UEBERROTH ZINC MINE HISTORIC DISTRICT
Old Bethlehem Pike and Saucon Valley Road
Upper Saucon Township
Lehigh County
Pennsylvania

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

STATE-LEVEL RECORDATION
Pennsylvania Historical and Museum Commission
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INTRODUCTION

The Ueberroth Zinc Mine Historic District is located northwest of the intersection of Old Bethlehem Pike and existing Saucon Valley Road, in Friedensville, Upper Saucon Township, Lehigh County, Pennsylvania. The Ueberroth Zinc Mine operation associated with the property was begun in 1846. The "Old Hartman" mine, also on the property, was in operation by 1860, because in that year the recently formed Lehigh Zinc Company acquired both mines (Miller 1925:72). The company built a number of mine-related structures that now lie in ruins. The best preserved structure is the giant pump house completed in 1872 to house "the President," the largest steam-powered pump in the world at the time. Adjacent foundation ruins indicate the location of additional mining structures. Housing for mine workers was also constructed in the 1860s or early 1870s, although only foundation ruins presently remain in the district. The Hartman Residence, built ca. 1870, was eventually used as a mine supervisor's house. Two related eligible resources stand outside the boundary of the Ueberroth Zinc Mine Historic District. The Correll Zinc Workers' house, to the north, was built in the 1860s or early 1870s. The Jacob Ueberroth house, located east of the district, dates to the early nineteenth century and was associated with the original owner of the land on which the first local zinc mine opened. The enormous pump shut down in 1876 due to the high cost of its operation, although it was returned to use several times before it was finally dismantled in 1891 (Miller 1925:74; Graves 1987). Unable to compete in the national zinc market, mining operations in the vicinity of Friedensville ceased entirely by 1893 (Hugh Moore Historical Park and Museums 1992:314). The mining properties were sold to the New Jersey Zinc Company in 1899 but lay idle until 1949, when the company began testing for mining and redevelopment potential, ultimately constructing new facilities and mines in the 1950s (Petro 1976:117; New Jersey Zinc Company 1951:12).

The Ueberroth Zinc Mine Historic District was determined eligible for listing in the National Register of Historic Places in October 1995, under Criteria A, C, and D, for its local historic and architectural significance and for its archaeological potential to yield information. The associated features within the historic district convey the early history of zinc mining in the region. The Hartman house retains a high level of physical integrity and represents an outstanding local example of Italianate and Queen Anne architectural styles. In addition, design traits characteristic of industrial structures are retained in the ruins of the massive pump house. Finally, the quarries, pits, ventilation shafts, ruins, and underground tunnels associated with mining operations in the district have the potential to yield important information about the technological development of the zinc industry and its effect on working and living conditions during the late nineteenth century.

This state-level recordation provides a description of the pump house (once containing "the President") and other features within the boundary. A brief description of the related Jacob Ueberroth house and the Correll Zinc Workers' house is also provided. These descriptions are followed by a detailed history of the Ueberroth Zinc Mine and "the President." Photographic docu-

mentation focuses on the pump house but includes other associated features in the district and the two related resources that lie outside the boundary.

PHYSICAL DESCRIPTION AND SETTING

The Ueberroth Zinc Mine Historic District lies northwest of the intersection of Old Bethlehem Pike and Saucon Valley Road, just northwest of the village of Friedensville. The setting is characterized by uneven terrain rising steadily toward wooded mountains in the north. Much of the historic district has become overgrown with trees and vegetation, contributing to the decay of mine-related structures. The irregular boundary encompasses the remains of two mines and their associated quarries, pits, ventilation shafts, haul road, and underground tunnels, as well as the ruins of a pump house, foundation wall ruins related to mine structures and worker housing, and the nineteenth-century Hartman dwelling (Figure 1). A haul road, a single-lane dirt track extending north near Saucon Valley Road, remains open and provides access to the Ueberroth quarry. Water fills the open quarry pits of both the Ueberroth and Hartman mines, providing a scenic landscape. The Correll Zinc Workers' houses, of which only one example presently remains standing, faced south onto Oak Hurst Rd, which runs parallel to the north boundary of the historic district. The Jacob Ueberroth house faces west onto Old Bethlehem Pike, adjacent to the portion of the historic district containing the Ueberroth Zinc Mine.

The Ueberroth Mine is situated 0.7 kilometers (0.45 miles) northwest of the intersection of Saucon Valley Road with old Bethlehem Pike at Friedensville, and 182 meters (600 feet) west of Old Bethlehem Pike and 0.65 kilometers (0.4 miles) southwest of Colesville. Larger and deeper than the Hartman quarry pit, the Ueberroth quarry pit has steep, rugged rock walls that form a picturesque water basin. The rim of the quarry is heavily wooded. Adjacent to the south rim of the quarry stand remnants of the original pump house for "the President."

The square-shaped pump house ruin stands approximately three stories high and is constructed of large, roughly coursed stones with particularly massive blocks at the corners of the structure. The approximate height of the structure is 12 meters (40 feet). The extreme thickness of the stone walls was designed to withstand the forces of the enormous pump housed inside. The walls vary in width from approximately 3.1 meters (9 feet) thick on the northern and southern facades to 1.5 meters (4.5 feet) thick on the east and west facade. The archway of the south facade is also 1.5 meters (4.5 feet) thick (Figure 2). Presently, trees cluster close around the base of the building and new growth has sprung from the tops of the walls, which are covered with ivy. A series of door and window openings are found on all facades. The window openings are asymmetrically placed with thick wood lintels. Windows are generally 2 meters (6 feet) tall and 1.39 meters (4 feet) wide. Two large rectangular portals are positioned off-center in the west and east facades, each measuring 2.43 meters (8 feet) tall and 3.65 meters (12 feet) wide, respectively (Figure 3). The door lintels on the east and west facade consist of three large pine beams constructed side by side, each measuring 381 millimeters (15 inches) in diameter. Windows located

in the north facade contain seven large pine beams constructed side by side. A central arched entrance in the south facade is lined with a double rowlock course of bricks resting on stone haunches (Figure 4). The depth of the archway is 1.5 meters (4.5 feet) and the height is 4.26 meters (14 feet). While none of the openings retain doors or windows, several windows in the north facade retain metal hardware (straps out of the wall). All interiors of the facades have remnants of floor beams that measure approximately 0.30 meters (1 foot) square.

Earthen debris and trees occupy the interior of the pump house structure. While none of the machinery associated with "the President" remains inside, the platform upon which it was built and the flywheel pits are evident (Figure 2; Figure 5). The platform measure approximately 10.3 meters (34.5 feet) long (from north to south) and 3.04 meters (10 feet) wide. It is constructed of stone. Two flywheel pits flank the center platform. Each measures 10.66 meters (35 feet) long (north to south) and 3.65 meters (12 feet) wide. They both are approximately 2.13 meters (7 feet) deep and are covered with debris, making the original depth unknown. A single 1.5 meter (5 foot) wide window is located on the north facade within each flywheel pit. This was to accommodate the revolutions of the flywheel that itself measured 10.66 meters (35 feet) in diameter.

Other ruined foundation walls and ventilation holes lie adjacent to the rim of the quarry pit but are not as intact as the pump house and have proved more susceptible to new tree growth. The ruins are associated with zinc mining activity at the site, although their precise uses remain unknown. Coal debris associated with zinc processing also lies among the ruins. Another feature which appears to have been associated with the pump house itself is a series of brick subterranean vaults that may have been used as steam transmission lines. This vaulting is located in a series of units, one located perpendicular to both the east and west facades and one large unit south and parallel to the southern facade. This southern vault is connected to the pump house itself by two lines that flank the arched entrance. Mounds of earth mark these locations and are approximately 0.91 meters (3 feet) wide. The top of the vault is near ground-level with several collapsed areas making the inside visible with minimal probing.

The "Old Hartman" open pit is located approximately 518 meters (1700 feet) southwest of the Ueberroth pit and approximately 518 meters (1700 feet) northwest of the intersection of Old Bethlehem Road and Saucon Valley Road. Smaller in size and less rugged than the Ueberroth pit, the Hartman pit is also filled with water. Like the Ueberroth mine, the Hartman quarry was worked during the second half of the nineteenth century, but it also came into reuse in the mid-twentieth century as a means to provide truck access to the "New Hartman Mine." All of the buildings associated with the New Hartman Mine have been destroyed.

A circa 1870 brick residence, known to have belonged to D. Hartman and subsequently used as a mine supervisor's house, is situated along Saucon Valley Road immediately south of the Hartman mines. The two-and-one-half-story residence is highly decorative, utilizing elements of the Italianate and Queen Anne style. The side-gable dwelling measures five bays wide and four bays deep with huge double chimneys at either gable end and an ell extending from the rear fa-

cade. A curved porch supported on Doric columns wraps around the main and side facades, broken by a pedimented pavilion before the front door.

The historic district also contains elements associated with workers' housing on the site. These elements include four depressions situated south of the Ueberroth Mine and east of the haul road. Their location coincides with that of workers' housing depicted as belonging to the Lehigh Zinc Company on a map of Upper Saucon Township dating from 1876 (Davis 1876). The depressions measure approximately 6.1 meters by 6.1 meters (20 feet by 20 feet) and are typified by fieldstone basements and partial foundations.

These workers' houses may have been similar to the Correll Workers' houses located north of the historic district on Oakhurst Drive, just west of the intersection with Old Bethlehem Pike. Although four houses had been standing when this resource was studied in 1995, only one house presently remains. The four houses were identical in form and orientation, each set back uniformly from the road. They were rectangular in plan with side-gable, slate roofs. The houses had only one room downstairs and an upper half-story accessed by a steep, narrow, boxed staircase. A door and one window occupied each front facade. Some window openings retained six-over-six wood sash. Like the workers houses that once stood in the Ueberroth Zinc Mine Historic District, these dwellings were representative of modest, inexpensive working class houses built in the 1860s or early 1870s. The houses were associated with the Correll Zinc Mine, which lay adjacent to the Friedensville Union Church at the northwest corner of Old Bethlehem Pike and Saucon Valley Road.

The Jacob Ueberroth house stands on the east side of Old Bethlehem Pike, southeast of the remains of the Ueberroth Zinc Mine. Although the house predates local zinc mining activity, it was owned by Jacob Ueberroth, who purchased four tracts of land in Friedensville in the 1820s and was an early discoverer of zinc on his property (see below). The Georgian-style center-hall dwelling measures five-bays wide by three bays deep and is constructed of roughly coursed stone walls with corner quoins. The two-and-one-half story house has double chimneys at either end and a two-story stone ell extending from the rear facade. The windows are modern replacements.

LOCAL HISTORICAL BACKGROUND

During the early years of the nineteenth century, Jacob Ueberroth, a farmer living in the Saucon Valley, Lehigh County village of Friedensville, tried to burn some local limestone in his limekiln. He was surprised to find that the stones did not transform neatly into lime when subjected to intense heat. Portions of the stones fused in the kiln, leaving the farmer with nuggets of a kind of ore he did not recognize. In 1830, Ueberroth attempted to identify and evaluate this ore by having a wagonload of limestone from his farm fired at Mary Ann Furnace in Berks County. Unfortunately for Ueberroth and his fellow experimenters, any ore that had been present in the stone was volatilized in the furnace, and it escaped out the furnace stack (Miller 1925:71).

In 1845, Ueberroth took a specimen of his ore to Theodore Roepper, Professor of Mineralogy and Geology at nearby Lehigh University. Roepper identified the ore as a silicate of zinc known as "calamine" $(ZnOH)^2 SiO^3$ (Miller 1925:71). The professor carried some of this ore to Lehman's Foundry in South Bethlehem where he learned that it combined nicely with native copper to produce brass. On the basis of this success, Roepper entered into partnership with Robert Earp, a Philadelphia importer, and together the men obtained a lease on Jacob Ueberroth's farm in hopes of using the ore to produce zinc oxide, an extremely fine white powder used as a pigment in paint, an additive in paper, and as a medicinal ointment. Because an effective method of refining zinc had not yet been developed in America, the first 8.16 tonnes (9 tons) of zinc ore extracted from the Ueberroth Mine in 1846 were shipped to England. The English furnaces were not capable of generating enough heat to refine the Friedensville ore, however, so the report came back to Roepper and Earp that the ore was unusable (Miller 1925:72).

In 1852, Charles Wetherill, a metallurgist working in the New Jersey Zinc Company's plant in Newark, patented a process for producing zinc oxide. The following year he was sent out to examine the zinc deposits at Friedensville and determine if his process could refine zinc ore on a commercial scale in that vicinity. When he reported back to his company that it could, Wetherill was charged with constructing a furnace in neighboring Bethlehem. The New Jersey Zinc Company's Bethlehem furnace was completed on October 12, 1853, and the next day the first load of zinc ore extracted from the Ueberroth Mine (still under lease to Robert Earp) was processed there (Miller 1925:72).

Recognizing the quality and potential value of the Ueberroth calamine, Wetherill acquired from Earp the lease on Ueberroth's property, after which the metallurgist tried to convey the lease and the rights to his zinc oxide process to his employer, the New Jersey Zinc Company. When the two parties could not come to an agreement, Wetherill resigned from the Company. In May 1858, he and Charles Gilbert formed the Pennsylvania & Lehigh Zinc Company with "the purpose of mining zinc ore in the counties of Lehigh and Northampton, of manufacturing zinc paint, metallic zinc, and other articles from said ore, and vending the same" (Miller 1925:72). In 1860, they reorganized the corporation as "the Lehigh Zinc Company." The same year, the company acquired the Ueberroth, Old Hartman, and Three-Cornered mines, and leased the Correll mine, all of which were in operation in the Friedensville area.

In its early years, the Company hired many experienced engineers and miners recently immigrated from England. Some of these men had left behind a mining industry in the Cornwall region that had been mired in a depression for a decade or more (Barton 1966). Census records compiled in 1870 indicated that 85% of Friedensville's zinc miners in that year were either English or Irish émigrés (United States Bureau of Census 1870). The first engineers employed at the Ueberroth Mine were of English extraction. Among them was Captain John M.H. Keenan, who began his career at Ueberroth as a superintendent. Keenan was a graduate of the Royal College of Engineers, Sappers, and Miners in Woolwich, England. Another early engineer was John West,

who came from a long line of Cornish mine-workers. His paternal uncle, William West, had gained notoriety for his work with steam engines in pumping applications. William held many patents and had developed numerous innovations for the famed Cornish pumping engine. His nephew William made a name for himself in America by building most of the Lehigh Zinc Company's steam-powered pumping engines (Barton 1966).

Lehigh Zinc Company officials learned that the geologic and hydrologic composition of the Saucon Valley is such that subterranean zinc mining could not be conducted there without the aid of pumping engines. Measuring 11.26 kilometers (7 miles) in length and 4-7 kilometers (3-4 miles) in width, the Valley is surrounded by crystalline ridges of the Reading Prong, most apparent in the gneiss outcrops of South Mountain on the north side of the Valley. Gneiss also underlies the Valley, forming a basin, and upon this is deposited a stratum of Potsdam Sandstone, then a layer of slate, and finally a stratum of dolomitic limestone measuring 426.72 meters (1,400 feet) in thickness and designated "the Beekmantown Formation." Zinc ore is present in this limestone (Drinker 1873:67; Socolow 1959:152).

The Ordovician limestone has been heavily folded and faulted by the uplifting of the surrounding granitic gneiss hills. Around Friedensville, the limestone strata are almost vertical. The close folding and faulting in the Saucon Valley has shattered the rocks to great depths. The most severe fracturing of the bedrock occurs around Friedensville (Miller 1925:79). Less than a mile north of the Ueberroth Mine is the Colesville Fault, with a displacement or "throw" measuring 762 meters (2,500 feet) in length. The Saucon Fault, which is oriented in the same general direction but registers a shorter throw, is located about 790.40 meters (2,600 feet) south of Friedensville (Socolow 1959:152). A third fault appears approximately 608 meters (2,000 feet) south of the Ueberroth Mine (Berg and Dodge 1981; Miller 1925:80). The shattered condition of bedrock in the Saucon Valley permits the active circulation of water, which in turn produces the mineralization around Friedensville.

Extensive water circulation concentrated the zinc ore deposits, but the presence of so much water made subterranean mining of the zinc ore difficult and therefore expensive. The granitic gneiss basin trapped water within the limestone. Rainfall passing through the limestone produced carbonic acid, which, when mixed with oxidized pyrite, yielded sulfuric acid. These chemical reactions dissolved the limestone, leaving subterranean caverns. Water filled these caverns, creating artesian pressures that forced water through cracks and faults throughout the Saucon Valley, flooding at some level any shaft a miner attempted to excavate (Miller 1925:86-87).

At first, Ueberroth's miners were kept busy extracting ore located close to the surface. There was a rich pocket of ore mixed in with outcroppings of limestone and clay that could be quarried (Miller 1925:86). From 1853 to 1855, 90718.47 tonnes (100,000 tons) of zinc ore were extracted through this "open pit" method of mining (Lesley 1892:436; Miller 1925:91). Once these surface deposits were exhausted, however, the Lehigh Zinc Company had no choice but to begin sinking

shafts down along the ore veins. When these shafts reached a depth of 12.16 meters (40 feet), the flow of water into them became very strong.

The tasks of hoisting ore and draining water from the shafts were initially performed separately by either hand-powered windlass or horse-powered hoisting gin known as a "horse whim" (Hunter and Bryant 1991:381). The Company's engineer, Captain John Keenan, eventually devised an improved horse-powered whim by which ore and water could be raised at the same time. The pump worked by Keenan's whim was capable of discharging 2271.25 liters (600 gallons) of water per minute (Pennsylvania and Lehigh Zinc Company 1853:7). The future, however, appeared to be in pumps powered by steam-engines.

In the years immediately preceding the Civil War, the Lehigh Zinc Company tried a variety of steam-engine-and-pump configurations, but all were either over-matched or ill-suited to the demands of the Ueberroth operation. Engineer William West installed a pumping engine of his own design in 1866. The horizontal, condensing, double-acting engine was capable of pumping 21576.85 liters (5,700 gallons) of water per minute from a depth of 40.23 meters (132 feet). It operated at a relatively slow 16 strokes per minute, generating 300 horsepower, which was enough to drive three pumps (Roberts et al. 1914). West also brought to the mines a pumping engine he had built in 1853. It was a 127-centimeter (50-inch), single-acting "Bull" beam engine, the first engine built on Cornish principles in America (Drinker 1873:69). Even working together, these engines and their pumps were not able to handle the flow of water into the Friedensville mines shafts, which were now approaching 45.6 meters (150 feet) in depth.

In 1869, West began drawing up plans for a steam-powered pumping engine larger than any other engine of its kind in the world. West's engine took several years to design, manufacture, and install. It was built on principles developed in the mining region of West's native Cornwall, England, and was thus classified as a "Cornish pumping engine." There were three primary components to the Cornish pumping system: a pump or series of pumps; a pumping engine at the surface; and, connecting them, a pump-rod assembly known as "pitwork" (Hunter and Bryant 1991:460). West had the engine for his pumping system manufactured by the Philadelphia firm of Merrick & Sons, in their Southwark Foundry. The pump, boilers, and mountings for the system were produced by I.P. Morris of Philadelphia. Much of the casting was subcontracted to Lazell, Perkins & Company of Bridgewater, Massachusetts (Barton 1969:259; Drinker 1873:69). Due to their great size, the engine and its associated pumping components had to be transported in sections from Philadelphia by rail. George Washington Boehm was contracted to haul the pieces from the Philadelphia and Reading train station at Center Valley to the mine site. Some pieces required specially designed wagons pulled by teams of 42 mules (Petro 1976; Roberts et al. 1914). The pumping system was assembled under the direction of Simeon Noell, a Cornishman with 21 years of experience with Cornish systems. Two Cornish immigrants were assigned to operate the engine (Barton 1969).

West called his engine "The President," presumably in honor of President Ulysses S. Grant, according to the following unattributed report:

> When the pump was finally operative, a formal dedication was planned to complement the tremendous effort of all concerned. An invitation was extended to President Grant to officiate at the dedication ceremonies . . . the great day arrived . . . but the Guest-of Honor never arrived. The papers in Washington indicated that he was in "the wilds of Pennsylvania." Rumors reached Friedensville that the President had stopped off to visit a longtime acquaintance of his in Doylestown [Bucks County, Pennsylvania] (we have also heard that it was [nearby] Trumbauersville) and after a few snorts . . . well, the dedication was forgotten (Petro 1976:116).

The President was fired up for the first time on January 29, 1872. It would run almost continuously for the next 4½ years. Although it had a calculated pumping capacity of 45424.94 liters (12,000 gallons) per minute from a depth of 91.2 meters (300 feet), the President rarely operated at peak capacity. Much of the time it pumped fewer than 34068.71 liters (9,000 gallons) per minute, and it was never necessary to run all of its pumps at their full capacity in order to keep the mine works free of water (Miller 1925:86). Even operating at less-than-peak capacity, the President had a dramatic affect on water levels throughout the porous Saucon Valley. An early twentieth-century mineralogist reporting on the Friedensville zinc mining industry noted that "When the big engine was running and pumping water from the Ueberroth Mine at a depth of 225 feet [68.4 meters], practically all the wells and springs in the Saucon Valley went dry, and lawsuits against the [Lehigh Zinc] company were threatened. Wells were drained as far to the southwest as Limeport, a distance of 4.5 miles [7.24 kilometers], and about 3.5 miles [5.63 kilometers] to the east. . . . At one time the water of the Saucon Creek, at a point about 1.5 miles [2.41 kilometers] southwest of the mine, entirely disappeared through an easy passageway into the mine. By means of refuse thrown into the creek bed the opening was sealed" (Miller 1925:87). The pumping created other problems. Removing water also removed hydrostatic support from the unstable limestone, leading to collapses. It was thus necessary to shore up non-vertical shafts and mine openings with timber.

The President's successful deployment was hailed by engineers on both sides of the Atlantic. A detailed and illustrated description of its conception and operation was published in a special supplement to the *Scientific American* on August 5, 1876. Written by and for engineers, the description was both a record of the President's vital statistics—reported, in some cases, by the designer himself—and an expression of the import of those statistics within the context of pumping technology. The report is therefore reproduced here almost in its entirety:

> The [Friedensville] mines have been worked to meet the demands of several manufactories, amounting in some single years to 1700 tons [1541.9 tonnes], and, in the aggregate, to 300,000 tons [272100 tonnes] of ore, including rich blende, which has been developed in the process of mining. At a very early day, water was en-

countered; the mining engineer, Mr. John West, matured a plan of engine, pumps, and shaft for raising 12,000 gallons [45424.94 liters] per minute from 300 ft. [91.20 meters] depth, and the company contracted with Messrs. Merrick, of Philadelphia, for this new engine, and with Messrs. I.P. Morris & Co. for the pumps, boilers, and mountings. We start with two plunger pumps of 30 in. [76.20 centimeters] diameter, set in cisterns 87 ft. [26.44 meters] down the shaft, one discharging into the adit [or tunnel] 25 ft. [7.60 meters] below the surface, the other discharging into tanks on the surface for condenser and boilers. Below these, two lifting pumps, hung in wire ropes, work to the bottom, 127 ft. [38.60 meters] below the collar of the shaft, or 122 ft. [37.08 meters] below the old zero point, or 75 ft. [22.80 meters] below the level of Saucon Creek, which crosses the road half a mile south. These pumps will throw 735 gallons [2782.28 liters] per stroke—the engine can work comfortably at 12 strokes per minute, and the power is more than adequate, and the dimensions of the shaft (30½ ft. by 21½ ft. in the clear) [9.27 meters by 6.53 meters] ample for doubling this number of pumps, and carrying all to a depth of 300 ft. [91.20 meters], or 178 ft. [54.11 meters] below the present bottom of the mines, with power still in reserve for what may be required below.

Our engraving [reproduced and annotated for this report as Figures 6A, 6B, 7A, 7B] shows that, in many respects, the engine is of the Cornish type. Mr. West has, indeed, carried with him from Cornwall the traditions of a successful practice.

It is well known that the Cornish engine can not be worked to any great extent expansively, unless the pits are so deep that the great mass has to be put in motion, in the shape of pump spears, etc. Now the lift in the Lehigh mines is comparatively small, and Mr. West therefore introduced the means of expansive working—that is to say, great mass in motion—in the shape of two fly-wheels. It will be seen that these wheels appear comparatively small in diameter, and nothing will give a better idea of the colossal dimensions of the whole of the machinery than the statement that they weigh *seventy-five tons* [68.02 tonnes] *each*. The beams appear light, but then there are four of them; the holding-down bolts also look slight, but their number is great. For the following particulars we are indebted to the courtesy of Mr. West: "The engine has a pumping capacity of 15,000 gallons [56781.18 liters] per minute, and has been run to 19,000 in cases of emergency, raising water from a depth of 350 ft. [106.40 meters]. The engine alone weighs 650 tons [589.55 tonnes], and including the pumps and boilers, the total weight of the machinery is 1000 tons [907 tonnes]. The cylinder is 110¼ in. [2.80 meters] in diameter; length of stroke, 10 ft. [3.04 meters]. The heaviest pieces of iron in the engine are the sections of beams, which weigh 24 tons [21.76 tonnes] each. The fly-wheels weigh 75 tons [68.02 tonnes] each; crank pins, 1 ton [0.90 tonnes] each. The piston rod is 14 in. [35.56 centimeters] in diameter. The crosshead weighs 8 tons [7.25 tonnes]. The connecting rods have 9 in. [22.86 centimeter] necks, and are 15 in. [38.10 centimeters] in the middle,

41 ft. 2½ in. [12.46 meters] long, and weigh 11 tons [9.97 tonnes] each. There are two air pumps, 50 in. [127 centimeters] in diameter each. The 'President' drives four plunger pumps, each 30 in. [76.20 centimeters] in diameter by 10 ft. [25.40 centimeters] stroke, and four lifting pumps each 31½ in. [80.01 centimeters] in diameter by 10 ft. [3.04 meters] stroke—the plunger pumps being uppermost and stationary. The lifting pumps are in the bottom of the shaft, and are moveable, so as to go down as the shaft is sunk. To handle these lifting pumps, hoisting or lowering them at pleasure, a steam capstan capable of lifting 50 tons [45.35 tonnes] vertically is used. By a series of strong gearing, a drum and a steel wire rope, with this capstan, if anything goes wrong with the pumps, they can be taken hold of by the top and pulled out of the water, repaired, and put back in a very short time." The arrangement of the valve gear is rather peculiar. It will be seen that the engine is double-acting. The valves are of the Cornish type, driven by cams bolted on the fly-wheel shaft rigidly. These operate on rolls attached to the end of levers. There were three sets of steam cams made with the engine to cut off respectively at 9 in., 20 in., and 36 in. [22.86 cm., 50.80 cm., and 91.44 cm.], to be changed to suit the work, but not adjustable. The speed is regulated by a throttle valve in the steam-pipe with a long arm and wire attached leading down to the bottom of the mine, and there connected to a block of wood which floats on the water. This regulates the engine according to the incoming water. This arrangement is quite new to us, and answers admirably. Mr. West attempted to make a commercial success in preference to an engineering refinement, or he would have tried an adjustable cut-off regulated by a wire and float in the same way. The 9 in. [22.86 cm.] cut-off was first tried, and gave good diagrams. Subsequently, however, the 20 in. cam was put on and worked better, the pressure being reduced; very little more coal was consumed, and the engines ran much more steadily and with less shock. The quantity of water is so great that when the engine is stopped while the shaft or pit is being sunk it will rise up over the suction pipes—wind bores—and valve chambers—clack pieces—in four minutes. This renders it necessary that the provisions for emergency should be very complete.

We believe that the engine is, practically, the largest fixed single engine in the world, that at Harlaem Meer being a compound engine with one cylinder within the other.
—*The Engineer* (*Scientific American* 1876)

A more exhaustive description of the President and its pump components was published in an article entitled "Abstract of a Paper on the Mines and Works of the Lehigh Zinc Company," which appeared in the 1873 edition of *Transactions of the American Institute of Mining Engineers* (Drinker 1873:68-70). At the time of the article's writing, the President was being readied for deployment. Among the specifications detailed in this article were the following:

The steam is to be supplied [to the President] by sixteen boilers, each 50 feet [15.2 meters] long, 36 inches [91.44 centimeters] in diameter, and built of 5/16ths iron.

Balanced valves, 20 inches [50.80 centimeters] in diameter, and with 1¾-inch [4.44-centimeter] life, are used to admit steam to the cylinder, which is of cast-iron, 110 inches [279.40 centimeters] in diameter, and 100 feet [30.40 meters] stroke, and weighs 30,398 lbs. [13770 kilograms]. The cylinder bottom weighs 26,798 lbs. [12139 kilograms], and the head 24,540 lbs. [11116 kilograms], making the total weight of the cylinder and heads 81,736 lbs. [37026 kilograms], or 40 net tons [36.28 tonnes]. The cylinder jacket is of cast-iron, 1 5/8 inches [4.12 centimeters] thick, and weighs 26,928 lbs. [12198 kilograms]. A space of half an inch [1.27 centimeters] is left between the cylinder and jacket, the latter being lagged with well-seasoned wood. The exhaust valves are 30 inches [76.20 centimeters] in diameter, and lift 3 inches [7.62 centimeters].

The condenser is situated directly beneath the cylinder, and a channel-way leads from it to the air-pump. The condenser and bonnet weigh 33,075 lbs. [14982 kilograms], and the bottom 24,213 lbs. [10968 kilograms], making a total of 57,288 lbs. [25924 kilograms]. The piston-rod is of wrought-iron, 14 inches [35.56 centimeters] in diameter and 22 feet [6.68 meters] long. The cross-head weighs 15,740 lbs. [7130 kilograms], and is fastened to the piston-rod by a nut weighing 1100 lbs. [498.30 kilograms]. A parallel motion is employed to keep the piston-rod vertical.

The working-beam is in four parts, lattice patterned, and weighs in all 95 net tons [86.16 tonnes].

The connecting-rods run from the working-beam to the fly-wheels, and are 41 feet 2½ inches [12.46 meters] from centre to centre, and 15 inches [38.10 centimeters] in diameter in the middle. They weigh over 16,250 lbs. [7361 kilograms] each. There are two fly-wheels, one on each side of the cylinder, each of which is 30 feet [9.12 meters] in diameter, and weighs, with weights bolted in, about 92 tons [83.44 tonnes]. The pump-rods are attached to the other end of the working-beams by back and centres, running through its four parts. One of these centres weighs 2374 lbs. [1075 kilograms].

There are two wooden main pump-rods, 2 feet by 3 [60.96 centimeters by 91.44], made of six pieces of one foot [30.48 centimeter] square Georgia pine lumber. The bucket-rods and the plunger-stockings are attached to them by means of set-offs, and a plunger-head.

There are to be four lift-pumps of 31½ inches [80.01 centimeters] in diameter, discharging into four tanks, resting on bearers, 96½ feet [29.33 meters] from the sur-

face. Four plunger-pumps force the water from the tanks to the surface. As the shaft is carried down, the lifting-pumps will not be required to raise the water more than one hundred feet [30.40 meters]. A fifth plunger and a fifth lifting cylinder will be provided, so that the work of lowering the pumps, as the deepening of the shaft will render necessary from time to time, will be much shortened in time, and seven of the eight pumps can be kept almost continually in operation. The engine can be run under a pressure of 60 lbs. [27.18 kilograms] to the inch, and would then exert nearly 3000 horse-power. It is, however, not intended to run at so high a pressure, but it is intended that the engine shall pump 17,000 gallons [64352.00 liters] of water per minute from a depth of three hundred feet [91.20 meters]. All the larger parts of the engine are made to resist a strain eight times greater than it is calculated they will ever be called upon to sustain (Drinker 1873:68-70).

A rare and richly-detailed eye-witness account of the President in operation and the workings of the mine it served was penned by one of four Lafayette College seniors—three majoring in engineering and one in chemistry—who paid the Ueberroth Mine a visit in 1876. Selected portions of that account are reproduced here:

Mr. B.C Webster, the ever courteous President of the Lehigh Zinc Company, had furnished us with passes, and with letters introducing us to Capt. Glasgow, the mining superintendent, we were soon "doing" the mines under his auspices. First we went to the large houses where they keep the biggest engine in America. . . . It looms up enormous in the gloom of its habitation, and the longer you look the larger it seems.

After examining the monster we were furnished with overalls and coats of white duck. We tucked the tails of the coats into the pants, tying the latter tight about our waists, and, encasing ourselves in dilapidated hats and rubbers, presented a grotesque appearance not to be described. Thus attired, we proceeded to the mouth of the mine, were furnished with candles, put in charge of an intelligent old miner, and commenced the descent.

Accustomed to the buckets of iron and to the cages of coal mines, which, although somewhat safe require no physical exertion, imagine us descending long lines of perpendicular ladders, clinging to the slippery rounds, treading on fingers of the man below, and receiving showers of dirt from heels of the man above, with lively apprehensions that the half-worn rounds might break and precipitate us into the depths below. Imagine us arriving at the foot to find that our further route lay along a single plank, perhaps loosely supported over an Abyss of unknown depth and profound darkness, perhaps with far below us the glimmering candles of the miners at work, and then a shouted-up warning that they were just going to blast. In other parts of the mine we crawled through narrow passages on hands and knees, and once squeezing

head foremost through a narrow opening, we half slid, half rolled down to the bottom of an inclined plane of rocks and mud. The galleries of the mine are formed by following out the veins of ore. They are generally from two to four feet in width—sometimes enlarging into chambers, and at one place . . . there is an immense hole, once occupied by the outcrop of the main body, from which veins lead off in several directions.

There is no regular system of timbering, as the veins are nearly perpendicular.

They use in these mines an explosive made of sawdust soaked in nitro-glycerine, called dualin. It is made up into cartridges and exploded with a detonator. A cartridge was opened for us, portions of the charge taken out and examined by candle-light and then set fire to upon a rock. It burned like dampened gunpowder, throwing out many sparks. We were cautioned not to smell the dualin for fear of headache, and told that the gases of the explosions often caused such effects in those not used to them.

One man has charge of all the blasting done in the mines. He let off a couple of blasts while we were below, which rumbled along the galleries and shook the solid rocks like an earthquake.

There is no special provision for ventilation in these mines, but the air is very pure, even in the lowest portions and at places we encountered strong drafts.

We met numerous parties of miners, some of them working in places where the water streamed from every crevice in the rocks. They are a healthy looking set of men, with whom underground life seems to agree. They get $1.15 per day, working from six to ten hours, according to the wetness of the headings. The ore is transported from the workings to the hoists in barrows, made narrow to pass through the galleries.

The mine is drained with a cistern at the bottom of the main shaft, from which the water is pumped to the surface. The upper portions of the mine were tolerably dry, but down below, and where they were mining blende, it was very wet; water trickled from the rocks in all directions, and occasionally we came to immense chutes, down which water was streaming from the upper levels.

Approaching the main shaft our road lay through galleries where a single plank led over streams of black water, rushing along with frightful impetuosity. A tremendous roaring kept growing louder and louder, and presently we emerged from the galleries into the main shaft, where we stood upon a platform of two to three planks, darkness above and below, all the noise that can possibly be made by running water

in our ears, and several pump rods, well furnished with bristling bolts and nuts, bolting up and down in dangerous proximity to our persons.

The air shaft is about thirty feet [9.12 meters] square and 220 feet [66.88 meters] deep. At the bottom is a rock cistern, into which discharges all the drainage of the mine. From this cistern four lift pumps, each 31½ inches [80.01 centimeters] in diameter, empty the water into four tanks, ninety-six feet [29.18 meters] below the surface, and from the latter four plunge pumps force it to the mouth of the shaft. There are two main pump rods each two by three feet [60.80 by 91.44 centimeters], built of Georgia pine, to which the bucket rods and plunger stocks are attached by set-off and a plunger head. The pumps and all of the large parts of the engine are built eight times stronger than the greatest working stress.

We had spent several hours below, going down a ladder to see this, crawling, almost bent double along some gallery after that, creeping through a small hole to inspect something else, ending with a straight climb of 220 feet [66.88 meters], and it is safe to say we were badly demoralized.

The washers are of the same kind of those used for treating limonite iron ores, a conical spindle set spirally with teeth, working in a trough, through which flows a stream of water. The ore is dumped in at one end, and is worked along by the teeth to the other, most of the sand and clay being washed out of it by the water.

After washing, the ore is passed through a revolving screen, which sizes it, and it is hauled to the smelting works. The sand and finer portions are "bundled," to extract any valuable ore which may remain in them.

In the winter, the blende is roasted in heaps near the mouths of the mines; this is not done in summer, as the sulphurous vapors are very injurious to the vegetation.

At the washers we finished our observation, and casting off our muddy overalls to resume the habiliments of ordinary life, refreshed ourselves by a good dinner at the Friedensville hotel, and took the back track, arriving in Easton late in the afternoon, tired and footsore, but with a large stock of information and many new ideas (Petro 1976:118-119).

The President was housed in a purely functional building, constructed solely for anchoring a massive engine to the ground and sheltering it from the elements. It was designed by engineers who were much more concerned about, and interested in, the structure's mechanical occupant (Barton 1966:169). Because of its functional nature, the building constructed to house the President was similar to engine houses constructed as early as the 1720s. Its foundation, to which the engine was anchored, had to be capable of withstanding the highest stresses the engine could

produce. To obtain a solid footing, workers had to excavate to a depth of 18.24 meters (60 feet) when the engine house foundation was constructed beginning in April 1869 (Roberts et al. 1914).

Atop this foundation, the engine house was a massive structure with stone walls several feet thick. The "bob-wall" carried the main weight and thrust of the engine. In Cornwall, the bob-wall was often constructed of granite blocks weighing as much as a half-ton each, or of the largest blocks available to the masons (Barton 1966). This wall was the fulcrum for the large working beams or "bobs." Set in the center of the bob-wall was the "beam pillow block" which provided the pivot point for the working beam. The pillow block usually consisted of triangular truss bracing, but one of the foundries which manufactured components of the President had developed a slightly different design. I.P. Morris and Company designed a block using large hollow castings resembling truncated pyramids (Stenton 1855). A similar system appears to have been used in the installation of the President.

The interior layout of the engine house was also based on a Cornish pattern, as reflected on the illustrations accompanying the 1876 *Scientific American* article (Figures 6A, 6B, 7A, 7B). Like other Cornish engine houses, the President's housing was divided into three chambers (National Trust 1998; Barton 1966). The bottom chamber, on ground level, was known as the "driving floor" because it accommodated the throttle and other controls. On this floor, engineers had access to the lower portion of the cylinder, the lower valve chest, condenser, flywheels, and air pumps. A tall, narrow, brick, arched doorway was centrally placed in the southern facade. Two large rectangular passages with massive wooden lintels led off the bottom chamber in eastward and westward directions. They may have been sized to allow for the installation and removal of the large cylinder and flywheels. The middle chamber provided access to the cylinder head and the upper valve chest. Both the bottom and middle chambers were contained within the stone walls of the house. The upper chamber, or "bob loft," was supported on wooden "spring beams." These beams were anchored to the back or southern wall of the house. They extended over the perpendicular joists and were cantilevered out over the northern or "bob" wall. A platform was created on the cantilevered portion of the beams to provide a stage for servicing the outside end of the working beam. This platform was enclosed to protect it and the working beam from the elements. The upper chamber also housed tackling gear used to lift heavy parts of the pump when repairs were needed.

Openings in the walls of the house were kept to a minimum size in order to avoid weakening the structure. It was a common practice in constructing Cornish engine houses to use large wooden beams for lintels (Barton 1966:180). The pine timbers utilized in the President's housing measured 38.10 centimeters (15 inches) square, and four or more timbers were employed for each lintel. The chimney or chimneys of the typical Cornish engine house were built into the corners of the house to increase the structure's stability and to reduce construction costs (Barton 1966:173). Historic images of the President's engine house show it equipped with two rectangular stacks, one at each end of the southern elevation.

Four-and-a-half years after it was first fired up, the President—along with the Ueberroth Mine it served—was shut down on October 28, 1876 (Miller 1925:86). Two reasons were generally advanced for the closure of the Lehigh Zinc Company's Saucon Valley mines, including Ueberroth, "Old Hartman," and "Three Cornered Lot." Some people believed, in error, that the ore had been exhausted. There were other reports, equally unfounded, of threatened litigation by farmers whose wells had run dry because so much water was pumped out of the earth. In fact, the Lehigh Zinc Company closed its Saucon Valley mines in 1876 because of the Company's "inability to compete with the New Jersey Zinc Co. in the manufacture of zinc oxide made from the zinc ores of Sterling Hill and Franklin Furnace, N.J., or with the companies operating in the Central States in the production of spelter" (Miller 1925:89). The expiration of the Wetherill patents in 1876 allowed other zinc processors—including the New Jersey Zinc Company—to construct and operate more efficient oxide furnaces. At the time that the Lehigh Zinc Company closed Ueberroth and other mines in the Saucon Valley, it entered into an agreement with the New Jersey Zinc Company to purchase "1,000 tons [907 tonnes] of ore a month from the New Jersey mines for a period of five years" (Miller 1925:90).

Census data compiled in 1880 indicates that zinc miners of the Saucon Valley either relocated or found new types of work after the closure of most of the Valley's mines (United States Bureau of Census 1880). No one living in Upper Saucon Township in that year was identified for census purposes as a "miner." There were, however, two mine superintendents of English heritage and three Pennsylvania-born zinc mine bosses still living in Upper Saucon, and they represented a potential rejuvenation of the area's zinc mining industry. In 1881, Franklin Osgood, part owner of the Correll or Saucon Mine approximately 547.20 meters (1,800 feet) south of the Ueberroth Mine, purchased the properties of the Lehigh Zinc Company and unified them under the corporate designation "Friedensville Zinc Company." The President was fired up again, and for periods during the mid-1880s it operated on a full-time basis again, draining the Friedensville-area mines (Torbeck et al. 1995). The reactivation of the Friedensville Mines appears to have been precipitated by the Friedensville Zinc Company's winning of one or more contracts to produce zinc for use in production of an alloy particularly well-suited to cartridge brass manufacture. It was reported in 1886 that "Lehigh zinc, or spelter, made from the ores of the Friedensville mines, near Bethlehem, Pa., has a world-wide reputation as the purest zinc in the world, and as specially adapted for use in cartridge making; in fact, it is the only zinc yet known that will make a cartridge that will never expand and stick in the gun in firing" (Miller 1925:79).

After another period of inactivity, the President was again called into duty on September 29, 1890. The Ueberroth Mine was not being worked at this time, but the Correll and Hartman Mines were active, so the President was needed to help lower the water level in the Friedensville-area mine works. This period of productivity lasted until September 15, 1891, when the President was shut down for good (Miller 1925:74). The following year the engine was sold to a scrap dealer for $10,000 and quickly dismantled (Graves 1987). It would have come in handy later in 1892 when workers in the Correll and Hartman mines opened a vein which flooded the mines. Attempts were made to lower the water level by using pumps seated on rafts in the Ueberroth Mine,

but these pumps were unable to take the water level down below 45.60 meters (150 feet). All mining in Friedensville ceased in 1893, and the mining properties were sold to the New Jersey Zinc Company in 1899 (Petro 1976:117).

As postscript, an article published in a Bethlehem newspaper in 1987 provided the following information on the fate of one of the President's few surviving components:

> [National Canal Museum archivist Lance] Metz said one of the boilers still exists. It's used as a holding tank at the Front Street location of G. Buehler & Co. in Allentown. He said the boiler is important because "There are very few boilers in the world like this." Developer Donald Goodman owns the Buehler company. He said the boiler is in the basement of the building (Graves 1987).

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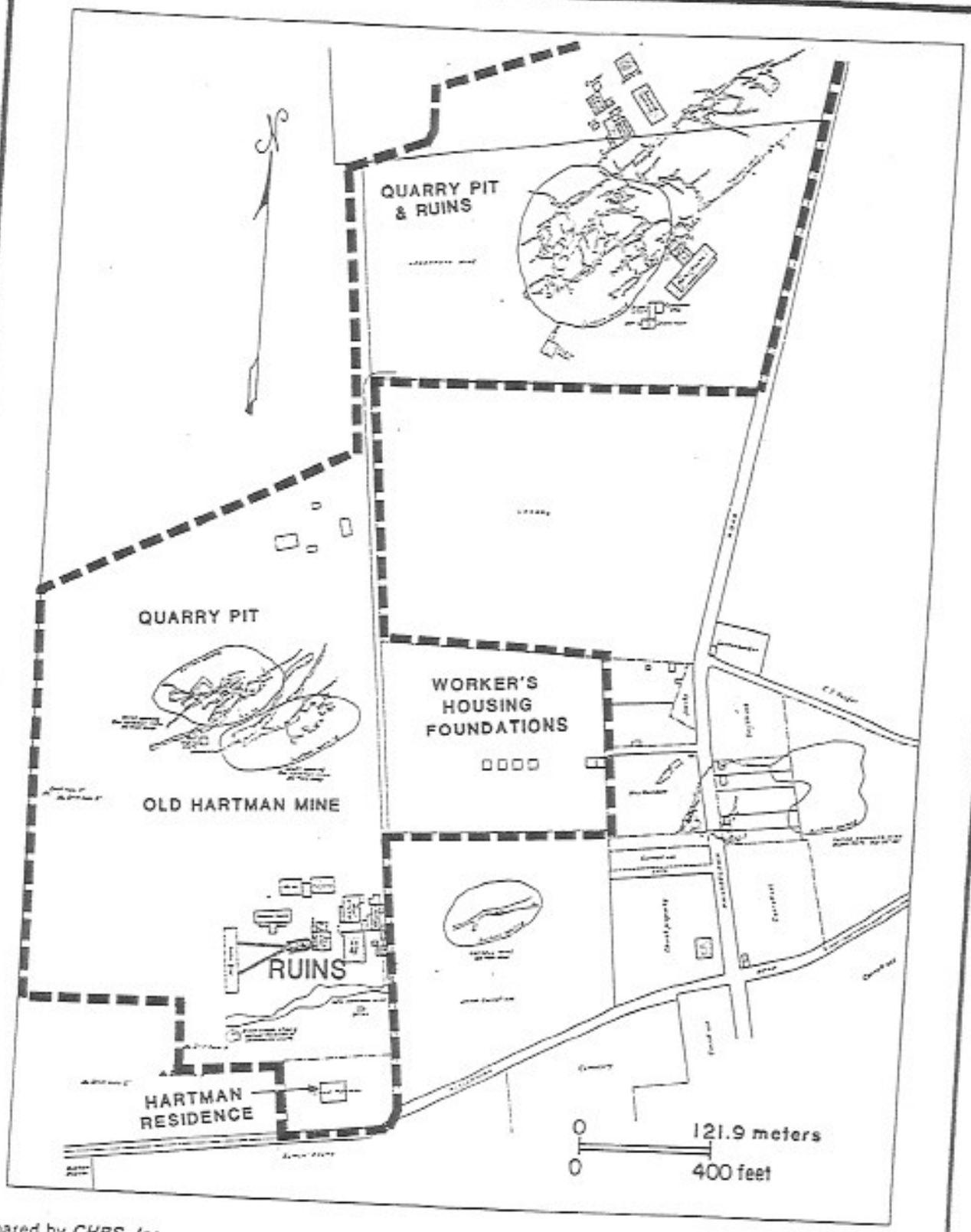
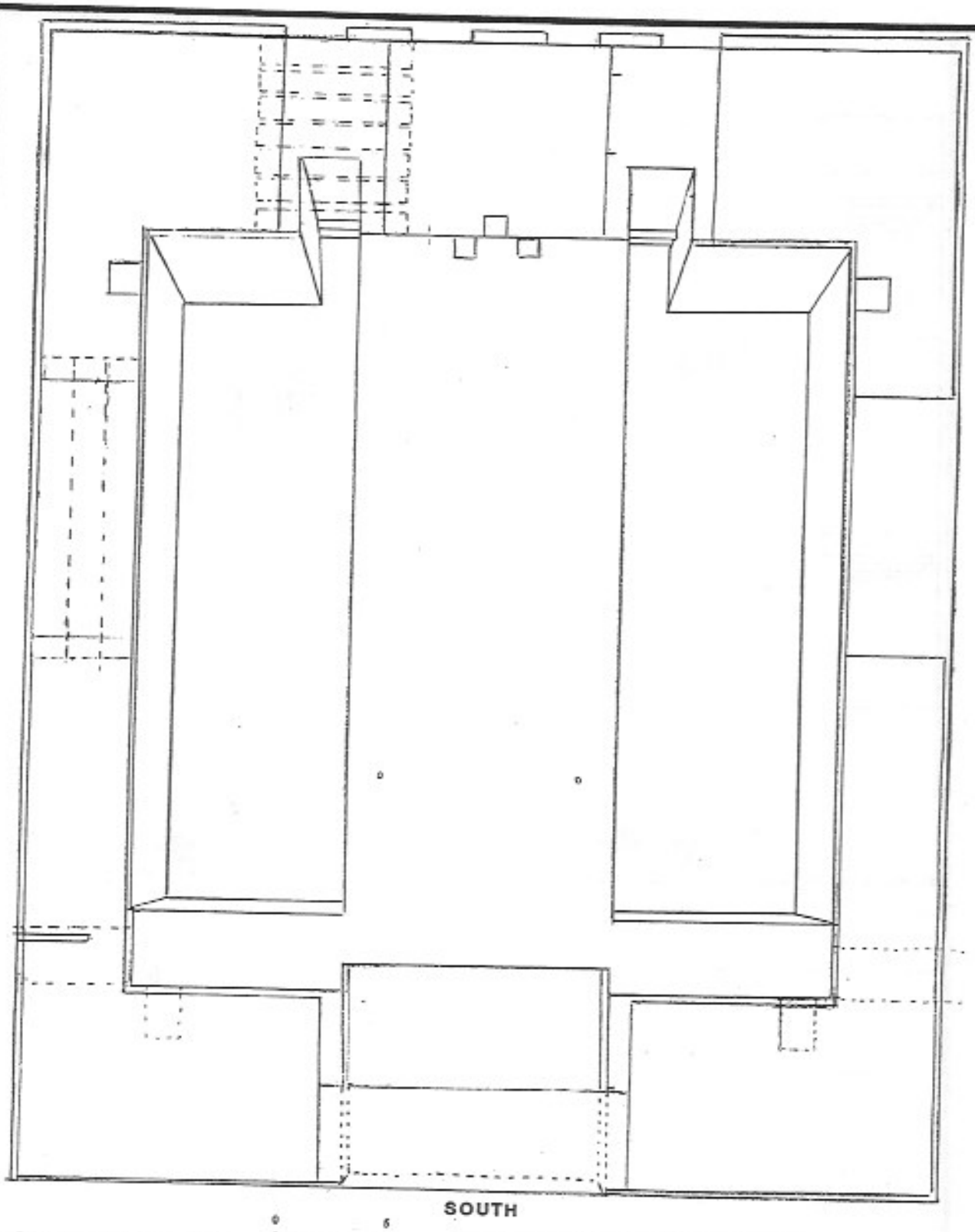


Prepared by *CHRS, Inc.*

NATIONAL REGISTER BOUNDARY

SAUCON VALLEY ROAD RELOCATION

FIGURE 1

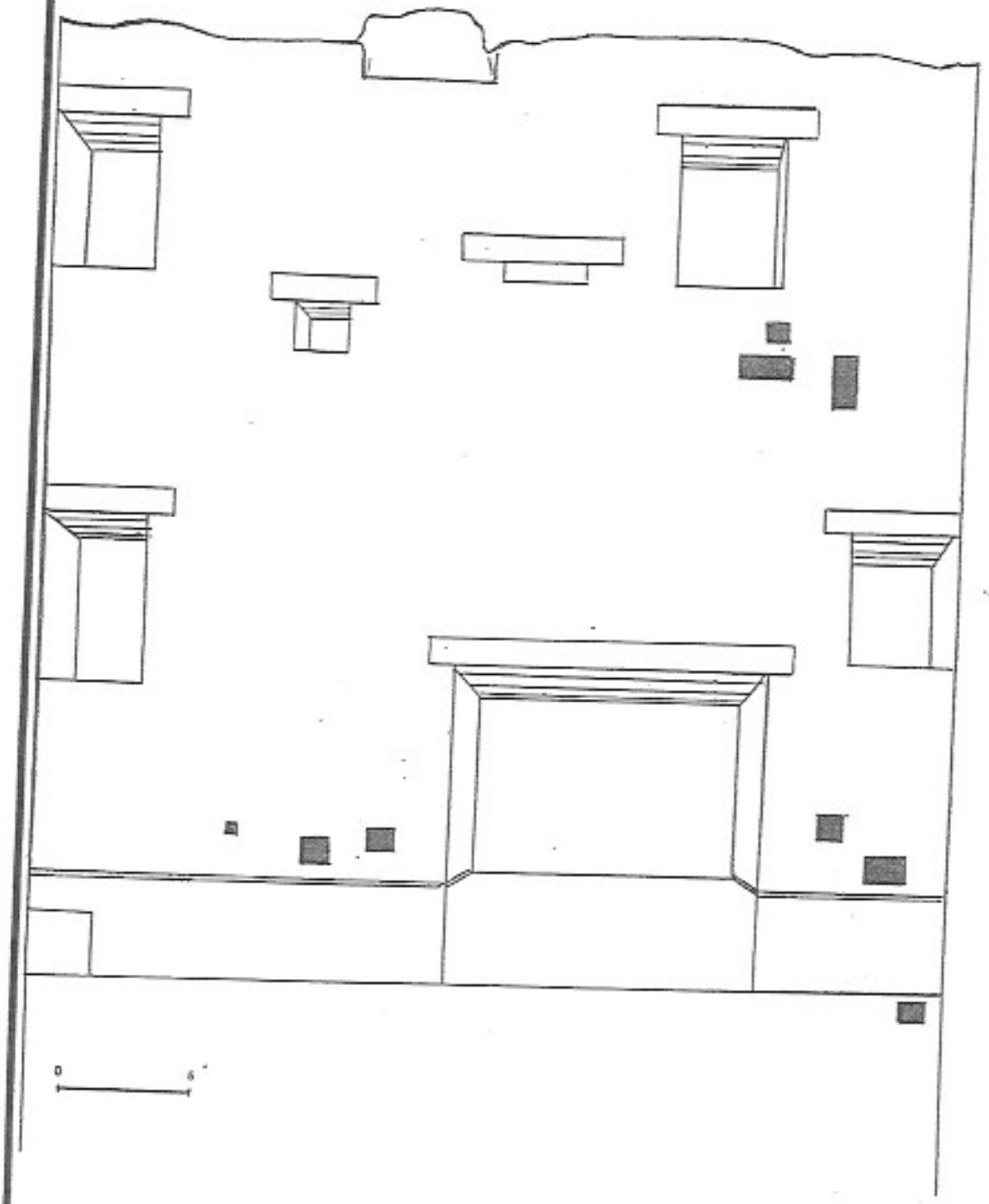


Prepared by C.H.R.S., Inc.

SOURCE: BASED ON MEASUREMENTS TAKEN BY CHRS, Inc. PERSONAL IN 1988

PUMP-HOUSE FLOOR PLAN

SAUCON VALLEY ROAD RELOCATION PROJECT | **FIGURE 2**

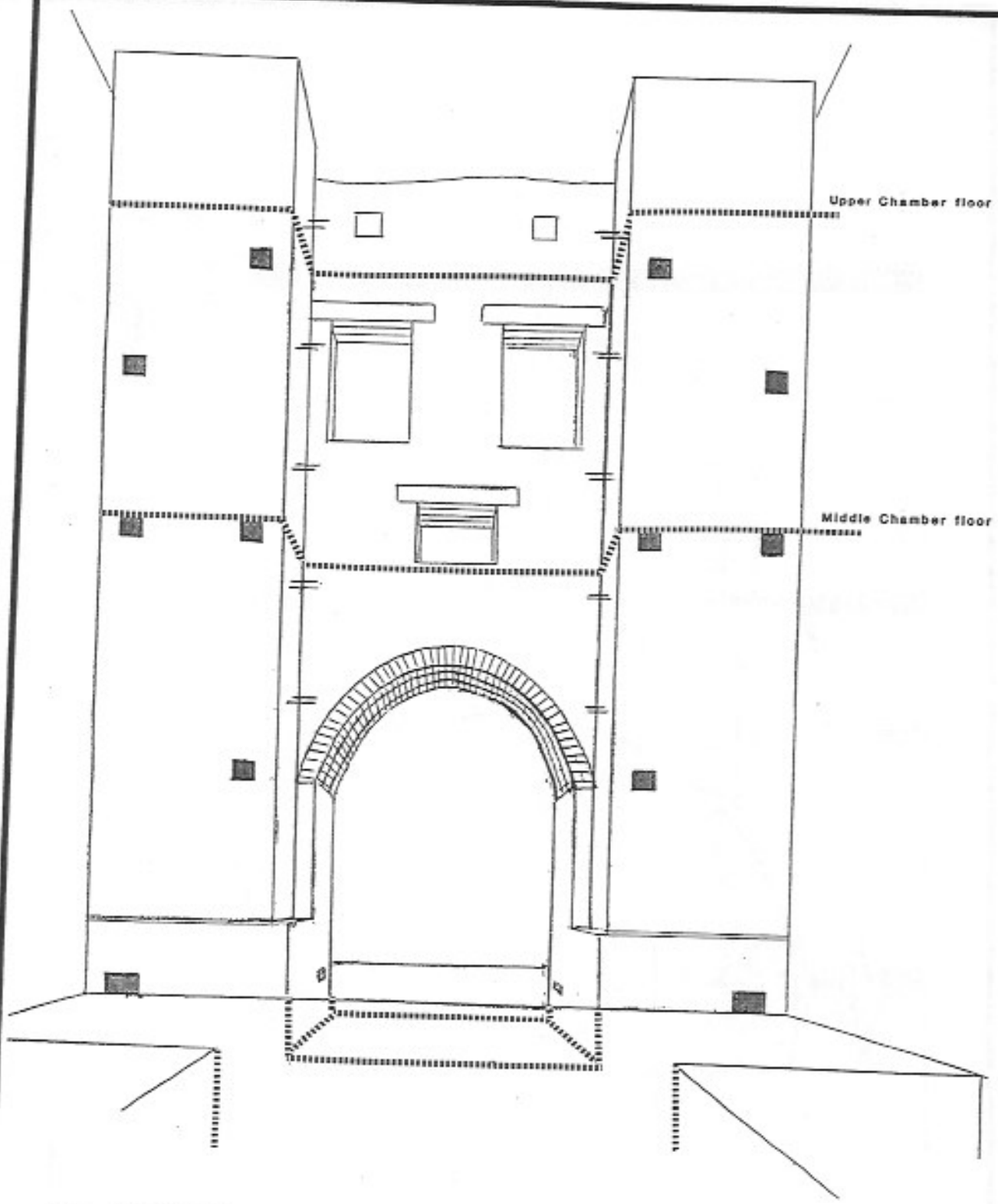


Prepared by C.H.R.S., Inc.

SOURCE: BASED ON MEASUREMENTS TAKEN BY CHRS, Inc. PERSONAL IN 1998

WEST WALL INTERIOR

SAUCON VALLEY ROAD RELOCATION PROJECT | **FIGURE 3**



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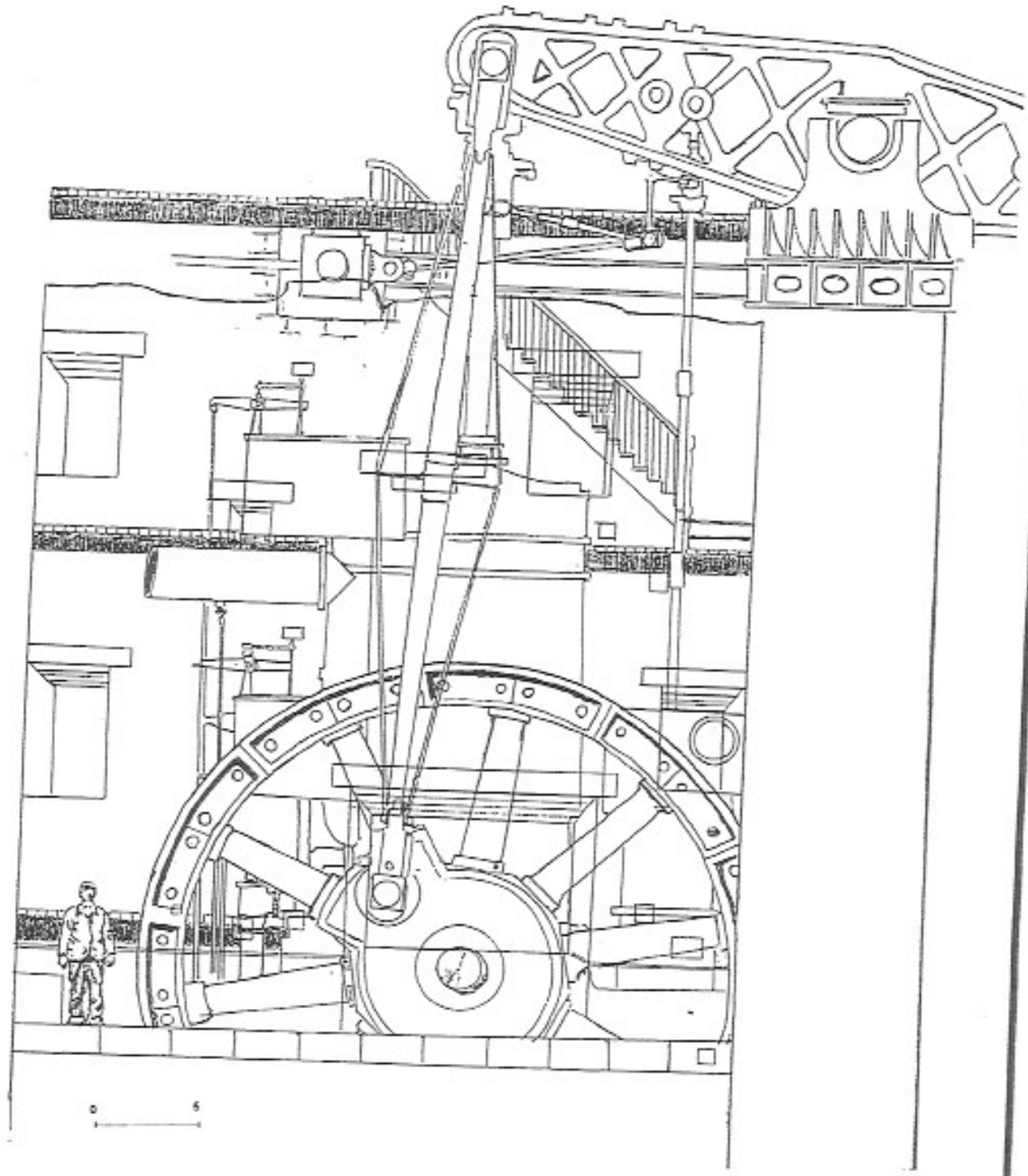
SOUTH WALL INTERIOR

SAUCON VALLEY ROAD RELOCATION PROJECT

FIGURE 4



Prepared by C.H.R.S., Inc.

SOURCE: COMPOSITE OF FIGURES 3& 7

WEST WALL INTERIOR & LOCATION OF THE "PRESIDENT"

SAUCON VALLEY ROAD RELOCATION PROJECT | **FIGURE 5**

STATE-LEVEL RECORDATION
UEBERROTH ZINC MINE HISTORIC DISTRICT

Location: Old Bethlehem Pike and Saucon Valley Road, Upper Saucon Township, Lehigh County, Pennsylvania

UTM: 18.465800.4490100
Quad: Allentown East, PA, 1:24,000

Date of Construction: 1845-1899

Builder: Lehigh Zinc Company; other unknown.

Present Co-owners: Stabler Land Company
4401 Camp Meeting Road
Friedensville, Pennsylvania 18034

Present Use: The ruins of the pump house and other foundation remains of mining buildings and worker housing within the Ueberroth Zinc Mine Historic District are no longer in use. In addition, the quarries, pits, haul road, ventilation shafts, and underground tunnels associated with zinc mining operations in the district lie abandoned. The Hartman Residence is currently occupied as a dwelling.

Significance: The Ueberroth Zinc Mine Historic District is significant for its history, architecture and ability to yield archaeological information. The zinc industry was a significant industrial giant during the mid-to-late nineteenth century and greatly contributed to the region's industrial prominence. The Hartman house retains a high level of architectural integrity and is an outstanding example of an Italianate and Queen Anne style dwelling. The ruin of the pump house which once housed "the President" also retains architectural details that convey the impressive scale and unique purpose of the structure. Vast historic archaeological remains within the district have the potential to yield information important to understanding the history and technology of the zinc industry and its effect on working and living conditions in the area during the late nineteenth century.

Project Information: The Ueberroth Zinc Mine Historic District was surveyed and subsequently determined eligible for listing in the National Register of Historic Places in 1995. The historic district will be adversely affected by the proposed relocation of the Saucon Valley Road through the northwesternmost corner of the historic district. To mitigate the adverse effect, the State Historic Preservation Office stipulated documentation to HABS/HAER guidelines of the pump house. This documentation was undertaken to fulfill this stipulation.

Philip Ruth, Dan Zagorski, Nancy Holst and Nadine Miller Peterson
Cultural Heritage Research Services, Inc. (CHRS)
403 East Walnut Street, North Wales, PA 19454

STATE-LEVEL RECORDATION

INDEX TO PHOTOGRAPHS

UEBERROTH ZINC MINE HISTORIC DISTRICT
Old Bethlehem Pike and Saucon Valley Road
Upper Saucon Township
Lehigh County
Pennsylvania

Photographs by Nadine Miller Peterson, Neeta Jitendra Desai, and Laura Black, CHRS Inc., September, 1998 and January 1999.

1 VIEW OF UEBERROTH MINE QUARRY PIT LOOKING NORTH.

2 VIEW OF SOUTH FACADE OF PUMP HOUSE RUINS THAT ONCE CONTAINED "THE PRESIDENT."

3 VIEW OF WEST FACADE OF PUMP HOUSE RUINS THAT ONCE CONTAINED "THE PRESIDENT."

4 DETAIL OF PORTAL, WEST FACADE OF PUMP HOUSE RUINS THAT ONCE CONTAINED "THE PRESIDENT."

5 VIEW OF NORTH FACADE OF PUMP HOUSE RUINS THAT ONCE CONTAINED "THE PRESIDENT."

6 DISTANT VIEW OF NORTH FACADE OF PUMP HOUSE RUINS THAT ONCE CONTAINED "THE PRESIDENT."

7 VIEW OF SOUTH INTERIOR WALL OF PUMP HOUSE RUINS THAT ONCE CONTAINED "THE PRESIDENT."

8 VIEW OF NORTHWEST INTERIOR CORNER OF PUMP HOUSE RUINS THAT ONCE CONTAINED "THE PRESIDENT."

9 VIEW OF OLD HARTMAN MINE QUARRY PIT LOOKING NORTH.

10 VIEW OF HAUL ROAD LOOKING SOUTH.

11 VIEW OF SOUTH AND EAST FACADES OF THE D. HARTMAN HOUSE.

12 VIEW OF SOUTH AND WEST FACADES OF CORRELL WORKER'S HOUSE LOCATED NORTH OF THE UEBERROTH MINE QUARRY PIT.

13 VIEW OF EAST FACADE OF CORRELL WORKER'S HOUSE LOCATED NORTH OF THE UEBERROTH MINE QUARRY PIT.

14 VIEW OF WEST FACADE OF THE JACOB UEBERROTH HOUSE LOCATED ON THE EAST SIDE OF OLD BETHLEHEM PIKE.

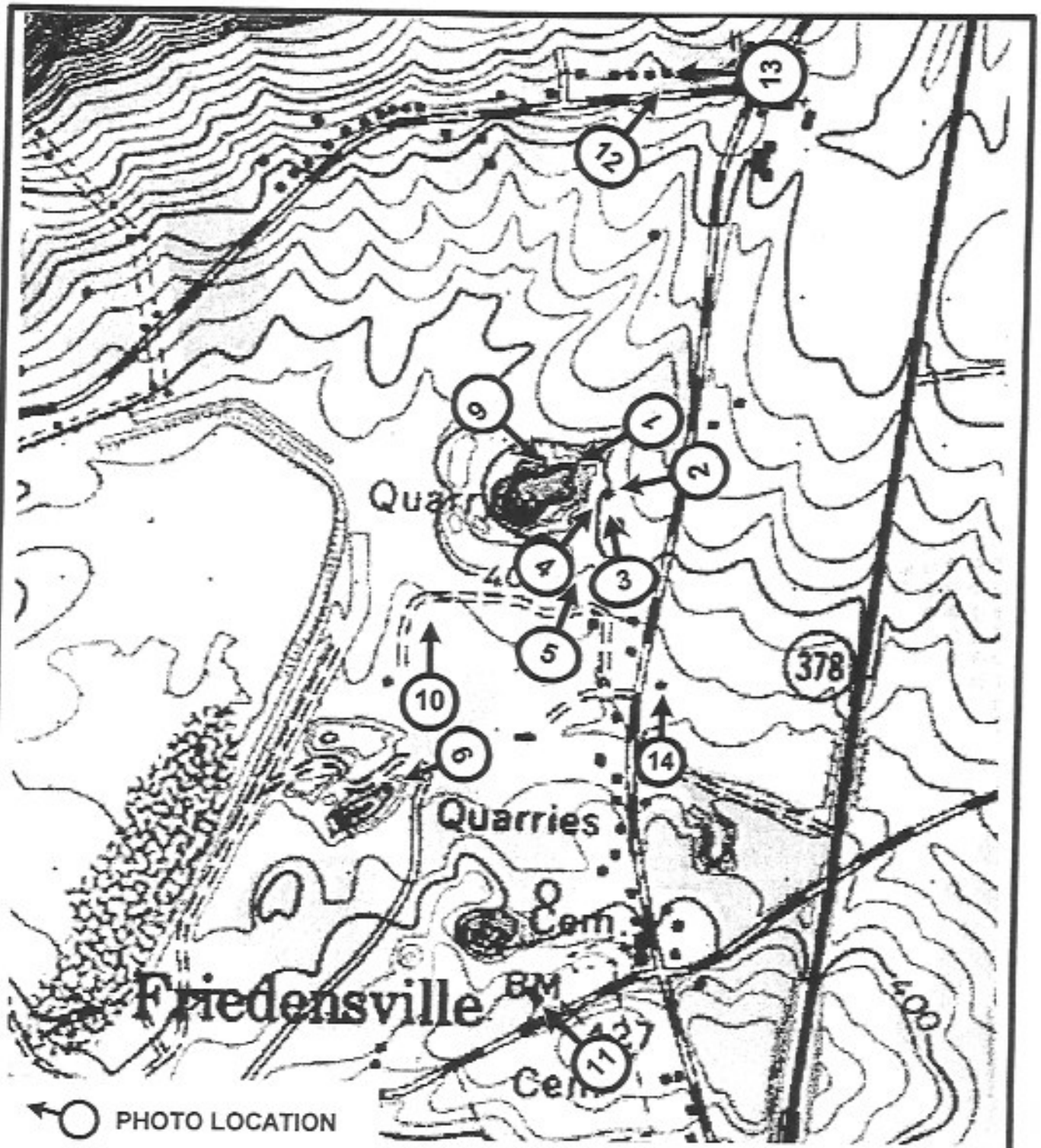


PHOTO LOCATION

PHOTOS 7 & 8 ARE INTERIOR VIEWS OF THE PUMP HOUSE

SOURCE: U.S.G.S., 1992
EAST ALLENTOWN, PA

Prepared by C.H.R.S., Inc.

PHOTO LOCATION MAP

SAUCON VALLEY RELOCATION PROJECT