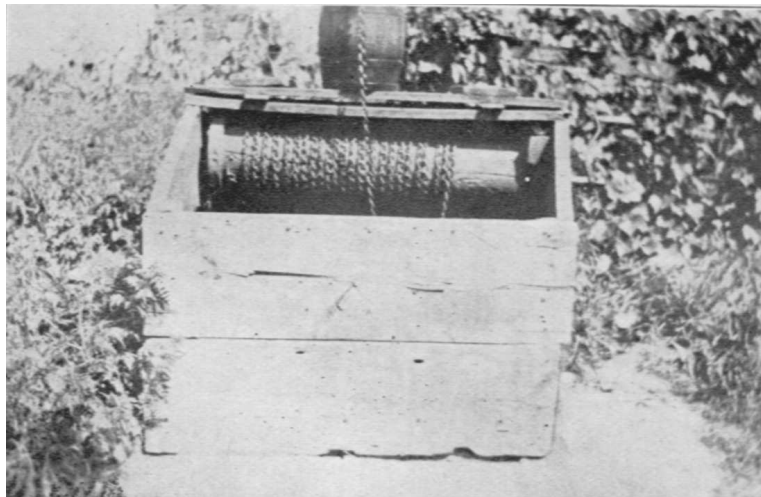
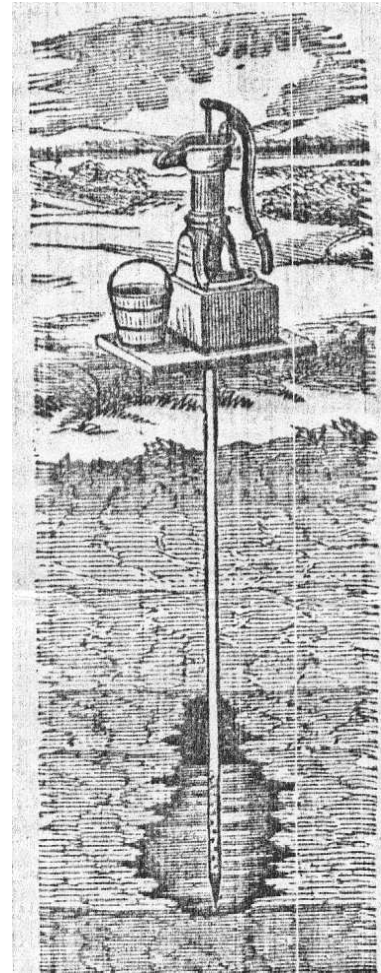


Figure 3. Well houses came in a variety of shapes and styles. The upper image is of a well house near Springfield, Sangamon County (Mann, Russo, and Garvert 1996:10). The middle image is a circa 1912 illustration of the simple frame well house on Jules and Ermentine LeVin's "Old Farm Near Cahokia Canal Bridge" (St. Clair County) (Gentsch and Kern 1991:31). The bottom image is of a primitive windlass for raising and lowering a bucket of water. This particular windlass was located across from "Old Dad Joe's" Tavern located two miles northwest of Ohio, Illinois (Coulter 1926:between pages 1000 and 1001).




PATENT DRIVE WELL POINTS.					
					
PRICES:					
1½ inch,	2 feet	3 inches long,	70 holes	.....	\$3.00
1½ "	2 "	6 "	90 "	.....	3.50
1½ "	2 "	9 "	110 "	.....	4.00
1½ "	2 "	10 "	130 "	.....	5.00
2 "	3 "	2 "	150 "	.....	6.00

Figure 4. By the latter nineteenth century, a simple cast iron hand pump (left) became fairly common feature on sites—rather rural or urban. Many of these pumps were positioned directly over a stone or brick lined well shaft, or over a cistern. At left, Molly Donelan is preparing to draw water from the well at her Springfield home in circa 1910 (Garvert, Mann, and Russo 1997:80). During the middle nineteenth century, a new form of well was introduced into the country (right). These wells, which were an American innovation, were formed simply by driving a pipe (with perforated end) into the ground (*The Cultivator and Country Gentleman* June 17, 1869; Thomas 1869:220). The lower image illustrates a “Patent Drive Well Point” available through the Chicago mail order firm of Hay and Prentice (Hay and Prentice 1883:4)

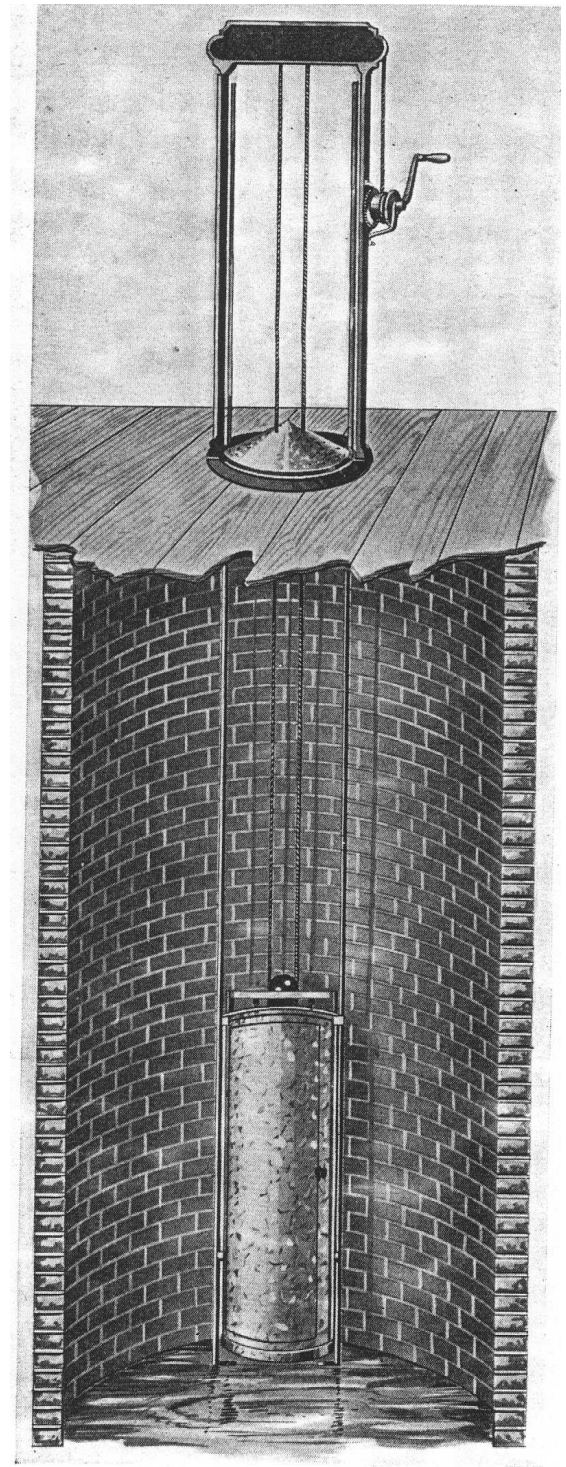
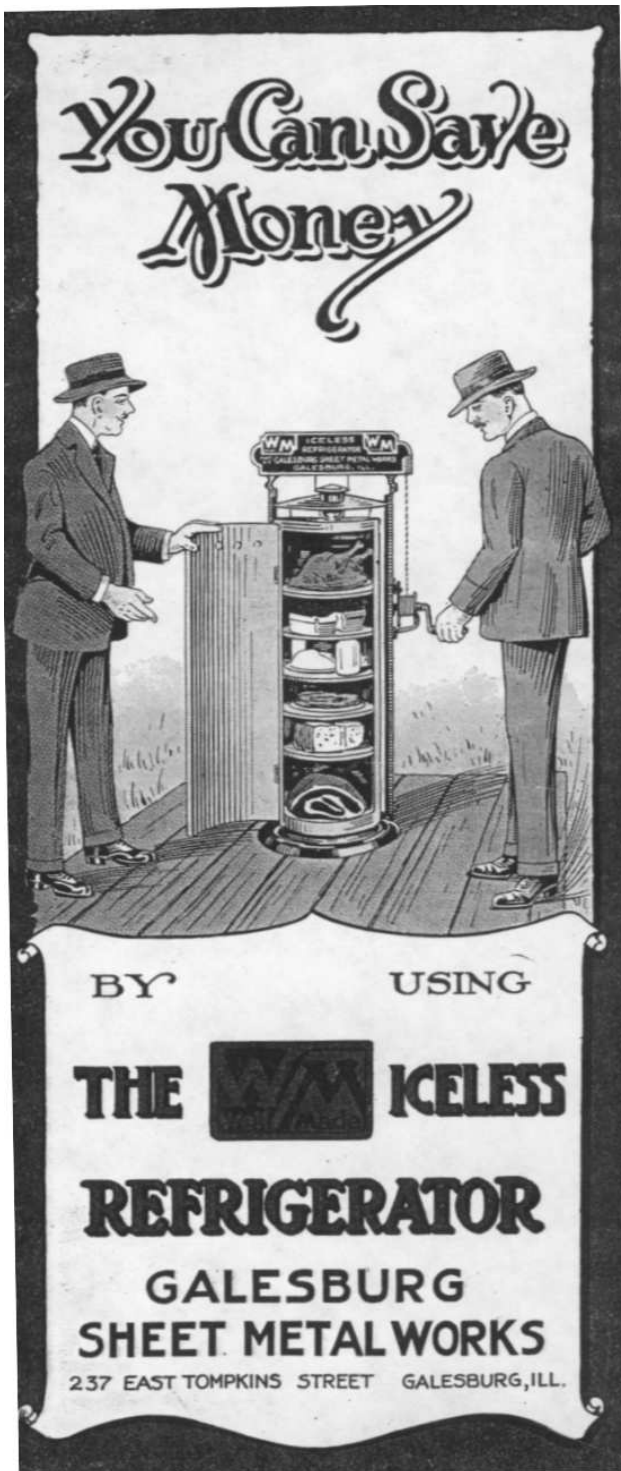


Figure 5. The *Well-Made Iceless Refrigerator*, which was manufactured in Galesburg, was an attempt to capitalize on the traditional use of the well shaft as a cold storage facility. With the ready availability of electric power and the use of the electric refrigerator during the middle twentieth century, this practice was finally abandoned (Galesburg Sheet Metal Works n.d.).

Cisterns were a convenient facility for storing collected water. As with wells, cisterns required an initial investment in labor and materials that was generally not expended by the earliest of settlers. As such, remains of cisterns do not appear associated with many of the earlier pioneer period sites in Illinois. Nonetheless, once they were constructed, they were built in a variety of methods and sizes. Unlike wells, which have relatively limited archaeological variability, great differences seems to exist in both the period literature and archaeological record regarding the methods of construction and size of cisterns constructed during the nineteenth century in Illinois. As *The Illustrated Annual Register of Rural Affairs* (1858:70) noted,

the great value of an abundant supply of water to houses and barns and which may be easily had by providing capacious cisterns, renders it important that the cheapest, best, and most convenient mode of construction should be adopted.

During the latter 1830s through 1850s, great experimentation and debate in period literature (particularly in the agricultural press) appears to have been taking place in cistern design and appropriate use of materials. It was not until the late nineteenth century that relatively standard cistern designs appear to have become common within the state.

In its simplest (as well as easiest and cheapest) form, a cistern consists of container (such as a wooden barrel or tub, or a large stoneware jar) located at the corner of a building. This barrel would have collected rain water channeled from roof runoff into the barrel via a gutter or roof valley. As these features generally rested on the ground surface, they have little archaeological visibility. Others may have been partially set into the ground and/or backfilled around with time—leaving a minimal archaeological signature. Several examples of small-diameter containers located at the suspected corner of a building and at, or near, the original ground surface may represent rain barrels partially set into the ground or buried during the normal process of soil aggrading that takes place at these historic sites during the nineteenth century. Such shallow barrel-shaped depression (complete with iron barrel hoops) are sometimes found near the corner of a dwelling (cf. Feature 5 at site 11Ra375, Ahler et al 1991; and Feature 5 at the Waddams Grove #1 Site, Mansberger, Halpin and Sculle 1992:88).

Unfortunately, one problem with these surface cisterns in most parts of Illinois is that they were apt to freeze during the winter months. One method of preventing the aboveground “cistern” from freezing was to place it in the ground and cover it with sufficient dirt to prevent it from freezing. As such, the simplest belowground cisterns consist of a hole dug into the ground with a wooden tub (with cover) or barrel placed in it and covered with dirt. Water was removed via a hand pump attached to a pipe that projected into the underground receptacle, or simply from a bucket lowered into the container via a curbed opening. Although limited in number, references to wooden cisterns are noted in the agricultural literature of the early nineteenth century for Illinois. In 1854, a correspondent from Joliet (Will County) who was touting the virtues of cement cisterns, wrote the magazine *Prairie Farmer* (1854:391) that cisterns, when “made of wood, *as are most in this city*, are wholly unsuitable; and even though sunk in the earth, or encased in a surrounding of tan bark two feet thick, the matter is not bettered, as we know from trial.” Similarly, in 1855, yet another correspondent from New York State noted the use of stave constructed wood cisterns. This individual had constructed a large wooden tub six feet high and six feet in diameter, held together with wooden hoops, which he had set in a bed of mortar with a thick plank cover. According to the correspondent, this cistern had performed well

and “appears may last another 25 years” (*Prairie Farmer* 1855:42). Noting the inadequacies of wooden cisterns (and the utility of a cement cistern), a Mr. Rockwell (of nearby Alamakee County, Iowa) discussed the disadvantages of wooden cisterns, noting that pine was the most common wood used for cisterns, the wood generally tainted the taste of the water, and that he had “never known a wooden cistern to last longer than five or six years without leaking” (*Prairie Farmer* 1855:160-161).

Although archaeological sites occupied prior to circa 1840 should exhibit evidence of such features (stave-constructed wooden containers set into the ground for holding water), conclusive evidence is not present. Clearly, the occupants of the vast majority of the sites occupied during this early phase of Illinois history do not seem to have constructed cisterns with any regularity.¹² If soft water was used by these early settlers, it apparently was collected in an aboveground rain barrel. Archaeologically, wooden cisterns should exhibit characteristics of wooden barrels set into the ground—and this should consist of evidence for vertical plank walls forming a circular pattern in plan (in contrast to horizontal planks forming a square or rectangular pattern) and distinctive proportions and profile suggestive of a barrel (with the center wider than the two ends). Evidence of wooden barrels set completely in the ground has been documented archaeologically within both Galena (Jo Daviess County) and Peoria (Peoria County). Those noted in Galena clearly functioned as privies (located on the rear of the lots with fecal material on their base) during the middle nineteenth century (Mansberger 1998.). The presence of these barrel privies in Galena may be a function of the entrepot character of this community at that point in time—as barrels were a common shipping container used for a great variety of commodities during the nineteenth century, and would have been relatively plentiful in this community at that date. Similarly, subterranean hole-set barrels have been documented in an 1840s-50s context along the river-front in downtown Peoria (Mansberger n.d). The presence of these barrels in an archaeological context in Peoria also probably reflects the entrepot character of that community at that point in time. In Peoria, these hole-set barrels were found paired with typical hole-set barrel privies—and appear to represent relatively well-constructed (and/or maintained) trash pits located behind the privy. It is also significant that no cisterns of any form were found at this Peoria location. Similar hole-set barrel privies were also documented at the Presidential Library and Museum parking garage project in downtown Springfield (Mansberger 2003).

Although this author is aware of no stave-constructed cisterns from an archaeological context in Illinois, one of the more likely candidates is Feature 17 at site 11ML437 in McLean County (Kreisa and McDowell 2002:39-41). This pit was discovered at an early farmstead that appears to have been initially occupied in the 1830s. This feature, which was located close to the suspected corner of an early structure at this site (noted by the presence of a brick fireplace

¹² As discussed earlier, this is evident with lower status families during that initial period of settlement in Illinois. Cisterns are not found archaeologically with any frequency on short-term sites during the initial years of settlement. Similarly, they do not seem to appear on sites occupied by the more affluent households of the same period. For example, no cisterns have been found at the Jarrot Mansion, which was constructed in St. Clair County in circa 1805-1810 (Mansberger 1999). Similarly, no cisterns were found at sites 11ML272 or 11ML274 which appear to represent early settlement locations for rather well-to-do families at Blooming Grove (McLean County) (Kreisa, McDowell and Halpin 1994). Unfortunately, these sites have not been investigated sufficiently to determine if cisterns might not be present at these early sites. Currently, our knowledge of sites occupied by more affluent families during the early years of settlement in Illinois is limited, as few sites of this type have been investigated archaeologically. And, unlike that espoused by Mazrim (2002:248), there is significant differences in both the material culture assemblages and site plans at these early settlement sites that warrants documentation and explanation. Future archaeological research will no doubt note substantial differences between the early settlement strategies employed by the early “subsistence” farmer and the more financially secure farm family.

foundation), had the distinctive profile of a barrel that measured approximately 1.4m (4'7") wide at the scraped surface and extended approximately 1.65m (5'5") below the scraped surface. Additionally, although the base of the feature was excavated with a backhoe, there apparently was no evidence of either a mortar or wood lining. Although the authors initially suspected that this feature represented a cistern, they concluded that it was "more likely to represent an infilled well." Nonetheless, approximately 6m (20') to the south of the cistern was located a brick-lined well (Feature 16). Although Feature 17 at this site may represent the remains of a shallow, short-term well abandoned and replaced by Feature 16, its location near the corner of the suspected structure and its form argues that it may have been an early barrel cistern. Among other factors, the presence of quality artifacts (both ceramics and glassware) attests to the rather high status of the family that occupied this site—another factor that may argue that the occupants of this site probably utilized a cistern for their daily activities.

Although some writers have reported the presence of wood cisterns in Illinois, the examples cited by these authors are not overly convincing to this author. For example, Mazrim (2002:57-82) has interpreted square-in-plan, wood-lined shafts at the Losch Farm Site in rural Madison County as cisterns.¹³ Although these features were initially identified as wells by the field excavators, Mazrim maintains that these features are wood-lined cisterns—an argument that seems illogical to this author. Archival evidence suggests early wood cisterns were probably of round stave construction—which would be necessary for the containers to hold water. Square in plan, wood-lined shafts with horizontal planking such as those uncovered at the Losch Farm Site would not hold water unless properly caulked. Additionally the features described by Mazrim are often found paired with features which were clearly non-contemporary wells—suggesting that these feature "sets" or clusters represent a series of rebuilt well shafts (with the earlier wood-lined shafts being replaced with more substantial brick-lined shafts). In stone-poor and wood-rich regions (such as portions of the upland reaches of St. Clair and Madison Counties), early settlers often substituted wood for stone, and constructed a variety of things of wood that one would normally construct with stone if it had been easily available—such as the lining of wells.¹⁴ Mazrim notes "while cisterns dating to the early nineteenth century may have sometimes been lined with wood, square wood-lined wells (constructed within a large backfilled excavation) would seem less likely" (Mazrim 2002:74). Mazrim also notes that "given... the lack of square, wood-lined wells in the archaeological literature of nineteenth-century Illinois, it seems more likely that Feature 231 functioned as a cistern." As noted above, wood-cribbed wells are known from Illinois, and probably were fairly common in early nineteenth century Illinois (cf. wells at Fort Massac, Mansberger 2002:249) particularly when quarried stone and manufactured brick were in short supply. Similarly, given the instability of the sandy soils present at the Losch Farm Site, a well lining was an absolute necessity.¹⁵ As such, I suspect that the features identified as cisterns by Mazrim (2002) are actually early wood lined wells.

¹³ Feature 222 consisted of two superimposed features (one square in plan, the other circular) that Mazrim has interpreted as a brick lined well and later wood-lined cistern. Other similar features interpreted by Mazrim as cisterns include Features 223 and 231 (Mazrim 2002:57-82). Unfortunately, none of these features were excavated completely to their bases, making final assessment of their function difficult at best.

¹⁴ The original portion of the Kiel House was a middle nineteenth century log structure located in rural St. Clair County—near present-day Mascoutah, Illinois. This traditional house was constructed using short segments of tree trunks (or "wood stumps") as piers—which were later replaced by more substantial masonry piers (Mansberger and Stratton 1994).

¹⁵ The construction of a cribbed well in unstable sandy soils would result in a large circular backfilled area around the outside of the cribbed well—exactly as indicated by Mazrim (2002).

In southern Illinois, a distinctive class of archaeological feature has been noted and interpreted as “unlined” or “earthen” cisterns. These features are generally round in plan, extend from 6-10’ in depth, often have slightly inward sloping walls with flat or basin-shaped bases, and often lack any evidence of a wall lining—whether wood, mortar, brick, or stone. As noted by Wagner (2002:45), “unlined earthen cisterns have been previously encountered on several early- to mid-nineteenth-century rural sites in southern Illinois.”¹⁶ As Wagner (2002:103) notes, the large amount of rock in these features suggest “that the walls of these early cisterns probably were rock-lined (McCorvie 1987:43; McCorvie et al. 1989), although later ones appear to have been rock and plaster-lined (McCorvie 1987:50-53).” Wagner (2002:103) further notes “the rock lining served to keep the clay walls from collapsing, while the nearly impermeable clay subsoil of southern Illinois retained the water.” It is doubtful that the clay subsoil would have sufficiently held the water in the cistern, and the lack of a mortar lining on the inside surface of the stone lining argues against these features functioning as cisterns. It seems more likely that these features represent shallow wells—wells that were either unlined, or lined with wood or stone, and that became “high and dry” with the dropping of the water table (which occurred quickly after settlement). Similarly shaped, stone-lined features were noted at the Fair View Farm Site (McCorvie et al. 1989). These features at the Fair View Farm Site (Features 3 and 26) were constructed with dry-laid sandstone, lacked an interior parging, were relatively wide-mouthed with an interior diameter of 1.8-2.25m, and generally extended past the existing water table to bedrock. Although described by McCorvie as cisterns, the only difference between these relatively wide-mouthed features and nearby Feature 23 (which had an interior diameter of only 60-70cm and interpreted as a well) was the diameter. As such, it is difficult to understand how one feature could have functioned as a cistern (preventing water from flowing out of the shaft and thus holding water in) while the other functioned as a well (allowing water to flow into the shaft, and thus to fill up the shaft). As such, it appears that two forms of wells (one wide-mouthed, the other narrow-mouthed) may have been present at this site. Potentially a functional (domestic versus livestock water) or temporal (early versus late) explanation can be given for these differences?

Similarly, although not located in southern Illinois, Gums (1999:35-44) documented four large pit features arranged around a well at the Whitley Site in eastern Illinois (Edgar County) that she interpreted as cisterns. These features were relatively large in diameter (approximately 2.2m by 2.5m in plan) and extended approximately 2-2.45m in depth (terminating at or near the present water table). Although much of the stone had been salvaged from these features, sufficient amounts were intact near the base to indicate that they had originally been dry-laid, stone lined shafts (only to be later robbed of their lining). No evidence of an interior mortar lining was present. In contrast, the adjacent well at the site (which also was unlined, having been robbed of its stone lining) measured approximately 1.5m by 1.68m in plan and extended to an estimated depth of 2.9 meters below the surface. Although the exceptionally wide diameter of these four shafts is larger than most wells, they extended well into the underlying ground water table at the time of excavation, and would have extended much farther into the underlying ground water when originally constructed—suggesting that they may indeed have functioned as wells. In keeping with our previous discussion, two forms of wells may be present at this site—a wide-mouthed, potentially early livestock well, and the narrow-mouthed later and/or domestic well. If these five features represent wells, the inhabitants of this site must have had difficulty in keeping their wells from collapsing and were constantly digging and re-digging new wells.

¹⁶ Sites with “unlined earthen cisterns” include the Davis Site (Features 1 and 5; McCorvie 1987:40-41, 51-52), the Huggins Site (Features 18, 19, and 21; McCorvie 1987:173, 179-181) and the Young Tavern (Feature 7; Wagner and McCorvie 1992:98).

Another possible explanation is that this feature cluster (consisting of four stone-lined, wide-mouthed pits arranged around a well) represents a special use function. One possible explanation is that these pits represent feed storage pits for the underground storage of corn and/or root crops for the feeding of livestock. The arrangement of these pits along a fence line, in close association with a potential stock well, suggests that these features may have been related to a rural livestock tradition—and not associated with household water storage.

By the late 1830s, the agricultural press was espousing the virtues of the relatively new style cement cistern. These cisterns, which were relatively simple and cheap to construct according to the agricultural press, simply consisted of a mortar-lined hole in the ground with a wooden cover (with access hole). The construction of such cisterns was made possible by the discovery and/or availability of hydraulic cements or mortars (sometimes referred to as “water lime”) within northern Illinois.¹⁷ The unique quality limestone used to manufacture this product had only recently been discovered during construction activity on the Illinois and Michigan Canal. *The Union Agriculturalist and Western Prairie Farmer* (1841:82), quoting from “the Peoria Press,” described the construction of a simple mortar-lined cistern in 1841:

The workmen proceed to dig a circular hole or pit, of the desired capacity, at the place where a cistern is wanted, and shape it after the visual form of a earthen pot... which shape is deemed best adapted to give strength. Care should be taken to have the sides as regular and smooth as the ground will admit. The plasterer comes next, to give it a coat of mortar made of hydraulic cement and clean sand, in proportion of about one of the former to two of the latter wet with water to a suitable consistency. This is plastered immediately against the sides of the pit, beginning at the bottom and extending upward and on the horizontal part of the offset to the perpendicular part. If the sides should be said it may give some trouble to the plasterer, which an expert workman can readily overcome—and if any part should cave a little, a few broken bricks or stones may be put in to hold up the sand or caving earth in its place. When this coat is sufficiently dry, of which the workman can judge, a second must be added and then a third, each about half an inch in thickness. These render their sides perfectly secure against the caving of the earth, forming a powerful stone pot or cistern which hardens and strengthens with age and proper use. The roofing or covering is lodged upon the offset, and is usually made of two inch plank, leaving a suitable hole, with a square box open at each end, inserted in the center where the water is to be drawn out. If the cistern is larger, joints or other timbers are to be put across it to support the plank, and earth about a foot deep. Before throwing the earth upon the plank, their joints must be secured with cement against the admission of dirt. This is, without doubt, the cheapest way of building cisterns, and may be practiced with success wherever they are wanted. One barrel of cement is sufficient for a cistern that will hold 80 barrels of water, and more where this earth can be smoothly dug out.

In 1843, the agricultural journal *Prairie Farmer* gave similar instructions for building a cistern. This new information was published after an earlier request from an individual presumably from Chicago (a Dr. Silas Long) who had noted that

¹⁷ The *Prairie Farmer* carried a letter from a Mr. James Clark on the uses and methods of preparing hydraulic cement in an 1848 issue (*Prairie Farmer* 1848:87). Mr. Clark notes that this material has been “in general use for building cisterns, cellar bottoms, cellar walls, a cheap and durable pipe for conveying water, mill flumes, mill dams, [and] houses. Cement makes a much stronger mortar than quick lime, and will set as hard as a rock in the water.”

there are a number of persons who are desirous of making or procuring them made, and as it is attended with considerable expense, further information is asked for upon the subject, as it is reported that hose who have had them in Chicago and elsewhere have found them not to answer their purpose. Either they crack or become leaky and let out part or all of the water, or where the water remains for a few weeks, it becomes so hard as to render it unfit for use (*The Prairie Farmer* 1843:70).

In response to Dr. Long's request for information, a Mr. Smith from Belvedere supplied the following insights into constructing a cement cistern.

To make a cistern of about 40 barrels—that being suitable size for a common family—I would commence by digging a circular hole, 8 feet in diameter and two feet deep; having made the bottom tolerably level, strike a circle 6 ½ feet in diameter on it, this leaving a shoulder all around to rest the plank on. Then dig by the circle a hole 6 feet deep, drawing gradually in as you go down, so that at the bottom it will be about 5 ½ feet diameter; then round out the bottom, about 18 inches deeper, thus making it somewhat in the shape of a pot ash kettle, but considerably deeper in proportion. When this is dug and well smoothed out, the cistern will be ready to receive the cement (Smith 1843).

Smith (1843) continued by giving detailed instructions as to how to mix the “water lime” and “coarse clear [sic] sand” for applying to the inside surface of the cistern. Smith's instructions called for laying on the lime “as thick as convenient, which will be about half an inch on the sides and an inch on the bottom. Cover it so as to protect [it] from the sun and rain, and in about 4 days it will be ready for another coat. Put on 4 coats of about the same thickness.” Smith (1843) continued by noting that, after sitting for three or four weeks it should have cured sufficiently “to let water in.” Smith (1843) further recommended taking precautions to place a board on the bottom of the cistern so that “the water to strike on at first” to protect the newly laid cement lining. Smith (1843) goes on at length about the problems associated with the application of the mortar lining and stressed the need to apply properly mixed cement in multiple, thin coats, with sufficient time between applications to allow for the proper aging of the cement. Many years later, *The Illustrated Annual Register of Rural Affairs* (1858:70) noted that “the two all-essential requisites for underground cisterns, are good hydraulic lime, and a supply of clear [sic] pure sand.” Smith (1843) noted that this cistern, of 40 barrels capacity, would require about two barrels of cement, and “none but that newly ground should be used for this purpose, as by exposure to the air it loses its hydraulic properties; and great care should be taken to prevent the cistern from freezing, as that will destroy it entirely.”

Discussing the cover for his new cistern, Smith noted that it “should be put on with oak plank, not less than 3 inches thick. Laid close, with cement spread over the cracks—also some cement spread on the shoulder to bed the plank in. A hole 18 inches square should be cut near the center of the cover, and round with a curb of good thick stuff should be placed, about three feet high. Then throw on the dirt and pack it well; and should it be sandy, it will be necessary to spread on the top a couple of loads of clay to prevent the water running through the cover, especially if the cistern should not be under a roof.” To prevent it from freezing, Smith (1843) further noted that “2 or 2 ½ feet will be little earth enough to put on the plank as a preventive....”

By the early 1840s, individuals within many of the larger communities in the state had begun to specialize in cistern construction. A Mr. Smith (described as a “half-acre farmer” from Belvedere who had “flourished a few years [earlier] as a mechanic”), appears to have been fairly well versed in the construction of cement cisterns, “it having occupied much of my time for two or three years past” (Smith 1843). Similarly, a Mr. Miner (from Winchester, Scott County) wrote in *The Prairie Farmer* in 1843 of “a person who made it a part of his business to furnish cement and build cisterns in the city [of St. Louis].” By mid-century, similar individuals were advertising their expertise in the Springfield (Sangamon County) city directories, while others were noted with specific occupations of “cistern builder.”¹⁸ Costs for such a family cistern was not overly high, especially if one constructed it themselves, which appears to have been the common practice. Miner (1843:95) cited a cost of ten dollars for the construction of “one large enough for a common family.” According to the agricultural press, the utility of these new cisterns was their longevity, ease of construction, and relative cheapness to construct. As one writer noted in 1845, “if kept from freezing, [such cisterns] will last a life time. Their greatest recommendation, however, is being so cheap. The lime may be bought in Chicago for \$2.50, or in Lockport, Will Co. for \$1.50, and the work any farmer can do, who can build a respectable tap to a cider barrel” (*Prairie Farmer*, A Lady’s Friend, Naperville, 1846). Yet another source, describing these cisterns, noted if properly constructed “I think any man good enough for a farmer can do all that labor without a mechanic [and] this cistern lasts forever” (*Prairie Farmer* 1855:258).

The *Illustrated Annual Register of Rural Affairs For 1855-6-7* (Thomas 1858:70-72) gave some insights into the construction of cisterns at mid-century.¹⁹ This periodical illustrated a sectional view of a simple mortar-on-soil cistern and pointed out some of the problems associated with this method of construction.

A very common and cheap form for the cistern is to dig a round hole into the ground with sloping sides, somewhat in the form of a narrow-bottomed tub, and then to plaster immediately upon the earth, fig. 1. Unless a slope is given to the sides, the mortar cannot be made to keep its place while soft, as it is nearly impossible to find a soil dry and hard enough to retain the plastering by simple adhesion. The top of this kind of cistern must therefore be wide, and consequently difficult to cover very large ones effectually and substantially. The covering is usually made of stiff and durable plank, supported if necessary by strong scantling, and over this is placed about one foot of earth to exclude completely the frost. A hole with a curb about eighteen inches by two feet, must be left in this covering, for the admission of the water pipe or pump, and to allow a man to enter for cleaning out the cistern when necessary. In cold or freezing weather, it is indispensably requisite to have this hole well stopped to exclude frost, which would otherwise enter the wet cement or walls, and produce cracking and leakage—a frequent cause of the failure of water-lime cisterns.

Archaeological examples of these early earth-walled, mortar-lined cisterns are relatively commonplace in Illinois appearing relatively quickly on the landscape during the late 1830s and early 1840s, and continuing to be constructed through the 1870s or 1880s (see attached figures).

¹⁸ The 1870 Federal population census for Sangamon County lists an Ohio-born individual named John Getcham as a “Cistern Builder.”

¹⁹ The exact text and cistern illustrations were later re-published in the well distributed and read house plan book entitled *The House: A Manual of Rural Architecture* (Woodward and Woodward 1866).

Within early Springfield, shallow earth-walled mortar-lined cisterns have been found at a variety of sites associated with the relatively upscale urban households. Relatively intact examples from the Sprigg House and Dubois House sites in the Lincoln Home National Historic Site (Mansberger 1997, 1998), and the Francis Site at the Lincoln Presidential Library project area (Mansberger 2001) were all of a similar size and appear to have been located off the rear corner of the house. All three probably were constructed during the 1840s or 1850s. A small, late 1850s example was found at the working class T. Winchester House Site in downtown Rockford (Mansberger 1990). An unusual, basin-shaped, pre-Civil War example was noted at the Drake Site in rural Stephenson County (Phillippe 1990). An unusually shaped conical cistern was noted in Will County (Naglich and Radziul 2002:29). Larger earth-walled, mortar-lined cisterns were associated with the Cook House (also located within the Lincoln Home National Historic Site), the Jesse Lindall Site in rural St. Clair County (Sonderman 1979), and at the Elizabeth Pottery Site in Jo Daviess County (Mansberger 1994). John Bareis constructed a large, egg-shaped cistern with brick dome for his up-scale East St. Louis house in circa 1870-75 (Stratton, Mansberger, and Flesher 1999). Other relatively large, straight-sided examples with brick domes appear within the distinctively German area of rural Monroe County (Sites 11Mo779; Gums 1995).

Archeological evidence has not documented the extremely thick walls noted by the agricultural periodicals (and is consistent with the earlier reference to “thinned walled country” examples noted above). In contrast, most of the examples documented in Illinois have relatively thin application of mortar applied to the dirt walls. These features generally have thin walled surfaces that appear to have failed frequently and exhibit multiple episodes of coating and/or re-coating. As noted above, these early mortar-lined cisterns were constructed in a great variety of shapes and sizes. Shapes vary from smaller half barrel or tub forms to larger egg-shaped and straight-sided cylinders. Although archaeological evidence documents that these structures were constructed in a great variety of shapes, it appears that the shallow, flat-bottomed cylinder with slightly inward sloping walls (and plank covering) was probably the most common form during the early years of use. By the 1850s-60s, these cisterns were generally larger straight-sided, relatively flat-bottomed, cylinder-shaped structures with brick-domed covers. Additionally, it appears that these early cisterns are much more common at urban sites, than on contemporary rural sites.

Often the evidence for the type of overhead cap or cover (plank versus brick dome) is limited in the archaeological record—especially with sites that have been disturbed by plowing. In some cases, fragments of interior plastered brick domes are intact within the fill of the cistern, or the lower course or two of brick from the dome is still intact; in other instances, the lack of brick in the fill suggests that a plank covering probably was used. One of the better-preserved examples of a small cistern with brick dome was at the Willis Allen House in southern Illinois (Paul, Ross, and Sandefur 1994). This cistern consisted of a shallow round pit with cement applied directly to the soil. A well-constructed brick dome—and projecting above the ground surface—capped the pit. Domes projecting above the ground surface, such as this one, probably were constructed beneath the floor of a building, as freezing would probably have been an issue otherwise.

By the middle nineteenth century (1850s), cistern use was becoming much more prevalent and more substantial brick-lined cisterns had become fairly standard for upscale households. Describing a farmhouse constructed in 1854 in rural Adams County, a promoter noted “it is a frame building; has two stories; good cellar; eight rooms and hall and is very well furnished. A good well and cemented *brick* cistern affords a large supply of water” (Andreas,

Lyter and Company 1872:82; italics added). By the middle 1850s, the agricultural press had begun to comment on the inadequacies of the earth-walled cistern. As one Iowa correspondent to the *Prairie Farmer* noted in 1855, “no cistern should be built without being walled up with good hard bricks or stone, and a substantial brick wall [or dome] turned over it...” (*Prairie Farmer* 1855:160-161). Writing in 1884, Jonathan Periam noted that “we suppose no one nowadays will consent to have a cistern plastered directly on the earth or clay. It is cheap, and it is as worthless as it is cheap” (Periam 1884:732-733).²⁰ After describing the cement-on-soil variety of cistern discussed above as “the cheapest form of such reservoirs,” Thomas (1858:70-72) noted in the *Illustrated Annual Register of Rural Affairs For 1855-6-7* that

a better, more capacious, and more durable mode is to dig the hole with perpendicular sides in the form of a barrel, and build the walls with stone or brick, to receive the plastering, (fig. 2.) In consequence of its circular form, operating like an arch, these walls will not be in danger of falling if not more than half the ordinary thickness of similar walls. For large cisterns they should be thicker than for small ones. The walls should be built perpendicular until about half way up, when each successive layer should be contracted as to bring them nearer together in the form of an arch, reducing the size of the opening at the top, and rendering a smaller covering necessary.

The previously mentioned Iowa correspondent, in describing the construction of a “substantial rain water cistern” in 1855, noted that

neither should cement alone be used, no matter how hard the earth may be; as in cities rats abound, they would dig down along the side, and the pressure of water would burst through the cement, as it is generally put on thin, especially in the country. I have known many cisterns ruined in this way. No cistern should be built without being walled up with good hard bricks or stone, and a substantial brick wall turned over it, with an endwise or what is termed an eight inch arch—four inches being entirely too slender. If the ground is very hard, a four inch wall, well laid with small joints, in good lime and sand mortar, will do, being laid as tight as possible against the earth; but if the soil is inclined to be loose, by all means build the wall eight inches thick. At the same time allow a space of six inches between the brickwork and earth. Have some good clay on hand, just moist enough to pack closely, and, every four or five inches of brick work, fill the space with the clay, and pound it down as compact as possible. This will prevent the cistern from bursting no matter how loose or sandy the soil. At the same time do not forget to sink your cistern so deep that the frost may not injure it. In this latitude, two feet or more of earth should be thrown on the top of the arch. The arch should have from twenty to twenty-four inches spring over a cistern eight feet in diameter. In any sort of earth, two coursed of bricks are necessary to lay over the bottom of the cistern. In loose or sandy soil, it needs a greater thickness. Put two coats of cement mortar on it without intermission. J. Rockwell, Alamahee County [Iowa] (*Prairie Farmer* 1855:160-161).

²⁰ Having said this, in 1933, the Agricultural Extension Division of the North Dakota Agricultural College in Fargo, North Dakota, gave plans and insights into constructing a “reasonably durable cistern... by plastering directly on the earth wall.” The agricultural bulletin continued by stating that “unless the cement plaster type of cistern is well constructed on good firm, well-drained soil, the results secured are likely to be disappointing. A much more satisfactory cistern is assured when forms are used to construct the standard concrete wall cistern” (Hamilton 1933:7).

Archaeological evidence of these masonry-walled cisterns is relatively common in Illinois—clearly they are one of the more common feature types present in the state, especially with later nineteenth and early twentieth century sites. Although the nineteenth century agricultural literature notes the use of both stone and brick wall lining material (and stone examples are probably awaiting discovery), this author knows of only a small handful of round, stone-lined and stone-domed cisterns in Illinois. One such cistern was documented in downtown Ottawa. By the late 1850s, cylinder-shaped brick cisterns with dome caps became a relatively standard design. Nonetheless, great variation exists in wall and dome construction methods, and water holding capacity (see attached figures). Variations in wall construction revolve around how the brick is laid in the wall—whether one or two courses in width, laid in a common running bond pattern, or laid on edge (as “sailors”) or on end (as “soldiers”). Similarly, variations in dome construction also are present—and include one course (4” wall with brick laid lengthwise) and two-course (8” wall with brick laid endwise, as noted above) construction, shape of dome (extent of curvature or “spring”), and method of throat construction. All of these variables reflect on the quality and/or cost of the cistern to construct—and have great archaeological value for interpretation.

One of the earlier brick-lined cisterns in Illinois known by this author, was located at the Mitchell House in rural Scott County. Constructed immediately outside a substantial brick farmhouse, this oval cistern (with stone curbed throat) was apparently constructed with the house in circa 1830 (Mansberger 1981:53, 55).²¹ Figures 30 and 31 illustrate the variability in wall and dome construction present within the cisterns documented in Illinois. A relatively odd-shaped, brick-lined cistern—whose inward sloping walls was more in keeping with early mortar-lined cisterns—was documented at site 11Mo792 (Feature 2, Gums 1995:188).

By the early 1850s, many promoters were espousing the health virtues of drinking cistern water over well water (cf. Fowler 1853:133), and a new emphasis on cistern construction appears in the agricultural literature. At this time, the emphasis shifts from how to build the cisterns, to how to improve the drinking quality of the water. With the new emphasis on cistern use, cistern builders began to incorporate filters into their design. Fowler (1853:133) noted “filtered rain water is the very best drinking water in the world. Lime or hard water is by no means as healthy as soft.” And again, much debate ensued in the agricultural press as to the proper method of constructing a “filtering cistern.” A correspondent to the *Prairie Farmer* in late 1854 discussed the perceived problems of drinking well water, and noted that “facts of long standing... published in these columns eight or ten years ago; all tending to show that in our western country from Alabama to Minnesota, to drink rain water habitually, is to escape the epidemics of the season... But it is not every cistern which will keep rain water in a condition fit to be drank” (*Prairie Farmer* 1854:391). This correspondent continued by discussing the “virtues of filtration as a means of making rain water palatable.”

Methods for achieving filtered cistern water were varied. Fowler (1853:133-134) discusses two methods in common use at that time. The first is an interior filter system that is constructed *within* the cistern chamber. In one method of interior filter, two chambers within the cistern were partitioned by a brick wall. In other cases, a dome-like enclosure was constructed around the lower end of the outlet pipe. In both cases, water entered the cistern on one side of the wall, passed through the soft-mud brick creating the wall, and was drawn out of the cistern

²¹ Although the exact date of the cistern is not known, the use of hand –turned, salt-glazed stoneware drain tile with this cistern suggests that the brick-lined cistern was constructed relatively early in the history of the house.

from the other side. Writing in the early 1860s, the *Illustrated Annual Register of Rural Affairs* noted “sometimes a common cistern is separated into two parts for filtering, by means of a straight wall partition. But unless the cistern is small, or the wall quite thick, there will be danger of its bursting by the unequal pressure when one is much fuller than the other” (Thomas 1876:169). These interior cisterns had certain disadvantages, in that they were difficult to maintain, and did not keep the inside of the cistern clean—and depending on the method of construction, the water might not filter through the brick “filter” fast enough for the pump to work effectively. The other form of filter discussed by Fowler (1853) is the exterior filtering system. As Fowler noted, such exterior filters could be of two types—portable or non-portable. Fowler (1853:134) discussed the use of portable exterior filters (consisting of a charcoal and sand mixture placed within a container) that could be purchased from a John Kedzie of Rochester, New York for the sum of \$5-\$10. Non-portable exterior filters were designed in a variety of aboveground and belowground configurations. One of the problems of these aboveground exterior filters—whether portable or non-portable—is that they did not operate under freezing conditions, and during their early years of use were poorly designed for large volumes of water.²² It was not until the early years of the twentieth century and the wide use of concrete, that external, aboveground filters became more common. Non-portable belowground filters were also espoused at a fairly early date—an excellent example of a large in-ground filter was depicted in the *Illustrated Annual Register of Rural Affairs, For 1861-2-3* (Thomas 1876:108). This wood cut illustrated a large cistern-like holding tank (that incorporated a charcoal and sand filter into its design) that was constructed immediately adjacent to, and flowed into, an adjacent cistern.

Filtering cisterns have been documented extensively in the archaeological literature. It was the discovery of a mid-century filtering cistern along the FAP 412 highway corridor north of Bloomington that lead Erich Schroeder to prepare what in essence is an early version of this paper (Schroeder n.d.). Brick-walled and domed filtering cistern with an interior partition wall, probably constructed during the later 1850s or 1860s, have been found in the Lincoln Home National Historic Site (at both the Corneau and Dubois Sites; Mansberger 1997, 1998). At both sites, contractors constructed a semicircular segment of wall within the larger chamber. At the Dubois House, the water had to pass through the brick partition wall (and thus be “filtered”) to enter the smaller chamber and be pumped out of the cistern. A slightly different strategy was used at the Corneau House (see Figure 36). Other interior filters have been noted at the LeTourneau Site (Kankakee County) (Mansberger 1986, 1987). A potential exterior filtering system dating from the middle nineteenth century was documented at the Sprigg Site at the Lincoln Home National Historic Site (Mansberger 1997). Similarly, an extremely large, potentially non-domestic or commercial cistern with a large exterior filter similar to that illustrated by Thomas (1876) was found in downtown Springfield, apparently having been constructed by Simeon Francis (the editor of the Capitol city’s *Illinois Journal*, and later the agricultural paper *Illinois Farmer*) during the early to middle 1850s (Mansberger 2001).

The late nineteenth century introduced a new material well adapted to cistern construction, and during the early years of the twentieth century, many publications began touting the virtues of concrete cisterns. Although many cisterns were constructed in the form of the typical cylinder-shaped shaft, constructing a round cistern of this new material was difficult to the untrained contractor. As such, during the early years of the twentieth century, many concrete cisterns were constructed square in plan, with reinforced concrete caps. Concrete

²² Thomas (1876:106), noted that “filters are either portable, and used for purifying a few pails of water at a time, or else fixed and attached to the cistern, to cleanse all that passes into it” (Thomas 1876:106).

cisterns usually appear, in Illinois, in rural and/or small village settings—as the use of concrete generally pre-dates the appearance of city water services in most of the larger communities within the state. By the early years of the twentieth century, within urban settings, cistern use began to drop off in favor of city water.

One aspect of historical archaeology is to document the everyday and/or commonplace features noted on the landscape—and place them into patterns of behavior for a particular time and place. But, archaeologists also are often uncovering the aberrant or unusual features that don't fit into these patterns of behavior. Various forms of cistern construction and/or use fall into this “aberrant” category. One such cistern documented by this author was a deep, well-like brick structure with bricked up floor, *and plastered interior surface* which was found at a rural Mendon Township site (Feature 2, Mansberger 1998:19).

Similarly, although circular cisterns predominate in Illinois' archaeological record, a tradition of square or rectangular cistern construction is present in the northern reaches of the state, particularly within stone-rich environments along the upper reaches of the Illinois, as well as the Kankakee, Du Page and Fox River Valleys. All examples known by this author have been constructed with stone. These cisterns are often located beneath a structure, incorporating the cistern walls into the basement foundation walls, and the overhead ceiling joists into the cap of the cistern. Most examples observed by this author have lath and plaster applied to the undersides of the floor joist to form the cap of the cistern—similar to an example noted by Hamilton (1933).²³ Such examples have been documented at two houses in Bourbonnais (the Le Tourneau Site and Hardees House Site) and at the Eagle Hotel in Wilmington (Mansberger 1986, 1987, 1994). Other examples have been capped with a large slab of stone (such as at the Edward Garfield Farm Site near Geneva, dating from circa 1859-60). The large cistern documented at the Dyer/Rathbun Site (Will County) was originally located outside of the dwelling, and was constructed with a distinctive stone-arched dome or cap. Although the rectangular plan of the cistern is in keeping with this northeastern Illinois cistern tradition, the stone-arched dome may be fairly atypical. Unlike the circular stone-lined “cisterns” of southern Illinois, all the square examples in the northern part of the state have extant stone walls with an interior mortar lining. Within this area, the square or rectangular shape of these cisterns appears to be a function of the materials used (stone—which is difficult to lay up in a well formed circle). These northern cisterns all appear to date to the middle nineteenth century (circa 1850-80).

To summarize, there appears to be great variability in cisterns located in Illinois—both in terms of their size (water holding capacity), and methods of wall and ceiling construction. The simple presence of a cistern has significant implications—depending on the time period of the site under study. The size and construction variables—which clearly have time and place significance—reflect upon the socio-economic status, and potentially the ethnic or regional background of the individual who constructed the cistern. These variables reflect on the cost of construction and/or quality of product produced, and represent significant variables relevant to interpreting nineteenth century sites in Illinois, and the greater Midwest.

²³ The Agricultural Extension Division, North Dakota Agricultural College, Fargo, North Dakota illustrated a rectangular cistern constructed within the basement of a house in their “*Soft Water and the Farm Cistern*” (Hamilton 1933:3). An unidentified correspondent in *The Illustrated Annual Register of Rural Affairs* (Thomas 1871:150-151) provided a plan of a rectangular stone cistern with an interior brick filter wall.

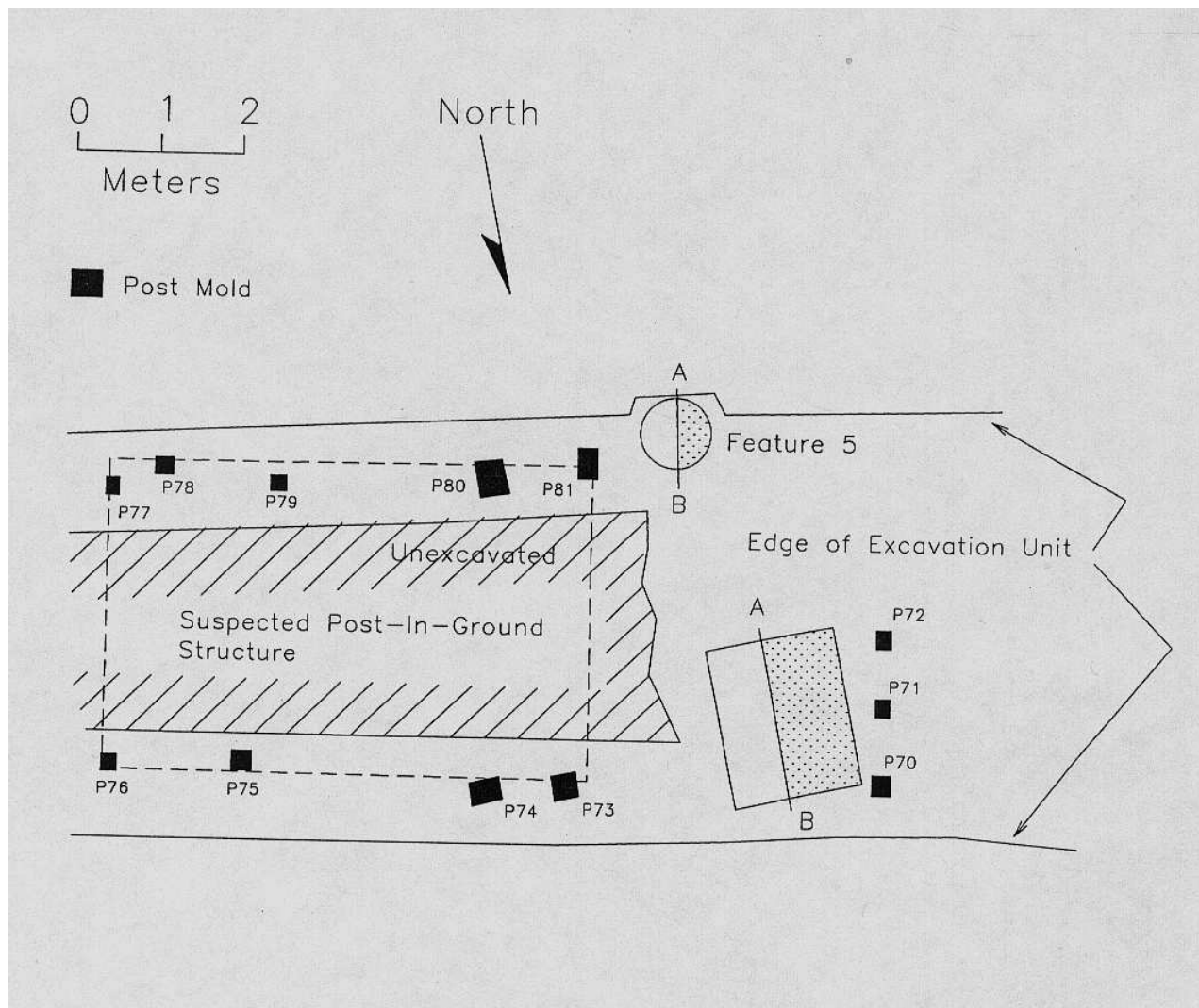


Figure 6. Details of small surface barrel (Feature 5) suspected as functioning as a cistern at the Waddams Grove Site in Stephenson County. This feature was a shallow, relatively flat bottomed, circular depression located at the suspected corner of a small structure (Mansberger, Halpin and Sculle 1992:88). This barrel probably was set slightly into the ground and received rain water off the roof of the adjoining structure. A similar example of this feature type was Feature 5 at the Baldwin Lake Site (Feature 5, Ahler et al. 1991).

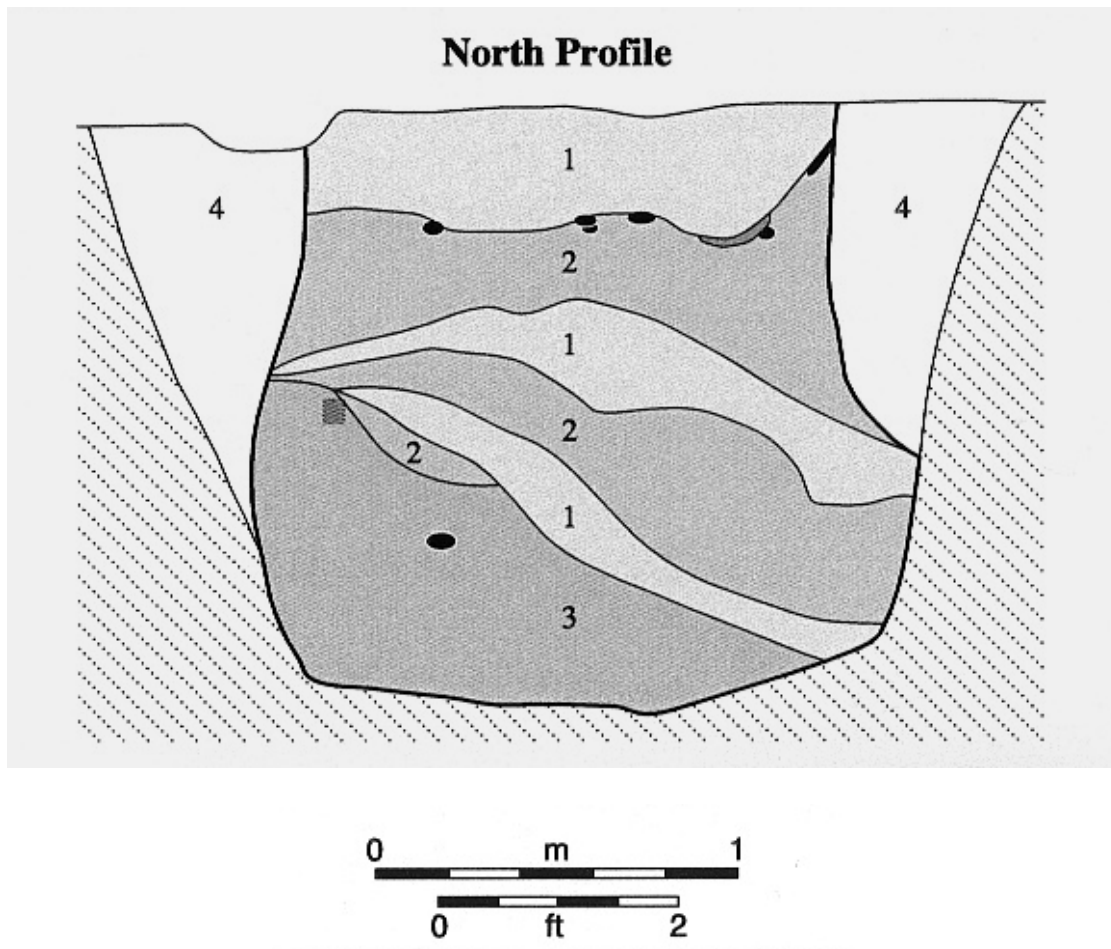


Figure 7. One of the more likely candidates for an early wooden barrel cistern in early Illinois was documented at archaeological site 11ML437 (Feature 17; Kreisa and McDowell 2002:39-41). This site represents the remains of a rural habitation located in McLean County. The suite of features and material culture items present at this site suggests that this site represented the remains of a farmstead occupied by a relatively high-status family, or that it had a specialized, non-farmstead function. This feature was round in plan and exhibited the distinctive profile of a barrel (cylinder with widest diameter at midsection). The lack of a mortar lining also suggests that this was a wooden container. Additionally, the feature was located in close proximity to a fireplace foundation and the suspected corner of a mid-nineteenth century structure—also arguing for its potential function as a cistern. Additionally, no fecal material was present in the base of the feature—suggesting that this feature did not function as a privy. Other hole-set barrels have been documented on mid-nineteenth century sites in Illinois but have been interpreted as privies (Galena; Mansberger 1998) or specialized trash pits (Peoria, Mansberger 2001).

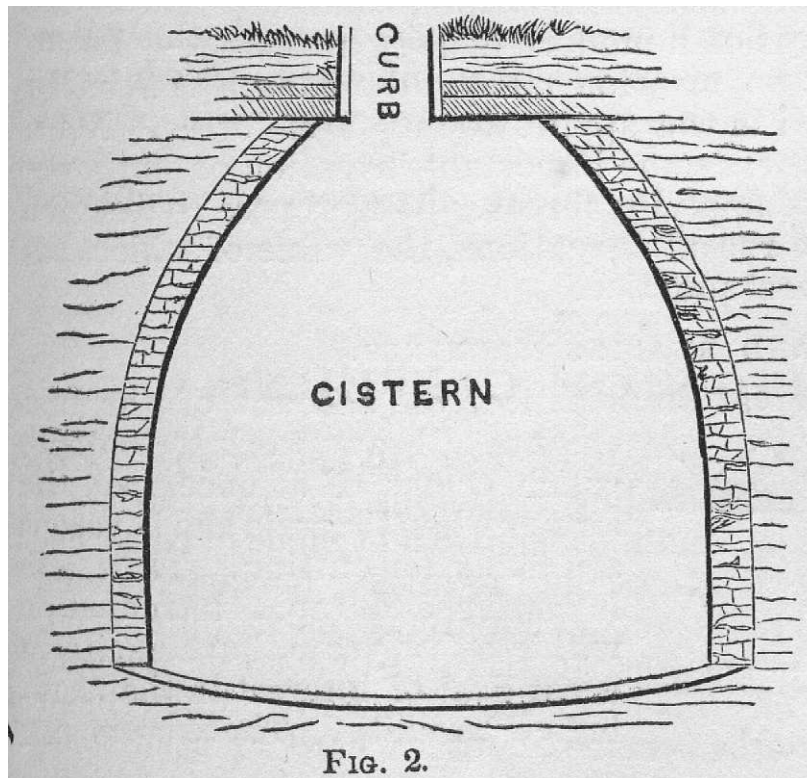
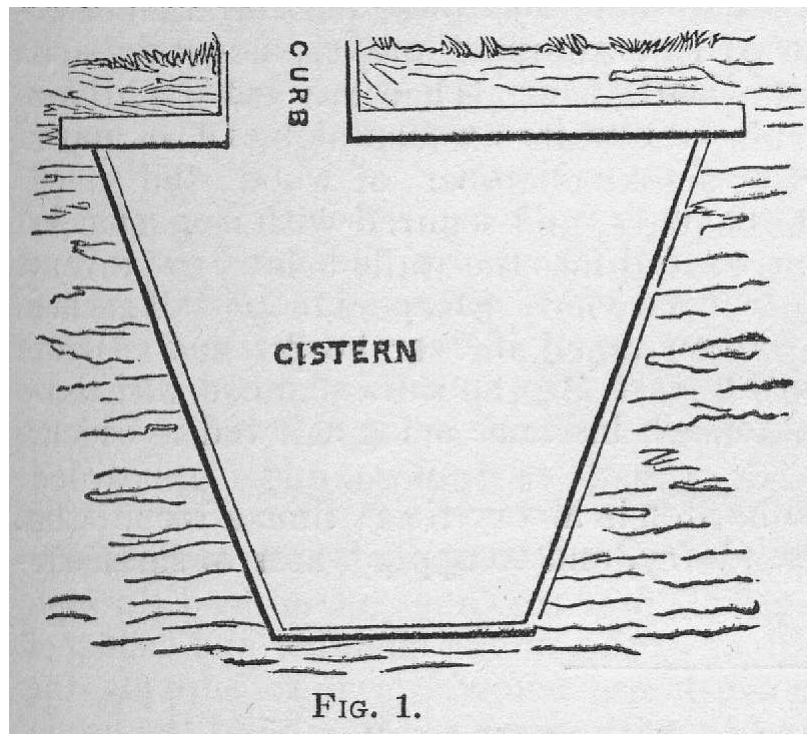


Figure 8. By the 1840s, the agricultural press was promoting the construction of cisterns for water storage. These two examples, although reprinted in 1858, probably were first published somewhat earlier—the original publication is currently unknown (Thomas 1858). The upper example was constructed with mortar applied directly to the ground surface. The lower structure had a masonry shaft with mortar bottom. Both structures had a plank cap with curb.

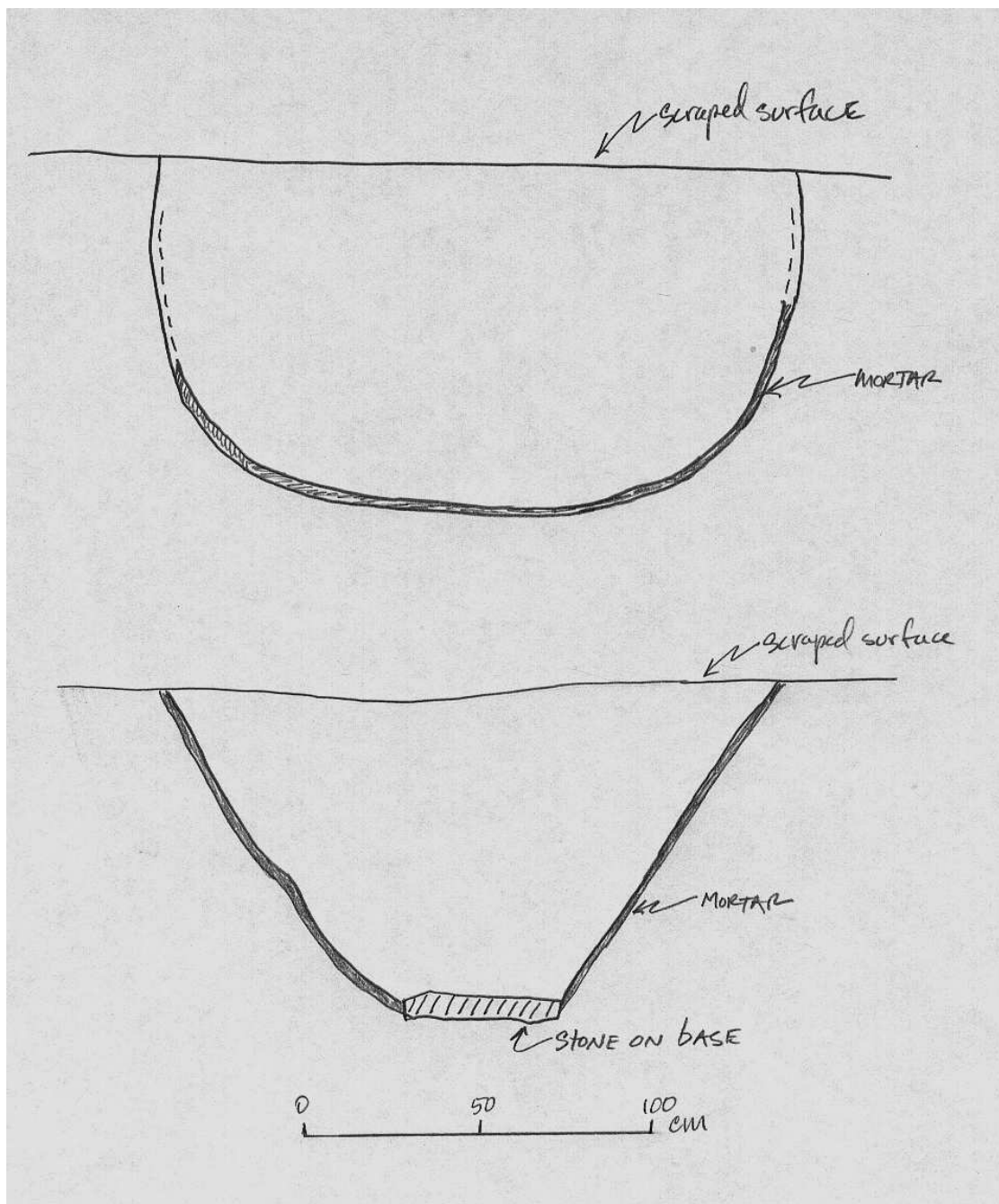


Figure 9. These are two examples of mortar-lined (or “cement”) cisterns from mid-nineteenth century rural Illinois contexts. Both structures were constructed by excavating a hole in the ground and applying hydraulic cement directly to the exposed ground surface. Both cisterns probably had a heavy plank cap covered with soil. These early cisterns represent a time of experimentation with new materials and cistern design. The top example is Feature 6 from the Drake Site in Stephenson County (Phillippe 1990:48). The lower cone-shaped cistern with stone resting on the base was documented at the Spangler/Baker Site in Will County (Naglich and Radziul 2002:29).

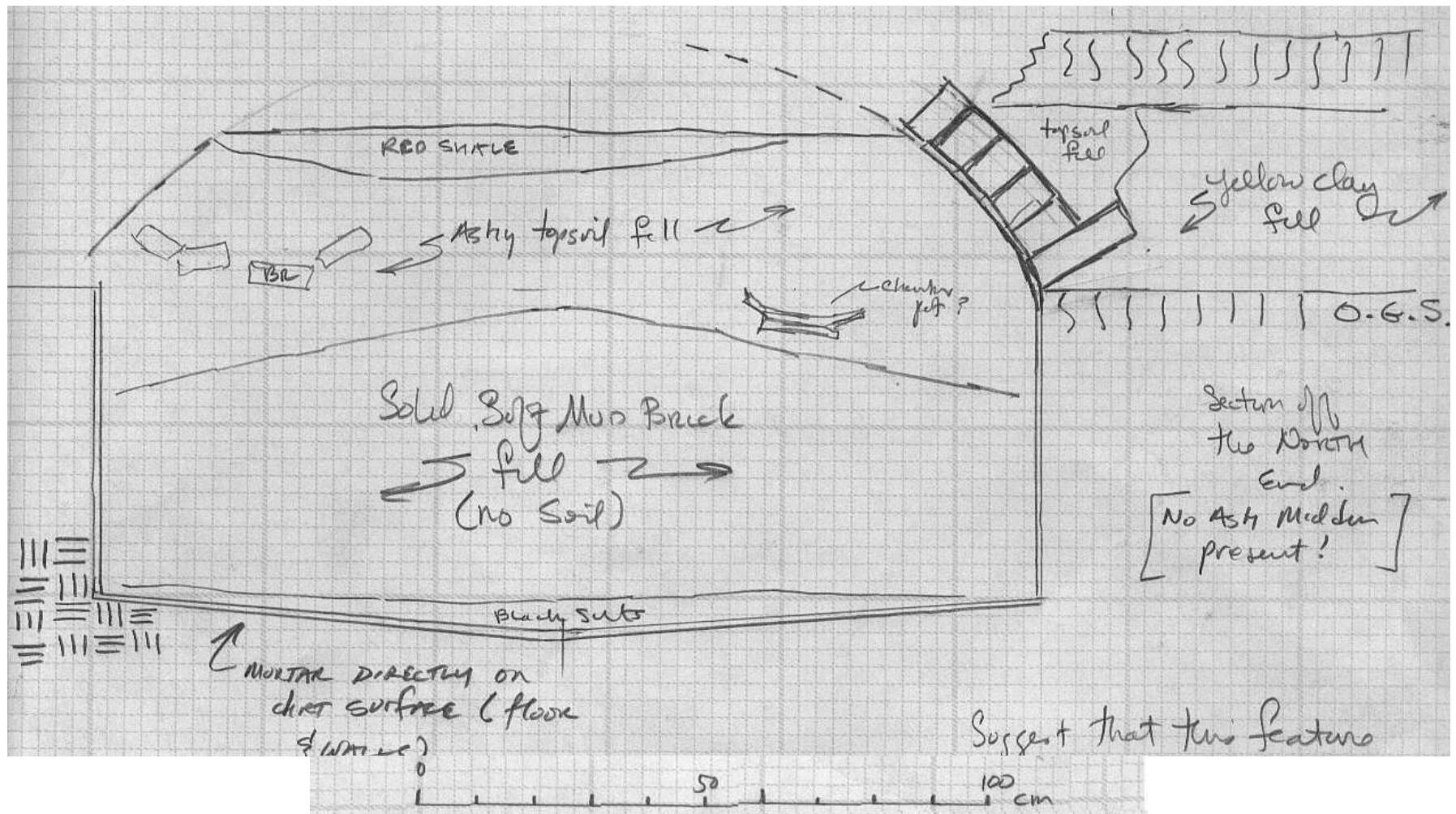


Figure 10. This relatively well preserved mortar-lined (or “cement”) cistern is substantially larger than those previously illustrated and has a single brick dome. This cistern was constructed in downtown Springfield (Sangamon County) presumably within the 1840s (Lincoln Presidential Library and Museum Project, Block 1, Mansberger 2002). As the presence of the brick dome, and larger holding capacity suggests, this cistern appears to have been associated with a fairly affluent household. A similar structure, believed to date from the 1840s, was documented at the site of the Francis residence in Springfield (Lincoln Presidential Library and Museum Project, Block 12, Mansberger 2002).

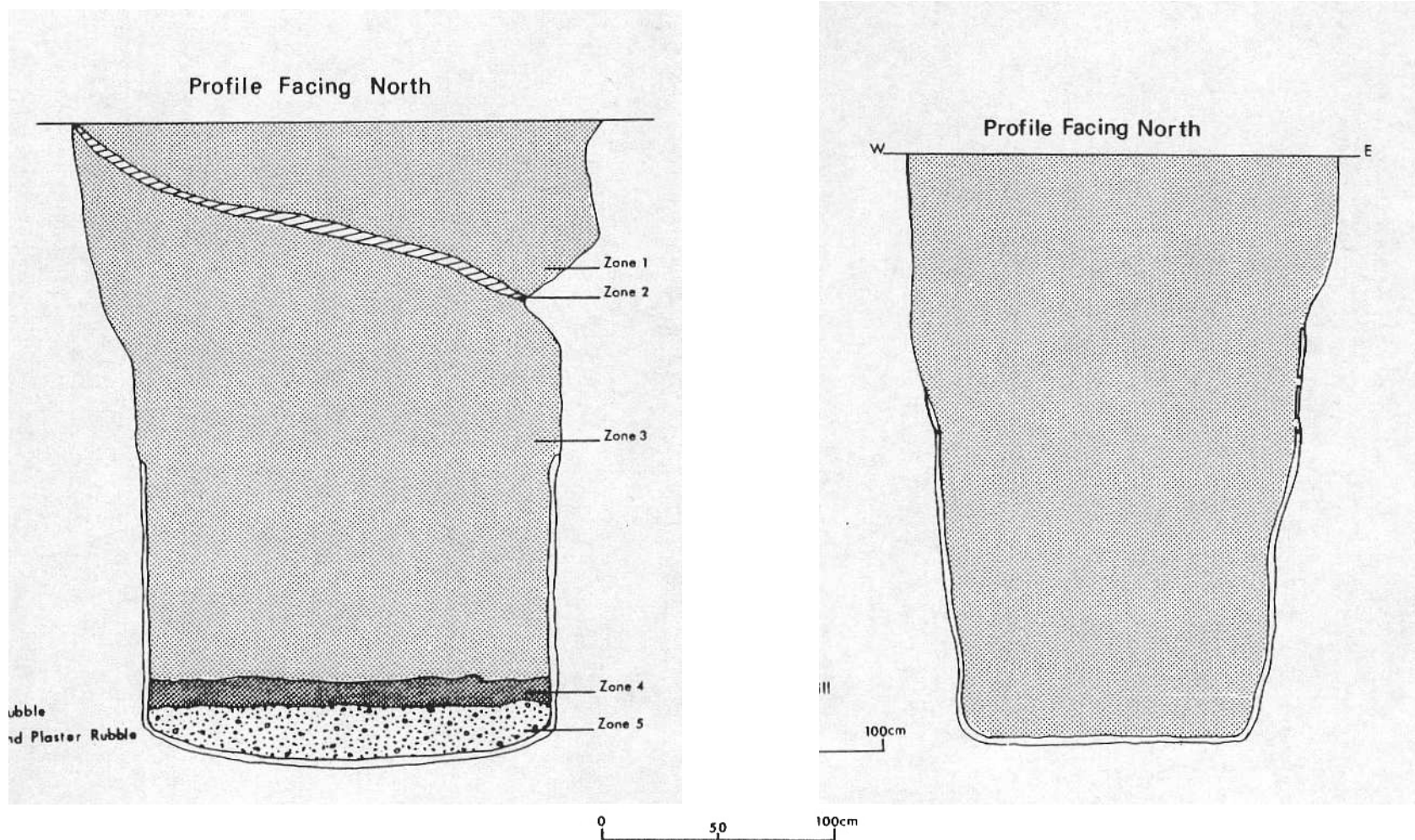
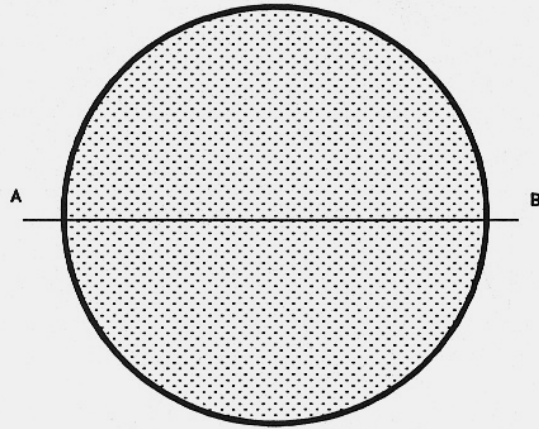


Figure 11. Larger mortar-lined (or “cement”) cisterns with distinctive cylinder shapes had begun to attain a relatively standardized shape by the 1850s. Both of these two cisterns (Feature 1, left; Feature 4, right) were documented at the Jesse Lindall Site in St. Clair County (Sonderman 1979:17, 26). Unfortunately, it is not known whether these structures were capped with a brick arched dome or simply capped with heavy planks. A similar feature was documented at the mid-nineteenth century Elizabeth Pottery Site (Mansberger 1994).

Plan View



BAREIS HOUSE
IL HABS No. SC-1999-1
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Section View

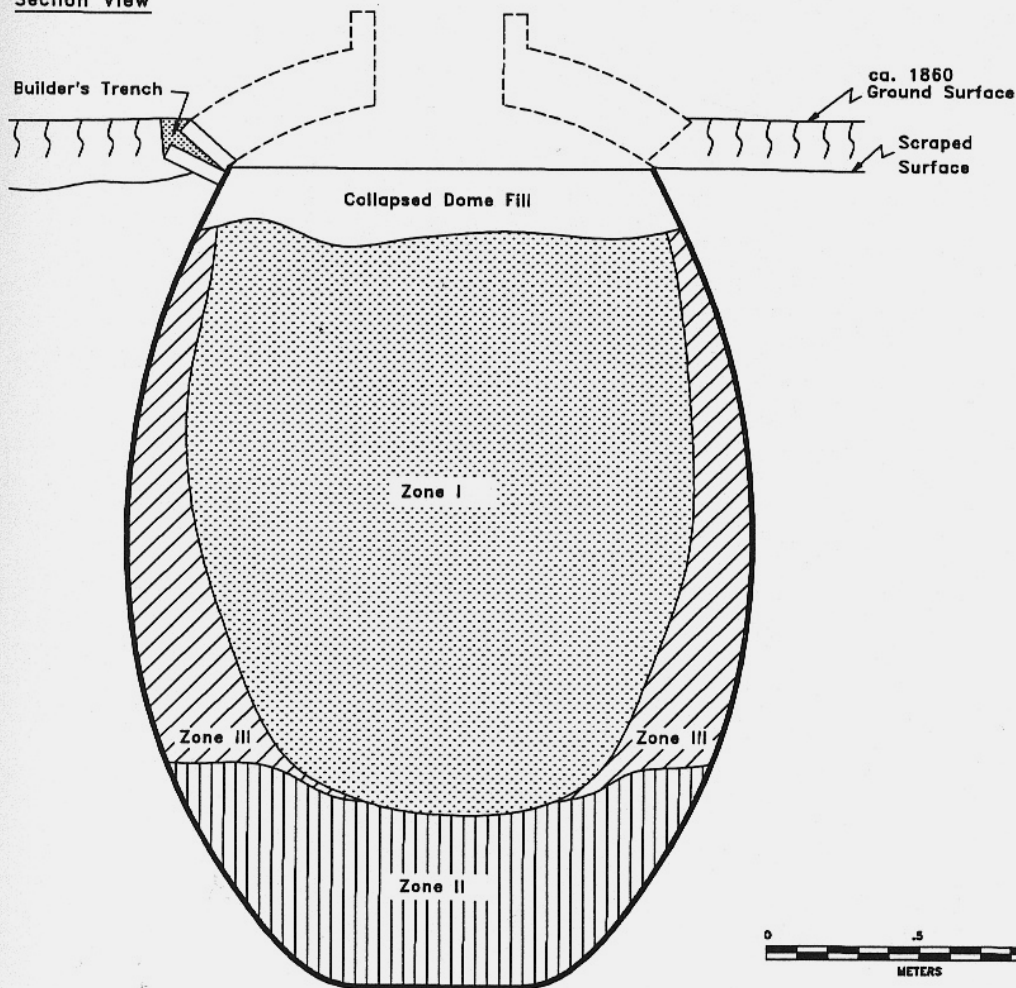


Figure 12. The mortar-lined (“cement”) cistern at the mid-century (circa 1870) Bareis House Site in East St. Louis consisted of a large egg-shaped structure with a two-course brick dome (Stratton, Mansberger and Flesher 1999). This cistern was associated with a substantial brick house that was occupied by a relatively affluent family. Both the large size of the structure and its two-course brick dome attests to the affluence of this household.

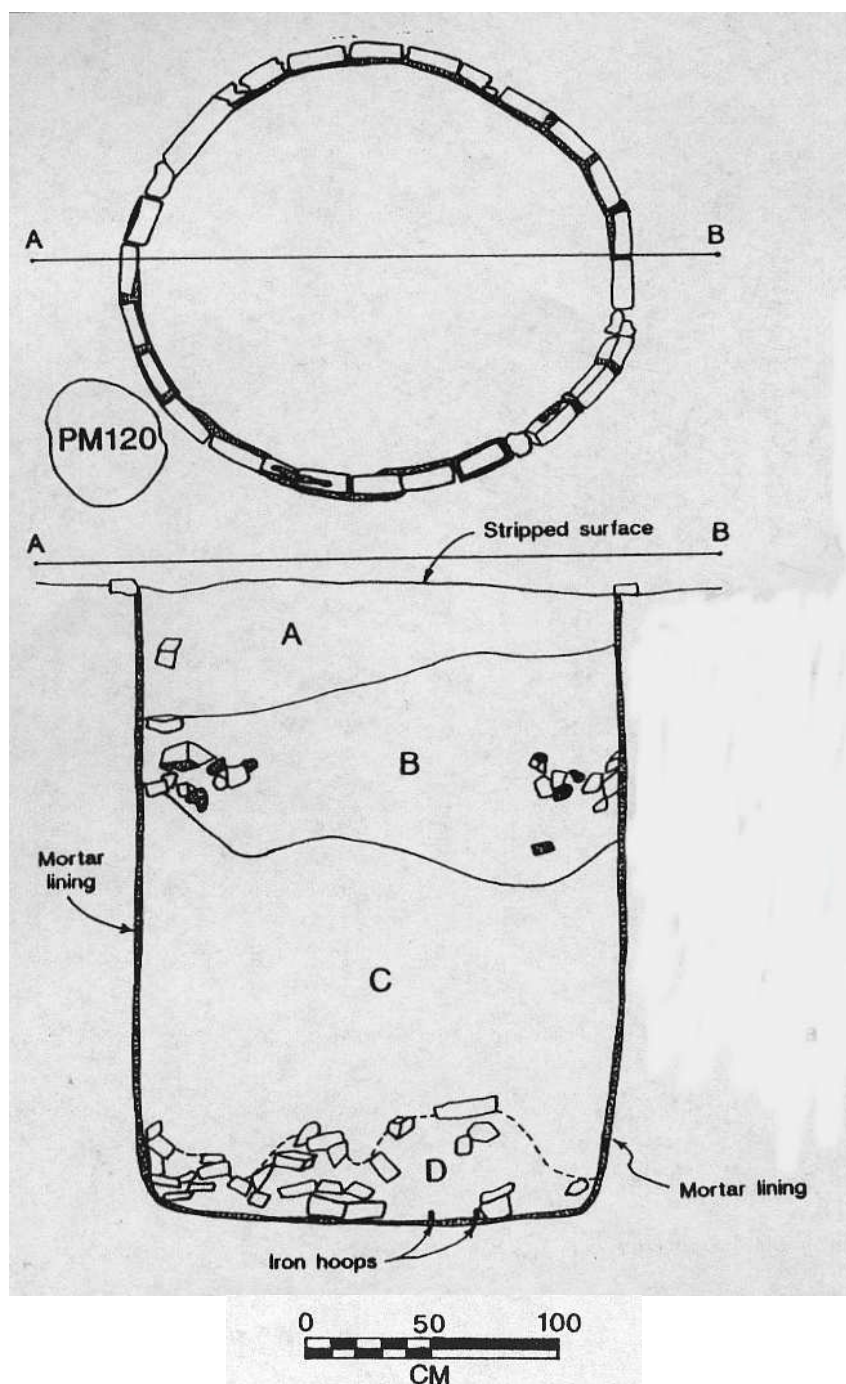


Figure 13. Substantial mortar-lined (“cement”) cisterns with cylindrical shafts and brick domes were being constructed in rural Monroe County by the later 1850s. This cistern was located at site 11MO779 (Feature 9, Gums 1995:131).

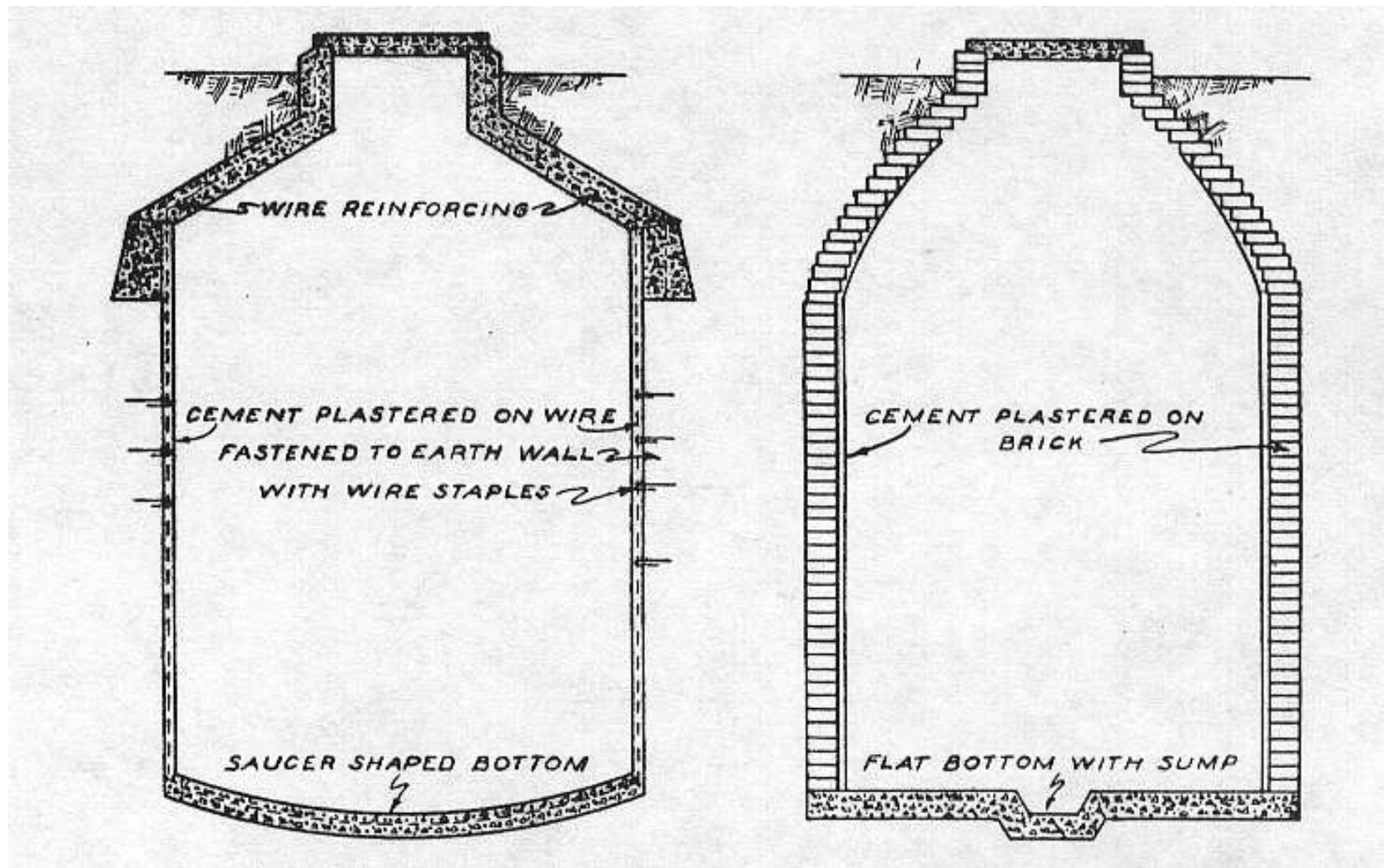


Figure 14. These two cistern illustrations, which note the two major forms of cistern construction in use at the time (“Cement Plaster”, left and “Cement Plaster on Brick” right), were published in an early 1930s publication from North Dakota (Hamilton 1933:7). It is interesting to note that the “mortar-lined” or “cement” cistern was still be espoused at this late date. This illustration also contrasts the different cistern base types in common use by the early years of the twentieth century—concave or saucer shaped bottom (left) and the flat bottom with sump (right).

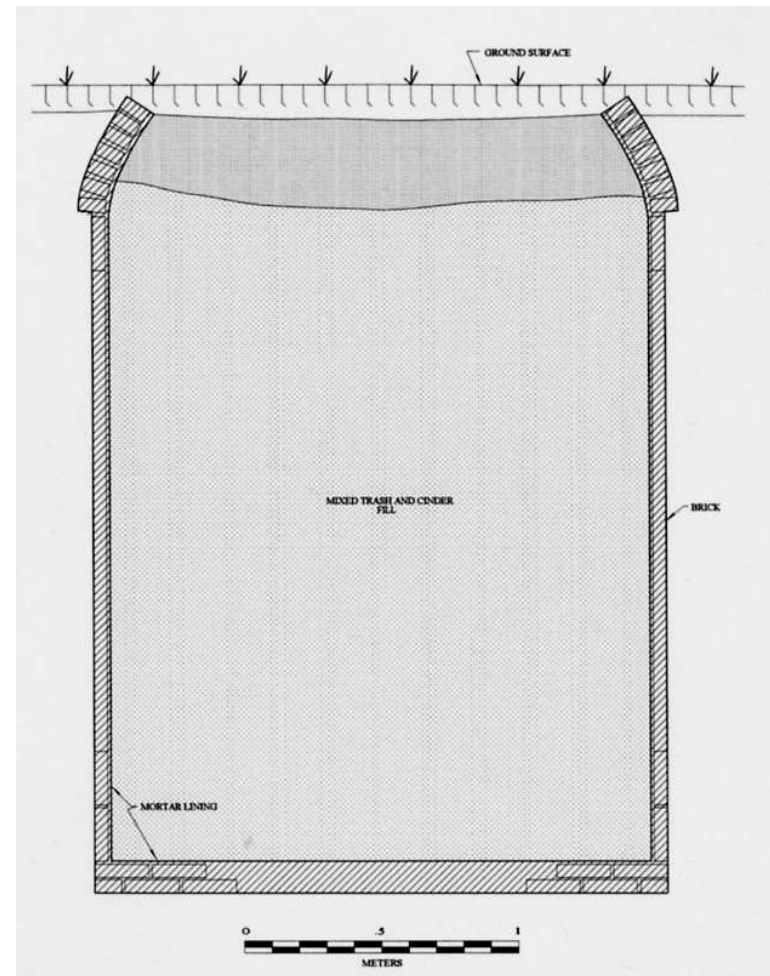


Figure 15. By the later 1850s and 1860s, brick-walled cisterns were becoming much more common. This brick-walled and brick domed cistern was constructed during the middle-to-late nineteenth century at the Walliser Site in Shiloh, St. Clair County. This brick cistern was constructed circa 1870 for a relatively low-income, working class household (Stratton and Mansberger 2003). In contrast to the relatively small size of this cistern, substantially larger structures with heavier constructed sidewalls and domes were constructed for more affluent households (cf. Quincy's Littlefield project, Mansberger 1992).

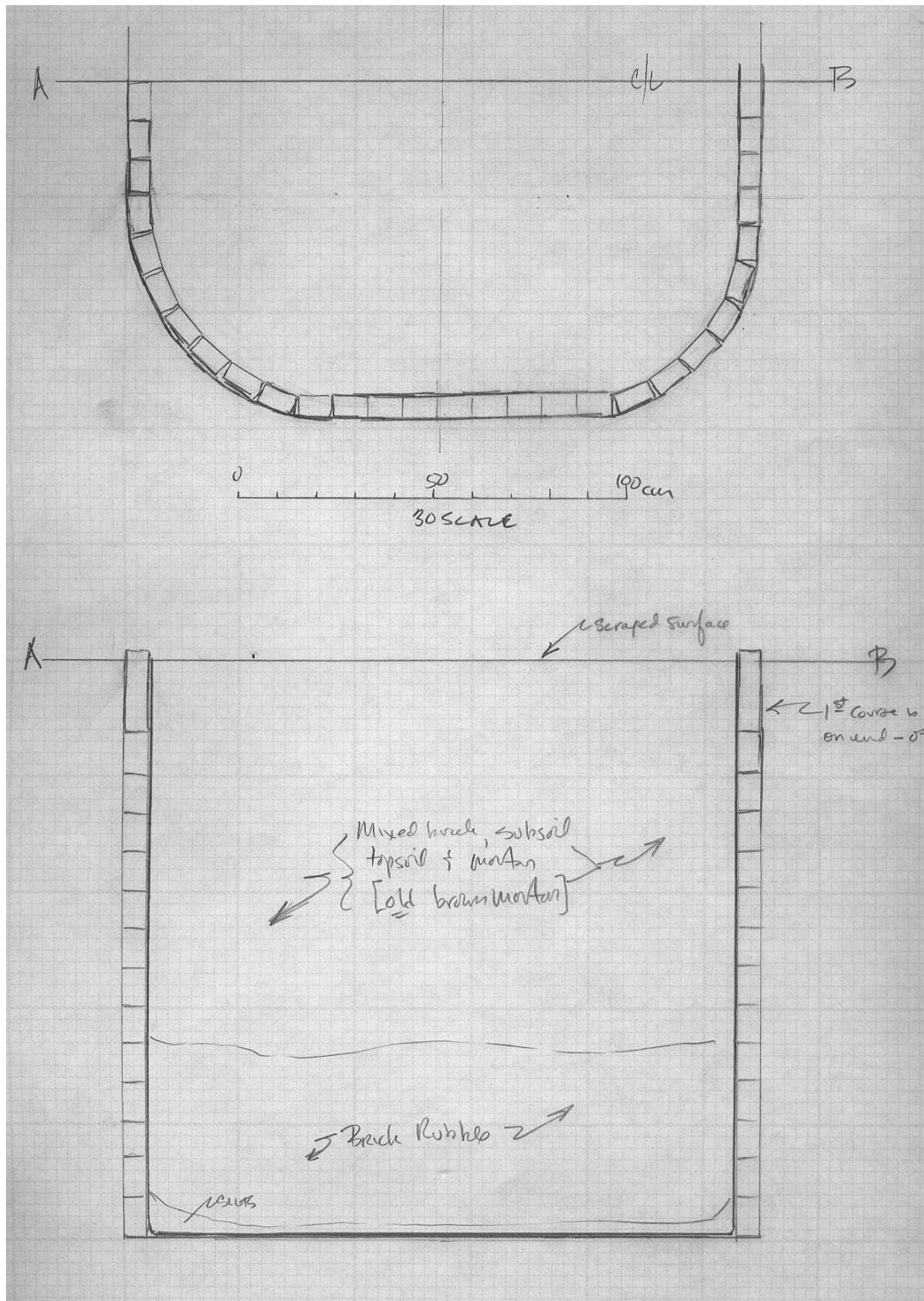


Figure 16. Although early brick cisterns generally were round in plan, oval examples were also constructed. This example (Feature 78), which was documented during excavations at the Lincoln Presidential Library and Museum parking garage project (Block 2, Ninian Edwards Addition, Springfield) was constructed with a flat base (lacking brick) and side walls with brick laid in both sailor and soldier coursing (Mansberger 2003). No evidence for a brick dome was present. This brick-walled cistern probably dates from the 1840s or early 1850s.

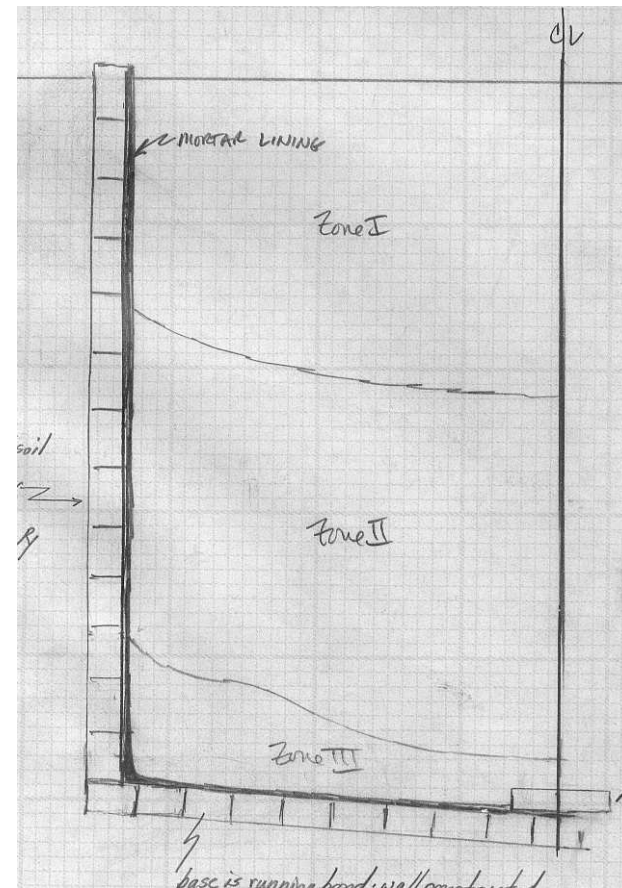
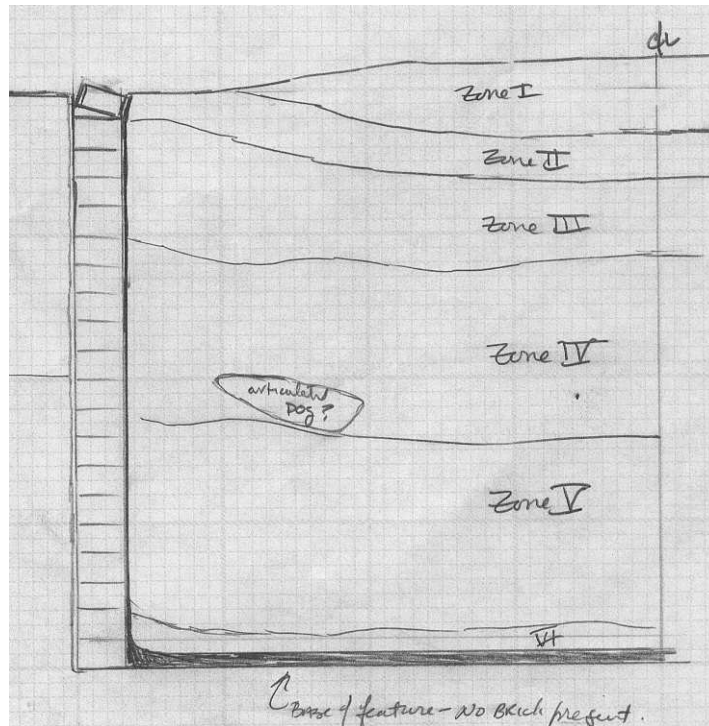


Figure 17. These two cisterns, both excavated at the Lincoln Presidential Library and Museum parking garage project (Block 2, Ninian Edwards Addition to Springfield), illustrate differences in construction techniques that reflect differential quality as well as age of construction. The earlier cistern at left (Feature 69), although it does have evidence of a brick dome, has a flat base with only a mortar floor (no brick) and has a diameter greater than its depth. In contrast, the later cistern on the right (Feature 68) has a sloped or basin-shaped brick floor, a raised center to support the pump's standpipe, and a diameter less than its depth. Although the analysis of the material within these features has not been completed as yet, Feature 69 appears to have been constructed in the 1840s while Feature 68 was probably constructed in the 1870s or 1880s (Mansberger 2003).

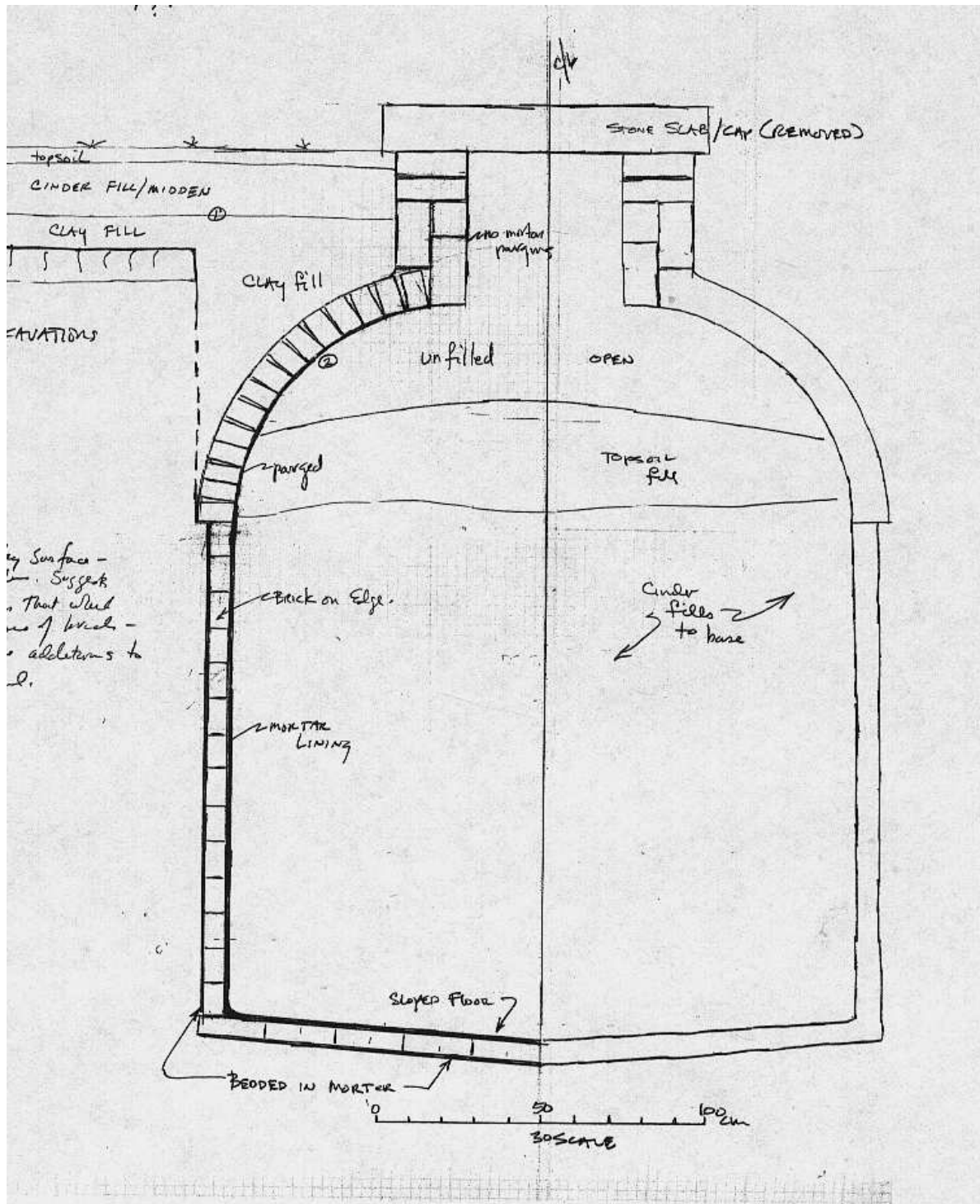


Figure 18. This brick-walled cistern was constructed sometime during the middle nineteenth century at the Dubois House (Lincoln Home National Historic Site, Springfield; Mansberger 1998). When originally constructed in circa 1860, the occupants of this large frame dwelling utilized a small mortar-lined or “cement” cistern. Upon constructing a new service wing onto the rear of the original house (sometime after 1860 but prior to 1884), the original cistern was abandoned and this more substantial structure (complete with interior brick filter) was constructed. Note the presence of the sloped brick floor and diameter less than its height.

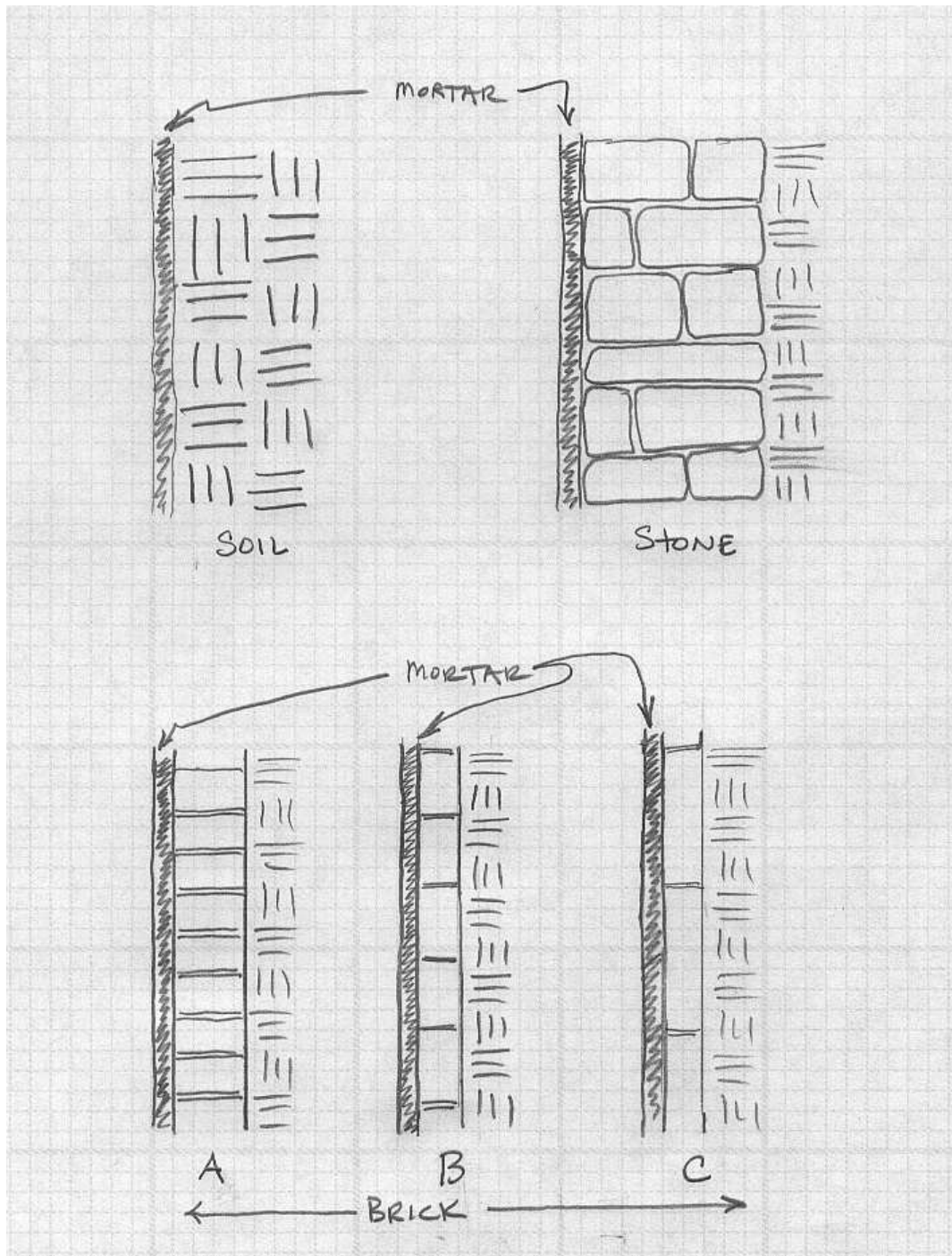


Figure 19. Great variation existed in the manner in which cisterns were constructed. This figure attempts to illustrate some of this variation. The upper left illustration indicates the method of applying a hydraulic lime mortar directly onto the excavated and/or exposed soil. The upper right illustration notes the use of mortar applied over a stone wall—a practice that was not overly common. The most common cistern construction methods utilized brick (bottom illustrations). A brick could be laid into a cistern wall in one of three different manners: A) on their flat surface or common running bond, B) as “sailor” coursing or on their side, or C) as “soldier” coursing or on end. Examples of all three methods are common—and in some cases both methods are utilized within the same structure.

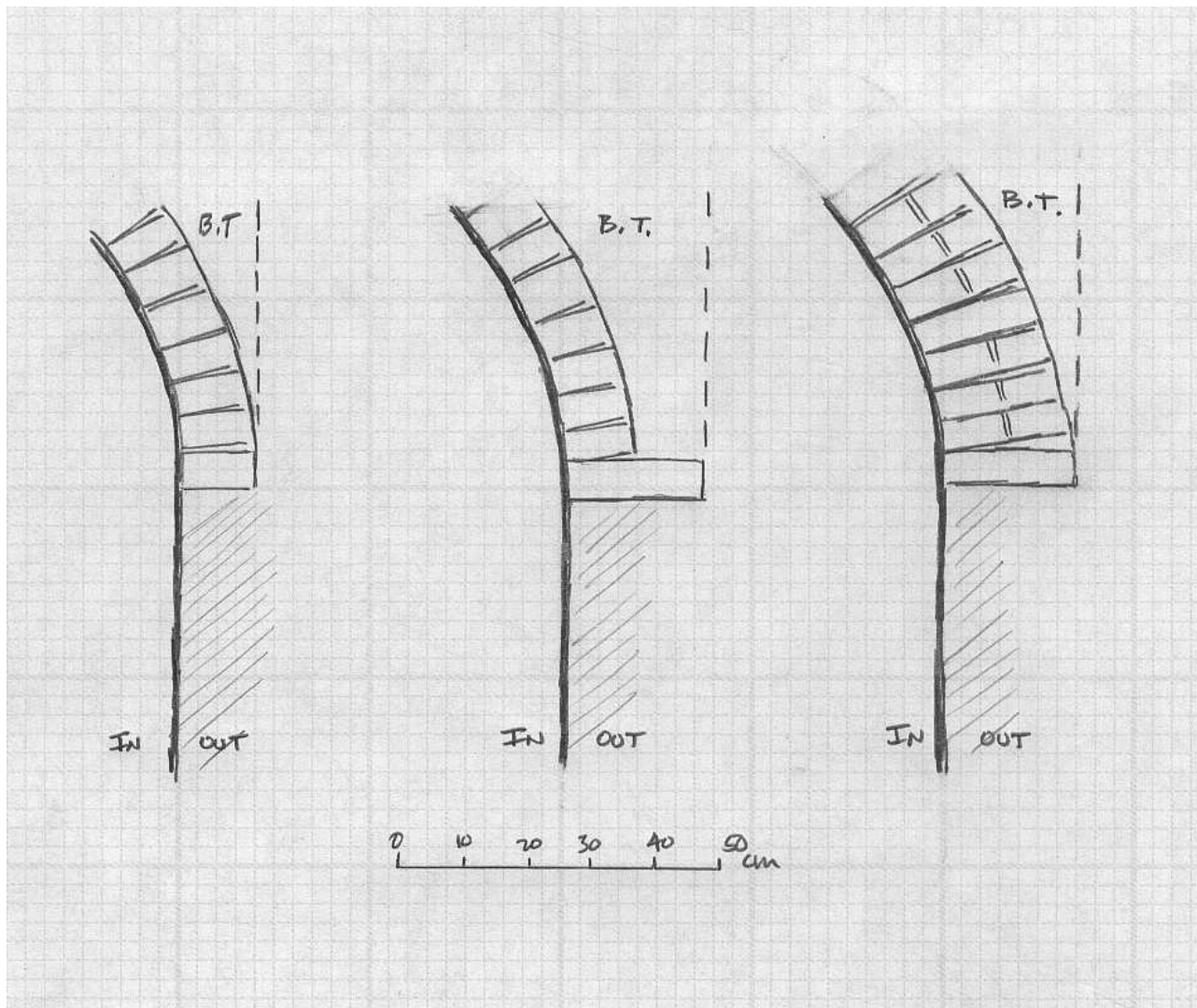


Figure 20. Similarly, great variation in dome construction techniques are also present. Although cistern domes constructed of stone are present, they are indeed rare. Domes constructed of brick are the most common and include single-width brick domes without starter course (left), single-width brick domes with double-width starter course (middle), and double-width brick dome (right). The width of the builder's trench (marked "B.T." above) was dependent on the width of the dome wall. Such brick domes were constructed on cisterns exhibited all manners of wall construction. The degree of "spring" within the arch is also variable—better quality arches have higher arched domes. Flatter domes require less materials but are less stable.

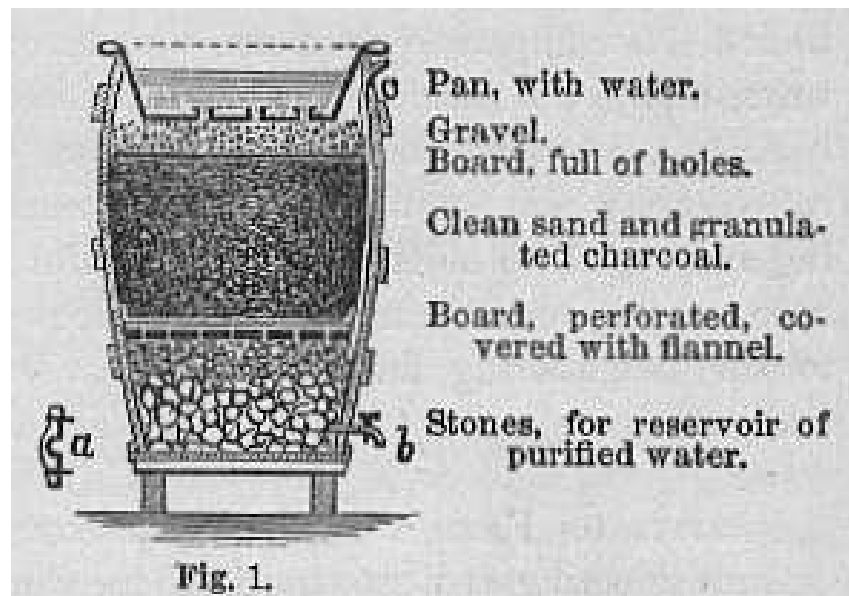
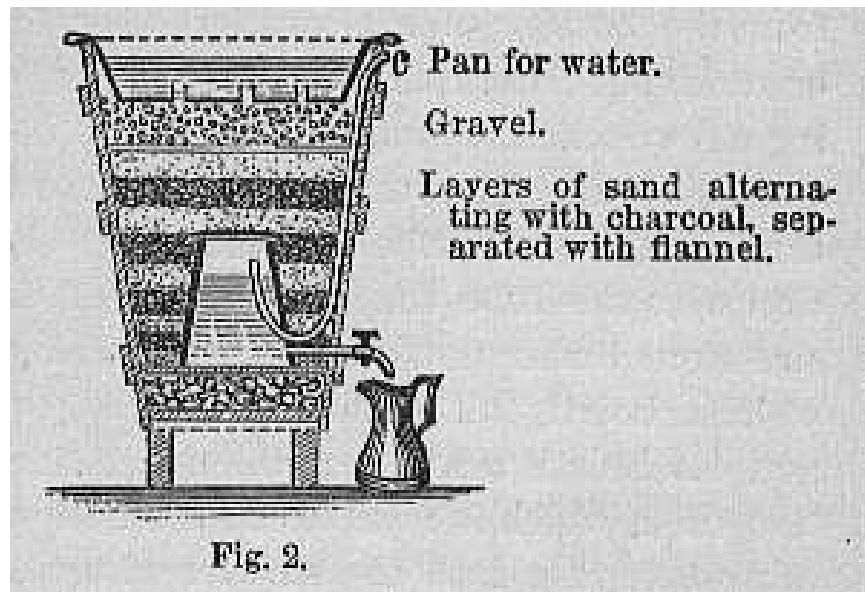


Figure 21. By the 1850s, the virtues of portable water filters for the purification of drinking water were touted by many agricultural journals and progressive writers. The two filters illustrated here utilized various sand and charcoal layers to cleanse the water. These portable filters were incorporated into the construction of cistern design by the middle nineteenth century (Thomas 1876:106-107).

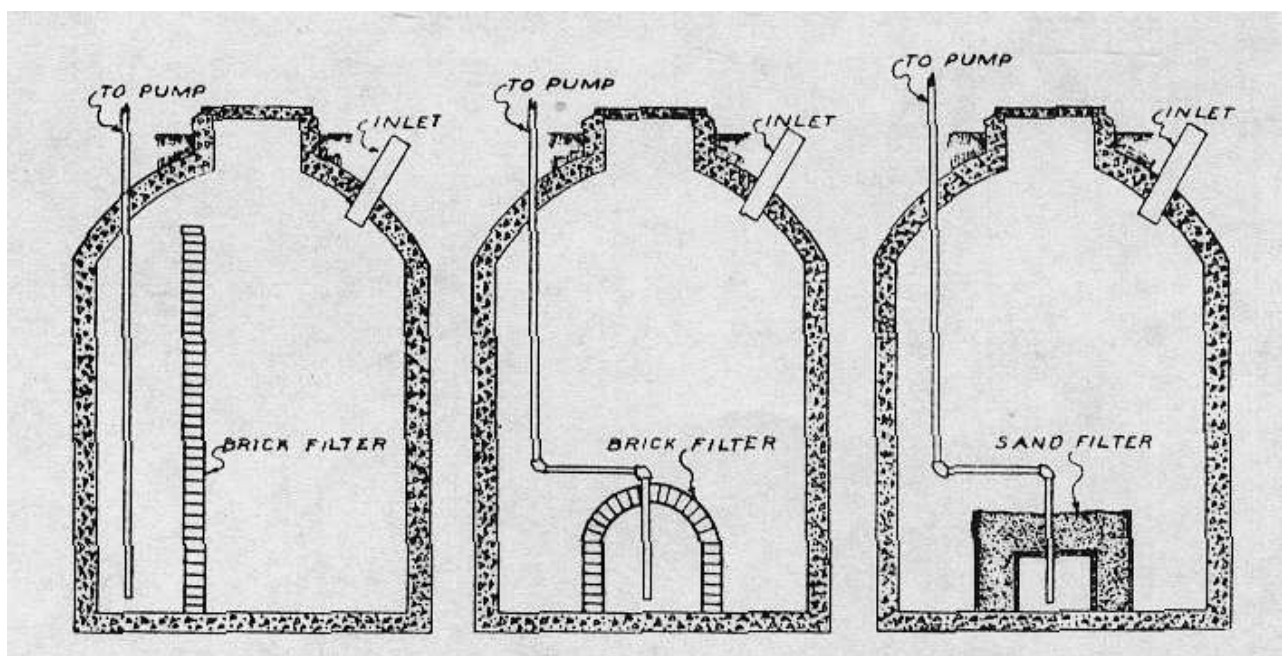


Figure 22. Types of interior filters commonly utilized in cistern construction (Hamilton 1933:5). These included brick partition walls (left) and self-supporting domes (middle), as well as sand-filled boxes (right). As they were located within the cistern, these filters were difficult to inspect and maintain.

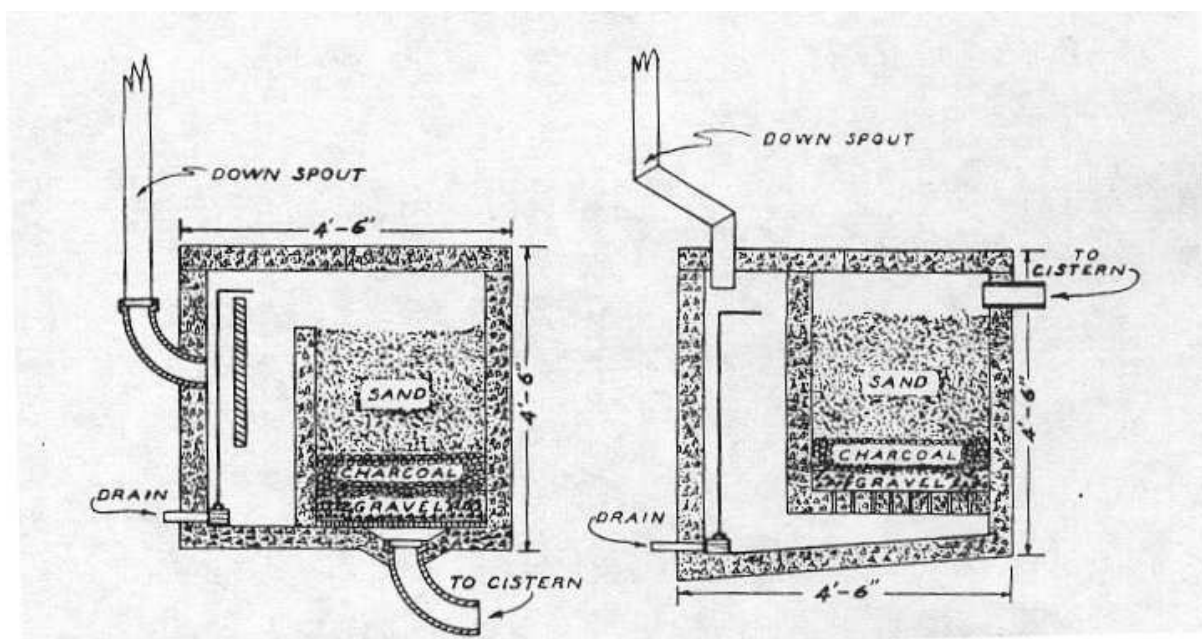


Figure 23. Two examples of more efficient exterior type filters (Hamilton 1933:5). Each filter consists of a sediment chamber and a sand-charcoal filter. The sand and charcoal mix was changed on a regular basis. These exterior filters were prone to freezing and did not work well in cold climates.

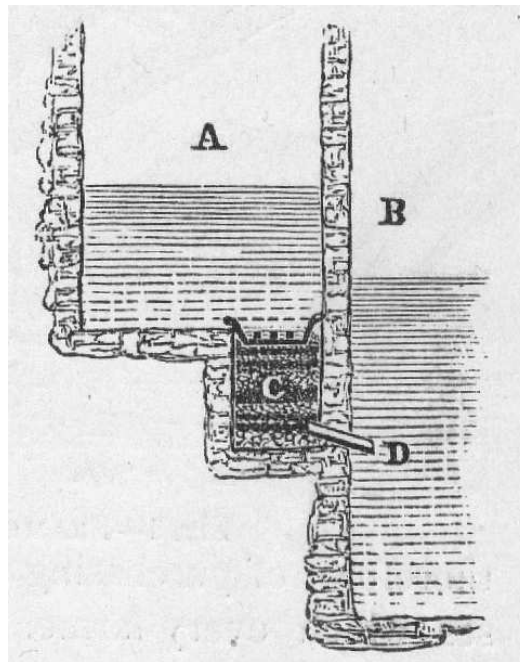
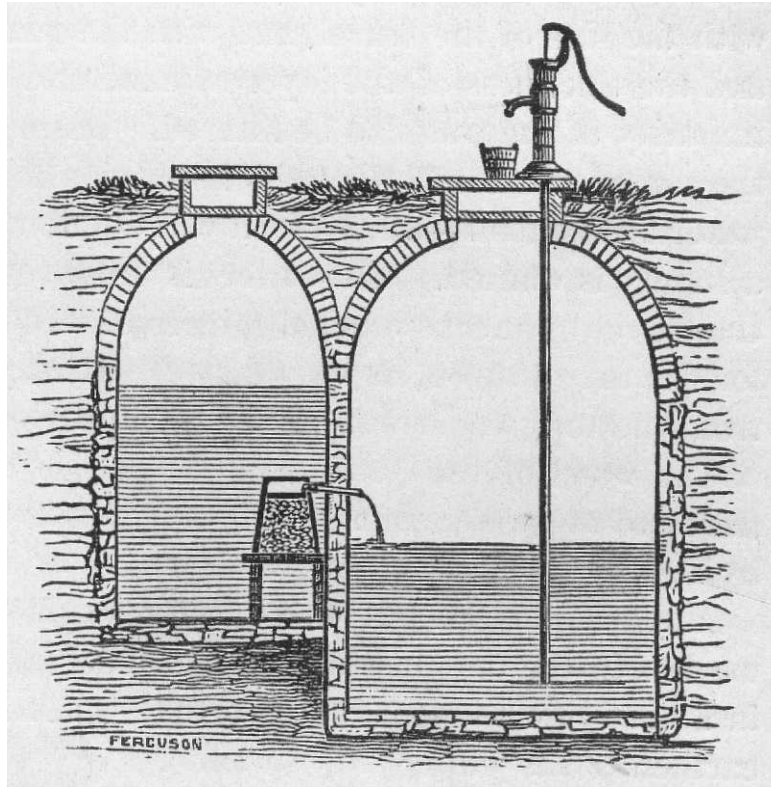


Figure 24. This is a middle nineteenth century illustration of an exterior filtering cistern that was built belowground to prevent freezing. Interior filters such as these incorporated the mechanics of the earlier portable filters (The Country Gentleman May 3, 1860; Thomas 1876:108-109). In essence, this design consisted of the construction of two side-by-side cisterns that shared a common wall. Water from the smaller collector cistern was forced through an interior filter into the larger receptacle from which the water was removed. Although the lower example was touted as being an improved design, it was more difficult to clean and maintain. A nearly identical brick lined cistern with adjacent filter, presumably constructed in the early 1850s and demolished in the 1860s, was found on Block 12 of the Lincoln Presidential Library project area (Features 12 and 14).

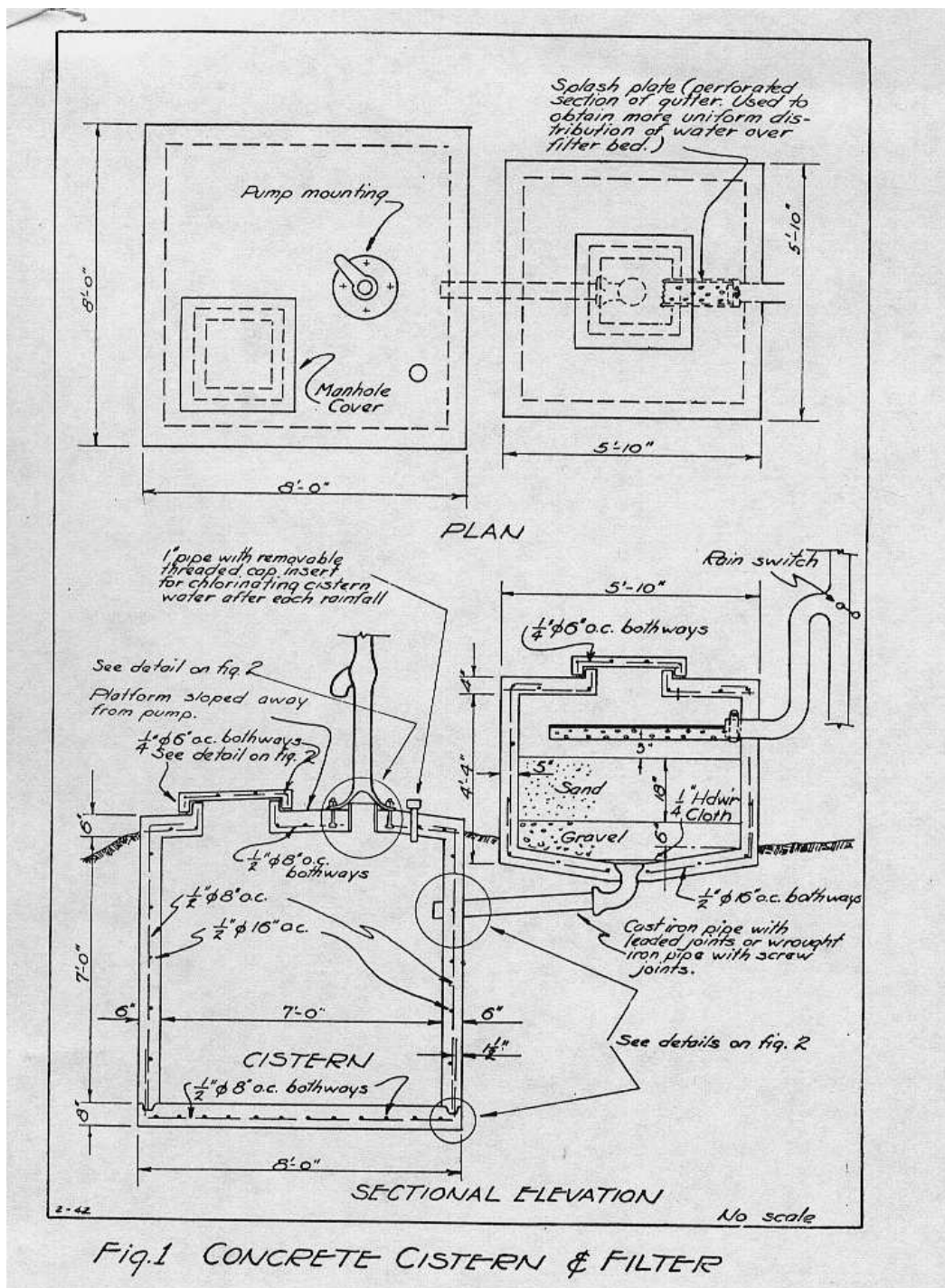


Figure 26. Concrete cisterns became common during the early years of the twentieth century. More difficult to construct round—bulletin on round concrete cistern construction (ADD CITATION).

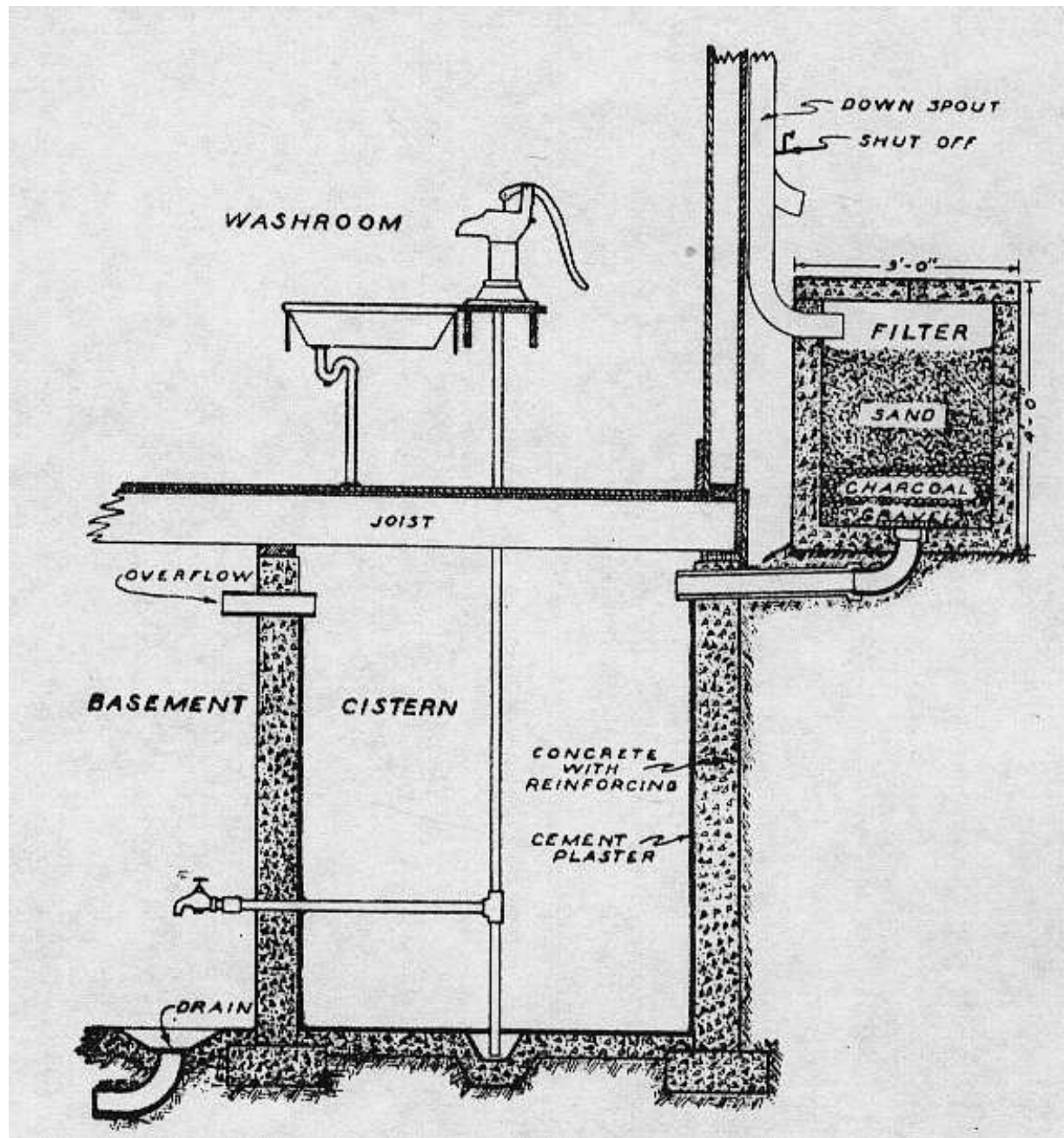


Figure 27. Example of a rectangular cistern (with a simple, above-ground sand-charcoal filter) constructed beneath a house. Note how the ceiling of the cistern was incorporated into the floor structure of the dwelling (Hamilton 1933:3).

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