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(In)Forming and Pressing Matters: Laying the Foundations for the Preservation and Interpretation of the Western Clay Manufacturing Company

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Abstract
In the United States, brick and tile manufactories were once ubiquitous. Currently, the number of extant late nineteenth- to early-twentieth century complexes devoted to the production of brick and tile products is negligible. Of the few remaining historic manufactories, none evidences what can be found at Helena, Montana's shuttered Western Clay Manufacturing Company (Western Clay): three generations of kiln technology and numerous intact principal buildings, machinery, and infrastructural elements related to the production of structural and hollow clay tile. Since its closure, Western Clay's place in historical memory has suffered attrition. Concomitantly, the greater public's understanding of this manufactory has diminished. Still, this site is poised to tell the little-known but important social, technological, and industrial histories of late nineteenth- and early-twentieth century brickyards. Through in-depth historical research, this thesis will illuminate the significance of Western Clay and begin to reinvest the site with historical memories. In an effort to revitalize, not elide important histories through the removal of buildings, machinery and infrastructural elements that might otherwise fulfill important mnemonic functions and provide both identity constructing and educational functions for both present and future generations, this work also furnishes the manufactory's stewards and supporters with a site-specific, historically informed rationale for future preservation decision-making. This rationale is grounded in author and preservation professional Ned Kaufman's concept of "storyscapes." It is also informed by both the aforementioned body of historical research and a general conditions assessment that was created during the summer of 2011.

Keywords
archie bray sr., charles bray, brickmaking, structural and hollow clay tile, montana

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(IN)FORMING AND PRESSING MATTERS: LAYING THE FOUNDATIONS FOR THE PRESERVATION AND INTERPRETATION OF THE WESTERN CLAY MANFUACTURING COMPANY

Sharon Reid

A THESIS

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In memory of my grandfather, John Arthur Reid.

Also, in memory of the Girard Point Grain Elevator (the Tidewater Grain).

I would like to extend special thanks to Chip Clawson of the Archie Bray Foundation for the Ceramic Arts, and also to Patty Dean of the Montana Preservation Alliance.

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Chapter I

Chapter II

Nestled amidst tall native grasses, and located adjacent to the foothills of the Rocky Mountain in Helena, in Montana's Prickly Pear Valley, sits a most intriguing and well-preserved aggregation of derelict industrial structures and machinery, along with piles of discarded industrial products—all of which constitute the Western Clay Manufacturing Company (from hereon, Western Clay), a late-nineteenth to mid-twentieth-century brick and tile manufactory (Fig. 1.1). Brick and structural and hollow clay tile manufacturing commenced on these grounds in the 1880s and continued, uninterrupted, through the manufactory's sudden closure in June of 1961.[1] Although the majority of this complex's buildings and machinery have suffered physically from decades of disuse and from a lack of consistent maintenance, Western Clay remains largely intact and exhibits a high degree of integrity.[2] Perhaps inadvertently, but nevertheless advantageously, a combination of occurrences over the past sixty-one years have resulted in the protection of—and ultimately the preservation of—this abandoned manufactory. These occurrences include: the 1951 founding of the Archie Bray Foundation for the Ceramic Arts (from hereon, ABF) by Western Clay's proprietor, a series of repurposing efforts in the 1950s and 1960s that resulted in the transformation of some of the brickyard's ancillary buildings into ceramic artist's studios, residences, and office spaces for the then nascent ABF; the 1966 auction and subsequent mothballing of the main manufacturing complex; the 1984 re-acquisition of the brickyard property by its successor and neighbor, the ABF; and the subsequent, ongoing stewardship provided to Western Clay by the prosperous ABF.[3] The site's 1985 listing as a National Historic

[1] Fred L. Quivik's National Register Nomination Form indicates that the Western Clay Manufacturing Company plant closed in 1960. The Bray indicates, however, that the plant closed in 1961. For more information regarding this discrepancy in years, see Quivik, National Register of Historic Places, "Inventory," 1985, 2. See also Archie Bray Foundation for the Ceramic Arts, "Walking Tour," Helena, MT: Archie Bray Foundation for the Ceramic Arts (2010).

[2] "Integrity," has been determined for this site by critiquing Western Clay within the context of the U.S. Department of the Interior, National Park Service's seven aspects of integrity: "location, design, setting, materials, workmanship, feeling, and association." For additional information, see, U.S. Department of the Interior, National Park Service, "Integrity," in "National Register Bulletin: Guidelines for Evaluating and Documenting Historic Aids to Navigation to the National Register of Historic Places" (NPS.gov, June 13, 2011). Accessed on December 28, 2011 at http://www.nps.gov/nr/publications/bulletins/nrb34/nrb34_8.htm.

[3] Chip Clawson of the Archie Bray Foundation for the Ceramic Arts mentioned this date on a personal tour that he gave on July 12, 2012 to members of the Architectural Conversation Lab at the University of Pennsylvania.

District has also aided in augmenting its historic significance.[4] This designation has not, however, assured the site protection. Over the past twenty-eight years many of this former manufacturing complex's structures—both primary or auxiliary—have been either lost or altered when the ABF has found it necessary to meet their expanding needs and continue to uphold the ABF's mission statement: "A fine place to work."[5]

Brick and tile manufacturing plants were once ubiquitous throughout the United States. Today, the number of extant late nineteenth- to early-twentieth century complexes devoted to the production of brick and tile products is negligible. Of the remaining facilities, few are still in operation. Of those, almost none evidences what can be found at the Western Clay Manufacturing Site: three generations of kiln technology along with a large number of relatively intact principal buildings and machinery, infrastructural elements related to the production of brick and structural and hollow clay tile, have retained not only their locations but also their massing. Because it retains such a high level of intactness, the Western Clay Manufacturing Company is well-poised to tell the little known but important histories of both of late nineteenth- and early-twentieth century brickyard labor and brick and structural and hollow clay tile production in the U.S. Uniquely, the Western Clay site also has the potential to interpret the relationship between industrial and ceramic art production. Although the Archie Bray Foundation for the Ceramic Arts would not exist today had it not been for Archie Bray, Sr.'s interest in the arts and his willingness in the 1940s to accommodate local artisans by allowing them to fire their artistic wares in the Company's beehive kilns, the Foundation has struggled for decades with the question of how to preserve the very fabric that speaks directly to its patrimony.

The exact number of American brick or brick and structural and hollow clay tile manufactories exceeding or nearing one-hundred years of age that still operate on their original

[4] Fredric L. Quivik, National Register of Historic Places, "Inventory—Nomination Form: Western Clay Manufacturing Company,"1985, 1-9. Nomination to the National Register does not ensure protection. This classification, however, is often accompanied by a level of respect that can assist in engendering support for the protection and/or preservation of a site.

[5] Archie Bray Foundation for the Ceramic Arts, "About Us," Last modified, August 17, 2011. http://www.archiebray.org/about_us/abf_history.html.

sites remains unknown.[6] Also unclear is the number of factories in this industry that have retained a large percentage of their historic fabric. It is known, however, that the number of brickyards in the U.S. has diminished drastically since the early- to mid-twentieth century. For example, in 1939, there were nearly 1000 manufactories in the U.S. that were dedicated to the production of brick or brick and tile products.[7] As of 2008, this number stood at a mere 163. In order to remain viable, many brickyards that have continued to operate on an historic campus have been pressed to technologically upgrade and expand their respective manufactories. Unfortunately, technological upgrading and expansion has often come at the expense of a brickyard's historic layout and its buildings, infrastructural elements, and machinery.[8] With only one U.S. company officially reporting to retain its original manufactory layout, claiming to still use the majority of its early twentieth-century equipment, and proclaiming

to be the sole manufactory employing coal fired kilns,[9] it is evident that the industrial remains at Western Clay are all the more significant. This information, while not encouraging, is valuable; it builds the case for why any future preservation-related decision-making on the part of the ABF and the affiliated stewards of Western Clay must be cautiously approached and thoughtfully undertaken.

Since the 1960s, both the disciplines of historic preservation and architectural history in the U.S. have expanded their purviews. Now, nearly a half a century later, vernacular

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[6] I have not been able to determine what percentage of functioning brick or brick and clay tile manufacturing facilities operates on historic grounds. More research in this area will need to be done. I did, on several occasions, attempt to contact the BIA, but neither my calls nor my emails were returned. I also inquired with Jeff Hollis, of the Continental Brick Company to see if he had any idea as to the number of plants still operating on historic grounds. Unfortunately, even he did not know.

[7] "Economic and Transportation Prospects: Subcommittee on Economic Study of the Railroad Committee for the Study of Transportation: Association of American Railroads, January," 61924-10. This figure does not include the following, clay refractories, or facilities dedicated to the production of roofing tiles.

[8] Hollis, personal conversation with author, February 16, 2012. Brian Belden of Belden Brick in Canton, OH, personal conversation with author, March 3, 2012. Jim, Brick Institute of America, Mid-East Region, personal conversation with author, April 4, 2012.

[9] The Colonial Brick Corporation's, Cayuga, IN manufactory is reported to be "the only brickmaker in the U.S. that still uses coal-fired beehive kilns." When I spoke with the plant manager, Steve, he informed me that the only other company that he used to know of that also had a large percentage of its original buildings and operated much of its technology was located in New York State. He did not recall the name of this manufactory. Steve, of Colonial Brick, personal conversation with author, November 3, 2011.My research efforts did not uncover any other brickmaking facility, in NY State or otherwise, that still retained and used so many of its original buildings and also, its turn-of-the-century equipment.

architecture—including industrial structures—is more regularly deemed worthy of preservation for its historic, social, cultural, political, and even its environmental significance.[10] Both scholars and professionals now look with frequency at buildings and entire complexes in the context of cultural landscapes and in terms of place, identity, and both individual and public memory. As a consequence, shuttered, derelict, and decaying industrial sites that were previously viewed eyesores and largely dismissed by the general public as well as by preservation professionals and architectural historians, have, through research and subsequent educational, arts, and cultural campaigns aimed at highlighting their respective histories, gained in value. To a large degree, however, this augmentation in value has resulted not from exposing the many social and cultural histories of a particular manufacturing building or site, but instead from the implementation of economic-driven redevelopment and adaptive reuse projects that have transformed defunct industrial buildings, and in some cases entire industrial campuses, into viable residences and commercial sites as well as loci for tourism.[11]

Despite the successes of many adaptive reuse projects involving former industrial buildings and campuses, the histories of many of these sites have gone under-interpreted. Disturbingly, in many instances a site's important, and most compelling histories have actually been largely elided as a result of preservation efforts. For example, author and historian Daniel Bluestone explains that in Richmond, Virginia, the adaptive reuse of the city's "Tobacco Row" has resulted in the physical envelopes of buildings being maintained while their interior have been so drastically altered to suit a new use that history has literally been erased from the buildings.[12] In other instances, uninformed or historically insensitive preservation decisions executed at an historic site, in an historic neighborhood, or on the grounds of a former manufactory campus, have resulted in the preservation of a particular building, or a set of buildings and structures that

[10] Daniel Bluestone, "Tobacco Row: Heritage, Environment, and Adaptive Reuse in Richmond, Virginia," Change Over Time (forthcoming), 23; Dolores Hayden, The Power of Place: Urban Landscapes as Public History, (Cambridge, MA: MIT Press 1995), 11.
[11] Bluestone, "Tobacco Row,"5. 15-16; Duncan Hay, "Action Steps for Preserving Industrial Heritage," Forum Journal, 25, no. 3 (2011): 21; August R. Carlino, "Greater Pittsburgh's Industrial Communities in Transition,"Forum Journal, 25, no. 3 (2011):336-39.
[12] Bluestone, "Tobacco Row," 1-26.

are deemed more easily adaptable. Other more difficult to reuse, often less easily understood and less aesthetically intriguing buildings at these same sites have been simply razed. Moreover, historic street patterns and circulation routes within particular neighborhoods or on campuses have been altered or removed; thus, drastically changing the historic character of the site. This kind of change, despite commonly being looked at as innocuous, can actually deleterious; if alterations happen and these alterations are not sensitive to the historic past, it afterward becomes difficult to both interpret and to reinvest sites with uses and patterns of use that could either help perpetuate historical memories of a place or, at a minimum augment one's historical understanding of the place.

Recently, the scholar and preservation professional, Ned Kaufman has argued that historical and cultural sites, and sites of social value, be recognized as "story sites." Kauffman considers story sites to be historic and cultural sites, as well as sites of social value. The "sociability" or what Kauffman calls the "cultural capital" of the story site—cultural practices or lifeways, philosophies, etc."—cannot necessarily be saved through the preservation of an historic structure. Thoughtful, historically informed preservation efforts can, however, make it easier—through its use, by dint of the types of actions that take place in and around a historic building or locus, and through various interpretative campaigns— for the site's associations to be maintained and perpetuated. In a similar vein, Bluestone has argued that without a "critical understanding" of a site's history and preservation planning that aims to foster connections with the past—either through exhibits that include things like oral history interviews and images or, whenever possible, through adaptive reuse designs that are sensitive to the history and the significance of the interior as well as the exterior spaces—both the historic function and significance of a site can easily be lost.[13] Moreover, Bluestone argues that when historical components are removed from a site relationships change and historical insight is lost. In the case of an industrial site's preservation, reuse, and active interpretation, good design coupled with an understanding of the site that

[13] Bluestone, "Tobacco Row," 3, 7, 25.

includes its recognition "as part of a broader industrial process with material inputs, products, and by-products that all worked their way through the buildings and the site…."[14]

Not surprisingly, after being closed for over fifty years ago, Western Clay's place in historical memory has suffered attrition. Concomitantly, the greater public's understanding of this site has diminished. In an effort not to impair or elide important histories of Western Clay through the removal physical components—buildings, machinery, physical infrastructure—that could otherwise fulfill important mnemonic functions, allowing for the resonance of memories in place and providing both identity constructing and educational functions for both present and for future generations, this thesis will furnish the ABF and other Western Clay stewards and supporters with a historically informed rational for future preservation decision-making at the site. In chapter that follows, this work will provide an informed understanding of the history of brick and structural and hollow clay tile production at Western Clay. This history will focus on explaining why the site was configured in the way that it was, how it operated, who operated it, and at what time periods these various individuals engaged in the manufactory of the company's products. It will answer such questions as: Were the layout and design of the Western Clay Manufacturing Plant regional or did it follow a nationally established pattern? In what eras were certain buildings and industrial landscape elements built, and to what specific processes of production did they relate? Were the technologies employed at the plant at the cutting edge? In an effort to also allow for a richer and more dynamic experience of what might otherwise seem a narrow, isolated and unimportant story, the history of the site will be expanded to include the entire production process—from the initial winning of clay at the Blossburg mine to the local and regional distribution of the company's industrially-manufactured clay products. Importantly, wherever possible, this project will also highlight the social history of the site. Although industrial sites are still often thought of as purely mechanical, no manufactory was devoid of the human element—whether an owner-operator or everyday laborer. People, with thoughts and feelings, not

[14] Daniel Bluestone, Toxic Sites as Places of Culture and Memory: Adaptive Management for Citizenship," in *Reclaiming the Land: Rethinking Superfund Institutions, Methods and Practices*, ed. Gregg Macey and Jonathon Z. Cannon (New York, NY: Springer, 2007), 245-266.

only made possible but also accomplished the production process. The stories of these laborers, however, are typically glossed over if not entirely left out of the history of the very sites where these individuals often spent the majority of their respective lifetimes. In an effort to tell the full, dynamic history of brick and hollow clay tile production at the Western Clay Manufacturing Company, the history of laborers must be included. Therefore, whenever possible, first or second hand accounts of the labor history at both brickyards in general, and at Western Clay will be included in an effort to help better understand what types of tasks individuals performed. This information will also help round out the meaning of the site by revealing that it is not purely a mechanized, bureaucratic site, but a factory that was shaped by and entirely dependent on human labor.

Research about brick and structural and hollow clay tile making will be limited to practices and facilities in the United States, Canada, and the United Kingdom. The rationale for this limitation is based on several considerations. First, the Western Clay Manufacturing Company was a U.S. company whose owners were known to be very cognizant of the practices of brick and tile production in North America. Second, since similarly designed clay manufacturing plants existed just north of the Montana border, in both the provinces of Alberta and Saskatchewan, Canada, and since it was a Canadian company from Medicine Hat, Alberta that purchased Western Clay in 1961 and subsequently mothballed it in an effort to stamp out what it saw as regional competition, it seems very likely that the Brays were attuned to the production practices of their northern neighbors. Lastly, the Company's first general manager-turned-proprietor was a British immigrant skilled in the art of brickmaking and was both knowledgeable about and accustomed to brickmaking practices in the United Kingdom.

Following this necessary and informative historical research, the third chapter of this greater work will offer a rational for future preservation decision-making at the site. This rationale will be based on the previously illuminated history of the site. It will be further reinforced by a combination of the following: 1) Kauffman's arguments for both thinking about and recognizing

historic sites in terms of storyscapes; 2) Bluestone's arguments for preservation efforts and adaptive reuse designs that are based on historical understanding of sites and critical thinking about how redesigns can engage with and thus, highlight, not "efface" history 3) a contemporary (summer 2011) assessment of the significance, integrity, and condition of the extant buildings and structure at Western Clay; and 4) an analysis of employed preservation strategies that have made for effective versus ineffective interpretation at several other historic industrial sites in the U.S.—both active and defunct.

2.1 Western Clay's Setting

The Western Clay manufactory's property—now technically part of the campus of the Archie Bray Foundation for the Ceramic Arts—is located within the Helena city limits, and lies roughly three miles to the northwest of the city's center[15] (Fig. 2.1). To access this site today, one must either walk or drive along a gravel road that follows a similar route to that once traversed by the historic brickyard's owners, its employees, and both its raw materials and finished products. This route leads south past the ABF's office and its original pottery building before making a gradual turn westward and passing just to the north of Western Clay's cluster of five iconic beehive kilns. Here, at what is technically the southeastern side of the ABF's twenty-six acre campus, one can see not only the kilns, but also the majority of the buildings and structures that were most directly associated with the production of brick and structural clay tile products.[16] This aggregation is comprised of the following: five beehive/downdraft kilns and their respective shed roofs, three ventilation stacks, a clustering of adjacent buildings that together form the tile works, a blacksmith's shop, and span of eighteen brick railroad piers.[17] Other key structures, such as the manufactory's two Scotch kilns[18]—now converted into a "summer" kiln pad, and a warehouse—and the later (circa 1957) continuous kiln, sit either more centrally within the campus or nearer to the western edge of this former manufacturing locus (Fig. 2.2). Although ruinous, the remains

[15] Sanborn, "Helena, MT," (New York, NY: Sanborn Map Company, 1930), Sanborn Map. Montana Historical Society; Sanborn. "Helena, MT," (New York, NY: Sanborn Map Company, 1958), Sanborn Map. Montana Historical Society.

[16] For the purposes of this report, I have chosen to use the term "structural clay tile products" to reference all of the types of tile products manufactured at Western Clay. This is the general term used by the U.S. Census Bureau to reference tile manufacturing. It is very important to note, however, that there are many categories of clay tile manufacturing and that technically, Western Clay manufactured structural clay, hollow clay building, and glazed tile products

[17] It is important to again mention that a number of the Western Clay buildings have been adaptively reused and now function as one part or another of the Archie Bray Foundation for the Ceramic Arts. Other buildings, such as the "bunk house" and the "Brick shop" have been demolished since Fred Quivik wrote the 1985 National Register Nomination for the Western Clay Manufacturing Company Historic District.

[18] In the past, these kilns have been referenced as scove kilns. See, for example, Quivik, "Montana Historical and Architectural Inventory: Site #11," 19; Archie Bray, Jr. Interview with Martin Holt, "The Oral History of the Archie Bray Foundation," Los Angeles, CA. 3 August 1978, 5. In a proceeding section, I will explain that these kilns were actually structured like Scotch kilns, not scove kilns.

of the manufactory's former brickmaking facility are wedged between the tile manufacturing building and the ABF's new David and Ann Shaner Resident Studio Center for ceramic artists. Strewn about the grounds, especially along the western and southern sides of the property, are countless piles of imperfect bricks,[19] and numerous discarded, often rusting pieces of machinery that were used in one or another building during some stage of the greater production process. The overgrown remains of the former brick works also punctuate the space immediately adjoining the tile works, between the engine room and the recently constructed ABF Resident Studio Center. Also peppered throughout both the interiors and exteriors of the buildings and accenting the greater landscape of the site today are myriad works—both large and small—of ceramic art (Fig. 2.3).

2.2 Brickmaking in the U.S.: A General Historical Context

As many authors have noted, the art of brickmaking is age-old.[20] Colonists, however, did not begin making brick with regularity in what is now the continental U.S. until the last quarter of the sixteenth-century.[21] Brickmaking, as an industry, was not formally recognized and recorded

[19] Alfred B. Searle, writer of several Cambridge Manuals of Science and Literature, explained in *Modern Brickmaking*, that bricks were categorized by their use and named according to their quality. Faulty or inferior bricks were termed "shuffles" and "shakes." See Alfred B. Searle, *Modern Brickmaking*, (London: Scott, Greenwood & Son, 1911), 16-17.

[20] Edward Dobson, A Rudimentary Treatise on the Manufacture of Bricks and Tiles, (London: Crosby Lockwood and Son, 1903), 1-4; Karl Gurcke, B*ricks and Brickmaking: A Handbook or Historical Archaeology* (Moscow, ID: University of Idaho Press, 1987), 1. See, specifically, Chapter 2, pages 39-40 of Gurcke's book for a concise, yet informative history of brickmaking; Fred Quivik, Searle, *Modern Brickmaking*, v; J. W. Crary, *Sixty Years a Brickmaker: A practical treatise on Brickmaking and Burning* (Indianapolis: T.A. Randall, c1890), 1;Yankee Hill Brick and Tile, "Brickmaking A to Z: Historical Origin," (Yankee Hill Brick and Tile, 2001). Accessed on October 3, 2011 at http://www.yankeehillbrick.com/history_handout01.pdf; Harley J. McKee, "Brick and Stone: Handicraft to Machine," in *Building Early America: Proceedings of the Symposium Held at Philadelphia to Celebrate the 250th Birthday of the Carpenters' Company of the City & County of Philadelphia*, ed. Charles E. Peterson, (Radnor, PA: Chilton Book Company, 1976), 82; Economic and Transportation Prospects: Subcommittee on Economic Study of the Railroad Committee for the Study of Transportation : Association of American Railroads, January, 1946," (Washington, DC: The Association, 1946), 61924-7.

[21] There are conflicting reports relating to the earliest production of bricks by settlers of what is now the eastern seaboard of the U.S. Archaeologist Karl Gurcke notes that "…bricks found at the Raleigh settlement on Roanoke Island in Virginia (1585-1586) seem to have been made locally. See Gurcke, *Bricks and Brickmaking,* 40. In contrast, authors John Leander Bishop, Edwin Troxell Freedley, and Edward Young, state in *A history of American Manufactures, from 1608 to 1860*, V.1 (Philadelphia: Edward Young & Co., 1864), 215, "The first bricks made in the Anglican Colonies, were made in Virginia as early as 1612." In this same publication, the aforementioned authors also note that first brick kiln definitively known to have existed in what is now the U.S. was built in Salem MA in 1629. See page 217 of A history of American Manufacturers. For additional information on early brickmaking in the Colonies, see, N. R. Ewan, "Early Brickmaking in the Colonies," (Camden, NJ: Camden County Historical Society, 1970). Accessed on January 4, 2012 at http://www.westjerseyhistory.org/articles/brickmaking/. See also Heinrich Ries and Henry Leighton, *History of the Clay-Working Industry in the United States*, (New York: John Wiley and Sons 1909), 9-10. Reis and Leighton attribute the date 1611 with the first use of brick in the colonies.

in the U.S. until the 1750s.[22] Although the Geologists Henrich Ries and Henry Leighton reported that the industry first took hold in western Pennsylvania, for the better part of a century this industry remained centered in the eastern states[23] (Fig. 2.4). During this early epoch, the Hudson River Valley was known as the epicenter of production.[24] Still, by the turn of the nineteenth century, brickyards were found stretching up and down the eastern seaboard, from New England through the Carolinas. The industry was also advancing westward. As it was tied to the expansion of the country, however, its rate of advancement, which was commensurate with the settlement patterns of the central and western areas of the continent, was slow.[25] It was not until the last quarter of the nineteenth century that brickyards were reported to be in operation throughout the U.S. and its territories, including Montana.[26]

Some brickyards may have existed in newly settled areas without having been recorded. Moreover, most of the early brickmaking outfits in newly settled territories were probably never meant to be permanent.[27] Ries and Leighton have suggested that the lack of value of raw clay, unlike that of precious metals, in addition to the low-tech nature of early brickmaking processes versus those employed in the mining industry made brick plants less notable to writers and recorders of technical literature.[28] Even those brickyards intended to remain for longer periods of time did not necessarily endure. There were, of course, large, successful manufactories in the country but until the turn of the twentieth century most of these were located in the East. The country also hosted countless small, family-run brickyards in operation. In Washington, DC, for example, small brickyards abounded until sometime just after the turn of the twentieth century. Around this time, many of these companies reported that their limited clay supplies were

[22] Ries and Leighton, History of the Clay-Working Industry, 9-10.
[23] Ibid., 10, 205.
[24] Ibid., 10. See also George V. Hutton, The Great Hudson River Brick Industry, (Fleichmanns, New York: Purple Mountain Press, Ltd., 2003).
[25] Ries and Leighton, History of the Clay-Working Industry, 10-12.
[26] Quivik, "The Western Clay Manufacturing Company: An Historical Analysis," 4-5.
[27] Both Ries and Leighton and Quivik explain that many brickyards developed simply to suit the building needs of a small community. After the community was constructed, the brickyard, which was not a sophisticated operation consisting of permanent buildings, was abandoned.
[28] Ries and Leighton, History of the Clay-Working Industry, 1-2.

exhausted. In some cases development pressures in the nation's capital simply forced a company to either close or relocate.[29] In contrast, Montana's smaller brickyards were not typically shuttered as a result of the exhaustion of clay. Nor did development pressures in this vast landscape crowd out brickmakers. Instead, these small operations were often rendered unnecessary and shut down due to their proximity to larger, more sophisticated manufactories that were capable of supplying not one, but many local communities with finished products.[30]

While brickyards of varying sizes and degrees of permanency existed throughout the U.S., in the early twentieth century the industry remained concentrated in the East—Pennsylvania, New York, New Jersey, and Maryland and West Virginia—and in the Midwest—Ohio, Indiana, Illinois, and Missouri.[31] Even in the 1940s, the industry was still centered in the Eastern U.S.[32] Unlike the West, these areas of the country were, of course, well-connected by an extensively developed rail system, navigable rivers and canal systems. In addition to proving advantageous with regard to the dispersion of products, this connectivity surely proved helpful in terms of providing those within the industry quick access to both information and to newly improved brick and structural clay tile-making equipment.[33] Despite forecasts made by the U.S. government in the 1940s that suggested that the demand for brick and structural clay tile would rise through the latter half of the twentieth century, by the mid-1970s, the nation's primary brick industry supporting organization, the Brick Industry Association (BIA) reported that in the U.S. only four hundred plants devoted to the production of brick were still in operation.[34] As of 1997,

[29] Dorothy R. Jacobson, "Report to the Agricultural Research Service on the Cultural History Values of the New York Avenue Brickyard" (August, 25, 1976), 17. Courtesy of the National Arboretum, Division of Education and Visitor's Services, Washington, DC.
[30] Quivik, "The Western Clay Manufacturing Company: An Historical Analysis," 5.
[31] Ries and Leighton, History of the Clay-Working Industry, 8.
[32] Brooke L. Gunsallus, Harold F. Breimyer, Aaron J. Blumberg, and Edgar C. McVoy, United States Department of Commerce, "Manufacturing Brick and Tile To Serve Your Community," Industrial (Small Business) Series No. 49, (Washington, DC: U.S. Government Printing Office, 1946), 16.
[33] Although on occasion the *Brick and Clay Record* showcased a brick or brick and structural clay tile plant in the West or in the Southwest, most of the facilities discussed between the late 1800s and the 1920s were located to the east of the Mississippi River.
[34] Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community: Chapter 1, The Future of the Clay Brick and Tile Industry" 1-3. Jacobson, "Report to the Agricultural Research Service," 19.

the number of operating brick plants in the continental U.S. had already been reduced to 203.[35] Nearing the end of the first decade of the twenty-first century, this number has been reduced further—recorded at just over 160 in 2008.[36] Brick production in the past fifty years has also shifted from the northeast and the north central areas of the country to the south—ranging from the south Atlantic states west to Texas.[37]

2.3 History of Brick and Tile Making at the Site

Chronology of Site Ownership and Introduction to the Historical Personages Related to Western Clay

Over the plant's operational lifetime, the Western Clay manufacturing complex not only enlarged in size and improved technologically, but it also changed in both name and ownership. Brickmaking technically commenced at the current Western Clay site in 1883 under the direction and proprietorship of Charles C. Thurston.[38] Thurston, a native of New Hampshire and the son of a brickmaker, was himself trained as a brickmaker prior to his migration westward. Before purchasing a three-hundred-acre ranch on which he subsequently erected a brickyard, Thurston had engaged in both brickmaking and the building trade in the nearby city of Butte.[39] During this epoch, only common bricks were produced at Thurston's brickyard. Their manufacture was crude and labor intensive; it necessitated the use of horsepower to transport, crush and mix the clay, and required laborers to first win the clay using the most basic of hand-tools, and afterward mold each brick by hand.[40]

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[35] David Cornwell, *Commercial Application of Water Marketing of Water Plant Residuals*, (U.S.: American Water Works Association, 2000), 42-42.
[36] Brick Industry Association, "Overview of the American Brick Industry: A Product of the Current Building Environment," (The Brick Industry Association, 2012). Accessed on January 4, 2012 at http://www.gobrick.com/Resources/AmericanBrickIndustry/tabid/7644/Default.aspx.
[37] Ibid. North Carolina and Texas were recently listed as the nation's two biggest suppliers of brick.
[38] See Fredric L. Quivik, "Western Clay Manufacturing Company: An Historical Analysis of the Plant and Its Development," (Butte, MT: Renewable Technologies, Inc., 1985), 8-9.
[39] Leeson, M.A. "Personal History and Reminiscences: C.C. Thurston." in History of Montana: 1739-1885, (Chicago: Warners, Beers, & Company), 1885, 1256; A. W. Bowen, "Charles C. Thurston," in Progressive Men of Montana, (Chicago: A. W. Bowen and Company, 1902), 893.
[40] Helen Fitzgerald Sanders, "Charles H. Bray," in History of Montana, (Chicago: Lewis Publishing Company), 1913, 1272.

Just a year after Thurston founded his manufactory on the edge of Helena, a skilled English brickmaker, Charles H. Bray (from hereon Charles Bray or Charles), made his way to this brickyard (Fig. 2.5). Born in Tavistock, Devonshire, England, and trained in the art of brickmaking, the industrious Charles Bray brought both extensive brickmaking knowledge and experience to the workplace.[41] Charles's employment under Thurston was, however, short lived. In part, the seasonal nature of brickmaking was to blame for what at first appears as Charles's brief tenure. Technically, it was Thurston's spring of 1885 sale of the brickyard to Nicholas Kessler—owner of both a brickyard and a brewery that were situated on the contiguous property, just to the south of Thurston's brickyard[42]—that led to Charles's disassociation with Thurston's works.

Nicholas Kessler, who since 1866 had been operating on the property adjacent to Thurston's brickyard, had nearly exhausted his supply of brickmaking clay by the time he purchased Thurston's works; thus, the need to acquire new clay deposits was paramount.[43] The transaction, however, not only provided Kessler with access to new clay sources, but it also brought him in direct contact with Charles Bray. Quickly realizing Charles Bray's knowledge, talents, and connectedness to the brickmaking industry, Kessler opted to retain Bray as the yard's superintendent.[44] Thereafter, the company called the Kessler Brick and Sewer Pipe Works (Kessler Works) prospered prodigiously and underwent both physical expansion and

[41] Ibid., 1272.

[42] Hopeful of discovering gold, Kessler, a native of Luxembourg, arrived in Montana in 1863. In 1865, however, Kessler settled permanently in Helena where he subsequently operated a successful brewery. An industrious man, Kessler noted the growing need for bricks as a building material. Although not a brickmaker by trade, in 1866, with the help of a Pennsylvania brickmaker, Matthew Wormer, he established a brickyard on the property adjacent to his brewery. By 1880, Kessler's brickyard, unlike Thurston's later yard, is said to have operated using brickmaking machines. See Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 8. Information about Kessler and both his brewery and brick and tile works can also be found in the following works: Fausto Gardini, "Nicholas Kessler: A Montana Pioneer from Luxembourg, (Fausto Gardini, 2009). Accessed on August 18, 2011 at http://knol.google.com/k/fausto-gardini/nicholas-kessler-1833-1902/2h2drar9l37dn/5#; Chere Jiusto, and Rick Newby, "A Beautiful Spirit: Origins of the Archie Bray Foundation for the Ceramic Arts," in A Ceramic Continuum: Fifty Years of the Archie Bray Influence, Peter Held, editor, (Seattle: University of Washington Press, 2001), 18; Joaquin Miller, "Nicholas Kessler," in Illustrated History of the State of Montana, (Chicago: Lewis Publishing Company, 1894), 154-55; Charles N. Kessler "A Few Remarks at the Occasion of the Opening of the First Branch of the Archie Bray Foundation," unpublished, 1951, 1-3, Montana Historical Society, "Clippings Files" Folder I, "Archie Bray Foundation."

[43] Kessler, "A Few Remarks," 2.

[44] Jesse Perry Rowe, "The Western Clay Manufacturing Company, Helena, Mont," *Brick and Clay Record* 26, no. 3 (1907): 173.

technological updating under the acumen and progressive-minded leadership of Charles Bray[45] (Fig. 2.6). An increase in the use of brick in both the rebuilding of structures that had previously been damaged by fire, and the general expansion of Helena, capital city of the new State of Montana as of 1889,[46] certainly brought financial success to the Kessler Works.[47] After all, the only nearby competitor of the Kessler Works was the Switzer Brick and Terra-Cotta Company (Fig. 2.7). This company, however, was located another fifteen or so miles from Helena, high in the Rocky Mountains, across the Continental Divide in the area known as Blossburg.[48] This augmented demand for bricks, while financially advantageous to the Kessler Works, simultaneously proved consternating. The clay on the grounds of the former Thurston Works was quickly being exhausted and the need to acquire a new, suitable source of accessible clay deposits was imminent.[49]

Although the details of the transaction remain elusive, in 1905 Kessler merged his business with that of Jacob Switzer, owner of the Switzer Brick and Terra-Cotta Company and its adjacent, two-hundred-and-eighty acre Blossburg clay pit.[50] This pit, which was time and again lauded for the fine quality of clay that it yielded, proved indispensable to the newly consolidated and growing business that was thereafter named the Western Clay Manufacturing Company[51] (Fig. 2.8). At the time of the merger Charles Bray was not only retained, but was actually

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[45] Ibid., 1272; A. W. Bowen, *Progressive Men of Montana*, "Charles H. Bray," (Chicago: A. W. Bowen and Company, 1902), 1501.

[46] Mt.gov, "Constitutional and Statehood Resources," Montana State Website. Accessed on January 19, 2012 at http://courts.mt.gov/library/montana_laws.mcpx.

[47] Fred Quivik, in "Western Clay Manufacturing Company: An Historical Analysis," 10, explains that by the turn of the twentieth century the Kessler Works was one of Montana's leading clay products manufacturers.

[48] Duane W. Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," Independent Record, V. II, No. 242, July 22, 1945. Montana Historical Society, Clippings Files, Folder "Western Clay Manufacturing Company"; Jiusto and Newby, "A Beautiful Spirit," 18. The Switzer Brick and Terra-Cotta Company was not founded until 1892. See Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 11.

[49] Kessler, "A Few Remarks," 2.

[50] Fred Quivik, National Register of Historic Places, "Inventory—Nomination Form: Western Clay Manufacturing Company,"1985, 5; Jiusto and Newby, "A Beautiful Spirit," 18. Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 173.

[51] Kessler, "A Few Remarks," 3; Miller, "Jacob Switzer," 154-155; Jiusto and Newby, "A Beautiful Spirit," 18; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 11; Fitzgerald Sanders, "Charles H. Bray,"1272. According to Charles N. Kessler, the clay at Blossburg was suitable for a wide range of industrial products, including pottery products. Joaquin Miller also noted, "The Blossburg land contains an inexhaustible quality of clay suitable for the manufacture of fire brick, terra cotta, and everything in that line."

promoted to secretary and general manager of the newly formed Western Clay Manufacturing Company.[52] Western Clay, conveniently located within the corporate limits of Helena, directly connected to the Northern Pacific rail line, and with its direct access to the bountiful and high-quality clay in the Blossburg pit, led to the immediate expansions of the manufactory on the grounds of the former Kessler Works.[53]

Throughout the first quarter of the twentieth century, Charles Bray kept Western Clay outfitted with the most advanced brick and tile manufacturing technologies.[54] So well equipped and modernized was the facility by 1907, that it was already considered "one of the best plants of its kind in the Northwest."[55] Charles, of course, remained a pivotal figure in the company. By 1920, he managed to buy out Jacob Switzer's interests in Western Clay.[56] Then, in 1928, he purchased the Kessler family's interests and assumed complete ownership of the Company, which he subsequently ran with the help of his sons, Archie (Archie, Sr.) and Ray.[57] Acting as the Company's president, Charles continued to oversee the manufactory's operations until his death in 1931.[58] Afterward, Archie Bray, Sr.—a trained ceramic engineer and former superintendant of his father's company—assumed the presidency of Western Clay[59] (Fig. 2.9).

A shrewd businessman and experienced clay worker, Archie Bray, Sr. controlled Western Clay with ease. Like his father, Archie endeavored to stay abreast of the clay industry's business practices and technological advancements and made changes, accordingly, to his company.[60]

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[52] Fitzgerald Sanders, "Charles H. Bray," 1272.
[53] Jiusto and Newby, "A Beautiful Spirit," 18; Rowe, "The Western Clay Manufacturing Company, Helena, Mont," 173; Fitzgerald Sanders, "Charles H. Bray," 1272; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 11.
[54] Jiusto and Newby, "A Beautiful Spirit," 18; Quivik, National Register of Historic Places, Inventory," 5; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 12. Quivik explains that "[b]y 1908, the Western Clay Manufacturing Company was known as the most complete clay manufacturing plant in Montana." Further, Quivik explains, by 1918, the Western Clay was not only the most complete, but also the largest manufacturer of brick and tile in the state. Also, Quivik lists the machinery, the types of products produced, and Western Clay's connection to two railroads as contributing to the plant's success.
[55] Rowe, "The Western Clay Manufacturing Company, Helena, Mont.," 173.
[56] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.
[57] Ibid., 1945; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 13.
[58] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," 1945; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 13.
[59] Bray, Jr. Interview with Martin Holt, 16.
[60] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," 1945; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 13.

In addition to his industrial clay production knowledge and skills Archie, Sr. had a profound interest in artistic clay production. This artistic passion eventually led to the founding of a separate ceramic arts foundation on the property adjacent to his brick and tile works.[61] Launched in 1951, this foundation, the ABF, was built with the help of Western Clay workers, was funded by the brickyard's revenue, and functioned concomitantly with the brickyard. When Archie, Sr. passed in 1953, his son Archie, Jr. took over the family business at his family's request.[62] Archie, Jr. also made attempts to modernize Western Clay, but a combination of factors, one of which related directly to the national decrease in the building industry's demand for clay products, led to the plant's 1960 closure.[63] Although IXL Industries Incorporated, a brickmaking company located in Medicine Hat, Alberta, Canada, subsequently purchased the Western Clay facility this manufactory was shuddered and never again placed in production.[64]

Brick and Clay Tile-making: Early Technologies and the Technological Advancements Made By Charles H. Bray, Archie Bray, Sr., and Archie Bray, Jr.

> It takes a peculiar sort of man to make a good brickmaker. You may take a hundred good, sensible average men; you will get twenty of them that will make good carpenters, or blacksmiths, or brick layers, or plasters, or painters, or shop keepers, or horse traders, or lawyers, or doctors, or farmers, or almost anything, and especially a quack professor or a party politician, but you will not find two that will make a first-class brickmaker and burner.
>
> John. W. Crary[65]

[61] Archie Bray Foundation for the Ceramic Arts. "History." Last modified, August 17, 2011. http://www.archiebray.org/about_us/abf_history.html.
[62] Bray, Jr., "Interview with Marion Holt," 16.
[63] Fred Quivik explains that Montana's other surviving brickyards were closed, one-by-one, in the 1950s. See "Western Clay Manufacturing Company: An Historical Analysis," 14. See also, Kim Elaine Wallace, "De/industrializing material culture: Refractory bricks and company housing in south-central Pennsylvania brickyard towns, 1890-1990, (PhD diss., University of Pennsylvaniam 2005), 129, 142-142. In her dissertation, Wallace speaks about the number of brickyards that closed in the 1950s.
[64] Chip Clawson mentioned this date on a tour that he gave to the ACL on July 12, 2012.
[65] Crary, John W., *Sixty years a brickmaker: A practical treatise on Brickmaking and burning and the management and use of different kinds of clays and kilns for burning brick*," (Indianapolis: T.A. Randall & Co., 1890), 70.

When Charles Bray began working at the Thurston Works in the spring of 1884, this brickyard appeared a respectable, but low-tech operation.[66] Even though hand-press machines had long been in use in other parts of the country by this decade, like most early Montana brickyards, Thurston's enterprise was a hand-molding facility.[67] Although no archival records documenting daily life at the plant in 1884-1885 have been found, various reports do note that during this historical epoch, horses powered the plant and aided in the hauling of clay and finished bricks.[68] Since no power tools or machinery were available, using primitive hand-tools—mining picks, shovels, and crowbars—workmen at Thurston's brickyard would have first "won," or mined clay that was deposited just below the earth's surface.[69] The exposed clay would then have been exposed to the natural elements—"weathered"—over a number of months, and afterward "tempered"—this latter term referencing a process that involved adding water and either "spading" or "slashing" the clay by hand in an effort to amalgamate these two substances.[70] Subsequently, horses would have been used to help further grind and temper, or what is termed "pug," the clay[71] (Fig. 2.10). This more thoroughly mixed substance would then have been hand-pressed by a deft workman, called a molder, into wooden molds[72] (Fig. 2.11). Following this molding process, bricks would have been set out to dry under makeshift shelters. Afterward, the

[66] Bowen, "Charles C. Thurston," In *Progressive Men of Montana*, 893. Bowen exclaimed that Thurston was a very respectable man while Leeson in *History of Montana*, 1256 explained that Thurston's brickyard was "…one of the finest brick yards in the [Montana] Territory." Historian Helen Fitzgerald Sanders wrote, "When Mr. [Charles] Bray assumed charge only common brick was manufactured and horse power was utilized." See Fitzgerald Sanders, "Charles H. Bray," 1272.

[67] McKee, "Brick and Stone," 85-86. McKee explains that a mechanized brick molding and pressing machine was operating in the Washington DC area by 1835. In 1838, the first brick molding and pressing machine was patented by Stephen Ustick of Philadelphia. See also Calvin Tompkins, "The Brick Industry About New York City," *Transactions of the American Society of Civil Engineers*, 18 (1888): 282; D.V. Purington, "Brick Manufacture Near Chicago," *Transactions of the American Society of Civil Engineers*, 18 (1888): 293. Brick manufactures in the NY and Chicago areas were not hand-molding their bricks in the last quarter of the 19th century. Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 3-4.

[68] Fitzgerald Sanders, "Charles H. Bray,"1272; Fredric Quivik, "Montana Historical and Architectural Inventory Form: Ste 22," Helena, MT (1985), 44; Charles N. Kessler "A Few Remarks," 1.

[69] The term winning references the mining of clay. See Gurcke, *Bricks and Brickmaking*, 4-5. Author Charles Thomas Davis explains how clay was won by hand. See Charles Thomas Davis, A *practical treatise on the manufacture of brick, tiles, terra-cotta, etc*., (Philadelphia: H.C. Baird & Co., 1897 (original publication 1893), 103-104.

[70] Davis, *A practical treatise* 106-107.

[71] Davis, *A practical treatise*, 112.- 113. Davis provides both an explanation of the early design of a pug mill and the process of pugging. His work also includes several illustrations of pug mills.

[72] Gurcke, *Bricks and Brickmaking*, 15. Gurcke provides a thorough explanation of the hand-molding process and includes information on the process of making sand-struck brick. Fred Quivik, in "Western Clay Manufacturing Company: An Historical Analysis," 3, explains that early Montana brickyards that employed hand-pressing methods pressed clay into sanded moulds.

air and sundried bricks would have first been stacked together in such a fashion that they formed their own kiln and following this step, they would have been fired. [73] Firing by this method took the form of either a clamp or a scove kiln.

Both clamps and scove kilns were temporary forms, but of the two, clamp kilns were more basic in design.[74] Constructed on level ground, clamp kilns took a rectangular shape and sloped inward as they rose in height. At their bases, a checkerboard pattern of previously burnt bricks was laid, the empty spaces between the bricks being in-filled with fueling materials.[75] Unfired or "green" bricks were then stacked on top of each base in a manner that allowed for several holes, or "eyes" to locate in the sidewall near the kiln's base.[76] The sidewalls and the top of this clamp were then stacked with an additional layer of previously fired brick. Once the form was completed to size, additional fueling material was stuffed into the "eyes" and the entire structure was subsequently ignited[77] (Fig. 2.12). In contrast to clamp kilns, scove kilns were constructed in sections so that arched firebox openings could be built into the base and connect to an interior firebox that would run the length of the kiln. This kiln's walls, however, also sloped as they rose skyward.[78] With the exception of the base, the lining of the fireboxes, a scove kiln was constructed with green bricks. After firewood was set into the tunnels and the kiln ignited, then an exterior layer of previously burnt brick was applied to the exterior of the kiln. To help insulate this kiln and prevent heat from escaping, this outer layer of brick was then daubed over with mud[79] (Fig. 2.13). While neither of these firing methods was particularly efficient, each proved advantageous to early brickmakers because it could be erected and fired wherever clay was dug and a brickmaking enterprise founded.[80]

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[73] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 2.

74 Interestingly, clamp kilns were used widely throughout the United Kingdom. See International Labour Office, United Nations Industrial Development Organization, and World Employment Programme, Small Scale Brickmaking, (Geneva: International Labour Office, 1984), Chapter IV, Clamp Kilns. See also, Gurcke, *Bricks and Brickmaking*, 31-32.

[75] Ibid, Chapter IV, Clamp Kilns.

[76] Ibid, Chapter IV, Clamp Kilns. Karl Gurcke, on page 29, notes that a typical clamp kiln reached a height of twenty-four to thirty bricks.

[77] Ibid, Chapter IV, Clamp Kilns; Gurcke, 31-32.

[78] Scove kilns reached an average height of thirty-five to forty brick courses. See Gurcke, *Bricks and Brickmaking*, 29.

[79] Gurcke, *Bricks and Brickmaking*, 29.

[80] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 7.

It remains unclear whether a clamp or scove kiln was used to fire bricks at Thurston's brickyard. In a 1940s newspaper editorial on Western Clay and its history it was, however, reported that in the late 1880s "…50 to 100 arches were constructed… [and that] when the arches were complete, cordwood was jammed in the arches."[81] This explanation suggests that if scove kilns were not used prior to Kessler's purchase of the Thurston Works and the subsequent installation of Charles Bray as superintendant of the newly expanded brickyard, then scove kilns were most certainly used afterward. It would not be surprising to find that Charles Bray fostered such an improvement at the manufactory. It has been well-documented that Kessler's retention of Charles's services at the time of the sale of the Thurston Works was a most beneficial move—whether intentional and made with acumen, or serendipitous.[82] Charles was both extremely knowledgeable about and skilled in the art of brickmaking. As a consequence, immediately after assuming his new post he began physically and technologically upgrading Kessler's brickyard as only someone with a very keen understanding of the industry and its technologies could do.[83] On the very grounds of what would become the Western Clay Manufacturing Company, Charles first installed a 15-horsepower steam engine.[84] Although by today's standards a seemingly modest machine, a 15-horsepower engine was quite powerful for this time period and it proved adequate for operating the manufactory's newly installed pugging and brick pressing machinery.[85] During this early period, Charles Bray also improved the manufactory's firing capabilities by constructing several permanent, more efficient kilns.[86] These brick structures appear to have been some version of a Scotch kiln. Like the previously discussed clamp and scove kilns, the Scotch

[81] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.
[82] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 1-39.
[83] Betsy Hunter Bradley, *The Works: The Industrial Architecture of the United States*, (New York: Oxford University Pr ess, 1999), 17.
[84] Rowe, "The Western Clay Manufacturing Company, Helena, Mont.,"174.
[85] Until the late 1890s it does not appear that larger steam engines were used in brick plants. See, for example, "The Simpson Brick Company's New Works at Chicago," *Brick and Clay Record* 6, no. 4 (1897): 279. Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 9, reports that both wet-mud and dry-clay presses were installed in 1885 by Charles Bray.
[86] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 9.

kiln was also a class of updraft kiln[87] (Fig. 2.14). Unlike clamp and scove kilns, the base, walls, and firebox tunnels of a Scotch kiln were permanently constructed of burnt bricks that were set in mortar.[88] At each end of the kiln was an opening that allowed for the loading and unloading of the structure. These openings were, of course, sealed during the burning process and deconstructed once the firing process was complete.[89] As a consequence, the only temporary major feature of a Scotch kiln was its roof. This feature was, however, even rendered permanent by the early 1890s as small technological advancements in the brickmaking industry were constantly being made[90] (Fig. 2.15). Therefore, while it is unclear if Charles Bray ever outfitted his Scotch kilns with permanent roofs, the opportunity did exist to further improve both the effectiveness and the permanency of this kiln type.[91]

Over the next eleven or so years, the progressive, hard working, and sagacious Charles Bray continued to expand and technologically update the Kessler's facility. In addition to the introduction of the steam engine and the mechanically operated pugging and pressing machinery, Charles Bray also outfitted the Kessler's manufactory with the buildings and equipment necessary for the production of decorative bricks, tile and sewer pipe, and flower pots and lawn vases.[92] So complete and up-to-date was this facility that by 1898 the Kessler Brick and Sewer Pipe Works manufactory was reported to include: a brick engine and boiler house, several drying sheds, a dry pan shed, a kiln shed, an office, bunk house, cook's house, superintendent's residence, a barn, two steam engines, two boilers, a sewer pipe press, and presses and dies for making flower pots, a dry pan, a wet pan, a dry press brick machine, and four wet-mud brick machines with pug mills."[93]

87 William George Nash, *Brickwork*, (London: Nelson Thornes, Ltd., 1983), 13-14.
88 International Labour Office, United Nations Industrial Development Organization, and World Employment Programme, Small Scale Brickmaking, Chapter IV, Scotch Kilns; Nash, *Brickwork*, 13-14.
89 Nash, Brickwork, 13-14.
90 Davis, *A practical treatise*: "Improvements to Kiln Roofs," 161-162. By 1893, a permanent, gable-style roof for Scotch kilns had been invented and patented by Thomas F. Adams of Philadelphia's Peerless Brick Company.
91 Nowhere have I read that the roofs of the Scotch kilns at Western Clay were permanent. Given Charles Bray's progressive attitude toward brickmaking technologies and his direct involvement with the nation's brickmaking and clay trade organizations, it is likely that he knew about this permanent feature and it is possible that he at least contemplated the possibility of installing it.
92 Fitzgerald Sanders, "Charles H. Bray,"1272; Bowen, "Charles C. Thurston," in *Progressive Men of Montana*, 893; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 12.
93 Kessler Family Papers, "Kessler Brick and Sewer Pipe Works Inventories," MC 161, Box 49, Folders 3, Montana Historical Society, Montana State Archives, Helena, MT; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 10.

Such rapid expansion and such a degree of technological upgrading are not surprising given Charles Bray's intimate connection with both the National Brickmaker's Association and the National Association of Clay Workers. Surely Charles Bray's sincere interest in staying current with the latest business practices and industry advancements despite the physical distance that existed between the manufactory that he operated and the epicenter of brick and tile making in the east aided prodigiously to the expansion and technological growth what was to become a small, but "A No. 1" Northwestern U.S. facility.[94]

Amongst all of the aforementioned improvements that Charles was making to Kessler's manufactory, in 1898 he added three round downdraft kilns[95] (Fig. 2.16). This style of downdraft kiln, which was topped with a domed roof, was in later years commonly referenced by those in the brickmaking industry as a "beehive."[96] In comparison to the clamp, scove, and Scotch kilns, the beehive was considered superior. Not only were beehives considered to be permanent kilns, but they also could be used to fire a variety of structural clay products—paver bricks, tile, and terra cotta wares such as flowerpots.[97] Additionally, this form of downdraft kiln was considered to be far more fuel efficient and immensely more effective at firing industrial clay products than its updraft counterparts. For example, downdraft kilns were reported to produce a harder and "more uniform product." They also worked very well for manufactures who desired to add special textures and color to the bricks and structural clay products that they produced.[98] While beehive

[94] Charles Bray definitely kept informed about latest business practices and technological advances and updates in the brickmaking industry. Charles, for instance, traveled as far east as Buffalo, NY to attend the association's 11th annual conference in 1897. "National Brickmaker's Association," *Brick and Clay Record* 6, no. 2 (1897): 87, 99, 139. Also, Fred Quivik on page 9 of An Analysis, explains that the following year, 1898, Charles traveled to Pittsburgh, PA, to attend the annual meeting of the National Clay Workers. Jesse Perry Rowe, called this facility an "A No. 1" operation. See Rowe, "The Western Clay Manufacturing Company, Helena, Mont.,"174.

[95] Kessler Family Papers, "Inventories," Folders 3; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 10.

[96] In the late nineteenth century, the term "beehive" does not appear in conjunction with round, downdraft kilns. It is afterward sparsely used in the early part of the twentieth century. The first mention of a beehive kiln that I found came from the September 1905, volume 14 publication of *The British Clay Worker*. The term was again used in the December 1921, volume 59 issue of *Brick and Clay Record*. Later in the twentieth century, the term came to be ubiquitously used, and typically used either instead of or at least along side the term downdraft.

[97] Davis, *A practical treatise*, 189; International Labour Office, United Nations Industrial Development Organization, and World Employment Programme, Small Scale Brickmaking, Chapter IV, Down-draught kilns; "Clay Products Manufacturing," *Ceramic data book*, (Chicago, Ill: Industrial Publications, 1935), 179-180.

[98] Gurcke, *Bricks and Brickmaking*, 32. Jeff Hollis, employee of and plant historian for the Continental Brick Company in Martinsburg, WV informed me in a personal conversation on February 16, 2012 that the beehive kilns were very good for producing hard brick and brick with a variety of surface textures. See also, R. B. Morrison, "Which Principle is Better for Burning Common Brick, Up-Draft or Down-Draft," *Brick and Clay Record* 6, no. 1, (1897): 96; Alfred B.

kilns became a standard feature of brick and structural clay product manufactories throughout North America after the turn of the twentieth-century, Charles Bray's pre-1900 use of this kiln type is notable. Although it cannot be confirmed, Charles's training in the brickmaking trade, which took place in the north of England where beehive kilns were most commonly used, may have influenced his early decision to employ this design in Montana.[99] What makes this possibility even more likely is the fact in addition to both understanding the advantages of using this kiln type and also being equipped with the knowledge to fire these kilns, Charles would also have had to know how to construct a beehive kiln.[100]

In terms of structure, round downdraft kilns were typically set on concrete foundation and built above a below-grade flue system that connected with an exterior chimneystack[101] (Fig. 2.17). These kilns ranged from twenty to forty-two feet in diameter and rose—not including their domed roofs—to a height of anywhere between eight to twelve feet above the ground.[102] Their walls, which were of a considerable thickness—at least at the base—were punctured near grade level by anywhere from eight to twelve firebox openings.[103] Arched doorways—typically two—were also set into the kiln's walls.[104] These doorways allowed for the loading and unloading of the kiln—a process that was extremely labor intensive. The kiln's wall was also topped with an arched dome that was perforated by a central oculus and often a series of small rectangular

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Searle notes, "the downdraft kiln… is the most efficient and satisfactory of all single kilns, yielding the most perfect color and the lowest fuel consumption of any intermittent kiln." See, Searle, *Modern Brickmaking*, 248.

[99] "Modern Bricks," *The British Clay Worker*, 14 (1905): 177. This publication notes that beehive kilns were more commonly used in Staffordshire and in the North of England. Interestingly, author Edward Dobson, in *A Rudimentary Treatise*, 40, also pointed out in 1903 that "cupolas," were widely used in Staffordshire.

[100] Arthur Frederick Greaves-Walker, *Clay Plant Construction and Operation*, (Chicago: Brick and Clay Record, 1919), 105. Typically, brick and clay product manufactures in the U.S. constructed their own kilns—regardless of the kiln type.

[101] B*rick and Clay Record* 26, no. 2 (1907): 93.

[102] The walls of the beehive kilns at Western Clay were documented at a height of nearly eleven feet, six inches and contained either eight or ten firebox openings. In diameter, they each measured nearly thirty feet. The *Ceramic data book*, 179, explains that round, downdraft kilns varied between twenty and forty-two feet in diameter. Reading through the many volumes of *Brick and Clay Record*, however, I found that these kilns typically ranged between twenty-five and thirty-seven feet in diameter. See, for example, *Brick and Clay Record* 18, no. 1, 22, Volume 27, 4, and Volume 27, no. 5, pg. 151, 282.

[103] Searle, *Modern Brickmaking*, 249.

[104] All of the beehive kilns that I have looked at the former United Clay Brickworks in Washington, DC, at West Virginia's Continental Clay, and in treatises on the manufacture of bricks, have a doorway opening on either side of a kiln. At Western Clay, however, only four of the remaining five beehive kilns have two doors. For additional information on the uses of these doors see Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 21.

openings called either "inspection points" or "peep holes."[105] Although considered permanent structures, in order to prohibit deterioration of the brick and the collapse of a beehive kiln's thick perimeter wall due to the heating and cooling processes, beehive kilns were either wrapped with a series of specifically metal bands or, on some occasions, sheathed entirely—minus their domes—with metal.[106]

Although experts on clay and brickmaking, like the British lecturer and author, Alfred B. Searle, admonished those in the industry that no two kilns functioned in the same manner;[107] overall the structural differences that existed amongst beehives were relatively minor. Throughout their many years of use in the U.S., only small refinements were made to the technology—the most grand of which was their conversion from coal to gas firing.[108] Thus, whether situated in the United Kingdom, New Jersey, Illinois, the District of Columbia, Alabama, Utah, or the Canadian provinces, one could easily indentify a beehive kiln. Typically, a manufactory had a series of

[105] Interestingly, although all beehive kilns appear to have had a central oculus, not every one was constructed with crown-level inspection points. Only four of the remaining five beehive kilns at Western Clay have these inspection points. These inspection points typically measured four by five inches. Peter Tawodzer, "Iglo Type Brick Kilns in Zimbabwe," Wall Building Case Study, Eschborn, Germany, 1997, pp. 1-4. Accessed on August 11, 2011 at http://sleekfreak.ath.cx:81/3wdev/GATE_DL/BUILDING/IGLOOKLN.PDF. Tawodzer references these holes as "inspection points." Samuel Guyserbeek, "Differences Between Pottery Bodies and Common Clays," *Brick and Clay Record* 7, no. 3 (1897): 182; F.M. Gardner, "Brick-burning, *Brick and Clay Record*, 7 no. 3 (1897): 190; Davis, *A practical treatise,* 188, 190. Guyserbeek, Gardner, and Davis all reference these holes in the domed roof as peep holes. The rise of a typical beehive's crown was between six and one-half to nine feet. See *Ceramic data book,* 179.

[106] International Labour Office, United Nations Industrial Development Organization, and World Employment Programme, Small Scale Brickmaking, Chapter III.4: Downdraft Kilns. Searle, *Modern Brickmaking*, 249. Searle explains that these circular kilns were wrapped with iron bands. Later kilns, however, were wrapped with steel bands. Although these bands were intended to prevent the kiln from damaged, this did not mean that the continual expansion and contraction of the kilns did not cause blowouts. At Western Clay, for example, Kiln number 7 evidences larges patches of repair. Although he does not indicate which Kiln, Archie Bray, Jr. talks about his father's efforts to repair a damaged kiln while it was still in the middle of the burning process. See Betty Bray Galusha, "Interview with Martin Holt," The Oral History of the Archie Bray Foundation, (Denver Colorado, 1978), 3. For an image of an early metal encased kiln, see, "Busy Times At The Works Of The Christy Fire Clay Company," *The Clay Worker*, 40 no.5 (1903): 449. See also Greaves-Walker, *Clay Plant Construction and Operation,* 96-97. Greaves-Walker provides a detailed explanation regarding the spacing of the metal bands on beehive kilns.

[107] As Alfred B. Searle explained, "do not think that all kilns are alike." See Searle, *Modern Brickmaking*, 365. As a caveat, it is worth noting that the owner of the Jenkins Brick Plant in Alabama actually designed a beehive kiln that he afterward manufactured and sold to other brickmaking operations in the South. See, Jenkins Brick and Tile Company, "Company History." Accessed on November 11, 2011 at http://www.jenkinsbrick.com/AboutUs/CompanyHistory/tabid/61/Default.aspx.

[108] Besides varying in wall height, dome height, and in diameter, the greatest structural difference found in this kiln type existed in the design of the flues and the pattern of the kiln floor, the formation of the bag walls—either square or round—and the thickness of the exterior walls and the size and depth of the fireboxes. For more information on round, downdraft kiln designs and design variations, see Searle, *Modern Brickmaking*, 249-250; "Roseville Brick and Terra Cotta Works," *Brick and Clay Record* 6, no. 5 (1897): 235-236. This article on the Roseville manufactory gives an excellent explanation of a beehive kiln's design, including images and measurements for flues, fire box openings, and bag walls. See also "Clay Products Manufacturing," *Ceramic data book*, 179-189 for very detailed information, including measured drawings, on beehive kilns and their construction.

these kilns. Beehives were freestanding structures that were either built adjacent to one another in a linear formation, or were clustered together around other principal brick or tile making and drying edifices (Fig. 2.18). Sometimes the proprietor of brick and tile manufactory chose, however, to house his kilns within a larger building.[109] This practice, which was advocated for by several early twentieth-century British brick and clay experts,[110] was indented to simultaneously serve several purposes. First, it was thought that by sheltering kilns from above brickmakers could protect the domes of the kilns from being soaked by and damaged over time by both rain and snow. Such a covering was also said to keep coal fuel supplies piled around the kiln dry.[111] Additionally, since keeping the foundations of a kiln dry was paramount to its continued success, it was thought that a roof covering would help protect the foundations and ultimately prolong the life of the kilns by preventing water from penetrating the ground directly next to the kiln.[112] Furthermore, a covering, and especially one that shielded both the roof and the sides of the kiln, was thought to protect the fireboxes from the wind and while also keeping the workmen dry, warmer, and, of consequence, more productive.[113] While this practice of sheltering kilns did not appear to be commonly employed in the U.S., clearly, Charles, and later his son, Archie, Sr. found it advantageous to put into use some version of this protective system. Although neither chose to completely shelter their beehive kilns from above, they did erect a protective circular wall and roof covering around the exterior of each kiln[114] (Figs. 2.19 and 2.20). At some point, the Brays

[109] R. H. Minton, "Unusual design for a fire brick plant," *Brick and Clay Record* 57, (1920): 215. This article indicates that six of the beehive kilns at the General Ceramics Co., in Metuchen, NJ were housed within a larger brick building. The author goes on to state that these buildings sheltering kilns could also be made of steel. The Medalta facility in Medicine Hat, Alberta, Canada, some of the company's beehive kilns were also housed within a larger edifice.

[110] Throughout the course of my research, it was only in the work of Alfred B. Searle and in that of Edward Dobson that the necessity for a kiln covering was both advocated for and explained.

[111] Searle, *Modern Brickmaking*, 321. "…[I]t is desirable to have one [a roof] erected over single kilns if the best or most economical results are expected from the firing. The reason is that all water which is driven off the top of the kiln by evaporation represents a definite waste of fuel which could be saved by the erection of roof or shed over the kiln. When no roof is provided, the crown or arch of the kiln begin to sag on account of rain soaking into the brickwork instead of being carried off the roof…"

[112] Searle, *Modern Brickmaking*, 321.

[113] Ibid., 312-313; Dobson, *A Rudimentary Treatise*, 40.

[114] Dobson, who was writing on brick and tile manufacturing in the U.K. at the turn of the twentieth century, is the only author whom I have found to reference the design of a protective circular enclosure around the outside of a beehive kiln. Aside from an image of a similarly protected beehive kiln at the Bulmer Brick and Tile Company in Sudbury, Suffolk, U.K., I have not run across any plant in either the U.S. or in Canada that employed this same functional design enclosure.

even extended the roofing system in a fashion that sheltered almost all of the spaces between and amongst four of their kilns and the adjacent tile work's drying shop.

Brick, sewer pipe, and other structural clay products were always stacked inside a beehive kiln in a particular manner. After being properly loaded, the doorways were then temporarily filled with brick. Coal was then fed into the firebox holes and afterward, ignited. The typical firing time for a beehive kiln was seven to ten days.[115] The bricks and structural clay products within the kiln were protected from direct exposure to the firebox flames by means of box-shaped interior called "bag walls."[116] Heat from the fires was directed upward from within the fireboxes. Once reaching the top of the dome, it was drawn downward toward the floor, out through the underground flue system, and up through the kiln's associated chimneystack.[117] Despite the fact that downdraft kilns were more effective at evenly firing clay products, the burning of this kiln type—especially when still coal fired—necessitated great skill and round-the-clock attention so that the proper degree of heat was always being employed.[118]

By 1907, just two years after Kessler-Switzer merger and the official formation of the Western Clay Manufacturing Company, the manufactory that Charles Bray had long supervised and was thereafter managing had made great progress. The manufactory had already expanded to include five downdraft kilns. It also had two steam engines—one a 250 horsepower Corliss engine that powered the entire plant, and the other a 20 horsepower engine used in the manufactory's machine shop—and, purportedly, "the best and most up-to-date brick tunnel

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[115] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945; Dorothy R. Jacobson, port to the Agricultural Research Service on the Cultural History Values of the New York Avenue Brickyard," (August 25, 1976),11.

[116] Searle, *Modern Brickmaking*, 327. Although the bag walls at Western Clay were square, some manufactories used round ones. Typically, bag walls measured about four fee in height and approximately three feet in width. See "Roseville Brick and Terra Cotta Works: Description of the Kilns," *Brick and Clay Record* 6, no. 4, (1897), 234. As the Roseville article explains, bag walls were made of fire brick, not regular brick.

[117] International Labour Office, United Nations Industrial Development Organization, and World Employment Programme, Small Scale Brickmaking, Chapter III.4: Downdraft Kilns; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 7; "Clay Products Manufacturing," Ceramic data book, 180; Gurcke, *Bricks and Brickmaking*, 32.

[118] Bray, Jr., "Archie Bray, Jr. Interview with Marion Holt", 6; Marion Mann, "Draft of The Historic Brickyard at the U.S. National Arboretum," unpublished, date unknown. Courtesy of the U.S. National Arboretum, Washington, DC, Historic Brickyard files.

drier in the Northwest [of the U.S.]."[119] As the Company grew in size and profited financially, Charles Bray also went about updating the existing buildings at the manufactory. For instance, he is noted to have "continued to upgrade the plant by converting wood frame structures [into brick structures]… and either enclosing or adding space to others."[120] During this historical epoch, Western Clay was reported that it was shipping finished products as far away as Spokane, WA. Though closer, many products were also shipped to various towns in Idaho, Wyoming, and Montana.[121] Of course, all the while, structural clay products were being sent to downtown Helena where it is reported that ninety-percent of the city's buildings, and much of its infrastructure—roads and water and sewer lines, in particular—were being constructed with Western Clay products.[122]

Like his father, Charles Bray, Archie Bray, Sr. was a resourceful, and hardworking man. Although Archie, Sr. had grown up around the brickyard, his father insisted that he attend the nascent, but already renowned ceramic engineering program at the Ohio State University in Columbus, OH.[123] Those in the brickmaking industry had long called for such a university program to instruct "first-class expert, scientific brick burners and clay workers… [who could greatly improve] the economy, efficiency and durability of the industry."[124] When Archie, Sr. commenced his studies at Ohio State in 1907, this program—the first of its kind to be established in the U.S.—was only thirteen years old.[125] Although it was not his ambition to become a brickmaker, a foreman, or the president of a brickmaking company, Archie, Sr. acquiesced to his fathers demands, earned his degree in ceramic engineering, and returned to Western Clay well outfitted with extensive and invaluable knowledge about clays and the structural clay-making

[119] Rowe, "The Western Clay Manufacturing Company," 173.
[120] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 12.
[121] Ibid., 175.
[122] Ibid., 175; Kessler "A Few Remarks," 1.
[123] Archie Bray, Jr. Interview, 3; Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945. The ceramics engineering department at the Ohio State University in Columbus had only been in existence seventeen years when Archie Bray, Sr. arrived in 1907. It was the only program for ceramic engineering in the entire country and it was lauded for its rigorous curriculum. For more information about the program and the course of study offered to students, see "Technical Instruction in Clayworking—II," In *The British Clayworker*, 14 (1905), 11-14.
[124] Crary, *Sixty Years a Brickmaker*, 45.
[125] Ries and Leighton, *History of the Clay-Working Industry*, 7.

industry.[126] Even this push to have his son attend a university that offered a degree in ceramics engineering evidenced Charles's progressive nature. According to Archie, Sr., "The texture and quality of your brick are all your own. One brickmaker cannot duplicate another's work to any great extent."[127] Surely, Archie's academic training in conjunction with the practical knowledge he had already acquired from his own father enabled him to make the highest quality products. As a consequence, within less than two years after graduating from Ohio State, Archie, Sr. was appointed the foreman of Western Clay. Then, after Charles Bray's purchase of Western Clay in 1928, Archie, Sr. was promoted to the position of the plant superintendant.[128]

When Charles Bray passed away in 1931, Archie, Sr. took over as president of the company that hailed as Montana's largest producer of brick.[129] In the twenty or so years that he had worked alongside his father at the manufactory, Archie, Sr. certainly witnessed the merits of Charles Brays efforts to both grow and improve the manufactory's production abilities, and the quality and diversity of the products that it produced. Therefore, it is not surprising that after assuming the presidency of Western Clay, Archie, Sr. continued his father's tradition of both keeping current with the industry and making state-of-the-art improvements to the company.[130] In 1931, immediately after a natural gas line was run to Helena, Archie, Sr. set about converting all of his beehive kilns and the company's boiler from coal to natural gas power.[131] The firing of the kilns by coal had always been a labor-intensive process that required workmen—including Archie, Sr. who was known to always be working right alongside his employees—to not only

[126] Although Archie, Sr. was a very determined man and a skilled brickmaker, Archie, Sr. wished to become a doctor. See Archie Bray, Jr. Interview, 3, for more information on Archie, Sr.'s early ambitions and his schooling at Ohio State.
[127] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.
[128] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945. Quivik reports that by 1928 Western Clay was "producing twice as much common brick as its nearest competitor in the city of Great Falls." See Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 12.
[129] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.
[130] Archie Bray, Sr. was quoted saying, "I always keep up with new methods [of manufacturing] through our industry trade journals." Independent Record, October 1, 1951. This shows that despite the transportation and communication constraints of the era and despite the distance of Helena, MT from the epicenter of the brickmaking industry in the eastern states—from Illinois east—Archie, Sr. was intent on running a state-of-the-art manufactory.
[131] Independent Record, "Public Witnesses take stand today as Helena Phase of hearing on importation of gas is opened," October 1, 1951, pg. 1; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 13.

break up the coal prior to its use, but then also haul it to the kiln and feed and monitor the kiln twenty-four hours a day until the firing process was complete.[132]

Although natural gas had, in some locations, used to fire downdraft kilns since the late nineteenth century,[133] access to this fuel resource was not even possible for Helena area residents and businesses until 1931. Therefore, while it may not at first appear that Charles Bray had been keeping up-to-date with the technologies, the matter of not converting the manufactory to natural gas power until 1931 related solely to the fact that prior to this date, Western Clay did not have access to this fuel type. Interestingly, when looked at in comparison to the dates that other brick and tile manufactories in the east, Western Clay's conversion actually appears quite early. For example, the Continental Brick Corporation in Martinsburg, WV did not convert its kilns to gas until 1957.[134] Also, Washington, DC's conveniently situated United Clay Brickworks Company lagged behind Western Clay when it came to the conversion of its kilns from coal to gas fire. In this latter case, it was 1939 before the kilns were retrofitted.[135] Even a Report completed in 1936 by the Railroad Committee for the Study of Transportation concluded, "the large majority of brick and tile plants use coal for firing [their kilns]."[136]

Another important technological change made by Archie, Sr. was the 1935 addition of Western Clay's first de-airing machine.[137] Although this apparatus was patented around the turn of the century, and despite the fact that it produced denser, stronger, and more pliable brickmaking clay, it took several decades before it was widely accepted within the brickmaking industry.[138] Thus, it seems fitting that the de-airing machine ordered in the mid-1930s by Archie, Sr., would have been the first of its kind to be shipped west of the Mississippi River.[139] Because Archie,

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[132] Bray, Jr., "Interview with Martin Holt," 5-6; Mann, "Draft of The Historic Brickyard at the U.S. National Arboretum," 6.
[133] Crary, *Sixty Years a Brickmaker*, 24; Davis, *A practical treatise*, 186-187; S. S. Wyer, "Applications of Gas Engineering to the Brick Industry," *Brick and Clay Record* 26, no. 2 (1907): 118-120.
[134] Jeff Hollis of the Continental Brick Corporation, personal conversation with author, February 16, 2012.
[135] Mann, "Draft of The Historic Brickyard at the U.S. National Arboretum," 6.
[136] Economic and Transportation Prospects: Subcommittee on Economic Study of the Railroad Committee for the Study of Transportation : Association of American Railroads, January, 61924-6.
[137] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 13.
[138] Gurcke, *Bricks and Brickmaking*, 21. Gurcke explains that a de-airing machine was first patented in the U.S. in 1902.
[139] Bowler, Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.

Sr., like his father, was very mindful of maintaining a state-of-the-art manufacturing facility, it at first comes as somewhat of a surprise to learn that neither he nor his father had invested in a continuous, tunnel kiln. A version of this particular technology was first used with some success during the 1850s in France[140] (Fig. 2.21). It was not, however, widely used in North America until well after the turn of the twentieth century.[141] Many lauded the efficiency, the decreased manual labor intensity of, and the relatively low energy-consumption of this kiln.[142] Still, as brickmaker John Crary noted, it is "the kiln that turns out the largest percentage of the best brick, at any reasonable cost, [that] is the best kiln [for one's manufactory]."[143] Additionally, the expert, Alfred B. Searle reminded brickmakers, "…[T]he pivot upon which the success or failure of the clay works turns is frequently due, not to the clay but to the kilns employed."[144] Although it cannot be confirmed, it is likely that neither Archie, Sr. nor his father, Charles Bray, ever felt it necessary to construct a tunnel kiln.[145] After all, these men were noted for being expert brickburners, their beehive kilns consistently yielded fine products, and both architects and builders throughout the West lauded the quality and color Western Clay bricks.[146]

Following in both his father's and his grandfather's footsteps, Archie Bray, Jr. who took over the family business in 1953 after the death of his father, made sincere attempts to upgrade

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[140] T. Ritchie, "A History of the Tunnel Kiln and Other Kilns for the Burning of Bricks," Bulletin of the Association for Preservation Technology, 12, no. 3 (1980): 51. In *Bricks to Build a House*, author John Woodford indicates the tunnel kiln may have originally been designed in 1845 in England. Apparently, it did not prove successful. See John Woodford, *Bricks to Build A House*, (London: Routledge and Kegan Paul, 1976), 120.

[141] "Patent for Continuous Brick Kiln," in *Brickbuilder*, 2, no. 12 (1893):114. In the U.S. the first patent for a continuous kiln was given to James Henney of Cloverport, KY. See T. Ritchie, "A History of the Tunnel Kiln," 55. This author explains that J.C. Anderson of Chicago, IL built the first American tunnel kiln in 1889. Interestingly, the Butte Sewer and Tile Company, located in Butte, MT was reported in 1908 to have the state's only continuous kiln. See Jesse Perry Rowe, "Some Economic Geology of Montana," in *University of Montana Bulletin*, 50, no. 3 (1908): 58.

[142] "Illinois Clay Men Pledge Aid to U. of I: Instructive Papers on Manufacturing Subjects Characterizes Annual Meeting of Illinois Clay Manufacturers Association," *Brick and Clay Record* 58, no. 3 (1921): 472.

[143] Crary, *Sixty Years a Brickmaker*, 89.

[144] Searle, *Modern Brickmaking*, 321.

[145] It is interesting to note that in a 1946 U.S. Department of Commerce publication on the manufacture of brick and tile, discussions on firing relate to periodic, not continuous tunnel kilns. See Gunsallus, Breimyer, et al., "Manufacturing Brick and Tile To Serve Your Community," 38-39.

[146] "National Brick manufactures association 11th annual, February 2nd," *Brick and Clay Record* 6, no. 1 (1897): 99-100. At this meeting, Charles Bray is consulted by other attendees on the burning of kilns. Bowler, in "Western Clay Plays Role in Growth, Beauty of Capital City," explains that Archie, Sr. paid very close attention to the firing of his bricks. He also reported on how Archie, Sr.'s bricks were "a favorite with many architects and builders." Jim Elliott, an employee at Western Clay during his youth and the site's former night watchman, in an oral history interview with the author on July 27, 2011, also explained, "While the kilns [beehives] were being fired, Archie watched and listened to them round the clock, like a hawk."

Western Clay. Just shortly after assuming the role as company president, Archie, Jr. converted the entire manufactory from steam to electric power.[147] Then, despite the sentiments that Charles and Archie Bray, Sr. held with regard to tunnel kilns, in 1957, Archie, Jr. installed a modern tunnel kiln at the site[148] (Fig. 2.22). Unquestionably, the loading, firing, cooling, and unloading the beehive kilns had, for years, proved both laborious and time consuming. Therefore, Archie Jr. figured that to meet the projected building demand and at the same time greatly reduce the time, labor, and the amount of fuel used in the firing process, it would prove advantageous for Western Clay if he installed a modern tunnel kiln.[149] Of consequence, a two-hundred-and-forty foot long kiln was constructed at the site and placed into production on July 4, 1957.[150] Just three days prior, on July 1st, the company's beehive kilns were fired for the last time.[151]

The modern tunnel kiln that was built at Western Clay under Archie Bray, Jr.'s direction was used to fire both brick and various forms of structural clay tile—hollow clay tile bricks, flue linings, and sewer pipes.[152] As its name suggests, this structure took the shape of a long tunnel. Its sides were lined with gas-fueled fireboxes and clay products that had previously been dried and loaded onto special carts were mechanically moved along a railroad-like track and through the length of the kiln.[153] The kiln, itself, consisted of three sections: a "preheating, a high-fire, and a cooling zone."[154] In the first area, pre-dried bricks and structural clay products would have been further exposed to moisture-extracting heat, in the second, the product would have been gradually heated to the desired firing temperature, and in the third section, the products would be cooled.[155]

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[147] Bray, Jr., "Interview with Martin Holt," 7; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 14.
[148] Bray, Jr., "Interview with Martin Holt," 19; *Great Falls Tribune*, Helena Brick Factory Begins New Operations," July 14, 1957.
[149] Bray, Jr., "Interview with Martin Holt," 19.
[150] Great Falls Tribune, "Helena Brick Factory," July 14, 1957.
[151] Ibid., July 1, 1957.
[152] Ibid., July 1, 1957. Interestingly, it is specifically stated in "Clay Products Manufacturing: Types of Kilns," *Ceramic data book*, 179, that all clay products, except sewer pipes, can be fired in a tunnel kiln.
[153] During a walk-through tour of the ABF/Western Clay property on July 12, 2011, Chip Clawson of the ABF provided both the author and members of the University of Pennsylvania Architectural Conservation Lab (ACL) with information about the Western Clay tunnel kiln.
[154] *Ceramic data book*, 190; Honeywell, "Application Profile: Tunnel Kiln," TK-1. Accessed on November 11, 2012 at http://content.honeywell.com/sensing/control/products/thermocouples/application/tunnel_kiln.pdf.
[155] Ceramic data book, 190.

Unlike the beehive kilns in which the loading, firing, cooling, and unloading process not only required six handlings by workmen but anywhere between seven and thirteen days to yield a cooled and sorted finished product, the tunnel kiln required only the loading and unloading of the carts, and between two and three days time to complete the firing and cooling process.[156] While the implementation of this new technology at Western Clay sounded ideal, unfortunately, as many in the brick industry had previously complained, the tunnel kiln was not particularly effective when it came to uniformly firing and thus, producing well-fired, properly hardened products. Much to Archie Bray, Jr.'s dismay, much of the brick fired in the new Western Clay tunnel kiln was defective. Of consequence, many batches of brick and structural clay products were immediately discarded on site. Others, it has been reported, were shipped to customers, but returned to Western Clay because they were not considered by architects and builders to be up-to-standard.[157] Today, many piles of these defective and discarded bricks can still be found piled around the greater Western Clay/AFB campus.

Provisions for the Western Clay Laborer, a Pivotal Figure in the Brickmaking Process

Although the Western Clay Manufacturing Company's campus is located just over three miles from downtown Helena, in the era of the horse-drawn carriage and even later, when cars were in existence but when automobile ownership was far from ubiquitous, this brickyard would surely have been considered remote and thus, largely inaccessible to the common laborer—especially through the harsh winter months. Therefore, it is not surprising to find that from an early date—probably starting immediately after Kessler bought the Thurston property in 1884 but definitely by 1897—in addition to the industrial structures, the company's thirty or so acre campus was outfitted with several boarding facilities, a dining facility for the laborers, and a

[156] Great Falls Tribune, "Helena Brick Factory," July 14, 1957; Davis, *A practical treatise*, 145; Brooke L. Gunsallus, Harold F. Breimyer, et al., "Manufacturing Brick and Tile To Serve Your Community," 40.
[157] Jim Elliott, interview with author, July 27, 2011.

working farm, complete with livestock.[158] In addition cultivating feed for the animals, the farm was reported to eventually grow vegetables and produce dairy products. For many years the company employed, and provided both room and board to men like Earl Elliott who once held the title, "farmer" and the Scotsman, John Henderson, who in the 1920s was Western Clay's "barnman."[159] Also, as early as 1897, the premise was reported to contain both housing and a kitchen facility designed specifically for a full-time cook.[160] Around the turn of the century, the company even had its own waiter, William Gaudlin.[161] Interestingly, while some of the company's earlier cooks were men, like the senior Russian immigrant, William Sieger, by the 1920s the cook's position was awarded to female applicants.[162] Exactly when a female cook was first hired and the preference for the switch from male to female cooks remains unknown. After a time, however, Western Clay specifically only sought females to fill this post.[163]

The concept of a company town was certainly not new in 1884 when Charles Bray started managing and expanding the Kessler works on the site of what later became Western Clay. Since the 1790s, industrial entrepreneurs had been developing villages and towns around various manufactories.[164] While most of these "company towns" were designed to accommodate families, a few, like the mill villages of Connecticut that were structured by Colonel David Humphreys, were designed to accommodate specific classes of workers, such as orphans, who were provided with room and board—but not with pay.[165] Unlike certain other industries, including the pottery

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[158] Kessler Family Papers, "Inventories for Kessler Brick and Sewer Pipe Works, January 1, 1897," MC 161, Box 49, Folders 2 Montana Historical Society, Montana State Archives, Helena, MT. This early inventory indicates that boarding and bunkhouses, a farm with cattle and horses, and a cook's house were located on the property. Although no chicken coop is listed on either the 1897 or the 1898 inventory forms and although there is no mention of pigs, Fred Quivik, in "The Western Clay Manufacturing Company: An Historical Analysis," 24, reports that at some point prior to 1934 the company's farm included cows, pigs, and chickens.

159 U.S. Census, 1920; Census Lewis and Clark, Montana; Roll: T625_972; Page: 4A; Enumeration District: 92; Image: 160; U.S. Census, 1930; Lewis and Clark, Montana; Roll: 1258; Page: 2B; Enumeration District: 15; Image: 293.0; FHL microfilm: 2340993. Ancestry.com. 1930 United States Federal Census.

[160] Ibid. The cook's work quarters was termed a "cook's shack."

[161] U. S. Census, 1900; Township 10, Lewis and Clark, Montana; Roll: 912; Page: 4B; Enumeration District: 160; FHL microfilm: 1240912. Ancestry.com. 1900 United States Federal Census.

[162] U. S. Census, 1900; Township 10, Lewis and Clark, Montana; Roll: 912; Page: 4B; Enumeration District: 160; FHL microfilm 1240912; U.S. Census, 1920; Census Lewis and Clark, Montana; Roll: T625_972; Page: 4A; Enumeration District: 92; Image: 160.

[163] "Wanted A Cook: Woman Cook Preferred," Helena Independent Record, June 7, 1946.

[164] Crawford, *Building the Workingman's Paradise,* 13-18. Initially, villages and towns were developed around textile mills.

[165] Ibid., 16.

industry, in the United Kingdom, Canada, and in the U.S., men typically handled all aspects of the brickmaking process.[166] Additionally, while the company was not located in Helena proper, unlike some small brickyards that developed to suit the needs of nascent frontier communities positioned far from any major settlements, the Western Clay was by all standards very close to the State's capital. Therefore, while it may have been advantageous for the company to house laborers on site so as to assure their availability for work at a labor and time-intensive job, the manufactory's proximity to Helena was probably not seen as being so great that it necessitated the development of an entire, self-sustaining company town full of families, stores, houses of worship, a school, and farms.[167] The decision on the part of the owners of this manufactory—first Kessler, then Kessler and Switzer, and then the Bray family—to first construct and afterward continue to maintain laborer-centered facilities on the greater manufactory campus reveals the continued importance of the worker in the production process.[168] It also shows that unlike some companies that saw workers as both employees and consumers, the laborers at Western Clay were solely thought of from a manufacturing standpoint.[169] Initially, maintaining the company in this somewhat removed location had everything to do with the fact that the manufactory needed

[166] Although not unheard of, during the first half of the twentieth century it was rare to find women working as brickyard laborers. When I visited the Continental Brick Company I asked Jeff Hollis if women ever worked in the production plant and he said that traditionally no women worked in the industry. The domestic clay wares industry, such as was present at the Medalta Pottery Works in Medicine Hat, Alberta, Canada, did employ women in the crafting stage of the production process. Unlike the typical brickyard or structural clay tile plant, this was largely a domestic wares production facility. See Marylu Antonelli and Jack Forbes, *Pottery in Alberta: The Long Tradition*, (Alberta, Canada: University of Alberta Press, 1978), 44. "Women made small items—bowls, jugs, out of yellow clay…."

[167] Interestingly, the few references to boarding facilities on the ground of a brickyard that I encountered related to a site located near larger towns or cities. In the case of the San Jose, CA Brickworks, this site, like the Western Clay campus, was located in very close proximity to a major metropolitan area. See "Found Dead in Bed: Old Man Dies a Lonely Death in Brickyard Bunkhouse," The Evening News, San Jose, CA, June 26, 1903, page 1. Accessed on January 28, 2012 at http://news.google.com/newspapers?nid=1982&dat=19030626&id=YzAiAAAAIBAJ&sjid=IKQFAAAAIBAJ&pg=3993,6210347. In this case, there were also reported to be family rental houses on the property. See Lance Armstrong, "Brickyard was important Riverside-Pocket area business," Valley Community Newspapers, Inc., April 14, 2010. Accessed on January 28, 202 at http://www.valcomnews.com/?p=1001. Also, in the case of the Rush City Brickyard, this site, too, was located near a relatively large northern Minnesota town. See Minnesota Bricks, "Rush City Newspaper Articles," (Minnesota Bricks, 2012). Accessed on January 28, 2012 at http://www.mnbricks.com/rush-city-newspaper-articles. Many other publications, from trade journal articles, to scholarly works, speak about the growth of company towns around brickmaking plants. See Wallace, "De/industrializing material culture," 2005. See also Hutton, *The Great Hudson River Brick Industry.*

[168] As I will explain below, the manufactory's farm operated through 1934 and the company maintained a policy that provided workers room and board up until 1947.

[169] Crawford, *Building the Workingman's Paradise*, 83. Many companies sold houses and the very products that they manufactured to their own workers. At Western Clay, it appears that workers were compensated at different times in the company's history in the form of both room and board and money, or simply in the form of a monetary paycheck. They were an integral part of the production process, but not seen as an additional set of consumers of the products that they produced.

to be positioned adjacent to the source of its raw material. Apparently, it was easier and perhaps cheaper to provide boarding facilities than it was to purchase new land and relocate an entire manufactory. As time passed and the manufactory expanded and became more productive, the financial feasibility of relocating the site to a less remote, in-town location probably became more unlikely.

Starting in the late 1880s, many of the country's industrial engineers were employing a concept that was interchangeably termed "industrial betterment," "factory welfare work" and "welfare capitalism."[170] Under this system, manufactory proprietors endeavored to improve the temperament, stability, and all around productivity of their worker by providing them with a host of workplace amenities—housing, cooked meals, clean and well lighted and ventilated environments, locker rooms, dining halls, and in some cases, even clubhouses, pools, and baseball fields, and libraries, etc. It was thought that by treating workers like family, a manufactory owner could reduce turnover rates and cultivate in his employees both a positive attitude toward the company, and a very strong and productivity-oriented work ethic. Not all of the aforementioned amenities, however, were provided free of charge; quite often, these provisions came as an added cost to the worker.[171]

In the early days of the company's history workers toiled six days per week and worked ten-hour days. Even later, when an eight-hour workday was standardized, the company still operated Monday through Saturday.[172] The men responsible for the burning of the kilns, especially in the days prior to the conversion of the kilns from coal to natural gas, were even required to work around the clock. As Archie Bray, Jr. explained, there is no way to make a kiln convenient for a man. When they're ready to salt is going to be two o-clock in the morning."[173] Still, despite

[170] Lindy Biggs, *The Rational Factory: Architecture, Technology, and Work in the Age of Mass Production*, (Baltimore: Johns Hopkins University Press, 1996), 64. This movement began in the late 1880s and was said to remain in place through the Great Depression. It was considered an improved version of its predecessor, the "paternalist" system.
[171] Ibid., 63, 65- 69, 74.
[172] Bray, Jr., "Interview with Marion Holt," 6; "Help!," *Helena Independent Record,* June 7, 1946. In 1946, it was still advertized that Western Clay's workweek was forty-eight hours long.
[173] Bray, Jr., "Interview with Marion Holt," 26. Archie, Jr. explained that during the firing process the beehive kilns required constant monitoring to ensure that the temperature within each kiln remained constant. Of course, when adding glazes to the kiln, additional work and attention was required.

the harsh, backbreaking nature of brickmaking, starting in the 1890s and spanning through the 1930s the manufactory—first as the Kessler Works and then as Western Clay—consistently reported having a labor force of between forty and fifty men.[174] Whether or not the brickyard workers were provided with free room and board from the time that the on-site boarding facilities were first erected and the farm was put into operation is unclear. In the late 1890s, Kessler's brickyard workers were collecting a paycheck, but it would not have been unheard of for the company owner to deduct money from each worker's paycheck to cover the cost of room and board.[175] Regardless of what system either may or may not have been in place prior to the turn of the twentieth century, by the time of Western Clay's formation, housing and sustenance were definitely included as part of an employees salary.[176] Interestingly, while this type of paternalistic policy in the U.S. was largely abandoned by the early 1930s, through the late 1940s these perks continued to be offered to the workmen at Western Clay as part of their remuneration packages.[177]

In the early years, especially around the turn of the century, most of the men employed by this brickyard were single or widowed and between the ages of 30 and 40. Almost none was a Montanan, much less a local.[178] For example, in 1900, the company reportedly employed and boarded four immigrants from Germany, two from Sweden, one from Austria, and one from England. U.S. born laborers who emigrated from the states of Ohio, Illinois, and Missouri were also listed as brickyard laborers and lodgers.[179] A decade later, none of these same employees were reported to still be living on-site. By 1930, only two older men of Irish descent, Michael

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[174] Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 175; Kessler Family Papers, "Inventories for Kessler Brick and Sewer Pipe Works, January 1, 1896," MC 161, Box 49, Folders 2 Montana Historical Society, Montana State Archives, Helena, MT; Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.

175 Kessler Family Papers, "Inventories for Kessler," Folder 2. See also Crawford, Building the Workingman's Paradise, 42. Here, for example, the author notes that George Pullman provided housing for his workers but required them to pay up to thirty percent of their wages to rent the houses.

[176] Quivik, "The Western Clay Manufacturing Company: An Historical Analysis," 24.

[177] Ibid., 24. Quivik reports that this policy was not terminated until 1947. See also "Help!," *Helena Independent Record*, June 7, 1946. This "help wanted" add reported that an on-site boarding facility was available to laborers.

[178] U. S. Census, 1900; Township 10, Lewis and Clark, Montana; Roll: 912; Page: 4B; Enumeration District: 160; FHL microfilm: 1240912. Ancestry.com. 1900 United States Federal Census [database on-line]. Provo, UT, USA: Ancestry.com Operations Inc, 2004. Original data: United States of America, Bureau of the Census. Twelfth Census of the United States, 1900. Washington, D.C.: National Archives and Records Administration, 1900. T623, 1854 rolls.

[179] Ibid.

Coyne, who was 60 and Ned Monnely, 45, were recorded by Federal census takers as being Western Clay "lodgers."[180] By this era, it was notable that not all men either needed or wanted to live at Western Clay. Many were married, likely living with their respective families, and probably either driving or catching a ride to work. Some longtime employees, like Earl Elliott and John Mola, lived in houses located within walking distance of the manufactory.[181] Still, there were reportedly a few workmen, like the skilled Emil Pearson who spent decades operating the manufactory's pug mills, lived on Western Clay's grounds until death.[182]

Although it cannot be confirmed, it appears that in addition to providing workers with housing and solid meals, the company's early decision to erect a "Lodge Hall" on the manufactory grounds and Archie, Sr.'s later installation of a showering facility for his workers reflected the additional efforts made by the various proprietors of the company to employ aspects of the "factory welfare work" ideology[183] (Fig. 2.23). At the same time, it should be noted that while the Lodge Hall was an early component of the manufactory, at some point under either Archie, Sr.'s management, or under his presidency and management, this Hall was closed. While Archie, Sr. did build showers for his men and while he continued to provide them with room and board well after the company decided in the early 1930s to stop producing the bulk of its own food, this brickyard was not noted for being an attractive, compelling place to work. While Archie, Sr. made sure that his laborers basic provisions were covered, he ran a very structured, labor-centered business. Men were expected to have performed any necessary maintenance before the sounding of the 8:00 a.m. work whistle. They were afterward expected to work solidly until called to lunch; at Western Clay there was no such thing as a coffee break. The same work ethic

[180] U.S. Census, 1930; Kessler, Lewis and Clark, Montana; Roll: 1258; Page: 2B; Enumeration District: 15; Image: 293.0; FHL microfilm: 2340993. Ancestry.com. 1930 United States Federal Census [database on-line]. Provo, UT, USA: Ancestry.com Operations Inc, 2002. Original data: United States of America, Bureau of the Census. Fifteenth Census of the United States, 1930. Washington, D.C.: National Archives and Records Administration, 1930. T626, 2,667 rolls.

[181] Elliott, personal conversation wtih author, July 27, 2011.

[182] Elliott, interview with author, July 27, 2011.

[183] When looking at the 1892 Helena, MT Sanborn map updated through 1922, one can see that a "Lodge Hall" previously existed on the manufactory grounds, just to the west of the company's two bunk houses.

was expected in the afternoon and early evening hours.[184] In fact, Archie, Sr. was reported to be so demanding of his workers and so rigorous in his management of the manufactory that many of his laborers remained company employees for only short stints.[185]

As previously noted, the life of a brickyard laborer was physically strenuous and demanding of his time.[186] At Western Clay, it was not easy to maintain a solid, productive workforce. Still, some basic efforts on the part of the company's proprietors were made to care for their workforce. Ensuring consistent productivity certainly necessitated that thought be given to both how the greater manufactory's acreage was developed and where each of the company's ancillary buildings was placed. When one reviews historic maps of the manufactory campus one readily notes that there is a visible separation between areas of heavy labor and areas of either an administrative, domestic, social, or an agrarian nature (Fig. 2.24). For example, if one were to divide the property into thirds, starting at the southern end of the thirty-acre campus and moving north to the boarder along the road now known as Country Club Avenue, it appears that the manufactory's boarding facility was located in a largely domestic and agrarian locus. After all, this location was home to the cook's house, the barn, the farmhouse, and large swathes of crop- and pasturelands. The middle of the company's property, which was literally delineated by its position inside of the two bounding railroad spurs—one on the south for delivery of raw materials and one on the north for the shipment of finished products—contained the heart of the company's industrial buildings. Then, directly to the north sat an aggregation of buildings housing a combination of work-related, but non-labor-intensive uses. Aside from the one anomaly, the chicken coop and its respective run, this northernmost area contained a company office, buildings for storage, a set of bunkhouses, and, at one point, the workmen's social hall.

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[184] Jim Elliott, interview with author, July 27, 2011.

[185] Apparently, during WWII, when it was difficult to retain laborers, Archie, Sr. would go into the bars in downtown Helena and recruit men to work at the brickyard. Most of these men found the work too exhausting and they found Archie, Sr.'s management style to be too strict. As a consequence, most quit immediately after receiving their first paycheck. Elliott, personal conversation with author, July 27, 2011.

[186] Archie Bray, Jr. explained that there were no such things as coffee breaks at Western Clay. Working at the manufactory, especially in the days prior to the company's switch from coal to gas firing was, "hard work." See Bray, Jr., "Interview with Marion Holt," 6.

While the distinction between the boarding house and the bunkhouses remain unclear, since both classifications of edifices were listed on the property as early as the mid-1890s, their respective locations—on either side of the central manufacturing facility—might indicate that each type of building served a very different purpose. If one looks closely at the boarding house, one can readily see that it is separated from the main area of production and placed near the cook's house.[187] Since the company's boarders or "lodgers" were provided with daily meals, the proximity of the cook's house to the boarding house is not surprising. Interesting, however, is the fact that of all of the buildings located on this southern end of the campus that were not directly related to the manufacturing process, the boarding house sat the closest to the central manufactory grounds. The boarding house's position seems intentional; its close proximity to the brick and structural clay tile making buildings appears to reflect its intimate relationship with the official area of production. Additionally, it is interesting to note that this domestic building was erected on the side of the campus that was nearest to the location where the raw clay was delivered and subsequently stored, and to the ends of the buildings where the processes of making both brick and structural clay tile products began. Each morning, the workmen residing this boarding house might rise, have breakfast, and afterward have but a few yards to walk before starting the official workday in the various production houses. In contrast, the bunkhouses were located near the end of the production process, meaning that they were situated near both the company's beehive kilns and the area where finished products were shipped from the manufactory. Since these kilns took a week, if not longer, to load, fire, salt, cool, and unload,[188] and since the firing process was arguably the most labor-intensive, but most crucial step in the brick and structural clay tile manufacturing process, the bunkhouses may have served as temporary resting quarters for those in charge of the kiln's twenty-four hour per day firing process.[189] The lodge, which for a time in the company's history existed adjacent to the bunkhouses, may have then served as a common

[187] It is interesting to note that while the boarding house was not oriented to the north and therefore did not directly face the heart of the industrial complex, its orientation toward the east instead of toward either the south or the west still provided workers with a view of the majority of the complex.
[188] Bray, Jr. "Interview with Marion Holt," 26.
[189] R. B. Morrison, Brickmaker's Manual, (Indianapolis: T.A. Randall and Company, 1890), 112-113. Morrison explains that a rested fireman will be a more conscientious and dutiful brickburner.

area to which these workers might retreat in-between their trips to either fuel or salt, or simply check the temperature of the kilns. Other workmen may have also congregated in this lodge for after work social activities prior to retreating to the boarding house that strictly served for the purpose of sleeping.

2.4 The Manufacture of Brick and Structural Clay Tile Products at Western Clay

Even after the invention and subsequent introduction to the brickmaking industry of steam powered and electrically generated machines, the fabrication of brick and structural clay tile products still necessitated that the raw material follow a similar five to six step trajectory of manufacture.[190] This process was not dissimilar to that previously used and slowly improved over time by centuries-worth of brickmakers who produced brick by hand. It first required that 1) the raw material be mined, or won, 2) that it be prepared, and 3) that it afterward be molded or formed, 4) that it be dried, and 5) fired.[191] If a step six is considered, it relates to the drawing of the products from the kilns, the sorting of these products, and either their storage or shipment.[192] As the historian Karl Gurcke has explained, this five to six step categorical list is best thought of as an outline for the process of brickmaking because technically, there always were and still continue to be countless individual variations of the greater brick and structural clay tile making process.[193] Of consequence, while there were similarities in the layout of manufactories and in the types of machinery, drying equipment, and kiln technologies that they employed, there never appears to have been a standardized factory design.[194] Since the basic art of pre-mechanized

[190] Gurcke, Bricks and Brickmaking, 4; Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community: Chapter 1, The Future of the Clay Brick and Tile Industry" 31.
[191] Gurcke, *Bricks and Brickmaking*, 4; Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community: Chapter 1, The Future of the Clay Brick and Tile Industry" 31.
[192] Gurcke, *Bricks and Brickmaking*, 4; Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community: Chapter 1, The Future of the Clay Brick and Tile Industry" 31.
[193] Gurcke, *Bricks and Brickmaking*, 4.
[194] While the many treatises, trade journals, and miscellaneous writings on brick and structural clay tile manufacturing facilities continually note how clay is processed and what types of machinery are necessary or typically employed in any given epoch in order to produce quality products, the descriptions and the photographs showing aerial views of plant layouts show a wide variety of plant configurations. Even renderings of plant-layouts change from publication to publication. Also, in her dissertation, "De/industrializing material culture," author Elaine Wallace cites an 1886 article on brickmaking that was published in Scientific American. This article suggested that no two brickyards functioned in the same manner. It also explained that a long-time proprietor of one brickyard could move on to manage a new yard and struggle until he became familiar with all of its many idiosyncrasies. Also, Chip Clawson in a personal

brickmaking was discussed earlier, the proceeding discussion of brick and tile production will be limited to a general description of the typical five-step post-steam and electric power manufacturing of brick and structural clay tile.

By the turn of the twentieth century, clays of varying consistencies—surface clays, fire clays, shale, and slate, for example—were typically won by first dynamiting the ground to break up the ground and afterward by employing the use of a steam-shovel to dig and actually mix the loosened clay.[195] In later decades, the gasoline powered shovels replaced those run by steam, but the basic process of winning clays remained consistent.[196] Typically, once won, the raw material was loaded into small open-top railroad cars that were configured to dump the clay from the end, the side, or from the bottom, and hauled via locomotive power to a designated storage area.[197] In many cases, the storage space consisted of an open sided shed designed to aid in the weathering of the clay.[198] Depending of the overall consistency of the clay—even if left to weather for a time--when desired for use it would follow one of two courses of sizing. If coarser in consistency, the clay would first be transported via a series of belt conveyors to a primary crushing machine that would reduce the clay to a finer texture by disintegrating both large rocks and small pebbles existing within the raw material. The action of the primary crusher differed depending on the make of the machine, but most commonly it rolled, hammered, or continuously gyrated and clamped under pressure.[199] If the raw material used were naturally finer in quality, then this trip

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conversation with the author on March 17, 2011 stated, "no two plants [brickmaking facilities] process clay in exactly the same way.

[195] Davis, *A practical treatise*, 119.

[196] Ceramic Data Book, "Clay Products Manufacturing," 165-166. This publication provides an excellent account of the clay winning operations of the first quarter of the twentieth century.

[197] Ceramic Data Book, "Clay Products Manufacturing," 168. This publication indicates that sometimes the freshly dug clay is sent directly to the processing area. Jeff Hollis of the Continental Brick Company explained that historically, his company mined clay as needed and delivered it directly to the processing area. Hollis, interview with author, February 16, 2012.

[198] As I will explain in a later section, this was the type of storage facility erected at Western Clay. Interestingly, a laudatory article from 1920 about a brick plant in Alabama also explains that the company's clay was stored in an open sided shed. See "Employee's welfare a first consideration: Alabama face brick plant is considered modern in every respect at this date and has high reputation among southern competing firms," *Brick and clay Record* 57 (1920): 222.

[199] Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community: Chapter 1, The Future of the Clay Brick and Tile Industry" 32-33. "Crushing and Reduction, " *Ceramic data book*, 168-169. Typically, primary crushers worked by either a rolling, crushing with teeth, or hammering-like action, reducing the coarseness of the clay and ridding it of pebbles and stones.

through the primary crusher would have been skipped. Instead, the clay would have been sent directly to a machine tailored to pulverize the clay.

Regardless of whether the clay type necessitated a trip through a primary crusher or not, before being sent to any tempering and mixing equipment all grades of raw clay were first processed through secondary crushing machine called a dry pan. In this large, seven to ten foot round dish the clay would have been rolled under pressure until pulverized—at which point it would then have passed through the grated bottom of the pan and landed in a temporary storage area.[200] From this locus, the powdered clay would then be lifted up to the top of a tower by means of a bucket elevator. Once reaching the pinnacle of the tower, the clay would be automatically dumped into a hopper that contained another screen closely spaced piano wires. This screen would have served as the final sieving process through which the clay filtered and dropped down into an enclosed space.[201] From this place of slightly longer-term storage are the fine, properly textured clay was conveyed as needed to a mechanically operated pug mill. At this stage, any volume of water, percentage of other clay types, or natural colorings would have been added.[202] Then, powered by either a steam or an electric motor, this machine filled with revolving knife blades would have "masticated and wedged the clay into a homogenous [and pliable] mass."[203] By the 1920s, the compactness and uniformity of the clay mixed in pug mills was augmented by the addition of a vacuum chamber called a de-airing machine.[204] Having been properly worked to a suitable strength and plasticity, whether pre-or post-de-airing machine days, the clay was then pressed out through a die and formed into a column of clay that took the shape of the die.[205]

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[200] "Crushing and Reduction, "*Ceramic data book*, 168-169; Quivik, "Montana Historical Inventory Form: Site 22," 43.
[201] "Crushing and Reduction," *Ceramic data book*, 168-169; Quivik, "Montana Historical Inventory Form: Site 22," 43.
[202] "Mixing and Tempering," *Ceramic data book*, 170; Wallace, "De/industrializing material culture," 33; Elliott, interview with author, July 27, 2011; Chip Clawson, personal conversation with author, March 17, 2012.
[203] "Mixing and Tempering," Ceramic data book, 170.
[204] Gurcke, *Bricks and Brickmaking*, 21. Although invented in 1902, it took decades before this de-airing chamber was widely used.
[205] Gurcke, *Bricks and Brickmaking*, 21. As I will later explain in detail the context of Western Clay, when making tile products of various shapes and sizes it was often necessary to change both the die and the spacing of the piano wires used to cut the formed clay.

The column of shaped clay was then conveyed to a cutter outfitted with specifically spaced piano wires. This cutter sliced through the column of clay, each time forming a set of individual bricks.[206]

Following the formation of each structural clay item, a workman termed an "off-bearer" loaded it onto a cart or pallet.[207] Although the products were solid enough to handle their loading required that the off-bearer stack them with precision and care.[208] Each cart or pallet was then sent to a drying facility designed to remove a pre-determined amount of moisture from the bricks.[209] Although several types of drying technologies were in existence by turn of the twentieth century, the most common were tunnel driers, radiated heat driers, steam pipe, and floor driers.[210] In the case of tunnel driers, carts of unfired products were advanced along narrow railroad tracks that each ran through a tunnel that was heated by either steam or waste heat generated from the kilns and fed into the tunnels by means of an underground piping system.[211] In contrast, radiated heat driers, steam pipe, and floor driers all referred to enclosed spaces lined with piping that was either heated by steam or waste heat.[212] In these larger, more open drying areas specifically designed carts or pallets loaded bricks or structural clay tile products were wheeled in and left to dry for several days.

After being dried and adequately cooled, laborers would have wheeled carts and pallets exiting either the drying tunnels or the drying room(s) to the kiln selected for the firing of the products. Updraft and downdraft kilns required the products to be carefully stacked, or "set." This process differed per kiln type but always commanded the employment of workers who were both knowledgeable about the most effective setting patterns and very deft with regard to handling the dried, but unfired products. Traditionally, a foreman known as a "setter" was responsible

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206 Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 34-35.
207 Gurcke, *Bricks and Brickmaking*, 24.
208 Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 36.
209 Gurcke, *Bricks and Brickmaking*, 24.
210 "Drying," *Ceramic data book*, 176-177.
211 Ibid., 26. Another name for unfired clay products is "greenware."
212 "Drying," *Ceramic data book*, 176-177. Sometimes it was the ceilings and walls of a drying room that were lined with piping. In other cases, steam-fed pipes were also fitted beneath generously spaced wooden floorboards.

for stacking the bricks and structural clay tile products in any number of complex arrangements within the kiln.[213] This setter was aided by a team, normally consisting of four to five men, known within the industry as a "setting gang."[214] Aside from the foreman, the gang consisted of "wheelers" and "tossers."[215] As these job titled suggested, wheelers were responsible for wheeling the carts and pallets of dried brick or tiles from either the drying tunnel or shop to the kilns—a job that required these men to stack bricks in a particular arrangement on each wheelbarrow. Tossers worked inside the kilns and literally threw the unfired bricks from the wheelbarrow to the setter.[216] If a tunnel kiln were used, then no additional handling of the products was required; before unfired products entered the drying chambers—regardless of the type employed—they would have already been stacked on the cart in an appropriate manner.

The firing of both updraft and downdraft kilns required both an immense amount of time and skill.[217] Once loaded, the kilns would have been sealed off and afterward fired. The fires that ignited the round downdraft, or "beehive" kiln—the most commonly employed kiln in the industry during the first quarter of the twentieth century—were fueled first by coal, and in later years by either natural gas or oil.[218] During the average seven day firing period, the bricks and structural clay tile products were subjected to a dehydration or "water-soaking period"

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[213] Davis, *A practical treatise*, 141-143. In the course of these pages Davis provides a good explanation of several setting patterns. For illustrations relating to the setting of kilns to achieve different effects see Greaves-Walker, *Clay Plant Construction and Operation*, 65-78.

[214] Davis, *A practical treatise*, 141. Jeff Hollis of the Continental Brick Company also explained that a typical setting team consisted of four to five men.

[215] Davis, *A practical treatise*, 141. The term, "trucker," appears to have been another name for "wheeler." It is possible that the term was more often used in Europe than in the U.S. Searle, a British brickmaking expert, sometimes used the word "brick truck," which appeared synonymous with "wheelbarrow" or "barrow." See, Searle, Modern Brickmaking, 202. Also, in the 1900 U.S. Census for Helena, MT, only European immigrants listed their job title as "trucker." In this same Census, a U.S. born laborer at Western Clay listed his job as "pallet wheeler." See United States of America, Bureau of the Census. Twelfth Census of the United States, 1900. Washington, D.C.: National Archives and Records Administration, 1900. T623, 1854 rolls.

[216] Davis, *A practical treatise*, 141.

[217] The skill of the kiln firemen had to be so great and they had to give this job so much attention that an industry-wide suggestion was made that these men receive bonuses. See L. C. Hewitt, "Putting the Kiln Fireman on Bonus," *Brick and Clay Record* 58 (1921): 130.

[218] Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 38. Not only were round downdraft kilns continually discussed and pictured in trade journals published during this epoch, but while conducting historical research on brick and tile manufacturing facilities in the U.S. I continually found this kiln type—and usually in large numbers—at each site. Gunsallus, Breimyer, et al, writing for the general public, spoke only of the round downdraft kiln when they referenced the firing of bricks.

an oxidation period, and finally, a hardening stage.[219] The temperature of the kiln was constantly monitored during this stretch of time to ensure that the proper temperature was always maintained. Also, if desired, salts and oils used for the coloring of bricks and structural clay tile products would be added during the firing stage.[220] Following the firing process, the kilns went through another long, equally regulated cooling period that lasted anywhere from two to seven days.[221] During this time, the doors were unsealed and large fans were often placed in the openings to help facilitate the flow of air into and throughout the interior.[222] Products that were fired in continuous tunnel kilns also went through this same three stage firing process. This latter technology, however, enabled a much shorter firing time.[223]

Subsequent to the process of firing and cooling, bricks and structural clay tile products were removed or "drawn" from the kiln and afterward either placed in storage or loaded for shipment.[224] Like setting and firing steps, this process also required both time and skill. Once cool enough, workmen would enter the kilns and laborers known as "shaders" would sort the products by coloring and by the quality of their firing.[225] Afterward, laborers would carefully stack the sorter brick on wheelbarrows specifically designed for carting brick[226] (Fig. 2.25). The wheelbarrows full of fired products would then either be moved to an area of storage where they would have subsequently been off-loaded, or the finished products would have been taken directly to a boxcar or a truck bed and appropriately stacked for shipment.[227]

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219 Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 38.
220 Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945; Bray, Jr. "Interview with Marion Holt," 26.
221 Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 40; Walker, "De/industrializing material culture, 37; Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945. According to the Bowler article, the kilns at Western Clay sometimes took as long as seven days to fully cool
222 Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 38-39.
223 Ritchie, "A History of the Tunnel Kiln," 55; *Great Falls Tribune*, "Helena Brick Factory," July 14, 1957; Wallace, "De/industrializing material culture," 40.
224 Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 38; "Drawing," *Brick and Clay Record* 18, no. 4 (1903): 169.
225 "Drawing," *Brick and Clay Record,* 169; Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 39.
226 Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 39.
227 Ibid.

Where Western Clay's Raw Material Came From, How it Was Won, and by Whom

Until the official formation of the Western Clay Manufacturing Company in 1905, the clay that Charles Bray used in the production of industrial clay products at the Kessler Works came either from the company grounds, or from a swathe of ground along East Lawrence Street, on the north side of Helena[228] (Fig. 2.26). After the 1905 merger of the Kessler and Switzer companies, clay was for a time still taken from these two aforementioned locations. The majority of the company's raw material, however, came from the former Switzer clay bank in Blossburg.[229] Packed in a clay bed that ran seventy-five feet deep, the clay from this location was repeatedly reported to be bountiful[230] (Fig. 2.27). Also, unlike the shale obtained from the Lawrence Street source and used in the production of common brick, the clay won at Blossburg was of a superior, "pottery clay" quality—a grade suited to the production of tile and terra cotta products.[231] Although this clay bank obviously proved most beneficial to Western Clay—it was not until the company closed that the mining of clay in this location ceased—the distance between this site and the manufactory proved most unusual. Typically, the clay mined for the production of brick and tile—whether the company was located in the eastern or southern parts of the U.S., in Canada, or in the UK—came from the area immediately surrounding a manufactory.[232]

In the 1880s through the early 1890s, the clay mined in the vicinity of what was to eventually become Western Clay's Blossburg pit was of the fire clay variety.[233] Found underground, this clay, which was minimal in quantity, was actually a by-product of the coal

[228] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945; Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 173.

[229] For additional information on the history of the mining of clay and the production of bricks in the Blossburg area—inclusive of information on both the Switzer company and the Mullan Fire Brick and Tile Company—see Jim Hansen, "The Bricks of Blossburg," in Kleptetko Chapter of the Society for Industrial Archaeology Newsletter, 26, no. 1 (2012): 8-12.

[230] Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 173.

[231] Ibid., 173. Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 11. Rowe reported that the clay at Blossburg "ranged from blue to almost white in color." Having visited this clay pit in the summer of 2011, I can confirm that the Blossburg clay does, indeed, fall into this range of color.

[232] Ries and Leighton, History of the Clay-Working Industry, 6. Jeff Hollis of the Continental Brick Company informed me that it is unusual for the main supply of a brick company's clay to be shipped from any great distance—as was the case for so many years at Western Clay; Wallace, "De/industrializing material culture," 36.

[233] Hansen, "The Bricks of Blossburg," 9. Hansen indicates that this clay amounted to approximately five percent of the earthen material removed by miners as they endeavored to reach the vein of coal. Fire clay produces a brick that is very resistant to heat and which is used in the lining of furnaces. See Searle, *Modern Brickmaking*, 16. For additional information about fire brick and its industrial uses, see John D. Ramsay, *Refractories: The Backbone of Industry*, (Cleveland: North American Refractories Company, 1940), 10-11, 17-22.

mining process.[234] Other surface deposits of good quality clay that was originally deemed the most suitable for the manufacture of terra cotta sewer pipe were soon found on the neighboring grounds of the coal mining operation.[235] Although the winning of clay was originally done by dint of manual labor, by the time that Western Clay had formed, clay was extracted by means of a steam shovel.[236] The steam shovel was not, however, put into operation until the clay in the clay bank was first loosened. This process typically required a workman to drill a series of small holes into the clay bed, then pack the holes with dynamite, and afterward ignite the explosive.[237]

In Blossburg, at the top of the Continental Divide, clay was won seasonally—typically during the months of July and August when the ground was driest and the weather warmest.[238] In the early years of the twentieth century, prior to the mass manufacturing of the automobile, travel to the Blossburg site was immensely consuming. Even after the automobile became a ubiquitous site, the trek high up into the Rockies along an unpaved wagon pass surely proved difficult for the most advanced of engines.[239] Of consequence, when Charles Bray took a crew of laborers up to Blossburg, everyone went with the intention of remaining at the mountaintop site until a year's worth of clay was won and transported via rail back down the pass to the Western Clay site.[240] This annual trip to Blossburg necessitated a great deal of preparation on the part of first Charles and later, Archie Bray, Sr. Although the site already contained a well, a cabin, a bunkhouse, a cook's house, and a corral for cows, at least a month's, if not two month's of provisions—

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[234] Hansen, "The Bricks of Blossburg," 9.
[235] Ibid., 10.
[236] For a detailed account of the specific process by which clay was won by hand in open pits, consult Davis, *A practical treatise*, 102-103. Bray, Jr., "Archie Bray, Jr. Interview with Marion Holt," 10.
[237] "Clay Products Manufacturing," *Ceramic data book*, 165. This publication reports that the holes, which were anywhere between one and one-quarter and two inches in diameter, were drilled into the clay bed in a horizontal pattern, extending in depth to the base of the pit. Richard Rogers, former miner of clay at Blossburg in the 1940s and 1950s also talked of the use of dynamite to loosen the clay along the edge of the clay bank. Richard was interviewed by the author of this work under the auspices of the Architectural Conservation Lab at the University of Pennsylvania on July 27, 2011, in Helena, MT.
[238] Bray, Jr., "Archie Bray, Jr. Interview with Marion Holt," 10; Galusha, "Interview with Marion Holt," 9. Betty Bray Galusha explained that "[the mining of the clay at Blossburg] was kind of a 24-hour a day operation in order to get it [the clay] out and get it down [the clay] before the weather closed you down."
[239] When I visited the Blossburg site in the summer of 2011, it was necessary for my guide, geologist Tim Stepp, to transport us to the site in his all-terrain, four-wheel drive vehicle. Prior to making the trip to Blossburg, Chip Clawson of the Archie Bray Foundation warned me that it was necessary to travel to the clay pit in a four-wheel drive vehicle.
[240] Bray, Jr., "Archie Bray, Jr. Interview with Marion Holt," 10.

including food and cooking instruments, cots, blankets, tools, and equipment—had to be transported to the site.[241] In addition, the company, which ran a full-fledged farming operation on the grounds of the Western Clay manufactory, and which provided a large percentage of its workers with both room and board, was obligated to find and hire a temporary, second cook to serve the needs of all who were working at the Blossburg site.[242] Although it is difficult to determine just how many men made the trip to Blossburg in any given year, for decades after the founding of Western Clay, the majority of the manufactory's workmen were sent over the Mullan Pass to the company's clay bank while a "skeleton crew" was left to tend to operations at the manufactory site.[243] Then, for reasons that remain unclear, not long before Archie Bray, Sr.'s death, Western Clay hired the N. Rogers Gold Mining Company, of Helena, MT, to mine the clay at Blossburg.[244]

During the first half of the twentieth century, once the clay at Blossburg was won, it was promptly dumped into a specialized, open-top rail car called a gondola[245] (Fig. 2.28). Within a summer, anywhere from seventy and one hundred gondolas, each of which was estimated to hold between fifty and ninety tons, were filled with clay.[246] Driven by locomotive force, these gondolas where then moved from the location of the clay pit along a 1.5-mile railroad spur that was connected to the main track of the Northern Pacific's rail line. Once on the Northern Pacific rail, the gondolas were then shipped down across the Mullan Pass directly to the Western Clay

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[241] Ibid., 10.
[242] Ibid., 10; Quivik, "The Western Clay Manufacturing Company: An Historical Analysis," 15, 24-25. The boarding facilities and the farm on the grounds of the main Western Clay manufactory will be discussed in more detail in the following section, Production Processes at Western Clay.
[243] Throughout Western Clay's lifetime, the company employed anywhere from fifty to a mere four men. At the turn of the century through the 1930s Western Clay consistently recorded a workforce numbering between forty and fifty. See Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 175; Quivik, "The Western Clay Manufacturing Company: An Historical Analysis," 13. Archie Bray, Jr. recalled going with his father to Blossburg when he was a young man. If, as he indicated in the 1978 oral history interview with Marion Holt, Archie, Jr. was six in 1923, then it is likely that his memories of the Blossburg camp go back at lest to the early 1930s. Whether or not this summer pilgrimage continued to take place into the 1940s is not known. According to Fred Quivik, however, Western Clay, did away with its room and board policy in 1947. This would lead one to believe that if not before, certainly after this date no crews were being sent for a month or so at a time to mine the Blossburg pit. Furthermore, Richard Rogers stated that his father's company, the N. Rogers Gold Mining Company, did not start winning clay at the Blossburg site until around 1950. At that time he said that there was no trace of any of the above-mentioned buildings.
[244] Richard Rogers, interview with author, July 27, 2011, Helena, MT.
[245] Bray, Jr., "Archie Bray, Jr. Interview with Marion Holt," 10.
[246] Ibid., 10.

manufactory[247] (Fig. 2.29). While it was not the least bit uncommon to transport clay from a clay pit to a brickyard's clay storage facilities via some type of rail car, the use of large, railroad gondolas was rare. Typically, when locomotive power was involved, a "dinkey train" hauled small steel or wooden cars that were designed to dump the clay from either the back end or the side, from an adjacent clay pit to a plant's clay storage facility.[248] Sometime in the mid-1950s, large quantities of clay started being shipped from Blossburg to the Western Clay brickyard via truck.[249] This change in shipping methods occurred as a result of the Blossburg clay pit's inefficient loading platform and a combination of both the steepness of the railroad spur and its poor condition.[250] Eventually, under Archie, Jr.'s direction, Western Clay started working with their mining contractor, Norman Rogers of the N. Rogers Gold Mining Company, to open new pits in Cardwell and in Townsend, MT.[251] Like Blossburg, both of these new pits were located quite a distance from Western Clay (Fig. 2.30). Since neither had a rail connection, the transport of clay was done entirely by truck.[252]

The Production of Brick and Structural Clay Tile Products at Western Clay

> [T]he manufacturing works was the physical embodiment of the proprietor's well-thought-out plan for the layout and routing of the manufacturing process.
>
> Betsy Hunter Bradley[253]

In terms of its physical layout, over Western Clay's operational lifetime, this industrial campus changed often. Structures were added and were sometimes either subtracted or altered

[247] This railroad spur was originally constructed by Jacob Switzer in 1892. See Jim Hansen, "The Bricks of Blossburg," need page numbers from Patty Quivik, "The Western Clay Manufacturing Company: An Historical Analysis," 11.
[248] "Clay products manufacturing," *Ceramic data book,* 167; Mann, "Draft of The Historic Brickyard, 4;

Jeff Hollis of the Continental Brick Company informed me that historically, his company hauled clay directly from the clay pit to the manufactory's primary crusher via a dinky train.
[249] Richard Rogers, Interview, July 27, 2011.
[250] Ibid., July 27, 2011. Richard mentioned that the rail line was coated with debris. This debris caused the locomotive engine to spin and thus, not gain the traction it needed to mount the steep grade leading to the clay pit.
[251] Ibid., July 27, 2011. According to Richard, Western Clay only received two or three truckloads of clay from the Townsend site. Apparently, this was a very special type of clay. It is not currently known for what it might have been used. In an interview Jim Elliott, formerly an employee of Western Clay during his youth and later a night watchman for the complex during the years that it was owned by IXL Industries out of Alberta, Canada, said that they clay taken from the Townsend pit was mined specifically because it was thought that it would make pure white bricks. Elliott, interview with author, July 27, 2011, Helena, MT.
[252] Richard Rogers, Interview, July 27, 2011.
[253] Bradley, The Works, 13.

in order to accommodate new or expanded uses or needs. Starting in the late nineteenth-century under the direction of Charles Bray, technologies at this facility were also upgraded regularly. Sometimes, these updates resulted in the reconfiguration of structures, which, in turn, led to one or another permutation in the role of the worker in the greater process of brick and structural clay tile manufacturing. In other cases, the technological advancements simply eliminated the need for a laborer to perform a certain task. At the time of its closure in 1960, Western Clay both physically appeared and functioned as a different industrial facility than it did when Charles Bray took over as manager in 1884. Still, despite the fact that a myriad of technological advances—many small ones and a few large ones—affected this manufactory's appearance, its productivity levels, and both the types and the quality of the products that it fabricated, throughout Western Clay's lifetime, the company's primary raw material—clay—continued to follow the same course through the processes of manufacture. In this respect, Western Clay was certainly not an anomaly.

In comparison to what happened in other major industries, like the auto industry, the changes associated with the brickmaking industry never proved sweeping or completely revolutionizing.[254] As the scholar Kim Wallace explains, "The mechanization in the brickyard was never monolithic, it progressed in fits and starts …[R]ather than a story of the progression of labor-replacing and alienating machinery, a history of brickmaking technology should be more a history of the machinery brickyards had to work with, of how brickyards made bricks."[255] Therefore, when viewed in light of the overall production process, the fabrication of bricks and structural clay products at Western Clay remained notably constant after the initial switch in the mid 1880s from hand-molding to the manufacture of goods via machine.[256] Although it has already been said that this manufactory changed both physically and technologically throughout its lifetime, for the purposes of describing how this particular site produced brick and structural clay tile products it is necessary to limit the subsequent discussion to a set timeframe rather than

[254] Wallace, "De/industrializing material culture," 34-35. See also Bradley, The Works, 15.
[255] Wallace, "De/industrializing material culture," 34-35. Gurcke also notes that the brickmaking mechanization process was neither smooth nor quick.
[256] Wallace, "De/industrializing material culture," 34-35.

trying to explain each and every little advancement and structural permutation that took place at this site. Considering that the manufactory was recognized as being Montana's largest and most complete brick and structural clay tile manufactory by the late nineteen-teens,[257] since brick and tile production in the nation peaked in 1925,[258] and because the pivotal figure, Archie Bray, Sr., the man who successfully ran the brick and structural clay tile plant and also bridged the connection between industrial and artistic clay production continued to make progressive changes to the plant through 1935, it appeared most appropriate to limit the time span to the decade between 1925 and 1935.

The Fabrication Process: From Raw Material to Finished Product At Western Clay (1925-1935)

Clay arriving by rail to the Western Clay brickyard was stored in a long, shed-like structure topped with a gabled roof and built around an elevated rail bed. At this receiving station, which marked the beginning stage in the production process, clays of different consistencies were purposely separated by type. The physical composition of the clay, be it shale, fire clay, or softer surface clays largely determined where on the property the material would be stored. Shale, for example, was kept close to the brick shop while ceramic grade clay was deposited in close proximity to the tile shop.[259] Prior to processing clay, some brickyards purposely housed their raw material in purpose-designed buildings fashioned in a manner that allowed the clay to undergo a period of weathering. This, however, was not why Western Clay stored its clay. Once the company started using the far-away Blossburg pit as its primary clay source, Western Clay had no choice but to stockpile the raw material on the manufactory grounds. Since it was necessary to store the clay somewhere, where better to have placed this material than in the area adjacent to the buildings housing the clay production machinery?

[257] Quivik, "The Western Clay Manufacturing Company: An Historical Analysis," 12.
[258] Subcommittee on Economic Study of the Railroad Committee for the Study of Transportation: Association of American Railroads, January, 1946," 61924-15; Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community: Chapter 1, The Future of the Clay Brick and Tile Industry" 2.
[259] Elliott, interview with author, July 27, 2011.

In the case of shale and coarser clays like fire clay, the raw material was first shoveled onto a mechanized conveyor belt and sent to a primary crushing machine. Within this machine, the raw material was forcefully rolled to both remove stones and diminish the overall coarseness of the clay.[260] Other clays that were naturally softer and more powder-like in their respective consistencies were spared the primary crusher and immediately transferred to a secondary crushing machine called a dry pan. Regardless of whether or not clay first went through the primary crusher, before advancing within the production process, all clays were processed in a dry pan. At Western Clay, the brick and the tile shop were each configured to manufacture products independent of the other. While each contained a separate set of specialized equipment for mixing, and forming, and unique buildings and apparatuses for drying the formed structural and hollow clay tile products, two elements that each shop had separately, but in common, were a dry pan and an elevator. Because the clay was processed slightly differently depending on whether or not it was being formed into a brick versus a structural or hollow clay tile product, from hereon, the sizing, forming, molding, and drying stages of clay manufacturing that took place within each the brick and the tile shop will be explained separately.

The General Process of Sizing, Forming, Molding, and Drying Structural and Hollow Clay Tile Products (1925-1935)

At the beginning of a typical production day, clay suited for tile making was transported by either wheelbarrow or small steam shovel from the main locus of storage into an area located at the southeastern end of the greater tile shop building.[261] Here, the clay began what would

[260] Chip Clawson, personal conversation with author, March 17, 2012. Chip confirmed that Western Clay's primary crusher was a roll-crusher. Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community: Chapter 1, The Future of the Clay Brick and Tile Industry" 32-33. "Crushing and Reduction," Ceramic data book, 168-169. Typically, primary crushers worked by either a rolling, crushing with teeth, or hammering-like action, reducing the coarseness of the clay and ridding it of pebbles and stones.

[261] Some version of the belt conveyor that ran from machine to machine at Western Clay was installed and in operation as early as 1898. Kessler Family Papers, "Kessler Brick and Sewer Pipe Works Inventories." This system was likely a very early version of the belt conveyor. One of the first mentions of a belt conveyor's use in a brick plant was from a 1903 volume of The Clay Maker. See "A model press brick plant," *The Clay Worker,* 40, no. 1 (1903): 80. It is important to note that while the conveyor carried clay to the brick plant, it did not carry this principal raw material to the tile plant. Chip Clawson, personal conversation with author, March 28, 2012.

more or less be a linear trip through the agglomeration of buildings known generally as the Tile Shop. Within this edifice, a series of machines—all of which were run off of an elevated steam powered line shaft that was outfitted with switchable belts—processed the clay. First, the clay was delivered directly into the side of a device called a dry pan (Fig. 2.31). This machine consisted of a large, eight-foot-round revolving pan with a grated bottom in which large heavy stationary rollers pulverized clay.[262] This machine also contained a side feeder through which its operator could insert "grog," or rubble bricks to be pulverized and simultaneously mixed with the incoming clay.[263] Since the bottom of the dry pan was configured with a grate, once ground to a suitable size the powder-like clay dropped through the openings and was afterward funneled into a lower-level room containing a bucket elevator.[264] The clay was then conveyed by means of this bucket elevator up through the building's tall tower. Once reaching the tower's cupola, the clay was automatically dumped into a hopper and further screened. The screen within the hopper was positioned at a forty-five degree angle. As the clay was dumped from the elevator into this hopper, the finest materials passed through the screen and were sieved into a holding area at the base of the tower. Any clay not yet finely ground enough to pass through the hopper was conveyed through a tube back down to the dry pan. After having successfully passed through the hopper's screen, the powdered clay located in the holding area was then transported to one of two stations. If intended for use in the making of hollow clay tile bricks, it was transferred via a conveyor belt to the tile shop's pug mill. If, on the other hand, it was marked for a run of structural pipe, such as drain or sewer tile, it was instead fed through a wooden tube that led directly into the tile shop's wet pan[265] (Fig. 2.32).

Western Clay's wet pan sat at the southeastern end of the tile shop. It was situated in a room below the level of the tile shop's clay bin. This machine both looked and functioned

[262] The brick shop was reported to have an eight foot round dry pan made by the American Manufacturing Company. See Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 173.
[263] Chip Clawson, personal conversation with author, March 17, 2012.
[264] This bucket elevator is sometimes referenced as a "cup elevator." See Rowe, "The Western Clay Manufacturing Company, Helena, Mont.," 173.
[265] Quivik, "The Western Clay Manufacturing Company: An Histoircal Analysis," 16; Elliott, interview with author, July 27, 2011; Clawson, personal conversation with author, March 17, 2012.

similarly to the dry pan, yet unlike the dry pan the wet pan had a solid bottom.[266] Clay entered the pan, water was added, and the mixture was afterward tempered thoroughly as the pan rotated round and the centrifugal force threw clay to the rim. When considered thoroughly worked, a plough-like device was inserted into the pan and tempered clay was mechanically scraped from the pan. The scraped clay was deposited on another belt conveyor and transferred up to the second level of the shop—in an area above the location of the wet pan. After reaching this second level, the clay was fed into a steam-powered hydraulic pipe press that was fitted with a die.[267] This press, known as a vertical extruder, was a two-story configuration. (Fig. 2.33) Depending on the desired shape or size of the product, the press's die was changed. If, however, it was necessary to produce a flowerpot, clay, instead of being fed to the hydraulic pipe press, was supplied directly from the wet pan to the flowerpot machine that was located in the manufactory's flowerpot shop.[268] This particular shop was a designated workroom adjacent to the wet pan.[269] While the flowerpot press was mechanically powered, it could not be operated without the help of a workman[270] (Fig. 2.34).

If not intended for pressing as sewer or drainpipe or flowerpots, clay pulverized in the tile shop was fed from the clay storage area to a one story room located at the southeastern-most end of the agglomeration buildings comprising the tile shop.[271] In this room sat a large, horizontal pug mill that was designed to accept clay from above[272] (Fig. 2.35). Within its multiple chambers clay, water and any desired additives that were not previously combined with the processed clay were thoroughly mixed and worked together by means of a series of rotating knife-like blades into a solid pliable form.[273] The worked clay then proceeds through an auger, which by means of a screwing action forced the tempered clay forward, through a die, and out onto a table outfitted

[266] "Mixing and Tempering," *Ceramic data book*, 171.
[267] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 17.
[268] "Forming and Molding," *Ceramic Data Book*, 173.
[269] Ibid., 17.
[270] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 17.
[271] Ibid., 17.
[272] Chip Clawson, personal conversation with author, March 17, 2012.
[273] Interestingly, Chip Clawson informed me that the angle at which the blades within the pug mill's pugging chamber were set determined the rate of speed at which the clay was processed through the machine. Personal conversation with author, March 28, 2012.

with a machine called a cutter[274] (Fig. 2.36). Western Clay's cutter was known as a side cutter. It was a hollow, cylindrical form strung with a series of specifically spaced piano wires. As it rotated, it cut into the column of extruded clay and sliced off individual tile products of the desired shape and size (Fig. 2.37). Afterward, the formed products were "hacked," or taken off of the conveyor belt and properly stacked on either a drying pallet or cart by four or five men interchangeably termed "hackers" and "off-bearers."[275] At Western Clay, as many as five men at a time could be found loading the carts full of unfired products and afterward wheeling them into the adjacent drying area.[276]

After being properly loaded onto a cart or a pallet, the hydraulically-pressed and molded pipes and flowerpots and the pugged, molded, and cut tile forms were wheeled to either the tile shop's first or second floor drying room. On both levels the building's wooden floors were lined with racks of steam pipes that when heated created atmospheric conditions within the building that were suitable for the drying of the structural clay tile products.[277] It is unclear as to what products ultimately ended up on the second versus the first drying floor since both floors were suitable for the drying of structural clay tile products. It is likely, however, that items formed by the sewer pipe press—a machine that yielded formed products on the second floor of the greater agglomeration of tile shop buildings—were initially dried on the second-story of what, since the late nineteen-teens was configured as a T-shaped drying floor (Fig. 2.38). It was not unusual for sewer and drainpipes pressed on the second floor of a shop. Within the industry these types of structural clay tile products were known for being dried on second, and sometimes even third levels of drying shops outfitted with dryer floors.[278] Likely, the increase in the demand for structural clay tile products prompted Archie, Sr. to expand the height the east side of the south side of the drying shop in the early 1930s. Using the shop's large belt-driven freight elevator,[279]

[274] Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 34-45; "Mixing and Tempering," *Ceramic data book*, 170-172.
[275] Davis, *A practical* treatise, 211-212; Gurcke, *Bricks and Brickmaking*, 24.
[276] Elliott, interview with author, July 27, 2011.
[277] "Drying," *Ceramic Data Book*, 178.
[278] Ibid., 178.
[279] Quivik, "Montana Historical Inventory Form: Tile Shop, Physical description, 2.

products could have been easily wheeled as needed from one drying floor to the next (Fig. 2.39). In addition to the elevator, two enclosed wooden ramps, one flanking the north façade of the drying shop and the other situated in the northeastern corner of this building, allowed for the wheeling of products from the second level out to the beehive kilns. On the ground floor of the drying shop a doorway along the north façade and two along the east façade also gave the workmen hauling the dried structural and hollow clay tile products direct access to the kilns.

The General Process of Sizing, Forming, Molding, and Drying Bricks (1925-1935)

As explained in the case of the tile shop, clay conveyed to the brick shop—whether or not it first required a trip through the primary crusher—was sent to the dry pan on entry to the building. This pan functioned in the exact same fashion as the one located in the tile shop. The only notable difference between the two machines related to their respective sizes and manufacturers. The brick shop's dry pan was, however, produced by the Stevenson company and was slightly larger than that used in the tile shop; this dry pan was nine, versus eight feet in diameter.[280] Again, as in the tile shop, clay pulverized by the dry pan emptied into an area where it was scooped up by a bucket elevator, conveyed to the top of the building's tower, and subsequently emptied into a hopper. If worked to a fine enough consistency, the clay then filtered down into a storage room where it awaited transfer into the pug mill. Once fed into the pug mill the clay was mixed proportionally with the desired amount of water and, like in the tile manufactory, sometimes with additives.[281] Then, powered by the company's Corliss steam engine this machine, which was designed similarly to the one located in the tile shop, would thoroughly mix and work the wet clay in a vertical cylinder outfitted with a series of sharp, rotating knives.[282] Until 1935, the well-worked clay in the brickmaking pug mill was pressed through the machine via the action of the augur and forced out of the machine's mouth through a steel die. After

[280] Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 173.
[281] "Mixing and Tempering," *Ceramic data book*, 170-172. One example of an additive was Rollin's Barium Carbonate. See "Rollin's Barium Carbonate," *Brick and Clay Record* 57 (1920): 426.
[282] The working of clay by this means served to kneed it into a homogenized and stiffened form.

the purchase and subsequent installment of the de-airing machine, however, the processing clay went through a final step in the greater tempering process prior to being extruded. In later twentieth-century pug mill models a de-airing chamber was built into the machine. Archie, Sr.'s machine however, was built to attach separately. Working in conjunction with the machine's auger and also an attached pumping device, the clay in the de-airing chamber was maintained in a vacuum. Under the pressure of the vacuum, any air remaining in the clay would expand and then condense.[283] This process yielded a very compressed form of clay known for the quality of both its pliability and strength.[284] With the help of the auger, the de-aired clay was pressed out of the mouth of the machine, through the die, and toward a side cutter with wires spaced to the dimension of bricks.

While the pug mill was certainly considered an effective, labor-saving machine, it still required supervision and maintenance. First, a laborer skilled in the proper mixing of the clay was required to man the pug mill and fix any mechanical problems that might occur. Second, it was necessary to always have around someone deft at switching belts from the main line shaft to the particular machine or pieces of machinery that at any given time needed to be in operation.[285] Although different men operated these machines throughout the company's long history, starting in the early 1930s and working up until his death, pug mill operator, Emil Pearson, was noted for his ability to consistently mix quality clay.[286] Likewise, next to Archie, Sr., longtime employee Bill Cunliff was known for his adroitness regarding the taking on and off of the various belts used to help power the numerous machines. Bill was also known for and for his ability to operate the manufactory's main power supply—its Corliss steam engine.[287] In addition to operating the machines in each of the manufactory's shops, dexterous off-bearers were needed to hack the newly formed brick. Four to five men stood at the end of the conveyor belt and carefully picked

[283] Gurcke, *Bricks and Brickmaking*, 21.
[284] Ibid., 21.
[285] Bray, Jr., "Interview with Marion Holt," 8.
[286] Elliott, personal conversation with author, July 27, 2011.
[287] Ibid., 8.

up five "raw" bricks at a time and loaded them onto the steel-wheeled drier carts in a fashion that assured that hot air could pass through them[288] (Fig. 2.40).

Immediately to the north of Western Clay's brick shop sat a series of brick drying tunnels (Fig. 2.41). Each sat parallel to the next and extended over one hundred feet in length along a north-south axis. Each tunnel was constructed of brick walls that rose to either side of a wooden floor underneath which steam pipes were laid. On top of the wooden floorboards, running centrally through the length of each tunnel, was a set of narrow tracks onto which the cars loaded with unfired bricks would glide.[289] At both the north and the south ends of each tunnel was a wooden door that, when closed, sealed the bricks inside. A singular roof that evidenced a number of heat ventilation stacks covered the entire series of tunnels—at first numbering seven and then numbering nine by the mid-1930s.[290] At Western Clay, fourteen carts, each full of hacked bricks, were fed, one after another, into a single drying tunnel.[291] Once loaded, the carts of brick spent between one and two days in the drying tunnel before being removed at the north end and afterward sent via an east-west oriented transfer track that led to the outside of the company's beehive kilns.[292]

The Firing Process (1925-1935)

By the mid-1920s Western Clay had discontinued the use of its Scotch kilns. This meant that subsequent to this time period, all of the firing of both brick and structural clay tile products took place in the company's beehive kilns. These kilns were capable of firing every kind of product the company made.[293] They were also widely lauded by the industry for both the quality and consistency of the products that they burned and for their efficiency in terms of fuel usage. Although no two brick or brick and structural clay tile making manufactories were configured in

[288] Elliott, interview with author, July 27, 2011. Jim explained that Archie, Sr. required his workers to remove bricks in multiples of five. Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 43.
[289] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 19-20.
[290] Ibid., 19-20; Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.
[291] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 19-20.
[292] Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 40.
[293] "Clay Products Manufacturing," *Ceramic data book*, 165.

quite the same way, it was common for beehive kilns to be constructed in horizontal rows, either along or near the end of a company's clay products drying facilities.[294] In the 1920s, Western Clay had six extant beehive kilns, at least five of which were in continuous production.[295] This process, especially when the kilns were still fired by coal, was both backbreaking and incessant. Even after the switch to natural gas in 1931, firing remained highly time consuming and required the attention of some of the manufactory's most highly skilled workers.[296] Besides Archie Bray, Sr., Western Clay's most praised brickburner, or "fireman," was an Austrian immigrant named John Mola.[297] Interestingly, Mola, who commenced work as a brickburner in 1913, previously owned and operated a family bakery—a business in which he would have needed to learn the art of controlling temperatures.[298] Archie, Sr. and John, along with a select and trusted group of other laborers ensured that after a kiln was set it was properly sealed, that its firebox entrances were appropriately filled with coal and that afterward, it was incrementally increased in temperature to somewhere between 2,000 and 2,500 degrees Fahrenheit.[299]

Before the firing of a kiln could begin, it first had to be loaded or "set" with the unfired products. Like the skill of brickburning, setting, was one of the few other "arts" of the brickmaking process. This process alone could take a vetted and dexterous "gang" of five men, directed by a foreman or head setter, the better part of a day to complete[300] (Fig. 2.42). Once

[294] For example, see Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 43. Visual exapmples of this configuration abound. See, for example, the remains of the Guignard Brickworks in Columbia, South Carolina. An image may be found at http://www.flickr.com/photos/joedbart/180684768/. See also, the "Medalta kilns, Medicine Hat, Alberta, Canada." Image available at http://www.waymarking.com/waymarks/WM2DXF_Medalta_Kilns_Medicine_Hat_Alberta. Old photographs of both the Continental Brick Company in Martinsburg, WV, and the North Mountain Brick Plant near Martinsburg, WV also evidence lines of beehive kilns.

[295] Sanborn Insurance Company Map, Western Clay Manufacturing Company, 1892 updated to 1922; Sanborn Insurance Company Map, Western Clay Manufacturing Company, 1930 showing "old kiln" used for oil storage; Elliott, interview with author, July 27, 2011.

[296] Greaves-Walker, *Clay Plant Construction and Operation*, 68. For a detailed account of proper techniques, including some illustrations, on the setting of beehive kilns consult Greaves-Walker, *Clay Plant Construction and Operation*, 68-78.

[297] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945; Elliott, interview with author, July 27, 2011.

[298] John Mola, Thirteenth Census of the United States, 1910, Helena, Lewis and Clark, Montana; Roll: T624_833; Page: 14A; Enumeration District: 0167; Image: 352; FHL microfilm: 1374846., www.ancestery.com. How interesting it is that a baker, someone whose job necessitated that he be skilled in the art of controlling temperatures of ovens, would become an expert kiln fireman.

[299] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945

[300] In some cases, it has been suggested that it can take up to two days to load a kiln that is 32 to 36 feet in diameter. See Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 38, 40. Jim Elliott explained that it was a day's worth of work for a team of five to set one of Western Clay's beehive kilns. These kilns were slightly

properly loaded to allow the desired amount of airspace between the bricks and structural clay tile products, both the kiln's doors and its central oculus were sealed. If the kiln had inspection points these openings were also plugged so as to allow for the rising of the temperatures within the interior and the effect of the downdraft process. Throughout the seven day burning process, the firemen and his crew worked around the clock, feeding coal into the fireboxes and monitoring by sight the color of the glowing brick inside. During this process the men also monitored the temperature of the kiln by inserting a thermometer encased in steel into each of the inspection points that were equally spaced around the outer circle of the domed roof[301] (Fig. 2.43). At other times, a plain metal rod or "rule" was inserted into these same inspection points in an effort to measure the shrinkage of the clay products being fired.[302] When required, the men also added coloring and surface texture altering salts and oils to the kiln through the firebox openings. After the long firing process, the kiln's doors were unsealed, the oculus removed, the firebox flues open, and the kiln was slowly cooled with help from a fan (Fig. 2.44).

The Sorting Process (for Brick) and Either the Storage or the Shipment of Finished Products (1925-1935)

Once the fired bricks and structural clay tile products were properly cooled, Western Clay's workmen entered yet another stage of labor intensive work. Not only was the removal of products physically strenuous, but it also required workers to expose themselves to temperatures that far exceeded one-hundred degrees Fahrenheit. During this stage, a gang of workers, including one or two shaders, toiled for one to two days "drawing" the brick from the fully stacked kiln.[303] The shader played a pivotal role in this drawing process because it was he, with his trained set of

smaller—30 feet in diameter—but were reported to hold up to 90,000 bricks each. See Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.

[301] There were many type of early thermometers used for monitoring the temperature of the kilns. Later, a "pyrometer" was used. For more information about the use of thermometers, see "The Superintendent: Helpful Hints for Practical Men Whose Problem is Maximum Production With Minimum Cost," *Brick and Clay Record*, 57, no. 11 (1920): 939.

[302] Searle, *Modern Brickmaking*, 351.

[303] Elliott, interview with author, July 27, 2011. Jim Elliott remarked that a cooled kiln did not equate to a cold kiln. The men who drew the bricks were constantly exposed to high temperatures as they worked to move the fired products from a kiln. Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 40.

eyes, who carefully but expeditiously sorted the products by type, coloring, surface texture, and hardness.[304] Aiding the shader in emptying the kiln were three to four other men who loaded the sorted products. Common, fire, and hollow clay tile bricks were loaded in multiples of five onto wheelbarrows designed for their transport. Structural clay tile products, which often came in a series of shapes, were typically loaded onto special pallet carts. Per Archie Bray, Sr.'s explicit instructions, the men loaded each wheelbarrow with one hundred bricks.[305] When full, each wheelbarrow was either carted off to storage or pushed up one of the ramps located between the kilns and wheeled directly onto a railroad boxcar. In the boxcar the bricks were then unloaded in multiples of five with the use of a large pair of brick tongs.[306] Unfortunately, it is not clear if Archie, Sr. issued a similar set of instructions for the stacking and transport of structural clay tile products.

Where Western Clay Products Went and How They Arrived at Their Destinations

> Every good brickmaker that makes a good brick erects an everlasting monument of his good work. It matters not whether that brick be laid n the laborer's cottage, or in the colossal monument of the great hero, still, and ever, it tells in nature's eloquent tongue of silence, of the modest virtues and worth of the maker.
>
> John W. Crary[307]

Speaking to a newspaper reporter in 1945, Archie Bray, Sr. stated, "It gives a person a certain sense of satisfaction to go into almost any town in Montana and some place look and be able to say, 'There's my brick.'"[308] A hardworking man who was known to wear dirty work clothes and a tattered hat wherever he went, and a man who subscribed to the philosophy, "you don't ask anyone to do anything that you won't do for yourself.,"[309] Archie, Sr. surely did not utter this statement with hubris. Certainly, his father Charles Bray had proved himself

[304] Drawing," *Brick and Clay Record*, 169; Gunsallus, Breimyer, et al, "Manufacturing Brick and Tile to Serve Your Community," 39.
[305] Elliott, interview with author, July 11, 2011. According to Jim Elliott, each wheelbarrow-full of bricks weighed approximately 450 pounds.
[306] Ibid.
[307] Crary, Sixty years a brickmaker, 71.
[308] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.
[309] Galusha, "Interview with Marion Holt," 3.

an able businessman and an "up-to-date and practical clay worker." It was Archie, however, who, ever since officially starting work at brickyard in 1911 brought such immense success to Western Clay.[310] Following the production trajectory of the former Kessler Works, in the years immediately proceeding the establishment of Western Clay, the new company proved successful as a manufacturer and seller of brick and structural clay products—especially tile and sewer pipe. Its products, most notably those that were infrastructural in nature—paver bricks and sewer pipes—were reported to have literally helped build and improve the city of Helena.[311] Still, even in the first decade of the twentieth century, Western Clay was found supplying bricks for new Helena Federal Building.[312] In the years that followed, demand for the company's product only increased. By the nineteen-teens, Western Clay was reported to be one of the state's largest, most prominent, sought after, and most consistent suppliers of brick and structural clay tile products.[313] Then, in the twenties, Helena's Algeria Shrine Temple (now known as the Civic Center), and the city's Fist National Bank and Trust Company became but two additional "monuments" of Charles and Archie Bray's fine craft, savvy business skills, and hard work[314] (Fig. 2.45). Soon to follow in the early 1930s was the Fort Harrison Veteran's Administration Hospital[315] (Fig. 2.46).

Western Clay's products were, of course, also making their way well beyond Helena. By 1908, numerous towns in Eastern Washington State, Idaho, and Wyoming were already receiving boxcars full of Western Clay goods.[316] Additionally, as both cities and small towns endeavored to physically improve their own infrastructures and also expand in terms of the number, quality,

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[310] "The Western Clay Manufacturing Co., Helena, Mont.," 175. Galusha, "Interview with Marion Holt," 8.
[311] Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 175; Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 28; Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.
[312] Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 175. Apparently, all but this Federal Building's roofing tile was constructed of Western Clay bricks.
[313] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 27; Fitzgerald Sanders, "Charles H. Bray,"1272. Fitzgerald Sanders also indicated, "no institution in Helena stands higher [than Western Clay] as a commercial asset to the city…."
[314] Crary, *Sixty years a brickmaker*, 71. Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945. Ellen Baumler, "Lots of Brick To Lay: Building the Archie Bray Foundation," in *Signature Montana* (Spring 2010): 11.
[315] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 28. Sanjay Talwani, "Historic VA buildings in jeopardy," Independent Record, August 7, 2011. Talwani's report confirms that the VA hospital was constructed prior to 1935.
[316] Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 174.

and nature of their building stock, Western Clay products were sent throughout the state of Montana. Great Falls, for example, used Western Clay bricks to pave its streets.[317] The cities of Bozeman and Missoula each saw many of their respective university buildings constructed from Western Clay brick while in Dillon, Western Clay bricks were used to build the Montana State Normal College. (Fig. 2.47) In Anaconda, Western Clay supplied bricks for the construction of the Montana Sate Tuberculosis Hospital.[318] In the northern Montana town of Browning, more of the company's bricks built the Museum of the Plains Indian[319] (Fig. 2.48). Even Butte, the city that was home to Western Clay's competitor, the Butte Sewer Pipe and Tile Company, chose to order some of Western Clay's bricks when erecting its own Federal Building[320] (Fig. 2.49). During World War II, railcar loads of Western Clay's radial chimney tiles also went as far as the California shipyards of the well-known industrialist, Henry J. Kaiser.[321]

Although not well accounted for in archival records, there were undoubtedly countless other, less grand and less publicized building projects that also made use of Western Clay's bricks and tiles. With such high production figures being recorded each year, brick and structural clay tile products were certainly not just being stockpiled.[322] As Archie Bray, Jr. recounted, both his grandfather and his father cultivated and maintained excellent relationships with both architects and principals in the construction industry. These relationships, in addition to the quality of the products offered, surely won the company many contracts and for years kept architects and builders returning to Western Clay when they were looking for appropriate building materials.[323] It is also worth noting that during the same period of time that Western Clay was increasing its production levels to meet what once seemed like the insatiable needs of the building industry, the

[317] Ibid., 174.
[318] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 28.
[319] Elliott, interview with author, July 27, 2011. Jim's father personally hauled bricks to this site.
[320] Ries and Leighton, *History of the Clay-Working Industry*, 128. In 1909, the Butte Sewer Pipe and Tile Company was reported to be one of the best plants in the state of Montana. Rowe, "The Western Clay Manufacturing Co., Helena, Mont.," 175.
[321] Bowler, "Western Clay Plays Role in Growth, Beauty of Capital City," July 22, 1945.
[322] Ibid., In 1945, Archie Bray, Sr. told this Great Falls Tribune reporter, that his company was making ten million bricks annually. Also, it was reported in this article that plenty of Western Clay products went for repair project that resulted from Helena's 1935 earthquake.
[323] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 28.

company was simultaneously using its own bricks to both function and grow. Kilns, for example, were repaired with bricks from the manufactory.[324] Also, the company used its own products to convert some of its older buildings and the piers supporting the raised section of railroad trestle, under which raw clay was dumped and stored, from wood to brick.[325]

For many years, a rail spur connected Western Clay to both the Northern Pacific and the Great Northern Railroads.[326] In the late nineteenth and early twentieth centuries, the company's primary material, clay, and its equipment and supplies—including the coal that was originally used to power the steam engine and firing the kilns—entered the grounds of the manufactory via this connecting track.[327] In this same fashion, Western Clay's finished products left the company's grounds. Although this highly accessible rail connection surely seemed ideal in an epoch devoid of the automobile, the fixed nature of the railroad lines eventually proved somewhat limiting to Western Clay's business interests.[328] Of consequence, when large trucks became available for the hauling of goods in the late 1930s, Archie Bray immediately added these vehicles to the manufactory's inventory[329] (Fig. 2.50). The addition of trucks, of course, also necessitated that a certain number of employees have a new skill—the ability to drive. Adding a fleet of trucks and drivers allowed Western Clay to reach building sites around the state that had previously been either inaccessible or quite difficult to reach.[330] Furthermore, this form of transportation allowed the company to make deliveries at its convenience. Jim Elliot, who worked at Western Clay as a teenager and who, sometime after the manufactory's closing in 1961, became the watchman for

[324] Galusha, "Interview with Marion Holt," 3

[325] Quivik, "Western Clay Manufacturing Company: An Historical Analysis," 12, 16.

[326] Jim Elliott, interview with author, July 27, 2011. Rowe, "The Western Clay Manufacturing Co., Helena, MT," 173.

[327] Bray, Jr. Interview with Marion Holt," 7. According to Dr. Jesse Perry Rowe of the University of Montana, Missoula, the company's clay came from the mines at Bridgewater and Red Lodge in Carbon County, MT.

[328] Galusha, "Interview with Marion Holt," 8-9.

[329] Ibid., 8-9. Elliott, interview with author, July 27, 2011. Jim Elliott said that Archie Bray, Sr.'s first truck was a 1938 Ford.

330 Whereas the railroad only went to certain locations, transport by truck allowed Western Clay to reach communities that were either off the beaten path or along secondary railroad lines which did not run freight with as great a frequency. In 1935, for example, a Mr. Robert Belgrade , who was for a time stationed in Warm Springs, near Anaconda, MT, was employed as a truck driver for Western Clay when he lost his life in an accident. See the Independent Record, October 10, 1935. Accessed on March 6, 2012 at www.wcm%20refs%20from%20ancestry.com. Economic and Transportation Prospects: Subcommittee on Economic Study of the Railroad Committee for the Study of Transportation: Association of American Railroads, January, 1946," (Washington, DC: The Association, 1946), 61924-179. This report indicates that starting in the late 1920s many brick manufacturers started shipping via truck because their main consumer market was local and more easily reached via automobile.

the site's new owner, IXL Industries, recalled how, in the early 1940s, his father often delivered two truckloads per day to building sites in Butte, MT.[331] While Charles and especially Archie Bray, Sr. may have though the use of trucks in the transportation of brick and structural clay tile products to be efficient, it proved no less labor-intensive than did the loading of rail cars. In fact, the transportation of products by truck was probably more grueling because it required that the driver not only help carefully hand-load the truck bed with the product—an average bed holding around 7,000 bricks—to be delivered, but also unload this product at the destination point.[332] Unfortunately for the truck drivers, despite what drawbacks this method of delivery might have had, this means of transport appeared to be the company's preferred method of shipping. Although it is not clear, it is likely that shipments of brick that were sent out of state were still sent by rail until the manufactory's closure in 1960. Generally, however, it appeared that most of Western Clay's products were sold within Montana and delivered via truck.[333]

[331] Jim Elliott, interview with author, July 27, 2011. It is worth noting that it contemporarily takes the better part of an hour to drive one-way to Butte. Surely, this trip took much longer in the 1930s, prior to the construction of major highways and advances in the automotive industry.

[332] Ibid., July 27, 2011. As a child Jim often accompanied his father when he hauled bricks to various locations around the state for Archie, Sr. in the late 1930s and early 1940s. Jim recalled how difficult—literally backbreaking—the loading and unloading of the brick was. Jim also mentioned that as soon as his father was able, he "retired" from hauling brick and assumed a different, less physically taxing position with Western Clay.

[333] *Great Falls Tribune*, "Helena Brick Factory," July 14, 1957. This article suggests that most of the company's bricks were being purchased and shipped within the state of Montana. Unfortunately, the company's records are missing and I am not able to currently determine the percentage of shipments in any given year that were made by truck versus by rail. Also, not having any records to access leave me but to conjecture why certain shipments might still have been made by rail while others were sent via truck.

3.1 Rationale for Preservation Decision-making in the Case of Western Clay

> Industrial heritage is about the machine, but it is also about the life, survival, and the recounting of workers' stories…
>
> Paul Shackel and Matt Palus[334]

In the section that follows, I will provide a framework for preservation decision-making that is specifically tailored to assist the ABF, and all partnering entities—whether existing or yet-to-be-recognized or established—as they collaboratively approach the preservation of Western Clay. The basic principles that animate this framework concern first the capacity for buildings, as objects of material heritage, to inform and influence memory and actions, and second the narrative possibilities of historic sites—where an historic site like Western Clay is essentially understood to be comprised of numerous, interwoven "story sites," what author and preservation professional Ned Kaufman calls a "storyscape."[335] The materiality of buildings is important for a number of reasons. First, buildings and other manmade structures provide physical evidence that is able to augment the social and cultural understanding of the past. They provide a materiality that can neither be duplicated nor represented equally by written sources.[336] According to the geographer Jon Goss, buildings are

> "…object[s] of material culture produced by a society to fulfill particular functions determined by, and thus embodying or reflecting, the social relations and levels of development of the productive forces of that society… They are also physical expressions of a way of life. Buildings reflect not only culture, however, for they are engaged in reproduction of social relations, both as monuments or more prosaic signs and symbols in communication of social meaning, and through their relations of separation and containment. A building is invested with

[334] Paul A.Shackel and Matt Palus, "Remembering an Industrial Landscape," International Journal of Historical Archaeology, 10, no. 1 (2006): 49-71.
[335] Kaufman, *Place, Race, and Story*, 3.
[336] Page Putnam Miller, Page, and Nelly Longsworth, "Nelly Longsworth: Champion for Historic Preservation," The Public Historian 23, no. 1 (2001): 9-10.

> ideology, and the space within, around, and between buildings is both produced and producing."[337]

Buildings and other manmade structures also function mnemonically, prompting the recall of both memories and stories.[338] When these "touchstones" or "vehicles" for memory of both histories and stories are no longer extant, the sense of place that these structures created on both individual levels and collectively—conjunction with other edifices, and natural and infrastructural elements of varying types—it becomes increasingly more difficult for stories to be recalled or reinvested in the context of the spaces that the buildings and various structures once occupied. Buildings and structural forms "are three-dimensional definers of our urban habitat."[339] At the most fundamental level, it is these material heritage forms that through their location, physical form, layout, and appearance, "support the retelling or reliving of … stories."[340] As a site,

What is most compelling and engaging about an historic site is its ability, largely through its material fabric, to tell the multitude of histories associated with it.[341] Moreover, when approached thoughtfully within the structure of networks, the history of a specific site can be expanded to reach more audiences by dint of illuminating a much fuller interpretation of place that is comprised of interwoven set of histories. In this latter case, a historic site has the capacity to tell stories of the world that both surrounded and shaped it. Reciprocally, a site also has the ability to illuminate histories about both the people and the world around it that the site played a role in shaping.[342] Again, Kaufman explains that each and every person has been profoundly shaped by history and yet "[h]istory only exists in the telling." "History," he clarifies, "…is much bigger … than all of the individual memories of everyone alive [and therefore] it must be constructed, told and retold in order to exist at all."[343]

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[337] Jon Goss, "The Built Environment and Social Theory: Towards and Architectural Geography," Professional Geographer 40, no. 4 (1988): 392.
[338] Ned Kaufman, P*lace, Race, and Story: Essays on the Past and Future of Historic Preservation*, (New York: Routledge, 2009) 49; Barbara Zelizer, "Reading the Past Against the Grain: The Shape of Memory Studies," *Critical Studies in Mass Communication*, 12 (1995): 222.
[339] Gene Norman in Kauffman, *Place Race, and Story*, 71..
[340] Kauffman, *Place Race, and Story*, 36, 37-38.
[341] Ibid, 36.
[342] Hayden, *The Power of Place*, 78.
[343] Kaufman, *Place, Race, and Story,* 49.

The recommendations that follow all have an eye to the capacity of a building, machine, structure, or production process to conduce such stories. In particular, I intend to root my approach to preservation decision-making in the previously illuminated history of the site that 1) helped frame Western Clay in the context of the brick and structural clay tile industry; 2) helped explain how the site functioned socially and technologically; and 3) helped pinpoint Western Clay's periods of significance. This framework will necessarily take into consideration both what is still present on the grounds of this manufactory as well as those buildings that are no longer extant. In the context of explaining why it may be difficult to interpret certain histories at the site and not others, and why I advocate for the framework that I propose, I will briefly address the significance of the buildings and the machinery that they house, as well as the various structures related to the organizational flow of the site's production processes. I will also succinctly discuss both the condition and the integrity of these buildings, pieces of machinery, and infrastructural elements.

The execution of a preservation strategy inevitably shapes the kind of story that the site can ultimately tell—whether this shaping is done deliberately or accidentally. That some strategies of preservation prove more successful than others is ultimately the result of the preservation effort's ability to rehabilitate and bring to life a compelling story associated with the site. Therefore, in order to further reinforce the rational for the following proposed framework, I will refer periodically to various efforts of preservation and interpretive campaigns employed at other historic industrial sites, calling attention to the ways in which they succeed or fail at doing justice to the compelling story or set of stories that dwell in these sites.

3. 2 Overview of the Stories that Western Clay is Best Positioned to Tell, and Why

Western Clay is commonly referenced as "the brickyard." Ironically, however, it is the story of brick production that the site can no longer tell with clarity. Also, while Western Clay

once evidenced a mix of industrial, agricultural, and domestic buildings that spoke to the largely self-sustaining nature of this manufactory, this greater history of the site now proves challenging to interpret.[344] As a result of either razing or disassembly, during the fifty-two years since the company's closure Western Clay has lost several of its principle buildings, as well as many of its ancillary buildings. It has also lost structural forms, such as the railroad spur and sections of the transfer tracks that relate directly to the process of brick and structural clay tile production. Furthermore, due to the sale of movable items, the site has lost certain pieces of machinery. As a consequence of this attrition, Western Clay is no longer positioned to interpret either its full social or its full industrial history. This is not to say that efforts previously employed by Western Clay's stewards in an effort to save certain buildings and structures at the expense of others were not well-intentioned. These actions were simply undertaken with different goals in mind. They were also carried out before the history of Western Clay—specifically its social history, its history in the context of both national brick and tile production as well as the context of a greater network of inputs and outputs—was more thoroughly researched. Also, these actions and interventions were carried out prior to anyone having knowledge as to just how few brick and tile manufactories from this era remain as intact, and contain as much in situ machinery, as Western Clay.

Now that this historical information has been compiled, various periods of significance have been highlighted, and the case for Western Clay's significance has been stated, it is critical that the manufactory's extant material fabric be carefully addressed as the ABF seeks to expand and improve its own organization. Western Clay is managed under the auspices of the ABF, a foundation with a patrimony inextricably linked to this brickyard. This fact has long been established and is actually most beneficial to Western Clay. This heritage link is critical. Not all former industrial sites are so fortunate. Washington, DC's only surviving brickyard, the United Clay Brickworks (also known commonly as the NY Avenue, NE Brickyard), stands as a sad

[344] As discussed in the previous chapter, most brickmaking facilities were either situated near cities, or company towns were literally constructed around them. Again, see Wallace, "De/industrializing material culture," 2005, for information on the development of communities around brick manufactories.

example of uninformed stewardship. This shuttered brickyard was acquired in the 1970s by its neighbor, the U.S. National Arboretum (USNA). Lamentably, neither the mission nor the focus of the USNA's work related to the story of brickmaking. As a result, after decades of confusion as to how the history of brickmaking could be interpreted within the context of the USNA's mission, preservation interventions damaging to the historical narrative and material fabric were eventually enacted on the surviving United Clay Brickwork's buildings, machinery, and infrastructure. Today, only a few of this former brickyard's structures remain, and those that do are not positioned to tell any particular history. To make matters worse, this site is not accessible to the public and has been actively deemphasized[345] (Fig. 3.1 and 3.2).

Despite the fact that Western Clay is most well known for the bricks that it produced, the ABF, and all site stewards and stakeholders must realize this site's ability to tell the story of brickmaking has been severely impaired. The current difficulty surrounding the interpretation of the history of brickmaking at Western Clay is, at the most fundamental level, related to the site's lack of an intact brick shop and its complete absence of brick drying tunnels. While some of the machinery associated with the brick shop is in situ, the majority of the building that housed this machinery has been demolished. Not only is the part of the building that remains in poor physical shape, but it also lacks the integrity necessary to convey information about the edifice's historic scale, massing, and aesthetic. Also, as the urban historian Dolores Hayden explains, buildings "allow for the sensory experience of space." This sensory experience augments both a connection to and an understanding of places in ways that are not possible when one only sees an image, or reads about a place.[346]

Unfortunately for Western Clay, if the history of brickmaking at this site were to be told, it would necessitate that the buildings in which the process of brickmaking took place now be

[345] The remains of the United Clay Brickworks are visually represented on the free visitor's map distributed by the USNA. Although represented, the map mentions nothing about what this area was. The former Brickyard area is darkened and accompanied by text that reads "area closed to public." The current director of Education and Visitor Services is frustrated with what has become of the brickyard but no one at the USNA knows, at this juncture, what to do with the site. So much has been lost, that the story of brickmaking cannot be told here. Then, of course, there is the question of what to do from here. For years, the USNA composting center has been located here.
[346] Ibid., 5.

reconstructed. Since reconstructing a razed building is not a desirable option—either financially or in terms of contemporary preservation philosophies[347]—it is recommended that all future preservation efforts at Western Clay be directed toward the buildings that evidence the highest integrity and that work in relation to one another to tell a compelling story. Unlike the site's brick works, Western Clay's tile works, including the tile drying shop, remains fully intact. Elements of each building are in varying states of disrepair but the tile work's overall integrity is high. One can walk both around and through these buildings taking note of different rooms and even the many extant early twentieth-century windows and doors. Importantly, one can also see and experience how the tile works and its equipment relate to other structures at Western Clay—such as the railroad spurs, the transfer tracks, and the exceptionally important beehive kilns. In this sense, one can begin to understand structural and hollow clay tile making as an active process that required many buildings and machines, as well as substantial infrastructure and manpower. Based on the extant remains at this site, hollow and structural clay tile making is the story that Western Clay is best suited to tell and all future preservation decisions should be based on this fact.

There are potentially a multitude of stories that might be told at Western Clay. The site's stewards must realize that it is not only they to whom the site currently has, or may in the future have meaning. Surely, this manufactory holds memories for former laborers and their respective families, as well as the local Helena community and even far-away purchaser's of the company's products. The ensemble of historical research, theories of preservation and narrative, the example of other preserved industrial sites, as well as a conditions assessment of the Western Clay site, highlight, however, the current advantage of the site to conduce certain kinds of site-related stories over other narratives. The desire to spotlight too many aspects of the site's history, or to focus first on individual features that, while relevant to the site's history, fail to coalesce into a larger, internally harmonious story of production at this manufactory may ultimately jeopardize

[347] See, "The Secretary of the Interior's Standards for the Treatment of Historic Properties, 1995: Standards for Reconstruction," in "Archeology and Historic Preservation: Secretary of Interior's Standards and Guidelines," Accessed on March 23, 2012 at http://www.nps.gov/history/local-law/arch_stnds_8_2.htm.

the site's ability to tell any comprehensive story of either labor or manufacturing processes. I therefore suggest that the ABF and other site stewards first base all of their future preservation decisions on whether or not the building, machinery or structure relates, first and foremost, to the industrial and social history of structural and hollow clay tile production. This is the most comprehensive story that the site, in its present condition, is able to convey. The second story that Western Clay's is best positioned to tell is that of the brickmaking and clay tile products industry's advancements in kiln technologies. As explained in the previous chapter, Western Clay evidences three generations of kiln technologies: the Scotch kiln, the beehive kiln, and the tunnel kiln. The majority of extant brickyards, even those operating on the grounds of an historic facility, can claim only two kiln types—the modern tunnel kiln and the historic beehive kiln.[348] Consequently, Western Clay has a second rare and compelling story to recount. This story of kiln technologies, however, does not mesh exceptionally well with the story of structural and hollow clay tile production. This is because the earliest firing technology, the Scotch kiln, was not used in the manufacture of structural and hollow clay tile products.

The Western Clay site is conducive to the telling of two important stories, one of which has priority over the other. I am advocating this hierarchy of storytelling because no other sites in the U.S. have been found that can tell the complete story of structural and hollow clay tile production. Furthermore, few sites in the world can adequately tell this story.[349] Therefore, the ABF should capitalize on its ability to illuminate this rarely told story. Otherwise, Western Clay might end up like the Hagley Museum in Wilmington, DE. While Hagley is a highly regarded museum of industrial history and a site that is certainly worthy of recognition, when the museum was founded in 1951 narrative emphasis was limited to the "contributions of DuPont [powder works] and other early industries along the Brandywine River to the U.S. independence and

[348] During the course of my research I have never read about, nor talked with anyone who could confirm that any historic brickyard in the U.S. whether still in operation or defunct, has all three generations of kiln technologies present.
[349] In Volos, Greece, a structural clay tile plant has been preserved and converted into a museum. See http://grhomeboy.wordpress.com/2007/04/03/thematic-museum-series-expands-in-volos/

progress."[350] As a consequence, the buildings, equipment and other structures that spoke directly to the history of black powder production were neither systematically nor carefully preserved in any manner that ensured that the story of black powder production could ever be clearly and effectively told in the context of the site's grounds. Even though Hagley has expanded and, even now, is in the process of refocusing its interpretive themes, interpretation is to a large degree limited at the site because of the previous preservation-related decisions that were made and which failed to focus on the telling of black powder production.

In the sections that follow, I will discuss the importance of the extant buildings, machinery, and structures at Western Clay as they relate to the production process of structural and hollow clay tile manufacturing. I have specifically not chosen to prioritize the preservation of buildings within the context of this work. Instead, it is my aim to formulate a preservation decision-making framework for the buildings, the machinery and the structures in relation to the site's structural and hollow clay tile production process. Next, I will proceed to a discussion of both the earlier and the later kiln technologies that the site evidences. Finally, I will discuss any remaining buildings, machinery, or structures and explain how their preservation—as opposed to their removal—might affect the telling of the site's history. It is not my intent to advocate that everything be saved, but simply to explain what physical components of the site need to be saved if the stories that Western Clay is best positioned to tell—structural and hollow clay tile making, along with changes in brick and tile firing technologies—are to be adequately relayed through the extant physical fabric.

[350] *DuPont Supervisory News Letter,* 11, no. 5 (Wilmington, DE: A. I. DuPont Nemours, 1957), Foundation Archives, Folder 2, Courtesy of the Hagley Museum and Library.

3.3 The Story of Structural and Hollow Clay Tile-Making

The Railroad Spurs: Western Clay's Connection to the World of Raw Materials, Machinery, and Consumers

All early to mid-twentieth century brickyards were dependent on railroads.[351] The railroad was not only involved in supplying a company with goods, machinery and raw materials, but it also played a pivotal role in the distribution of finished products.[352] As a consequence, where the spur connected with the main rail line greatly influenced a manufactory's layout and overall organization. Western Clay proved no exception. Undoubtedly, the location and configuration of this company's railroad spur influenced the layout of the operation. Early in the twentieth century it also ensured that this "remotely" located company could operate successfully and, furthermore, that it could both become and maintain its status as a state-of-the-art manufactory. Although the earliest extant map showing the layout of Western Clay is a 1922 Sanborn Fire Insurance map, the manufactory's connection to the main railroad via a spur was noted in print as early as 1908[353] (Fig. 3.3). When looking at the map, however, one can readily see that the spur, which entered the property from the northeast, ran south along the eastern edge of the campus, forked just past the company's office building. The location of this split, which was just to the north of the aggregation of structures that formed the main manufacturing complex, sent one leg of the track curving off to the west, just a few yards to the north of the company's kilns. The other leg of the track headed further south before terminating at a stub turnout.[354] At this terminus, another track was joined to the main spur. This track immediately curved to the northwest, making a wide turn before heading due west along a set of elevated railroad piers (Fig. 3.4). This elevated section of

[351] Wallace, "De/industrializing material culture," 105. Transportation: Association of American Railroads, January, 61924-9.
[352] During late nineteenth- and early twentieth-centuries, it was actually common for manufactures to publish advertisements that showcased their respective company's connection to the railroad. This visual information readily informed consumers as to how each company's products were delivered. See Bradley, *The Works*, 13.
[353] Rowe, The Western Clay Manufacturing Co., Helena, Mont.," 173.
[354] For additional information about this term, "stub turnout," see http://www.prototrains.com/stub/stub.html.

track ran parallel to the southern end of both the brick and the structural clay tile manufacturing complexes. It eventually terminated to the west of the brick manufacturing shop, but not before becoming enclosed within a tall shed-like structure that spanned 225' of track.[355]

Each of the two forks leading from the main spur served an entirely different purpose and need. The section of track that ran due south along the east side of the property before it again split and headed west, running parallel to the south side of the agglomeration of factory buildings, was consciously positioned to deliver coal, other important materials, and, of course, raw clay to their respective storage locations. In contrast, the rail that ran to the north of the kilns served the company's shipping needs. In this latter case, empty boxcars were loaded with finished products that were either coming directly out of the kilns or from one of the company's warehouses. This information reveals that although the railroad spur and its configuration might at first seem inconsequential, it actually played a decisive role in the operation of this manufactory. This basic structural element actually signifies both the beginning and the end of the production process. It also helps to explain both how and where raw materials and other necessary materials and machinery came in and how finished products were removed from the company grounds. Both this connection to the world beyond the Western Clay campus and the basic routing system for goods within the interior of the campus are essential components of the greater story of production at this site. A site that either is either no longer physically able show this valuable connection of the manufactory to the outside world of raw materials and consumers, or chooses not to highlight this connection severely curtails the interpretability of the site. To explain, interpretation is limited in such cases because no manufactory ever exists in a vacuum. Even the average brickyard, with its on-site clay pit, required that other materials—salts, oil or coal, for instance—be imported. Also, workers typically came from outside the confines of the manufactory. Likewise, even when workers lived on-site, these men certainly ventured outside of the company grounds. Furthermore, the central purpose of a manufactory was to produce saleable

[355] Sanborn Insurance Map, Helena Montana, Map of the Western Clay Manufacturing Company, 1922.

goods. Therefore, for the company to remain solvent it was essential to ensure that finished products left the manufactory grounds in as efficient and timely a manner as possible. The railroad speaks to all these aspects of the historical experience of the manufactory.

Today, it appears that both the eastern and the south-to southwestern running sections of Western Clay's spur have been either removed or possibly—in places—buried under decades' worth of dirt and overgrowth. Also, while the elevated section of track is no longer extant, eighteen brick piers on which the track rested are still prominently featured along this southern stretch of the facilities manufacturing locus. Along the north end of the property, a road has replaced the section of track where empty boxcars once sat, awaiting loading. (Trucks eventually took over this function—hence the road.) While it may not be an ideal historical marker in the eyes of preservation professionals, with respect to interpretation this road does follow the basic path of the original spur track. Therefore, it is certainly a suitable interpretable substitute for the original track. In the case of the main, north-south oriented section of the spur that was located to the east of the property, I recommend that it either be better surveyed and afterward highlighted, or, if buried, uncovered. Similarly, I recommend that the track branching off from the stub turnout and heading west along the southern end of the production facility be highlighted. With regard to the brick piers, at least a consecutive set should be preserved. Not only was this historically the only location on the greater Western Clay campus that contained an elevated section of rail, but this was also the manufactory's principle location for clay storage. Perhaps even more importantly, now that the shed that enveloped this trestle is gone, these piers serve as the only physical reminders of the method by which the gondolas full of clay were dumped, via a bottom-release mechanism, into the storage area. Also, both the spacing and the height of these piers help to give one an idea as to how the various types of clay were separated and how much clay could have been stored.

Based on the importance of this spur to the greater story of production at the site, illumination of both the spur and the piers is critical to telling the complete story of the overall

flow of fuel products, machinery and raw materials into the site, as well as the outward stream finished products from the site. In certain areas, a simple walking path might indicate the spur. Or, if still extant under the earth, and if desired by the site's stewards, sections of the track might even be made visible. Whatever the preservation and the interpretive method ultimately employed, recognizing the narrative importance of this spur, the two lines of track that branch off from this spur, and the elevated section of track is important. The eventual physical loss of this spur, as well as the failure to accentuate its importance, will lead to a less comprehensive interpretation of the site.

The Agglomeration of Buildings that Comprise the Tile Works and the Tile Drying Shop

> [N]o matter how ideal a layout might be considered initially, the constant changes that characterized manufacturing—improvements in production technique, the availability of more mechanized equipment, and changes in the product line—could easily render it less effective.
>
> Betsy Hunter Bradley[356]

Until one acquires a thoroughgoing understanding of the production process, the buildings that together comprise the greater "tile shop" and "tile shop drying area" manifest as a confusing, even intimidating, aggregation of buildings. Especially when viewed from the exterior, it is at some points difficult to discern what constitutes an original building and what might be identified as an addition (Figs. 3.5). As the historical research revealed, over the recorded lifetime of Western Clay, this agglomeration of buildings shifted in shape and size. Sections of this clustering were also converted over the better part of a decade from board and batten sided structures to either brick or hollow clay brick tile walled buildings. Although this hodgepodge of structures looks haphazard, it was in fact constructed in a purposeful fashion. Of course, there was no standardized plant design for brickyards. As long as a manufactory had the requisite raw materials and processing equipment, an owner had leeway with regard to how he chose to

[356] Bradley, *The Works*, 56, 65.

configure his production shop. It is therefore not surprising to find that Western Clay's tile shop was uniquely configured to suit what, in any given epoch, Charles and Archie Bray, Sr. considered to be most appropriate and effective for their manufactory.[357]

At its southeastern-most end, the tile shop agglomeration evidences a turn-of-the-twentieth-century powerhouse. This building originally consisted of two rooms, one of which housed the boiler, while the other contained the company's Corliss steam engine.[358] Like all industrial powerhouses, Western Clay's was constructed out of a noncombustible material—in this case, not surprisingly, brick. From this building's roof, two tall, slender sheet-metal chimneystacks jutted skyward. Today, this building evidences high integrity although its masonry, its windows frames, and especially its roof, are in various states of either fair or poor condition. Also, the building's once prominent chimneystacks are now deteriorated and in bent and collapsed positions.[359] Still, despite the fact that it was the products produced from the clay that brought the company a profit, kept laborers employed, won Western Clay local and regional recognition, and in a tenuous way brought about the founding of the ABF, Western Clay clearly could not have become a success or a state-of-the-art facility were it not able to produce the basic power necessary to operate its brick and tile manufacturing machinery. For this reason, this particular shop plays a central role in the history of mechanized brick, structural clay, and hollow clay tile production at Western Clay. The powerhouse's location, at the base of the production shop also speaks volumes to how raw clay was moved through the production process at this site. Until 1953, when the facility was fully converted to electric power, nearly every machine at Western Clay operated as a result of the power generated by this one steam engine. Thus, it was necessary for the buildings housing the requisite hollow brick and structural clay tile making

[357] Historian Betsy Hunter Bradley explains that for many industries of the late nineteenth and early twentieth centuries, there never proved a "best way to lay out the works." Bradley, *The Works*, 65. The lack of consistency in brick plant designs was discussed in the previous chapter. Although they each employed similar technologies, every plant was different from the next.
[358] Ibid., 49-50.
[359] It is not clear whether these stacks are iron or steel.

machinery to be located in close proximity to the powerhouse, and also be configured in such fashions that allowed the distributed power to actually reach the machines.[360]

Like all manufactory owners, as new technologies emerged the Bray's updated their facility and made concomitant adjustments to the grouping of buildings that comprised the tile works.[361] The location of the basic set of tile works production machinery, however, appears to have remained notably constant throughout the manufactory's lifetime. This long-term stability regarding the placement of the machines likely resulted from the fact that aside from advances in kiln technologies, the brick and tile making processes remained relatively consistent decade after decade. Machines were improved for efficiency and for the quality of their output, but the sequence of production, and to a large degree, the methods by which materials were handled remained unchanged.[362] Actually, the most notable permutations to the greater tile shop came in the form of the south-end addition of a machine shop and the expansion of an east-side, second-story drying room. Both additions complemented the existing works instead of reconfiguring the flow of materials through the site. Of these two major additions, the machine shop proved very important. It was within this attached building that the company's valuable machine parts were repaired. It was also the space in which many hand tools were hand-fabricated.[363] The location of this shop is not surprising. According to Historian Betsy Bradley, "the machine shop was often located near the works engine and boiler house for the efficient transfer of power…"[364]

To the north was the tile drying area, integrally structured into the agglomeration of buildings that comprised the tile works (Fig. 3.6). As a building, this drying shop worked in conjunction with the production shop. No formed tile products could be fired before they were first appropriately dried. Other than being outfitted with steam-heated radiators and a central transfer track that helped to facilitate the horizontal movement of materials through the site, this

[360] Bradley, *The Work*s, 56; Biggs, *Rational Factory*, 86.
[361] Bradley, *The Work*s, 56
[362] Wallace, "De/industrializing material culture," 33-34.
[363] Elliott, Interview with author, July 27, 2011.
[364] Bradley, *The Works*, 44.

long, wide, double-storied section of building did not necessitate the placement of any specific machinery. As a consequence, this section was able to extend much further north than any of the previously discussed sections of the tile works. Nevertheless, prior to the early 1950s when the manufactory became fully electrified, this building's shape and size were to some degree dictated by the need for natural light. As a consequence, it was outfitted with numerous windows spaced at regular intervals along both the ground and the second story. Interestingly, although this space was a drying area—intended to hold heat that would cause the exsiccation of the newly formed "green" clay products and prepare them for firing in the kiln—this areas window were structured to open. The fact that light and ventilation manifest in two notable aspects of the building's design again reflected the fact that human workers, and not simply machines, were a central part of the structural and hollow clay tile production process.[365]

Were Western Clay's tile shop to be razed, or were parts of it to be insensitively altered in terms of their configuration, neither the history of tile making nor the stories related to the manufacture of tile products could be fully told. As a complete unit, set within the context of other structures on the site, the tile works is very significant. This agglomeration of buildings helps illuminate how, where, and by whom or what the clay was processed. As one moves from space to space within the tile works, one is presented with the opportunity to see how both energy and raw materials flowed horizontally, and sometimes even vertically, through the site. Inside this clustering, one can also gain an understanding of what it might have felt like to work within the confines of this establishment. Were the tile works not present in the landscape of Western Clay, or were buildings like the tile shop's pug mill room, machine shop, and the elevator tower to be demolished, there would be a confusing lacunae in the story of tile making. The tile works buildings, in conjunction with the rail, the machinery, the transfer tracks and the kilns, form a narratively coherent place. As explained earlier, buildings and other physical artifacts work mnemonically. They "either trigger memories for insiders, who have shared a common

[365] Ibid., 26, 70.

past, … or [they can] represent shared pasts to outsiders who might be interested in knowing about that past."[366] In cases like the United Clay brickyard at the USNA, a mere scattering of the original buildings—including several beehive kilns, the remains of the brick drying tunnel, and a building known as the "Locker Room"—is extant. As a result, it is almost impossible to discern what happened at this site. In no way does the random selection of preserved structures explain the brickmaking process. While they might be independently interesting as a building or an engineering type, only chards of history are present as a result of the buildings and structures remaining at this locus; no profoundly riveting or engaging narrative can easily be reinstated in this place.

In comparison to the United Brick Company, the remains of the Hagley powder works is much better maintained and slightly more readable in terms of an historic narrative or a storyscape. This legibility is a result of most, versus only a sampling of Hagley's many manufacturing buildings having been preserved (Fig. 3.7). Still, some of Hagley's buildings evidence little but a set of either three or four exterior stone walls. In some cases, these walls do not even extend to the original height of the building's first story. As a consequence, it is exceptionally difficult to comprehend how these buildings looked when they were outfitted with interior partitions, and with windows, doors, and a roof. Certainly, many of Hagley's buildings were in disrepair, and much of their machinery had been either scrapped or sold between 1921, when the manufactory closed, and the time that the museum opened thirty years later. Despite loss, ageing, and lack of maintenance, many of these buildings had more of a story to tell. Early preservation strategies that were carried out, however, were not directed to assuring that the production of black power at Hagley could explicitly be narrated via the extant buildings, machinery, and structures. The desire to tell this story grew over time but after much of the physical fabric had been removed as a result of the earlier preservation strategies. Lacking the features necessary to render them fully-intact buildings, the majority of Hagley's production

[366] Hayden, *The Power of Place*, 46; Bluestone, "Tobacco Row," 26.

facilities stand as ruins, conveying about as complete a story about black powder production as Western Clay's ruined brick works reveals about brickmaking. Also, how convincing is Hagley's interpretation of black powder production when demonstrations take place within the company's machine shop—a building that served an important, ancillary function in terms of the entire site, but an edifice that never directly housed any black powder making processes?

Since the current configuration of Western Clay's tile works conveys an immense amount about the very production process that took place within its walls, this cluster of buildings must be retained. Altering this agglomeration in any profound way would certainly impede the public's ability to engage with what occurred here and learn the specifics of how the process unfolded. Even in the case of the Continental Brick Company in Martinsburg, WV—a brick manufactory that operates on the grounds of an historic facility and that has retained some of its original material fabric and its historic technologies—where buildings have been eradicated, or where they have been largely demolished, it is difficult to envision, much less understand, how the buildings looked and how the materials flowed within them. It is therefore best for Western Clay's stewards to focus on the preservation of this entire agglomeration. This complex is well-poised to be adaptively reused. As the architectural historian Daniel Bluestone admonishes, however, "We need to consider the extent to which these [adaptive reuse] projects encourage a capacity for critical reflections on the histories associated with particular places."[367] Accordingly, any strategy employed in the context of this agglomeration of buildings should certainly take into consideration the current layout—including the horizontality of the interior spaces, the connectedness of the various edifices to one another, and also the openness of the tile shop. Admittedly, some industrial edifices that were either intentionally configured around machinery or designed to actually support a particular piece of equipment are not always easy to adapt to new uses.[368] This, however, is not a concern in the case of Western Clay's tile manufactory. Still,

[367] Bluestone, "Tobacco Row," 3.
[368] Hay, "Action Steps," 13.

preserving the spaces that together comprise this agglomeration of buildings while also retaining both the visual and physical paths by which power and raw clay flowed through the production process, and by which humans circulated within and amongst the connected buildings will certainly require both the implementation of careful design strategies (Fig. 3.8) If thoughtfully undertaken with an eye to the capacity of the buildings and their interior layouts to conduce histories about the various industrial and social histories Western Clay can, however, accurately re-interjected these stories into this important set of buildings. On the other hand, were these circulation routes not retained, and were the historical pattern of use and movement disrupted, it would be very difficult for Western Clay's stewards to adequately relay stories about the manufacture of structural and hollow clay tile products.

The Tile Shop's Machinery

> In too many cases, industry has been scrubbed clean out of these [former] industrial sites.
>
> Duncan Hay[369]

What would Western Clay's tile works be if its complex interior were wiped clean of the machines that actually fabricated structural and hollow clay tile products? All too often, the envelopes of industrial buildings have been preserved while their interiors have suffered either from the loss of machinery that spoke to the use of the site or from insensitive adaptive reuse efforts.[370] As explained in the previous section, both the presence and the integrity of buildings do matter; these physical touchstones form the base of a story site. In an industrial facility the machinery does, however, also matter. Without the machinery that processed the raw clay into shaped forms and without the technologies that both powered and assured the sustained transfer of energy to the tempering and forming machines, it is unclear as to what history or histories could otherwise be recounted in the context of a complex like the Western Clay's tile works.

[369] Ibid., 13.
[370] Hay, "Action Steps," 16; Bluestone, "Tobacco Row," 3, 13-15, 20.

Assessing the effectiveness of preservation strategies rendered at other industrial sites, historian Duncan Hay questions whether or not we have saved anything of significance when we remove machinery from an industrial site.[371] Saving just select pieces or parts of machinery and inserting them back into an adaptively reused building simply amounts to "hardware decoration;"[372] this kind of action is almost pointless as it fails to either relay any real history of a site's production processes. As unfortunate as the story is, the fact that the majority of United Clay's machinery had been stripped from the company's brick plant prior to anyone attempting to preserve or interpret this site led the USNA and other preservation advocates to claim, "The structure is essentially a brick shell, the function of which is told only by some transfer cars an a shed for the dinkey train."[373] In contrast, Western Clay's tile works and its adjacent power station and machine shop still exhibit almost all of their respective early to mid-twentieth-century machinery. Together this agglomeration of buildings houses numerous industrial items that are authentic to the site: a steam boiler, conveyor belts, a bucket elevator, a dry and a wet pan, a pug mill, a vertical press and several flowerpot presses, lathes and drill pressed, most of which is still in situ. Unlike the site's brick works, Western Clay's tile works, including the tile drying shop, remains fully intact. As a consequence, Western Clay is disposed to tell a very compelling and complete story of production within the very spaces where these production activities took place Both the authenticity of these machines, and the fact that they are in situ also proves immensely beneficial to Western Clay.

The fact that Western Clay's machines are authentic to this site places this manufactory in the minority. Few other sites can claim so many authentic pieces of machinery that are still positioned in their historic locations. The Continental Brick Company removed its early twentieth-century equipment as the plant modernized and expanded during the early 1980s.[374] Not even all well stewarded historic industrial sites can offer this degree of authenticity.

[371] Hay, "Action Steps," 16.
[372] Ibid., 16.
[373] Jacobson, "Report to the Agricultural Research Service on the Cultural History Values of the New York Avenue Brickyard, "11.
[374] Hollis, personal conversation with author, February 16, 2012.

Again, in the case of Hagley, no concern was originally shown toward the preservation of the site's machinery and objects of infrastructure. As a consequence, as time passed the site's new director sought to expand Hagley's interpretation to include more on the history of black powder production, the institution was forced to either reconstruct pieces of machinery like a mill water wheel, or appropriate infrastructural components, like the narrow-gauge rail tracks, from other DuPont owned sites.[375] At Western Clay, one can look at the machinery, however, and see that it was, for example, specifically manufactured for this company (Fig. 3.9).Aided by historical understanding, one can also come to learn that certain machines, like the tile shop's dry pan, is the very machine that Charles Bray researched thoroughly and purchased with confidence around the turn of the twentieth-century (Fig. 3.10). Even more exciting is the fact that these machines are mostly all original to the context of their surroundings. With few exceptions, one of which is a hand operated flowerpot press, a visitor can walk into the tile shop's dry pan, wet pan or sewer pipe press room and see the machinery as it relates to its respective space.

Having all of this original machinery in place certainly augments Western Clay's storytelling abilities. It is useful to be able to see both where and how products were produced and it is advantageous to be able to follow the flow of the manufacturing path. The in situ machinery at this site takes, however, Western Clay to another level with regard to its interpretive abilities. Should the site's stewards someday choose to turn the tile works into a living history museum, or should they simply choose to occasionally demonstrate either parts of or the entire process of the manufacture of structural and hollow clay tile products, the opportunity is definitely afforded them by dint of this extant, in situ machinery. In the early 1970s, Doylestown, PA's Moravian Pottery and Tile Works (Moravian) found itself in a similar position (Fig. 3.11). Henry Mercer's one famous artistic clay tile production shop was shuttered, but its original machinery, including an auger, and uniquely designed hand presses and other hand-crafting tools, remained in situ.

[375] "Water wheel to be placed between old powder mills." *Wilmington Morning News*, 16 August 1964, Foundation Archives, 5. Courtesy of the Hagley Museum and Library Archives; Emerson Williams, "Railroad to Make Comeback at Hagley," *Wilmington Evening News Journal*, 21 September 1970, Foundation Archives, 5. Courtesy of the Hagley Museum and Library Archives.

Likewise, the manufactory's layout remained largely unmodified. After the site was taken over by the County (Bucks County, PA) and the decision was made to turn it into a type of "living history museum." Given the high integrity of the building, which evidenced its original clay-mixing, production, firing areas, and the company's showroom, and considering that there existed copious writings regarding the various production techniques employed at Moravian, the County was able to swiftly and successfully transition this shuttered manufactory into a living history museum.[376] It is important to recognize that not every process demonstrated at Moravian is executed exactly as it was done during Henry Mercer's time. Some of the manufactory's workstations have been relocated within the building, and a few modern intrusions can be found in each of the various workstations. The extant, in situ machinery and the well-maintained building, in conjunction with the historically replicated tile making activities undertaken by the resident ceramists and the full-time staff members work together, however, to relay many successful historical narratives. Moravian certainly stands as a model for what Western Clay might become, especially if Western Clay takes action to preserve its extant tile making machinery in situ. It is also worth noting, however, that despite Moravian's many laudable qualities, Western Clay is currently in a better position to interpret a more complete story of tile making because the site still evidences its railroad spur that prominently reveals how the raw products entered the property and how the finished goods left the manufactory grounds.[377]

The Beehive Kilns, Their Respective Sheds, and the Smokestacks

Western Clay's beehive kilns stand today as the site's most recognized features. Of the six beehive kilns known to have existed on this manufactory grounds during the first quarter of the

[376] Vance Koehler, Curator, Moravian Pottery and Tile Works, personal conversation with author, November 7, 2011. Vance explained the history of the Moravian Pottery and Tile Works and provided a wealth of information about how the site has been interpreted since 1988, when he assumed his current position with the museum.

[377] The extant physical fabric of Moravian limits the stories that are told at Moravian. Unlike Western Clay, there is no physical fabric that helps visitors understand how the clay was delivered to Moravian, where this unprocessed material was stored, and how it typically left the premises after being manufactured into finished products.

twentieth century, five are still extant[378] (Fig. 3.12). Although these kilns have become iconic, and despite the fact that they are often used to symbolize the entire Western Clay brickyard—and even the Archie Bray Foundation for the Ceramic Arts—this is particular kiln design was certainly not unique to this site. By the nineteen-teens and nineteen-twenties, almost every U.S. brickyards had at least a few beehive kilns.[379]Certainly, the shapes of these structures set them apart from the other buildings and structures typically found at both brick and brick and tile manufactories. Despite their iconic status, at Western Clay these kilns cannot alone signify the process of either brickmaking or structural and hollow clay tile production. This is not to say, however, that the kilns did not play an exceptionally pivotal role in the greater production process. While raw clay had to be properly processed, formed, and dried prior to reaching the kilns, it was at the firing period that either led the successful vitrification of bricks and structural and hollow clay tile products or it occasioned the costly ruination of an entire batch of formed clay products.[380] When it came to choosing the most suitable kiln for a manufactory, clay industry publications time and again recommended that no expense be spared with regard to construction plans and building materials, and afterward to their maintenance.[381] Thus, either of their own volition, or urged by the industry, brickyard proprietors typically paid extra attention to the type or types of kiln technologies that they employed and they also sought the expertise of some of the industry's most skilled, trustworthy, hardworking laborers.[382]

Downdraft kilns were widely recognized for the quality of products that they burned. These kilns were also versatile in that they could be used to fire virtually any clay product—bricks and structural and hollow clay tile products, domestic wares, and artistic works.[383] In the

[378] The both the 1922 and the 1931 Sanborn maps show six kilns on the Western Clay site. By the time the 1951 Sanborn map was produced, only five beehive kilns remained.
[379] During the course of this research I continually ran across images of beehive kilns on the grounds of brick manufactories.
[380] Morrison, *Brickmaker's Manual*, 93.
[381] Greaves-Walker, *Clay Plant Construction and Operation*, 207; Hewitt, "Putting the Kiln Fireman on Bonus," *Brick and Clay Record*, 130.
[382] For additional information, please reference the preceding chapter, especially the following sections: 5: The Manufacture of Brick and Structural Clay Tile Products at Western Clay and, 5.3: The Production of Brick and Structural Clay Tile Products at Western Clay: The Firing Process (1925-1935); Also, see Greaves-Walker, C*lay Plant Construction and Operation*, 68.
[383] Although it has not been the focus of this study, beehive kilns were also used to fire both domestic and artistic wares. For example, see Metalta Potteries in Medicine Hat, Alberta, Canada. See also, Newby and Jiusto, "A Beautiful

U.S., beehives were not, however, widely used until after the turn of the twentieth century. For this reason, as the history chapter revealed, the early employment of this kiln type at Western Clay is certainly notable. Although in 1898 three downdraft kilns were reported to be in use on the grounds of what would become Western Clay, it appears that these original beehives were replaced sometime shortly after the turn of the twentieth-century. Which of the extant kilns were the first of this second generation of beehive kilns to be constructed on the site is unclear. However, it is interesting to note that one of the remaining five kilns has but one entranceway while each of the other four evidences two. Although all beehive kilns vary from each other in some way or other, these five kilns also differ from each other in additional ways. Two, for example, have only eight fireboxes and are slightly shorter in height than the other three. Also, the dome of one of the five kilns lacks inspection points and amongst the kilns there is a recognizable difference in the brick floor patterning that rests above the subterranean flues. While none of these differences is monumental, the lack of consistency in the building type suggests that these kilns might have been built at different times; their respective changes may indicate the implementation of industry-standard or owner-imposed upgrades.

Within the brick and structural and hollow clay tile industry, there existed a number of different underground flue system designs for downdraft kilns.[384] With regard to this particular construction design aspect of the downdraft kiln technologies, it appears that every brickyard proprietor independently chose to employ the flue system or systems that he felt most appropriate and beneficial to the firing of his company's wares. This practice bore a verisimilitude to the common industry practice whereby each individual manufactory owner decided what style or styles of kiln technologies best suited his company's needs. In all but one case, each of Western Clay's five remaining kilns still evidences its original perforated flooring pattern. Although no kiln floor configuration might initially appear exceptional, in each downdraft kiln's case, its perforated brick floor played a profoundly important role in the firing process. The overall

Spirit," 23. Western Clay's beehive kilns were also used to fire artistic clay products.

[384] For examples of flue designs, see Ceramic data book, 182-185.

configuration of a downdraft kiln's floor—consisting of a series of specifically sized bricks, each placed a certain distance apart from the next and laid in a configuration that allowed hot air and gasses to pass from the kiln's interior down through the floor, into the subterranean flue system, and up and out through a nearby chimney stack—was an integral part of this particular firing technology (Fig. 3.13). In this respect, one cannot consider the kiln and its flue system without also recognizing the chimneystack to which the flue system was directly linked and without which this particular technology could not have functioned (Fig. 3.14).

Resulting from the fact that the underground flue system and the chimneystack to which each kiln's flues connected were part and parcel of the downdraft kiln technology, any preservation efforts directed at the former company's beehive kilns must take both the perforated floors and the extant chimneystacks into consideration. Undoubtedly, the interestingly shaped kiln buildings are the most visually arresting structures. To preserve these kilns without also making visible the perforated flooring pattern of each and preserving the chimneystack to which each kiln's flue system is linked would do this technology a great narrative disservice. This technology was not simply an above-ground, beehive-shaped, brick walled and metal-banded structure capped with a dome; rather, these kilns were carefully designed above- and below-ground structures with an integrally associated chimneystack. Again, it is worth considering the case of the remains of the United Clay kilns on the grounds of the USNA. Those that have been taken down to a height of three to four feet, that have been capped, and that have had both their respective floors filled in and their chimneystack's razed can no longer tell the story of a technology or a step in a larger manufacturing process (reference Fig. 3.19).

Several other important features of beehive kiln technologies are also extant and ripe for interpretation at Western Clay. The most obvious, perhaps, is the very location of the beehive kilns and each of the remaining five kiln's respective station in relation to the tile work's

drying shop, the locus where Western Clay's brick drying tunnels once stood, and each kiln's placement in relation to the other four kilns. As was referenced in the preceding history chapter, beehive kilns were almost always arranged in linear fashion and were constructed either around or near a manufactory's main production houses.[385] Certainly, the location of Western Clay's remaining kilns and the relationship that is derived from this cluster of kilns in relation to other manufactory buildings and infrastructural features as well as their relation to each other must be carefully taken into consideration. Preservation decision-making at Western Clay must take into consideration not simply the condition or integrity of each kiln, but also the meaning and the significance of this firing technology that is conveyed by both the individual and the collective locations of these downdraft kilns. Preserving one kiln, its perforated interior floor and adjoining stack might suffice when telling the story of round downdraft kiln technologies, but it will not adequately suffice for the telling of the full story of the brick and structural and hollow clay tile manufacturing process at Western Clay. Since beehive kilns were "periodic" in their nature—this kiln technology necessitated long burning times—for Western Clay to keep up its production levels and to remain solvent, it was necessary for the company to have multiple kilns. It was also necessary for these kilns to be simultaneously in one or another stage of the firing process. As a consequence, a singular kiln could hardly explain what the daily production process was like at Western Clay. With a number of the kilns preserved a visitor could, however, much more easily understand the labor-intensity and the high production levels of this well-known, state-of-the-art, prolific brick and tile manufacturing company.

Another notable feature of Western Clay's beehive kilns is their shed roofing and enclosed sidewall systems. Today, four of the five kilns share a conjoined roofing system while one presents the meager remains of a completely separate shed enclosure. While some brick and tile industry experts warned manufacturers of the dangers of not sufficiently designing roofing or kiln enclosure systems suitable for shielding the top of kilns from moisture and for carrying

[385] Even the USNA's United Clay Brickworks evidences the remains of this linear patterning. Also, while the existance of Continental Brick's historic beehive kilns is threatened, they still currently testify to the industry's recognized need to purposely design manufactories with grouped and aligned beehive kilns.

water away from a downdraft kiln's sidewall's and thus its foundation,[386] in the U.S. neither the covering nor the housing of kilns in a larger building appeared a particularly common practice. As a consequence, Western Clay currently stands as a unique case; it is a site where what appears to have primarily been a British-style of sheltering kilns was used. It is also a site where this aforementioned kiln-sheltering design was further modified, at least in the case of four out of Western Clay's five beehive kilns, to better suit the local climate conditions and the owners' perceived needs for the manufactory (Fig. 3.15). Despite the fact that these kiln sheds are now in various states of disrepair, four out of the five still exhibit high integrity. Moreover, these sheds work together to create a rarely seen enclosed workspace. Certainly, this component of Western Clay augments the exclusivity of this site, setting it apart from numerous other historic brick and tile manufactories. These sheds contemporarily help brand Western Clay as a unique American manufactory, but during the company's operational lifetime, they may have also served as a welcome shelter—from both the heat and the cold--for the company's laborers. While neither the story of the building of these shed enclosures nor any stories about what it was like to work in and around the sheds is currently known, this information may eventually be garnered through additional oral history interviews. Such information would undoubtedly expand the story of and subsequently increase interest in these unique forms.

A final, but extremely important aspect of beehive kiln technology that Western Clay is well poised to tell is the labor-intensive story of the setting, or stacking a beehive kiln full of yet-to-be-fired products.[387] Early- to mid-twentieth-century brick and structural and hollow clay tile industry treatises and trade journal articles report that—depending on the desired outcome of the firing—there were myriad ways in which a kiln could be stacked.[388] Although only one of Western Clay's kilns is still partially stacked with drain pipes, and despite the fact that this stacking pattern is but one example of many, these remaining pipes are a powerful narrative force

[386] Searle, *Modern Brickmaking*, 321; Dobson, *A Rudimentary Treatise*, 40.
[387] According to the author Frederick Greaves-Walker, "There is probably no other department in a brick plant where as highly skilled labor is required as in the setting department." Greaves Walker, *Clay Plant Construction and Operation*, 68.
[388] For more information regarding several of the many ways in which a kiln could be stacked see Greaves-Walker, *Clay Plant Construction and Operation*, 69-78.

in their collective ability to tangibly reveal how such products were set for proper firing within a round kiln (Fig. 3.16). It is exceptionally rare to find an example of either fired or unfired brick or structural and hollow clay tile products stacked within a kiln—much less a well-intact, early twentieth-century beehive kiln.[389]

Ramp Between the Kilns

Today, the remains of only one ramp are located between the beehive kilns currently referenced as kiln number "7" and kiln number "8." These are the kilns situated adjacent to the northern-most track of the rail spur—the track along which boxcars were parked and loaded with finished products. This ramp no longer extends, however, all the way out to the end of the shed surrounding the kilns—the location where the rail track was once located. Still, the ramp stands as a vestige of the era of structural and hollow clay tile making; it commences parallel to the south ends of kilns 7 and 8—the location of each kiln's "main" entrance—and extends a short distance north between these kilns. Its configuration indicates the direction by which finished products were carted onto the railcars. Before learning the full story of brick and structural and hollow clay tile production at Western Clay, one might think that the kilns signified the end of the production process. This ramp, however, is more accurately symbolic of the end of the process because as discussed previously, until the company's shaders properly sorted and graded the fired products and until labors spent hours (if not an entire day) removing products from the kiln, the production process was technically not complete. As a consequence, while neither monumental in scale or design, this simple ramp plays a very important role in the site's history. It serves as the final linchpin, enabling story of the clay's horizontal movement through the greater facility to be tied together. I therefore advise the ABF and other stewards to preserve and interpret this element in the context of the dirt roadway that now marks the location of the northern-most railroad track.

[389] During the course of this research project, I never encountered another kiln reported to be stacked with either fired or unfired products. Not even the Medalta Potteries or the Moravian Pottery and Tile Works, each of which functions at least partially as a museum, can claim such a feature.

Although the ramp is in disrepair and lacks integrity, this structural element is critical to retain. Exactly how the AFB and other stewards might choose to interpret the missing sections of this ramp will need to be determined. Here, I simply wish to call attention to the fact that in order to effectively narrate how finished products made their way from the manufactory grounds to the consumer, this ramp needs to be maintained. This structural element conveys information about the operation of early- to mid-twentieth-century brick and structural and hollow clay tile manufactories that other historic facilities—both active and defunct—of either this same classification or a similar classification cannot. For example, although the United Clay Brick Corporation and the Continental Brick Company were both historically linked to railways, none—not even the operating Continental Brick Company, which occasionally still ships brick by railcar—evidences physical fabric that shows how products were moved from kilns to the area of export.

3.4 The Story of Kiln Technologies, inclusive of the Scotch, Beehive, and the Tunnel Kiln

As discussed in the beginning of this chapter, the second story that Western Clay is best positioned to tell through its extant architecture is the history of the brick and structural and hollow clay tile industry's kiln technologies. By the turn of the twentieth century there were three common kiln types: updraft, downdraft, and tunnel kilns.[390] Of these three types, there were countless variations found across the U.S., in Canada, and in the United Kingdom.[391] Each kiln type was considered to have one or another advantage over the other and brickmakers often swore by either a specific variation of a kiln type or by the modifications that they independently chose to make to one of these aforementioned three types.[392] As explained in the previous chapter, an owner of a brickyard was encouraged to decide for himself what kind of kiln best suited his

[390] Alfred Broadhead Searle, *The clayworker's hand-book: a manual for all engaged in the manufacture of articles from clay*, (London: Charles Griffin and Company, 1906), 154.
[391] Ibid., 154-170.
[392] Crary, *Sixty years a brickmaker*, 18.

needs. Although each of the three kiln types mentioned within this work was in use prior to the turn of the twentieth century, there were noticeable differences amongst these technologies.

Unlike most other industries, the technological advances that updraft and downdraft kilns underwent over time were relatively subtle. Still, downdraft kilns were considered an improved technology. Not only was this second type permanent, but it could also be used to fire a wide variety of products. Of the three types, tunnel kilns, which came to dominate the industry by the second half of the twentieth century, were the most technologically advanced. They were also the only kiln type that continued to be technologically upgraded in an effort to curb fuel-usage and augment firing efficiency. While a number of sites located in the U.S., Canada, and the United Kingdom are either still positioned to tell the story of beehive kiln or modern tunnel kiln technologies, aside from Western Clay, none appears to currently be positioned to the story of either updraft kilns or the progression of the kiln technologies. The reason for this dearth of updraft kilns stems from the fact that most were intentionally impermanent; these kilns were constructed of the very products they were intended to fire. After their respective burning, cooling, and disassembly, no significant physical trace of temporary updraft kilns remained. Although Western Clay's updraft kiln was of a more permanent variety, the fact that it is extant means that Western Clay is exceptionally well positioned to tell the unique history of a rarely visible kiln type. Additionally, the extant physical fabric at this manufactory evidences a unique story about both the industry's technological developments and the Bray family's employment of these technologies to meet the perceived needs of Western Clay. Additionally, the narrative associations that can be made as a result of the location of each of these kiln types in relation to other extant physical fabric—buildings, machinery, and infrastructural items—helps round out the greater history of the site's manufacturing processes. For example, having both the beehive and the tunnel kilns augments the interpretability of the site by revealing how the manufactory was

physically designed both to accommodate the different technologies and situate their location in relation to the extant buildings, machinery, and infrastructure. While the Scotch kilns stand alone without the brick manufacturing facility to which it was inextricably linked, this type still helps signify why this facility was known both formally and informally as a brickyard.

The Scotch Kiln

Brick manufacturing on the grounds of Western Clay commenced with the use of temporary up-draft scove or clamp kilns. As discussed in the history chapter, up-draft kilns were not considered particularly effective when it came to vitrifying bricks. Neither were they considered terribly heat-efficient. This kiln type did, however, prove inexpensive and both clamp and scove kilns were quite useful to small, impermanent brickyards. It is most likely that due to Charles Bray's training in the United Kingdom, where more permanent kiln types were in common use in the latter half of the nineteenth century, influenced his decision to first construct Scotch kilns on the grounds of what became Western Clay. Outside of Western Clay, it is unclear how many of this kiln type were in operation in North America. Regardless of how many there may have been, this kiln type was rarely referenced in U.S. publications regarding the manufacture of brick and tile products. Not surprisingly, during the course of this research, no references to extant Scotch kilns were found either on the grounds of operating or defunct brick or brick, structural, and hollow clay tile manufactories in the U.S. Several ruined remains of this kiln type were located in the United Kingdom, but of these, none was being actively maintained.[393]

Technically, two Scotch kilns remain at Western Clay. These structures are known today as the "Summer kiln pad" and "Warehouse number 3." Unfortunately, the "Summer kiln pad" is lacking the majority of its exterior walls, and is therefore grossly deficient in terms of integrity

[393] During the course of my research, I only found a few references to extant Scotch kilns. None was found in the U.S. In the United Kingdom, several were located, but none appeared to be in exceptionally good condition. See, for example, "Ticknall Village Trail," in Ticknall Life, (Ticknall Life, Derbyshire, UK, 2012). Accessed on March 28, 2012 at http://www.ticknall.org.uk/village/walks/204-village-trail?showall=1. See also, Alan McWhirr and David Smith, "A Brickworks in Ashwell Road, Oakham," in Leicestershire Archaeology and History Society, 68 (1994): 90.

(Fig. 3.17). In contrast, "Warehouse number 3," is in poor condition—its brick is deteriorating, it has suffered greatly from the loss of mortar, and each of its four façades evidences missing brick (Fig. 3.18). Still, each of its walls remains largely intact and if one looks closely at the exterior, he or she can even see where, along both the east and west sidewalls, the kilns firebox openings were located.[394] As a consequence of the building possessing most of its late nineteenth- to early twentieth-century building materials, overall, "Warehouse number 3" evidences a high degree of integrity. Unlike the "Summer kiln pad," the level of "Warehouse number 3's"integrity positions this kiln to be much more easily interpreted as a technology.

In relation to the importance of this remaining Scotch kiln's integrity, it is again worth mentioning the case of the United Clay Brickworks site in Washington, DC. As explained previously, the majority of this former manufactory's buildings have been razed. Most of those that remain have suffered a loss of integrity as a result of the enacted preservation campaign. As a consequence, the site has been structurally, and in turn, narratively compromised. Although unfortunate, this case proves particularly effective with regard to its ability to reveal how profoundly the compromised integrity of a building or a technological structure can affect its interpretation—despite the fact that the building's or the structure's condition may be stabilized. Looking at the remains of all but two of the United Clay Brickwork's kilns, one can barely begin to understand what these structures once looked like, how they might have operated as a technology, and how it may have felt to work both in and around them (Fig. 3.19). When contrasted with a kiln that has had its integrity preserved one immediately recognizes how greatly a structure's integrity affects its interpretability. Although the case of the United Clay Brickworks is sad, it stands as an excellent example for both what Western Clay should not do and why. Knowledge gained from this site regarding the importance of maintaining a structure's integrity in conjunction with an augmented understanding of what the repercussions of both a structure's and an entire site's compromised integrity are should prompt Western Clay's stewards to pay close

[394] It may also be possible to see the remains of the fireboxes from the kiln's interior. This building is currently used as a storage space and during my time on the site I was not able to effectively move through the kiln's interior in order to look for the remains of the openings.

attention to the preservation decisions they choose to enact in relation to the "Warehouse number 3" Scotch kiln.

Although the story of this Scotch kiln's use cannot be well narrated within the context of the actual process of brickmaking, from what remains of the "Warehouse number 3" Scotch kiln, visitors to the site can certainly learn through its extant physical fabric about the brick and tile industry's firing technologies. Also, the intact quality of the kiln, it's setting in relation to the location of the rail spur that was used for loading empty boxcars with finished products, and even the ruins of the brick shop, help position "Warehouse number 3" to be interpreted in the context of the site's social history. In addition to telling the stories of how this kiln technology worked, both this kiln's contemporary integrity and setting can together foster narratives about the laborious methods by which the workmen loaded, tended to the firing of, and afterward unloaded this particular kiln. Given the rarity of this kiln type, and considering how well intact this kiln actually is in relation to both Western Clay's "Summer kiln pad" and the remains of Scotch kilns found elsewhere, I advocate that Western Clay's stewards endeavor to preserve this particular kiln.

The Tunnel Kiln

Although versions of tunnel kilns were placed in operation starting in the 1850s, and despite the fact that by the second quarter of the twentieth century many brick and tile manufacturers in the U.S. relied heavily on this continuous kiln type, it was neither the decision of Charles or Archie Bray, Sr. to operate a tunnel kiln on the grounds of Western Clay.[395] Archie Bray, Jr. erected this kiln type in the late 1950s with the intentions of modernizing the manufactory. Compared to its predecessors, the periodic updraft and downdraft kilns, the tunnel kiln was known for its ability to fire clay products in a very short time span. This kiln's design also lessened the number of handlings of formed clay products that had previously been required

[395] Prior to the second quarter of the twentieth U.S. based manufactures considered tunnel kilns to be "an experiment." Greaves-Walker, *Clay Plant Construction and Operation*, 104.

of brickyard laborers.[396] Unfortunately for Western Clay, the construction and subsequent employment of this kiln actually contributed to the company's demise. As a consequence, the kiln currently stands simultaneously as a symbol of technological advancement and a reminder of how technological updates—especially in the brickmaking industry—did not always equate with success.[397]

Today, the metal shed that housed the tunnel kiln is extant (Fig. 3.20). This kiln has, however, been physically compromised as a result of the adaptive use of the space inside the tunnel kiln shed (Fig. 3.21). Additionally, the recent construction of several ABF buildings on the principal manufactory grounds has severed both the direct visual and the physical—in terms of transfer tracks—connection of this tunnel kiln with both the brick and tile shop. Therefore, in terms of their setting and association, this tunnel kiln and the building that houses it are now lack integrity. The kiln itself is also lacking integrity with regard to its materials. Although this kiln was U-shaped, only one leg of the greater U exists. Still, due to being sheltered from the elements by the larger shed in which it is housed, this remaining section of the kiln is in good physical condition. Thus, at least some portion of the greater story of this particular kiln technology can be told via the extant material fabric. While the compromised physical integrity, setting, and association of this kiln type may inhibit the telling of a rich history of this particular technology, I still recommend to Western Clay's stewards that the remaining section of this tunnel kiln, along with the shed that houses it, be preserved. Having this third-generation kiln technology on site, and being able to compare and contrast it—especially in terms of labor intensity and firing methods—with the other two kiln technologies helps to round out the picture both of Western Clay's evolution as well as the progression of brick and hollow and structural clay tile industries firing technologies. As touched on previously, Western Clay stands as extraordinary example of a site that has examples of all three of the industry's main kiln types. Keeping all three kiln types,

[396] *Great Falls Tribune*, "Helena Brick Factory," July 14, 1957.
[397] Crary, *Sixty years a brickmaker*, 37. As discussed in the history chapter, the firing of quality bricks had as much to do with the fireman as it did the kiln technology. Certainly, downdraft kilns retained more heat than updraft kilns, and tunnel kilns were considered to be the most fuel-efficient of the three kiln types. Those who tended to the burning of the brick had, however, the most profound influence on the technologies.

even though they might not each be perfectly preserved, will allow for firing technologies to be interpreted; thus, besides gaining recognition for its ability to interpret the story of structural and hollow clay tile production, Western Clay will have the opportunity to develop an interpretive campaign at this site that does not appear to be available at any other historic brick or structural and hollow clay tile manufactory in the U.S.[398]

3.5 Other Western Clay Buildings, Objects, Etc., that Merit Preservation

The Remains of the Brick Shop

As discussed previously, such a paucity of Western Clay's original brick shop remains that this building currently lacks the integrity necessary for the process of brickmaking to be accurately and effectively interpreted. The remains of this structure—including a line shaft and several significant pieces of the machinery that this shop was meant to house—do stand, however, as testaments to the site's principal industry (Figs. 3.22 and 3.23). Although I certainly would not advise the ABF or any other steward to invest time, money, and effort into the reconstruction of any part of this building, it may be helpful in terms of the overall interpretative ability of Western Clay were the ruins of this brick shop stabilized and retained. Although in poor condition and lacking integrity, the remains of this shop do manage to contribute minimally to the overall feeling of this industrial landscape. From the location of these ruins, one can also gain some understanding of where the brick shop stood in relation to many of the site's other buildings and infrastructural elements.

Were the remains of the brick shop and its extant machinery actively preserved in a state of ruin, this ensemble would be poised to operate mnemonically in a manner similar to the many buildings at Hagley's black powder yard. In Hagley's case, while none of its incomplete

[398] It is possible that somewhere there exists another brick or structural and hollow clay tile manufactory that both evidences and interprets three generations of kiln technologies. During the course of this research none was, however, found. Certainly, there are other sites around the world that interpret the manufacture of clay products. The Claybank Brick Plant in Claybank, Saskatchewan, Canada, the Medalta Pottery in Medicine Hat, Alberta, Canada, the Maws Tile Works in the United Kingdom, and the Rooftile and Brickwork Museum in Volos, Greece, stand as reputable and inspirational examples.

and machinery-devoid structures is able to evoke the same level of historical understanding as can an intact building replete with its industrial equipment, each individually aids in augmenting the collective feeling and association of the manufacturing site. At Western Clay, if the ruins of its brick shop were highlighted, visitors to the site would at least be able to gain some understanding of the historical relationship that this edifice held with other manufactory buildings and structures. Although perhaps not as profoundly impacting as an intact edifice, retaining some part of this principal manufactory shop—even if it is eventually integrated into a newly designed building—will still allow for narratives to be reconnected to the site. If these ruins are completely erased from the grounds, however, it will be more difficult to cultivate a sense of place and connect narratives to this industrial landscape.

Piles and Pallets of Discarded Bricks and Structural and Hollow Clay Tile Products

Among the many physical remnants of Western Clay's manufacturing past are numerous piles of and pallets stacked high with discarded bricks (Fig. 24). There are conflicting accounts surrounding the factors that precipitated the formation of these piles of brick. The different stories are not only curious and compelling, but moreover, they are important to the greater story of both the site's overall history and the story of the kiln technologies chosen for the site. For example, according to Archie Bray, Jr. the piles of brick strewn about the company grounds manifest on this site long before the tunnel kiln was ever erected.[399] Countering this information, a former workman divulged that under Archie Bray, Sr.'s direction, Western Clay never accrued piles of discarded brick. If deficient bricks were found among the mix of fired products, these bricks were immediately collected and recycled.[400] According to this same laborer, the piles of discarded brick currently lying about the Western Clay property resulted from the ineffective operation of the manufactory's mid-twentieth-century tunnel kiln.[401] Although it would not be necessary to save all of the remaining piles of bricks, and while saving them in situ would not necessarily aid in

[399] Bray, Jr. Interview with Martin Holt, 5.
[400] Elliott, personal conversation with author, July 27, 2011.
[401] Ibid.

their interpretation, preserving some of this discarded brick would certainly help perpetuate the aforementioned stories—regardless of whether one is factual and one is not.

Hand Tools and Industrial Objects

The building interiors and to some extent, the grounds of Western Clay, are strewn with various hand tools and industrial objects related to the production of brick and structural and hollow clay tile products. For instance one can find many dryer carts used to stack, dry, and afterward transport greenware to the company's kilns. Also numerous are various styles of wheelbarrows that were used either to haul green products into the kilns for stacking or to transport the fired, cooled, and shaded products from the kiln interiors to boxcars or storage facilities. Moreover, molding tables, molds, forming blocks, burnt brick handling gloves, wrenches, and even a box of the company's sample bricks—exhibiting a range of colors, textures, and available surface finishes—remain on the premise. Although many of these tools and objects might not be historically linked to one specific location, they are all historic to the site. It is these objects that can help further the social narrative of the site. For example, future stories might be uncovered that help reveal exactly how a worker preferred to use one style of mold or how he preferred a certain brick finish over another—or perhaps detested them all. Also, through this equipment, stories surrounding the backbreaking labor required of the workers might be made more palpable.

4.1 Concluding Thoughts and Promising Directions for Future Research

Before any preservation efforts are enacted at a historic site, it is strongly recommended that the site's stewards and supporters first become well-informed about a site's history—or histories. Both a thorough and thoughtful understanding of, and a critical look at the site's past are essential to countering "public amnesia," reconnecting a site with histories that may currently be out of the reach of public memory, and allowing for the active cultivation of new memories of place.[402]At its most basic level, this work involves conducting traditional culturally-, technologically-, and socially-focused historical work as well as public history research—"non-traditional evidence and presentation formats" including oral history interviews.[403] Ideally, this work would involve the collaboration of many parties including both professionals and community members.[404] Such efforts can certainly help to augment historical understanding of a site like Western Clay. Technically, the purpose of undertaking this type of work is bipartite. First, it is intended to help a sites stewards and supporters to determine the significance of the site by first identifying the historical narratives associated with the historic building, structure, or locus. Once significance has been established, this previously undertaken research afterward allows for informed site-specific preservation decision-making to take place in relation to the evaluation of the narrative possibilities of the site in question. This research also has the potential to both realize and promote more complete, evocative, and engaging historical narratives of place; a site like Western Clay has meaning and has both affected and been affected by the surrounding community, landscape, and culture. Historical research also has the opportunity to help identify

[402] Bluestone, "Toxic Sites," 246, 253; Bluestone, "Tobacco Row," 26.
[403] Jennifer Evans, Public History Resource Center, "What is Public History," November 5, 2010. Accessed April 20, 2012 at http://www.publichistory.org/what_is/definition.html.
[404] Kauffman mentions, and I agree that such collaborative efforts should include the work of anthropologists, preservation professionals, traditional historians with various specializations, including public history historians, archaeologists, architects, folklorists, geographers, and perhaps in the case of a place like Western Clay also geologists. See Kauffman, *Place, Race, and Story,* 53.

new stakeholders—parties also recognized to have some relationship with or vested interest in the site such as former workers or their family members, local citizens, site neighbors, and recipients of goods and products in the case of Western Clay—and bring them into the greater stewardship fold.

As this work has illuminated, the more research that is undertaken, and the more comprehensive the investigations into a site's history are, the greater the possibilities will be for historic sites like Western Clay to realize its interpretive and educational potential and maintain the sense of the place through first the preservation of and afterward the interpretation of the physical elements that act as story sites and together work to form a storyscape. These elements simultaneously function as repositories for and inducers of historical memories. These buildings and structures, through dint of materially being presented for active engagement, serve to foster new memories of place.[405] Preservation of a site like Western Clay can, of course, take many forms. Certain buildings and structures may be adaptively reused while others might be restored or even preserved in a state of ruin. Whatever decision is ultimately made, each type of preservation action chosen should be sensitive to the sites history. They should aim to maintain and manage the now recognized narrative possibilities that were discussed at length in Chapter 3 and derived from a combination of historical understanding, significance, and both existing conditions and the current integrity of structural materials. Additionally, this work has revealed that in terms of history, it is limiting when the preservation of a site like Western Clay is only approached in terms of a certain building or a particular grouping of buildings that prove most architecturally significant or aesthetically pleasing. For instance, Western Clay's beehive kilns are undoubtedly interesting to look at but whether a single kiln or even as a grouping of five, these kilns tell little about what actually happened on the site. If preserved along with and in the context of other site buildings, equipment, and structures recognized to have operated in conjunction, then many more histories of the site can be recounted. Also, knowing the social history of the

[405] See Bluestone, "Toxic Sites," 245-264.

site and being able to interject these narratives into the place helps to both broaden interest in the greater site and enrich the storyscape. Moreover, this work has shown that the history of Western Clay does not stop and start at the edge of either the contemporary ABF campus or the section of the property that contains the greatest clustering of former industrial buildings, machinery, and structures. "Industrial heritage," writes Duncan Hay, vice president of the Society for Industrial Archaeology, "is far more than factories alone. Physical manifestations of industrial society can be seen in surrounding workers' housing, community structures, infrastructure and landscape."[406] Although the worker's housing may not be applicable in Western Clay's case, these "physical manifestations of industrial society are certainly still evident in many other local, regional, and state sites. Also, Daniel Bluestone has perspicaciously noted and called attention to the fact that the retention of the material framework for remembering and understanding both a site and the site in relation to its surroundings—the natural landscape, community, ecosystems, transportation systems, etc.—is crucial if the public, which is inclusive of recognized stewards, former workers and their families, area residents and community members, and visitors to the site, is going to be provided with opportunities for learning and for historic engagement.[407]

Western Clay certainly has a wealth of history to impart on many levels. In the time allotted for this study, only some of the basics of this manufactory's history have been documented and revealed. Undoubtedly, the more information that is uncovered about Western Clay and the more that this site is able to be linked to: both the historical and contemporary Helena community; the late nineteenth and early to mid-twentieth-century brickmaking industry technologies and labor history—nationally, regionally, and locally; the social history of the site's former workforce—labors, cooks, farmers, proprietors, and contracted employees; the railroads; and to the sources of raw materials and the infrastructure (as in paved streets) and the buildings constructed with this company's products, the more significant and engaging the site will become. Additionally, one other area of scholarship that was cursorily touched on in Chapter 3, but which would certainly augment the case for the preservation of Western Clay's buildings, structures, and

[406] Hay, "Preserving Industrial Heritage," 19.
[407] Bluestone, "Toxic Sites, 245-46,251; Bluestone, "Tobacco Row," 25-26.

machinery is of social theory: memory studies, ideology, and spatial practice. Still, even without this extra level of theoretical backing, the historical associations that have been made and the stories that have been uncovered proved most useful; they allowed for the development of a well-informed framework for future preservation decision-making at Western Clay. This aggregation of information has shown that as the site physically manifests today, Western Clay is best positioned through it extant architecture to tell first the history of structural and hollow clay tilemaking, on a local, regional, and national scale. Secondarily, it is well positioned to tell the little-known, but important story of the brick and structural and hollow clay tile industry's kiln technologies.

It is crucial to note that the small amount of social research that was undertaken during the course of this project proved promising and brought to light a new, previously under-interpreted historical component to both Western Clay and to the history of its production processes. Future work in this area could easily prove bountiful and may result in the re-insertion of additional narratives into the existing storyscape. For example, research undertaken showed that around the turn of the twentieth-century Western Clay both lodged and employed a number of Western European and Scandinavian immigrants and men who had emigrated from Eastern states. Future research might reveal more information about these various immigrant groups and their reasons for working in a brickyard. It might answer such questions as: Were these laborers trained in the art of brickmaking prior to arriving at Western Clay? Did they and other workers, even native Montanans, simply acquire skills on the job? Was it simply coincidental that many of the men who came from the Eastern states to work at Western Clay came from states known to be large producers of clay products? Additional information might reveal how long the average worker remained employed at Western Clay and it might shed light on the more nuanced details of life as a Western Clay laborer and boarder. Also, future attention should be directed at tracking down and conducting official oral history interviews with former Western Clay laborers, with their family members, and with other community members, like Western Clay's longtime neighbor, Scott Buswell, who have personal memories of the manufactory. It is imperative that

this particular public history work happens as soon as possible. Many of the individuals who had a direct connection to the site's history have already passed away; thus, the actual memory of this manufactory has already diminished. Those former workers, like Jim Elliott, and individuals like Richard Rogers who were in some way once connected to the manufactory are growing older with each passing year and if their memories are not soon tapped there is a possibility that these actual memories of place will be forever lost.

Future directions for research should also consider looking at programming that not only respects, but brings to life the history of Western Clay while also managing to integrate well with the mission and the objectives of the ABF. There are several sites that might be looked at as potential models. A few of these sites were mentioned in passing within the context of this work—Moravian Pottery and Tile Works (Moravian), and Medalta Potteries (Medalta). None, however, became a focus because the objective of this thesis was to first lay the necessary groundwork for interpretation by delving as far into the history of the site as possible and afterward take the historical information garnered and constructing a framework for preservation decision-making based on informed knowledge of the site. As Western Clay moves from preservation decision-making and into the realm of programming and interpretation, sites like Moravian and Medalta should be studied. Additional sites worthy of study are Claybank, Saskatchewan, Canada's Claybank Brick Plant National Historic Site and Museum, The Maws Craft Center in Jackfield, Shropshire, United Kingdom, and the Tsalapatas Brickworks Museum in Volos, Greece should also be consulted for both their programming and interpretive strategies.

"A model press brick plant." The Clay Worker 40, no. 1(1903): 80.

Antonelli, Marylu and Jack Forbes, Pottery in Alberta: The Long Tradition. Alberta, Canada: University of Alberta Press, 1978.

Archie Bray Foundation for the Ceramic Arts. "About Us." Last modified, August 17, 2011. http://www.archiebray.org/about_us/abf_history.html.

Archie Bray Foundation for the Ceramic Arts. "History." Last modified, August 17, 2011. http://www.archiebray.org/about_us/abf_history.html.

_____. "Walking Tour," Helena, MT: Archie Bray Foundation for the Ceramic Arts (2010).

Armstrong, Lance. "Brickyard was important Riverside-Pocket area business." Valley Community Newspapers, Inc., 14 April 2010. Accessed on January 28, 202 at http://www.valcomnews.com/?p=1001.

Baumler, Ellen. "Lots of Brick To Lay: Building the Archie Bray Foundation." *Signature Montana* (Spring 2010): 11.

Biggs, Lindy. *The Rational Factory: Architecture, Technology, and Work in the Age of Mass Production*. Baltimore: Johns Hopkins University Press, 1996.

Bishop, John Leander, Edwin Troxell Freedley, and Edward Young, state in *A history of American Manufactures, from 1608 to 1860*, V.1. Philadelphia: Edward Young & Co., 1864.

Bluestone, Daniel. *Buildings, Landscapes, and Memory*. New York: W.W. Norton and Company, (2011).

_____ "Tobacco Row: Heritage, Environment, and Adaptive Reuse in Richmond, Virginia." Change Over Time (forthcoming).

Bowler, Duane W. "Western Clay Plays Role in Growth, Beauty of Capital City." Independent Record, V. II, No. 242, July 22, 1945. Montana Historical Society, Clippings Files, Folder "Western Clay Manufacturing Company."

Bradley, Betsy Hunter. *The Works: The Industrial Architecture of the United States*. New York: Oxford University Press, 1999.

Bray, Archie Jr. Interview with Martin Holt, "The Oral History of the Archie Bray Foundation," Los Angeles, CA. 3 August 1978. 1-29. Montana Preservation Alliance's Archie Bray Foundation Files, Folder ABF Oral History Interviews.

Brick Industry Association. "Overview of the American Brick Industry: A Product of the Current Building Environment." The Brick Industry Association, 2012. Accessed on January 4, 2012 at http://www.gobrick.com/Resources/AmericanBrickIndustry/tabid/7644/Default.aspx.

Brooke L. Gunsallus, Harold F. Breimyer, Aaron J. Blumberg, and Edgar C. McVoy, United States Department of Commerce, "Manufacturing Brick and Tile To Serve Your Community," Industrial (Small Business) Series No. 49, (Washington, DC: U.S. Government Printing Office, 1946), ii-51.

"Busy Times At The Works Of The Christy Fire Clay Company." *The Clay Worker* 40, no. 5 (1903): 449.

Carlino, August R. "Greater Pittsburg's Industrial Communities in Transition." *Forum Journal* 25 no. 3 (2011): 32-39.

Crary, John W. *Sixty years a brickmaker: A practical treatise on Brickmaking and burning and the management and use of different kinds of clays and kilns for burning brick*. Indianapolis: T.A. Randall & Co., 1890.

Colonial Brick Corporation. "The Lone Survivor." Accessed on October 14, 2011 at http://www.colonialbrick.com/history.php.

_____. "The Process." Accessed on October 14, 2011 at http://www.colonialbrick.com/process.php.

Crawford, Margaret. *Building the Workingman's Paradise: The Design of American Company Towns*. London: Verso. (1995).

Cornwell, David. *Commercial Application of Water Marketing of Water Plant Residuals*. U.S.: American Water Works Association, 2000.

Davis, Charles Thomas. *A practical treatise on the manufacture of brick, tiles, terra-cotta, etc*. Philadelphia: H.C. Baird & Co., 1897 (original publication 1893).

Dobson, Edward. *A rudimentary treatise on the manufacture of bricks and tiles: containing an outline on the principles of Brickmaking*. London: Crosby Lockwood, 1903.

DuPont Supervisory News Letter 11, no. 5. Wilmington, DE: A. I. DuPont Nemours. (1957). Courtesy of the Hagley Museum and Library, Foundation Archives, Folder 2.

Economic and Transportation Prospects: Subcommittee on Economic Study of the Railroad Committee for the Study of Transportation: Association of American Railroads, January, 1946." Washington, DC: The Association, 1946.

Elliott, Jim. Oral History Interview with Chip Clawson. Video recorded by author for The University of Pennsylvania's Department of Historic Preservation. Helena, MT, 27 July 2011.

"Employee's welfare a first consideration: Alabama face brick plant is considered modern in every respect at this date and has high reputation among southern competing firms." *Brick and Clay Record* 57 (1920): 222.

Ewan, N. R. "Early Brickmaking in the Colonies." Camden, NJ: Camden County Historical Society, 1970. Accessed on January 4, 2012 at http://www.westjerseyhistory.org/articles/brickmaking/.

"Found Dead in Bed: Old Man Dies a Lonely Death in Brickyard Bunkhouse," The Evening News, San Jose, CA, 26 June 1903, page 1. Accessed on January 28, 2012 at http://news.google.com/newspapers?nid=1982&dat=19030626&id=YzAiAAAAIBAJ&sjid=IKQFAAAAIBAJ&pg=3993,6210347.

Galusha, Betty Bray Interview with Martin Holt, "The Oral History of the Archie Bray Foundation," Los Angeles, CA. 3 August 1978. 1-29. Montana Preservation Alliance's Archie Bray Foundation Files, Folder ABF Oral History Interviews.

Gardner, F.M. "Brick-burning." *Brick and Clay Record* 7, no. 3 (1897): 190.

Gardini, Fausto. "Nicholas Kessler: A Montana Pioneer from Luxembourg." Fausto Gardini, 2009. Accessed on August 18, 2011 at http://knol.google.com/k/fausto-gardini/nicholas-kessler-1833-1902/2h2drar9l37dn/5#.

Goss, Jon. "The Built Environment and Social Theory: Towards and Architectural Geography." *Professional Geographer* 40, no. 4 (1988): 392-403.

Greaves-Walker, Arthur Frederick. *Clay Plant Construction and Operation*. Chicago: Brick and Clay Record, 1919.

Gunsallus, Brooke, L., Harold F. Breimyer, Aaron J. Blumberg, and Edgar C. McVoy, United States Department of Commerce. "Manufacturing Brick and Tile To Serve Your Community," Industrial (Small Business) Series 49. Washington, DC: U.S. Government Printing Office, 1946.

Gurcke, Karl. *Bricks and Brickmaking: A Handbook for Historical Archaeology*. Moscow, ID: The University of Idaho Press, 1987.

Guyserbeek, Samuel "Differences Between Pottery Bodies and Common Clays." *Brick and Clay Record*, 7, 3 (1897): 182.

Hammond, Martin. *Bricks and Brickmaking*. Aylesbury, Bucks, UK: Shrine Publications, 1981.

Hansen, Jim. "The Bricks of Blossburg," in Kleptetko Chapter of the Society for Industrial Archaeology Newsletter, 26, no. 1 (2012): 8-12.

Hay, Duncan. "Action Steps for Preserving Industrial Heritage." *Forum Journal* 25 no. 3 (2011): 13.

Hayden, Dolores. *The Power of Place: Urban Landscapes as Public History*. Cambridge, MA: MIT Press (1995).

"Helena Brick Factory Begins New Operation." *Great Falls Tribune*, July 14, 1957, 7-8. Montana Historical Society, Clippings Files, "Western Clay Manufacturing Company File."

Helena Independent Record, October 10, 1935. Accessed on March 6, 2012 at www.wcm%20 refs%20from%20ancestry.com.

Hewitt, L.C. "Putting the Kiln Fireman on Bonus," *Brick and Clay Record* 58 (1921): 130.

Honeywell. "Application Profile: Tunnel Kiln." TK-1. Accessed on November 11, 2012 at http:// content.honeywell.com/sensing/control/products/thermocouples/application/tunnel_kiln. pdf.

Hutton, George V. T*he Great Hudson River Brick Industry*. Fleichmanns, New York: Purple Mountain Press, Ltd., 2003.

"Illinois Clay Men Pledge Aid to U. of I: Instructive Papers on Manufacturing Subjects Characterizes Annual Meeting of Illinois Clay Manufacturers Association." *Brick and Clay Record* 58, no. 3 (1921): 472.

Industrial Publications, Inc. "Ceramic catalogs on equipment and materials: with supplementary reference guides to processes in the manufacture of brick, enamel, glass, pottery, refractories, sewer pipe, terra cotta, tile, etc." Industrial Publications, 1934, 165-191.

International Labour Office, United Nations Industrial Development Organization, and World Employment Programme. "Small Scale Brickmaking." Geneva: International Labour Office, 1984.

Jacobson, Dorothy R. "Report to the Agricultural Research Service on the Cultural History Values of the New York Avenue Brickyard" (August, 25, 1976), 17. Courtesy of the U.S. National Arboretum, Washington, DC, In-house files: Brickyard.

Jenkins Brick and Tile Company. "Company History." Accessed on November 11, 2011 at http:// www.jenkinsbrick.com/AboutUs/CompanyHistory/tabid/61/Default.aspx.

Jiusto, Chere and Rick Newby, "A Beautiful Spirit": Origins of the Archie Bray Foundation for the Ceramic Arts, In *A Ceramic Continuum: Fifty Years of the Archie Bray Influence*, edited by Peter Held. Seattle: University of Washington Press, 2001, 17-61.

Kaufman, Ned. *Place, Race, and Story: Essays on the Past and Future of Historic Preservation*. New York: Routledge (2009).

Kessler, Charles N. "A Few Remarks at the Occasion of the Opening of the First Branch of the Archie Bray Foundation." Unpublished, 1951, 1-3. Montana Historical Society, "Clippings Files" Folder I, "Archie Bray Foundation."

Kessler Family Papers, "Inventories for Kessler Brick and Sewer Pipe Works, January 1, 1897," MC 161, Box 49, Folders 2 Montana Historical Society, Montana State Archives, Helena, MT.

Leeson, M.A. "Personal History and Reminiscences: C.C. Thurston." In History of Montana: 1739-1885. Chicago: Warners, Beers, & Company, 1885, 1256.

Lincoln, Marga. "60 Years and Then Some." Independent Record, June 16, 2011. Accessed on July 27, 2011 at http://helenair.com/news/years-and-then-some/article_35246096-97e0-11e0-84c9-001cc4c03286.html.

Mann, Marion. "Draft of The Historic Brickyard at the U.S. National Arboretum." Unpublished, date unknown. Courtesy of the U.S. National Arboretum, Washington, DC, Historic Brickyard files.

Martin Brick Machine Manufacturing. *Illustrated catalogue of brick making machinery and brick yard appliances*. Lancaster, PA: Martin Brick Machine Manufacturing Co. date unknown.

McKee, Harley J."Brick and Stone: Handicraft to Machine." In B*uilding Early America: Proceedings of the Symposium Held at Philadelphia to Celebrate the 250th Birthday of the Carpenters' Company of the City & County of Philadelphia*, ed. Charles E. Peterson. Radnor, PA: Chilton Book Company, 1976.

Medalta, "Historic Clay District History," Last modified, 2011. http://medalta.org/museum/historic-clay-district-history.

_____ . "Clay Chronicels: Stories from a Pottery Factory, Medalta Potteries Historic Site, Medicine Hat, Alberta, Canada. Last modified, 2011. http://www.virtualmuseum.ca/pm_v2.php?lg=English&ex=00000494&fl=0&id=exhibit_home.

Medora Brick Plant. "History of the Medora Brick Plant." Steve Graves, 2011. Accessed on October 14, 2011 at http://www.medorabrickplant.org/index.htm.

Miller, Joaquin. “Jacob Switzer.” In *Illustrated History of the State of Montana*. Chicago: Lewis Publishing Company, 1894, 154-55.

_____ .”Nicholas Kessler.” In *Illustrated History of the State of Montana*. Chicago: Lewis Publishing Company, 1895, 269-70.

Putnam Miller, Page, and Nelly Longsworth. “Nelly Longsworth: Champion for Historic Preservation.” The Public Historian 23, no. 1 (2001): 9-25.

Minnesota Bricks, “Rush City Newspaper Articles,” (Minnesota Bricks, 2012). Accessed on January 28, 2012 at http://www.mnbricks.com/rush-city-newspaper-articles.

Mitner, J.E. “Sewer Pipe and How to Make it.” *Brick and Clay Record*, 18, no. 2 (1903): 80.

Minton, R.H. “Unusual design for a fire brick plant.” *Brick and Clay Record* 57, (1920): 215.

“Modern Bricks,” *The British Clay Worker* 14 (1905): 177.

Morrison, R. B. *Brickmaker’s Manual*. Indianapolis: T. A. Randall and Company, 1890.

_____ . “Which Principle is Better for Burning Common Brick, Up-Draft or Down-Draft,” *Brick and Clay Record* 6, no. 1, (1897): 96.

National Park Service. “The Secretary of the Interior’s Standards for the Treatment of Historic Properties, 1995: Standards for Reconstruction,” in “Archeology and Historic Preservation: Secretary of Interior’s Standards and Guidelines,” Accessed on March 23, 2012 at http://www.nps.gov/history/local-law/arch_stnds_8_2.htm.

Nash, William George. *Brickwork*. London: Nelson Thornes, Ltd., 1983.

“National Brick manufactures association 11th annual, February 2nd.” *Brick and Clay Record* 6, no. 1 (1897): 99-100.

Nickerson, John H., Jr. “An Incomplete History of the Archie Bray Foundation.” Master’s thesis, Alfred University, 1969. The Montana Preservation Alliance, “ABF Articles.”

O’Connor, Richard P. “A history of Brickmaking in the Hudson Valley.” PhD diss. University of Pennsylvania, 1987.

Parks Canada. “Canada’s Historic Places: Claybank Brick Plant National Historic Site of Canada.” Parks Canada, 2011. Accessed on October 2, 2011 at http://www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=9350.

“Patent for Continuous Brick Kiln.” *Brickbuilder* 2, no. 12 (1893): 114.

Quivik, Fredric L. “The Western Clay Manufacturing Company: An Historical Analysis and Its Development.” Butte, MT: Renewable Technologies, Inc., 1985, 1-34.

_____ . National Register of Historic Places, “Inventory—Nomination Form: Western Clay Manufacturing Company,” 1985, 1-9.

_____ . Montana Historical and Architectural Inventory Form, Helena, MT (1985), 1-53.

Ramsay, John D. *Refractories: The Backbone of Industry*. Cleveland: North American Refractories Company, 1940.

Ries, Heinrich and Henry Leighton. *History of the Clay-Working Industry in the United States*. New York: John Wiley and Sons, 1909.

Ritchie, T. “A History of the Tunnel Kiln and Other Kilns for the Burning of Bricks.” In *Bulletin of the Association for Preservation Technology* 12, no. 3 (1980): 51.

“Rollin’s Barium Carbonate.” In *Brick and Clay Record* 57 (1920): 426.

Roseville Brick and Terra Cotta Works: Description of the Kilns.” *Brick and Clay Record* 6 no. 4, (1897): 234.

Rowe, Jesse Perry. “Some Economic Geology of Montana.” *University of Montana Bulletin* 50, no. 3 (1908).

Rowe, Jesse Perry. “The Western Clay Manufacturing Company, Helena, Mont.” *Brick and Clay Record*, 26, no. 6 (1907): 173-175.

Sanborn. “Western Clay.” Sanborn Company Fire Insurance Map, 1892, updated to 1922, Montana, Plate 148.Courtesy of the Montana Historical Society. Helena, MT.

Sanborn. “Western Clay.” Sanborn Company Fire Insurance Map, 1930, Montana, Plate 148. Courtesy of the Montana Historical Society. Helena, MT.

Sanborn. “Western Clay.” Sanborn Company Fire Insurance Map, 1951, Montana, Plate 148. Courtesy of the Montana Historical Society. Helena, MT.

Sanders, Helen Fitzgerald. “Charles H. Bray.” In *History of Montana*. Chicago: Lewis Publishing Company, (1913), 1272.

Searle, Alfred B. *Modern Brickmaking*. London: Scott, Greenwood & Son, 1911.

Searle, Alfred Broadhead. *The clayworker’s hand-book: a manual for all engaged in the manufacture of articles from clay*. London: Charles Griffin and Company, 1906.

Shackel, Paul A. and Matt Palus. "Remembering an Industrial Landscape." International Journal of Historical Archaeology, 10, no. 1 (2006): 49-71.

Squires, Frederick. The Hollow Tile House. New York: William T. Comstock Co., 1913.

Talwani, Sanjay. "Historic VA buildings in jeopardy," Helena Independent Record, 7 August 2011. Accessed on February 2, 2012 at http://helenair.com/news/historic-va-buildings-in-jeopardy/article_609cb448-c0b3-11e0-b233-001cc4c002e0.html (2012).

"The Simpson Brick Company's New Works at Chicago." In *Brick and Clay Record* 6, no. 4 (1897): 279.

"The Superintendent: Helpful Hints for Practical Men Whose Problem is Maximum Production With Minimum Cost," Brick and Clay Record, 57, no. 11 (1920): 939.

Tomkins, Calvin. "The Brick Industry About New York City." *Transactions of the American Society of Engineers* 18 (1888): 281-290.

Tawodzer, Peter. "Iglo Type Brick Kilns in Zimbabwe." Wall Building Case Study, Eschborn, Germany, 1997, pp. 1-4. Accessed on August 11, 2011 at http://sleekfreak.ath.cx:81/3wdev/GATE_DL/BUILDING/IGLOOKLN.PDF (April 1997).

U. S. Census, 1900; Census Place: Township 10, Lewis and Clark, Montana; Roll: 912; Page: 4B; Enumeration District: 160; FHL microfilm: 1240912. Ancestry.com. 1900 United States Federal Census [database on-line]. Provo, UT, USA: Ancestry.com Operations Inc, 2004. Original data: United States of America, Bureau of the Census. Twelfth Census of the United States, 1900. Washington, D.C.: National Archives and Records Administration, 1900. T623, 1854 rolls.

U.S. Census, 1910; Census Place: Kessler School District, Lewis and Clark, Montana; Roll: T624_833; Page: 1B; Enumeration District: 0168; Image: 343; FHL microfilm: 1374846. Thirteenth Census of the United States, 1910 (NARA microfilm publication T624, 1,178 rolls). Records of the Bureau of the Census, Record Group 29. National Archives, Washington, D.C

U.S. Census, 1920; Census Place: Kessler, Lewis and Clark, Montana; Roll: T625_972; Page: 4A; Enumeration District: 92; Image: 160. Original data: Fourteenth Census of the United States, 1920. (NARA microfilm publication T625, 2076 rolls). Records of the Bureau of the Census, Record Group 29. National Archives, Washington, D.C..

U.S. Census, 1930; Census Place: Kessler, Lewis and Clark, Montana; Roll: 1258; Page: 2B; Enumeration District: 15; Image: 293.0; FHL microfilm: 2340993. Ancestry.com. 1930 United States Federal Census [database on-line]. Provo, UT, USA: Ancestry.com Operations Inc, 2002. Original data: United States of America, Bureau of the Census. Fifteenth Census of the United States, 1930. Washington, D.C.: National Archives and Records Administration, 1930. T626, 2,667 rolls.

U.S. Department of the Interior, National Park Service, "Integrity," in "National Register Bulletin: Guidelines for Evaluating and Documenting Historic Aids to Navigation to the National Register of Historic Places" . Accessed on December 28, 2011 at http://www.nps.gov/nr/publications/bulletins/nrb34/nrb34_8.htm (13 June 2011).

W.A. Riddell Company. W.A. Riddell Company: the oldest and largest manufacturers of clay-working equipment for complete clay-working plants, stiff mud and dry press brick. Bucyrus, OH: The W.A. Riddel Company, 1929.

Wallace, Kim Elaine. "De/industrializing material culture: Refractory bricks and company housing in south-central Pennsylvania brickyard towns, 1890—1990," PhD diss., University of Pennsylvania, 2005.

"Water wheel to be placed between old powder mills." *Wilmington Morning News*. 16 August 1964. Courtesy of the Hagley Museum and Library Archives, Foundation Archives, 5.

Williams, Emerson. "Railroad to Make Comeback at Hagley." *Wilmington Evening News Journal*. 21 September 1970. Courtesy of the Hagley Museum and Library Archives, Foundation Archives, 5.

Woodford, John. *Bricks to Build A House*. London: Routledge and Kegan Paul, 1976.

Wyer, S. S. "Applications of Gas Engineering to the Brick Industry." *Brick and Clay Record* 26, no. 2 (1907): 118-120.

Yankee Hill Brick and Tile, "Brickmaking A to Z: Historical Origin," (Yankee Hill Brick and Tile, 2001). Accessed on October 3, 2011 at http://www.yankeehillbrick.com/history_handout01.pdf.

Zelizer, Barbara. "Reading the Past Against the Grain: The Shape of Memory Studies," *Critical Studies in Mass Communication*, 12 (1995): 222.

Figure 1.1: “The Western Clay Manufacturing Company, overview from northewast looking southwest.” Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

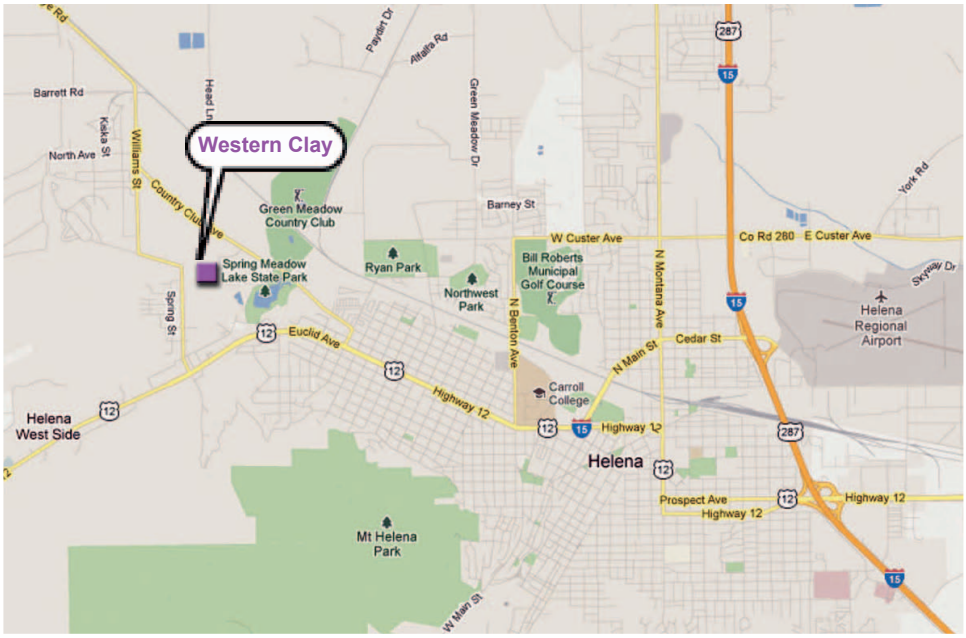


Figure 2.1: Map showing location of the Western Clay Manufacturing Company in relation to downtown Helena, MT. Helena, MT, Courtesy: Google Maps, 2012, http://maps.google.com/.

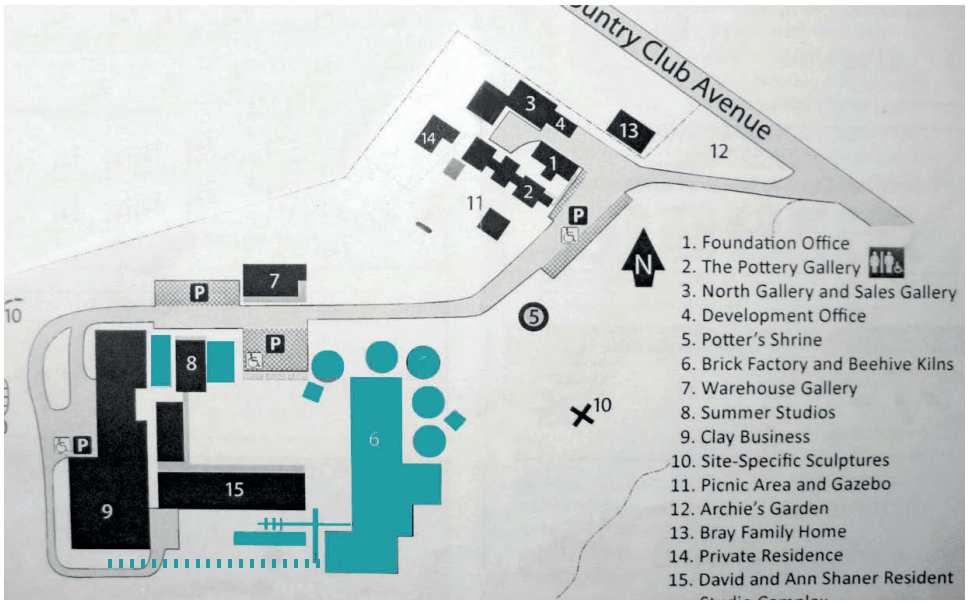


Figure 2.2: Contemporary campus map of the Archie Bray Foundation for the Ceramic Arts. Map modified to highlight the location of the remaining, although sometimes adaptively reused Western Clay Manufacturing Company's industrial structures. Based on the Archie Bray Foundation for the Ceramic Arts Walking Tour Brochure.

Figure 2.3: Ceramic art on the ABF Property. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

RANK OF TWELVE LEADING STATES AS PRODUCERS OF CLAY PRODUCTS FROM 1890 - 1907

1890	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907.
Pa.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.
O.	Ill.	Pa.	Pa.	Pa.	Pa.	Pa.	Pa.	Pa.	Pa.	Pa.	Pa.	Pa.	Pa.	Pa
.N.Y.	Pa.	Ill.	N.Y.	N.J.	N.J.	N.J.	N.J.	N.J.	N.J.	N.J.	N.J.	N.J.	N.J.	N.J.
N.J.	N.Y.	N.Y.	Ill.	N.Y.	Ill.	N.Y.	Ill.	N.Y.	Ill.	Ill.	Ill.	N.Y.	N.Y.	Ill.
Ill.	N.J.	N.J.	N.J.	Ind.	N.Y.	Ill.	N.Y.	N.Y.	N.Y.	N.Y.	N.Y.	Ill.	Ill.	N.Y.
Ind.	Mo.	Mo.	Ind.	Mo.	Mo.	Mo.	Mo.	Mo.	Ind.	Mo.	Ind.	Mo.	Mo.	Ind.
Mo.	Ind.	Ind.	Mo.	Ind.	Ind.	Ind.	Ind.	Mo.	Ind.	Ind.	Ind.	Ind.	Mo.	Ind.
Mass.	Ia.	Mass.	Mass.	Mass.	Ia.	Ia.	Ia.	Ia.	Ia.	Ia.	Calif.	Calif.	Calif.	Calif.
Calif.	Mass.	Ia.	Ia.	Mass.	Mass.	W. Va.	W. Va.	W. Va.	Calif.	Ia.	Ia.	Ia.	Ia.	Ia.
Colo.	Mich.	Calif.	Md.	Conn.	Md.	Wisc.	Mass.	Mass.	Mass.	W. Va.	Ky.	Ky.	W. Va.	W. Va.
Neb.	Md.	Mich.	Conn.	Md.	Minn.	Md.	Md.	Calif.	Calif.	Ky.	W. Va.	Md.	Ky.	Ky.
Md.	Wis.	Minn.	Mich.	Tex.	Calif.	Calif.	Ky.	Tex.	Colo.	Mass.	Ga.	Ga.	Kas.	Tex.

Figure 2.4: “Rank of the Twelve Leading States as Producers of Clay Products, 1800-1907.” Image from Heinrich Ries and Henry Leighton, *History of the Clay-working Industry in the United States*, p. 8, New York: John Wiley and Sons, 1909.

Figure 2.5: Image of Charles H. Bray. “Charles H. Bray.” In Duane W. Bowler, “Western Clay Plays Role in Growth, Beauty of Capital City,” *Helena Independent Record,* Volume II, No. 242. July 22, 1945. Courtesy: Montana State Archives, “Clippings Files: Western Clay Manufacturing Company.”

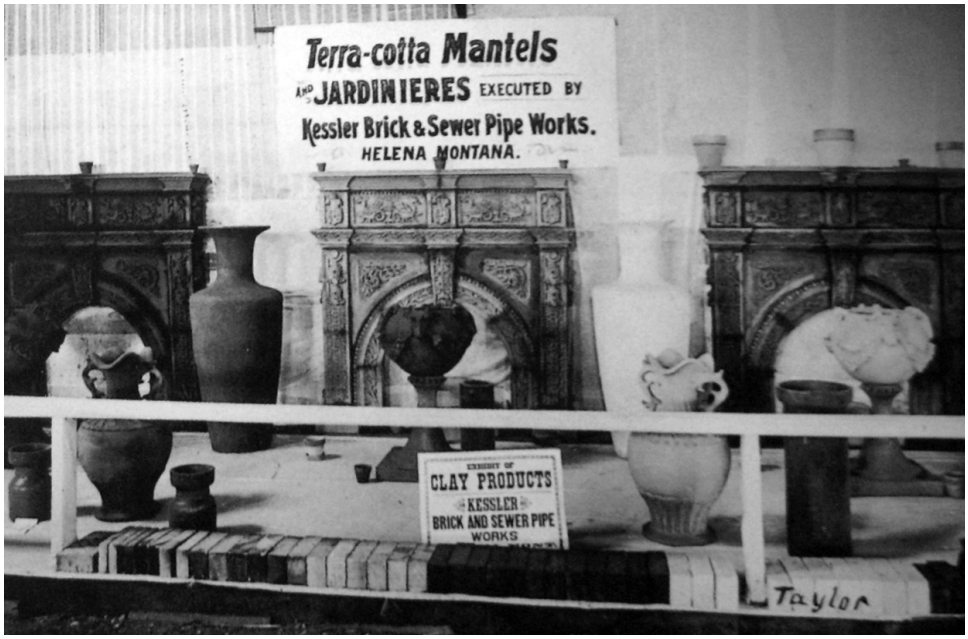


Figure 2.6: “Display of the range of clay products manufactured at the Kessler Brick & Sewer Pipe Works, Montana State Fair, ca. 1908. Montana Historical Society Photograph Archives.” In *A Ceramic Continuum: Fifty Years of the Archie Bray Influence*, 18, Seattle: University of Washington Press, 2001.

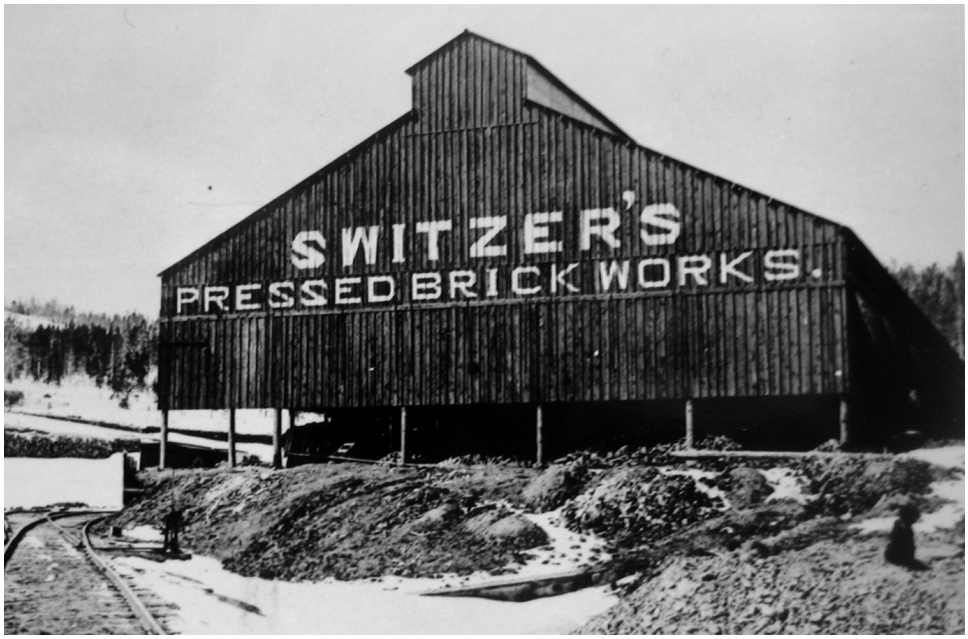


Figure 2.7: “Switzer Pressed Brickworks, Blossburg, MT.” Historical image of plant. Date and photographer unknown. Image courtesy of the Montana Hitorical Society, Helena, MT.

Figure 2.8: “Western Clay Manufacturing Company: Vitrified Culvert and Sewer Pipe,” Advertisement. Date and photographer unknown. Image courtesy of the Montana Hitorical Society, Helena, MT.

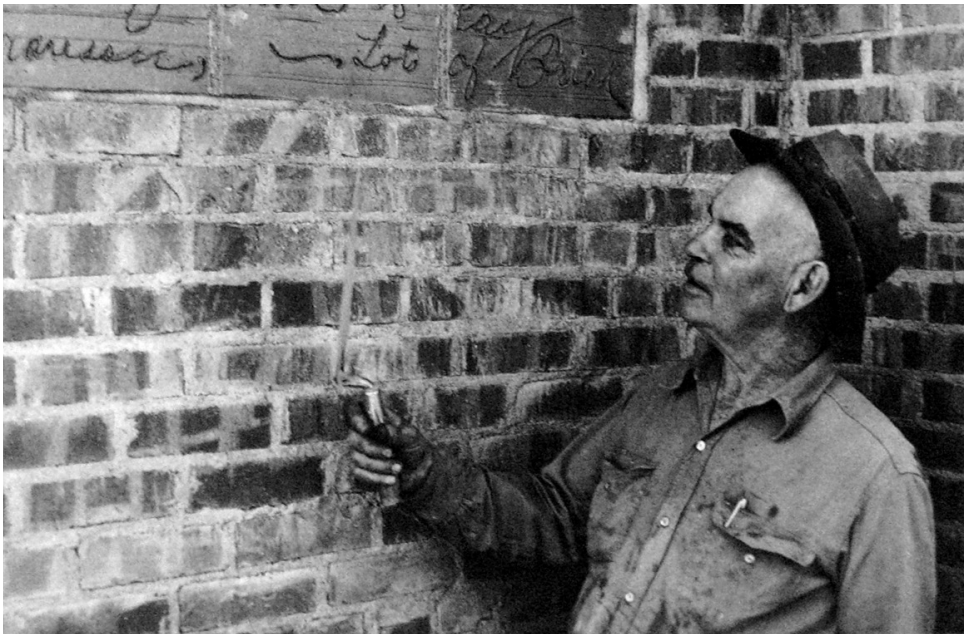


Figure 2.9: Archie Bray, Sr., “Archie Bray with trowel in hand.” L. H. Jourd, photographer, 1952. Image courtesy of the Archie Bray Foundation for the Ceramic Arts.

Figure 2.10: Horse operated pug mill at the Soft Salida Brick Company. Image courtesy of the Salida Library. From http://cozine.com/2009-october/the-story-of-soft-salida-brick/.

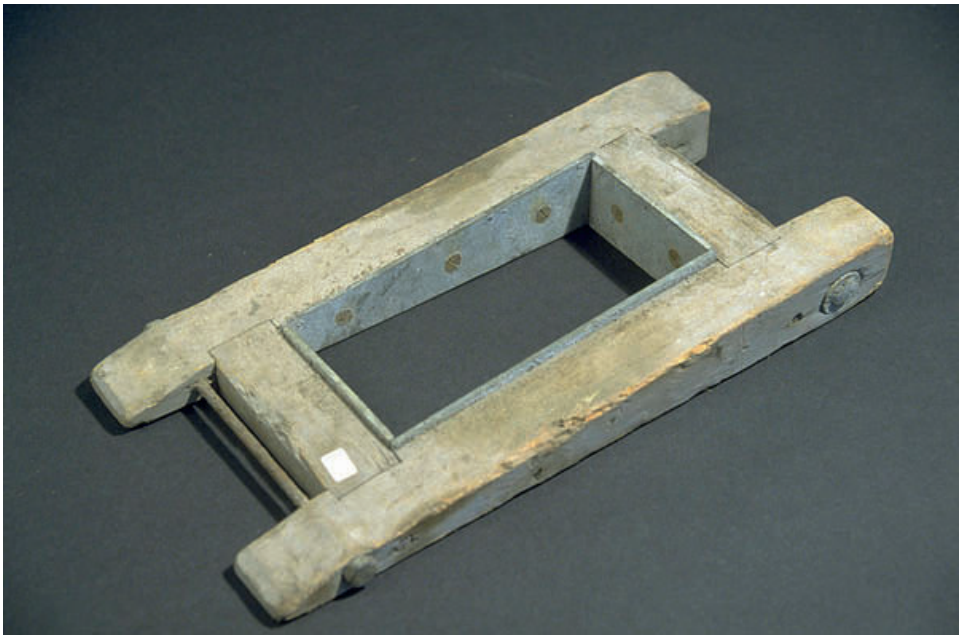


Figure 2.11: “Wood and Steel Brick Mould.” Photographer unknown, 2007. Courtesy of the East Lothian Museum, East Lothian, United Kingdom. Image from http://www.flickr.com/photos/eastlothian/540650616/in/photostream/lightbox/.

Figure 2.12: “Men building a clamp kiln to fire the raw brick. Photographer unknown, cirica 1900. From Old Canal Pottery, http://madpotter-oldcanalpottery.blogspot.com/.

Figure 2.13: Image of a scove kiln. Photographer unknown, circa 1900. Image from http://brickcollecting.com/history.htm.

Figure 2.14: Modified version of a Scotch Kiln. “Baumber Brick Kiln.” Ken Redmore, photographer, 2006. Society for Lincolnshier History and Archaeology. Image from http://slha.org.uk/slha/Main/GalleryBricks.

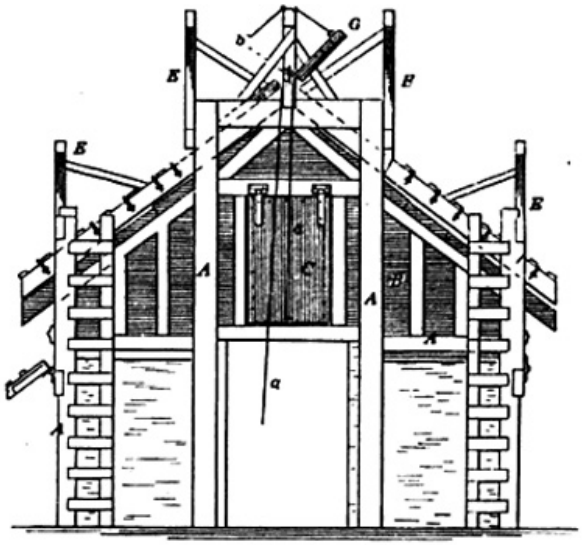


Figure 2.15: “End elevation of brick kiln embodying [the invention of the permanent roof].” From Charles Thomas Davis, *A Practical Treatise on the Manufacture of Bricks, Tiles, Terra-Cotta, Etc*. (Philadelphia: Henry Carey Baird & Company, 1884), 161.

Figure 2.16: “Early beehive kilns at either the Kessler or Western Clay Works.” Courtesy of the Montana Historical Society, Helena, MT.

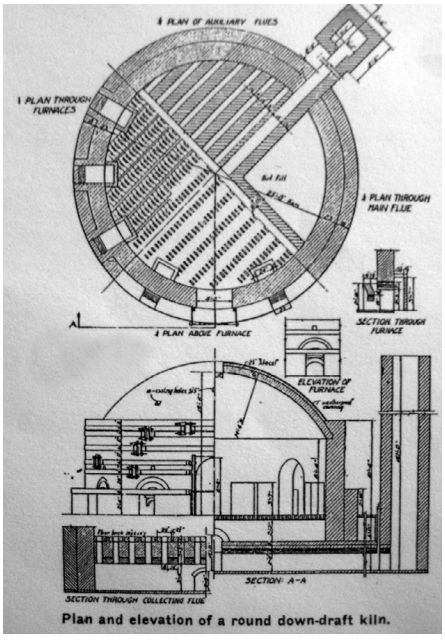


Figure 2.17: Flue system and chimneystack connection of a beehive kiln. “Plan and elevation of a round down-draft kiln.” “Clay Products Manufacturing,” *Ceramic data book*, (Chicago, Ill: Industrial Publications, 1935), 184.

Figure 2.18: Image showing the location and arrangement of beehive kilns. Image of the North Mountain Brick Plant in Eastern West Virginia. Photographer unknown, circa 1950. Image Courtesy of Jeff Hollis, Continental Brick Company, Martinsburg, WV.

Figure 2.19: 1890s era beehive kiln with shed roof. Bulmer Brick and Tile Company, Ltd., Suffolk UK. Peter Minter, photographer, date unknown. Image courtesy of Peter Minter.

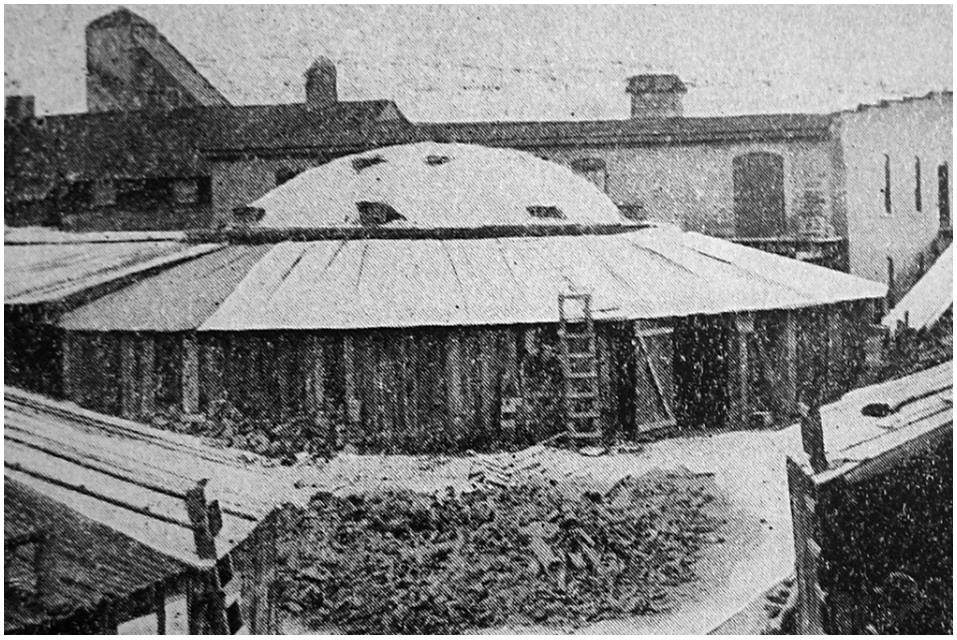


Figure 2.20: Rowe, Jesse Perry. Early 20th Century Kiln Sheds at Western Clay. "Some Economic Geology of Montana." *University of Montana Bulletin* 50, no. 3 (1908).

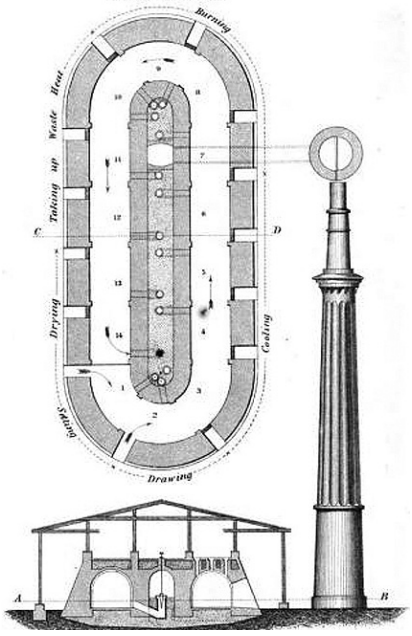


Figure 2.21: Early tunnel kiln. "Hoffman's Annular Kiln." Image from Quincy Adams Gillmore. *A Practical Treatise on Coignet-beton and other artifical stone*. New York: D. Van Nostrand Publishers, 1871, Plate IX.

Figure 2.22: Remains of the late 1950's Tunnel Kiln at Western Clay. Joe, E. B. Elliott, photographer, July 2011.

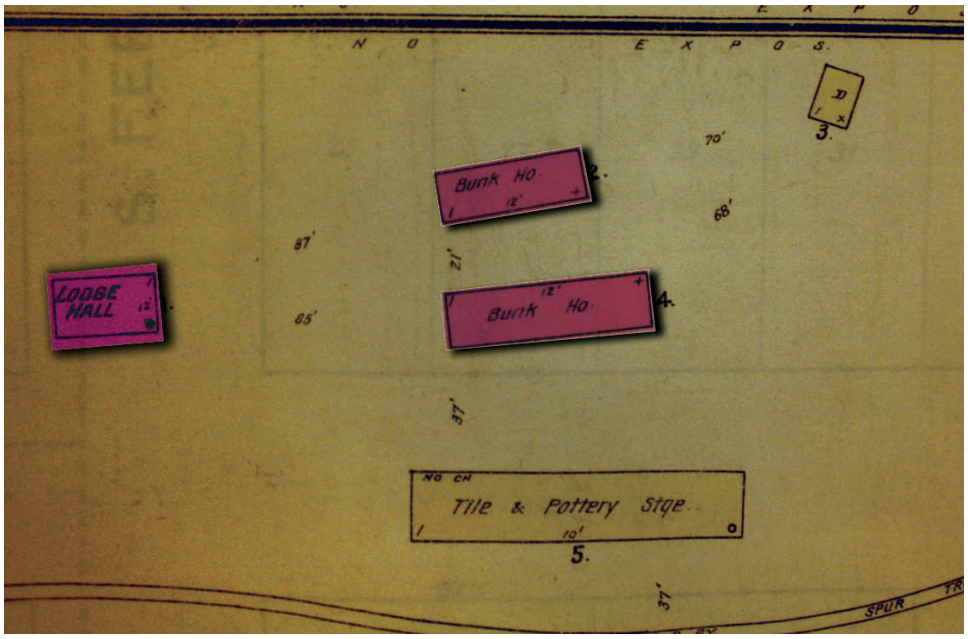


Figure 2.23: Map showing Western Clay's Lodge Hall and bunkhouses. "Western Clay." Sanborn Company Fire Insurance Map, 1892 updated to 1922, Montana, Plate 148. Courtesy of the Montana Historical Society, Helena, MT.

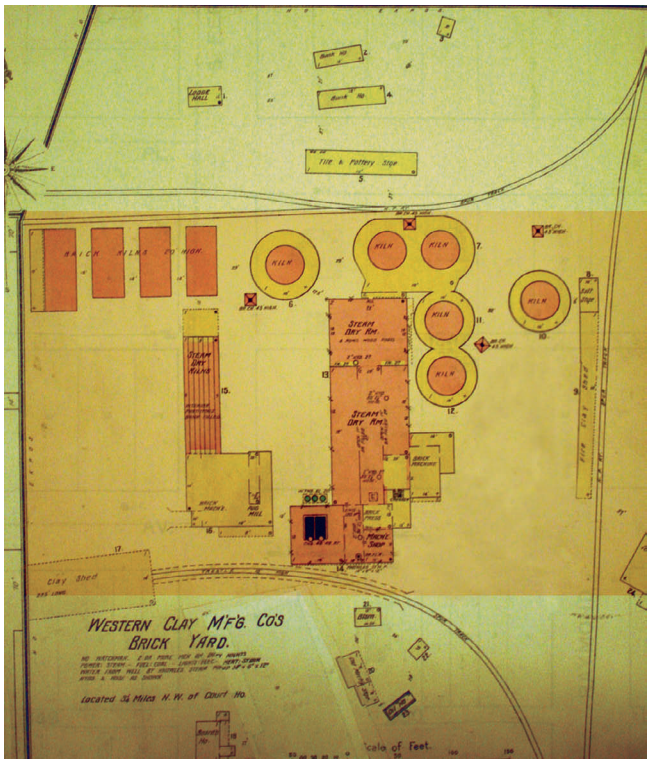


Figure 2.24: Map of Western Clay with central area of heavy production highlighted. "Western Clay." Sanborn Company Fire Insurance Map, 1892 updated to 1922, Montana, Plate 148.Courtesy of the Montana Historical Society, Helena, MT.

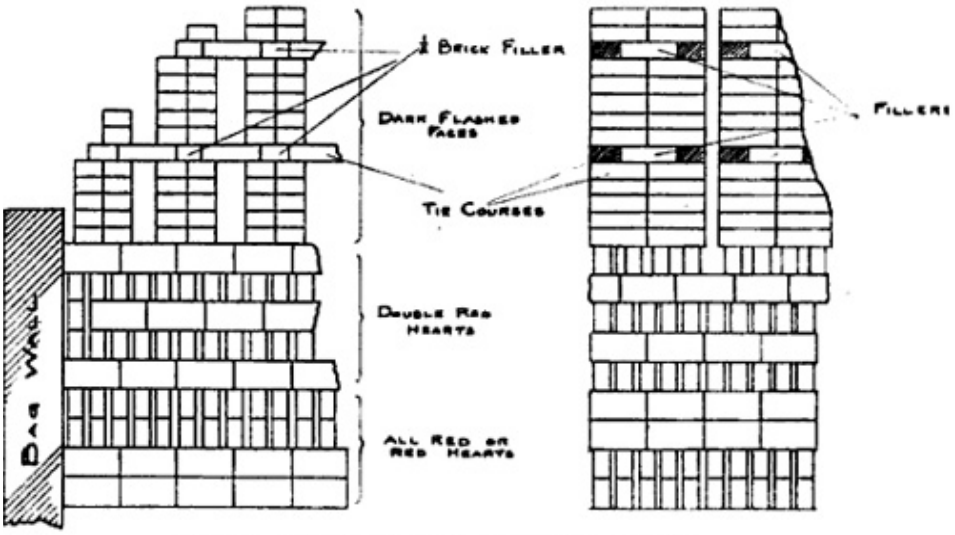


Fig. 41. Combination Flat and Edge Setting.

Figure 2.25: Example of setting patterns for a downdraft kiln. "Combination Flat and Edge Setting." *Frederick Greaves-Walker. Clay Plant Construction and Operation*. Chicago: *Brick and Clay Record*, 1919, 77.

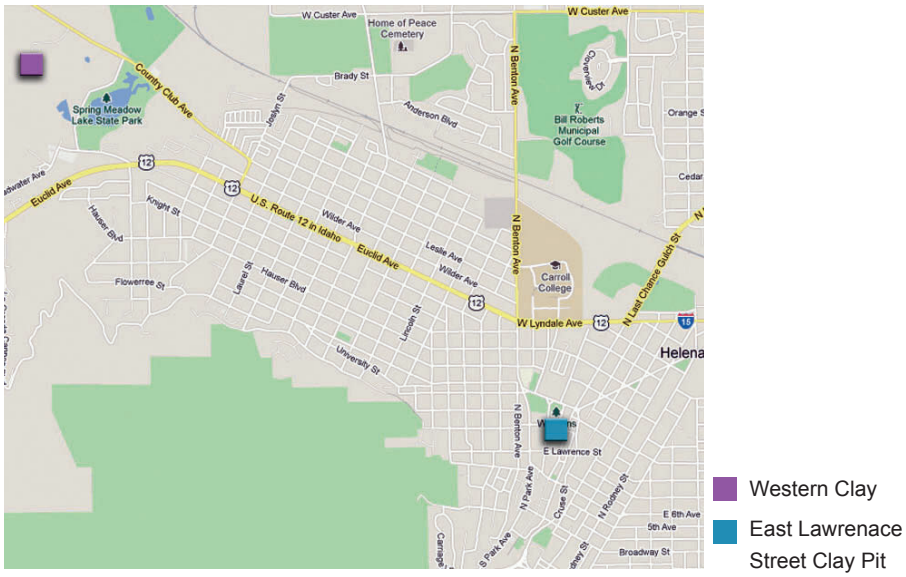


Figure 2.26: Map showing the location of the Lawrence Street clay deposit (in relation to Western Clay). Image from Google Maps, 2012, http://maps.google.com/.

Figure 2.27: Blossburg clay pit. Image courtesy of Author, 2011.

Figure 2.28: Example of a gondola car. “Union Pacific Gondola Car.” John C. La Rue, Jr., circa 1976. From Railroad.net, http://www.railroad.net/articles/railfanning/worktrains/index.php.

Figure 2.29: Northern Pacific train traveling down the Mullan Pass. Image courtesy of Author, 2011.

Figure 2.30: Map of Montana showing location of three clay pits mined by Western Clay throghout the 20th Century. Montana Highway Map. Courtsey of the State of Montana. Locations Marked by Richard Rogers, formerly of the N. Rogers Goldmining Company, 2011.

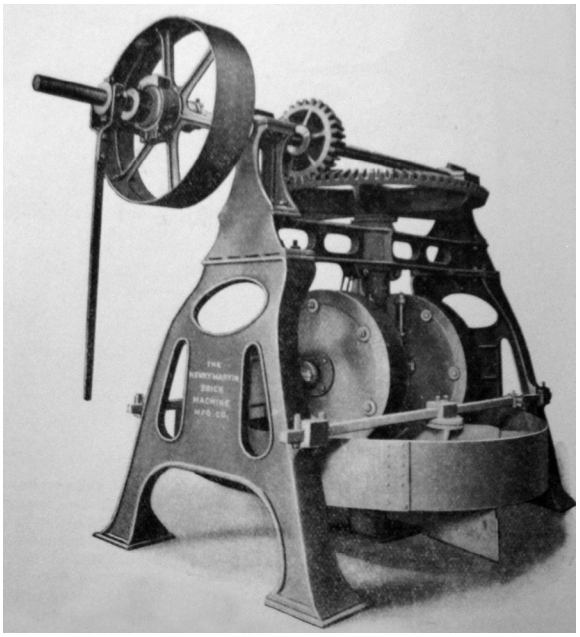


Figure 2.31: “Martin’s Improved nine foot dry pan.” W. A. Riddell Company (Bucyrus, Ohio). *Clay-working machinery*. Bucyrus, Ohio: W. A. Riddell Company, 1929, 239.

Figure 2.32: Wet pan, “The Toronto Foundry and Machine Company’s Type C, 6 Foot Wet Pan.” *Brick and Clay Record*, 57, no. 13 (1920): 1074.

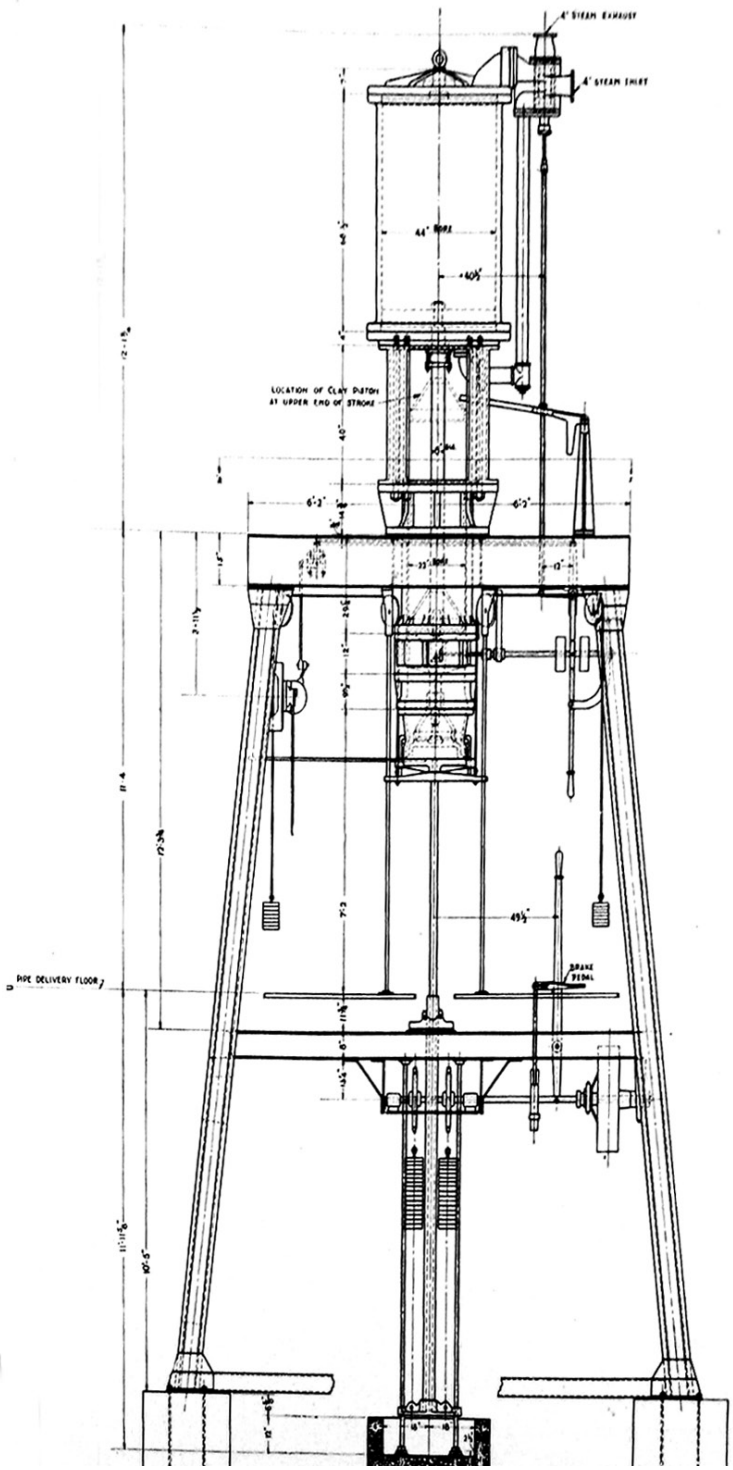


Figure 2.33: Two-story pipe press. “American Sewer Pipe Press--Size 44’ x 60’ x 22’.” W. A. Riddell Company (Bucyrus, Ohio). *Clay-working machinery*. Bucyrus, Ohio: W. A. Riddell Company, 1929, 239.

Figure 2.34: Western Clay's flowerpot press. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 2.35: Western Clay tile shop pug mill. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 2.36: Hollow clay product dies at Western Clay. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

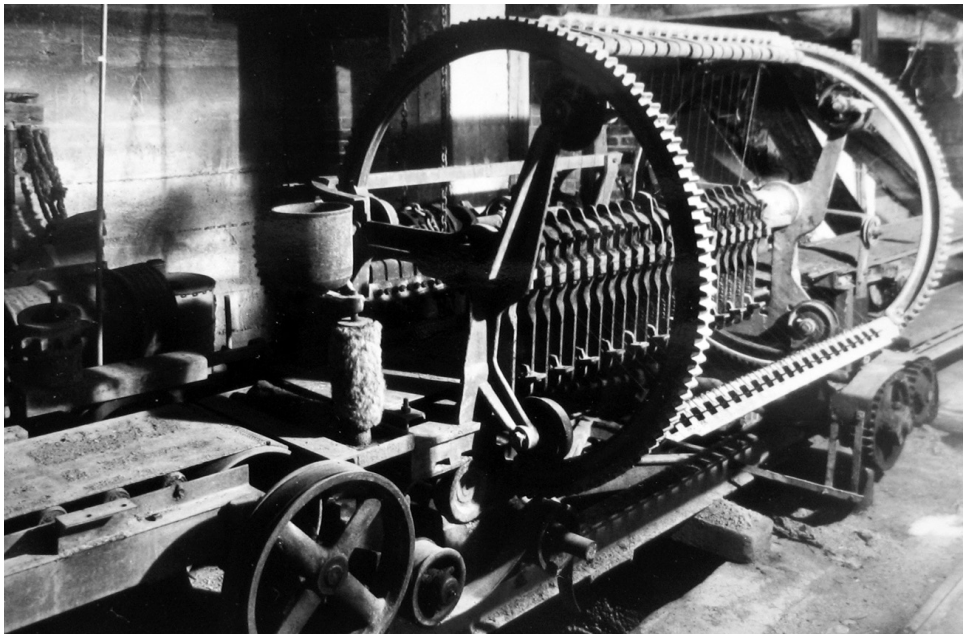


Figure 2.37: Western Clay “brick cutter (view to southwest).” Fred Quivik, photographer, 1984. Courtesy of the Univeristy of Pennsylvania Architectural Conservation Laboratory.

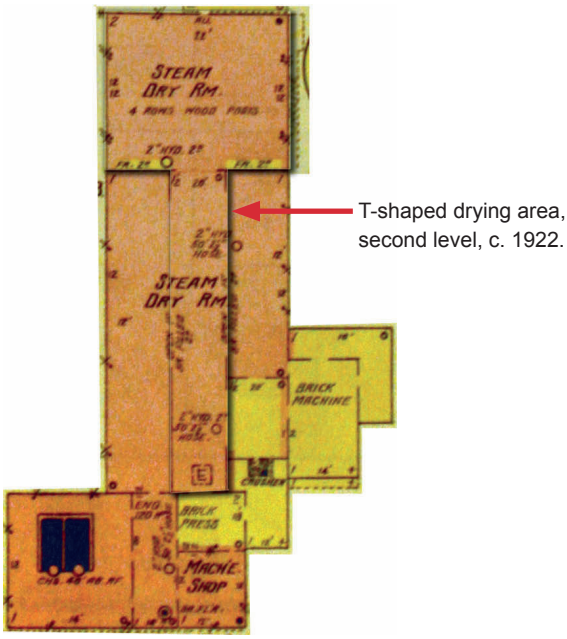


Figure 2.38: Layout of the original two-story drying floor in the Western Clay Tile Works. "Western Clay." Sanborn Company Fire Insurance Map, 1892 updated to 1922, Montana, Plate 148.Courtesy of the Montana Historical Society. Helena, MT.

Figure 2.39: Two-story tile shop lift at Wester Clay. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

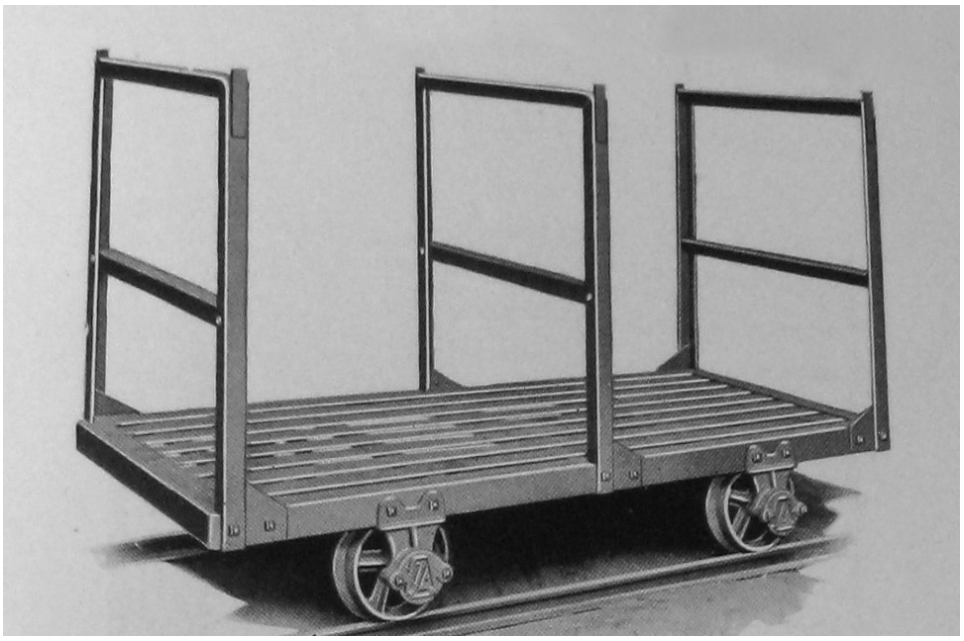


Figure 2.40: “Triple-deck car used for drying hollow block and drain tile.” Riddell Company (Bucyrus, Ohio), 1929. Clay-working machinery. Bucyrus, Ohio: W. A. Riddell Company, 1929, 261.

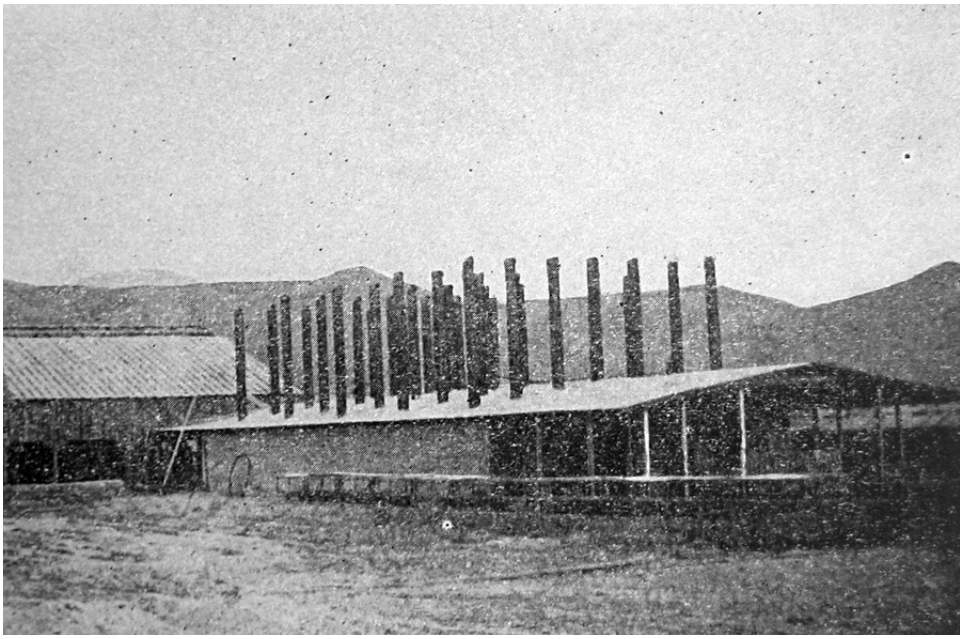


Figure 2.41: “Western Clay Manufacturing Company brick drying tunnel.” Photographer unknown, circa 1908. Courtesy of the Montana Historical Society, Helena, MT.

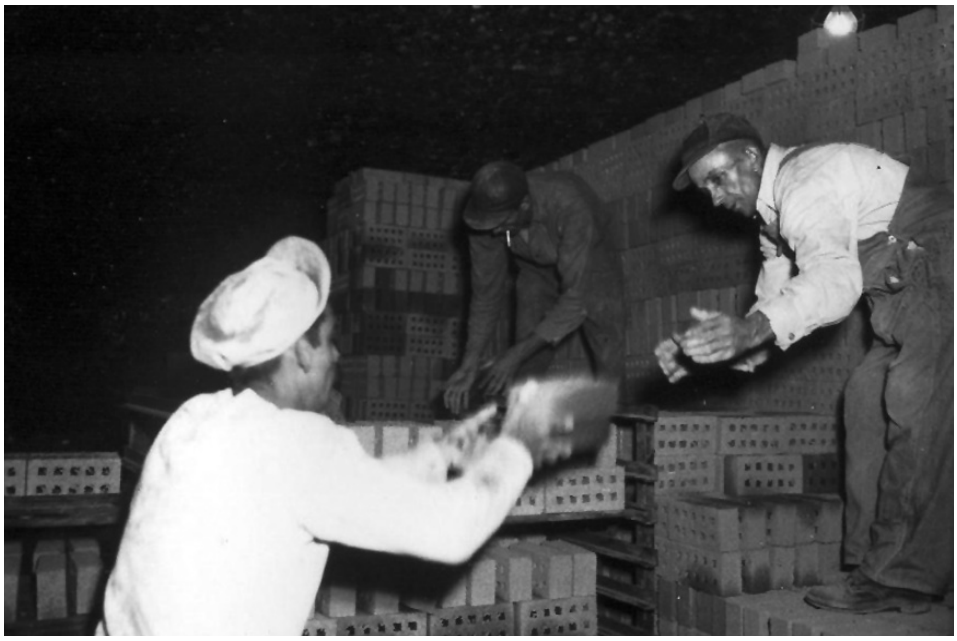


Figure 2.42: Image of a setting gang. “Continental Brick, Arlie’s Gang.” Photographer unknown, circa. 1940. Image Courtesy of Jeff Hollis of the Continental Brick Company, Martinsburg, WV.

Figure 2.43: Kiln thermometers and pyrometers. “Tycos Temperature Instruments.” *Brick and Clay Record*, 57, no. 11 (1920): 948.

Figure 2.44: Large metal fan used to facilitate the cooling of kilns. Image courtesy of author, 2011.

Figure 2.45: Civic Center, Helena, MT “Algeria Shrine Temple, Helena, MT.” Photographer unknown, cirica 1920. Image from The Islamic Society of Western Massachussetts, http://masjidma.com/.

Figure 2.46: Fort Harrison Veteran's Administration Hospital. Image from Helena As She Was: Images of Montana's Capital City, http://www.lifelikecharm.com/west_of_helena.htm.

Figure 2.47: Montana State Normal College. Artist unknown, circa 1914. Image from http://en.wikipedia.org/wiki/File:Montana_State_Normal_College,_Dillon,_Montana.png.

Figure 2.48: “Museum of the Plains Indians, in Browning, Montana.” D.J. Schmidt, photographer, date unknown. Published by Glacier Studio, Browning, MT. Image from http://www.cardcow.com/223110/museum-plains-indians-browning/.

Figure 2.49: Butte, MT, Federal Building. Artist unknown, date unknown. Image from http://www.ebay.com/itm/Montana-Postcard-Butte-FEDERAL-BUILDING-North-Main-St-Vtg-PC-Mont-MT-Mitchell-/270805841354#ht_500wt_709.

Figure 2.50: Photo of Western Clay truck, Driver Earl Elliott with his son, Jim Elliott, c. 1940. Courtesy of Jim Elliott.

Figure 3.1: United Clay Brickworks or the United States National Arboretum Brickworks. Image courtesy of Author, 2012.

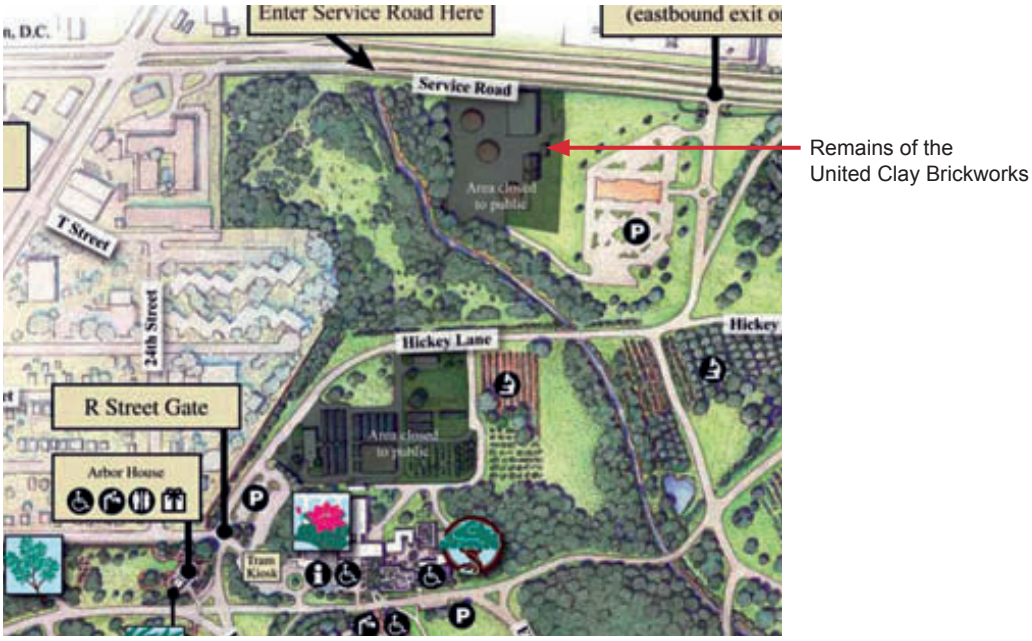


Figure 3.2: Map of the U.S. National Arboretum showing the uninterpreted remains of the United Clay Brickworks. Courtesy of the U.S. National Arboretum, 2012.

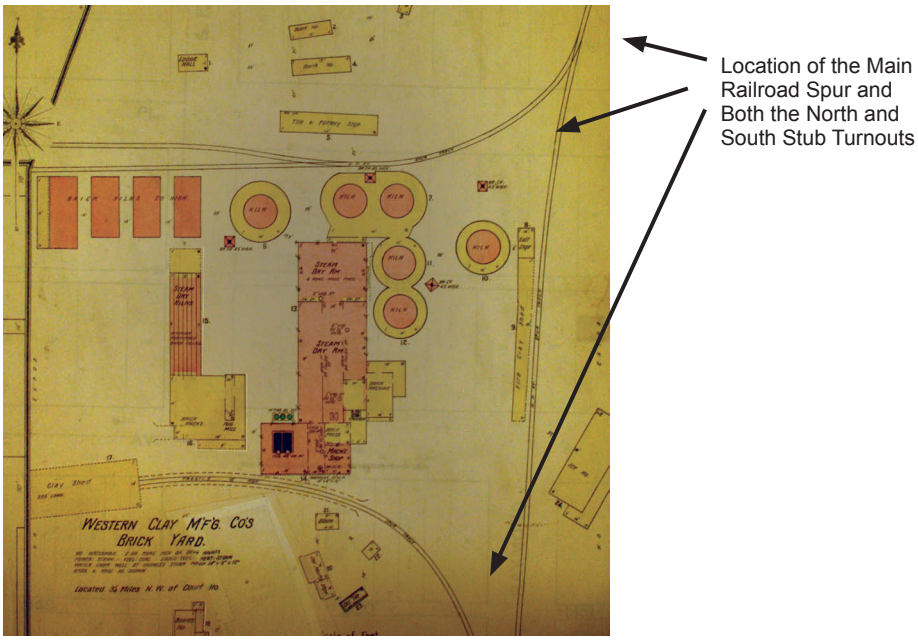


Figure 3.3: Map from first quarter of the 20th Century showing Western Clay's connection to the railroad. "Western Clay." Sanborn Company Fire Insurance Map, 1892 updated to 1922, Montana, Plate 148.Courtesy of the Montana Historical Society. Helena, MT.

Figure 3.4: Remains of Western Clay's brick railroad piers. Image courtsey of author, 2011.

Figure 3.5: Compilation of buildings comprising part of the Western Clay Tile Works. Pictured are the power House, the machine shop, the elevator tower, and a section of the clay storage room. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.6: Interior shot of Western Clay's tile shop drying area. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.7: Mill building at the Hagley Museum Image courtesy of author, 2012.

Figure 3.8: Western Clay's line shaft and belts in relation to the tile shop drying room (in background). Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.9: Western Clay boiler. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.10: Western Clay dry pan. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.11: Moravian Pottery and Tile Works. Image courtesy of author, 2011.

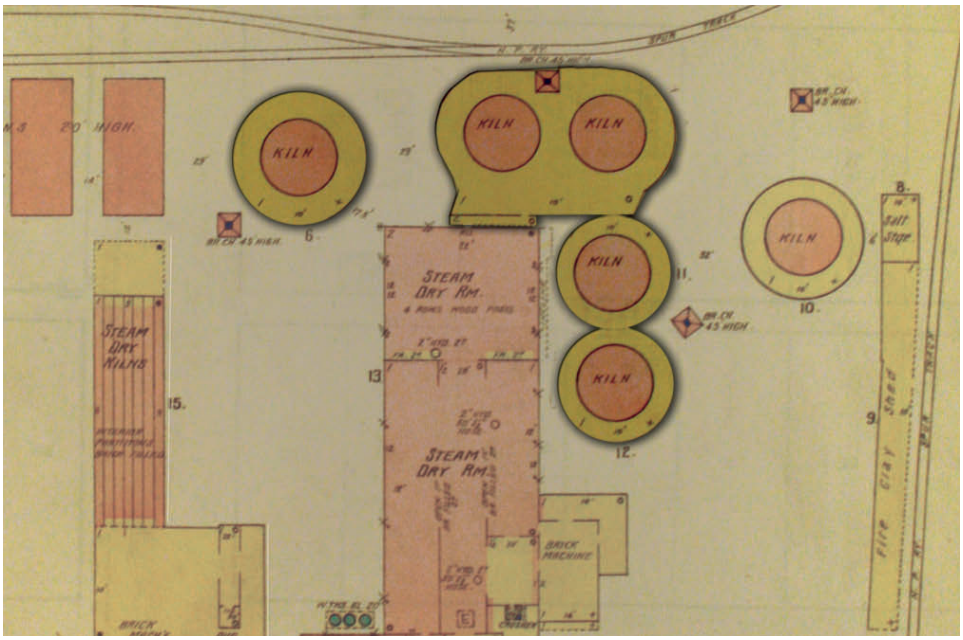


Figure 3.12: 1892 Helena, MT Sanborn Fire Insurance Map of the Western Clay Manufacturing Company, updated to 1922. Map altered to show the five remaining beehive kilns.

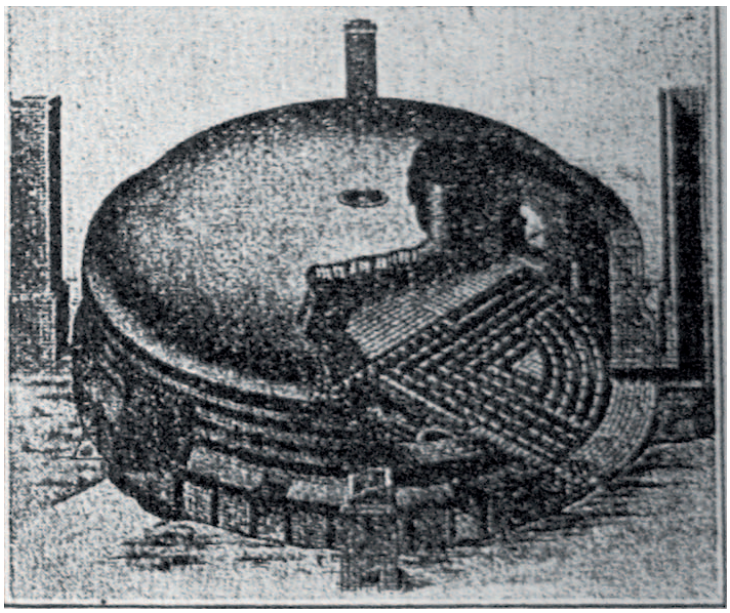


Figure 3.13: Illustration of and underground flue system and "section showing method of constructing perforated kiln floors." Images from "Clay Products Manufacturing," *Ceramic data book*, (Chicago, Ill: Industrial Publications, 1935), 182.

Figure 3.14: Chimneystack associated with Western Clay's kiln "Number 6." Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.15: Western Clay kiln shed design. Shed surrounding kiln “Number 8.”Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.16: Western Clay kiln “Number 8,” stacked with drain pipe. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.17: Summer Kiln Pad, Scotch Kiln. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.18: Warehouse number 3, Scotch Kiln. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.19: Preserved remains of a United Clay Brickworks beehive kiln. Courtesy of Author, 2012.

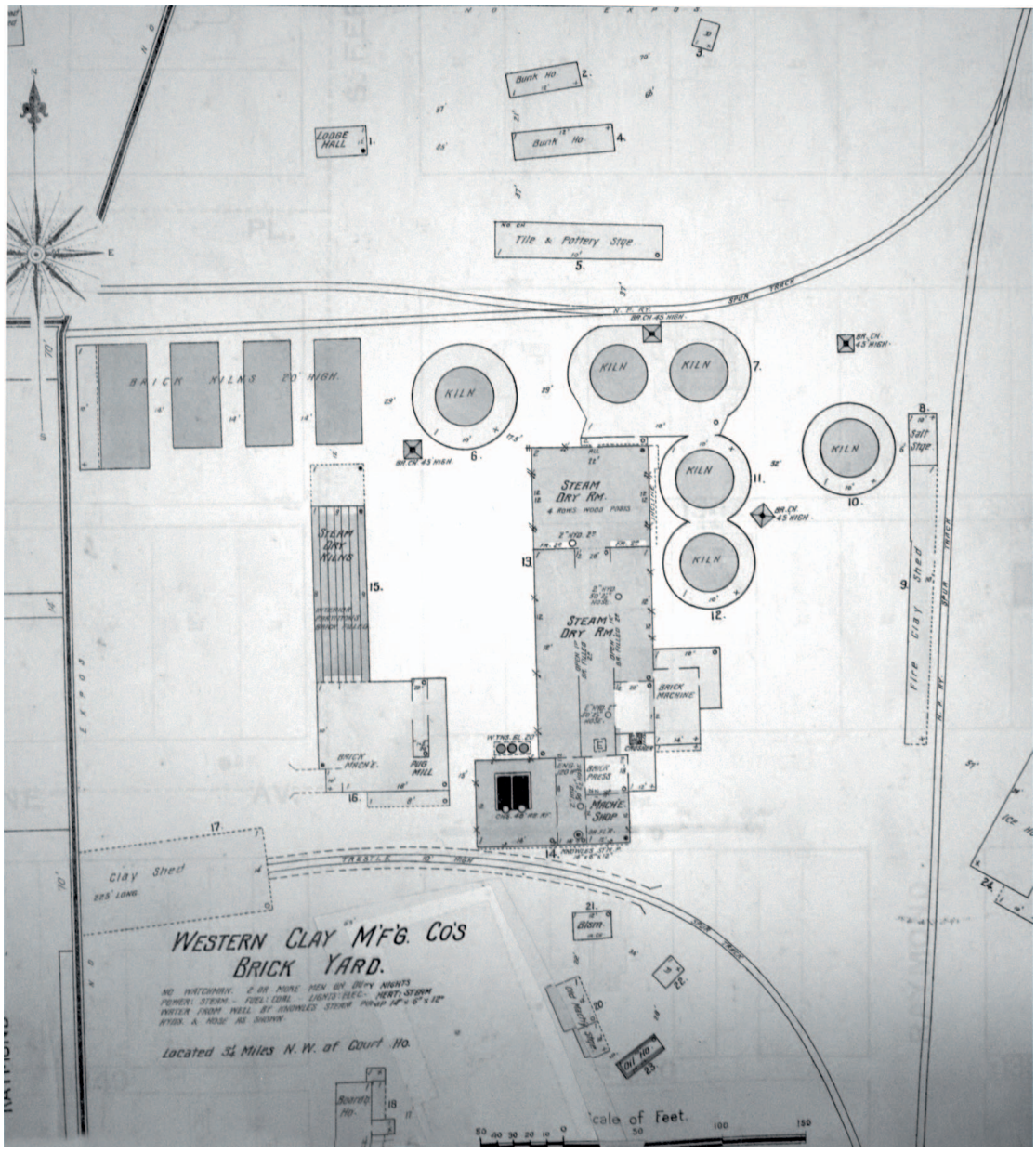
Figure 3.20: Building housing the Western Clay tunnel kiln. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.21: Western Clay tunnel kiln. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

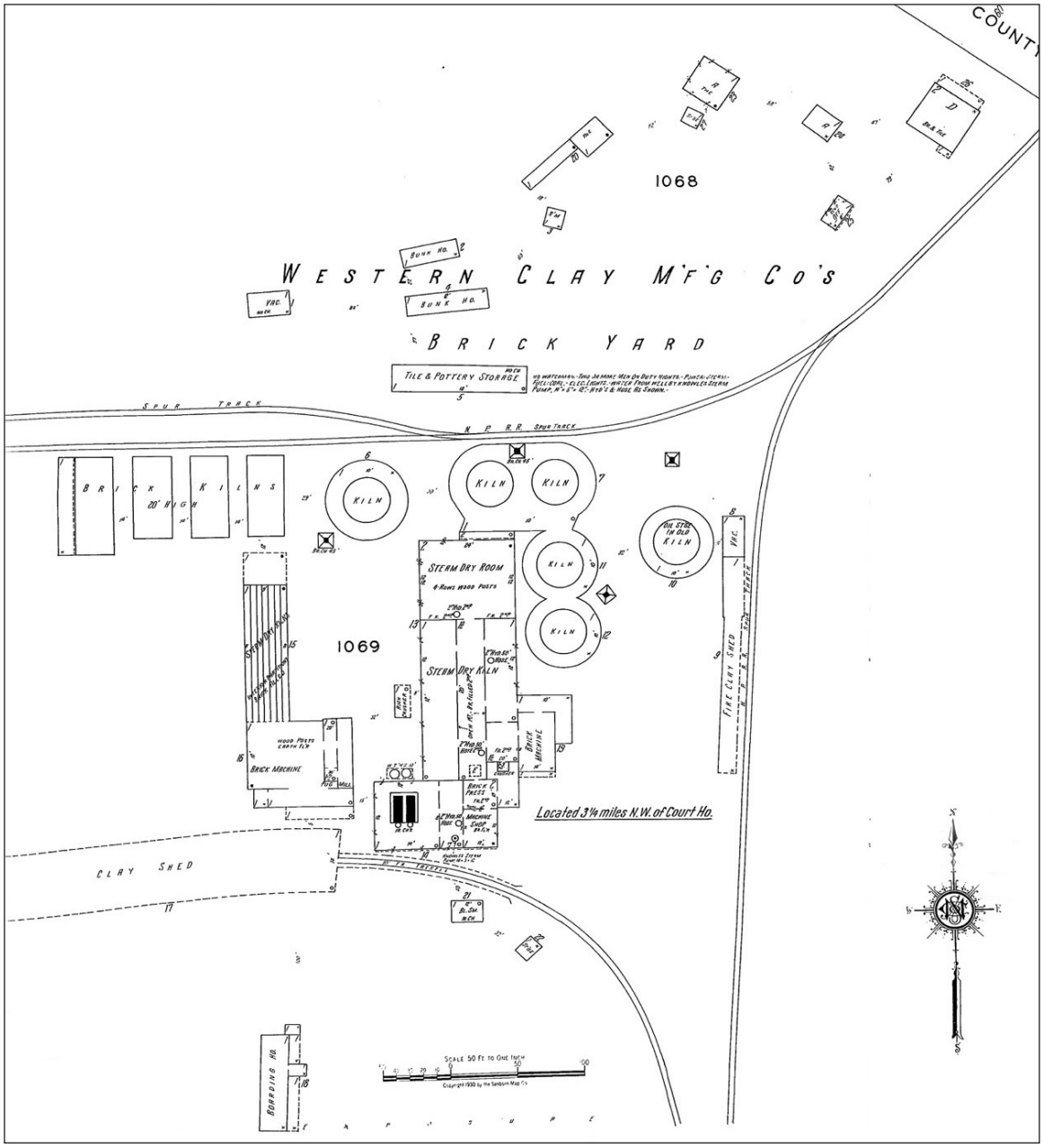
Figure 3.22: Brick shop remains. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

Figure 3.23: Brick shop machinery, in situ. Joe E. B. Elliott, photographer, July 2011. Courtesy of the University of Pennsylvania Architecture Conservation Laboratory.

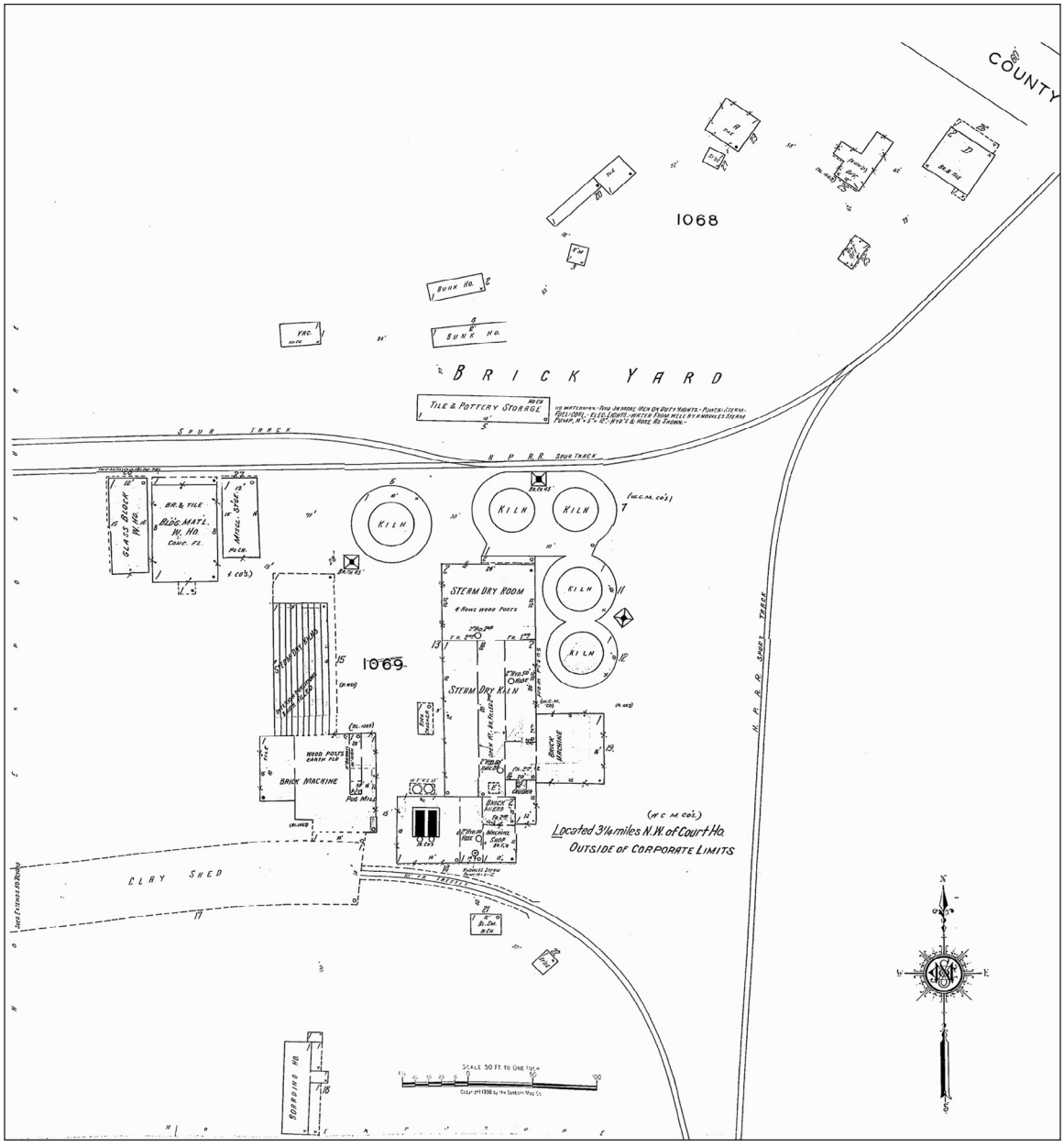
Figure 3.24: Pallet stacked with discarded brick. Image courtesy of author, 2011.



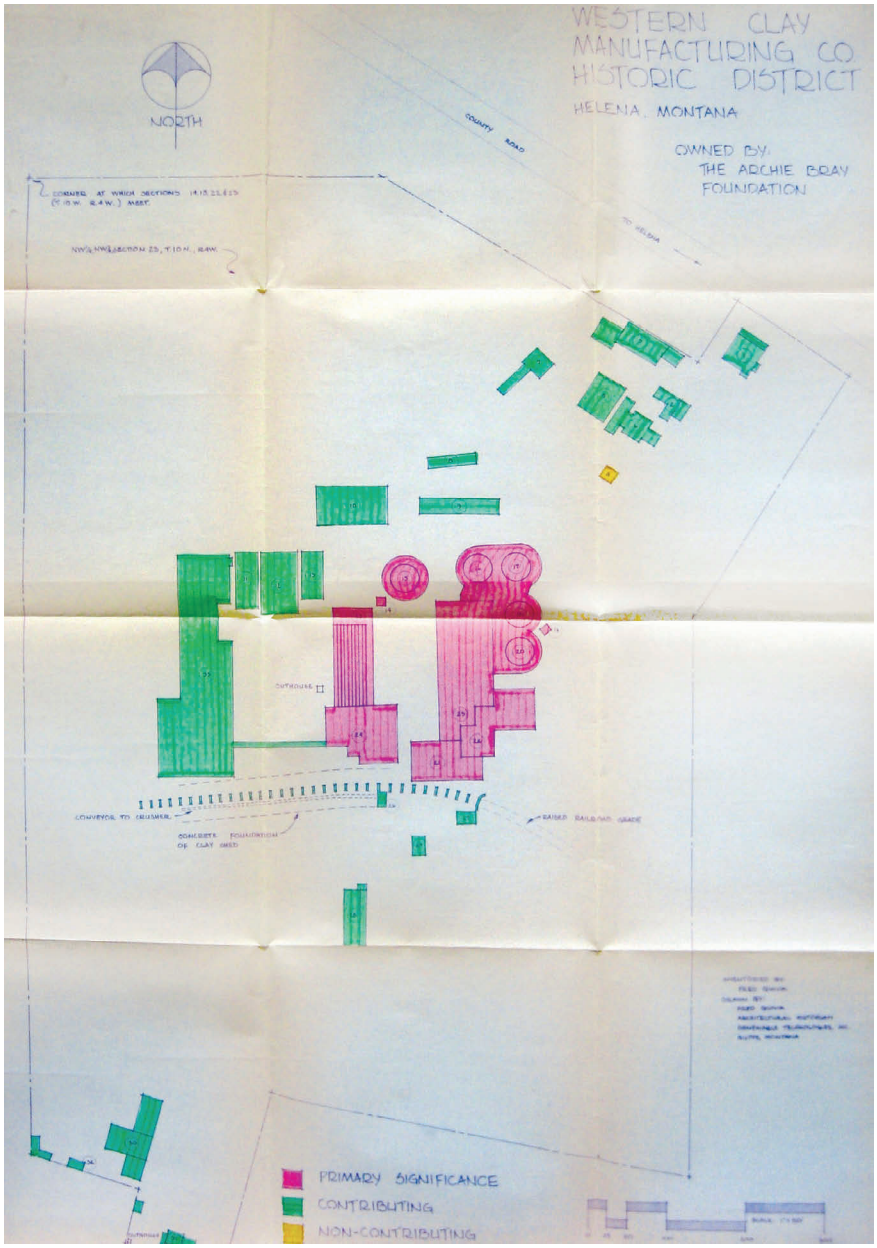
1892 Sanborn Company Insurance Map, Updated to 1922



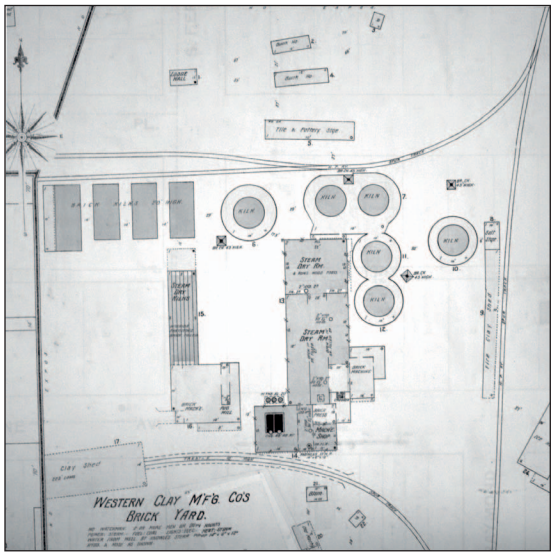
1930 Sanborn Company Insurance Map



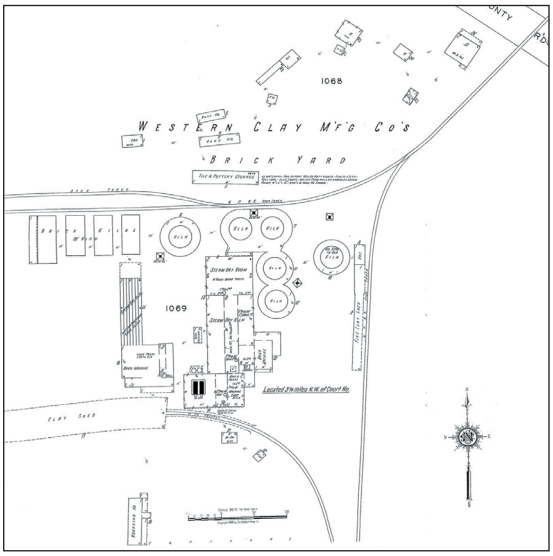
1951 Sanborn Company Insurance Map



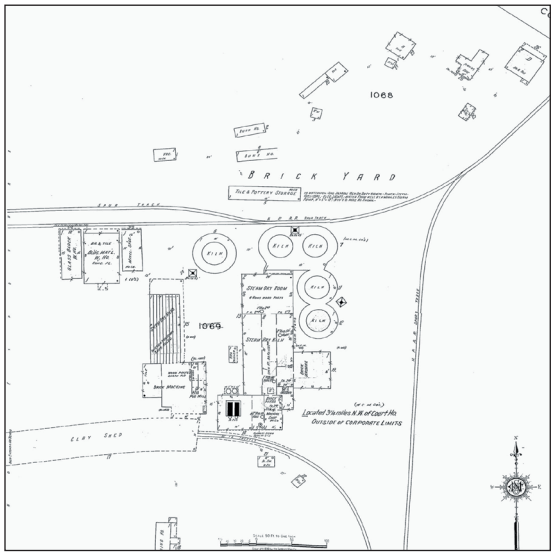
1985 Map of Western Clay, Courtesy of Fred Quivik



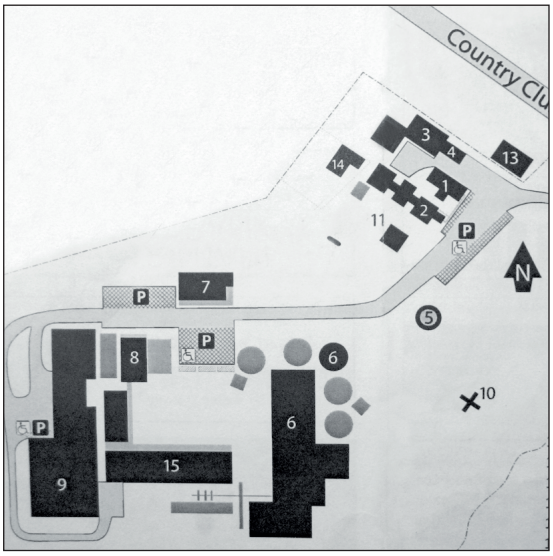
1892 Sanborn Company Insurance Map, Updated to 1922



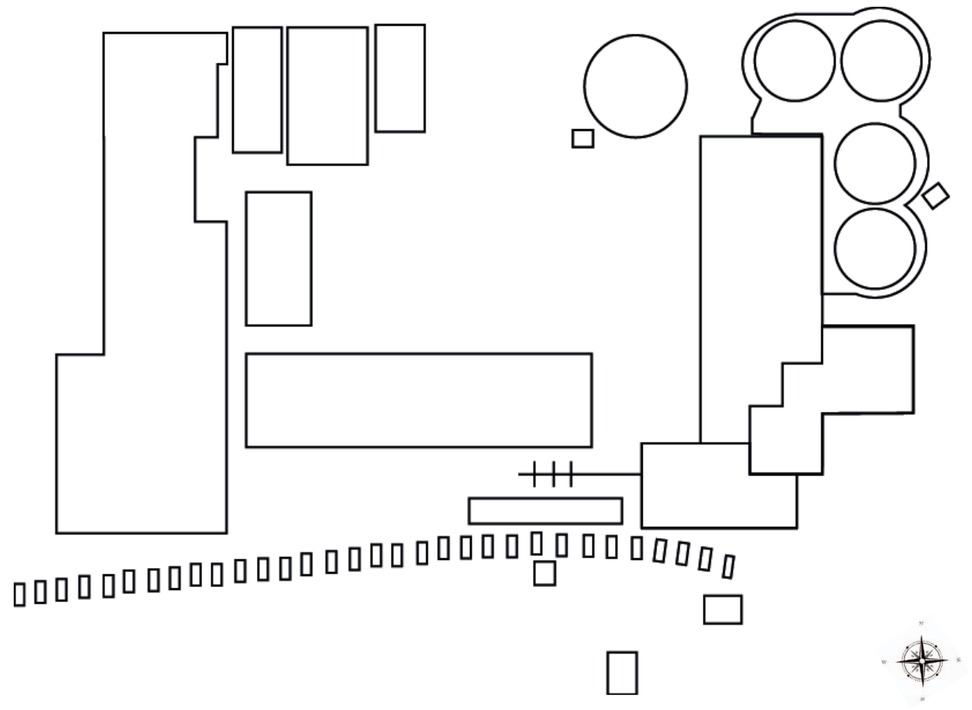
1930 Sanborn Company Insurance Map



1951 Sanborn Company Insurance Map



2011 Archie Bray Foundation, Walking Tour Map

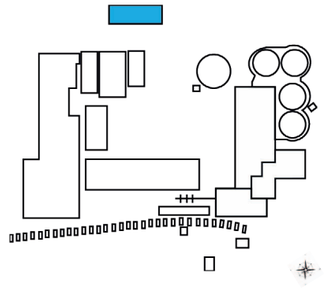


General Conditions Assessment, Western Clay Manufacturing Company, 2011

BUILDING 10: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 1

Joe Elliott, 2011

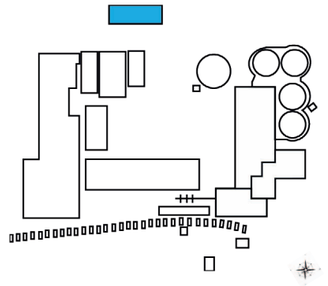


BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/ MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY
10	WAREHOUSE	CONTRIBUTING	WAREHOUSE GALLERY	NORTH	BRICK AND HOLLOW TILE	FAIR	SOME WEATHERING AND CRACKING ON FACES OF BRICKS; AREAS OF REPAIR NEAR ROOF LINE AND AROUND WINDOWS; SOME WEATHERING OF BRICK FACES; SOME LOSS OF MORTAR; EVIIDENCE OF MORTAR REPAIR ABOUT HALF WAY UP FA□ADE	HIGH	1	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	10	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	MOST WINDOWS HAVE BEEN REPLACED	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
10	WAREHOUSE	CONTRIBUTING	WAREHOUSE GALLERY	SOUTH	BRICK AND HOLLOW TILE	FAIR	SOME STEPPED CRACKING, DETERIORAION OF BRICK, BROKEN HOLLOW TILES, REPARIR AND/OR ALTERATION WORK	MEDIUM	1	6	WOOD AND GLASS	GOOD	DOORS APPEAR TO BE REPLACEMENTS	NONE	1	RIBBED GLASS BLOCK	GOOD	PROBABLY NOT ORIGINAL TO THE BUILDING	LOW
10	WAREHOUSE	CONTRIBUTING	WAREHOUSE GALLERY	EAST	BRICK AND HOLLOW TILE	FAIR	EVIDENCE OF REPAIR BRICKS AROUND WINDOWS AND ROOF LINE; SOME LOSS OF MORTAR; CRACKING AND LOSS OF HOLLOW TILE AT BASE WITH OCCASIONAL LOSS OF ENTIRE BRICK	HIGH	1	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	5	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
10	WAREHOUSE	CONTRIBUTING	WAREHOUSE GALLERY	WEST	BRICK AND HOLLOW TILE	FAIR	OCCASIONAL CRACKING OF HOLLOW BRICKS AND FACES OF OTHER COMMON BRICKS; AREAS OF REPAIR NEAR ROOF LINE AND AROUND WINDOWS; SOME WEATHERING OF BRICK FACES; SOME LOSS OF MORTAR	HIGH	1	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	3	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET

BUILDING 10: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 2

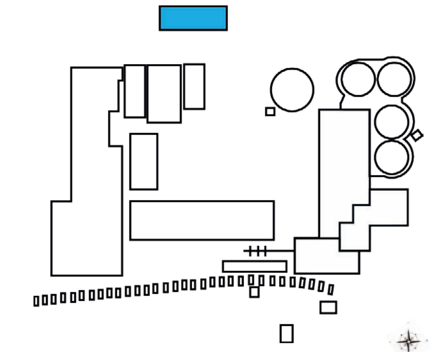
Joe Elliott, 2011



BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	CORNICE MATERIAL	CORNICE DESCRIPTION	CONDITION	CONDITION NOTES	INTEGRITY	NUMER OF CHIMNEY OR SMOME STACKS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES	VEGETATION
10	WAREHOUSE	CONTRIBUTING	WAREHOUSE GALLERY	NORTH	WOODEN BEAMS AND ROLLED ROOFING MATERIAL	GOOD	NEW	NONE	WOOD	FASCIA BOARD BUT NO SOFFIT	GOOD	APPEAR TO BE NEW	NONE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	RAFTER BEAMS RUN NORTH/SOUTH; SLIGHTLY SLANTED ROOF, SLOPES NORTH/SOUTH	VERY HIGH BASAL VEGETATION AT EASTERN CORNER WITH TALL GRASS ALL ALONG BASE OF FA□ADE
10	WAREHOUSE	CONTRIBUTING	WAREHOUSE GALLERY	SOUTH	WOODEN BEAMS AND ROLLED ROOFING MATERIAL	GOOD	NEW	NONE	WOOD	FASCIA BOARD BUT NO SOFFIT	GOOD	APPEAR TO BE NEW	NONE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	RAFTER BEAMS OVERHANG THE BUILDING BY SOME DISTANCE	NOT APPLICABLE
10	WAREHOUSE	CONTRIBUTING	WAREHOUSE GALLERY	EAST	WOODEN BEAMS AND ROLLED ROOFING MATERIAL	GOOD	NEW	NONE	WOOD	FASCIA BOARD BUT NO SOFFIT	GOOD	APPEAR TO BE NEW	NONE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	LITTLE BASAL VEGETATION
10	WAREHOUSE	CONTRIBUTING	WAREHOUSE GALLERY	WEST	WOODEN BEAMS AND ROLLED ROOFING MATERIAL	GOOD	NEW	NONE	WOOD	FASCIA BOARD BUT NO SOFFIT	GOOD	APPEAR TO BE NEW	NONE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	VERY HIGH BASAL VEGETATION AT NORTHERN CORNER, INCLUDNG A TREE

BUILDING 10: CONDITIONS INFORMATION, ELEVATION DETAILS

Joe Elliott, 2011

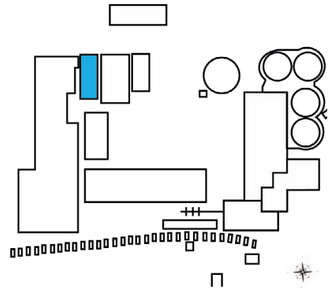


BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES
10	NORTH	WINDOW	ALUMINUM OR VINYL AND LIGHT OF GLASS	ALUMINUM OR VINYL	SINGLE LIGHT CASEMENT	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	IF REPLACED, THEN LACKS INTEGRITY
10	NORTH	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	NORTH	WINDOW	ALUMINUM OR VINYL AND LIGHT OF GLASS	ALUMINUM OR VINYL	SINGLE LIGHT CASEMENT	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	IF REPLACED, THEN LACKS INTEGRITY
10	NORTH	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	NORTH	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	NORTH	WINDOW	ALUMINUM OR VINYL AND LIGHT OF GLASS	ALUMINUM OR VINYL	SINGLE LIGHT CASEMENT	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	IF REPLACED, THEN LACKS INTEGRITY
10	NORTH	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	NORTH	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	NORTH	WINDOW	ALUMINUM OR VINYL AND LIGHT OF GLASS	ALUMINUM OR VINYL	SINGLE LIGHT CASEMENT	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	IF REPLACED, THEN LACKS INTEGRITY
10	NORTH	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	NORTH	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	SOUTH	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	SOUTH	DOOR	WOOD	WOOD	SINGLE GARAGE DOOR WITH RAISED LIGHTLS, 5 OVER 5	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	MODERN REPLACEMENT/ALTERATION
10	SOUTH	DOOR	WOOD AND PAINTED METAL	WOOD	WOOD FRAME AND DEEP WOODEN INFILL SURROUNDING PAINTED METAL DOUBLE DOOR	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	MODERN REPLACEMENT/ALTERATION
10	SOUTH	DOOR	WOOD	WOOD	SINGLE GARAGE DOOR WITH RAISED LIGHTLS, 3 OVER 5	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	MODERN REPLACEMENT/ALTERATION
10	SOUTH	DOOR	WOOD	WOOD	SINGLE GARAGE DOOR WITH RAISED LIGHTLS, 3 OVER 5	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	MODERN REPLACEMENT/ALTERATION
10	SOUTH	DOOR	WOOD	WOOD	SINGLE GARAGE DOOR WITH RAISED LIGHTLS, 3 OVER 5	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	MODERN REPLACEMENT/ALTERATION
10	SOUTH	DOOR	WOOD AND PAINTED METAL	WOOD	WOOD FRAME AND DEEP WOODEN INFILL SURROUNDING PAINTED METAL DOUBLE DOOR, EACH DOOR WITH A GLASS WINDOW OPENING	GOOD	APPEARS TO BE A MODERN REPLACEMENT	NONE	MODERN REPLACEMENT/ALTERATION
10	EAST	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	EAST	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	EAST	WINDOW	WOOD AND GLASS LIGHT	WOOD	WOODEN FRAME WITH CENTER MULLION SEPARATING TWO LARGE LIGHTS OF GLASS	FAIR	WOOD FRAME IS WEATHERED	HIGH	NONE
10	EAST	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	EAST	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 8 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	WEST	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 16 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	WEST	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 16 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	WEST	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 16 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING
10	WEST	WINDOW	GLASS BLOCK	NONE	FILLED WITH RIBBED GLASS BLOCK 4 BLOCKS HIGH BY 16 BLOCKS WIDE	GOOD	IN GOOD CONDITION	LOW	UNLIKELY TO BE ORIGINAL TO THE BUILDING

BUILDING 11: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 1

Joe Elliott, 2011

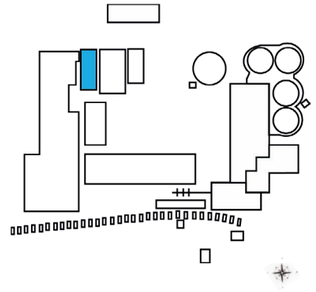


BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY
11	WAREHOUSE #3 (SCOVE KILN)	CONTRIBUTING	WAREHOUSE #3	NORTH	BRICK AND WOOD	POOR	MAJOR LOSS OF BRICK; LOSS OF MORTAR; BASAL DETERIORATION; AREAS OF REPAIR; DETERIORATION OF BRICK FACES; STEPPED CRACKING ALONG MORTAR JOINTS	MEDIUM	1.5	1	HORIZONTAL WOODEN BOARDS	FAIR	BOARDS ARE WEATHERED AND PAINT COLOR IS WORN	HIGH	3	WOOD FRAME, MULLIONS AND MUNTONS, 3 OVER 3 SET IN LARGER CASEMENT FOR ALL 3 WINDOWS	FAIR	MOST MULLIONS AND MUNTONS PRESENT BUT LOSS OF LIGHTS OF GLASS	HIGH
11	WAREHOUSE #3 (SCOVE KILN)	CONTRIBUTING	WAREHOUSE #3	SOUTH	BRICK AND WOOD	POOR	LOSS OF MORTAR; BASAL DETERIORATION; AREAS OF REPAIR; DETERIORATION OF BRICK FACES; STEPPED CRACKING ALONG MORTAR JOINTS	MEDIUM	1.5	1	HORIZONTAL WOODEN BOARDS	FAIR	BOARDS ARE WEATHERED AND PAINT COLOR IS WORN	HIGH	3	WOOD FRAME, MULLIONS AND MUNTONS, 3 OVER 3 SET IN LARGER CASEMENT FOR ALL 3 WINDOWS	GOOD	ALL WINDOW COMPONENTS PRESENT; COVERED ON EXTERIOR WITH CORRUGATED METAL BUT WINDOWS VISIBLE FROM INSIDE	HIGH
11	WAREHOUSE #3 (SCOVE KILN)	CONTRIBUTING	WAREHOUSE #3	EAST	BRICK AND WOOD	POOR	LOSS OF MORTAR WITH STEPPED CRACKING IN SOME AREAS; LOSS OF BRICK; DETERIORATION OF BRICK FACES;SOME BASAL DETERIORATION AND MORTAR LOSS	MEDIUM	1.5	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
11	WAREHOUSE #3 (SCOVE KILN)	CONTRIBUTING	WAREHOUSE #3	WEST	BRICK AND WOOD	POOR	LOSS OF MORTAR WITH STEPPED CRACKING IN SOME AREAS; LOSS OF BRICK WITH INNER WYTHES EXPOSED; DETERIORATION OF BRICK FACES;SOME BASAL DETERIORATION	MEDIUM	1.5	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE

BUILDING 11: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 2

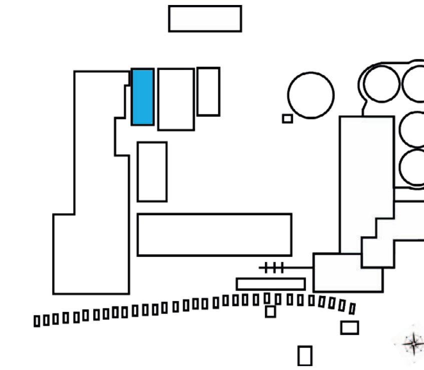
Joe Elliott, 2011



BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	CORNICE MATERIAL	CORNICE DESCRIPTION	CONDITION	CONDITION NOTES	INTEGRITY	NUMER OF CHIMNEY OR SMOME STACKS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES	VEGETATION
11	WAREHOUSE #3 (SCOVE KILN)	CONTRIBUTING	WAREHOUSE #3	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	WOOD	EAVES EXTEND AND ARE EXPOSED; RED PAINT COLOR REMAINS; NO ACTUAL CORNICE	FAIR	WOOD IS WEATHERED, MAY BE SLIGHT ROT	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	ROOF IS PEAKED IN AN EAST/WEST DIRECTION; THE FA□ADE EVIDENCES SOME REPAIR WORK AND LARGE AMOUNT OF LOSS/MISSING BRICK; ROOF SHAPE ALLOWS FOR A LOFTED ONE-HALF STORY AREA THAT IS FRONTED WITH VERTICALLY LAID WOODEN BOARDS. ALTHOUGH THREE WINDOWS, ALL INSTALLED WITHIN A SINGLE CASEMENT SO THAT TOGETHER THE THREE APPEAR AS ONE WINDOW	SOME BASAL VEGETATION
11	WAREHOUSE #3 (SCOVE KILN)	CONTRIBUTING	WAREHOUSE #3	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	WOOD	EAVES EXTEND AND ARE EXPOSED; RED PAINT COLOR REMAINS; NO ACTUAL CORNICE	FAIR	WOOD IS WEATHERED, MAY BE SLIGHT ROT	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	ROOF IS PEAKED IN AN EAST/WEST DIRECTION; THE FA□ADE EVIDENCES SOME REPAIR WORK AND LARGE AMOUNT OF LOSS/MISSING BRICK; ROOF SHAPE ALLOWS FOR A LOFTED ONE-HALF STORY AREA THAT IS FRONTED WITH VERTICALLY LAID WOODEN BOARDS. ALTHOUGH THREE WINDOWS, ALL INSTALLED WITHIN A SINGLE CASEMENT SO THAT TOGETHER THE THREE APPEAR AS ONE WINDOW	SOME BASAL VEGETATION
11	WAREHOUSE #3 (SCOVE KILN)	CONTRIBUTING	WAREHOUSE #3	CORRUGATED SHEET METAL (LAID VERTICALLY) OVER RAFTER BEAMS	FAIR	METAL IS PATCHED IN SOME PLACES AND APPEARS OXIDIZED	MEDIUM	WOOD	EAVES EXTEND AND ARE EXPOSED; RED PAINT COLOR REMAINS; APPEARS AS THOUGH A FASCIA BOARD	FAIR	WOOD IS WEATHERED, MAY BE SLIGHT ROT	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	HIGH, BUT NOT THICK BASAL VEGETATION
11	WAREHOUSE #3 (SCOVE KILN)	CONTRIBUTING	WAREHOUSE #3	CORRUGATED SHEET METAL (LAID VERTICALLY) OVER RAFTER BEAMS	FAIR	METAL IS PATCHED IN SOME PLACES AND APPEARS OXIDIZED	MEDIUM	WOOD	EAVES EXTEND AND ARE EXPOSED; RED PAINT COLOR REMAINS; APPEARS AS THOUGH A FASCIA BOARD	FAIR	WOOD IS WEATHERED, MAY BE SLIGHT ROT	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	SIGNIFICANT AMOUNT OF BASAL VEGETATION

BUILDING 11: CONDITIONS INFORMATION, ELEVATION DETAILS

Joe Elliott, 2011



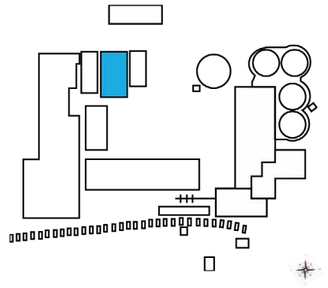
BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES	GENERAL NOTES
11	NORTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	FRAME IS WEATHERED BUT WINDOW MULLIONS, MUNTINS, FRAMES, AND LIGHTS ARE ALL PRESENT	HIGH	NONE	THIS WINDOW, ALONG WITH THE NEXT TWO ON THIS FA□ADE, MAKES UP ONE LARGER WINDOW
11	NORTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	FRAME IS WEATHERED BUT WINDOW MULLIONS, MUNTINS, FRAMES, AND LIGHTS ARE ALL PRESENT	HIGH	NONE	THIS WINDOW, ALONG WITH THE NEXT TWO ON THIS FA□ADE, MAKES UP ONE LARGER WINDOW
11	NORTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	FRAME IS WEATHERED BUT WINDOW MULLIONS, MUNTINS, FRAMES, AND LIGHTS ARE ALL PRESENT	HIGH	NONE	THIS WINDOW, ALONG WITH THE NEXT TWO ON THIS FA□ADE, MAKES UP ONE LARGER WINDOW
11	NORTH	DOOR	WOOD	WOOD	DOUBLE DOOR, SLIDING ON WOODEN RAIL, BOARD AND BATTEN, EXTERIOR BOARDS ON A DIAGONAL, PAINTED RED	FAIR	WOOD IS WEATHERED BUT PAINT IS STILL VISIBLE AND DOORS FUNCTION ORIGINAL HARDWARE IS MISSING	HIGH	NONE	HARDWARE IS CONTEMPORARY
11	SOUTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	FRAME IS WEATHERED BUT WINDOW MULLIONS, MUNTINS, FRAMES, AND LIGHTS ARE ALL PRESENT	HIGH	NONE	THIS WINDOW, ALONG WITH THE NEXT TWO ON THIS FA□ADE, MAKES UP ONE LARGER WINDOW
11	SOUTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	FRAME IS WEATHERED BUT WINDOW MULLIONS, MUNTINS, FRAMES, AND LIGHTS ARE ALL PRESENT	HIGH	NONE	THIS WINDOW, ALONG WITH THE NEXT TWO ON THIS FA□ADE, MAKES UP ONE LARGER WINDOW
11	SOUTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	FRAME IS WEATHERED BUT WINDOW MULLIONS, MUNTINS, FRAMES, AND LIGHTS ARE ALL PRESENT	HIGH	NONE	THIS WINDOW, ALONG WITH THE NEXT TWO ON THIS FA□ADE, MAKES UP ONE LARGER WINDOW
11	SOUTH	DOOR	WOOD	WOOD	SINGLE DOOR, BOARD AND BATTEN, EXTERIOR BOARDS ON A DIAGONAL, HINGED LEFT	FAIR	WOOD IS WEATHRED, RED PAINT IS WORN OFF, BUT DOOR IS FULLY INTACT	HIGH	NONE	NONE

- ALONG EACH FACADE, WINDOWS AND DOORS ARE NUMBERED FROM LEFT TO RIGHT AND TOP TO BOTTOM

BUILDING 12: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 1

S. Reid 2011

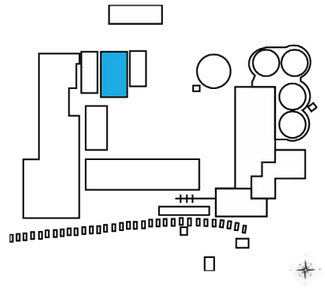


BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY
12	WAREHOUSE #2	CONTRIBUTING	SUMMER STUDIO	NORTH	BRICK AND HOLLOW TILE	GOOD	MASONRY IN RELATIVELY GOOD CONDITION, DESPITE SOME PATCHES OF DETERIORATING BRICK OR TILE, OCCASIONAL LOSS OF MORTAR (BUT NOT WIDESPREAD) AND SOME ROUGH REGROUTING	HIGH	1	1	METAL AND GLASS	GOOD	NEW REPLACEMENT DOORS	NONE	2	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
12	WAREHOUSE #2	CONTRIBUTING	SUMMER STUDIO	SOUTH	BRICK AND HOLLOW TILE	GOOD	MASONRY IN RELATIVELY GOOD CONDITION, DESPITE SOME PATCHES OF DETERIORATING BRICK OR TILE, OCCASIONAL LOSS OF MORTAR (BUT NOT WIDESPREAD) AND SOME ROUGH REGROUTING	HIGH	1	1	METAL AND GLASS	GOOD	NEW REPLACEMENT DOORS	NONE	1	METAL FRAME, FIXED/NON-OPERABLE, NO SASH, WTH 3 LIGHTS OF GLASS	GOOD	NO MISSING MULLIONS OR LIGHTS	HIGH
12	WAREHOUSE #2	CONTRIBUTING	SUMMER STUDIO	EAST	BRICK AND HOLLOW TILE	GOOD	MASONRY IN RELATIVELY GOOD CONDITION, DESPITE SOME PATCHES OF DETERIORATING BRICK OR TILE, OCCASIONAL LOSS OF MORTAR (BUT NOT WIDESPREAD) AND SOME ROUGH REGROUTING	HIGH	1	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	4	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
12	WAREHOUSE #2	CONTRIBUTING	SUMMER STUDIO	WEST	BRICK AND HOLLOW TILE	GOOD	MASONRY IN RELATIVELY GOOD CONDITION, DESPITE SOME PATCHES OF DETERIORATING BRICK OR TILE, OCCASIONAL LOSS OF MORTAR (BUT NOT WIDESPREAD) AND SOME ROUGH REGROUTING	HIGH	1	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	4	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET

BUILDING 12: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 2

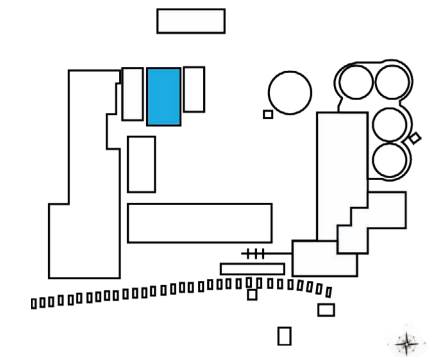
S. Reid 2011



BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	CORNICE MATERIAL	CORNICE DESCRIPTION	CONDITION	CONDITION NOTES	INTEGRITY	NUMER OF CHIMNEY OR SMOME STACKS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES	VEGETATION
12	WAREHOUSE #2	CONTRIBUTING	SUMMER STUDIO	WOODEN BEAMS AND ROLLED ROOFING MATERIAL	GOOD	LOOKS NEW	NONE	WOOD COVERED WITH ROLLED ROOFING MATERIAL	BEAMS RUNNING NORTH SOUTH AND OVERHANG BLDG; RAFTERS CAPPED WITH A FASCIA BOARD THAT IS COVERED WITH ROLLED ROOFING MATERIAL; NO SOFFIT	GOOD	APPEARS NEW	NONE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	ROOF SLOPES NORTHWARD	VERY LITTLE BASAL VEGETATION
12	WAREHOUSE #2	CONTRIBUTING	SUMMER STUDIO	WOODEN BEAMS AND ROLLED ROOFING MATERIAL	GOOD	LOOKS NEW	NONE	WOOD COVERED WITH ROLLED ROOFING MATERIAL	FASCIA BOARD COVERED WITH ROLLED ROOFING MATERIAL THAT IS FOLDED OVER AND STAPLED	GOOD	APPEARS NEW	NONE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	VERY LITTLE BASAL VEGETATION
12	WAREHOUSE #2	CONTRIBUTING	SUMMER STUDIO	WOODEN BEAMS AND ROLLED ROOFING MATERIAL	GOOD	LOOKS NEW	NONE	WOOD COVERED WITH ROLLED ROOFING MATERIAL	BEAMS RUNNING NORTH SOUTH AND OVERHANG BLDG; RAFTERS CAPPED WITH A FASCIA BOARD THAT IS COVERED WITH ROLLED ROOFING MATERIAL; NO SOFFIT	GOOD	APPEARS NEW	NONE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	LITTLE BASAL VEGETATION
12	WAREHOUSE #2	CONTRIBUTING	SUMMER STUDIO	WOODEN BEAMS AND ROLLED ROOFING MATERIAL	GOOD	LOOKS NEW	NONE	WOOD COVERED WITH ROLLED ROOFING MATERIAL	FASCIA BOARD COVERED WITH ROLLED ROOFING MATERIAL THAT IS FOLDED OVER AND STAPLED	GOOD	APPEARS NEW	NONE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	HIGH, BUT NOT THICK BASAL VEGETATION

BUILDING 12: CONDITIONS INFORMATION, ELEVATION DETAILS

S. Reid 2011



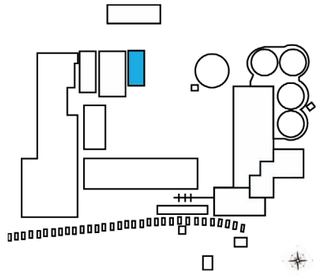
BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES	GENERAL NOTES
12	NORTH	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	MAY HAVE REPLACED EVEN OLDER WINDOWS
12	NORTH	DOOR	METAL AND/OR VINYL AND GLASS	METAL	SET OF DOUBLE DOORS, EACH DOOR WITH ONE FIXED PANE OF GLASS	GOOD	REPLACEMENT	NONE	REPLACEMENT DOORS	OUTER DOOR FRAME IS WOODEN BUT INNER FRAME IS METAL
12	NORTH	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	MAY HAVE REPLACED EVEN OLDER WINDOWS
12	SOUTH	DOOR	METAL AND/OR VINYL AND GLASS	METAL	SET OF DOUBLE DOORS, EACH DOOR WITH TWO LOWER PANELS AND ONE FIXED PANE OF GLASS	GOOD	REPLACEMENT	NONE	REPLACEMENT DOORS	OUTER DOOR FRAME IS WOODEN BUT INNER FRAME IS METAL
12	SOUTH	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	WINDOW OPENING HAS A LARGE WOODEN SILL WHICH MAY INDICATE THAT THE METAL FRAMED WINDOW IS A REPLACEMENT OR IT MAY INDICATE THAT EITHER EACH OR AT LEAST MANY OF THE WINDOWS ON THIS BUILDING ALSO HAD SIMILAR SILLS
12	EAST	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	NONE
12	EAST	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	NONE
12	EAST	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	NONE
12	EAST	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	NONE
12	WEST	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	NONE
12	WEST	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	NONE
12	WEST	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	NONE
12	WEST	WINDOW	METAL AND GLASS	METAL	FIXED METAL FRAME THREE PANES OF GLASS SEPARATED BY TWO METAL MUNTINS	GOOD	NONE	HIGH	NONE	NONE

- ALONG EACH FACADE, WINDOWS AND DOORS ARE NUMBERED FROM LEFT TO RIGHT AND TOP TO BOTTOM

BUILDING 13: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 1

S. Reid 2011

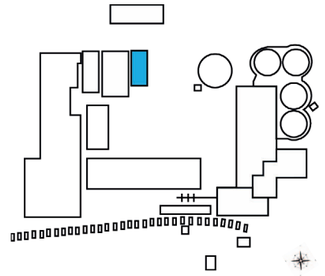


BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY
13	WAREHOUSE #1 (SCOVE KILN)	CONTRIBUTING	SUMMER KILN PAD	NORTH	WOOD	POOR	FA□ADE COVERING LOFTED STORY IS IN FAIR CONDITION BUT FIRST FLOOR HAS NO REMAINING ORIGINAL WALL	LOW	1.5	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	3	WOOD FRAME, MULLIONS AND MUNTONS, 3 OVER 3 CASEMENT	POOR	MOST MUNTONS MISSING BUT FRAMES AND MULLIONS, ALTHOUGH WEATHERED, ARE INTACT	FAIR
13	WAREHOUSE #1 (SCOVE KILN)	CONTRIBUTING	SUMMER KILN PAD	SOUTH	BRICK AND WOOD AND CORRUGATED METAL	GOOD	BRICK IS DETERIORATED, LOSS OF MORTAR, ROUGH MORTAR REPAIR, WOOD IS WEATHERED, BUT NOT ROTTING	HIGH	1.5	1	WOOD	FAIR	WOOD IS WEATHERED AND SOME BOARDS ARE WARPED BUT NOT ROTTEN	HIGH	3	WOOD FRAME	UNKNOWN	WINDOWS ARE COVERED BY CORRUGATED SHEET METAL; WINDOWS NOT VISIBILE FROM INTERIOR OF BUILDING	UNKNOWN
13	WAREHOUSE #1 (SCOVE KILN)	CONTRIBUTING	SUMMER KILN PAD	EAST	CORRUGATED METAL	FAIR	SOME CORRUGATED METAL COVERS THE SOUTHERN END OF THIS EAST-FACING FACADE	LOW	1.5	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
13	WAREHOUSE #1 (SCOVE KILN)	CONTRIBUTING	SUMMER KILN PAD	WEST	CORRUGATED SHEET METAL	GOOD	CORRUGATED METAL SHEETS ARE RED IN COLOR AND APPER NEW	NONE	1.5	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE

BUILDING 13: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 2

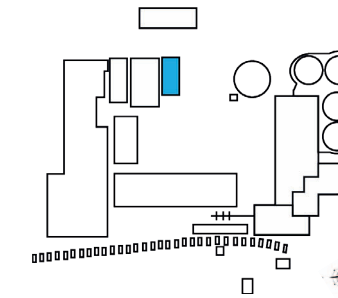
S. Reid 2011



BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	CORNICE MATERIAL	CORNICE DESCRIPTION	CONDITION	CONDITION NOTES	INTEGRITY	NUMER OF CHIMNEY OR SMOME STACKS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES	VEGETATION
13	WAREHOUSE #1 (SCOVE KILN)	CONTRIBUTING	SUMMER KILN PAD	NORTH	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE , SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	WOOD	EAVES EXTEND AND ARE EXPOSED; RED PAINT COLOR REMAINS; NO ACTUAL CORNICE	FAIR	WOOD IS WEATHERED, MAY BE SOME ROT	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	MUCH OF THE BUILDING'S MAIN FA□ADE, THAT COVERING THE GROUND FLOOR, IS ABSENT; THE AREA UNDER THE EAVES IS SIDED WITH VERTICALLY LAID WOOD BOARDS; THE PENTED ROOF ALLOWS FOR AN ATTIC-LIKE AREA, OR A HALF STORY WITH WINDOWS; ROOF IS PEAKED IN A EAST/WEST DIRECTION ONLY	NOT APPLICABLE
13	WAREHOUSE #1 (SCOVE KILN)	CONTRIBUTING	SUMMER KILN PAD	SOUTH	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE , SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	NOT APPLICABLE, SEE GENERAL NOTES	WOOD	EAVES EXTEND AND ARE EXPOSED; RED PAINT COLOR REMAINS; NO ACTUAL CORNICE	FAIR	WOOD IS WEATHERED, MAY BE SOME ROT	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	MUCH OF THE BUILDING'S MAIN FA□ADE, THAT COVERING THE GROUND FLOOR, IS ABSENT; THE AREA UNDER THE EAVES IS SIDED WITH VERTICALLY LAID WOOD BOARDS; THE PENTED ROOF ALLOWS FOR AN ATTIC-LIKE AREA, OR A HALF STORY WITH WINDOWS; ROOF IS PEAKED IN A EAST/WEST DIRECTION ONLY	NOT APPLICABLE
13	WAREHOUSE #1 (SCOVE KILN)	CONTRIBUTING	SUMMER KILN PAD	EAST	CORRUGATED SHEET METAL (LAID VERTICALLY) OVER RAFTER BEAMS	FAIR	METAL IS PATCHED IN SOME PLACES AND APPEARS OXIDIZED	MEDIUM	METAL	METAL BEAM ACTS AS CORNICE; DO NOT BELIVE IT IS ORIGINAL	FAIR	BEAM APPEARS WEATHERED	NONE ?	3	FAIR	FIREBRICK STACKS SHOW SOME DETERIORATION, METAL PIPE STACK SHOWS WEATHERING	VARIES, SEE CORRESPONDING DATA SHEET	TWO OF THE STACKS THAT PERFORATE THIS EAST SLOPING ROOF BELONG TO KILNS MADE OF FIRE BRICKS	LITTLE BASAL VEGETATION
13	WAREHOUSE #1 (SCOVE KILN)	CONTRIBUTING	SUMMER KILN PAD	WEST	CORRUGATED SHEET METAL (LAID VERTICALLY) OVER RAFTER	FAIR	METAL IS PATCHED IN SOME PLACES AND APPEARS OXIDIZED	MEDIUM	WOOD	WOODEN BEAM ACTS, TO SOME DEGREE, AS A FASCIA BOARD; IF CAN BE CALLED CORNICE, IS NOT A BOXED CORNICE	FAIR	WOOD APPEARS WEATHERED, BUT NO VISIBLE ROT	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	HIGH, BUT NOT THICK BASAL VEGETATION

BUILDING 13: CONDITIONS INFORMATION, ELEVATION DETAILS

S. Reid 2011



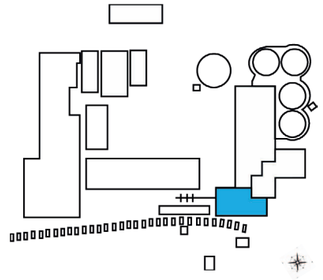
BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES	GENERAL NOTES
13	NORTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	MISSING ALL HORIZONTAL MUNTINS AND LIGHTS	MEDIUM	NONE	SURROUNDING WOODEN FRAME IS IN GOOD CONDITION
13	NORTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	MISSING ALL HORIZONTAL MUNTINS AND LIGHTS	MEDIUM	NONE	SURROUNDING WOODEN FRAME IS IN GOOD CONDITION
13	NORTH	WINDOW	WOOD AND GLASS	WOOD	THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION	FAIR	ONE MUNTIN AND ONE LIGHT REMAIN	MEDIUM	NONE	SURROUNDING WOODEN FRAME IS IN GOOD CONDITION
13	SOUTH	DOOR	WOOD AND GLASS	WOOD	BOARD AND BATTEN, VERTICAL BOARDS ON EXTERIOR, HINGED ON RIGHT SIDE	FAIR	SIGNS OF WARPING AND WEATHERING	HIGH	NONE	DOOR RETAINS ORIGINAL METAL HARDWARE
13	SOUTH	WINDOW	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	IF LIKE OR SIMILAR TO THE NORTH SIDE OF BUILDING (AS THIS OPENING APPEARS), THEN THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION
13	SOUTH	WINDOW	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	IF LIKE OR SIMILAR TO THE NORTH SIDE OF BUILDING (AS THIS OPENING APPEARS), THEN THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION
13	SOUTH	WINDOW	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	IF LIKE OR SIMILAR TO THE NORTH SIDE OF BUILDING (AS THIS OPENING APPEARS), THEN THREE, 3 OVER 3 FIXED FRAME WINDOWS INSTALLED WITHIN A SINGLE WOODEN FRAME, EACH WINDOW SEPARATED BY A MULLION

• ALONG EACH FACADE, WINDOWS AND DOORS ARE NUMBERED FROM LEFT TO RIGHT AND TOP TO BOTTOM

BUILDING 21: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 1

Joe Elliott, 2011

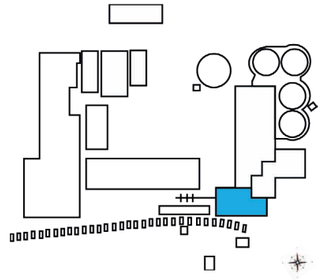


BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY
21	BOILER ROOM, ENGINE ROOM, MACHINE SHOP	PRIMRY	TILE SHOP'S BOILER ROOM, ENGINE ROOM, MACHINE SHOP	NORTH	BRICK	FAIR	SOME BASAL EROSION OF BRICK AND OTHER AREAS OF MORTAR LOSS	MEDIUM	1	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	2	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET
21	BOILER ROOM, ENGINE ROOM, MACHINE SHOP	PRIMRY	TILE SHOP'S BOILER ROOM, ENGINE ROOM, MACHINE SHOP	SOUTH	BRICK	FAIR	EVIDENCES A LOT OF REPAIR AND ALTERATION, ALSO DETERIORATION OF BRICKS; UNABLE TO DETERMINE IF BASAL EROSION DUE TO THICKNES OF VEGETATON	LOW	1	1	WOOD	POOR	DOOR IS WARPED, WOOD ROTTEN/SOM E HOLES	MEDIUM	2	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET
21	BOILER ROOM, ENGINE ROOM, MACHINE SHOP	PRIMRY	TILE SHOP'S BOILER ROOM, ENGINE ROOM, MACHINE SHOP	EAST	BRICK	FAIR	SOME WEATHERING OF BRICK AND LOSS OF MORTAR; UNABLE TO DETERMINE IF BASAL EROSION DUE TO THICKNES OF VEGETATON	MEDIUM	1	1	WOOD	FAIR	INTERIOR OF DOOR WEATHRED, PEELING OF PAINT	HIGH	1	SINGLE SASH, 2 OVER 2, TOP SECTION IS FIXED, ARCHED, 2 OVER 2	FAIR	BOTTOM RAIL OF SASH IS ROTTING	HIGH
21	BOILER ROOM, ENGINE ROOM, MACHINE SHOP	PRIMRY	TILE SHOP'S BOILER ROOM, ENGINE ROOM, MACHINE SHOP	WEST	BRICK	FAIR	SOME BASAL EROSION OF BRICK AND OTHER AREAS OF MORTAR LOSS	MEDIUM	1	0	NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	2	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET

BUILDING 21: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 2

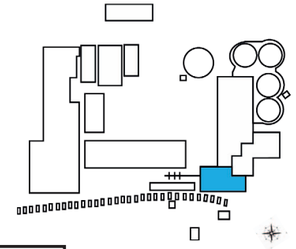
Joe Elliott, 2011



BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	CORNICE MATERIAL	CORNICE DESCRIPTION	CONDITION	CONDITION NOTES	INTEGRITY	NUMER OF CHIMNEY OR SMOME STACKS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES	VEGETATION
21	BOILER ROOM, ENGINE ROOM, MACHINE SHOP	PRIMRY	TILE SHOP'S BOILER ROOM, ENGINE ROOM, MACHINE SHOP	NORTH	WOODEN BEAMS AND PLANKS, WITH CORRUGATED METAL SHEETING	POOR	WOOD ROTTING, SOME COVER MATERIAL, SOME LOSS OF HORIZONTAL BOARDS	MEDIUM	WOOD	BOXED CORNICE	POOR	LARGE AMOUNT OF CORNICE REMAINS BUT WOOD IS ROTTING; SOME AREAS CONTAIN BOTH FASCIA BOARD AND SOFFIT WHILE OTHER ONLY CONTAIN THE SOFFIT	MEDIUM	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	ONLY A SECTION OF THIS BUILDING'S NORTH FA□ADE--THAT OF THE BOILER ROOM--IS AN EXTERIOR WALL; ROOF IS PEAKED IN CENTER, CREATING FOUR SIDES; STACKS ARE CRUSHING ROOF	VERY THICK AND HIGH BASAL VEGETATION ALONG THE SOUTH FA□ADE--ESPECIALLY TOWARD EAST END OF FA□ADE, INCLUDES TREES
21	BOILER ROOM, ENGINE ROOM, MACHINE SHOP	PRIMRY	TILE SHOP'S BOILER ROOM, ENGINE ROOM, MACHINE SHOP	SOUTH	WOODEN BEAMS AND PLANKS, WITH CORRUGATED METAL SHEETING	POOR	WOOD ROTTING, SOME COVER MATERIAL, SOME LOSS OF HORIZONTAL BOARDS	MEDIUM	WOOD	BOXED CORNICE	POOR	LARGE AMOUNT OF CORNICE REMAINS BUT WOOD IS ROTTING; SOME AREAS CONTAIN BOTH FASCIA BOARD AND SOFFIT WHILE OTHER ONLY CONTAIN THE SOFFIT	MEDIUM	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	SEVERAL WINDOWS HAVE BEEN BRICKED IN AND WALL SUSTAINED MAJOR DAMAGE WHEN THE PLANT'S WATER TANK WAS INSTALLED	VERY THICK AND HIGH BASAL VEGETATION ALONG THE SOUTH FA□ADE--ESPECIALLY TOWARD EAST END OF FA□ADE, INCLUDES TREES
21	BOILER ROOM, ENGINE ROOM, MACHINE SHOP	PRIMRY	TILE SHOP'S BOILER ROOM, ENGINE ROOM, MACHINE SHOP	EAST	WOODEN BEAMS AND PLANKS, WITH CORRUGATED METAL SHEETING	POOR	WOOD ROTTING, SOME COVER MATERIAL, SOME LOSS OF HORIZONTAL BOARDS	MEDIUM	WOOD	BOXED CORNICE	POOR	MORE CORNICE REMAINS HERE THAN ON OTHER FACADES BUT WOOD IS ROTTING; AREAS CONTAIN BOTH FASCIA BOARD AND SOFFIT	MEDIUM	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	WINDOW AND DOOR AR ONLY VISIBLE FROM THE INSIDE	VERY THICK AND HIGH BASAL VEGETATION WITH TREES
21	BOILER ROOM, ENGINE ROOM, MACHINE SHOP	PRIMRY	TILE SHOP'S BOILER ROOM, ENGINE ROOM, MACHINE SHOP	WEST	WOODEN BEAMS AND PLANKS, WITH CORRUGATED METAL SHEETING	POOR	WOOD ROTTING, SOME COVER MATERIAL, SOME LOSS OF HORIZONTAL BOARDS	MEDIUM	WOOD	BOXED CORNICE	POOR	LARGE AMOUNT OF CORNICE REMAINS BUT WOOD IS ROTTING; SOME AREAS CONTAIN BOTH FASCIA BOARD AND SOFFIT WHILE OTHER ONLY CONTAIN THE SOFFIT	MEDIUM	2	POOR	HAVE FALLEN OVER AND ARE CORRODING	POOR	NONE	VERY HIGH BASAL VEGETATION, INCLUDING TREE-LIKE GROWTH

BUILDING 21: CONDITIONS INFORMATION, ELEVATION DETAILS

Joe Elliott, 2011



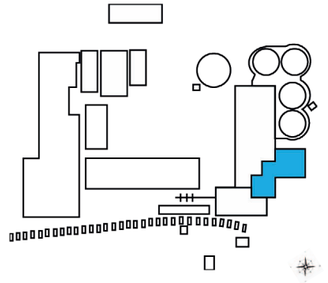
BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES	GENERAL NOTES
21	NORTH	WINDOW	WOOD AND GLASS	WOOD	SINGLE SASH, 2 OVER 2, TOP SECTION IS FIXED, ARCHED, 2 OVER 2	FAIR	WEATHERED AND PART OF MUNTIN MISSING	HIGH	NONE	ALL CONDITIONS NOTED FROM INTERIOR
21	NORTH	WINDOW	WOOD AND GLASS	WOOD	SINGLE SASH, 2 OVER 2, TOP SECTION IS FIXED, ARCHED, 2 OVER 2	FAIR	WEATHERED	HIGH	NONE	ALL CONDITIONS NOTED FROM INTERIOR
21	SOUTH	WINDOW	WOOD AND GLASS	WOOD	FIXED 4 LIGHTS HIGH, 2 WIDE, TOP LIGHTS ARE ARCHED	FAIR	WOOD IS WEATHERED AND ONE PANE OF GLASS IS BROKEN	HIGH	NONE	ALL CONDITIONS NOTED FROM INTERIOR
21	SOUTH	DOOR	WOOD AND GLASS	WOOD	BOARD AND BATTEN DOOR WITH VERTICAL BATTEN AND FIXED ARCHED WINDOW ABOVE DOOR THAT CONTAINS 4 LIGHTS	FAIR	EXTERIOR OF DOOR IS WARPED, WOOD ROTTEN/SOME HOLES	HIGH	INTERIOR OF DOOR HAS A HIGHER INTEGRITY THAN EXTERIOR	ARCHED WINDOW ABOVE DOORWAY IS IN GOOD CONDITION; COVERED ON EXTERIOR; DOOR APPEARS TO BE MISSING ORIGINAL HARDWARE
21	SOUTH	WINDOW	WOOD AND GLASS	WOOD	FIXED 4 LIGHTS HIGH, 2 WIDE, TOP LIGHTS ARE ARCHED	FAIR	WOOD IS WEATHERED AND TOP PART OF CENTRAL MUNTIN IS MISSING	HIGH	NONE	ALL CONDITIONS NOTED FROM INTERIOR
21	EAST	WINDOW	WOOD AND GLASS	WOOD	SINGLE SASH, 2 OVER 2, TOP SECTION IS FIXED, ARCHED, 2 OVER 2	FAIR	BOTTOM RAIL IS ROTTING	HIGH	NONE	ALL CONDITIONS NOTED FROM INTERIOR
21	EAST	DOOR	WOOD AND GLASS	WOOD	BOARD AND BATTEN DOOR, DIAGONAL BATTEN, CENTER RAIL, FIXED ARCHED WINDOW ABOVE DOOR BUT WITHIN DOOR FRAME	FAIR	INTERIOR OF DOOR WEATHRED, PEELING OF PAINT	HIGH	NONE	ALL CONDITIONS NOTED FROM INTERIOR
21	WEST	WINDOW	WOOD AND GLASS	WOOD	SINGLE SASH, 2 OVER 2, TOP SECTION IS FIXED, 2 OVER 2	FAIR	WEATHERED	HIGH	NONE	ALL CONDITIONS NOTED FROM INTERIOR
21	WEST	WINDOW	WOOD AND GLASS	WOOD	SINGLE SASH, 2 OVER 2, TOP SECTION IS FIXED, 2 OVER 2	FAIR	WEATHERED	HIGH	NONE	ALL CONDITIONS NOTED FROM INTERIOR

• ALONG EACH FACADE, WINDOWS AND DOORS ARE NUMBERED FROM LEFT TO RIGHT AND TOP TO BOTTOM

BUILDING 22: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 1

S. Reid 2011

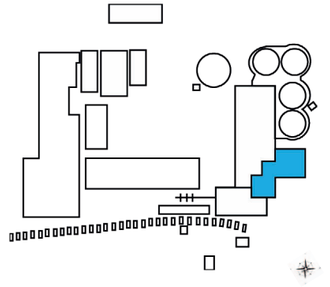


BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY
22	TILE SHOP	PRIMRY	TILE SHOP'S PUG MILL	NORTH	BRICK	FAIR	SOME DETERIORATION OF BRICK, SOME LOSS OF MORTAR OR CRUDE RE-POINTING	MEDIUM	1	1	WOOD	UNDETERMINED	CANNOT SEE DOOR FROM OUTSIDE	UNDETERMINED	4	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
22	TILE SHOP	PRIMRY	TILE SHOP'S PUG MILL	SOUTH	BRICK	FAIR	SOME DETERIORATION OF BRICK, SOME LOSS OF MORTAR OR CRUDE RE-POINTING	MEDIUM	1	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	5	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
22	TILE SHOP	PRIMRY	TILE SHOP'S PUG MILL	EAST	BRICK AND HOLLOW TILE	POOR	LOSS OF BRICK/HOLLOW TILE BELOW WINDOWS, ALSO DETERIORATION OF BRICK/TILE AND MORTAR LOSS	LOW	1	1	WOOD	POOR	DOOR IS WARPED, WOOD ROTTEN/SOME HOLES	LOW	4	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
22	TILE SHOP	PRIMRY	TILE SHOP'S PUG MILL	WEST	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	1	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE

BUILDING 22: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 2

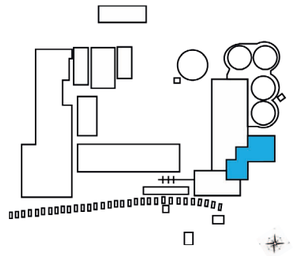
S. Reid 2011



BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	CORNICE MATERIAL	CORNICE DESCRIPTION	CONDITION	CONDITION NOTES	INTEGRITY	NUMER OF CHIMNEY OR SMOME STACKS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES	VEGETATION
22	TILE SHOP	PRIMRY	TILE SHOP'S PUG MILL	NORTH	WOODEN BEAMS AND PLANKS	POOR	WOOD ROTTING, NO COVER MATERIAL REMAINING AND ROOF COMLETELY CAVING IN	LOW	WOOD	HAS FASCIA BOARD	POOR	ROTTING; NOT CLEAR IF ORIGINALLY A BOXED CORNICE; NO SOFFIT; EAVES MAY HAVE BEEN EXPOSED	LOW	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	THE NORTH FA□ADE'S DOOR IS COMPLETELY COVERED BY VEGETATION, DOOR DETERMINED TO BE WOOD BECAUSE INSIDE LIGHTLS ARE WOOD; CONSISTENT WITH OTHER DOORS IN BUILDINGS SURVEYED	EXTREMELY HIGH AND THICK BASAL VEGETATION ALL ALONG NORTH SIDE OF WALL, INCLUDING TREES
22	TILE SHOP	PRIMRY	TILE SHOP'S PUG MILL	SOUTH	WOODEN BEAMS AND PLANKS	POOR	WOOD ROTTING, NO COVER MATERIAL REMAINING AND ROOF COMLETELY CAVING IN	LOW	WOOD	HAS FASCIA BOARD	POOR	ROTTING; NOT CLEAR IF ORIGINALLY A BOXED CORNICE; NO SOFFIT; EAVES MAY HAVE BEEN EXPOSED	LOW	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	VERY THICK AND HIGH BASAL VEGETATION ALONG THE SOUTH FA□ADE, INCLUDING TREES
22	TILE SHOP	PRIMRY	TILE SHOP'S PUG MILL	EAST	WOODEN BEAMS AND PLANKS	POOR	WOOD ROTTING, NO COVER MATERIAL REMAINING AND ROOF COMLETELY CAVING IN	LOW	WOOD	HAS FASCIA BOARD	POOR	ROTTING; NOT CLEAR IF ORIGINALLY A BOXED CORNICE; NO SOFFIT; EAVES MAY HAVE BEEN EXPOSED	LOW	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	HIGH, BASAL VEGETATION WITH LARGER TREE/SHRUBS TOWARD SOUTHERN END
22	TILE SHOP	PRIMRY	TILE SHOP'S PUG MILL	WEST	WOODEN BEAMS AND PLANKS	POOR	WOOD ROTTING, NO COVER MATERIAL REMAINING AND ROOF COMLETELY CAVING IN	LOW	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	WESTERN WALL OF BUILDING IS ACTUALLY THE EXTERIOR WALL OF THE TILE SHOP DRYING ROOM; THIS WALL INCLUDES BOTH ONE WINDOW AND DOORWAY	NOT APPLICABLE

BUILDING 22: CONDITIONS INFORMATION, ELEVATION DETAILS

S. Reid 2011



BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES
22	NORTH	WINDOW	GLASS BLOCK	NOT APPLICABLE	FILLED WITH RIBBED GLASS BLOCK 4 HORIZONTAL 8 VERTICAL	GOOD	IN GOOD CONDITION	LOW	NOT ORIGINAL TO THE BUILDING
22	NORTH	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	GOOD	WINDOW IS FULLY INTACT	HIGH	NONE
22	NORTH	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	GOOD	WINDOW IS FULLY INTACT	HIGH	NONE
22	NORTH	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	GOOD	WINDOW IS FULLY INTACT	HIGH	NONE
22	NORTH	DOOR	WOOD	WOOD	VERTICAL BOARD PAINTED RED, BOARD AND BATTEN	FAIR	WEATHERED AND SOME ROTTING	HIGH	APPEARS TO BE ORIGINAL TO THE BUILDING
22	SOUTH	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	FAIR	LIGHTS OF GLASS ARE MISSING	MEDIUM	LIGHTS OF GLASS ARE MISSING
22	SOUTH	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	GOOD	ONLY BOTTOM MUNTIN IS MISSING	HIGH	ONLY BOTTOM MUNTIN IS MISSING
22	SOUTH	WINDOW	WOOD	WOOD	WOOD FRAMED WINDOW OPENING	POOR	ONLY THE FRAME REMAINS	LOW	ONLY THE FRAME REMAINS
22	SOUTH	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	GOOD	ELEMENT IS ENTIRELY INTACT	HIGH	ELEMENT IS ENTIRELY INTACT
22	SOUTH	WINDOW	GLASS BLOCK	NOT APPLICABLE	FILLED WITH RIBBED GLASS BLOCK 4 HORIZONTAL 8 VERTICAL	GOOD	IN GOOD CONDITION	LOW	NOT ORIGINAL TO THE BUILDING
22	EAST	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	GOOD	ELEMENT IS ENTIRELY INTACT	HIGH	ELEMENT IS ENTIRELY INTACT
22	EAST	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	GOOD	ONLY THE BOTTOM MUNTIN IS MISSING	HIGH	ONLY THE BOTTOM MUNTIN IS MISSING
22	EAST	WINDOW	WOOD	WOOD	WOOD FRAMED WINDOW OPENING	POOR	ONLY THE FRAME REMAINS AND FRAME IS ROTTING	LOW	ONLY THE FRAME REMAINS AND FRAME IS ROTTING
22	EAST	WINDOW	METAL AND GLASS	METAL	METAL FRAME SIDE HINGED SIX LIGHTS	GOOD	ELEMENT IS ENTIRELY INTACT	HIGH	ELEMENT IS ENTIRELY INTACT
22	EAST	WINDOW	GLASS BLOCK	NOT APPLICABLE	FILLED WITH RIBBED GLASS BLOCK 4 HORIZONTAL 8 VERTICAL	GOOD	IN GOOD CONDITION	LOW	NOT ORIGINAL TO THE BUILDING

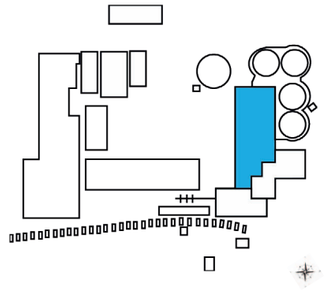
• ALONG EACH FACADE, WINDOWS AND DOORS ARE NUMBERED FROM LEFT TO RIGHT AND TOP TO BOTTOM

* THIS STRUCTURE HAS NO WEST-FACING EXTERIOR WALL

BUILDING 23: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 1

Joe Elliott, 2011

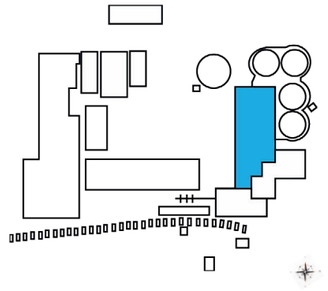


BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/MATERIALS	CONDITION	CONDITION NOTES
23	DRYING SHOP	PRIMRY	TILE SHOP'S DRYING ROOM	NORTH	BRICK	FAIR	STEPPED CRACKING ALONG MORTAR JOINTS NEAR PARAPET AND CORBELING, BASAL EROSION OF BRICK WITH MORTAR LOSS, LARGE LOSS OF BRICK IN WALL (AT BASE--CENTER OF FA□ADE)	HIGH	2	2	WOOD	FAIR	WOOD IS WEATHERED AND DOORS ARE SOMEWHAT WARPED	HiGH	8	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET
23	DRYING SHOP	PRIMRY	TILE SHOP'S DRYING ROOM	SOUTH	BRICK	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	2	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
23	DRYING SHOP	PRIMRY	TILE SHOP'S DRYING ROOM	EAST	BRICK	FAIR	STEPPED CRACKING NEAR CORBELING OF NORTHERN PARAPET, GENERAL BASAL EROSION OF BRICK, INCLUDING MORTAR LOSS	MEDIUM	2	4	WOOD	POOR	DOORS ARE VERY WARPED AND WEATHERED	MEDIUM	14	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET
23	DRYING SHOP	PRIMRY	TILE SHOP'S DRYING ROOM	WEST	BRICK	FAIR	STEPPED CRACING WITH MORTAR LOSS, SOME DETERIORATION AND LOSSS OF BRICK; POSSIBLE ALTERATION/REMOVAL OF DOOR OR WINDOW, GENERAL BASAL EROSION	HIGH	2	1	WOOD	POOR	DOOR APPARES TO BE WARPED AND ROTTEN/PARTS MISSING	POOR	14	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDIN G ELEVATION DETAIL SHEET

BUILDING 23: GENERAL CONDITIONS ASSESSMENT INFORMATION

Sheet 2

Joe Elliott, 2011

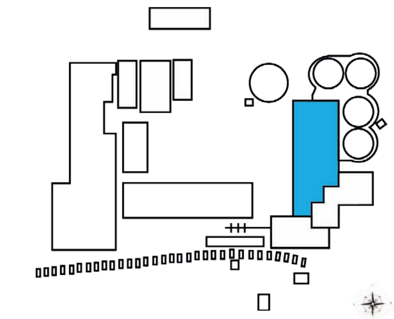


BLDG NUMBER	BLDG NAME 1985 (QUIVIK)	BLDG SIGNIFICANCE 1985 (QUIVIK)	BLDG NAME 2011 (BRAY)	ELEVATION	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	CORNICE MATERIAL	CORNICE DESCRIPTION	CONDITION	CONDITION NOTES	INTEGRITY	NUMER OF CHIMNEY OR SMOME STACKS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES	VEGETATION
23	DRYING SHOP	PRIMRY	TILE SHOP'S DRYING ROOM	NORTH	WOODEN BEAMS AND PLANKS, WITH CORRUGATED METAL SHEETING	POOR	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	THIS SIDE OF THE BUILDING EXHIBITS A SHALLOW STEPPED PARAPET, ALL BRICK	LOW BASAL VEGETATION
23	DRYING SHOP	PRIMRY	TILE SHOP'S DRYING ROOM	SOUTH	WOODEN BEAMS AND PLANKS, WITH CORRUGATED METAL SHEETING	POOR	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	THIS FA□ADE IS NOT EXPOSED TO THE EXTERIOR, BUT INSTEAD ABUTS OTHER BUILDING WALLS IN THE TILE WORKS COMPLEX; THUS, IT BECOMES AN INTERIOR WALL	NOT APPLICABLE
23	DRYING SHOP	PRIMRY	TILE SHOP'S DRYING ROOM	EAST	WOODEN BEAMS AND PLANKS, WITH CORRUGATED METAL SHEETING	POOR	WOOD ROTTING, CAVING IN, SOME CORRUGATED METAL SHEET COATING, BUT AREAS MISSING	MEDIUM	WOOD	BOXED CORNICE	POOR	FASCIA AND SOFFIT ARE MISSING IN MANY PLACES AN ROTTING IN MANY OTHERS	LOW	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	SIGNIFICANT AMOUNT OF BASAL VEGETATION
23	DRYING SHOP	PRIMRY	TILE SHOP'S DRYING ROOM	WEST	WOODEN BEAMS AND PLANKS, WITH CORRUGATED METAL SHEETING	POOR	WOOD ROTTING, CAVING IN, SOME CORRUGATED METAL SHEET COATING, BUT AREAS MISSING	MEDIUM	WOOD	BOXED CORNICE	POOR	FASCIA AND SOFFIT ARE MISSING IN MANY PLACES AN ROTTING IN MANY OTHERS	LOW	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	SOME BASAL VEGETATION TOWARD NORTH END OF BUILDING, BUT SIGNIFICANT AMOUNT OF BASAL VEGETATION NEAR SOUTH END OF BUILDING'S WEST FA□ADE

BUILDING 23: CONDITIONS INFORMATION, ELEVATION DETAILS

Sheet 1

Joe Elliott, 2011

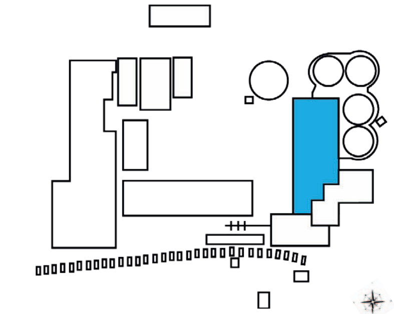


BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES	GENERAL NOTES
23	NORTH	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	SOME MISSING PANES OF GLASS AND SASH IS DAMAGED	HIGH	NONE	NONE
23	NORTH	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	SOME BROKEN PANES OF GLASS AND VERY WEATHERED MUNTINS	HIGH	NONE	NONE
23	NORTH	DOOR	WOOD	WOOD	BOARD AND BATTEN	FAIR	NONE	HIGH	NONE	HINGED ON LEFT, BOARD IS BEADED
23	NORTH	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	SASH IS VERY WARPED, SEVERAL PANES OF GLASS AND MUNTINS MISSING	MEDIUM	NONE	NONE
23	NORTH	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	WOODEN FRAME IS ROTTING BUT SASH, MUNTINS, AND MOST PANES IINTACT	HIGH	NONE	NONE
23	NORTH	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	NONE
23	NORTH	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	BOTTOM LEFT MUNTINS ARE MISSING AS ARE LIGHTS	MEDIUM	NONE	NONE
23	NORTH	DOOR	WOOD	WOOD	BOARD AND BATTEN	FAIR	WARPING ALONG BOTTOM OF DOOR	HIGH	NONE	BOARD IS BEADED
23	NORTH	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	POOR	HAS FRAME AND SASH, BUT REMAINDER MISSING	LOW	NONE	NONE
23	NORTH	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	POOR	HAS FRAME AND SASH, BUT REMAINDER MISSING	LOW	NONE	NONE
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	COMPLETELY INTACT
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	ONE PANE OF GLASS MISSING	HIGH	NONE	BECAUSE OF HIGH VEGETATION AND KILN SHED ROOFS, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION AND KILN SHED ROOFS, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR

BUILDING 23: CONDITIONS INFORMATION, ELEVATION DETAILS

Sheet 2

Joe Elliott, 2011

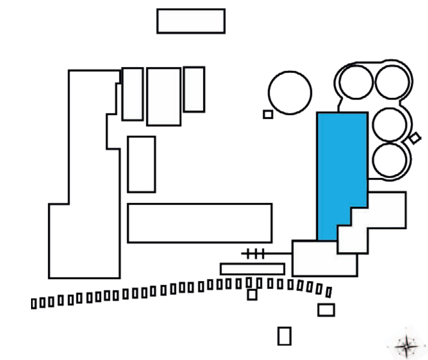


BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES	GENERAL NOTES
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	SOME BROKEN AND/OR MISSING PANES OF GLASS AND SEVERAL MISSING MUNTINS	MEDIUM	NONE	NONE
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	POOR	BOTTOM SASH MISSING	LOW	NONE	BOTTOM SASH IS COVERED WITH WOODEN BOARDS SO CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	EAST	DOOR (NE CORNER)	WOOD	WOOD	BOARD AND BATTEN	POOR	BOARDS MISSIN, BOARDS EXTREMELY ROTTEN AND WARPED	MEDIUM	NONE	DOOR RETAINS ORIGINAL METAL HARDWARE AND IS HINGED ON THE RIGHT, PAINT COLOR REMAINS
23	EAST	WINDOW (OPENS ONTO PUG MILL RM)	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	POOR	BOTTOM SASH MISSING	MEDIUM	NONE	WINDOW OPENS ONTO ROOM WITH PUG MILL
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	EAST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	EAST	DOOR	WOOD	WOOD	BOARD AND BATTEN	GOOD	WEATHERED, ESPECIALLY ALONG BOTTOM WHERE PAINT IS WEARING OFF BUT COMPLETELY INTACT	HIGH	NONE	RETAINS ORIGINAL METAL HARDWARE, HINGED LEFT, FRAME IS DETERIORATED
23	EAST	WINDOW	METAL AND GLASS	METAL	METAL FRAME, HINGED LEFT, CASEMENT, 8 LIGHTS	GOOD	COMPLETELY INTACT	LOW	NOT ORIGINAL	NONE
23	EAST	WINDOW	METAL AND GLASS	METAL	METAL FRAME, HINGED LEFT, CASEMENT, 8 LIGHTS	GOOD	COMPLETELY INTACT	LOW	NOT ORIGINAL	NONE
23	EAST	WINDOW	METAL AND GLASS	METAL	METAL FRAME, HINGED LEFT, CASEMENT, 8 LIGHTS	GOOD	COMPLETELY INTACT	LOW	NOT ORIGINAL	NONE
23	EAST	DOOR	WOOD	WOOD	BOARD AND BATTEN	FAIR	WEATHERED, PAINT FADING AT BOTTOM	HIGH	NONE	ORIGINAL DOOR HANDLE AND LOCK ARE MISSING, BOARD IS BEADED
23	WEST	WINDOW (2ND FLOOR OF DRYING SHOP)	WOOD	WOOD	DOUBLE HUNG SASH 6 OVER 6	POOR	NO PANES OF GLASS AND MISSING MUNTINS	LOW	NONE	NONE
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	MUNTINS PRESENT, BUT ONLY ONE PANE OF GLASS	HIGH	NONE	NONE
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	TOP SASH'S MUNTINS MISSING AND PANES OF GLASS	MEDIUM	NONE	NONE

BUILDING 23: CONDITIONS INFORMATION, ELEVATION DETAILS

Sheet 3

Joe Elliott, 2011



BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES	GENERAL NOTES
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	POOR	BOTH SASHES PRESENT BUT BOTH MISSING MUNTINS AND PANES OF GLASS	LOW	NONE	NONE
23	WEST	WINDOW (1ST FLOOR OF DRYING SHOP)	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	OUTSIDE OF WINDOW COVERED WITH METAL SHEETING, SO CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	BOTTOM SASH IS MISSING MUNTINS AND GLASS, TOP SASH IS INTACT	MEDIUM	NONE	OUTSIDE OF WINDOW COVERED WITH METAL SHEETING, SO CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	OUTSIDE OF WINDOW COVERED WITH METAL SHEETING, SO CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	OUTSIDE OF WINDOW COVERED WITH METAL SHEETING, SO CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	FAIR	TOP SASH INTACT, BOTTOM SASH IS MISSING TWO MUNTINS	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR
23	WEST	DOOR	WOOD	UNCLEAR	BOARD AND BATTEN	FAIR	WOOD IS WEATHERED AND WARPED WITH SOME NARROW SECTIONS OF BOARD MISSING	MEDIUM	NONE	INTERIOR OF THE DOOR IN WORSE CONDITION THAN EXTERIOR, DOES NOT LOOK AS THOUGH THERE IS A DOOR FRAME ANY LONGER
23	WEST	WINDOW	WOOD AND GLASS	WOOD	DOUBLE HUNG SASH 6 OVER 6	GOOD	COMPLETELY INTACT	HIGH	NONE	BECAUSE OF HIGH VEGETATION, CONDITIONS NOTED FROM THE BUILDING'S INTERIOR

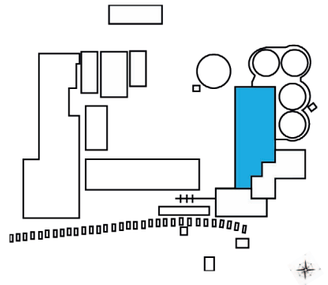
• ALONG EACH FACADE, WINDOWS AND DOORS ARE NUMBERED FROM LEFT TO RIGHT AND TOP TO BOTTOM

* THIS STRUCTURE HAS NO SOUTH-FACING EXTERIOR WALL

BUILDING 23 RAMP A GENERAL CONDITIONS INFORMATION

Sheet 1

S. Reid 2011

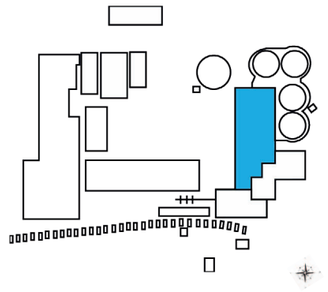


BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY
23-A	NORTH	WINDOW	NONE	NONE	UNCLEAR	POOR	NO TRACE OF A WINDOW REMAINS. ONLY AN OPENING FOR A WINDOW EXISTS	LOW
23-A	NORTH	WINDOW	WOOD	WOOD	UNCLEAR	POOR	ONLY THE FRAME AND A VERTICAL MUNTIN REMAIN	LOW
23-A	WEST	WINDOW	WOOD	WOOD	UNCLEAR	POOR	FRAME IS ROTTING AND FALLING OUT OF WALL OPENING. ONLY A VERTICAL MUNTIN REMAINS.	LOW
23-A	WEST	DOOR	WOOD	NONE	SHUTTERED DOOR WITH METAL HINGES	FAIR	WOOD IS SPLIT, WEATHERED, ROTTING, AND WARPED. HINGES ARE WEATHERED BUT SHUTTERS ARE INTACT	HIGH

BUILDING 23, TOWER: GENERAL CONDITIONS INFORMATION

Sheet 1

S. Reid 2011

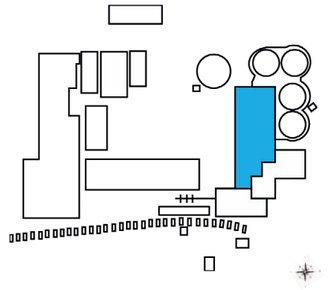


BLDG NUMBER	BUILDING NAME	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY
23	TILE SHOP TOWER	NORTH	CORRUGATED METAL SIDING	FAIR	SIDING IS WEATHERED BUT APPEARS TO BE ORIGINAL	HIGH	NOT APPLICABLE	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
23	TILE SHOP TOWER	SOUTH	CORRUGATED METAL SIDING AND WOOD	FAIR	SOME SIDING IS MISSING, THUS EXPOSING WOODEN STRUCTURE UNDERNEATH, SOME SIDING HAS BEEN REPLACED, SIDING IS WEATHERED	MEDIUM	3	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
23	TILE SHOP TOWER	EAST	CORRUGATED METAL SIDING	FAIR	SIDING IS WEATHERED BUT APPEARS TO BE ORIGINAL	HIGH	3	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	5	WOOD, THREE OVER THREE CASEMENT WINDOWS	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
23	TILE SHOP TOWER	WEST	CORRUGATED METAL SIDING	FAIR	SOME SIDING IS MISSING, THUS EXPOSING WOODEN STRUCTURE UNDERNEATH, SOME SIDING HAS BEEN REPLACED, SIDING IS WEATHERED	MEDIUM	3	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE

BUILDING 23, TOWER: GENERAL CONDITIONS INFORMATION

Sheet 2

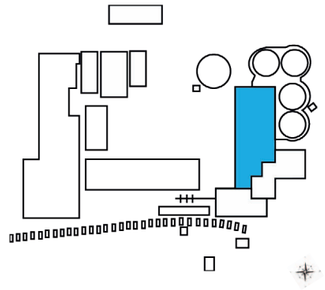
S. Reid 2011



BLDG NUMBER	BUILDING NAME	ELEVATION	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	CORNICE MATERIAL	CORNICE DESCRIPTION	CONDITION	CONDITION NOTES	INTEGRITY	NUMER OF CHIMNEY OR SMOME STACKS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES	VEGETATION
23	TILE SHOP TOWER	NORTH	FLAT SHEET METAL AND CORRUGATED SHEET METAL	FAIR	WEATHERED BUT INTACT	HIGH	WOOD	FASCIA BOARD ATTACHED TO EAVE AND SLIGHT OVERHANG TO ROOF SHEATHING	GOOD	NONE	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NORTH SIDE OF THE TOWER IS MOSTLY A SLANTED ROOF	NOT APPLICABLE
23	TILE SHOP TOWER	SOUTH	FLAT SHEET METAL	POOR	WEATHERD WITH MISSING SHEETS OF METAL	MEDIUM	WOOD	FASCIA BOARD ATTACHED TO EAVE AND SLIGHT OVERHANG TO ROOF SHEATHING	FAIR	NONE	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	NOT APPLICABLE
23	TILE SHOP TOWER	EAST	FLAT SHEET METAL	FAIR	WEATHERED BUT INTACT	HIGH	WOOD	FASCIA BOARD ATTACHED TO EAVE AND SLIGHT OVERHANG TO ROOF SHEATHING	GOOD	NONE	HIGH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	NOT APPLICABLE
23	TILE SHOP TOWER	WEST	FLAT SHEET METAL	POOR	WEATHERD WITH MISSING SHEETS OF METAL AND UNDERLYING ROOF STRUCTURE STARTING TO FAIL	MEDIUM	WOOD	FASCIA BOARD ATTACHED TO EAVE AND SLIGHT OVERHANG TO ROOF SHEATHING	POOR	ROTTING	LOW	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NONE	NOT APPLICABLE

BUILDING 23, TOWER: CONDITIONS INFORMATION, ELEVATION DETAILS

S. Reid 2011



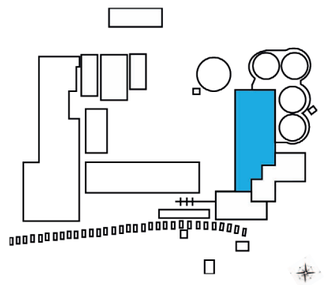
BLDG NUMBER	ELEVATION	TYPE OF OPENING	OPENING MATERIALS	FRAME	STYLE	CONDITION	CONDT NOTES	INTEGRITY	INTEGRITY NOTES
23	EAST	WINDOW	WOOD AND GLASS	WOOD	FIXED THREE OVER THREE LIGHTS	GOOD	TWO BOTTOM LIGHTS O GLASS MISSING. OTHERWISE INTACT	HIGH	TWO LIGHTS OF GLASS ARE MISSING BUT EVERYTHING ELSE IS INTACT
23	EAST	WINDOW	WOOD AND GLASS	WOOD	FIXED THREE OVER THREE LIGHTS	GOOD	BOTTOM CENTER LIGHT OF GLASS MISSING. OTHERWISE INTACT	HIGH	ONLY ONE LIGHT OF GLASS IS MISSING
23	EAST	WINDOW	NOT APPLICABLE	WOOD	NOT APPLICABLE	NOT APPLICABLE	ONLY THE OUTER WINDOW FRAMING EXISTS	LOW	ONLY THE OUTER FRAME REMAINS
23	EAST	WINDOW	WOOD AND GLASS	WOOD	FIXED THREE OVER THREE LIGHTS	FAIR	MISSING THREE LIGHTS OF GLASS AND LEFT-MOST HORIXONTAL MUNTIN HAS FALLEN OFF	MEDIUM	OUTER AND INNER WINDOW FRAME, MUNTINS, AND LIGHTS OF GLASS PRESENT. ONE LIGHT AND A MUNTIN HAVE FALLEN BUT ORIGINAL MATERIALS STILL PRESENT
23	EAST	WINDOW	WOOD AND GLASS	WOOD	FIXED THREE OVER THREE LIGHTS	GOOD	COMPLETELY INTACT	HIGH	COMPLETELY INTACT

• ALONG EACH FACADE, WINDOWS AND DOORS ARE NUMBERED FROM LEFT TO RIGHT AND TOP TO BOTTOM

BUILDING 23, RAMP A: ELEVATION DETAILS

Sheet 1

S. Reid 2011

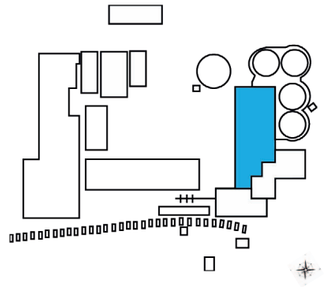


BLDG NUMBER	BUILDING NAME	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	INTEGRITY NOTES	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY
23-A	RAMP A	NORTH	WOOD	POOR	WOOD IS SEVERELY WEATHERED AND WARPED WITH ROTTING IN SOME AREAS, ESPECIALLY AT ENDS OF BOARDS	MEDIUM	DESPITE WEATHERING AND WARPING THE RAMP IS INTACT AND THE WOOD ALL APPEARS TO BE ORIGINAL	2	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
23-A	RAMP A	WEST	WOOD	FAIR	SOME OF THE WOODEN BOARDS APPEARS MORE WEATHERED AND WAPRED THAN OTHERS. PERHAPS SOME REPLACEMNT BOARDS	MEDIUM	WOOD IS SEVERELY WEATHERED, SOME CRACKING OF THE WOOD, SOME BOARDS MAY HAVE BEEN REPLACED IN THE MORE RECENT PAST	2	1	WOOD WITH METAL HINGES	FAIR	CLOSURE HARDWARE IS MISSING, WOOD IS SEVERELY WEATHERED, WARPING	HIGH

BUILDING 23, RAMP A: ELEVATION DETAILS

Sheet 2

S. Reid 2011

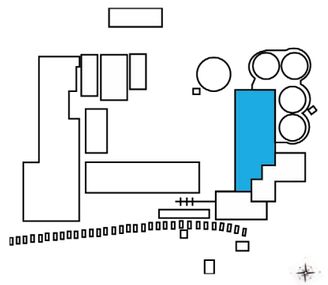


BLDG NUMBER	BUILDING NAME	ELEVATION	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY	NUMBER OF WINDOWS	WINDOW TYPE/MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY
23-A	RAMP A	NORTH	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	2	WOOD	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET	VARIES, SEE CORRESPONDING ELEVATION DETAIL SHEET
23-A	RAMP A	WEST	1	WOOD WITH METAL HINGES	FAIR	CLOSURE HARDWARE IS MISSING, WOOD IS SEVERELY WEATHERED, WARPING	HIGH	1	WOOD	POOR	FRAME IS ROTTING AND FALLING OUT OF WINDOW OPENING	POOR

BUILDING 23, RAMP B: GENERAL CONDITIONS INFORMATION

Sheet 1

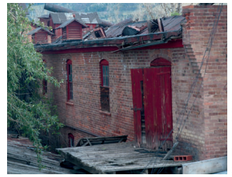
S. Reid 2011



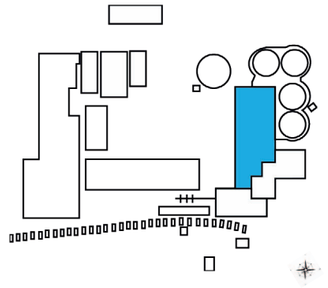
BLDG NUMBER	BUILDING NAME	ELEVATION	ELEVATION MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	INTEGRITY NOTES	NUMBER OF LEVELS	NUMBER OF DOORS	DOOR MATERIALS	CONTDITION	CONDITION NOTES	INTEGRITY
23-B	RAMP B	NORTH	WOOD	POOR	ALMOST ENTIRELY COLLAPSED	LOW	ALMOST ENTIRELY COLLAPSED	2	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
23-B	RAMP B	EAST	WOOD	POOR	ALMOST ENTIRELY COLLAPSED	LOW	ALMOST ENTIRELY COLLAPSED	2	0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE

BUILDING 23, RAMP B: GENERAL CONDITIONS INFORMATION

Sheet 2



S. Reid 2011



BLDG NUMBER	BUILDING NAME	ELEVATION	NUMBER OF WINDOWS	WINDOW TYPE/ MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	ROOFING MATERIALS	CONDITION	CONDITION NOTES	INTEGRITY	GENERAL NOTES
23-B	RAMP B	NORTH	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	WITH THE EXCEPTION OF PLATFORM ATTACHING TO WALL OUTSIDE OF THE BUILDING'S SECOND STORY DOOR OPENING, THE ENTIRE STRUCTURE HAS COLLAPSED. THE REMAINING PLATFORM IS ROTTING
23-B	RAMP B	EAST	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	WITH THE EXCEPTION OF PLATFORM ATTACHING TO WALL OUTSIDE OF THE BUILDING'S SECOND STORY DOOR OPENING, THE ENTIRE STRUCTURE HAS COLLAPSED. THE REMAINING PLATFORM IS