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Historic Context and Management Plan for the Quarry Pond Archeological Complex on Fort Drum

Susan I. Enscore and Carey L. Baxter

April 2012



Cover Image: Lime Quarry, Lewisburg, NY, undated (Diana Township History Office).

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Final report

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Prepared for Public Works, Environmental Division
Cultural Resources Section, PW-ENV
Fort Drum, NY 13602

Abstract

Land annexed by Fort Drum in 1941 included a defunct limestone quarry filled with water. Known as Quarry Pond, the site is part of a larger group of archeological sites known as the Quarry Pond Complex that also contains industrial ruins, early lime kilns, and a railroad berm and grade. The complex first furnished limestone for flux used in an iron blast furnace in Lewisburg. The ruins of three lime kilns are extant near the pond. When advances in iron production made the furnace obsolete, the quarry provided limestone used by sulfite mills in paper production or by the steel industry. In 1931, the quarry suddenly filled with spring water and was shut down. It is perhaps best known as the site of a spectacular cavern filled with very large and beautiful calcite crystals that were displayed at the New York State Museum for nearly seventy years. Although the site is significant for discovery of the crystals, the level of its destruction has resulted in a loss of integrity. The complex maintains the potential, however, to yield useful information about nineteenth- and early twentieth-century extractive industries, and it should be managed to minimize damage to the component parts of the complex.

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Preface

This study was conducted for Public Works, Environmental Division, Fort Drum, NY, under Project 334557, “Quarry Pond.” The technical monitor was E.W. Duane Quates, Archeologist, Cultural Resources Section, PW-ENV, Fort Drum, NY.

The work was performed by the Land and Heritage Conservation Branch (CN-C) of the Installations Division (CN), U.S. Army Engineer Research and Development Center – Construction Engineering Research Laboratory (ERDC-CERL). The ERDC Project Manager was Adam Smith. At the time of publication, Dr. Christopher White was Chief, CEERD-CN-C; John Bandy was Chief, CEERD-CN; and Alan Anderson was Technical Director for Military Ranges and Lands. The Deputy Director of ERDC-CERL was Dr. Kirankumar Topudurti, and the Director was Dr. Ilker Adiguzel.

The Commander and Executive Director of ERDC was COL Kevin J. Wilson, and the Director of ERDC was Dr. Jeffery P. Holland.

Acknowledgements

The authors wish to recognize and thank those who assisted with the formation of this report, including: Duane Quates, Fort Drum Archeologist; Jaime Marhevsky, Fort Drum Cartographer, the Fort Drum Master Planning staff; Lynn Thornton, Town of Champion Historian; Laura Prieto, Village of Carthage Historian; Ross Young, Town of Diana Historian; Jeanette Wicks, Harrisville, NY; Jack Gormley, Carthage, NY; Lisa Carr, Watertown Daily Times Librarian; the staff of Lewis County Historical Society; and the staff at Lewis County Courthouse.

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Collection of the late Isabel Muir, Harrisville, NY
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Watertown Daily Times Archives
MATRIX Journal Photo Collection
Jack Gormley, Personal Collection, Carthage, NY

Unit Conversion Factors

Multiply	By	To Obtain
acres	4,046.873	square meters
feet	0.3048	meters
miles (U.S. statute)	1,609.347	meters
square feet	0.09290304	square meters
square inches	6.4516 E-04	square meters
square miles	2.589998 E+06	square meters
square yards	0.8361274	square meters
yards	0.9144	meters

1 Introduction

1.1 Background

Through the years, the U.S. Congress has enacted laws to preserve our national cultural heritage. The first major preservation legislation was the Antiquities Act of 1906. It was instrumental in securing protection for archeological resources on federal property. The benefits derived from the Antiquities Act and subsequent legislation precipitated an expanded and broader need for the preservation of historic cultural resources. With this growing awareness, the U.S. Congress codified the National Historic Preservation Act of 1966 (NHPA) on 15 October 1966, making it the most sweeping cultural resources legislation to date.

Congress created the NHPA to provide guidelines and requirements aimed at preserving tangible elements of our past, primarily through creation of the National Register of Historic Places (NRHP). Contained within this NHPA (Sections 110 and 106) are requirements for federal agencies to address their cultural resources, which are defined as any prehistoric or historic district, site, building, structure, or object. Section 110 requires federal agencies to inventory and evaluate their cultural resources. Section 106 requires determining the effect of federal undertakings on those properties deemed eligible or potentially eligible for the NRHP. If the effect is considered adverse, measures must be taken to mitigate that negative impact. Documentation to Historic American Buildings Survey (HABS) or Historic American Engineering Record (HAER) standards is often utilized for mitigation purposes.

Fort Drum, New York, consists of 107,652 acres near Watertown, New York (Figure 1). Its mission includes “command of active component units assigned to the installation, provide administrative and logistical support to tenant units, support to tenant units, support to active and reserve units from all services in training at Fort Drum, and planning and support for the mobilization and training of up to 80,000 troops annually.”¹ The mission of the 10th Mountain Division (Light Infantry) is “to be manned

¹ “Fort Drum and 10th Mountain Division History,” Fort Drum website, http://www.drum.army.mil/AboutFortDrum/Pages/History_lv2.aspx.

and trained to deploy rapidly by air, sea, and land anywhere in the world, prepared to fight upon arrival and win.”²

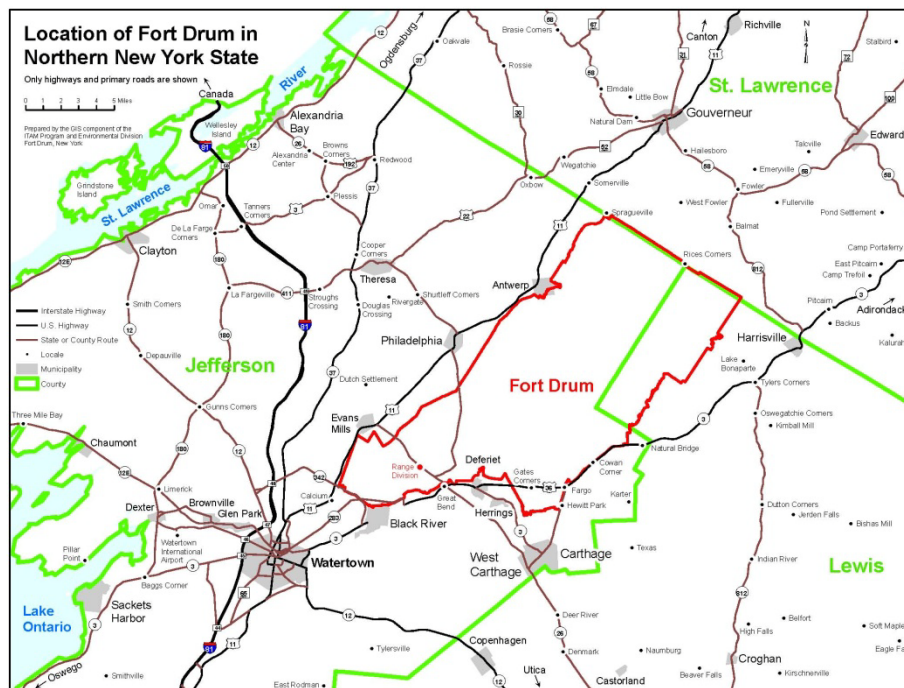


Figure 1. Map showing location of Fort Drum (Fort Drum Cultural Resources Section).

Across the country, rapid engagement in World War II led to a massive mobilization program that included the creation of new military bases and the expansion of existing ones. Known as Pine Camp at the time, Fort Drum required additional acreage to meet the Army's pressing training needs. A large area of land was acquired in 1941, resulting in the elimination of homesteads, villages, farms, and industries. Although nearly all buildings and structures were razed by the Army, many of the properties remain as archeological sites today. According to Fort Drum's website, "three of the lost villages were associated with the late nineteenth century rural iron industry of northern New York."³

One of those lost villages was Lewisburg. An iron blast furnace ran for many years in this village, and the limestone necessary for the blast process came from the quarry site nearby. When advances in iron production techniques made the furnace obsolete, the quarry then

² "North Country History," *Watertown Daily Times*, <http://www.watertowndailytimes.com/section/ncghistory>.

³ "Cultural Resources" <http://www.drum.army.mil/PublicWorks/Pages/CulturalResources.aspx>.

provided limestone for the New York Lime Company and later the Basic Refractories Corporation of nearby Natural Bridge, New York. Most of the lime was used by sulfite mills in paper production or by the steel industry. In 1931, the quarry suddenly filled with spring water and was shut down. The quarry is perhaps best known as the site of a spectacular cavern filled with very large and very beautiful calcite crystals which were removed in 1906 and displayed at the New York State Museum in Albany for nearly seventy years.⁴ (More details are given in Chapter 2.)

Today, the site is known as Quarry Pond, part of the larger Quarry Pond Archeological Complex. It is currently managed by Fort Drum as a potentially National Register of Historic Places eligible industrial complex containing a submerged archeological site component. To assist in proper management of this property, Fort Drum tasked ERDC-CERL to research and produce a historic context and management plan.

1.2 Scope

This report presents a history and management plan for the Quarry Pond Complex at Fort Drum, NY. Although the pond complex and the associated features are the focus of this report, information is also provided on the iron industry in the area during the period of quarry operations, the settlement patterns relevant to the operation of the quarry, design and use of early lime kilns, the discovery of the Rose Grotto, and the takeover of the quarry by Fort Drum.

The Cultural Resources Office at Fort Drum⁵ has sponsored previous work that is relevant to this effort. Through these reports, the historic contexts of area rural villages and the local iron industry have been thoroughly covered. As a result, the discussion contained in this report concerning the Village of Lewisburg and its iron industry is not comprehensive. See the reports listed below for a full understanding of these topics.

- Re-Evaluation of Rural Historic Contexts for the Fort Drum, New York Vicinity, 1986.
- A Report on the Rural Village and Iron Industry Historic Contexts of the Fort Drum, New York Vicinity, 1988.

⁴ The museum retains the exhibit, but has rotated it to storage in recent years.

⁵ All documents are available at the Cultural Resources Section, Public Works Environmental Division (PW-ENV) of Fort Drum, NY.

- Historic American Engineering Record: Lewisburg Furnace, 1988
- Quarry Pond, TA 14B, 1999.160
- Quarry Railroad Berm and Grade, FDH 1255, TA14A, 2001.022
- Report on Dispersed Social Center, Rural Industry and Agricultural Processing Sites at Fort Drum, New York, 2002
- Site Revisit, FDH 1074/FDH 1085, TA 14B (2006.046)
- Quarry Pond Diving and Film, TA 14B (2008.059)
- Quarry Pond Diving, TA 14B (2009.054)

1.3 Objectives

The first objective of this project is to create a document that contains the history of the lime quarry now part of Fort Drum, as far as the historical record permits. The second objective is to provide advice for development of a more detailed Quarry Pond management plan with consideration for future training and recreational applications for the quarry pond as it exists today.

1.4 Approach

1.4.1 Archival research

The project team (project manager Adam Smith, author Susan Enscoe, and author Carey Baxter) utilized primary and secondary literature to determine settlement history for the nearby Village of Lewisburg, the history of the companies extracting and manufacturing the lime, and the specific history of the lime quarry (now known as Quarry Pond) on Fort Drum. Sources included books, journal articles, photographs, interviews, manuscripts, maps, and newspaper articles found at area libraries, museums, and historical societies' repositories. The Cultural Resources Section at Fort Drum provided existing documentation and historic maps of the study area.

1.4.2 Site visits

ERDC-CERL personnel made trips to Fort Drum and the surrounding communities the week of 15 November 2010 and the week of 18 April 2011. During these trips, the team gathered relevant information for the historic

context, visited Quarry Pond and took photographs for reference, and collected archival information from area repositories. Research was conducted at the Carthage Free Library, the Diana History Museum, the Lewis County Historical Society, the Lewis County Courthouse, the Jefferson County Historical Society, the Watertown Public Library, the Watertown Daily Times, the Lowville Journal and Republican, and the NY State Archives and Museum. Several area residents were interviewed. Additionally, a multitude of web sites were investigated for relevant content, including on-line libraries of regional newspapers.

1.4.3 Analysis

After initial research was completed, the team analyzed the gathered information. Archival and field information was integrated throughout the course of the research. Using archival sources, the research team extracted relevant historical information. The material was then integrated to tell the story in both text and images. Although information and a few photographs were available for the quarry from about 1902, no historic photographs or textual descriptions were located for the earlier period, for either the larger quarry or the lime kiln area in association with the Lewisburg furnace. Therefore, original quarry site operations and appearance could not be determined.

2 Historic Context for Fort Drum Quarry Pond

The existing pond at the site of the former New York Lime Company/Basic Refractories Corporation quarry is associated with the lime industry in northern New York from the middle of the nineteenth century until approximately 1935. Mining and treatment of minerals was an important industry to the state, bringing in millions of dollars a year. In 1906, for example, the mineral industries in the state produced \$37,118,430 worth of products.⁶ The quarry is located roughly three miles north from the Village of Natural Bridge and one mile east from the former Village of Lewisburg. Although a small part in this industry, the Lewisburg/Sterlingbush quarry provided lime for many years. The quarry was also the site of an important mineralogical discovery in 1906, when a rock fall revealed a cave full of extremely large calcite crystals. The crystals were removed, and their setting was reconstructed at the New York State Museum in Albany, where they were on display for seventy years. The Department of the Army is the present owner of the quarry. The site is quite disturbed, as it is now part of a training area at Fort Drum (Figure 2).

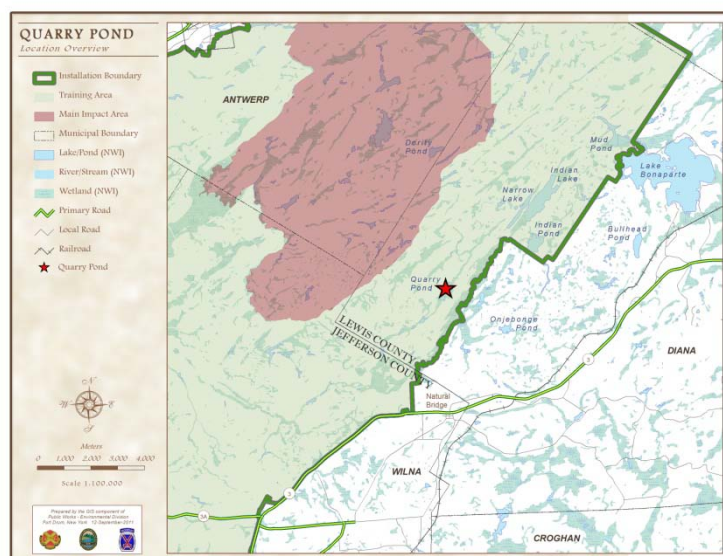


Figure 2. Location of Quarry Pond on Fort Drum, 2011 (Fort Drum Cultural Resources Section).

⁶ D.H. Newland, "The Mining and Quarry Industry of New York State: Report of Operations and Production During 1906," Bulletin 112, New York State Museum (Albany: New York State Education Department, 1907), 6

2.1 Development of Lewisburg/Sterlingbush, New York

In the early- to mid-1800s, Irish, Polish, and Hungarian immigrants settled in Lewisburg beside the Indian River, approximately four miles from the present site of Natural Bridge, in Lewis County, New York. Logging, mining, and iron works enabled by nearby natural resources meant the community was, at one time, regarded as one of the area's most important villages.⁷

2.1.1 Early settlement and industry

Although the Village of Lewisburg no longer exists, it was inhabited for a little over one hundred years, with traces of its history remaining. Located in the far western part of the Town of Diana in Lewis County, New York, ownership of the land that developed into Lewisburg went through several hands before the U.S. Army acquired it in 1941. Originally part of Oneida County, Lewis County was established by 1810.⁸ Permanent settlements in the area had multiplied during the 1790s and the first decades of the nineteenth century, as tensions and economic difficulties resulting from the Revolutionary War died down. After 1786, short-term taxation relief was available for recently purchased land if it was quickly settled. This policy led to an active period of land speculation.⁹ The impact of the Treaty of Canandaigua in 1794 resulted in more land becoming available for settlement.¹⁰

Several villages sprang up along the Indian River, usually around a gristmill or sawmill. In Lewis County, there were sixteen gristmills and forty-six sawmills by 1820.¹¹ A great deal of the land in the area was owned by Joseph Bonaparte, brother of the French military and political leader, Napoleon Bonaparte. A sawmill was built on the Indian River in 1825, at Joseph Bonaparte's direction.¹² This was the first construction in the area

⁷ Sue Burgess, "Glimpses into the past..." *Lowville Journal and Republican*, September 18, 1973 in Vertical File: Lewisburg, Lewis County Historical Society, Lowville, NY.

⁸ Louis Berger & Associates, Inc., "Historic American Engineering Record: Lewisburg Furnace," HAER No. NY-189, (Philadelphia: National Park Service Northeast Region), 1988, 6.

⁹ *Ibid.*, 5–6.

¹⁰ Robert G. Koch, "The Canandaigua Treaty of 1794: Events Leading up to the Treaty," *The Crooked Lake Reiew*, November 1994, http://crookedlakereview.com/articles/67_100/80nov1994/80koch.html.

¹¹ *Ibid.*, 7.

¹² Hamilton Child, *Gazetteer and Business Directory of Lewis County, New York for 1872-73*, (Syracuse, New York: The Journal Office, 1872), 92.

that would become Lewisburg. A photograph probably taken in the early 1900s shows the dam and sawmill on the left side of the image (Figure 3). It is not known, however, if the structure in the image is the original or a newer version. The initial activity at the site that would become Lewisburg is prophetic because the village would become defined by industry. Timber was soon superseded by iron production, and the ebb and flow of the village mirrored the fortunes of the iron industry.



Figure 3. Lewisburg river industries, photograph labeled 1907 (Diana Town Historian's Office).

The emergence of a local iron industry during the early 1800s provided an impetus for many settlements in the area. While the center of the iron and steel industry in New York would emerge along the Hudson River south of Albany, there were hinterland operations established in northern New York utilizing basic technology.¹³ Iron ore deposits were fairly plentiful, and the forested land provided timber for charcoal. The geologic character of the underlying rock offered the other necessary ingredient, lime. There was an ironworks constructed on the Indian River at Rossie, New York, as early as 1813. The owner, Mr. Parish, built a furnace in Antwerp, New York, soon after, and James D. LeRay opened one at Carthage, New York, in 1819. By 1929, there were a dozen or so of these furnaces operating in the region.¹⁴ Iron was fired in these furnaces primarily through the cold blast technique, as described here:¹⁵

¹³ Louis Berger & Associates, Inc., "Historic American Engineering Record: Lewisburg Furnace," 7.

¹⁴ Harry F. Landon, *The North Country: A History, Embracing Jefferson, St. Lawrence, Oswego, Lewis and Franklin Counties*, New York. Volume One, (Indianapolis, Indiana, 1932), 199.

¹⁵ Georgess McHargue, *In the North Country: The Archeology and History of Twelve Thousand Years at Fort Drum*, (Littleton, Massachusetts: Timelines, Inc., 1998), 35.

... cartloads of iron ore, limestone, and charcoal were introduced into the stone furnace structure at the top, having come up an earthen ramp and across a wooden bridge...the carts would have been drawn by horses, mules, or oxen...At the lower level of the furnace, a water wheel was used to force a blast of air through the pipe leading into the base of the furnace...and directed into the burning mass by a nozzle called a tuyere...The limestone served as a chemical flux to carry away impurities (that is, slag), while the molten iron ran out through vents in the bottom of the furnace...and into the criss-cross channels on the floor where it could be cooled and cut into “pigs” or market-size bars.

The components of a blast furnace are shown in Figure 4.

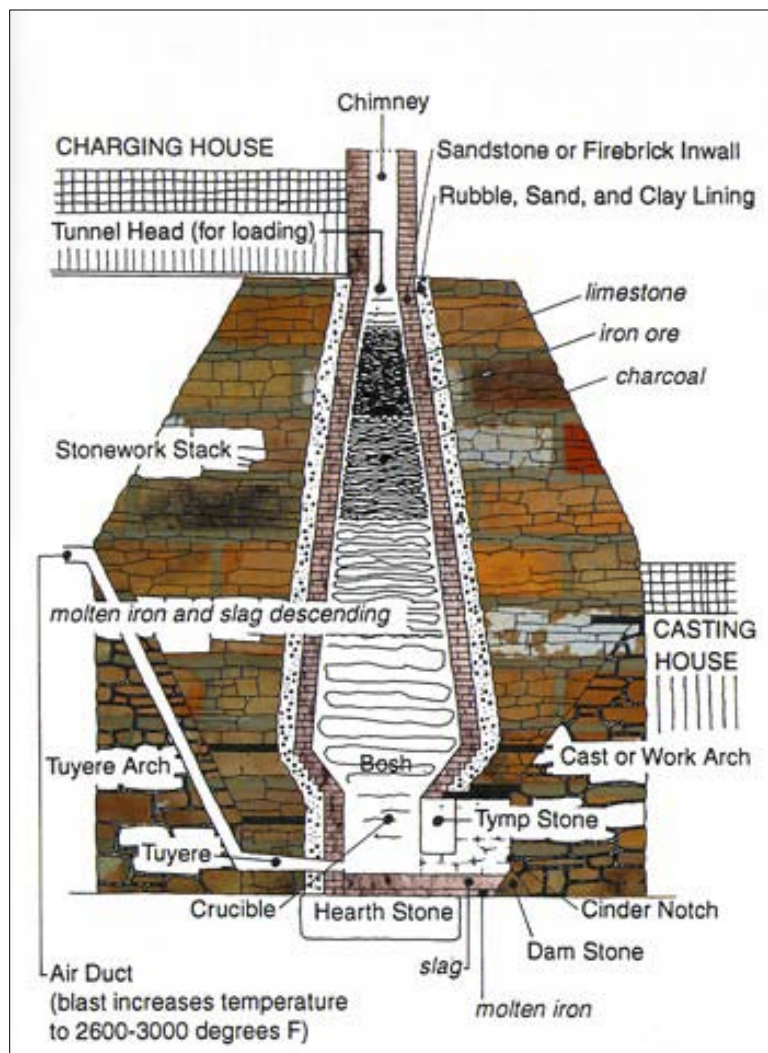


Figure 4. Diagram of a cold-blast, charcoal-fueled iron furnace (WITF, Inc., Courtney Howell, found at <http://explorepahistory.com/displayimage.php?imgId=1-2-FBE>).

It is unknown if the locale had a name when the sawmill was erected in 1825, but by 1831 the name “Louisbourg” or “Louisburg” was given to the land by new owners. The genesis of the name was an effort by four Frenchmen—Louis Fannel and the Jomaine brothers (Nicholas, Constant, and Charles)—to cash in on the early iron industry. These four purchased the land from Bonaparte’s agent in 1831, and a charcoal-powered cold blast furnace was operating by the following year.¹⁶ For nearly the next fifty years, an iron blast furnace operated intermittently at the same site.

The initial effort lasted only a few years and made only two or three short production blasts. Seeing little return on their investment, the four Frenchmen sold the property in 1836 to a group of investors from New Jersey: Isaac K. Lippencott, Joseph M. Morgan, and David D. Reamer.¹⁷ As would become a pattern with new owners, the furnace stack was rebuilt, and the partners proceeded to manufacture pig iron, stove components, and other cast-iron products that found a market in Rochester, New York.¹⁸ Although financial success was achieved, the local supply of ore on their lands soon played out, and they were forced to buy iron from the mine in Rossie, New York.¹⁹ With an unstable market and a forced reliance on an unrelated ore supplier, the Louisburg furnace became a losing proposition, and the furnace was closed in 1848 while a buyer was sought.²⁰ Figure 5 shows development of the village by 1846, with the “Louisburg Furnace” noted and ten structures clustered south of the furnace and around the road.²¹

¹⁶ Louis Berger & Associates, Inc., “Historic American Engineering Record: Lewisburg Furnace,” 9; Marie F. Bean and Isabel R. Muir, “The Story of Louisburg and Alpina,” *4 Rivers Journal*, Vol. 5, No. 1, Jan-Mar 1982:105.

¹⁷ Richard S. Allen, “The Furnaces of Fort Drum,” *Bulletin of the Jefferson County Historical Society*, Vol. 16, December 1984:22.

¹⁸ *ibid.*

¹⁹ *ibid.*

²⁰ *ibid.*, 23.

²¹ “Map of the Lands of the Joseph Bonaparte Tract in Jefferson and Lewis Counties, New York,” 1846, in Lewis County Courthouse Clerk’s Office.

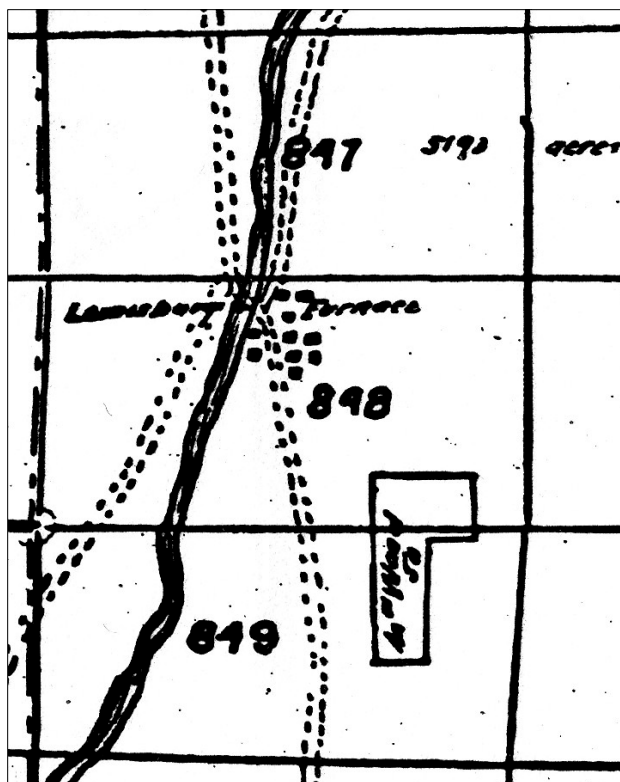


Figure 5. Detail from 1846 Bonaparte Tract Map showing development at the furnace site (Lewis County Courthouse Clerk's Office).

2.1.2 James Sterling and the growth of Lewisburg

That buyer turned out to be James Sterling, a major presence in the industry who became known as the “Iron King of Northern New York.” A very large man, he was six feet, three inches tall and at one point weighed nearly four hundred pounds. Sterling also possessed a drive to succeed in the iron industry.²² Trained in iron production at the Rossie furnace, he started his first business in the field of iron production in 1836 by purchasing land north of Antwerp, New York, that contained a large amount of excellent iron.²³ Having secured a steady supply of ore, he moved to other aspects of the industry by investing in ironworks located in Jefferson, St. Lawrence, and Lewis Counties. He had a small blast furnace going near Antwerp by 1837, financed through a stock company organized as the Sterling Iron Company, which was made up of himself and four associates.²⁴ Sterling, a man of some ambition, named the village growing

²² Jay L. Lininger, “The Mineralogy of St. Lawrence County, New York: A Historical Sketch,” *MATRIX: A Journal of the History of Minerals*, Vol 6, No. 3:92.

²³ *ibid.*

²⁴ Allen, “The Furnaces of Fort Drum,” 17-18.

around that furnace “Sterlingburgh,” not to be confused with another substantial community that he also founded around a furnace enterprise to the south and west that he named “Sterlingville.” The companies organized to run Sterling’s interests came and went over the next several decades, but he prospered in the iron business.

By 1852, Sterling owned the mine and three blast furnaces, which were producing a large quantity of both iron ore and pig iron. To expand his interests even further, that same year Sterling purchased the failed property at Louisburg from Lippencott (sole owner at that time). The purchase of the entire village and 4,500 acres of adjoining land cost Sterling \$10,000; the purchase was made in partnership with his brother Samuel Sterling, and Hiram Polley of Jefferson County.²⁵ As with Sterling’s other properties (Sterlingville and Sterlingburgh), this new acquisition needed a new name; Sterling successfully petitioned for the village and its post office to be rechristened as Sterlingbush.

Sterling’s ownership marked the village’s most prosperous phase. Sterling began local improvements immediately, including razing and reconstructing the furnace stack, draining swamps, clearing land, and constructing new roads, all at a cost of \$13,000. Additionally, the company provided land for the construction of a Catholic Church, possibly for the Irish laborers that Sterling is thought to have brought to the village (Figure 6).²⁶ In addition, the former private residence of David D. Rheamer was turned into a hotel by Sterling, who used it to house the teamsters moving ore from his mine for the blast furnace.²⁷ Taken over by John F. Pierce in 1902, the hotel (Figure 7) was an enduring business that remained part of the village until it was destroyed by fire in 1925.²⁸

²⁵ Glenn Hawkins, “The Rose Grotto at White Rock,” reprinted in *4 Rivers Journal*, Vol. 13, No. 1&2, January-June 1990, 376; Allen, “The Furnaces of Fort Drum,” 17-18.

²⁶ Louis Berger & Associates, Inc., “The Fort Drum Cultural Resource Project Task Order 15: A Report on the Rural Village and Iron Industry Historic Contexts of the Fort Drum, New York Vicinity,” (East Orange, New Jersey: Louis Berger & Associates, Inc., 1988), 2-11.

²⁷ “Lewisburg Hotel,” *Historic Natural Bridge Photo Gallery*, http://www.historic-naturalbridge.com/gallery/v/NatBrdge1/Natural+Bridge+N_Y_+075.jpg.html

²⁸ Hawkins, “The Rose Grotto,” 376.



Figure 6. St. Patrick's Church, Lewisburg, undated (Diana Town Historian's Office).



Figure 7. Pierce Hotel, Lewisburg, pre-1925 (Diana Town Historian's Office).

An 1857 Lewis County map shows the village at the height of Sterling's reign over the iron industry (Figure 8). The growth seen in contrast to the 1846 map is striking, as the village has spread across the river and further south along the road.

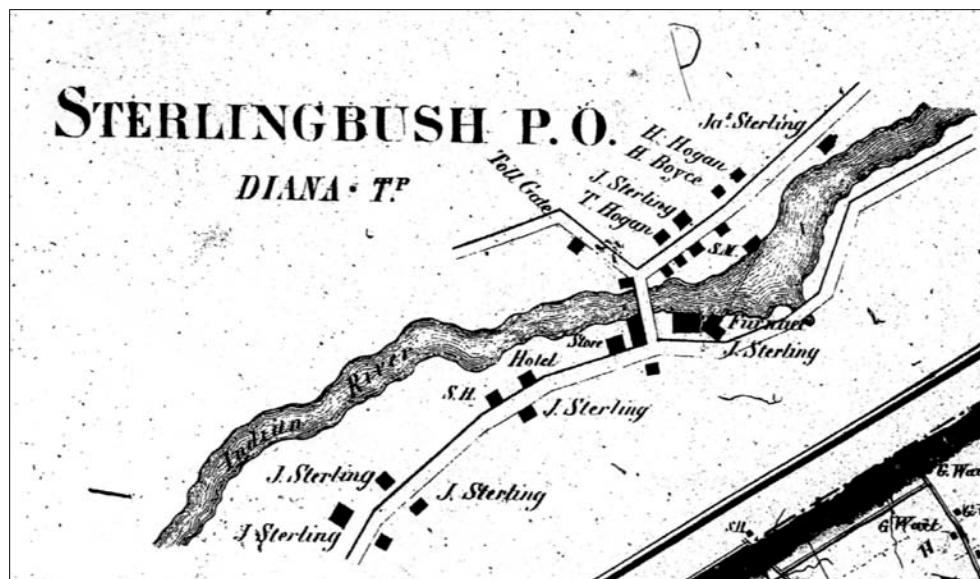


Figure 8. Sterlingbush detail from 1857 Ligowsky Map of Lewis County (New York State Archives).

One of Sterling's improvements, the rebuilt blast furnace, is described by Allen as follows:²⁹

The new Sterlingbush furnace was 33 feet high and nine feet across the bosh [the opening at the base where the molten iron extrudes]. It was powered by an 18-foot breast wheel with nine-foot buckets, driving a round, wooden, double-acting cold blast cylinder of the same dimensions as the other Sterling works: five and a half feet in diameter, with a four-foot stroke making seven revolutions per minute.

Below is an artist's rendition of the working furnace (Figure 9). The raw ingredients were loaded from the top, the water wheel provided energy to create the blasts of air, and the molten iron came out the bottom where it filled sandy molds.

²⁹ Allen, "The Furnaces of Fort Drum," 22.

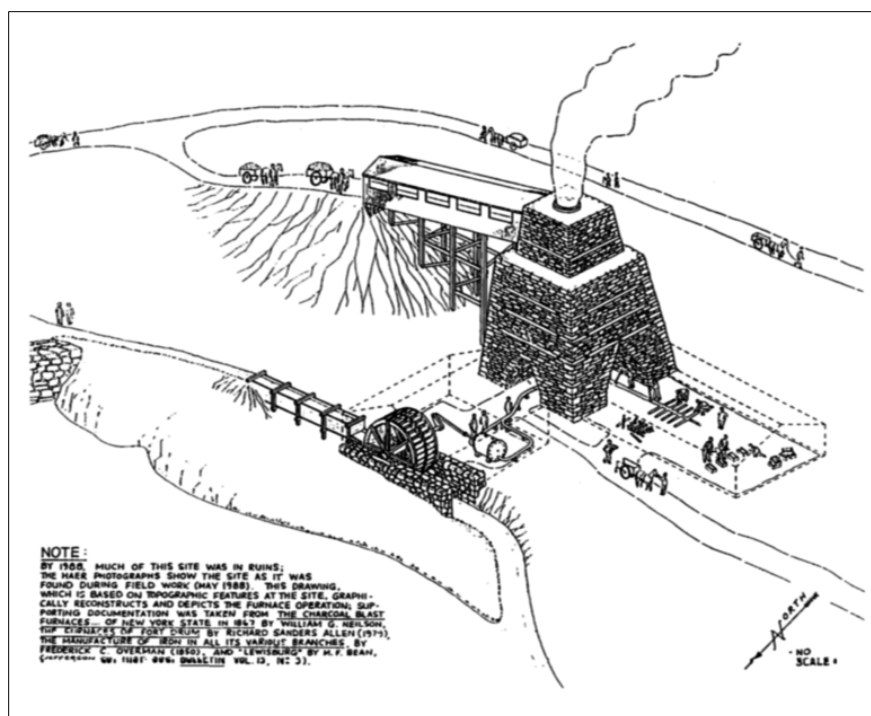


Figure 9. Artist's rendition of Lewisburg Blast Furnace in use (HABS/HAER 1988).

The furnace produced an average of 1,000 tons of pig iron a year, but fell victim to the vagaries of the market along with the rest of James Sterling's holdings. Overextended at a time when the iron market dipped, Sterling's losses forced him into retirement, and his business concerns were shut down in 1858.³⁰ The Sterling Iron Mine produced a profit, however, and after Sterling's death in 1863, his sons A.P. Sterling and James Sterling, along with Rochester Hungerford, reopened the Sterlingville and Sterlingbush furnaces.³¹ They manufactured pig iron for use in the Civil War, producing 2,820 tons in a continuous 40-week blast in 1864.³² A.P. Sterling operated the furnace on and off until 1869, when it was sold along with all the Sterling properties to Edwin B. Bulkley, owner of the Jefferson County Iron Company.³³ As this company was more interested in selling ore, few blasts were made at the Sterlingbush furnace over the next dozen years, and the operation was shut down permanently in 1881.³⁴ From the period represented by the photo, it was in ruins by the turn of the century (Figure 10).

³⁰ Allen, "The Furnaces of Fort Drum," 19.

³¹ *ibid.*

³² *ibid.*, 23.

³³ *ibid.*

³⁴ *ibid.*



Figure 10. Ruins of the Lewisburg blast furnace, circa 1900
(Diana Town Historian's Office).

As stated earlier, the fortunes of Sterlingbush rose and fell with the industry that supported it. An 1875 atlas shows a moderate amount of growth, mostly as construction filled in along the road (Figure 11). Although Jefferson Iron Company owns much of the property, there are still Sterlings present in the village at that time.

By 1875 there were eight dwellings, a school house (Figure 12), a post office, and two churches. Industries at that time included a sawmill, the Jefferson County Iron Company (using ten or more buildings plus the furnace), a blacksmith, wagon shop, and a store.³⁵ A town hall was added later (Figure 13).

Although use of the name Sterlingbush began to decline after Sterling's death, it remained until at least the 1880s. The use of the old name of Louisburg (now altered to Lewisburg) began a comeback, and the village was primarily known by that name until it was deserted in 1941 when the Army took over the land.

³⁵ Louis Berger & Associates, Inc., "The Fort Drum Cultural Resource Project Task Order 15," Appendix.

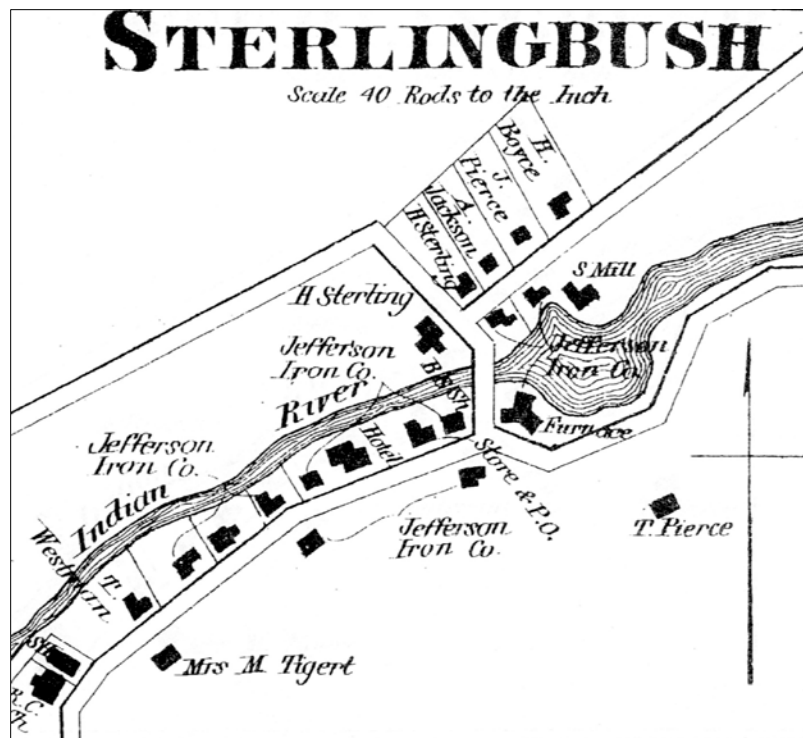


Figure 11. Detail of 1875 D.G. Beers Atlas of Lewis County showing Sterlingbush properties (New York State Archives).



Figure 12. Lewisburg School, 1908 (Diana Town Historian's Office).



Figure 13. Town Hall, Lewisburg, undated (Diana Town Historian's Office).

2.2 The Lewisburg Quarry

Quarry Pond is just the latest name held by the former limestone quarry. It was first the Louisburg Quarry, then the Sterlingbush Quarry, back to the Lewisburg Quarry (with new spelling), followed by the New York Lime Quarry, and finally the Basic Quarry. The name changes reflected changes in quarry use and ownership over time. During the initial stages of iron production activities conducted by the four Frenchmen, the site most likely was simply referred to as the Louisburg Quarry. When the iron-making activities were purchased by James Sterling, the quarry took on the name of the rechristened village and was known as the Sterlingbush Quarry. When the village reverted to the new spelling of Lewisburg in the later 1800s, the quarry did as well, then known as the Lewisburg Quarry. In 1902, the quarry acquired new owners, and a processing mill was constructed at Natural Bridge, making the quarry the New York Lime [Company] Quarry. The site's final appellation was the Basic Quarry, due to the property's purchase in 1915 by the Basic Refractories Corporation of Pennsylvania.³⁶

The northwest flank of the Adirondack Mountains, known as the "Grenville Series," is primarily composed of metamorphosed sedimentary

³⁶ Isabel Muir, "Epilogue," *4 Rivers Journal*, Vol. 13, No. 1 & 2, January-June 1990, 381.

and igneous rocks.³⁷ Included among the metamorphic rocks are concentrations of limestone, which the Lewisburg quarry exhibited as dolomitic marble.³⁸ The quarry was located on the eastern slope of a northeast/southwest ridge of this limestone (Figure 14 and Figure 15).³⁹

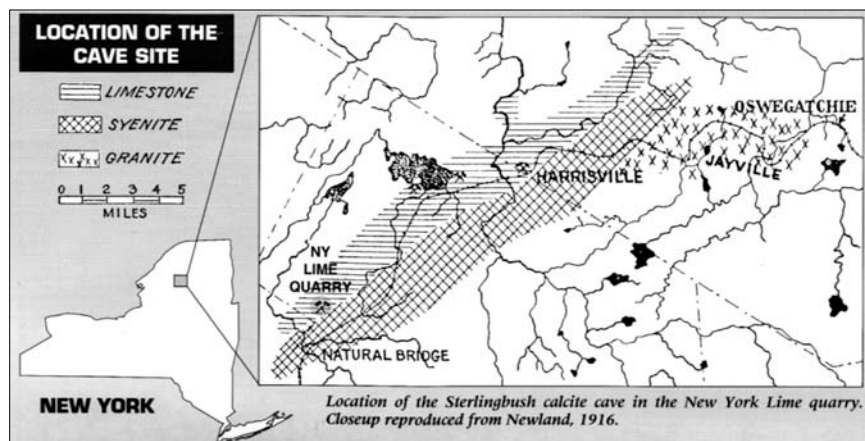


Figure 14. 1916 map showing types of geological material with the Lewisburg quarry marked (MATRIX Vol. 7, No. 3, 1999:107).

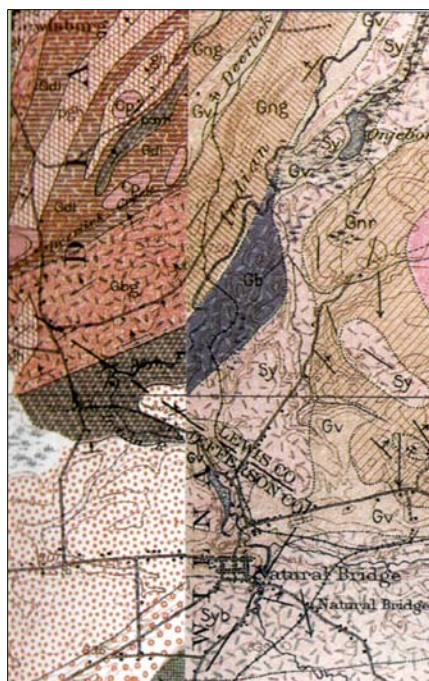


Figure 15. Composite of 1934 (left) and 1926 (right) geologic maps showing bands of material and relative locations of Lewisburg (upper left corner) and the Lewisburg quarry (upper center) (MATRIX Vol. 7, No. 3, 1999:110).

³⁷ *ibid.*, 106.

³⁸ *ibid.*

³⁹ H.P. Whitlock, "Calcites of New York," (Albany: New York State Museum Memoir 13, 1910), 78.

2.2.1 Lime kilns

It is likely that the owners of the furnaces in the town of Louisburg were aware of the nearby source of limestone and quarried it.⁴⁰ There is evidence that lime was also burned on the site, probably to produce lime for use as flux in the iron-making process. There are three nineteenth-century kilns still present in varying stages of ruin in the Quarry Pond Complex; no records were found to indicate the owners of these kilns or the exact time periods when they were operated.

During the mid- and late-nineteenth century, lime kilns were ubiquitous in the rural landscape. Small kilns were often located on individual farms, where they supplied lime to be used as fertilizer. The kilns also served as a source of lime for construction, commonly used in plaster and mortar. Additionally, there were many small commercial kilns operating in rural areas, serving a group of individuals or a small industrial enterprise. Their legacy most often remains in the names of roads once used to access the site for purchasing lime.⁴¹ As with the site at Quarry Pond, these kilns often consisted of a group of two or three individual kilns, either stand alone or as multiple openings in one large structure, depending on the quantity of quicklime needed.

Kilns were often located near an extraction site for limestone, as the raw stone required significant cost and effort to move any distance. The burnt lime was much reduced in bulk from the original stone, and could be efficiently packed for transport. Once the limestone was at the kiln site, it was carried to the top of the furnace stack, usually along a ramp or road constructed at a higher point in the hillside above the kiln. If the kiln was located on flat ground, an area at the back of the kiln would be raised by creating a mound of earth that could be used to bring supplies up to the stack opening. At the Quarry Pond Complex, the three lime kilns were located in a row along the base of a hill. A lower road ran in front of the kiln bases, while an upper road and ramp was placed for moving the extracted limestone to the top of the furnace. There was a small extraction site directly to the north of the westernmost kiln (see Figure 47).

⁴⁰ Stephen L. Nightingale, "The Sterlingbush Calcite Cave Reconstruction of the New York State Museum, Albany, New York," *MATRIX: A Journal of the History of Minerals*, Vol 7, No 3: 110.

⁴¹ For example, Lime Kiln Road in Charlotte, VT; Lime Kiln Road, Hopewell Junction, NY; and Limekiln Road, Inlet, NY.

The process of burning created a chemical reaction, breaking the chemical bond between calcium oxide and carbon dioxide in the calcium carbonate limestone, and leaving the pure calcium oxide or “quicklime” behind. This process required prolonged burning, so kilns were designed for slow, continued burning. Stone kilns from the early nineteenth century, known as “intermittent” kilns, had square or circular fieldstone retaining walls. Inside the kiln, the limestone was placed over a stack of firewood and larger stones (Figure 16). A primary drawback of this type of kiln was the necessity to completely cool the kiln before the lime could be removed and the next cycle started.⁴²



Figure 16. Cross-section of the base of an early wood-fired lime kiln (Gilmore 1874).

The “perpetual” kiln was designed to solve this problem, and was in use in by mid-century, if not a little before then. This kiln type allowed continual use, as it could be recharged with stone and fuel, and lime drawn off below without stopping the operation. Perpetual kilns were often built into hillsides, facilitating the constant recharging. The front walls at the ground level were often built out along the hill contour to act as a retaining wall.⁴³ Perpetual kilns had circular plans, with the shaft (or “pot”) wider in the middle than at the ends. This retained heat and facilitated the downward flow of the limestone.⁴⁴ The hearth below was usually six to ten feet high

⁴² Raymond W. Smith, “Eastburn-Jeanes Limekilns,” *Historic American Engineering Record* (Washington, DC: National Park Service, 1976), 7.

⁴³ *Ibid.*, 8.

⁴⁴ *Ibid.*

and almost as wide, with an opening having an arched or capped stone lintel. Horizontal shafts from the hearth to the shaft provided air flow control and access for removing the quicklime. A grate of iron bars at the bottom of the shaft supported the stone and fuel charge. Kilns often had a lining of firebrick. A kiln height of 20 feet would have been average.⁴⁵

A lime kiln built in 1857 and described by the owners presents a typical design and operation process:⁴⁶

A kiln is round on the inside and often square on the outside. The upper cylinder comes down to a narrower neck just above the firebox at the bottom of the chimney. The cooling zone is down below the firebox. The firebox comes in from two sides.

You stack wood as close as you can and as high as you can reach. Then you dump the rock in at the top...“Next, you light the fire. In about 36 hours you should be able to make your first draw of lime. You take out the ashes and drop the lime into the cooling basin. From then on the lime sticks and you have to trim it with a cutting bar around the edges. The lime sits in there like a cone. You trim the edges and drop it straight down. It has to cool six hours below the firebox before you can pull it out. Even at that time it will be so hot that it will be transparent.

When you get ready to draw the lime you let the fire die down. Then when you get ready to cut the kiln you draw the lime. You take a couple of big sticks of wood in there and pry just over the edge. Then you take your bar and trim it. The work was very hazardous and you had to keep from getting burned.

Firing a kiln is a very technical job. Really it takes an expert to fire a kiln. If they relaxed and rested their eyes too much the kiln would tell on them and go to “rocking”. We had the best people you could ever assemble—they could do anything. We had little to work with except our hands for the most part.

⁴⁵ Ibid.

⁴⁶ “Lime Kilns: Processing Limestone to Make Plaster,”
http://www.wabashanderiecanal.org/Lime_Kilns.html.

It is highly likely that the Quarry Pond kilns were typical in their construction and operation as other perpetual kilns. Their location near an extraction site, against a hillside, and square exteriors with circular interior hearths—all would indicate design characteristics of the perpetual kiln. The use of cement in one the kilns for the exterior lintel and surrounding wall may have been original or may have been a later attempt to shore up the kiln (Figure 17). It is also possible that this kiln was constructed in the last half of the nineteenth century to expand production.



Figure 17. Hearth interior, lime kiln near Quarry Pond, 1996 (Fort Drum Cultural Resources Section).

There are three possibilities for the utilization of the kilns and their relationship to the larger Quarry Pond Complex. First, the kilns were constructed and operated utilizing both the smaller bed nearest the kilns and the larger quarry. Second, the smaller bed was the only quarry on the site

until the large quarry operation began in 1902, and is the one referred to in the older textual sources. Third, the kilns and smaller extraction bed were used for the initial furnace activities at Louisburg, but were expanded with the large quarry when James Sterling expanded the operation.

By the late nineteenth century, the local iron industry was disappearing, but the quarry and its products remained. As other industries began to expand into mass production, limestone remained a useful commodity in the manufacture of several industrial products including paper and steel.

2.2.2 Quarry operations

Little is known about the operations at the quarry before it was purchased by the New York Lime Company in 1902. It is possible that the quarry continued operations after the blast furnace was shut down by selling limestone to other users. Beginning in 1902, the new owners greatly increased (or restarted) limestone production at the quarry and installed equipment for crushing stone at the site.⁴⁷ In the early 1900s, limestone quarrying at the site was done with steam power, and there was likely an onsite wood-fired boiler. Steam powered the drills that created bore holes for explosives to be placed in the rock, with the explosion then breaking the rock into smaller slabs.⁴⁸ It seems that animal power was still being used to some extent after 1902, as a photo taken in 1906 shows horses attached to wheeled carts on the quarry floor (see Figure 27).

An undated photograph (Figure 18), likely from the Basic Refractories ownership period after 1915, shows what appears to be a system for removing the rock from the quarry by filling cars or carts with stone (the carts apparently were moved where needed by a series of rail tracks), then lifting them to the surface. The mechanism for lifting and moving the carts was stabilized with a derrick system. One supporting tower was located at the top of the quarry ridge, and a second one was near the crushing area at the quarry entrance. The structure in the bottom of the quarry is unidentified, but was likely an industrial shop for mining activities.

⁴⁷ "Ore Car Raised From Flooded Mine at Drum," *Watertown Daily Times*, September 14, 1978.

⁴⁸ Hawkins, "The Rose Grotto," 377.



Figure 18. Lime quarry, Lewisburg, undated (Diana Town Historian's Office).

Another view of the quarry in operation (Figure 19) shows the buildings and activities alongside the quarry. In the center of the photograph is the boiler building, which produced steam to run the mining and crushing equipment. Large pipes can be seen exiting the building on the right and leading to the crushing or deposition facilities at the right side of the photograph. There also appears to be a smaller scale piping or hosing emanating from the quarry side of the building and proceeding down into the quarry itself. On the hill to the far right is the other derrick tower for lifting and transferring the stone. Spoil piles are visible in the central background, and the railroad spur is seen approaching the quarry from the right center background, heading toward the left center of the photograph. It is not possible to tell if the spur winds around to the quarry rim or if those tracks are separate.



Figure 19. Lime quarry at Lewisburg, undated (Diana Town Historian's Office).

The railroad spur was constructed to move the crushed stone to the processing plant at Natural Bridge.⁴⁹ The Carthage and Adirondack Branch of the New York Central & Hudson River Railroad passed through Natural Bridge by 1895, if not before (Figure 20). By 1897, this same line was part of the New York Central Railroad (Figure 21). The rail spur and quarry are visible on the 1916 US Geological Survey (USGS) Lake Bonaparte Quadrangle (Figure 22). The field survey for this map was carried out in 1912 and 1913, meaning that the New York Lime Company owned the spur depicted on the map. The spur met the Carthage and Adirondack line just north of Natural Bridge at a station named "Burnett."⁵⁰ There is no indication in the records that the spur was altered in any way by the Basic Refractories Corporation during their period of ownership.

⁴⁹ Nightingale, "The Sterlingbush Calcite Cave Reconstruction," 107.

⁵⁰ David Babson, "Quarry Railroad Berm and Grade, FDH 1255, TA14A (2001.022)," (Fort Drum, NY: Cultural Resources Section, 2001), 1.

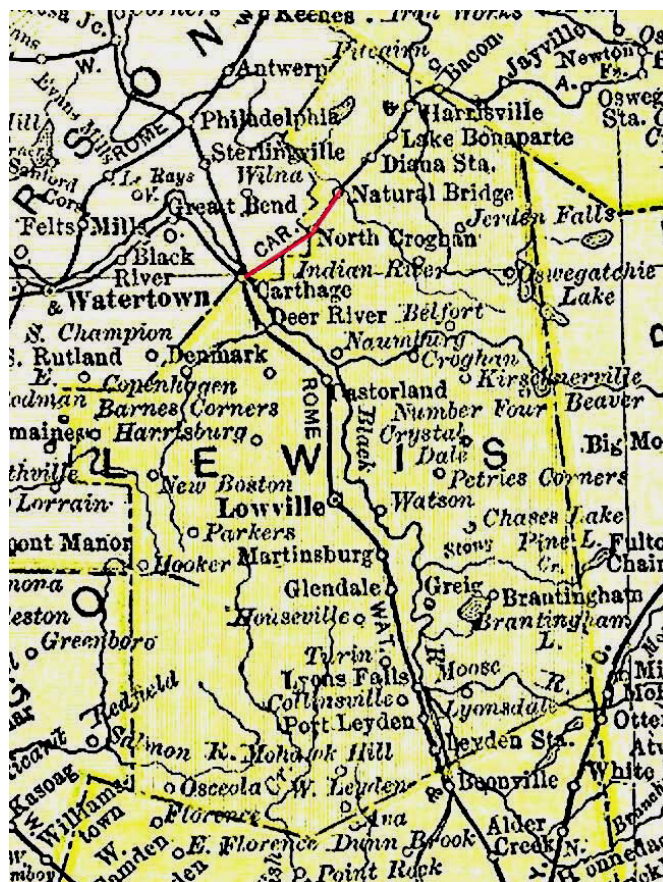


Figure 20. 1895 map of Lewis County showing the railroad between Carthage and Natural Bridge (<http://www.livgenmi.com/1895/NY/County/lewis.htm>).



Figure 21. Detail of 1897 map of Lewis County; showing railroad (<http://www.rootsweb.ancestry.com/~nylewis/images/1897LewisNYmap.jpg>).

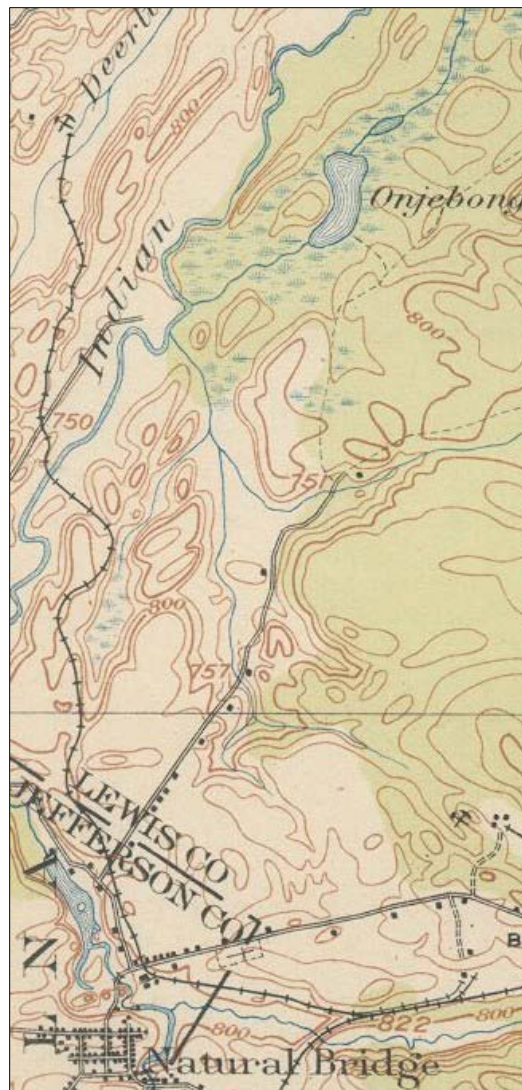


Figure 22. 1916 USGS Lake Bonapart Quadrangle showing location of Lewisburg Quarry along Deerlick Creek and rail spur (<http://docs.unh.edu/NY/lbnp16sw.jpg>)

It is not known exactly when the New York Lime Company installed this rail link, but the company owned locomotives by 1905. Engine 1501 (shown in Figure 23), was constructed for the New York Lime Company in 1905 by Shay Locomotives, under the company name of Lima Locomotive & Machine Company. The wood- and coal-fired engine continued to serve the New York Lime Company (and later the Basic Refractories Corporation) until 1922, when it was sold and the corporation purchased Shay Engine 2881. Basic Refractories also owned two other locomotives by Shay: Engine 553 (scrapped in 1917) and Engine 2755 (date unknown).⁵¹

⁵¹ Shay Locomotives webpage, <http://www.shaylocomotives.com/index.html>



Figure 23. New York Lime Company engine, undated
(from collection of the late Isabel Muir, Harrisville, NY, used by family permission).

Work in the quarry was tough, exposed, and dangerous. It was hot in the summer, cold in the winter, and the quarrymen would be covered with lime dust. Heavily dependent on manual labor, quarry work required that workers toiled through twelve-hour days and six-day work weeks. At the time of peak production in the early 1900s, the 40–55 employees received about 75 cents a day.⁵² The local newspaper reported an incident in 1928 that was probably seen in various versions (including lethal accidents) throughout the operation of the quarry:⁵³

George McIntyre, 20, son of Myron McIntyre, was seriously injured Saturday while at work in the lime quarry of the Basic Refractories Corporation. He was down in the pit, when his father, who was working near, noticed a rock falling and shouted to his son. He started to run but tripped and fell. The rock struck him on the right leg, cutting the flesh to the bone from the knee to the ankle. He was taken to the office of Dr. C.S. Drury, who sent him to Watertown to the House of the Good Samaritan.

Work continued at the mine throughout the 1920s, but an accident of nature created an abrupt end to the activities. A 1988 newspaper article recounted the experiences of a group of previous residents visiting the site

⁵² Sue Burgess, “Glimpses into the past...”.

⁵³ “George McIntyre Seriously Injured While at Work in Lime Quarry,” *The Lowville Journal and Republican*, undated.

of Lewisburg and the quarry and contains reminiscence from William P. Savage, who was 22 when the village ceased to exist. He described the quarry as being in operation until 1931, when “a crew blasting a new vein in the rock hit a natural spring which flooded the quarry.”⁵⁴ Apparently the waters rose quickly, and mining equipment was caught on the quarry floor.⁵⁵ Ten years later, the land was taken over by Fort Drum. A 1964 description of the site stated, “...the quarry is filled with water, the buildings about it falling into decay, the large waste pile appearing like some gigantic ash-strewn volcanic pile.”⁵⁶ A photo taken in 1974 shows the ruins of a large structure associated with the quarry activities (Figure 24). This may have been an industrial-scale lime kiln, but no confirmatory evidence was located. An article in a local newspaper described the lime refinery in Natural Bridge, and in discussing the operation, stated “when the lump lime is delivered at the mill...”⁵⁷ If the mill was receiving lump lime (a term for quicklime or lime after it had been calcined in a kiln), then there must have been a kiln on the property. However, no further proof of this was found.



Figure 24. Ruins of structure at Quarry Pond, 1974 (courtesy of Jack Gormley, Carthage, NY).

⁵⁴ Thomas Fine, “Lewisburg Tour Stirs Bittersweet Memories,” *Watertown Daily Times*, October 30, 1988, B-1.

⁵⁵ “Flooded Mine To Be Searched By Divers in Try to Recover Gear,” *Watertown Daily Times*, September 14, 1978.

⁵⁶ Hawkins, “The Rose Grotto,” 375.

⁵⁷ “Natural Bridge Lime Works,” 1903 newspaper article on file at the Carthage Free Library, Carthage, N.Y.

In 1978, divers from the Jefferson County Underwater Rescue Team, in conjunction with personnel from Fort Drum, conducted several underwater explorations of Quarry Pond. Among their discoveries were “two ore carts, drill bits, and some other mining equipment.”⁵⁸ A joint military-civilian project to raise some of this equipment occurred on 16 September 1978 when the Rescue Team divers were accompanied down to the old quarry floor by a Fort Drum officer.⁵⁹ A surface support team of six Fort Drum personnel assisted with logistics, including a crane to haul up objects. A 2,600-pound mining cart made of wood and hand-welded metal was located and made to float to the surface by using air-filled drums. The crane lifted the cart out of the pond and onto a truck for removal from the site, along with a set of wheels and a section of the rails that served as track for the cart. Other items identified by the divers remain at the bottom of the quarry, including other carts, more track, and a blacksmith shop. The smithy was described as “a bench and vices and neatly piled bearings for repairing the mining cart wheels is sheltered by 20-foot long, 10-inch timbers which protected the smith from rockfalls at the mine.”⁶⁰

A dive was conducted in 2008 by Lewis County Sheriff Department’s rescue divers, and attempts were made to videotape the artifacts remaining in the pond. Although there were expectations of finding a steam shovel and railroad cars, the murky quality of the water prevented a determination of the existence of these artifacts. Divers did discover a 1950s-era Chevrolet that had been dumped into the pond at some point and a fly wheel (Figure 25 and Figure 26). The following year, another diver training event occurred. This time, the opening of the crystal cave was located, along with a standing structure (likely the industrial shop).⁶¹

⁵⁸ “Flooded Mine To Be Searched.”

⁵⁹ “Ore Car Raised From Flooded Mine at Drum.”

⁶⁰ *ibid.*

⁶¹ “Quarry Pond Diving,” TA 14B (2009.054), Archaeological Investigations at Fort Drum 2009.

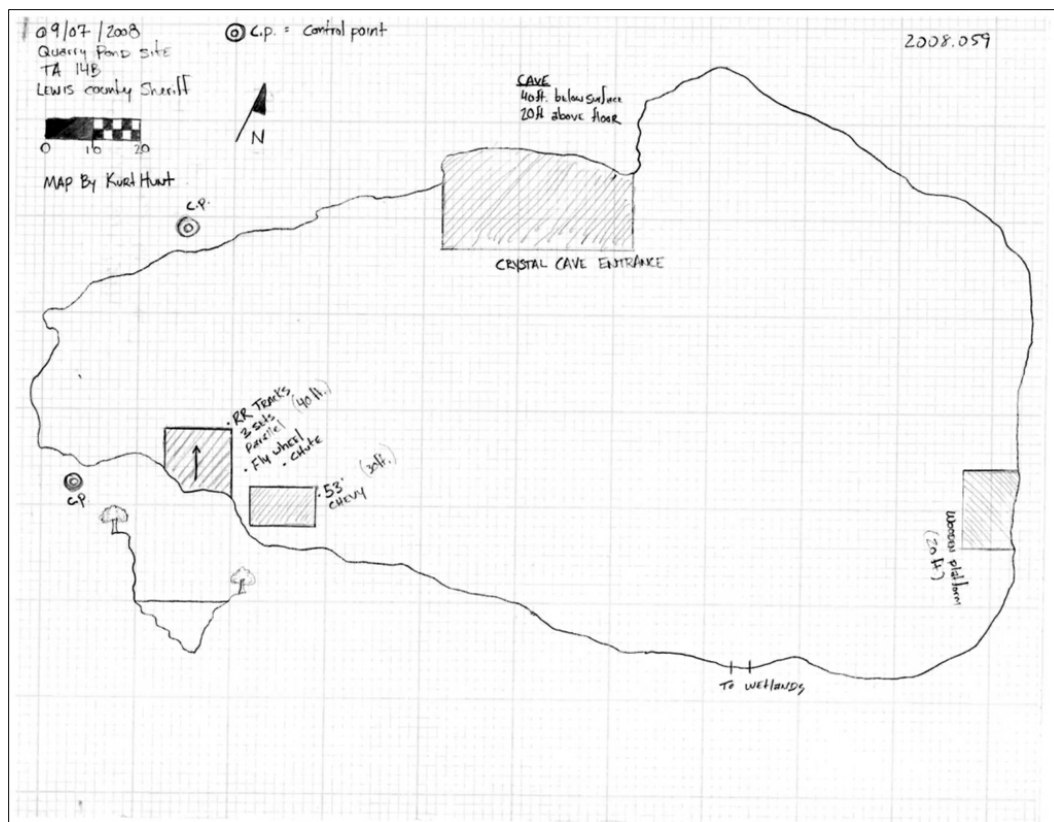


Figure 25. Sketch map showing initial finds from dive, 2008
(Fort Drum Cultural Resources Section).

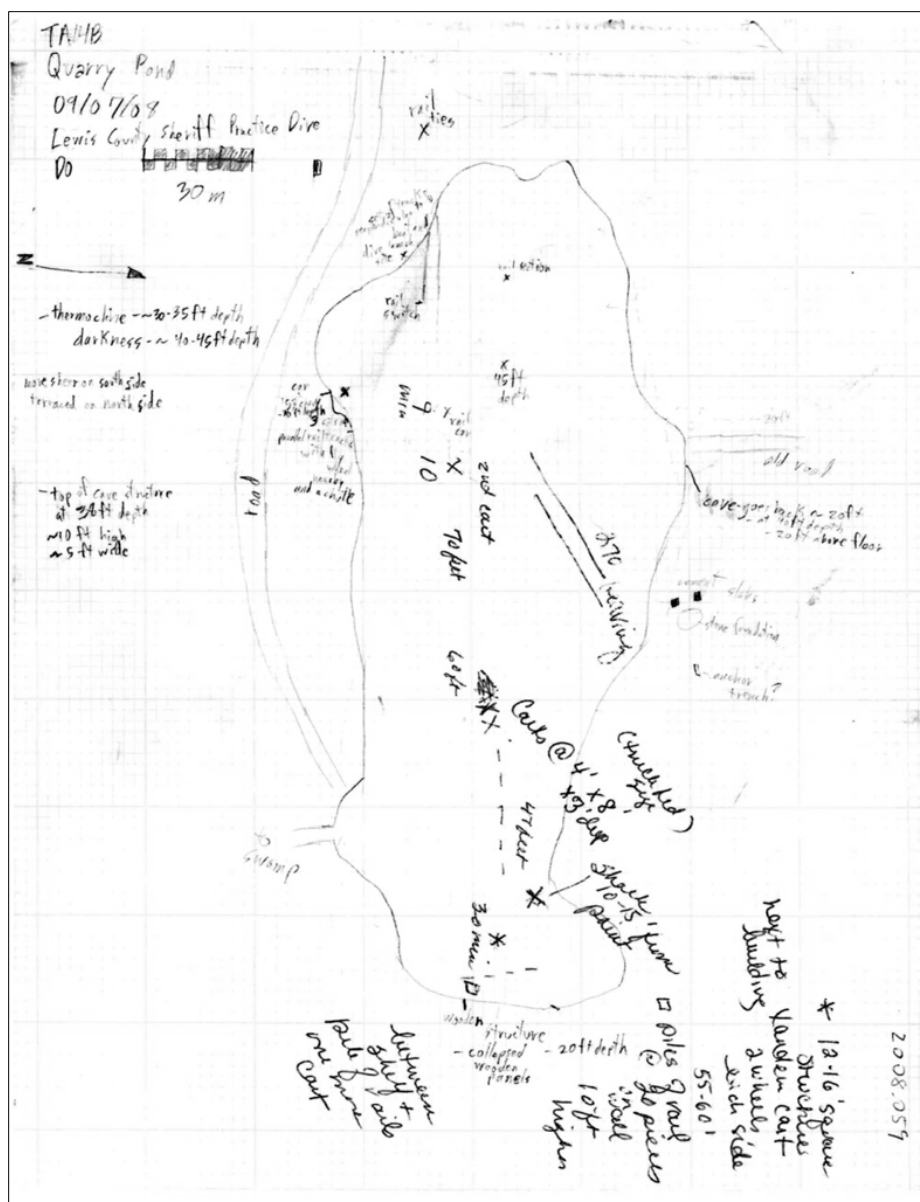


Figure 26. Sketch map with notes from dive, 2008 (Fort Drum Cultural Resources Section).

2.2.3 Rose Grotto

Scrambling up the side of the slide, he noted that the rays from the sun were entering this cavern in such a manner that it appeared lighted from within. As he drew closer he gasped in disbelief. His eyes were dazzled by the brightness of the reflected sun upon the crystals within. Brilliant flashes of rose and amethyst light swirled about him...⁶²

⁶² Hawkins, "The Rose Grotto," 377.

The quarry's most significant historical role began in late summer, 1906. During routine operations at the New York Lime quarry one afternoon, workers were startled by an ominous noise. The sound of shifting and sliding rock heralded a partial collapse of one section of the quarry face. When the dust settled, a previously hidden cave was revealed; the cave featured an opening approximately four square feet in size that was some twenty-five to thirty feet above the quarry floor (Figure 27).⁶³

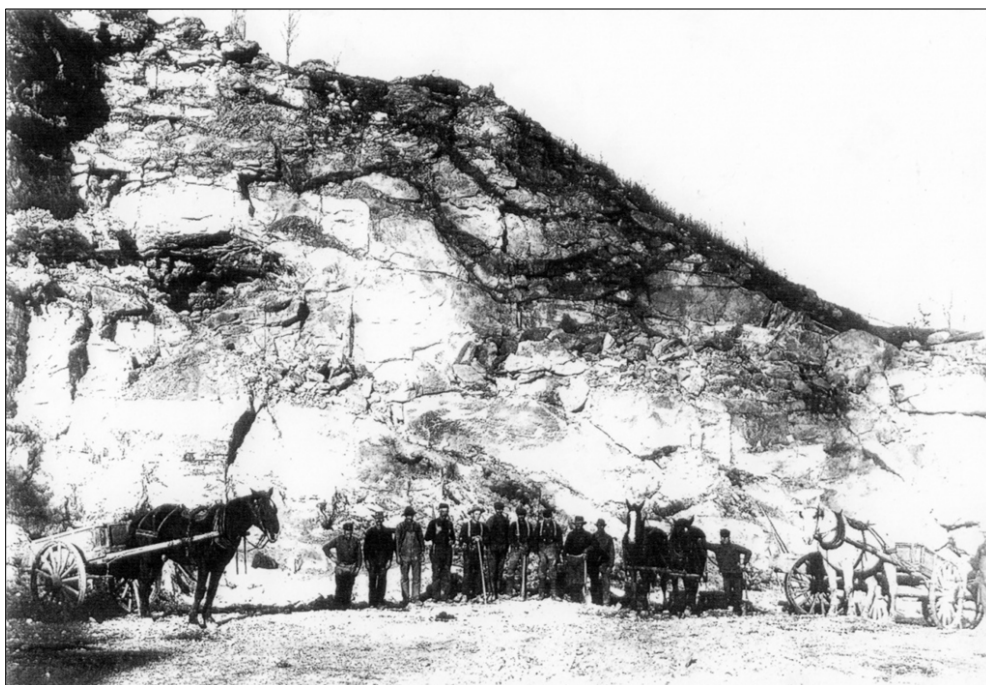


Figure 27. Photograph of New York Lime Company quarry wall, with cave entrance on left about halfway up, 1906 (Diana Town Historian's Office).

When a workman clambered up to investigate, he discovered the cave was full of very large calcium carbonate crystals that reflected the sunlight in vivid shades of rose and amethyst. Several more employees joined him, and then the mine superintendent was called. Equally impressed by both the visual display and the forty-foot depth of the cave, he passed word of the discovery to his supervisors.⁶⁴ Miss Pauline Sterling, a descendent of James Sterling, became involved in the aftermath of the discovery.⁶⁵ She contacted the New York State Museum. Assistant State Geologist Chris A.

⁶³ G. Byron Bowen, *The History of Lewis County*, (New York: Willard Press, 1970) pp 171-178; Whitlock, "Calcites of New York," 78.

⁶⁴ Hawkins, "The Rose Grotto," 378.

⁶⁵ There is some indication in the records that she was either one of the quarry owners or had some part of the mineral rights on the land, but nothing substantiated. Bowen, *Lewis County*, 171-178; Bean and Muir, "Story of Louisburg and Alpina," 108.

Hartnagel arrived at the quarry in October and investigated the calcite cave, noting a widening of the cavity just inside the opening.⁶⁶ This ten-foot wide, five-foot high cave extended approximately twenty feet into the quarry wall. A narrower extension continued for another twenty feet.⁶⁷ The walls were covered with crystals, some very large, and most had perfectly smooth planes (Figure 28). The find was important due to the number, perfect shape, unusual size, delicate color (due to manganese), and the multiple formations of “twinned” crystals (development of two parallel crystals from the same plane. Representatives from the New York State Museum recommended the mine be temporarily shut down and the crystals removed to preserve “Rose Grotto” from the mining activities and to display the cave’s crystal contents at the museum.⁶⁸



Figure 28. Calcite crystal from Sterlingbush quarry cave (*MATRIX* Vol. 7, No. 3, 1999: 113).

Mr. Hartnagel set himself up at the Louisburg Hotel, previously owned by James Sterling and then owned by John Pierce (and later known as the Pierce Hotel). He began organizing the removal of the crystals as other museum staff arrived to assist him.⁶⁹ Mr. Hartnagel had to direct the workmen to exercise extreme caution when removing the crystals due to their fragile nature, which could lead to shattering upon detachment from the cave surface (Figure 29). It took six weeks for the crystals to be detached and packed. When the task was completed, approximately

⁶⁶ Whitlock, “Calcites of New York,” 78.

⁶⁷ Hawkins, “The Rose Grotto,” 378.

⁶⁸ Hawkins, “The Rose Grotto,” 378; Burgess, “Glimpses into the past...”.

⁶⁹ Hawkins, “The Rose Grotto,” 379.

fourteen tons of calcite crystals had been shipped to Albany, in “80 barrels, 14 kegs, and 22 boxes.”⁷⁰



Figure 29. Interior of partially excavated cave, Lewisburg quarry (MATRIX Vol. 7, No. 3, 1999: 109). Notice the large rectangular crystal at the upper right.

Once the crystals arrived in Albany, the immense task of creating the proper display space began. As some of the individual crystals weighed in excess of one thousand pounds, deciding how best to support them caused some difficulty. Museum administrators decided to replicate the cave as much as possible, but not attempt to put individual crystals back in their original locations relative to the other crystals. The “cave” utilized was a blind closet in the museum’s mineral hall, a space about eight-feet square. Because this space did not provide enough depth for an accurate reproduction of the cave, the display designers cleverly placed mirrors in the closet; the mirrors were hidden from view but provided reflections to give an appropriately apparent depth.⁷¹

As the closet floor was not capable of bearing the crystals’ combined weight, an iron framework was constructed that hung suspended from a roof girder. A series of curved wooden ribs descended from the framework

⁷⁰ Nightingale, “The Sterlingbush Calcite Cave Reconstruction,” 108.

⁷¹ Noah T. Clarke, “The Reconstruction of the Sterlingbush Calcite Cave,” *New York State Museum Bulletin*, No. 219-220, March-April 1919, 223.

to form an irregular dome on which the individual crystals were attached.⁷² The next step was fraught with danger, as the crystals had to be drilled in order to insert the bolts and screws necessary to hang the specimens. The fragile nature of the calcite meant it was likely to shatter during the drilling process. The display staff at the museum, led by Noah Clarke, developed a technique that resulted in the loss of only two crystals out of the hundreds that were eventually fastened to the ribs.⁷³

The crystals were placed from back to front, attached to the framework, and then held in place with a combination of plaster and cheese cloth laid over a small-mesh wire screen. This arrangement served the dual purpose of hiding the framework and simulating a cave interior. The crystals were placed over the ceiling and all the way around to the front, oriented toward a two and one-half square foot window for viewing purposes. Finally, a raised false floor displayed the largest crystals in a simulation of where they had been found in the cave. Each crystal in the entire arrangement was placed with an eye toward fitting it exactly to the next one and making sure the best crystal faces were displayed both to the viewer directly and in the reflected view from the mirrors.⁷⁴ There were twenty-one dim electric lights hidden behind the crystals with the deepest colors, which provided backlighting to bring out the color and give the crystals a soft glow.⁷⁵ As described in the 1918 annual report for the museum, “the clever disposition of the electric lighting brings out the deep rose shades shown by transmitted light and the amethyst color seen under reflected rays” (Figure 30).⁷⁶

⁷² Clarke, “The Reconstruction of the Sterlingbush Calcite Cave,” 223.

⁷³ *ibid.*, 224-225

⁷⁴ *ibid.*, 225

⁷⁵ *ibid.*, 225-226

⁷⁶ “Introduction,” *New York State Museum Bulletin*, No. 219-220, March-April 1919, 13.



Figure 30. Artist's rendition of calcite cave reconstruction, 1918 (MATRIX Vol. 7, No. 3, 1999: 113).

Although it was felt at the time that the crystals were the largest ever discovered, subsequent finds elsewhere included even larger crystals.⁷⁷ This fact, however, did not diminish the excitement provoked over the discovery and exhibition of the “Sterlingbush Calcite Cave.” According to Nightingale, “the exhibit opened on June 13, 1909. It would prove to be one of the most popular displays at the New York State Museum for the next seventy years.”⁷⁸ Some of the remaining crystals were exchanged with the Royal Ontario Museum of Mineralogy in Toronto, Canada, in 1938; a “Crystal Cave” was on exhibit there successfully from 1939 until 1978.⁷⁹ The display at the New York State Museum remained in place, a favorite with both children and adults, until 1979. At that time, the museum moved into a new building in downtown Albany. The Sterlingbush Calcite Cave was dismantled, apparently with a plan to reconstruct it in the new space, but this never happened.⁸⁰ The crystals have been in storage at the

⁷⁷ A 1981 article in *American Mineralogist* listed the largest crystals known for many mineral types. There were calcite crystals found in Iceland that were significantly larger than those in the “Rose Grotto.” Peter C. Rickwood, “The Largest Crystals,” *American Mineralogist*, Vol. 66, 1981: 892 [885-907]

⁷⁸ Nightingale, “The Sterlingbush Calcite Cave Reconstruction,” 112.

⁷⁹ *ibid.*, 115.

⁸⁰ *ibid.*, 112.

museum since then, although a few are on exhibit with other mineral specimens at the museum today.

2.3 Natural Bridge Lime Mill

In 1897 or 1898, J.H. Hungerford, Bradford Sterling, and Pliny Sterling started a lime mill at a site along the Indian River at the Village of Natural Bridge. Dissatisfied with the method used for burning the lime, they discontinued the business within the year. A new partnership with an interest in the property was formed in July 1900 by J.G. Jones and E. Wallace Branaugh. After leasing the property, they secured new steel kilns and opened new quarries. On 17 February 1902, Mr. Branaugh sold his interest to Peter Yousey.⁸¹

2.3.1 New York Lime Company

This new arrangement was christened the New York Lime Company and incorporated with four officers and \$25,000 in capital stock.⁸² It is not clear whether the Sterlingbush quarry was purchased immediately before or after the incorporation of the New York Lime Company. Company officers began to expand the facility immediately upon incorporation; they purchased the nearby property and lime kilns of P.M. Hall, along with the Bemis farm that contained 364 acres of timber land with large quantities of carbonate limestone.⁸³ This limestone was used for building construction, and the other quarries were mined for dolomitic or magnesian limestone that was burned to produce slaked lime.⁸⁴ The process used by the New York Lime Company was state of the art, as it superseded the older method of manufacture that left the slaking to the lime purchasers. In a 1903 newspaper article, the manufacturing process was described in detail:⁸⁵

⁸¹ "Natural Bridge Lime Works."

⁸² *ibid.*

⁸³ Several members of the Hall family apparently had lime works in the Natural Bridge area beginning in the 1860s. There is reference to a "Natural Bridge Lime Works" started by a Luther Hall, and a "Hall Bros. Lime Works" started by Luther P. Hall (Isabel Muir, "The History of Natural Bridge," *4 Rivers Journal*, Vol 3, No 2, 1980, 41.)

⁸⁴ Production of slaked lime involves heating limestone in high-temperature kilns until the stone undergoes a thermal decomposition, losing its carbon dioxide. The resulting material is known as quicklime. Treating the quicklime with water produces slaked lime, which is slightly soluble in water and is most commonly used to make mortar and plaster.

⁸⁵ "Natural Bridge Lime Works."

When the lump lime is delivered at the mill it is placed in the concrete slacking [sic] trenches at a depth of six or eight inches. It is then sprinkled with water, a specified amount for each cubic foot of lime, with a water car running on a track supported by concrete piers and side walls. Immediately following on the same track a lime car is run which covers the watered lime to be slacked with hydrated lime to the depth of about six inches. This covering holds the steam which is generated by the slacking lime and not only assists in the slacking process but by its [heat], thoroughly dries the lime so that when it is shoveled into the spiral conveyor, which is about 120 feet long, and taken to the mill it is perfectly dry and ready for grinding. As the lime leaves the spiral conveyor it passes to a vertical bucket conveyor about 50 feet in height, which carries it to the upper part of the mill and is discharged on to a Sturtevant screen which separates the fine lime suitable for market from the coarse lime. The latter is discharged into large bins with cone shaped bottoms and from there to a Sturtevant emery mill which reduces it to a very fine powder. It is carried from the emery mill, into another bucket elevator which takes the ground lime to the top of the mill where it is discharged into one of four large packing bins, from whence it is discharged into troughs containing spiral conveyors. These troughs have several openings fitted with valves and attachments for holding the bags into which the finished lime is drawn. These bags are of either cloth or paper and are made to contain 50 pounds of lime. The plant and trenches are so arranged that both magnesian and building lime can be handled separately without interfering in any way with the operation of the plant.

The dolomite/magnesian limestone, part of which came from the New York Lime quarry, was then sold primarily to sulfite pulp mills, where the lime was used as part of the chemical process to break down wood fiber into pulp for paper manufacture. The New York Lime Company supplied lime to most of the sulfite manufacturers in the Black River district. In 1903, the mill was running twenty-four hours a day and producing forty-eight tons of finished product daily.⁸⁶

The mill facilities at Natural Bridge included a “storeroom for freshly burned lump lime, 40x18 feet and 12 feet in height; trench room for slaking, 100x18 feet, containing two concrete trenches each 100x5 feet and 6 feet deep, with concrete trough between the two in which a spiral

⁸⁶ “Natural Bridge Lime Works.”

conveyor turns; mill proper, 86x28 feet and 52 feet high and containing all machinery for elevating, screening, grinding and packing; storeroom, 65x24 feet, connecting with the main building” (Figure 31 and Figure 32).⁸⁷

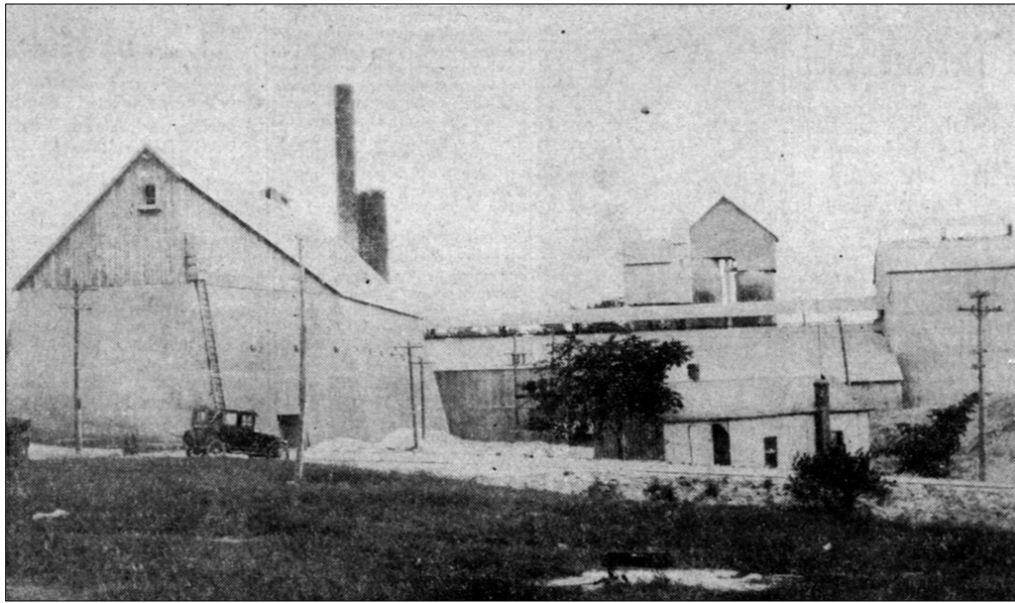


Figure 31. The New York Lime Company plant in Natural Bridge (collection of Watertown Daily Times).

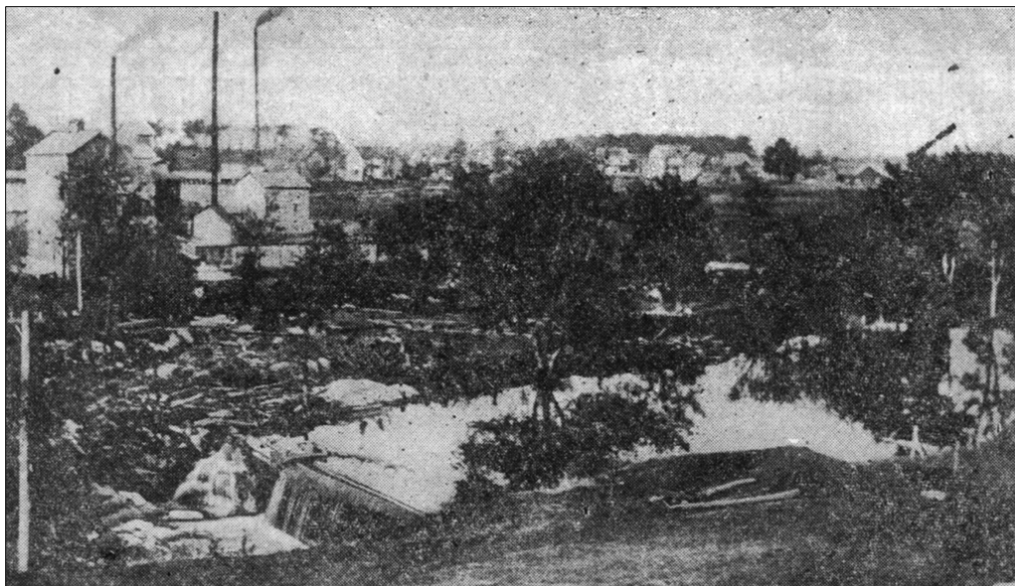


Figure 32. The New York Lime Company plant at Natural Bridge (collection of Watertown Daily Times).

⁸⁷ “Natural Bridge Lime Works.”

The company contracted with Ruggles-Coles Engineering Company of New York City to purchase “elevating and conveying machinery, a number of small steel cars and a grinder plant.”⁸⁸ The facility was water-powered, and the owners had a 60-foot dam, a long flume, and a “Stilwell & Bierce type” water wheel.⁸⁹ Within a few years, they had purchased a one hundred-foot by six-foot rotary kiln fired by gas.⁹⁰ In 1903, the company employed forty men and ten teams with a weekly payroll of \$600, and plans were already being discussed for enlarging the operation.⁹¹ Among those plans was an extension of the Carthage & Adirondack Railroad branch that ran to the mill and onward to the quarries; a survey for this extension was already underway.

In 1907, the New York Lime Company applied for a patent in Canada on a process for making lime, with John G. Jones listed as the inventor.⁹² The patent was granted on 26 March 1907. It is not clear why the patent was sought in Canada.

The expansion and promise that the company exhibited in 1903 had evaporated by 1914, when the New York Lime Company filed for bankruptcy. The bankruptcy likely was due to demand fluctuations in the lime market, which had experienced several downturns in recent years. The company had been making efforts to expand their market, including producing circulars in 1911 that made it at least as far as Lynchburg, Virginia. The circular offered to deliver “raw ground lime rock” to the depot there “in sacks for \$3 per ton, and in bulk at \$2 per ton, with a freight from New York to Lynchburg of \$3.80 per ton added.”⁹³ In 1913, they tried shifting their primary market from local and regional sulfite mills to steel mills, as a local newspaper stated that October: “For many years the principal market has been to the various sulphite (*sic*) mills in this section; the entire output is now being disposed of at the large steel mills in the Buffalo Pittsburgh district. The company has a daily output of

⁸⁸ “Notes,” *Iron Age*, Vol. 70, July-December 1902:49

⁸⁹ “Natural Bridge Lime Works.”

⁹⁰ E.S. Fickes, “The Rotary Kiln,” *Cement and Engineering News*, Vol. 24, 1912:108.

⁹¹ “Natural Bridge Lime Works.” Carthage & Adirondack Railroad was taken over by the New York Central & Hudson River Railroad in 1891; its use in the 1903 is likely a carryover (Douglas J. Fear, “New life in the North Country,” *TRAINS*, November 1997, <http://www.rochester-railfan.net/mwha.htm>).

⁹² “Process of making lime,” <http://ip.com/patent/CA104355A>.

⁹³ “Lime from New York State,” *Southern Planter*, Vol. 72:622.

about sixty five tons of lime, and in addition is shipping large quantities of stone.”⁹⁴

As part of the disintegration of the company, a March 1915 appraisal of its value found assets estimated at \$52,996. When the company first petitioned for bankruptcy in October 1914, it was valued at \$140,868.⁹⁵ The primary reason for the loss in value was the real estate assets and company life insurance policies being held by L.G. Johnson and F.W. Coburn in trust against a \$75,000 bond issue the company had authorized.⁹⁶

The dissolution hit the individual owners hard as well. Peter Yousey of Carthage filed for bankruptcy in 1914, and his property was appraised for purposes of settling debts. At the time, he had \$30,000 in notes against the New York Lime Company, \$19,000 in checks, and an open account of \$53,000.⁹⁷ There was no value placed on these claims related to New York Lime Co.

2.3.2 Basic Refractories Corporation of Natural Bridge

The March 1915 appraisal was probably due to the imminent purchase of the bankrupt company by the Basic Refractories Corporation of Natural Bridge, a recently incorporated firm with a capitalization of \$250,000. The company’s directors were Francis K. Purcell of Watertown, Roy P. M. Davis of Harrisburg, Pa., and Lewis B. Lindemuth who had moved from Harrisburg to Natural Bridge a short time before. Basic Refractories Corporation had holdings in other states and seems to have been based in Pennsylvania. Formation of the new company was not only covered locally, but also the company announced its presence in trade journals, including the Chicago-based *Mill Supplies* journal, which stated in a news column that the company was open to “deal in all basic refractory materials and products.”⁹⁸

The new company took over the property of the New York Lime Company, including the plant and the quarries. Basic Refractories Corporation was

⁹⁴ “Northern NY Notes,” *Gouverneur Free Press*, October 8, 1913, 1.

⁹⁵ “Shrinkage in Value,” *Lowville Journal and Republican*, March 18, 1915, 1.

⁹⁶ *ibid.*

⁹⁷ “Yousey Property Shrinks,” *Lowville Journal and Republican*, March 11, 1915, 1.

⁹⁸ “General News from the Field,” *Mill Supplies*, Vol. V, No. 1, January 1915, 71.

reported to have “secured options on the mineral rights in a large area near Natural Bridge.”⁹⁹ Quarries that had collected water through disuse would be pumped out and utilized. Plans for replacement of some plant components and new construction were soon underway, with the goal of enlarging the plant and increasing daily capacity to 200 tons (Figure 33).¹⁰⁰ This move would make Basic Refractories the largest lime producer in northern New York, and the new owners planned to sell at least part of the lime product to steel mills in Pennsylvania for use as flux for refining steel.

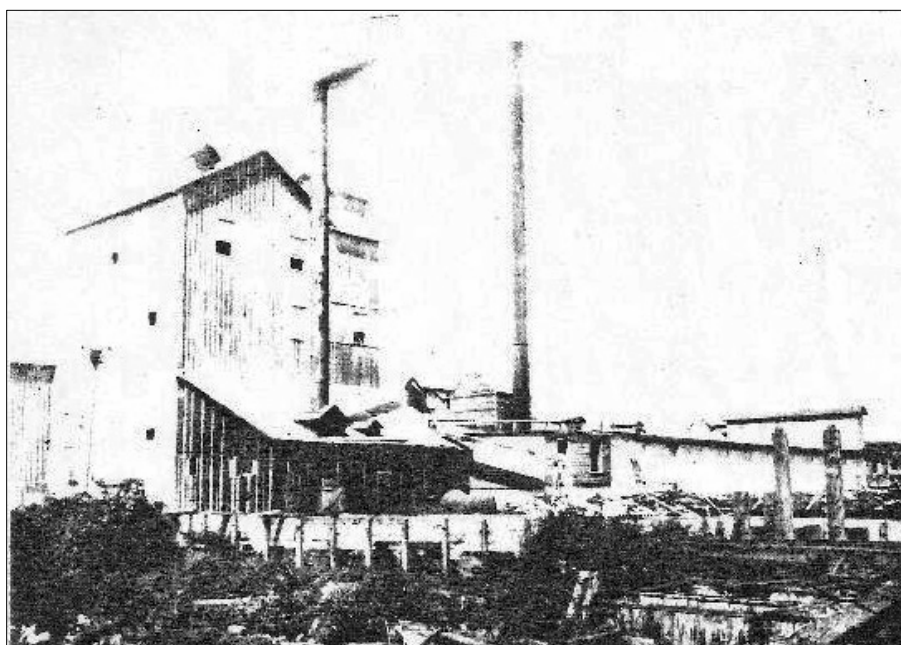


Figure 33. Basic Refractories Corporation plant at Natural Bridge (from the collection of the late Isabel Muir, Harrisville, NY; used with family permission).

The Basic Refractories plant was destroyed by fire on the morning of 25 January 1921. The loss was estimated at \$160,000 and included destruction of all buildings except the engine house and the office. A 1,000-ton pile of coal also burned, and a coal dust explosion was blamed for the fire. The plant was not running at a high capacity, and only a few men were at work. Newspaper coverage at the time includes mention of a quarry three miles from Natural Bridge that was owned by the company.¹⁰¹

⁹⁹ “\$250,000 Company Formed: Company Will Take Over Northern New York Lime Plant at Natural Bridge, With 200 Tons Daily Capacity,” *The Lowville Journal and Republican*, March 25, 1915, 1.

¹⁰⁰ *ibid.*

¹⁰¹ “Big Fire at Natural Bridge,” *Lowville Journal and Republican*, January 27, 1921, 1.

The plant was soon rebuilt and production continued, but the loss of the quarry in 1931 seemed to signal the end for the company. Things came to a head when a stakeholder meeting was called for 8 June 1933 to decide if the lime plant and quarries of the Basic Refractories Corporation at Natural Bridge would be permanently discontinued. Also up for action was the idea to sell the kiln and accessories “at the best price obtainable.”¹⁰² The quarry had not been worked since October 1931 because the company’s stone storage bins were full at that time, and it was likely shortly after this that the quarry flooded. The stored stone had been worked since then, however, and the stored supply was exhausted by early May 1933.¹⁰³

The decision was made to close the plant, and action was taken almost immediately. By mid-July 1933, forces of local men were dismantling the plant under the supervision of R. W. Leib, of Hillmeyer, Pennsylvania. Mill equipment was shipped to the Basic Refractories Corporation plant in Hillmeyer, including the large rotary kiln and all other equipment.¹⁰⁴ It took several weeks for the work to be accomplished. It was expected the buildings would be razed, but that seems not to have happened, as an 11 July 1935 announcement was placed in the local newspaper telling readers of the annual Jefferson County tax sale. This sale was to include “the Basic Refractories corporation, including lime mill and 14 acres of land near Natural Bridge.”¹⁰⁵ The land was sold off over the next few years to various individuals, and the history of these two companies came to an end.

2.4 Fort Drum acquisition of the quarry

Today, the old quarry is on land which was acquired ... by Camp Drum when the federal government decided more land was needed to train soldiers as the peace time draft was becoming necessary. At that time, Lewisburg ceased to be.¹⁰⁶

¹⁰² “Stockholders To Meet June 8,” *The Lowville Journal and Republican*, May 18, 1933, 1.

¹⁰³ It is not clear from sources why the lack of stored stone necessitated discontinuing the plant, unless additional stone could not be obtained for some reason.

¹⁰⁴ “Removing Plant: Basic Refractories Lime Plant to be Transferred from Natural Bridge to Pennsylvania,” *The Lowville Journal and Republican*, 27 July 1933, 1.

¹⁰⁵ “Tax Sale Lists 453 Properties,” *The Lowville Journal and Republican*, July 11, 1935, 5.

¹⁰⁶ Sue Burgess, “Glimpses into the past...”.

2.4.1 Brief history of Fort Drum

The area now known as Fort Drum was first utilized for military activities in 1907. Nearly 11,000 acres were purchased for \$62,360, and the newly established military reservation began a long tradition of hosting summer training activities.¹⁰⁷ For the next thirty years, Pine Camp came to life in the summers with field training for “small units of the regular army with units of the National Guard, C.M.T. [Civilian Military Training] and R.O.T.C.”¹⁰⁸ In 1935, the summer training involved the largest peacetime maneuvers undertaken in the United States. COL Raymond W. Briggs, then commander of Madison Barracks, Fort Drum’s parent installation, had advised the Watertown Chamber of Commerce of the War Department’s plans to hold massive maneuvers involving much larger numbers and multiple types of equipment including tanks, artillery, infantry, and aircraft.¹⁰⁹ A large amount of land would be needed to support this exercise, and sites in Pennsylvania and New Jersey were being considered. Although Pine Camp was too small to host all of the activities, the Chamber of Commerce got trespass permission from farm owners in the area, put together a prospectus, and won approval from the War Department to have the maneuvers on Pine Camp and adjacent Jefferson County land.¹¹⁰ Over 36,000 troops were involved in the August 1935 maneuvers, which were judged a great success.¹¹¹

2.4.2 1941 expansion

As potential involvement in World War II began to look more likely, the War Department set plans in motion for a massive expansion of training facilities across the entire country. Camp Drum was selected as a division training site, and both a land acquisition program and a construction program were rapidly implemented. At a cost of \$20 million, the ten-month construction program completed in 1941 resulted in a new cantonment consisting of 800 buildings.¹¹²

¹⁰⁷ Ernest C. Gould, “Camp Drum,” *Bulletin of the Jefferson County Historical Society*, Vol. 8, No. 2, April 1967: 6 [6-10] In Major Carl Olson, “Pine Plains to Fort Drum,” *4 Rivers Journal*, Vol. 4, Nos. 2-3, April-September 1981: 74, the appropriation for the establishment of Pine Camp is given at \$75,000.

¹⁰⁸ Gould, “Camp Drum,” 6.

¹⁰⁹ *ibid.*, 8-9

¹¹⁰ *ibid.*

¹¹¹ “Fort Drum and 10th Mountain Division History.”

¹¹² *ibid.*

As these buildings were going up, others were coming down. Approval came from Washington for the \$2 million purchase of 75,000 acres of land adjoining Pine Camp, including property in Jefferson County (Towns of LeRay, Antwerp, Philadelphia, and Wilna), and Lewis County (Town of Diana).¹¹³ This action essentially quadrupled the acreage of the installation and provided vast tracts of land for training purposes. Purchasing the properties occurred in 1940 and 1941, with over 100 tracts having been transferred to the installation by Labor Day, September 1, 1941, which was the deadline for residents to move out and the day Fort Drum took control of the land.¹¹⁴ As a result, 525 families (some 2,000 people) had to relocate, and the communities of LeRaysville, Sterlingville, Lewisburg, North Wilna, Alpina, and Woods Mills were completely eliminated.¹¹⁵ Scores of smaller settlements and individual farms were also lost in the transactions, and other villages lost varying degrees of their property, which greatly inhibited their ability to survive. In all, 3,000 buildings or structures were destroyed after being vacated, including twenty-four schools, six churches, and several post offices.¹¹⁶ As with the Quarry Pond Complex, access to the Village of Lewisburg site is restricted, and its industrial past is now a footnote to Fort Drum history.

¹¹³ Gould, "Camp Drum," 6-10.

¹¹⁴ "Fort Drum and 10th Mountain Division History."

¹¹⁵ Olson, "Pine Plains to Fort Drum," 74.

¹¹⁶ *ibid.*

3 Research Results

The identification of historically significant properties is achieved through evaluation of their position within the larger historic context. According to the NRHP, historic contexts are defined as “...the patterns, themes, or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within prehistory or history is made clear.”¹¹⁷ A historic property is determined significant or not significant by applying standardized National Register Criteria for Evaluation within the property’s historical context. Any resources representing significant aspects of history are then analyzed to see if they retain sufficient integrity to convey those significant aspects.

3.1 Consideration of significance criteria with respect to Quarry Pond

The following sections detail this study’s findings regarding the Quarry Pond Complex, as well as the affiliated industrial sites at Lewisburg and Natural Bridge. The Quarry Pond Complex is a complicated site, containing partial standing structures as well as submerged artifacts, remnants of transportation corridors, and a large amount of debris consisting of concrete, metal, and stone. The complex was altered over time during its period of significance through changing extraction and processing technologies succeeding each other on the landscape.

The Quarry Pond Complex as a set of above surface buildings is not eligible under Criterion B (famous persons) or Criterion C (design). The only potential significance would have been under Criterion A (events), for the Crystal Cave. The calcite crystals discovered in 1906 were removed the same year to Albany, and the cave was destroyed through subsequent quarrying.

What remains is significance under Criterion D (information potential), which refers to a site that has “yielded, or is likely to yield, information important in prehistory or history.”¹¹⁸ Further archeological investigation

¹¹⁷ U.S. Department of the Interior, National Park Service, *National Register Bulletin: How to Apply the National Register Criteria for Evaluation*, (Washington, DC.: GPO, 1997), 7.

¹¹⁸ Ibid., 2.

of the submerged artifacts in Quarry Pond, the three small lime kilns and associated extraction site, the railroad berm, and the area of the large partial structure ruin could provide information on the scale of local mineral extraction and processing industries, the types of materials and equipment utilized, the time frames in which the earlier activities at the site occurred, and the technology and design of lime kilns. For this reason, it is possible to look at the Quarry Pond Complex as an archeological site significant under Criterion D.

3.2 Current conditions

In order to determine if the components retain sufficient integrity to adequately represent their historic significance, it is necessary to look at the current conditions of each component of the Quarry Pond Archeological Complex. The major elements are looked at for integrity related to remaining structural features and archeological site integrity (i.e. lack of site disturbance). Current conditions are also described for the Village of Lewisburg and the Natural Bridge Lime Production Facilities, as they were connected with the historical use of the Quarry Pond Archeological Complex, and for completeness.

3.2.1 Quarry Pond Archeological Complex

The Quarry Pond remains, with its sheer walls partially hidden by water (Figure 34). Except for a few relics removed in 1978, quarry artifacts lie on the bottom of the pond, untouched for eighty years. The ruins of three earlier lime kilns remain on the site, to the southwest of the lake (Figure 35 and Figure 36). The small lime kilns have collapsed over time, but the sites are undisturbed. The railroad spur is long gone, but the embankment serves as an access road to the area, continuing along FUSA Boulevard to the installation boundary and beyond, with remnants of a bridge across the Indian River still in place (Figure 37).¹¹⁹

There are no complete standing buildings, and the concrete foundations have been used for target practice, scattering pieces all over the site (Figure 38). A partial standing structure remains on the site (see Figure 24). This could possibly have been the support structure for a large kiln, or it could have been part of the stone crushing operation. The area around this partial standing structure is likely undisturbed.

¹¹⁹ Babson, "Quarry Railroad Berm and Grade," 2.

The spoil pile from the quarrying and crushing activities is the only major component of the complex that has been disturbed. Located to the south-southwest of the Quarry Pond, the site was flooded and developed as wetlands in 1999. When excavated, the spoil pile was also revealed as the dumping site for large amounts of the quarry operation infrastructure that had been demolished. A sample of artifacts was recovered from the filled area and the wetlands project was then completed.¹²⁰



Figure 34. Quarry Pond on Fort Drum, 2010 (ERDC-CERL).

¹²⁰ "Quarry Pond, TA 14B 1999.160, (Fort Drum, NY: Cultural Resources Section, 1999; "Quarry Railroad Berm and Grade, FDH 1255, TA 14A 2001.022," (Fort Drum, NY: Cultural Resources Section, 2001).



Figure 35. Row of lime kiln ruins near Quarry Pond, 1996 (Fort Drum Cultural Resources Section).



Figure 36. Lime kiln with arched opening near Quarry Pond, 1996 (Fort Drum Cultural Resources Section).



Figure 37. Road replacing rails on berm at Quarry Pond, 2010 (ERDC-CERL).



Figure 38. Fragment of concrete from former structure at Quarry Pond, 2010 (ERDC-CERL).

3.2.2 Village of Lewisburg

A 1949 USGS map shows the elimination of buildings in Lewisburg (Figure 39). Foundations of buildings still exist under the vegetation, the cemetery remains, and the road network is still largely intact. The only standing structure remaining in Lewisburg is the ruins of the blast furnace (Figure 40 and Figure 41). The site is off limits to the general public, although exceptions are occasionally made for former inhabitants or other approved visitors. The Village of Lewisburg is a National Register of Historic Places listed archeological district.

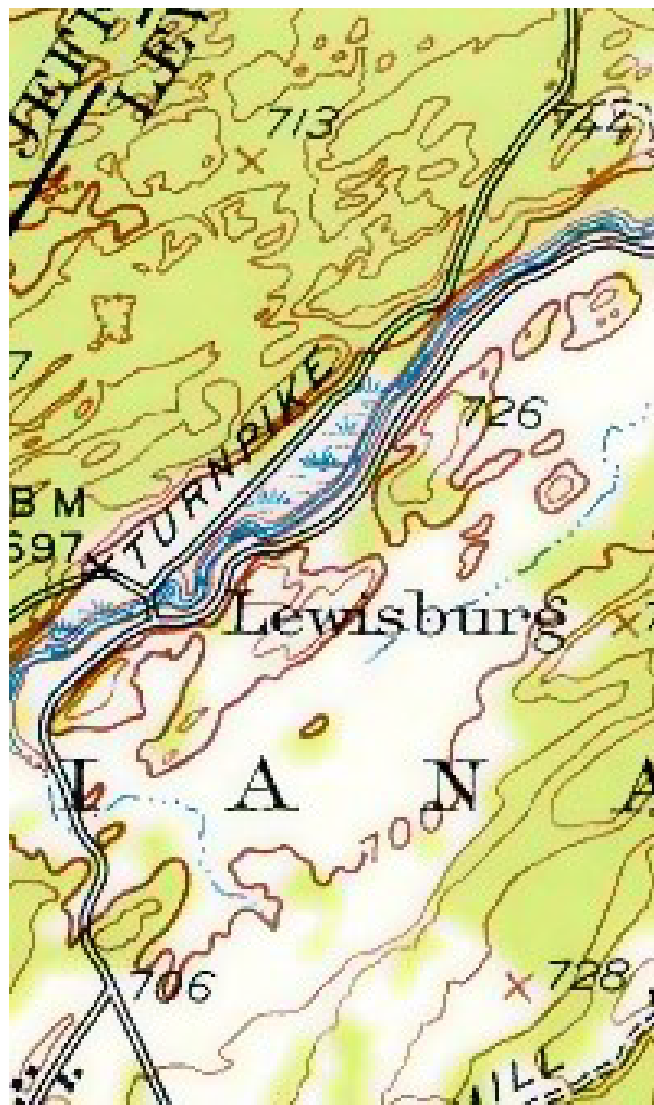


Figure 39. Detail of USGS 1949 Antwerp Quadrangle showing the loss of buildings in Lewisburg (<http://docs.unh.edu/NY/antw49se.jpg>).



Figure 40. The Lewisburg Furnace Ruins in 2010 (ERDC-CERL).



Figure 41. Ruins of Lewisburg Furnace, front elevation, 2010 (ERDC-CERL).

3.2.3 Natural Bridge lime production facilities

There is only the ruin of one large manufacturing building left at the site of the former New York Lime Company in Natural Bridge (Figure 42). The remainder of the production facility was dismantled in 1933. The private property is now largely an outdoor storage area, with industrial debris scattered about (Figure 43). The landscape still bears the scars of the lime production (Figure 44).



Figure 42. Recent photo of Natural Bridge lime mill ruins (Diana Town Historian's Office).



Figure 43. Site of former Basic Refractories Corporation plant at Natural Bridge, 2011 (ERDC-CERL).



Figure 44. Riverbank at site of lime works in Natural Bridge, 2010 (ERDC-CERL).

3.2.4 Research findings

The Quarry Pond Archeological Complex is important for research potential and most of the archeological components have not been disturbed. The most logical designation for this complex would be as a discontinuous contributing element to the Lewisburg Historic District at Fort Drum. There are several links between the former iron industry town and the quarry complex. There is a tentative connection with the Sterling family through the uncorroborated report of the involvement of Miss Sterling with the discovery and removal of the calcite crystals. It is quite possible that the Sterling family was owner of either the property or the mineral rights to the property, and that these rights were retained by the family after the ironworks at Lewisburg were sold.¹²¹ There is also a connection with the smaller extraction site and the three small lime kilns, since a small-scale industrial operation such as this would have been necessary to the functioning of the iron furnace at Lewisburg, especially in its earlier incarnations.

¹²¹ It could be informative to conduct more detailed research on land records in the area of Lewisburg and the Quarry Pond Archeological Complex at the Lewis County Courthouse.

4 Recommendations for Management and Preservation of the Quarry Pond Complex

The following recommendations are suggested for consideration by Fort Drum CRM staff for continued maintenance of the Quarry Pond Complex consisting of the Quarry Pond Site (FDH 1074) and the Quarry Railroad Berm and Grade (FDH 1255). The following recommendations were generated without considering manpower or resource availability at Fort Drum to implement the recommendations. The recommendations instead represent a best-case scenario (in terms of site preservation) of site management options. It is understood that manpower and resource availability may affect the feasibility and implementation of some, if not all, of the options listed below.

4.1 Site monitoring

The Quarry Pond Complex should be inspected by personnel from Fort Drum CRM or qualified archaeologists under contract to Fort Drum CRM once every calendar year. Tasks to complete onsite visits should include a visual inspection of all features to determine any stability issues. Natural and manmade damage to the site, including but not limited to: erosion, tree fells, fires, vehicle ruts, excavation, etc., should be noted. No ground-disturbing activity should be conducted on the site without the presence of an observer from the Fort Drum CRM or their designated representative. A database file should be created and maintained by the Fort Drum CRM office that contains the reports from each site visit and monitored activity on the site.

4.2 Signage

The site should be marked as “off limits” for any unauthorized ground-disturbance activities. Signage should also discourage persons from climbing on or near the aboveground features or removing anything from the site. Portions of the complex are covered with large quantities of poison ivy. It is recommended that signs warn visitors of this hazard. Signs could be posted at the parking area telling visitors to stay on maintained areas. There could also be signage near the kilns to indicate that this area specifically is off limits. It is not necessary that the onsite signs identify the site as a cultural resource.

4.3 Littering

The Quarry Pond Complex is the location of recreational facilities, and the public does have access to the site. Site documentation from previous investigations reports that a 1950s-era car has been found at the bottom of Quarry Pond, indicating that some significant dumping has occurred at the site since the DoD took possession of the property.¹²² Littering and the dumping of modern debris should be prohibited and prosecuted by installation authorities.

4.4 Accurate site documentation

The boundaries of the complex have been well documented and exist in GIS format (Figure 45). Existing maps of the site, however, do not meet the requirements of site documentation described in the New York State Historic Preservation Office (SHPO) Phase I Report Standards.¹²³ Formalized maps do not exist for the internal features of the sites. (Examples of existing sketch maps can be seen in Figure 46 and Figure 47). Only one sketch map examined in this effort had a reference scale, but this map only described a portion of the site, was not dated, and was referenced only to an arbitrary grid (Figure 47). Other site revisit reports do not contain any maps, use pacing to describe approximate distances between features, and mention surface features that could not be relocated.¹²⁴ The site form filed with the New York SHPO also lacks a map and any textual description of the site, instead directing the researcher to an unpublished manuscript kept on file at Fort Drum for information.

Additional documentation of this site is needed. It is recommended that the site be fully and accurately mapped. The mapping effort should be conducted with a Surveying Total Station or GPS data-collection surveying system with mapping grade accuracy (± 1 meter). To facilitate this mapping effort and all future efforts, a minimum of two permanent datum points should be established on the site. These points should be tied to UTM coordinates. Features to be mapped should include all surface architecture and features, which should include modern roads, historic road remnants, spill piles, ore beds, walls, kilns, and areas of site disturbance or

¹²² "Quarry Pond Diving, TA 14B 2009.054," (Fort Drum, NY: Cultural Resources Section, 2009).

¹²³ "State Historic Preservation Office Phase I Archaeological Report Format Requirements," (Albany, New York: New York State Office of Parks, Recreation and Historic Preservation, 2005), <http://nysparks.com/shpo/environmental-review/documents/PhaseIReportStandards.pdf>.

¹²⁴ "Quarry Pond, TA 14B 1999.160.

erosion. Site maps should be digitized to GIS shape files. It is understood that accurate mapping of underwater features requires specialized equipment, and expertise that may not be available to Fort Drum. It is recommended, however, that existing (and all future) sketch maps of underwater features be digitized and added to the surface-feature shape files. As part of the mapping effort, each feature should be assigned a name or number designation, and these labels should be applied to all future reports of the site (see note on Figure 49).

It is recommended that the two sites currently described at this location, the Quarry Pond Site (FDH 1074) and the Quarry Railroad Berm and Grade site (FDH 1255), be combined into a single site—the Quarry Pond Complex. These two sites were active at the same time and served the same industrial purpose. Monitoring and documenting tasks for these two sites would be improved by combining them into a single effort.

An updated Site Inventory Form should be filed with the New York SHPO. This form should include a textual description of the site and all features within, an abbreviated site history, and accurate maps.



Figure 45: GIS data layers associated with the Quarry Pond Complex (Fort Drum Cultural Resources Section).

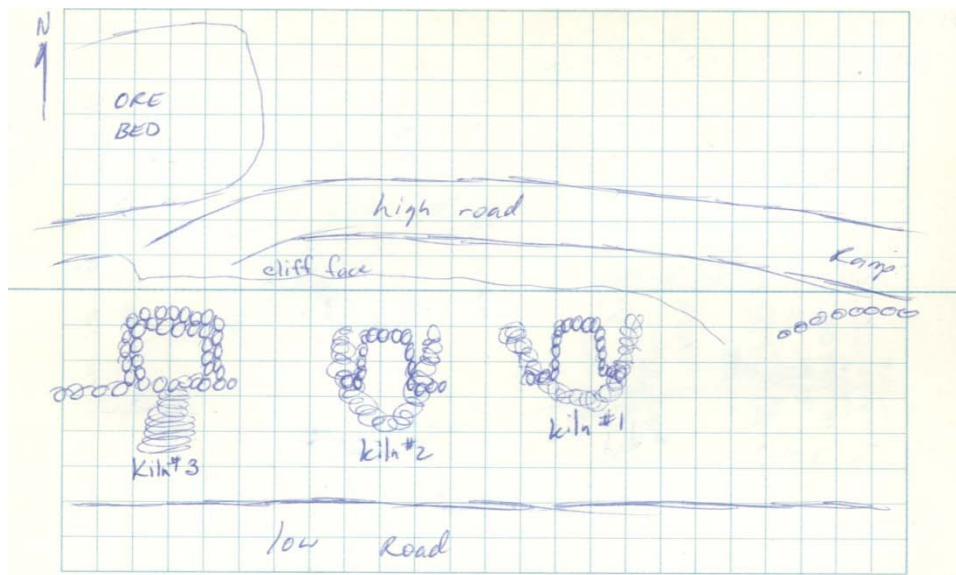


Figure 46: Sketch map associated with 1996 revisit of the Quarry Pond Complex (Fort Drum Cultural Resources Section).

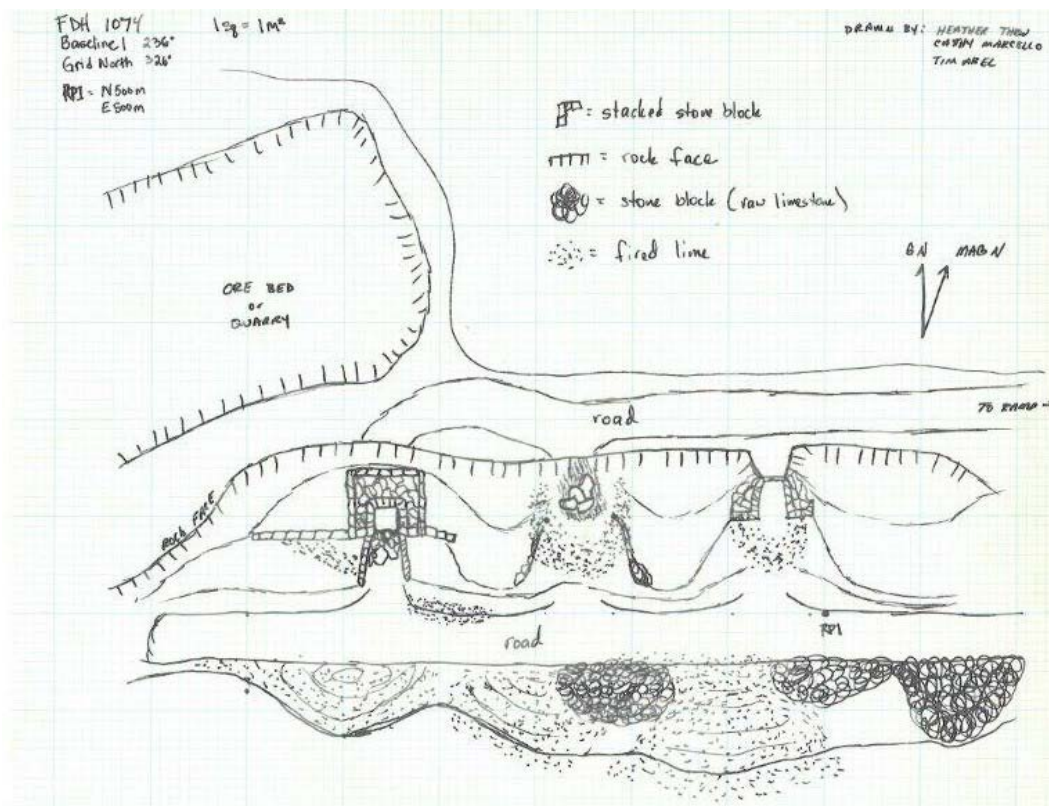


Figure 47. Undated sketch map (with scale) of a portion of the Quarry Pond Complex (Fort Drum Cultural Resources Section).

4.5 Vegetation management

The effect of vegetation on archaeological sites has been well documented.¹²⁵ Tree and bush roots can destabilize earthworks and architecture. Tree falls can disrupt soil stratigraphy, disturb archaeological context, and damage aboveground archaeological and architectural features. Bare earth, however, increases the likelihood of erosion and site degradation. Vegetation management, therefore, should be part of any site management plan. Numerous examples exist in the literature of the effective use of vegetation to stabilize archaeological sites.¹²⁶

Photographs of the Quarry Pond Complex demonstrate that the area is heavily wooded and that trees are actively growing within architectural feature/remains (Figure 47, Figure 48, Figure 49, Figure 50). Additionally, the site revisit report from 2001 described portions of the site as being impassable by foot due to vegetation, and that some features within the site are obscured by vegetation.¹²⁷



Figure 48. Quarry Pond Complex, Earth Day 2010 (Fort Drum Cultural Resources Section).

¹²⁵ Andropogen Associates, *Earthworks Landscape Management Manual*. (Washington, DC: National Park Service, Park Historic Architecture, 1989).

¹²⁶ D.B. Barker, "Stabilization Project: Santee Indian Mound," *CRM* 15(2):19-20, 1992; M.K. Brown, "Mothballing Albany Mounds," *American Archaeology* 3(3):214-217, 1983; G. Hamel and K. Jones, *Manual of Vegetation Management on New Zealand Archaeological Sites*, Publication No. 17 (Wellington, New Zealand: New Zealand Historic Places Trust, 1982); K.L. Jones and P.G. Simpson, *Archaeological Site Stabilization and Vegetation Management, Case Studies II: Auckland and Northland, Otago and Canterbury, and Wellington*. Science and Research Series No. 90. (Wellington, New Zealand: New Zealand Department of Conservation, 1995).

¹²⁷ "Quarry Railroad Berm and Grade 2001.022."

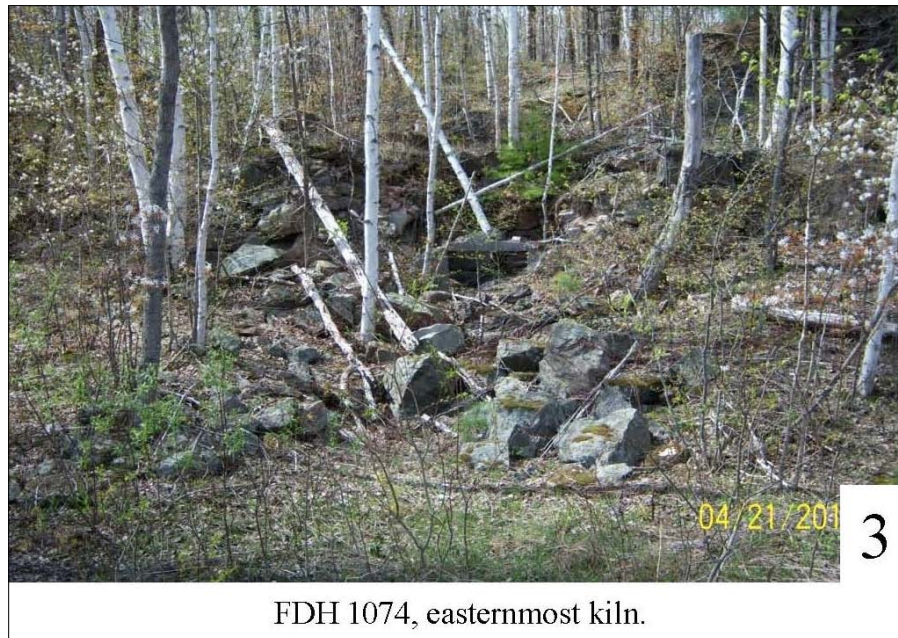


Figure 49: Lime Kiln at Quarry Pond Complex, 2010 (Fort Drum Cultural Resources Section, Project 2010.010). *Note:* the label of “easternmost kiln” shown on this photo may be incorrect. Photographs of this feature included with Project 2006.046 were labeled as “southwesternmost kiln.”



Figure 50: Quarry Pond Complex, feature designation unknown, 1996. (Fort Drum Cultural Resources Section).

It is recommended that trees, dense brush undergrowth and any climbing or clinging vines and ivy be removed from the immediate proximity of the aboveground features to slow natural deterioration of the features. National Park Service's Guidelines recommend that coniferous trees which will not resprout should be cut down at ground level.¹²⁸ Deciduous trees should be felled, leaving twelve to eighteen inches of stump aboveground. Tree stumps and root systems should not be removed from the ground but should be allowed to decompose naturally in the soil. The tree cuts should be angled to facilitate water runoff from the top of the stump and slow the stump/root decomposition. Areas to be cleared of trees should include everything within and from two to three meters surrounding aboveground features, including the railroad berms. A swath of undergrowth and trees should be left between aboveground features and publicly accessible portions of the complex to discourage persons from exploring the features. All felled trees (including natural tree falls) should be removed from the site. Climbing or clinging plants should be removed from aboveground features with hand clippers. Holdfasts and roots attached to the features should not be pulled from the surface face but should be left to decompose in situ. Periodic revisits of the site should include efforts to remove saplings and shrubs from the cleared areas associated with features.

In addition to removing destructive vegetation immediately around the features, erosion should be slowed by the encouragement of native grasses and ground cover plants on bare earth within the complex boundaries. The roots of these plants will hold the soil to the site. Installation environmental managers should be consulted on specific species of plants, native to the area, that are best suited for site conditions.

4.6 Management of vehicular traffic

The ACHP Section 106 Archaeology Guidance recommends diverting vehicular traffic away from eligible sites.¹²⁹ It is understood that at the Quarry Pond Complex, this recommendation is not entirely practical. The site has recently been used as a SCUBA training site and is also used as a recreational fishing site (Figure 51). The only access to the site is by walking or driving on the top of the railroad berm, which is one of the archaeological features of the site (Figure 52).

¹²⁸ Andropogen Associates, *Earthworks Landscape Management Manual*.

¹²⁹ Advisory Council on Historic Preservation, "Section 106 Archaeology Guidance," 2009, www.achp.gov/archguide.

The following recommendations are intended to minimize the amount of damage to the site in general and the railroad berm in particular, while still allowing access to the site.

- It might be useful to control access by establishing a permit or pass requirement for access to the site, if suitable monitoring could be enforced. As access is through the defined archeological site boundaries, it is also desirable to decrease the number of visitors. Perhaps the Office of Morale, Welfare, and Recreation (MWR) could rethink use of the site as a recreational facility, since eliminating this use would minimize risks to site integrity.
- Passenger vehicles, including small recreational vehicles such as all-terrain vehicles (ATVs) or dirt bikes should be prohibited from driving or parking on the sides of the railroad berm feature as this will place additional stress on the sidewalls of the feature. This prohibition should include pulling a vehicle off to the side of the access road to park or turn around. This prohibition should be achieved through signage or fencing.
- A designated parking area for onsite parking and vehicle turnaround area should be established and clearly marked by signage. This parking area should be on flat ground that is a minimum of 10 meters from any aboveground features. As existing maps of the Quarry Pond Complex do not include the exact location of known site features, it is not possible to recommend a spot for the parking/turnaround area in this report. The decision of the location of the parking area should be made by Fort Drum CRM staff.



Figure 51: Sign indicating vehicular and recreation activity at the Quarry Pond Complex, 2011 (ERDC-CERL).

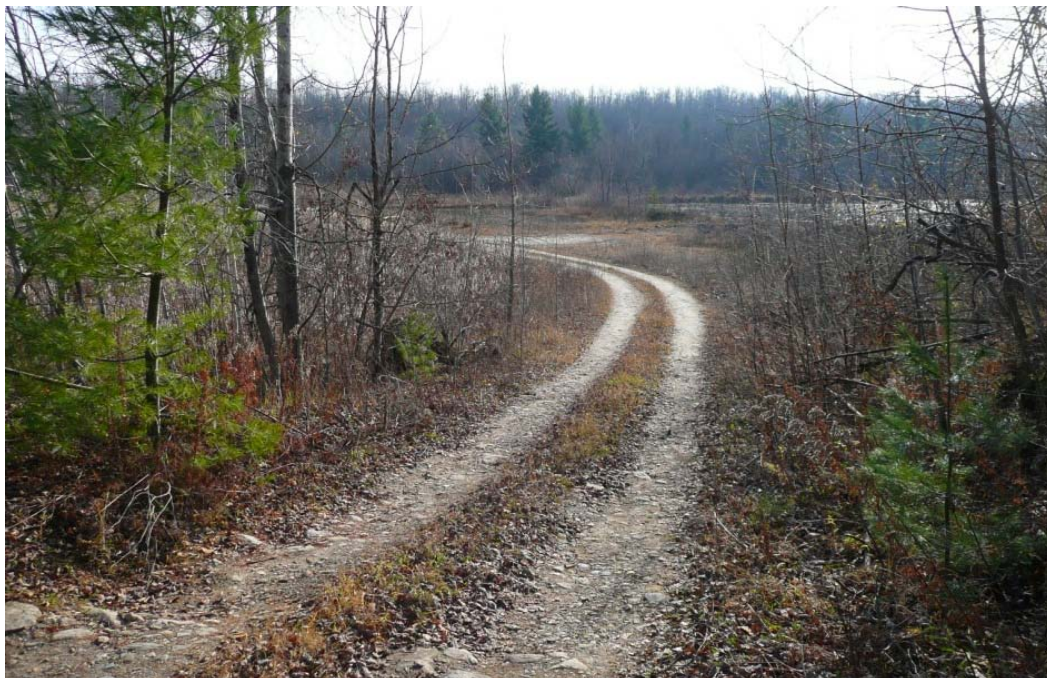


Figure 52: Access to the Quarry Pond Complex on the railroad berm feature, 2011 (ERDC-CERL).

4.7 Wetlands management

The Quarry Pond Complex is surrounded by wetlands (Figure 53). Elevation maps demonstrate that portions of the site are not significantly different in elevation from the surrounding wetlands (Figure 54); thus, the site should be monitored for flooding. If it is determined that the site regularly floods after rain or snowmelt events, it is recommended that the Fort

Drum CRM staff investigate the feasibility of establishing a drainage system that diverts water away from the site to the southeast or southwest. This system should not drain the adjacent wetlands but prevent the waters from rising to an elevation that would flood the site.

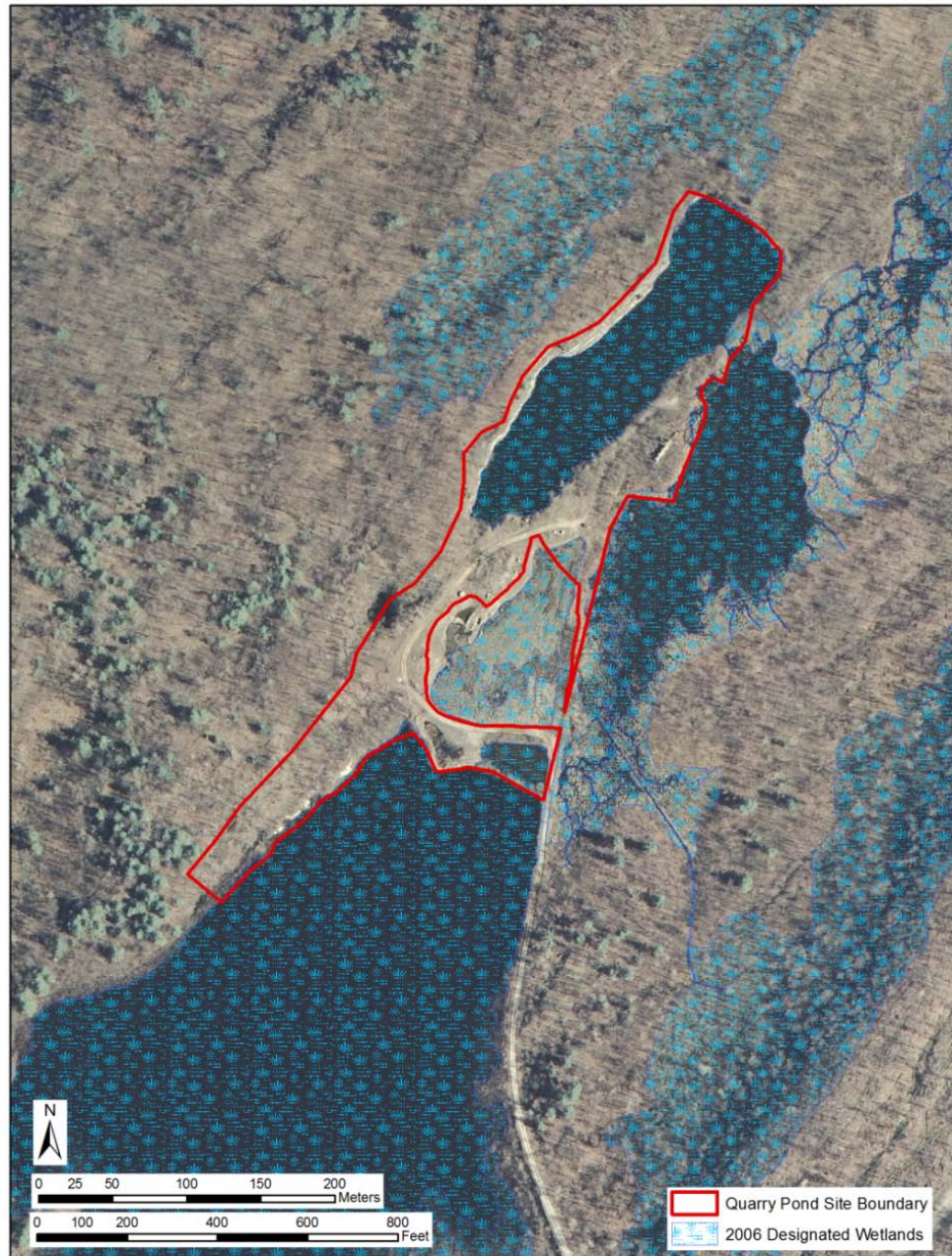


Figure 53: Quarry Pond Complex and designated wetlands, 2012 (ERDC-CERL and Fort Drum Cultural Resources Section).

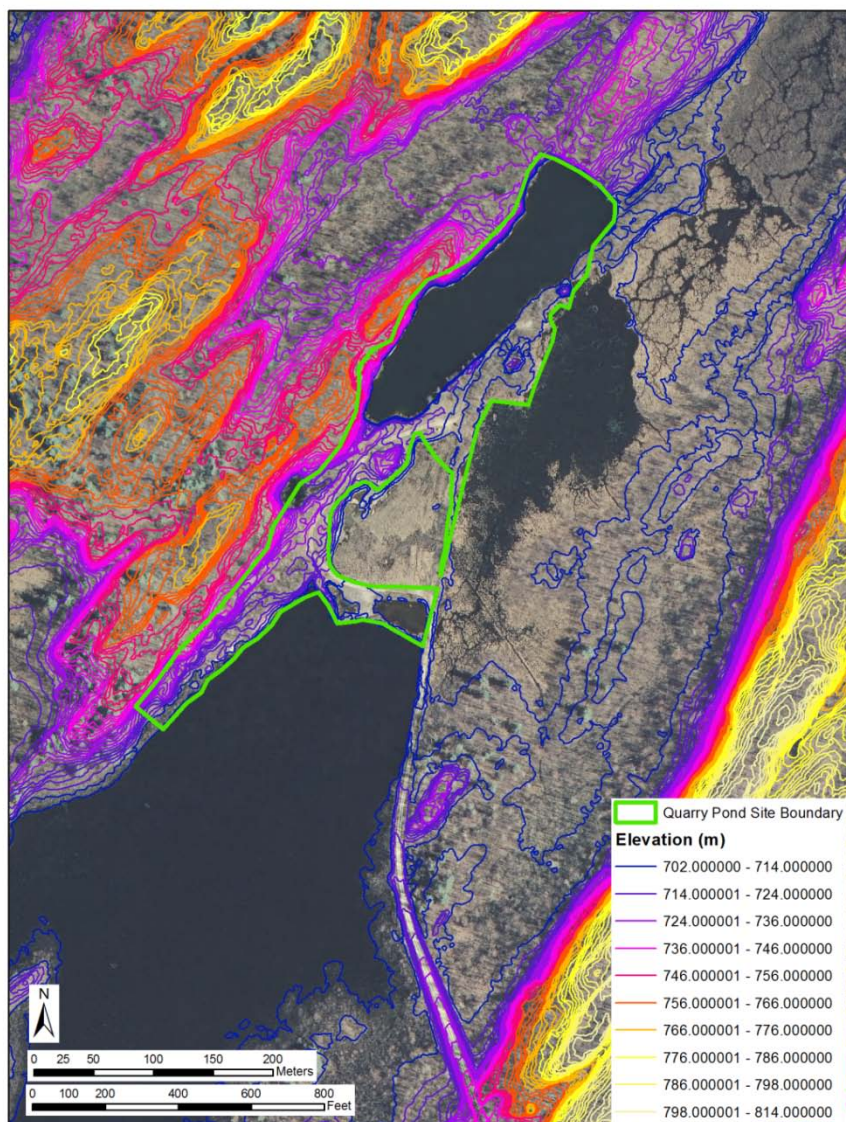


Figure 54: Quarry Pond Complex and elevation contours, 2012 (ERDC-CERL and Fort Drum Cultural Resources Section).

4.8 Water quality monitoring

The Quarry Pond Complex was an industrial facility. Equipment used on the site, and described earlier in this report, included steam engines, railroad locomotives, and lime processing kilns. The textual records are not explicit about what kind of fuel was used to power the lime extraction and processing facilities throughout its operational life. The fuel source was most likely wood, but there is a possibility that coal or coke was used to fire the steam engines, railroad locomotives, or even the kilns during later periods of site use. The heavy machinery on site would have required oil to lubricate the moving parts. These activities can produce chemical contam-

inations in the soil, such as coal tar. The documented presence of a car at the bottom of Quarry Pond could result in gasoline, motor oil, battery acid, and antifreeze contamination on the site. Additionally, it should not be assumed that the known car dump is the only instance of illicit dumping at the site. It is therefore recommended that the site and surrounding wetlands be monitored for water quality and chemical contaminants. Any additional archaeological work conducted on the site should include coal slag, clinkers, and other industrial waste as artifact categories to be observed and reported. Documentation of industrial waste information and artifacts on the site will provide valuable information, now missing from the archival records, on how the site was used in the past and what its continuing impact is on the surrounding environment.

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1. REPORT DATE (DD-MM-YYYY) 30-04-2012		2. REPORT TYPE Final Technical Report		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Historic Context and Management Plan for the Quarry Pond Archeological Complex on Fort Drum				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Susan I. Enscoe and Carey L. Baxter				5d. PROJECT NUMBER Project 334557, "Quarry Pond"	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Engineer Research and Development Center (ERDC) Construction Engineering Research Laboratory (CERL) PO Box 9005 Champaign, IL 61826-9005		8. PERFORMING ORGANIZATION REPORT NUMBER ERDC/CERL TR-12-7			
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Public Works, Directorate of Environment Cultural Resources Section, PW-ENV Fort Drum, NY 13602				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Land annexed by Fort Drum in 1941 included a defunct limestone quarry filled with water. Known as Quarry Pond, the site is part of a larger group of archeological sites known as the Quarry Pond Complex that also contains industrial ruins, early lime kilns, and a railroad berm and grade. The complex first furnished limestone for flux used in an iron blast furnace in Lewisburg. The ruins of three lime kilns are extant near the pond. When advances in iron production made the furnace obsolete, the quarry provided limestone used by sulfite mills in paper production or by the steel industry. In 1931, the quarry suddenly filled with spring water and was shut down. It is perhaps best known as the site of a spectacular cavern filled with very large and beautiful calcite crystals that were displayed at the New York State Museum for nearly seventy years. Although the site is significant for discovery of the crystals, the level of its destruction has resulted in a loss of integrity. The complex maintains the potential, however, to yield useful information about nineteenth- and early twentieth-century extractive industries, and it should be managed to minimize damage to the component parts of the complex.					
15. SUBJECT TERMS Fort Drum, Quarry Pond, historic context, New York limestone industry, Rose Grotto					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 85	19a. NAME OF RESPONSIBLE PERSON
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (include area code)