1. NAME AND LOCATION OF PROPERTY

Historic Name: W. A. Young & Sons Foundry and Machine Shop

Other Name/Site Number:

Street and Number (if applicable)**:** 116 Water Street

City/Town: Rices Landing **County:** Greene **State:** PA

2. SIGNIFICANCE DATA

NHL Criteria: 1 and 4

NHL Criteria Exceptions: N/A

NHL Theme(s): V. Developing the American Economy
1. Extraction and Production

Period(s) of Significance: 1900 - 1965

Significant Person(s) (only Criterion 2)**:**

Cultural Affiliation (only Criterion 6)**:**

Designer/Creator/Architect/Builder:

Historic Contexts: XVIII. Technology (Engineering and Invention)
D. Tools and Machines
American Labor History (draft)

Paperwork Reduction Act Statement. We are collecting this information under the authority of the Historic Sites Act of 1935 (16 U.S.C. 461-467) and 36 CFR part 65. Your response is required to obtain or retain a benefit. We will use the information you provide to evaluate properties nominated as National Historic Landmarks. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number. OMB has approved this collection of information and assigned Control No. 1024-0276.

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3. WITHHOLDING SENSITIVE INFORMATION

Does this nomination contain sensitive information that should be withheld under Section 304 of the National Historic Preservation Act?

___ Yes

_X_ No

4. GEOGRAPHICAL DATA

1. Acreage of Property: 0.2

2. Use either Latitude/Longitude Coordinates or the UTM system:

Latitude/Longitude Coordinates:
Datum if other than WGS84:
(enter coordinates to 6 decimal places)

Latitude: 39.949742 **Longitude:** 79.998317

OR

UTM References: Zone Easting Northing

3. Verbal Boundary Description:

The National Historic Landmark boundary for the W. A. Young & Sons Foundry and Machine Shop is equivalent to the property boundary of Greene County tax parcel 21-04-106, which is depicted on the attached Sketch Map entitled, "APE INDICATING STP LOCATIONS AND SITE W.A. YOUNG & SONS FOUNDRY AND MACHINE SHOP, Rices Landing, Greene County, Pennsylvania," as prepared by Christine Davis Consultants, Inc.

4. Boundary Justification:

The boundary contains the historic property and all buildings and structures historically associated with the W. A. Young & Sons Foundry and Machine Shop, as prepared by Book and Clark Corp., 2006, for Christine Davis Consultants, Inc.

5. SIGNIFICANCE STATEMENT AND DISCUSSION

INTRODUCTION: SUMMARY STATEMENT OF SIGNIFICANCE

W. A. Young & Sons Foundry and Machine Shop is an outstanding example of a small, family-owned, twentieth-century foundry and machine shop. "Job shops" like W. A. Young & Sons, which did custom jobs for a variety of clients, are an important component of the American industrial economy. Made possible by the development of machine tools and line-shaft power systems in the late-eighteenth, early-late-eighteenth, and early-nineteenth centuries, small foundries and machine shops such as this undertook custom work for both local clients and larger, regional corporations, providing employment and supporting larger mass-production facilities. Robert Vogel, Curator Emeritus of Mechanical and Civil Engineering for the National Museum of American History, has called W. A. Young & Sons "…one of the nation's best preserved machine shops of the period."[1] As such, it is nationally significant under NHL Criterion 1: "Association with Events in the area of Industry" and under the theme "Developing the American Economy."

Businesses like W. A. Young & Sons have been little studied, and an examination of its history, operation, and equipment provides important information on a neglected part of the American industrial economy, the small, family-owned, twentieth-century job shop. W. A. Young & Sons is also nationally significant under NHL Criterion 4 in the area of Engineering.[2] It contains one of the finest, if not the finest, extant collection of machine tools found in a small job shop. The totality of the site -- the collection of buildings and work spaces, machine tools, foundry equipment, patterns, work benches, finished products such as hardware, and miscellaneous materials -- captures the material culture of a twentieth-century small foundry and machine shop. The period of significance runs from 1900, when the first of the shop's buildings was constructed, to 1965, when the shop ceased operations, leaving in place most of its machine tools, hand tools, equipment, and patterns.

PROVIDE RELEVANT PROPERTY-SPECIFIC HISTORY, HISTORICAL CONTEXT, AND THEMES. JUSTIFY CRITERIA, EXCEPTIONS, AND PERIODS OF SIGNIFICANCE LISTED IN SECTION 2.

The history of the W. A. Young & Sons Foundry and Machine Shop was thoroughly documented by the National park Service's Historic American and Engineering Record (HAER) in 1992. The history of the complex presented below is adapted from the HAER's documentation, "Written Historical and Descriptive Data."[3]

The history of W. A. Young & Sons is tied to the development of Rices Landing, Pennsylvania, which, in turn, is tied to the history of navigation on the Monongahela River. In 1854, the privately held Monongahela River Navigation Company built its Lock and Dam No. 6 at the village of Rices Landing. The lock would remain until dismantled by the United States Army Corps of Engineers (USACE) in 1965.[4] With the lock and dam in place,

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[1] Christine Davis, "Rices Landing Historic District." National Register of Historic Places Registration Form. Washington, DC: National Park Service, 1993, 8.5.

[2] This nomination focuses on the technological and engineering dimensions of the W. A. Young & Sons Foundry and Machine Shop. While limited archeological reconnaissance had been conducted as part of compliance archeology undertaken at the site, the assessment of archeological significance is beyond the scope of the current nomination. Future work and consideration of the site's potential to yield nationally significant archeological information may one day support additional consideration under National Historic Landmark Criterion 6. The current nomination, however, addresses the property's significance under Criteria 1 and 4, as is outlined below.

[3] Robb, Brown, and Marston, 5-13.

[4] The USACE took control of the Monongahela Navigation System in 1897. See Judith A. Heberling, Scott D. Heberling, and Conrad Weiser, *National Register of Historic Places Multiple Property Documentation Form: Historic Resources of the Monongahela*

Rices Landing prospered as a commercial depot for the surrounding community and a shipping point for interior Greene County towns.[5] That role was diminished somewhat in the 1870s, when the first railroad through the area bypassed Rices Landing, placing its tracks on the river's opposite bank, as did the Monongahela Railroad in 1903. However, a subsidiary of the Pennsylvania Railroad, the Pittsburgh, Virginia & Charleston (PV&C), extended to Rices Landing in 1906. The new railroad line, along with the river navigation system, solidifying the borough's place in the regional and national distribution network. In 1913 the PV&C was extended further south to the emerging coal and coke fields of Greene County. Rices Landing's businesses, including W. A. Young & Sons, were now served by both river and rail and had the riverboat, railroad, and coal companies as potential customers.[6]

William A. Young, a descendant of two established families of Washington and Greene counties in Southwestern Pennsylvania, purchased a plot of land in Rices Landing for $700 in 1900. The following year his mother, Rachel A. Young, bought the adjoining lot for $400. She sold it to her son for the same price in 1902. William Young built his foundry and machine shop on these two parcels of land.[7]

An experienced carpenter, in 1900, Young constructed a two-story frame machine shop on the property, using lumber from the family farm supplemented by lumber purchased from a local sawmill. The 45-by-40-foot building housed the machine and pattern shops. Over the next several years Young expanded the operation and floor plan, adding a 45-foot by 35-foot back shop with a dirt floor and, in 1908, a 75-by-72-foot foundry, which included a charging cupola and a traveling crane on an independent track.[8]

Young's business had four work areas: the Foundry, the Front Shop, the Back Shop, and the Pattern Shop. The cupola furnace was in the foundry, along with a casting tumbler, finish grinder, core oven, and casting sand. The foundry's floor was dirt, for ease in casting and to minimize fire hazards. Wood flasks and frames, and wheel and gear patterns all were stored in this room. Young made all patterns himself, from yellow pine. The Pattern Shop contained the machine tools used to fabricate the pattern pieces, including two wood lathes, a table saw with planer and jig borer, band saw, sander, mitre shear, and mortising machine. It also housed the shop office and the hardware store. The Front and Back shops held predominantly metal-working machine tools, including lathes, a planer, screw press, grinders, drills and drill presses, as well as a blacksmith's press. More detail can be found on the HAER drawings included in this nomination.[9]

Young outfitted his shop primarily with second-hand machine tools acquired through Pittsburgh dealers and various catalogs. He often bought second-hand in the belief that well-built machines, even if older, were a better value than new machines of lesser quality. Machines were acquired across a broad geographic area from firms in Detroit, Buffalo, Cincinnati, Cleveland, Erie, Lancaster, Philadelphia, Pittsburgh, Worcester, Massachusetts, and Rutland, Vermont. According to family lore, the largest lathe came from a Philadelphia shipyard.[10]

Throughout its existence, W. A. Young & Sons employed only a few workers. They included a series of foundrymen to operate the cupola furnace and make the castings. When the last of these foundrymen left the

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River Navigation System in Pennsylvania and West Virginia, 1838-1960 (Pittsburgh: Heberling and Associates and the USACE, 2010), E-6. See also, http://www.loc.gov/pictures/item/pa2946.sheet.00002a/resource/.

[5] Robb, Brown, and Marston, 3.

[6] Ibid., 4.

[7] Ibid., 5.

[8] Ibid., 6.

[9] Robb, Brown, and Marston,7; HAER, Sheet 3 and Sheet 4.

[10] Robb, Brown, and Marston, 6.

region in the early 1930s, Young chose not to replace him and closed the foundry; competition from large-scale, efficient foundries in Pittsburgh, located approximately 50 miles to the north, and elsewhere in the region made it no longer cost effective to produce his own castings. After that, the facility functioned only as a machine shop.[11]

Besides William Young, the two men most closely identified with the machine shop were his sons, Walter and Carl. Following the death of their father in 1940, the sons took over shop operations. Carl Young claimed that the family deliberately kept the number of workers small, because if they had employed as many as four or five individuals, a union would have tried to organize the shop and they would have lost control.[12]

Despite the desire to keep the shop small, W. A. Young & Sons participated in war training program during World War II, which temporarily altered the work organization of the shop. In an article from the August 21, 1941, *Waynesburg Republic* it was noted that W. A. Young & Sons was "to be made available for men desiring to acquire skills in metal working crafts, particularly machine tool operations." Training would include operations of engine lathes, shapers, drill presses, planers, bench lathes, and grinders. The program, which was run in cooperation with the federal Works Progress Administration, was open to men between the ages of 18 and 50. Upon completion of the course, the trainees were expected to "make their services available to holders of national defense contracts."[13] Later in the war, W. A. Young & Sons participated in a program that trained women as well as men on machine tools. A local man was hired to oversee the program, and a secretary was assigned to the shop to monitor progress and prepare necessary reports. The shop itself had to be modified to accommodate machinery, which required the hiring of a third machinist, William Minor. Walter and Carl Young each supervised one training shift, with Minor handling the third. Minor had worked as machinist at a nearby shop until that facility closed.[14]

Prior to the war, much of W. A. Young & Sons work had come from area coal mines. Following the war, a decline in local coal production severely curtailed orders from large coal operators. As a substitute, automobile repairs became an increasingly large part of the shop's business. The Youngs modified the shop to meet the growing importance of the automobile, selling gasoline in five-gallon cans and building a grease pit in the former foundry in order to work under vehicles inside the shop.[15]

The machine shop continued to operate for another twenty years following the end of World War II. In 1965, however, the US Army Corps of Engineers dismantled the navigation lock at Rices Landing, decreasing the importance of the river trade in the community's livelihood. Post-war highway improvements, including the construction of the Interstate Highway System, while a benefit to the country as a whole, had a negative impact on small, out of-the-way communities like Rices Landing, which was bypassed. The improved road and highway system also allowed large companies to distribute their products into towns that had previously been too inaccessible for it to be profitable.

Customers who had relied upon W. A. Young & Sons due to its proximity could now buy nationally distributed goods. Further, the transportation improvements increased personal travel, meaning that retail consumers could more easily reach larger towns for shopping, lessening reliance on local merchants like W. A. Young & Sons. With business already suffering, following the death of Carl, the last surviving son of William Young, the Young family closed the shop in 1965. In 1969, the family sold the shop to private investors; in 1985, the

[11] Ibid., 7, 11.
[12] Ibid., 7-8,12.
[13] Ibid., 8.
[14] Ibid.
[15] Ibid., 12.

building and all its machinery was purchased by the Greene County Historical Society.[16] In 2009, the Steel Industry Heritage Corporation (SIHC) took ownership of the property. SIHC made changes to secure and protect the long-term survival of the shop, most notably the in-kind replacement of the shop roof in 2012. Otherwise, the shop has hardly changed since it closed in 1965, and with all its machinery intact, the property remained a pristine example of an early twentieth century local foundry and machine shop.

Operating the W. A. Young & Sons Foundry and Machine Shop

A series of articles in the 1900 issue of *The Engineering Magazine* noted that machine shops were becoming increasingly specialized, using the very best machine tools to turn out large quantities of one or just a few specific items. Moreover, mechanical and technological advances in machine tool design and operation had made it possible for single semi-skilled operators to run entire banks of machines. The series concluded,

> …the day of the large general shop, prepared to do business in all lines of machine building, has certainly passed and passed forever. It is, perhaps, true that there will continue to exist a number of small repairing and general jobbing shops, supported by the various machine users in their immediate localities…the small jobbing shop will give a decent support to the owner who attends closely and intelligently to the needs of his patrons, and to a small force of clever and versatile all-around mechanics under him, who prefer the variety and lack of strenuous effort of the small shop to the relentless crush towards the front in a single line, which must be the characteristic of the machine shop, light or heavy, of the future.[17]

Aside from the condescending characterization of the jobbing, or job, shop as "lack[ing] strenuous effort," the description almost perfectly captures the operation of W. A. Young & Sons.

A "jobbing shop" like W. A. Young & Sons was a firm that did any work that came its way, with no job too large or too small.[18] It made products for a diverse customer base, ranging from local residents and area businesses to large regional manufacturers and extraction industries, for which it made parts and performed specialized services.[19]

Young's machines were powered by a belt-drive line shaft system. The shaft was turned by a main belt, which also powered a subsidiary line shaft in the Pattern Shop. Power was transferred to individual machine tools via smaller leather belts. Because electricity in 1900 was virtually unknown in rural Pennsylvania outside of mining areas, W. A. Young & Sons was originally powered by a 12- horsepower Vulcan steam engine, with a separate 8-horsepower Nagle engine to power the cupola blower. (It is not known where the engines were situated.) These were later replaced by a 20- horsepower Bessemer gas engine with a gravity fed cooling system. The cooling system's wood supply tank was placed in the Pattern Shop on the second floor. In the mid-1920s the Bessemer engine was replaced by a 20-horsepower Westinghouse electric motor.[20] Since 2014, power has been provided by a modified tractor engine.

Machine tool placement depended upon a number of factors. The hangers that held up the line shafting and the pulleys had to be spaced either according to the number of machines to be run by that section of the shaft, the power load for the machines, or the layout of the shop. To prevent bending of the line shaft, machine tools had

[16] Ibid., 12-13.
[17] Henry Roland, "The Revolution in Machine-Shop Practice, VI – The Machine Works of the Immediate Future," *The Engineering Magazine: An International Review* XVIII (1900): 903.
[18] Robb, Brown, and Marston, 6.
[19] Ibid. 12-13.
[20] Robb, Brown, and Marsten, *HAER PA-199*, 6.

to be arrayed in opposing ranks so that the pull of belts in one direction was approximately offset by an equal amount of pull in the opposite direction.[21] Beyond these considerations, Young followed the traditional machine shop pattern of placing machine types together, in families. For example, he gathered all his lathes together, with corresponding secondary machines located nearby. Another factor used in determining shop layout was the size and power requirements of the machines. Those machine tools demanding the greatest amount of power under load usually were located closest to the main motor. By 1941, the machinery in the shop included five engine lathes, four grinders, a drill press, one radial drill, pipe machines, a key seater, an automatic centering drill, power hacksaws, shapers, planers, milling machines, and a collection of other tools.[22] A complete list of machine tools in the shop is shown on the measured drawings of the facility.

Much of the work undertaken by W. A. Young & Sons came from area coal mines. The first deep- shaft coal mine opened in Greene County in 1902. Soon after, other mines opened in the county, including captive mines owned by steel corporations, and these firms gave W. A. Young & Sons a good deal of business. For example, in 1923, the shop spent five months making parts for the steamship *Atha*, which was owned by the Crucible Fuel Company, a subsidiary of Crucible Steel. In 1928, the shop manufactured one worm-drive ferry unit for the Nemacolin mine of the Buckeye Coal Company, which was owned by Youngstown Sheet and Tube Company. In 1935, W. A. Young & Sons changed the wheels on a 13-ton locomotive and made a flange, both for Crucible Steel. Other products for coal and steamboat companies included shafts for coal tipples, drills, bushings, oiler cans, and grates. Because of its small size, the shop preferred not to bid on large sustained projects from the mining companies, but would often subcontract for a portion of the work.[23]

For smaller companies, W. A. Young & Sons produced such work as parts for oil wells and bridges. For individuals, it manufactured automobile parts, including U-joints and axles for trucks, and all manner of hardware, a good deal of which remains in the office and store on the shop's second floor. For children, the Young shop made toys and repaired bicycles.[24]

If the shop was contracted to fabricate a new part or product, the process began with a pattern. When a pattern did not already exist, William Young would make hone from a sketch or existing part. The pattern would be provided to the foundryman, who set sand in the bottom part of a casting flask --typically cast iron – and covered it with the cope (the upper part of the mold), and then turned the whole thing upside down. Molten metal would be tapped from the furnace into a ladle. The crane would maneuver the ladle to the mold or casting flask, where the molten metal would be poured. Once the part was sufficiently cooled it would be finished in the machine shop, where the appropriate machine tools would be used to refine the product, bore holes, and correct tolerances. After the foundry had closed, parts or steel blanks would need to be brought in from outside manufacturers; the machining process would be the same.[25]

NHL Criterion 1 – Association With Events for Industry and NHL Criterion 4 – Exceptional Value for a Type, Period, or Method of Construction: Historic Context

Machine tools and machine shops are products of the Industrial Revolution. Prior to then, tools to work metal were virtually unknown, as were large machine tools constructed from metal. In 1775, the principal members of all machinery were made of wood, a material that could be worked by the hand tools of the day. Metal was

[21] Fred H. Colvin, *60 Years with Men and Machines: An Autobiography* (New York: Whittlesey House, McGraw-Hill Book, 1947), 22.
[22] Robb, Brown, and Marston, 5-7.
[23] Ibid., 4, 8, 9-10.
[24] Ibid., 4, 8, 9-10.
[25] Ibid., 9-10.

confined to fastenings and smaller parts, composed of castings or forgings, which were fitted by hand. Crude lathes, drills, and boring mills existed, but they lacked both the necessary power and holding devices strong and accurate enough to guide a tool or produce any real degree of accuracy. As noted by historian Joseph Wickham Roe in his classic work, *English and American Tool Builders*, "appliances for cutting metal were little better than those of the Middle Ages."[26] All that would change in a remarkable, half-century period from approximately 1800 to 1850, when the machine tools like the boring machine, engine lathe, planer, shaper, and drop hammer were invented and developed, along with the necessary adjuncts like limit gauges and standard taps and dies.[27]

A number of factors converged in the late-eighteenth and early-nineteenth centuries to create the machine tool industry and the machine shop. The change began with the textile industry. A series of inventions which mechanized yarn and cloth production, combined with modern banking practices and the use of stock corporations, gave rise to factory-based textile production in both England and the United States. Initially, textile manufactories had to be built along rivers and canals, the only places that could provide sufficient and reliable sources of power. The successful development of the steam engine by James Watt and others abetted the spread of the factory production, allowing manufactories to be established away from falling water. In light of these advancements and the success of mechanized textile production, industrialists, and entrepreneurs looked to apply factory principles to the manufacturing of other products. This desire to maximize production capabilities created a demand for better, stronger, and more accurate machines of production, machines made from metal rather than wood. This, in turn, created a new class of toolmakers, who developed machines tools to cut and work metal accurately and economically.[28]

The earliest machine tool development occurred in England. Seminal figures included Samuel Bertham, who one writer calls "the first individual to fully comprehend and formulate the possibilities of the toolmaker and his art."[29] Joseph Bramah, the first toolmaker to reach commercial prominence, patented the hydraulic press in 1795, improvements to the steam engine in 1801, and rotary and reciprocating planing machines for metal and wood in 1802, along with milling machines for lock parts. The greatest of all English machine builders was Henry Maudslay, inventor of the slide rest, block machinery, flour and sawmill machinery, punches, mill and marine steam engines, and fine screw-cutting equipment. He also laid the basis for the lathe, planer, and slotter.[30]

In the 1840s and 1850s, various American toolmakers, including Stephen Fitch and Henry D. Stone, improved on Maudslay's inventions, most notably by attaching a revolving head carrying a number of metal-working tools to the slide rest of a lathe. Known as a turret or capstan, the head could be either revolved or locked to the slide rest by the machine operator, enabling the machine tool to perform a variety of functions. The turret lathe, "the first radical improvement on Maudslay's slide rest," began to be commercially manufactured in 1854 by the Robbins and Lawrence Machine Shop of Windsor, Vermont.[31] Christopher Miner Spencer of the Hartford Machine-Screw Company improved on the turret lathe, adding a universal cam, which automated the making of machine screws.[32] Writing in 1916, Roe lauded Spencer: "The importance of this invention cannot be over-

[26] Joseph Wickham Roe, *English and American Tool Builders* (New Haven: Yale University Press,1916), 3-4.
[27] Ibid., 4-5.
[28] Ibid., 1, 6-8.
[29] Henry Roland, "The Revolution in Machine-Shop Practice. I-The Evolution of the Toolmaker," *The Engineering Magazine* XVIII (1900): 54.
[30] Ibid.57-58; Roe, 7-9.
[31] Roe, 143.
[32] Roland, "The Revolution in Machine-Shop Practice. II – The Development of the Automatic Screw Machine," *The Engineering Magazine: An International Review* XVIII (1900), 187-200; Roe, 176.

estimated. It ranks with Maudslay's slide-rest and the turret tool-holder, as it is an essential feature in all modern automatic lathes."[33]

In addition to advances in tool making, Americans also made a significant contribution to power distribution within manufactories. Early American factory owners, following the English example, initially used heavy wood shafting and toothed gears and cogs to transfer water or steam power to the line shafting that powered their machine tools. Later, both American and English manufacturers turned to stronger, less easily damaged cast iron gears and cogs. However, aspects of the gear and cog transmission system were problematic. Both wood and iron gears suffered from "vibration and bending at every revolution," which led to breakage and expensive repairs. So, too, did any shock to the geared systems. Replacing a broken gear could shut a plant down for a week or more, costing the factory both time and money.[34] Additionally, because the teeth of gears and cogs were not accurately formed, this type of power system produced great noise and vibration.[35]

Because of the problems inherent with gear and cog power systems, American manufacturers began exploring alternative power generating and transmission systems. In 1828, at a textile mill in Lowell, Massachusetts, a leather belt was used for the first time to power a factory's main drive shaft; previously, leather belts had only been employed to connect line shafting to individual pieces of machinery. Over a period of about 10 years, American manufacturers experimented with both single belt-drive systems, where one leather belt powered an entire factory, and multiple belt-drives, where separate belts ran machinery on each floor or parts of each floor. To American manufacturers, the advantages of the leather-belt drive system were manifold: it was quieter than the gear and cog system; the elasticity of the belts allowed them to absorb shocks without damage to the transmission system; machinery within the factory could be more conveniently arranged since locations could be changed simply by shortening or lengthening a belt; and, most importantly, a broken belt could be changed in a day or less, greatly reducing down time.[36]

Adoption of leather-belt drives as the source of power in American manufactories did not happen overnight. Numerous problems needed to be addressed and surmounted, including finding the optimum speed and tension at which to run the belts; discerning the best way to keep belts from slipping on and from pulleys and drums; and developing methods to achieve a net reduction in frictional losses of power.[37] However, by 1840 many American factories had adopted the belt-drive power system.

British-trained factory manager James Montgomery called leather-belt drives one of the characteristic differences between British and American mills: "All the most recently built [American] Mills are belted;" he added that "many of the older ones have had the shafts and gears removed, and belts substituted in their place."[38] The use of belt-drives only increased after 1840, due to advances in the technology. Higher line shafting speeds (in the area of 250 r.p.m.) and a concomitant increase in the speed of drive shafts enabled belts to be run on iron pulleys without slipping. Quick-connect couplings and yokes used to fasten one length of shafting to the next, self-aligning shafting hangers, and cold-rolled shafting all contributed to the diffusion of

[33] Roe, 176.
[34] Theodore Z. Penn, "The Development of the Leather Belt Main Drive," *IA: The Journal of the Society for Industrial Archeology* 7, No. 1 (1981): 3, 9.The quotation is from Thomas Thorneycraft, "On the Forms of Shafts and Axles," *Journal of the Franklin Institute* 51 (1857): 57.
[35] Penn, 9; Louis C. Hunter, *A History of Industrial Power in the United States, 1780-1930. Volume One: Waterpower in the Century of the Steam Engine* (Charlottesville: The Eleutherian Mills-Hagley Foundation of the University of Virginia Press, 1979), 462.
[36] Ibid., 3-9.
[37] Ibid., 6-9.
[38] Ibid., 9.

high-speed leather-belt main drives.[39] Historian Louis C. Hunter called the use of leather belts "the most distinctive and important American contribution to power distribution within factories."[40]

American improvements to both power distribution and machine-tool development was driven in large part by the concept of manufacturing using interchangeable parts, a second characteristic distinguishing American from British factory production. Roe described interchangeable manufacturing as "the art of producing complete products, the corresponding parts of which are so nearly alike that any part could be fitted into any one of the products."[41] Put another way, interchangeability was the desire to manufacture and finish component parts of a product so precisely that assembly of the final product could be completed without the need to custom fit the parts. This method of production, first undertaken in this country in the early-nineteenth century, was so sufficiently different from English practice that British writers dubbed it "the American System."[42]

The history of interchangeable manufacturing has been addressed in any number of historical studies.[43] Initially, the use of interchangeable parts was applied to high-grade, labor-intensive articles made in large numbers, a manufacturing scenario in which interchangeable parts were most economically valuable.[44] For these reasons, interchangeability was first attempted in the early nineteenth century at various armories and other manufacturers of firearms. From there, as the nineteenth century progressed, the American System of manufacturing spread to a host of other factory-produced durable products, including sewing machines, locomotive parts, bicycles, watches and clocks, hardware, and agricultural implements. Historian David Hounshell, in an influential study, persuasively argued that the American System reached full fruition in the early-twentieth century, when the Ford Motor Company combined interchangeability with assembly line construction to mass-produce automobiles and nearly all its component parts.[45]

The effect of the American System on machine-tool production was profound. In order to apply and advance the techniques of interchangeability, machine toolmakers and products manufacturers engaged in a process which one historian called "technological convergence." A later historian compared the interplay between toolmakers and manufacturers as analogous to the networks developed in the late-twentieth and early-21st centuries in Silicon Valley.[46] Machine toolmakers worked with manufacturers in various industries as they encountered problems relating to cutting, planing, boring and shaping interchangeable metal parts. As each problem was solved, machine-tool firms gained new knowledge, which they then used to refine existing tools, or to develop new machine tools, dies, jigs, fixtures, and other implements of production.[47]

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[39] Ibid., 11-12.

[40] Louis C. Hunter, *A History of Industrial Power in the United States, 1780-1930. Volume One: Waterpower in the Century of the Steam Engine.* Charlottesville: The Eleutherian Mills-Hagley Foundation of the University o of Virginia Press, 1979.

[41] Roe, 128.

[42] David A. Hounshell, *From the American System to Mass Production, 1800-1932* (Baltimore: Johns Hopkins University Press, 1984), 4.

[43] Perhaps the earliest treatment dates to 1883, when the U.S. Census Bureau addressed it as part of a history on the development of the factory system. More recent interpretations include treatments by Merritt Roe Smith (1977), David Hounshell (1984), David A. Meyer (2006), and Ross Thomson (2009). See the bibliography for full citations.

[44] Roe, 128.

[45] Hounshell, 3-4.

[46] Nathan Rosenberg, "Technological Change in the Machine Tool Industry, 1840-1910," *Journal of Economic History*, Volume 23, No. 4 (December 1963), 43; David R. Meyer, *Networked Machinists: High-Technology Industries in Antebellum America* (Baltimore: The Johns Hopkins University Press, 2006), 1-4.

[47] Hounshell, 4.

The advances in machine-tool designs enabled those operating machine tools in factories to produce and finish metal components and final products with ever-growing speed and efficiency. Better and more sophisticated machine tool designs meant that tolerances and variations from piece to piece became smaller and smaller while the knowledge and skill necessary to operate the machines decreased, particularly in large manufactories. One history of machine tools, published at about the time William Young was opening his shop at Rices Landing, described the progression of machine tools as moving from hand-controlled to semi-automatic to fully automatic. With a self-acting machine tool, the machine operator placed the piece to be worked into the machine, created the cutting tools to be used, set and re- set the cutting tools to the most efficient angles as the work progressed, and established the machine tool's velocity. Operating the tool required a great deal of skill and knowledge by the machinist. With a semi-automatic machine tool, the manufacturer of the machine tool sharpened and set the positions of the cutting implements, which were often on a turret or capstan, then placed the rough piece into the machine tool, put the cutting implements into action, and replaced finished pieces. The machine operator exercised little judgment or discretion.

Fully automatic machine tools produced the desired part "without human intervention beyond the placing a bar of metal within reach of the feeding mechanism of the machine."[48] Machine operators using fully automatic tools became machine tenders working banks of machines that performed multiple functions.[49] Durable goods manufacturers like the Ford Motor Company, Baldwin Locomotive, Westinghouse Air Brake, and countless others established large machine shops employing hundreds of workers who created the parts that would be used to manufacture their finished products.

Most histories of American manufacturing focus on topics like interchangeability, the rise of mass production, and the development of heavy industry. Discussions of machine shops tend to focus on those that made machine tools, particularly in the antebellum period; those that manufactured specialized equipment needed for production in a particular industry, such as textiles; or those that were associated with large-scale industrial production, like the Ford Motor Company, Baldwin Locomotive, Westinghouse Air Brake, and countless others established large machine shops employing hundreds of workers who created the parts that would be used to manufacture their finished products. However, this focus tells only part of the story of American industrial and machine-shop development. It does not address small machine shop operations in the late-nineteenth and early-to-mid-twentieth centuries; in fact, not a single academic study on this topic could be located. This oversight results in a less than full picture of American industrial development.

As is well known, although heavy industries employing hundreds or even thousands of people drove the American economy from the mid-nineteenth well into the twentieth century, these firms were not the norm. Most workers were employed in establishments with 10 or fewer employees.[50] These smaller shops were just as much a creation of the Industrial Revolution as large factories, and they too played a pivotal role in industrial production. Smaller machine shops provided local employment, served local and regional needs, and frequently supplied services to the larger industrial concerns that dominated a region or the nation. Small machine shops also combined pre-industrial and industrial methods of manufacturing products, requiring a level of craftsmanship often absent in large machine shops stocked with fully automatic machine tools.[51]

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[48] Roland, 180-181, 187.
[49] Ibid. 47-48.
[50] To cite just one example, the 1909 Manufacturers Census listed 1,695 establishments classified as "Foundry and Machine Shop Products," which employed 86,821 workers. The largest percentage of such shops employed one to five people. See United States Department of Commerce and Labor, Bureau of the Census, *Thirteenth Census of the United States Taken in the Year 1910. Volume 9 – Manufactures 1909: Reports by States, With Statistics for Principal Cities* (Washington, DC: Government Printing Office, 1912), 1042.
[51] Fred H. Colvin and Frank A. Stanley, *Running a Machine Shop* (2nd ed., New York: McGraw-Hill, 1948), 59-62.

Evaluation of National Significance:
The W. A. Young & Sons Foundry and Machine Shop is nationally significant under both NHL Criterion 1 – Association with Events and NHL Criterion 4 – Exceptional Value for a Type, Period, or Method of manufacturing establishment: the small, family-owned-and-operated machine shop and Construction. The complex is a highly intact example of an important and under-studied type of twentieth century foundry. Using machine tools and a power system developed and improved throughout the course of the nineteenth century, William A. Young established what might be referred to today as a niche business, a family owned and operated small manufactory where parts were fabricated, machinery and their components were repaired, and the needs of both the local population and larger corporate concerns were met. In southwestern Pennsylvania, vertically-integrated heavy industries like railroads and railroad equipment makers, coal companies, and steel manufacturers all developed large machine shops to serve their own needs.[52] However, despite the growth and domination of these large corporations in the economy of both southwestern Pennsylvania and the nation, job shops like W. A. Young & Sons operated alongside them, supplying parts, special services, and custom work that larger concerns could not do as affordably or effectively. W. A. Young & Sons' history of production for regional coal companies, riverboat lines, and railroads clearly demonstrates this function.[53]

In some respects, W. A. Young & Sons was more akin to the nearly ubiquitous village blacksmith shop of the eighteenth and nineteenth centuries (and which continued to remain viable into the twentieth century, as manufacturing censuses demonstrate) than to the large industrial machine shops of the late-nineteenth and twentieth centuries that specialized in mass-produced products.[54] Like a village blacksmith shop, W. A. Young & Sons primarily served local and regional markets, performing a wide range of services, due to the ever-changing nature of the demands made on a job shop. Where small machine shops such as W. A. Young & Sons differed from blacksmith shops was in machinery and power. Typically, a blacksmith shop was equipped with a few foot-powered tools and most of the work was done by hand. Machine shops had a much wider range of machine tools, which were powered by a belt-driven, line-shaft system.

Consequently, a job shop like W. A. Young & Sons could perform a wider range of services and had a larger customer base than a village blacksmith. In both cases, however, producing the work required a good deal of craftsmanship and knowledge.[55] New England labor historian David A. Zonderman has written that "the machinist was a kind of industrial artisan, a human link between the two worlds of skills and the new possibilities of mechanized production."[56] This aptly describes Young and the machinists and founders working under him. Determining just how many small foundries and machine shops were in operation in the early- and mid-twentieth century, when W. A. Young & Sons was in operation, is problematic.

The 1900 manufacturers' census called accurately counting "manufacturing and mechanical establishments… a source of perplexity."[57] By 1904, for census purposes "manufacturing establishment" had become virtually synonymous with the industrial factory system, a distinction that would be carried forward into future censuses.

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[52] Robb, Brown, and Marston, 2.
[53] Ibid., 2.
[54] For example, the 1900 Manufacturers' Census listed 51,000 blacksmithing and wheelwright shops. See United States Department of Commerce and Labor, Bureau of the Census, *Twelfth Census of the United States Taken in the Year 1900* (Washington, DC: Government Printing Office, 1902), cv.
[55] Robb, Brown, and Marston, 3.
[56] Quoted in John P. Johnson, *Robbins & Lawrence Armory (American Precision Museum), Windsor, Windsor County, Vermont,* HAER No. VT-39 (Washington D.C.: National Park Service, 1991), http://lcweb2.loc.gov/pnp/habshaer/vt/vt0100/vt0163/data/vt0163data.pdf, 27.
[57] *Twelfth Census of the United States Taken in the Year 1900*, xxxv.

The count excluded "neighborhood, household, and hand industries…and establishments doing only work to the order of the individual customer,"[58] distinctions that would seem to have rendered W. A. Young & Sons something other than a manufacturing establishment. The only thing clear is that small foundries and machine shops like W. A. Young & Sons seem to have been common. The 1910 census estimated that nearly 700 foundries and machine shops operated in Pennsylvania alone. Forty percent of them were small operations, accounting for just two percent of the workers employed in those businesses. Only 12 percent of foundry and machine shops employed more than 100 workers, but they employed 72 percent of all such workers. Thus, small shops like W. A. Young & Sons were more typical of the period than large specialty shops.[59]

Industrial directories compiled by the Commonwealth of Pennsylvania in 1919 and 1922 placed W. A. Young & Sons in the category "Machine Repair Shops." In 1919, there were 241 such businesses located in Pennsylvania; by 1922 that number had *grown* to 281.[60] They included large establishments employing hundreds of people as well as sole proprietorships. They were located throughout the state, although most were found in Pennsylvania's larger, more industrial cities. Rural Greene County had three in 1922. In addition to W. A. Young & Sons, Waynesburg, the county seat, had two; one was a sole proprietorship, while the second employed 16, including an office staff of four. Greene County's neighbors, Fayette and Washington counties, although more industrialized, had only four and three, respectively.[61] A decade later, W. A. Young & Sons was still one of three machine shops in Greene County; the others had one and 10 respectively. By 1941, only W. A. Young & Sons and the smaller shop continued to operate.[62] By contrast, neighboring Washington County had five machine shops in 1931. The largest employed 31 men, the smallest, one. The smallest of Washington County's shops ceased to exist by 1947, while those that remained expanded their workforces. Only one of the shops still in operation employed fewer than eight people.[63] Fayette County, which had train yards and an extensive mining industry, also had large machine shops in Uniontown, Fairchance, and Connellsville. By 1947, however, only two remained open, one with 36 employees, the other 18.[64]

A number of factors hastened the demise of small job shops like W. A. Young & Sons. As noted in a previous section, post-war highway improvements, including the construction of the Interstate Highway System, had a negative impact on small, out of-the-way communities and businesses, because it allowed large companies to distribute their products into towns that had previously been too inaccessible to be profitably served. Local and regional customers who had relied upon small machine shops as the only way to get goods made or repaired could buy nationally distributed goods. The transportation improvements and increased personal travel also meant that retail consumers could more easily reach larger towns like Pittsburgh for shopping, lessening a reliance on local merchants.

Technology may also have played a role, particularly in the case of belt-driven shops. As the twentieth

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[58] As explained in United States Department of Commerce, Bureau of the Census, *Abstract of the Census of Manufacturers 1914* (Washington, DC: Government Printing Office, 1914), 9.

[59] United States Department of Commerce and Labor, Bureau of the Census, *Thirteenth Census of the United States Taken in the Year 1910: Abstract of the Census, with Supplement for Pennsylvania* (Washington, D.C.: General Printing Office, 1913), 717.

[60] *Third Industrial Directory of Pennsylvania* (Harrisburg: Department of Labor and Industry, 1919), 311-315; *Fourth Industrial Directory of Pennsylvania* (Harrisburg: Department of Internal Affairs, 1922), 344-349.

[61] *Third Industrial Directory of Pennsylvania*, 862-878 and 1321-1334.

[62] *Seventh Industrial Directory of Pennsylvania* (Harrisburg: Department of Internal Affairs, 1931), 670; *Tenth Industrial Directory of Pennsylvania* (Harrisburg: Department of Internal Affairs, 1941), 605.

[63] *Seventh Industrial Directory of Pennsylvania*, 297-298; *Tenth Industrial Directory of Pennsylvania* (Harrisburg: Department of Internal Affairs, 1941), 250.

[64] *Seventh Industrial Directory of Pennsylvania*, 278, 282; *Tenth Industrial Directory of Pennsylvania*, 246; Robb, Brown, and Marston, 11.

century progressed, newer machine tools increasingly used high-speed steel as their cutting elements. These instruments required two or three times the power of older machine tools, pressing overhead belt- drives beyond their capacities and eventually hastening the change-over to individual machine tools with electric motor drive.[65] The once commonplace small, belt-driven machine shop was being phased out.

Consequently, few twentieth-century belt-driven foundries and machine shops like W. A. Young & Sons, once widespread and an important part of the American industrial economy, remain extant today. W. A. Young & Son is nationally significant because it is one of the most complete examples of its type and period. What makes W. A. Young & Sons exceptional is its completeness. The shop's buildings are virtually unaltered on the outside and inside; the extensive collection of machine tools, hand tools, workbenches, tool cases, and cranes remain from the shop's period of significance; the line shafting and leather belts that provided power are largely intact; the cupola furnace is present; the large and varied virtually unaltered on the outside and inside; the extensive collection of machine tools, hand tools, workbenches, tool cases, and cranes remain from the shop's period of significance; the line shafting and leather belts that provided power are largely intact; the cupola furnace is present; the large and varied wood patterns, templates for pieces made at the shop, are stored in place, ready to be used; the intact office and hardware store evoke the store's managerial and commercial operations; and the feeling and association created by the sum of the parts convey the sense of a small, family-run foundry and machine shop from the early- and mid-twentieth centuries. Adding to the property's high integrity of feeling and association is its setting. W. A. Young & Sons remains occupies its original site in a small, rural town bypassed by the Interstate Highway System, along the river that led to the growth of both the business and the town of Rices Landing as a whole.

Comparisons to other Foundry and Machine Shops

Because few, small, twentieth-century foundries and machine shops remain, finding comparable properties is difficult. To date, no similar property has been nominated as a National Historic Landmark. However, as a result of researching the collections of the HABS/HAER and the listings of properties on the National Register of Historic Places (NRHP), a number of similar resources have been found. They are as follows.

The Appomattox Iron Works in Petersburg, Virginia was listed in the NRHP in 1976 and recorded by HAER in 1983.[66] The recordation includes measured drawings, photographs, and written and historical descriptive data; the last incorporates the earlier NRHP nomination. The facility, a complex of nine buildings, was much larger than W. A. Young & Sons and three of the buildings were Federal style structures dating to the early-nineteenth century. Like W. A. Young & Sons, the Appomattox Iron Works included a machine shop, foundry, blacksmith shop, hardware store, carpentry shop, and pattern storage. However, there were additional buildings and functions, including a separate core room, a pipe shop, stables, an area to assemble peanut shellers (a product manufactured by the company), a crib and toolmakers' shop, a blueprint storage area, an office, and a three-room apartment. The Appomattox Iron Works had an operational life span similar to that of W. A. Young & Sons. The company was founded in 1899; the foundry ceased operation in 1946, and the machine shop closed in 1952. The hardware store and another building remained open until 1972. As had been the case at W. A. Young & Sons, the Appomattox Iron Works machine shop originally was powered by a vertical steam engine that ran a belt-driven line shaft and machine tools powered by belts. At the time of the recordation, the steam engine remained on site but not in its original location. The machine shop included an extensive

[65] Thomas J. Misa, *A Nation of Steel: The Making of Modern America 1865- 1925* (Baltimore: The Johns Hopkins University Press, 1995), 201.

[66] Gary R. Arabak and Dan Clement, *Appomattox Iron Works, HAER VA-25* (Washington, DC: National Park Service, 1983); Virginia Landmarks Commission, "Appomattox Iron Works," National Register of Historic Places Inventory-Nomination Form (Washington, DC: National Park Service, 1976, http://lcweb2.loc.gov/pnp/habshaer/va/va0800/va0817/data/va0817data.pdf.

collection of machine tools, although not quite as many as W. A. Young & Sons, including lathes, drill presses, grinders, a shaper, and an electric hoist. At the time the property's NRHP nomination was written in 1976, the carpentry shop contained planers, various saws, a lathe, joiner, bender, and tool grinder; there were also many patterns stored in the complex, for such things as machinery, tobacco presses, maritime equipment, bearings, wheels and spokes, and gears, pulleys and wheels. The property's foundry included a cupola furnace located outside the foundry room, a blower, a floor pit furnace, and a wooden boom called "the last of its type in the U.S."[67] Unlike at W. A. Young & Sons, the foundry cores were stored in a separate room.

Appomattox Iron Works manufactured peanut shellers, machines made of wood and metal from a design the company apparently invented. It was also something of a job shop, supplying local "homes, farms, and businesses with items such as andirons, coal grates, hinges, hoes, tie bars, axes, fences, gates, wheels, gears, and shafts."[68] The demise of its business was attributed to the standardization of parts, the consolidation of many smaller machine manufacturers into larger companies, and modern retailing practices, many of the same factors that led to the closing of W. A. Young & Sons. The recordation called Appomattox Iron Works "indicative of a small town iron works of the late-nineteenth and early-twentieth century…the accumulated collection of buildings, machinery, patterns and tools, plus business records that make the site an usual survival," qualities similar to what makes W. A. Young & Sons historically significant.[69] The complex operated as a living history museum from 1991 until 1993, when it was damaged by a tornado.[70] Attempts to discern if any machinery remains inside the buildings have been unsuccessful, but seems unlikely that the facility retains a well-preserved *in situ* collection of historic machine tools such as those still found at W. A. Young & Sons.

A second, somewhat comparable property is the Soule Steam Feed Works (SSFW) in Meridian, Mississippi. This company was founded in 1892, just a few years before William Young opened his business in Rices Landing, although it remained in operation until 2002. It is now an industrial museum. The complex contains three historic buildings that housed functions similar to those of W. A. Young & Sons. Building #1, a two-story brick-and-stucco structure with heavy timber framing, was purchased by Soule in 1893 and initially used as machine and assembly shops, and an office. In 1907, when a new machine shop was built, the downstairs of the original building was converted into a mill-supply store and the upstairs was converted into storage. The building also contains an 8-by-12 foot fireproof vault.[71] The property's 1907 machine shop is Building #2. Like W. A. Young & Sons, the two-story, pressed brick building contains belt-driven machine tools operated by a line shaft running almost the length of the building. Originally steam driven, the line shaft is now powered by an electric motor dating from the 1920s. The building's floors are wood, with the machine tools installed on concrete pads, as is the case at W. A. Young & Sons. According to the resource's website, "about 75% of the original equipment remains installed in the building," a percentage similar to that found in W. A. Young and Sons. Although the business upgraded its technology over time, it retained its original equipment, and when the site became an industrial museum, the tools were returned to their original locations. The building also features a blacksmith shop with two forges.[72]

Building #3 is a two-story brick foundry built in 1917 and expanded from 1923 to 1925. It is currently described by its owners (Mississippi Industrial Heritage Museum) as a "foundry that represents state-of-the-art

[67] Virginia Historic Landmarks Commission, 7.3.
[68] Ibid., 8.1.
[69] Arabak and Clement, 1.
[70] Library of Virginia, "A Guide to the Appomattox Iron Works and Supply Company Records, 1834-1992," http://ead.lib.virginia.edu/vivaxtf/view?docId=lva/vi00685.xml, 2011.
[71] Mississippi Industrial Heritage Museum at Historic Soule Feed Works, "Soulé Steam Feed Works, Company History," accessed July 18, 2014, http://www.soulelivesteam.com/history.html.
[72] "Soule Steam Feed Works, Company History."

industrial design in the early-twentieth century."[73] Like W. A. Young & Sons, there is a coke-fired cupola furnace, which pre-dates the building, and a bronze and brass furnace. Like W. A. Yong and Sons, many patterns made at Soule remain (estimated to be in the thousands), have remained stored in a portion of the foundry's second floor, which also contains much of the facility's original woodworking equipment. There are important ways, however, in which the SSFW foundry differs from W. A. Young & Sons. For example, in addition to the cupola furnace, there is an electric furnace that was added to the SSFW foundry in the early 1970s; a 1977 Vulcan Engineering NoBake System that used chemical binders to solidify molding sand; a core-making department; and two employee locker rooms, one outfitted for white employees and a second for African American employees, a mix of modern and historic features not present at W. A. Young and Sons.[74] In the final analysis, SSFW's history and operation are more comparable to that of a single-purpose machine shop producing tools and equipment for a particular industry than to a small, family- become more local and regional in nature, promoting mill supplies, machine-shop services, foundry castings, and machine repair as well as steam engine manufacturing.[75]

One business somewhat more akin to W. A. Young & Sons was the Key City Iron Works Foundry (KCIWF) in Dubuque, Iowa, which was recorded as part of the National Park Service's Historic American Building Survey (HABS) in 1988.[76] Although smaller than W. A. Young & Sons, the first floor of this facility's 30-by-45-foot building erected in 1890 was also designed to house machine tools driven by steam-powered leather belts. The second story of this machine shop was used for storage; a single-story blacksmith shop was added in 1909. Like W. A. Young and Sons, this company appears to have functioned as a job shop during at least the very late-nineteenth and early-twentieth centuries; it "produced ornamental trim, trip hammers, and wood shavers, among other iron items."[77] Power was supplied by a steam-powered belt-drive and subsidiary belts. At the time of the HABS recordation, the exterior and interior were described as "extremely well preserved, down to the loading boom on the front and much of the machinery inside."[78] Although four interior photographs taken at the time show a lathe, the line shaft, the main belt-drive and subsidiary belts, a work bench, and wood storage shelves. Even so, KCIWF does not appear to preserve anywhere near the extent of machine tools or patterns inventory of W. A. Young & Sons, and solid documentation on its years of operation or client base does not appear to be available.

The above comparative analysis supports the identification of W. A. Young & Sons Foundry and Machine Shop as one of the nation's preeminent examples of a small, family-owned belt-driven, early-to-mid-twentieth century foundry and machine shop. The exceptional historic integrity of the building and its site, as well as its retention of a substantially complete collection of the firm's historic belt-driven machine tools to make W. A. Young & Sons a truly exceptional historic property.

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[73] See "Building #3, ttp://www.soulelivesteam.com/Frame-3-historypage3.html?refresh=1331338424301.
[74] "Soule Steam Feed Works, Company History."
[75] Ibid.
[76] HABS, "Key City Iron Works", 1988
[77] Clayton B. Fraser, *Key City Iron Works Foundry, 898 Jackson Street, Dubuque, Dubuque County, Iowa, HABS No. IA-160-AK* (Washington, D.C.: National Park Service, 1988), http://www.loc.gov/pictures/item/pa2222/http://lcweb2.loc.gov/pnp/habshaer/ia/ia0300/ia0314/data/ia0314data.pdf.
[78] Fraser, 2.

6. PROPERTY DESCRIPTION AND STATEMENT OF INTEGRITY

Ownership of Property		**Category of Property**
Private:	X	Building(s):
Public-Local:		District:
Public-State:		Site:
Public-Federal:		Structure:
		Object:

Number of Resources within Boundary of Property:

Contributing		**Noncontributing**
Buildings:	4	Buildings:
Sites:		Sites:
Structures:	2	Structures:
Objects:		Objects:
Total:	6	Total:

PROVIDE PRESENT AND PAST PHYSICAL DESCRIPTIONS OF PROPERTY
(Please see specific guidance for type of resource[s] being nominated)

The resource consists of four contributing buildings and two contributing structures. The machine shop and foundry occupy three interconnected, utilitarian, frame buildings known as the Front Shop, the Back Shop, and the Foundry (Figure 1).[79] Taken together, the buildings form a roughly square complex approximately 72.5 feet wide and 75.5 feet deep. The buildings are visually unified by their red clapboard siding and the regular and symmetrical pattern of the 6-over-6-pane, double-hung wood-sash windows. All building in the complex have stone foundations and the complex as a whole is topped by a standing-seam metal pediment roof. The roof, which dates to 2012, retains the same exterior features as the historic roof; it is pierced at the ridge line by three circular sheet-metal ventilation monitors. There are also two metal stove stacks, one on the front side and the other on the back side of the roof near its west end. Behind the machine shop and foundry are two structures, "a skull cracker," and a lean-to style oil house/small storage shed. When the W. A. Young & Sons Foundry and Machine Shop ceased operation in 1965, the complex as a whole -- buildings, machine tools, hand tools, other equipment, and patterns -- was left intact.[80] No pre-1965 photographs of the shop interior are known to exist. However, in 1991, the Historic American Engineering Record (HAER) created a set of measured drawings, took large-format black-and-white photographs, and wrote a history of W. A. Young & Sons.[81] The drawings represent the layout of the shop at the time of its closing. The drawings are included as part of this nomination; the floor plans identify interior photograph locations. Comparing the HAER drawings to current conditions reveals that the foundry and machine shop are virtually unchanged since 1991 and thus presumably unchanged

[79] Historic American Engineering Record (HAER), "Measured Drawings: Sheet 3," *PA-199, W.A. Young & Sons Foundry and Machine Shop, Rices Landing, Greene County, Pennsylvania, 1900-1969,* (Washington, DC: National Park Service, 1991), http://www.loc.gov/pictures/item/pa2222/.

[80] Frances C. Robb, Mark M. Brown, and Christopher H. Marston, "Written Historical and Descriptive Data," *W.A. Young & Sons Foundry and Machine Shop, Rices Landing, Greene County, Pennsylvania, 1900-1969, HAER PA-199,* (Washington, DC: National Park Service, 1992), 13.

[81] HAER, Sheet 3.

since 1965. The resource reflects all seven aspects of historic integrity as defined by the National Historic Landmark designation Criteria: location, design, setting, materials, workmanship, feeling, and association.

Because the buildings and equipment exist in a virtually unaltered state, the property's integrity of feeling and association are exceptional. W. A. Young & Sons is located in the borough of Rices Landing, Fayette County, in southwestern Pennsylvania, approximately 12 miles southwest of Brownsville, Fayette County, and 20 miles north of the Pennsylvania - West Virginia border. Rices Landing occupies a narrow and level river terrace, a more precipitous hill slope, and a level ridge top that was historically adjacent to Lock and Dam No. 6 on the Monongahela River. The W. A. Young & Sons Foundry and Machine Shop is a contributing resource to the Rices Landing Historic District, which was listed in the National Register of Historic Places (NRHP) in 1992 for its architecture, industry, transportation, and archaeology.[82] W. A. Young & Sons occupies a lot on the river terrace on the southwest side of Water Street, which parallels the river. The other buildings on Water Street are one-story and two-story vernacular style residences.

Exterior Description – Front Shop and Foundry

The Front Shop, the first building constructed for W. A. Young & Sons, was erected in 1900. By 1908, two additional buildings had been constructed, the Foundry and the Back Shop.[83] Because the changes occurred so early in the history of W. A. Young & Sons and because the Front Shop and Foundry appear to be one building, their exteriors will be described together.

The Front Shop (Photographs 1 and 3) houses the machine shop on the first story and the Pattern Shop on the second story. The frame Front Shop is two stories high, six bays wide, and five bays deep.
It rests on a stone foundation and is sided with horizontal clapboards. The fenestration was arranged symmetrically on all sides, with 6-over-6-pane, double-hung, wood sash installed to provide natural light. With the subsequent construction of the Back Shop and Foundry, the Front Shop's east and rear (south) walls became interior walls. This means that windows remain on what are now interior walls.

The two-story high, four-bay wide Foundry (Photographs 2 and 4) was constructed on the east side of the Front Shop. Its west wall is the former exterior wall of the Front Shop. Combined, the front (north) façade of the Front Shop and Foundry is 10 bays wide. The second story of the façade has a row of six, 6-over-6-pane, double-hung, wood-sash windows. On the first story there are a paneled wood pedestrian door, three 6-over--pane double-hung sash windows, a wood triple-leaf equipment door constructed of vertical boards, a single 6-over-6 window, another triple-leaf equipment door, and a single, 6-over-6- pane window. Above the doors are flat-arch fanlights; the one over the pedestrian door has three lights, while those over the equipment doors have 10. All windows and doors are topped by shallow wood, classically inspired pediment hoods and metal flashing. Between the first and second stories is a line of cutout wood letters stretching across the length of the façade, reading "W. A. Young & Sons Foundry and Machine Shop." At the cornice is a line of symmetrically spaced scroll sawn-wood brackets.

The five-bay-deep west side of the Front Shop (Photograph 3) has similar brackets, windows, and window arches, and symmetrical fenestration pattern, except there are no doors, only windows. Between the first and second stories are cutout letters identifying the building as "W. A. Young & Sons." Some of the letters have sections missing. The east exterior wall of the Foundry has two distinct sections (Photograph 5). The front portion is two stories high and features 6-over-6 double-hung windows, a few of which are cracked or have

[82] Christine Davis, "Rice's Landing Historic District," National Register of Historic Places Registration Form (Washington, DC: National Park Service, 1993), 1.
[83] Robb, Brown, and Marston, 5; HAER, Sheet 3.

missing pieces. Above the windows are raised wood letters spelling out "W. A. Young & Sons Foundry and Machine Shop;" above these letters are scroll-sawn brackets. At the rear of the Foundry is a one-story gable end section. Five-bays deep and three-bays wide, it has the same foundation, clapboard siding, windows, and window treatments as the other parts of the building. At the rear side of the Foundry are two windows and a double-leaf equipment door. The arrangement of the windows and door are not symmetrical; the equipment door is set rather higher to provide access into the Foundry's cupola loft. Extending from the door hood is the steel I beam of a travelling crane.

Historic Exterior Description – Back Shop

Like the Front Shop and Foundry, the frame Back Shop has a stone foundation, clapboard siding, and symmetrically spaced 6-over-6, double-hung, wood-sash windows with window hoods. The Back Shop is one-story high, three bays deep, and eight bays wide. It is located behind the Front Shop and perpendicular to the Foundry. In the east gable end is a sliding double-wide wood equipment door with two four-light windows. To its south are two 6-over-6 double-hung windows. Above it is a small circular vent. The long south (rear) elevation has the following fenestration/ doorway pattern: a window, a pedestrian door, and six more windows. The door is topped by a flat-arch fanlight with three lights. Between the third and fourth window is a cast-iron pulley and extension of the shop's main line (power) shaft that is supported by a wood shelf with scroll-sawn brackets. The Front Shop and Back Shop are connected by a one-story high, two-bay wide, and two-bay-deep hyphen. The hyphen had a stone foundation, clapboard siding, a gable roof, one 6-over-6-pane window sash, and a diamond-shaped, four-light fixed window.

Historic Interior Description - Introduction

The interior of W. A. Young & Sons was organized into four work areas: Front Shop, Pattern Shop, Back Shop, and Foundry. Because W. A. Young & Sons was a job shop (a firm that did any business that came its way), the machinery was not arranged in any kind of sequential order, as it would have been in a shop that performed specific, standardized production operations. However, the shop followed the traditional machine-shop pattern of placing like machines together, in families.[84]

Most machine tools received power from the main horizontal line shaft, which passes in a north-south direction through the center of the Front Shop and Back shops. A few machines are driven by later electric motors. When the shop opened, the line shaft was powered by a steam engine. Between the 1920s and the shop's closing in 1965, alternating current electricity was used for lighting and some power. Today, power is supplied by a gasoline-fueled, ex-tractor engine, which turns the shaft's main line shaft through a heavy leather flat belt. Power is transferred from the main line shaft to the individual machine tools via lighter leather belts. All machines powered by the line shaft were equipped with loose and a fixed power pulley. To provide power to a machine, a lever was shifted, which operated a steel fork that moved the belt from the loose to the fixed pulley. Most levers are wood and hang from the ceiling; in a few cases, the levers are steel and are attached to the base of the given machine.

Historic Interior Description – Front Shop

The first floor of the 45-by-40 foot Front Shop houses machine tools, miscellaneous equipment, and one shop-built potbelly stove, which supplied heat.[85] Historically, the Front Shop had two potbelly stoves, but one has been removed. The floor of the Front Shop is oak tongue-and-groove boards. The machines tools themselves are mounted on concrete pedestals. The Front Shop walls are composed of unfinished framing studs and the interior faces of the clapboard walls.

[84] Ibid., 6-7.
[85] HAER, Sheet 3.

The structural system of the Front Shop includes four lines of wood beams running east-west. The beams are supported by built-up wood posts spaced approximately 10 feet on center. The beams support the floor joist of the second floor; aisles run north-south between the front pedestrian and equipment doors and the Back Shop. The aisle leading from the equipment door is overlaid with a board wearing surface; it is not known if this surface is original, but it is historic. To the west of the west aisle, parallel to the west wall, are two engine lathes, a shop-built arbor press, and an electric grinder. To the east of the east aisle is an oval, sheet-metal drill case. The remaining machine tools are located between the aisles and the back wall of the shop. Engine lathes are found near the front pedestrian door and along the west wall; drill presses, grinders, and milling machines are found predominantly in the center of the room.

Immediately above the entrance door of the Front Shop's first story is a curved steel track running from the front to the west walls. This supports a one-half ton hoist/jib crane. To the east of the pedestrian entrance door are two, over-under mounted, wooden tool cabinets. Next to them is a 15-foot-long workbench with multiple drawers and open storage spaces. Mounted above the west end of the table is another tool cabinet. Immediately adjacent to the worktable is a wooden phone booth, adjacent to an exterior equipment door. At the northeast corner of the room, where the front wall and the wall between the Front Shop and Foundry meet, is a hand-operated elevator, consisting of an open wooden platform with ropes on either side. The elevator is directly in front of a doorway between the Front Shop and Foundry. The doorway features a wooden panel door and a two-light transom above.

Along the perimeter wall of the Front Shop's first story are two, large, wooden storage cabinets behind a drill case. The shop's former toilet -- a small room with wood walls and a vertical board door – is also located along this wall. Next to the former toilet is a small storage closet inset under wooden stairs that leads up to the Pattern Shop on the second floor. The wooden handrail for these stairs is not original. An exterior doorway with wood-plank door topped by a two-light transom is located adjacent to the foot of the stairs. An electric drive shaft "C" that powers a blower for the Foundry cupola furnace is located in the southwest corner of the Front Shop's first story.

In the south (rear) wall of the Front Shop's first floor is an equipment door -arch fanlight with 10 lights, then two porcelain sinks. Above the sink is a water tank supported by topped by a flat T-shaped metal pole. Historically, the tank fed both the sinks and a gravity cooling system for the machine tools. Behind the sink and the pole are two 6-over-6-pane windows that look out onto a light court. A large opening in this wall leads from the Front Shop to the hyphen connecting the Front Shop and the Back Shop.

A second, half-ton traveling crane spans from the first story's west wall to the automatic centering drill. The gasoline-powered former tractor engine that now powers the main shaft is located immediately to the southeast of the centering drill. Non-historic steel circuit breaker boxes have been installed near the west end of the curved rail of the crane spanning this wall, which, while devoid of shelving, retains patterns and jigs hanging from nails on the wall.

Historic Interior Description – Pattern Shop

The second-story Pattern Shop sits directly above the Front Shop and has the same dimensions (Figure 2).[8] This shop has three means of entry: the stairway from the Front Shop below, located along the east wall; a trap door to the west of the stairway; and the hand-operated elevator located in the room's northeast corner. Like the Front Shop, the Pattern Shop has a tongue-and-groove, pine floor and unfinished stud walls faced with exterior clapboard sheathing. Internal structural elements include two ranges of wooden, four-by-eight posts spaced

approximately 10 feet on center. Spanning the posts are two wood beams with regularly spaced, reinforced with intermediate wood framing members.

The Pattern Shop is organized into two distinct areas: a workroom, and an office/hardware store. The office/hardware store, located in the northwest corner of the Pattern Shop, is the smaller of the two spaces at approximately 22 feet long and 10 feet wide with beadboard wall surfaces. Because the office/hardware store walls do not reach to the ceiling of the Pattern Shop, the area immediately above the office/hardware store functions as a storage space. The office's southeast corner is curved. The office/hardware store has two entrances, one on its east side and the other on its south side. Both entrances have paneled wooden doors. The space's interior retains a wood-and-glass display case, a wooden desk, and a round, metal flue from one of the first-floor stoves; the west wall has a mounted wood-and-glass cabinet at the south end, and shallow open wood shelves at its northern end.

The north (front) wall is fronted with shallow wooden open shelves running from west to east between the windows; it also retains a cabinet with a wooden door, an intercom made from tubular sheet metal, and shelves with small wooden drawers for nuts and bolts. The northeast corner of this same space retains a set of deep, L-shaped, open wooden shelves. The south wall also retains open wooden shelves along the lower portion of the wall below space to hang things from nails. The ceiling finish surface in the Office/Hardware store is pressed sheet steel; hanging from the ceiling is an early (possibly original) gas lamp.

The W. A. Young & Sons' Pattern Shop takes up the rest of the second floor space. The Pattern Shop has a smaller number of machine tools than the Front Shop, giving the room a more open appearance. As is the case with the Front Shop, most machine tools are belt-driven, with power supplied by the main line shaft on the first floor. A leather belt transfers power to a second line shaft attached to the Pattern Shop's ceiling.

The majority of the machinery located in this space is woodworking equipment for making patterns. This machinery includes a mitre shear, a clamp horse, a band saw, a woodworking lathe, and a sander, all located to the south of the office/hardware store. The circular water tank to the east of these machines fed the sinks in the Front Shop, and cooled the facility's air compressor, hand-operated band-saw sharpener, grind stone, and table saw with a planer and jig borer. A structural support for the shop's main power shaft is located near the band saw, and a sheet-metal shear and sheet metal-working table remain to the southeast of the office/hardware store. In addition to the machine tools, the Pattern Shop contains dozens of completed patterns and parts of patterns, stored on shelves and placed along the walls. For example, a long, deep set of wood shelves located along the east wall contains patterns for locomotive, steamship, and river boat parts, as well as railroad-track switches. Other patterns are found on the floor below these shelves.

Shelves supported by metal rods suspended from the ceiling and containing patterns are located between the windows along the south wall. A tool cabinet with a wooden door is mounted on the south wall. Patterns are hung along the space's west wall, as well as along the face of the of the southern partition wall separating this space from the office/hardware store.

Interior Description – Back Shop

The Back Shop is approximately 45 feet wide by 32 feet deep. Because W. A. Young & Sons is built on a parcel of land that slopes down toward the Monongahela River to the north, the stone foundation at the rear of the Back Shop is exposed to a height of about four feet. Like the Front Shop, the Back Shop has walls of exposed studs faced backed with exterior clapboard siding and a wood floor. Centered along the wall separating it from the Front Shop is a 10-foot by nine-foot rectangular light well with a concrete floor. The light well has a single 6-over-6-pane, wooden, double-hung window and a paneled wood door on its west side,

paired 6-over-6-pane, wooden, double-hung window on its east side, and two, 6-over-6-pane, wooden windows on its north and south sides. The shop's main line shaft passes through the light well and on its east side, and two, 6-over-6-pane, wooden windows on its north and south sides. The shop's main line shaft passes through the light well and through the Back Shop.

The first floor of the Back Shop houses historic machine tools; the upper half-story is an open room below the roof eaves that historically was used as additional pattern storage. Two north-south aisles run between the Front and the rear of the Back Shop. The Back Shop also has three parallel west-east aisles. The majority of the machine tools and equipment in the Back Shop consist of metal working equipment. The welding area is located in the transitional area between the Front and Back Shops; it includes a welding table in addition to the previously mentioned arc welder. Moving north along the west aisle from the welding area, there are a screw press, an air compressor, and an electric motor. Two concrete machinery pads still extant along the west wall held machinery placed in the shop during World War II that subsequently was removed.[9] To their north of the machinery pads are a screw press and a machine for bending metal wagon-wheel tires. Along the east aisle, there is an electric-powered forging hammer, an anvil, and a blacksmith's forge with a square metal hood. West of the forge are belt-driven and electric blowers. Along the rear (south) wall of the Back Shop are racks for metal stock, a brick, gas-fired annealing furnace with a hinged metal door, a hydraulic wheel press, wood steps leading to a paneled pedestrian door, and an L-shaped set of stairs leading to the second floor of the Back Shop. The center of the room retains a large metal planer, a metal shear, and a cast-iron stove.

Interior Description – Foundry

The Foundry takes up the entire east side of the W. A. Young & Sons complex. In contrast to the Front and Back Shops, which are filled with machine tools, the inside of the roughly 27-foot wide, 72.5-foot deep, two - story Foundry is predominantly open space. The floor is earth, befitting its casting function. The building's stone foundation is exposed to the height of approximately four feet along the rear and a portion of the east wall. Like the rest of the shop, most of the Foundry's exterior walls are exposed studs, the exterior faces of which are sided with clapboards. The interior of the west wall has a clapboard finish having original been an exterior side of the Front Shop. The Foundry's roof framing consists of Warren trusses supporting longitudinal purlins.

The Foundry's cupola, or furnace, is located near the rear (south) end of the building. It is cylindrical structure constructed of riveted steel plate with a firebrick lining with a diameter of approximately three feet. Roughly 4.5 feet from the floor is a 1-foot high steel outer ring with circular openings covered by steel plates that allowed foundrymen to view and work molten iron inside. Extending from the front of the cupola at a height of approximately three 3.5 feet is the furnace's blower pipe. A second, shorter pipe at the rear of the cupola was used to discharge slag. A long, 2-foot diameter air duct leads from the blower in the Front Shop to supply the cupola's tuyere. The cupola was charged from the cupola loft, a platform behind the cupola. A hinged, curved steel door provides access to the cupola's interior. The cupola loft occupies the top of the very south end of the building; it has an oak-plank floor and a metal pipe railing to which a short section of steel cyclone fencing (not original) has been attached. The cupola loft, which is accessed via a set of wooden stairs located along the east wall of the Foundry, currently has a small pile of coke fuel remaining in it.

Along the perimeter of the east wall is a metal brass furnace connected by a pipe to a potbelly stove, which apparently helped provide a draft for the furnace. Most of the north half of this wall is taken up by two sets of shallow wooden shelves that hold casting cores, patterns, and miscellaneous items. Between the shelves is a gas-fired, core oven for baking (hardening) cylindrical sand cores of certain molds. It stands approximately four feet high and two feet deep. Its interior is lined with shelves; its exterior walls are asbestos.

Spanning the length of the Foundry's north wall above the equipment door is a narrow wooden catwalk with a metal pipe railing. The catwalk is supported by 10 wooden brackets like those under the building's roof eaves. The Foundry's west wall retains large wheel, gear, and other patterns hung along the wall. Projecting from this wall near its north end is a one-story, women's toilet room featuring with vertically laid board walls during World War II; more patterns are stored on top of this enclosure as well as along its east side. A wooden hose reel remains in place immediately south of the women's toilet enclosure. The only machine tool located along the west wall is a casting tumbler just northwest of the cupola.

The Foundry also includes several other notable historic features. One of these is an electric-powered overhead traveling crane that was used to move molten iron to the casting floor. The rails for the crane line the space's east and west walls at a height of roughly 12 feet from the cupola loft on the south to the catwalk on the north. The rails consist of rolled-steel beams. Attached to a crossbeam between the rails is an electric-powered, eight-ton jib crane/hoist. The Foundry's grease pit -- used for oil changes and other automobile repairs -- remains intact in the center-front portion of the floor. The Foundry retains many tools relating to the casting operation, including the cupola's ladle, puddling tools, scrapers, and hand tools for working casting sand.

Historic Exterior Description – Skull Cracker, Oil House, Storage Shed

The property as a whole includes one other separate historic structure and two additional historic buildings. The structure is a "skull cracker," which was used to break obsolete iron castings and other metal objects.[10] Also known as a "yard- drop," W. A. Young & Sons' skull cracker consists of two distinct features: a steel derrick and a steel ring. The derrick is approximately 12-feet high and 3-legged. One leg is curved and has a steel pulley on the end. Extending out from it are two straight legs. Attached to the pulley would have been a rope or chain and a steel "headache ball" that would then be dropped onto the material to be broken resting on a circular concrete plate approximately 3 feet in diameter. While the shop's rope and headache ball are no longer attached to the derrick; the ball remains extant and is currently being stored in the Foundry.

The single story Oil House (Photograph 37) remains in place behind the skull cracker. It is comprised of a 4-bay-long open section and a one-bay by one-bay enclosed section. Both sections are topped by a shed roof. The open section uses saplings as support posts and is sided with "V" joint vertical boards. The enclosed portion has a vertical-board wood door on its west side and a six-pane, fixed sash window on its north side. The Storage Shed is a 1½-story high, 2-by-2-bay building with a terra cotta tile roof gable roof. The shed has double-leaf wood doors on the north side; all other walls are blank. The roof is no longer extant.

Assessment of Historic Integrity

The W. A. Young & Sons Foundry and Machine Shop retains an exceptionally high degree of integrity of location, design, setting, materials, workmanship, feeling, and association. Its character-defining historic features readily convey significance of the property. The property's setting is very similar to what it was during the property's 1905-1965 period of historic significance. The community of Rices Landing today remains a rural village located along the left bank of the Monongahela River. In terms of its immediate setting, the shop still faces the river on a short, narrow street it shares with residential buildings, as it did historically. While Monongahela River Lock and Dam No. 6, which played a significant part in the development of both Rices Landing and business at W. A. Young & Sons, is no longer extant, but the remainder of the setting is largely unchanged.

The shop's historic, character-defining design and workmanship features are also very intact. The exterior of the complex's three major buildings – Front Shop, Back Shop, and Foundry – are unaltered from their historic appearance, except for some minor deterioration due to age and deferred maintenance, most notably section loss

to wood lettering and cracks in some of the windows. The buildings appear to be a single complex, unified by the red clapboard siding, historic window sash, and fenestration patterns. The character-defining features throughout the interior are also remarkably intact. The interior spaces retain their historic functions of Front Shop, Back Shop, Pattern Shop/Office, and Foundry. The line shaft and other power transmission features as well as the extensive collection of historic machine tools left in the shop when it ceased operation in 1965 remain in their original locations, as do the foundry's cupola and charging station, annealing furnace, blacksmith's forge, wood patterns, work benches, stoves, hand tools, and hardware produced on site. The intact exterior and interior convey the workmanship of William A. Young who designed, built and equipped the shop and the way in which the shop functioned during the period of significance.

Previous documentation on file (NPS):

_X_ Previously listed in the National Register (fill in 1 through 6 below)
__ Not previously listed in the National Register (fill in **only** 4, 5, and 6 below)

1. NR #: 92001723 (contributing resource to Rices Landing Historic District)
2. Date of listing: 12/24/1992
3. Level of significance:
4. Applicable National Register Criteria: A_X B__ C_X D_X_
5. Criteria Considerations (Exceptions): A__ B__ C__ D__ E__ F__ G__
6. Areas of Significance: Transportation, Industry, and Architecture

__ Previously Determined Eligible for the National Register: Date of determination:
__ Designated a National Historic Landmark: Date of designation:
__ Recorded by Historic American Buildings Survey: HABS No.
__ Recorded by Historic American Engineering Record: HAER No. P.A.-199
__ Recorded by Historic American Landscapes Survey: HALS No.

Location of additional data:

State Historic Preservation Office: Pennsylvania and Historical Museum Commission
Other State Agency:
Federal Agency: Historic American Engineering Record, National Park Service; Library of Congress
Local Government:
University:
Other (Specify Repository):

8. FORM PREPARED BY

Name/Title: Gerald M. Kuncio/Senior Historian

Address: Skelly and Loy, Inc., 3280 William Pitt Way, Pittsburgh, PA 15238

Telephone: 412-828-1412

Date: July 31, 2014

Edited by: J. Paul Loether, Chief
National Register and National Historic Landmarks Program
National Park Service
1201 Eye St. NW (2280), 8th Floor
Washington, DC 20005

Telephone: (202) 354-2003

(Repository for Original Digital Photograph Files: Skelly and Loy, Inc., 3280 William Pitt Way, Pittsburgh, PA 15238 – all photographs by Gerald M. Kuncio,, 2014**)**

Photograph 1. (PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0001) North (front) and east elevations, facing southeast.

Photograph 2. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0002. North and west elevations, facing southwest.

Photograph 3. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0003. West elevation, facing south.

Photograph 4. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0004. North (front) elevation of the Foundry, facing southeast.

Photograph 5. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0005. East elevation of the Foundry, facing southwest.

Photograph 6. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0006. East elevation of the Foundry from the rear, facing north.

Photograph 7. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0007. Doors to the cupola loft, facing northwest.

Photograph 8. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0008. West elevation of the Back Shop, facing south.

Photograph 9. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0009. Rear (south) elevation of the Back Shop, facing east,

Photograph 10. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0010. Flywheel of the horizontal line shaft at the back of the Rear Shop, facing northeast.

Photograph 11. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0011. Hyphen between the Front Shop and Back Shop, facing northeast.

Photograph 12. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0012. Horizontal line shaft in the Front Shop, facing southeast.

Photograph 13. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0013. Horizontal line shaft in the Back Shop, facing east. In the background is the hand forge.

Photograph 14. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0014. Gasoline engine that powers the shop and main belt, facing south.

Photograph 15. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0015. Main belt of the horizontal line shaft, facing southeast.

Photograph 16. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0016. West aisle between the Front Shop and Back Shop and machine tools, facing southwest.

Photograph 17. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0017. East aisle between the Front Shop and Back Shop, machine tools, and drill press cabinet, facing southwest.

Photograph 18. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0018. Engine lathes, shop-built broaching press, and electric grinder, facing southwest.

Photograph 19. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0019. Machine tools in the Front Shop, facing south.

Photograph 20. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0020. Machine tools in the Front Shop, facing north.

Photograph 21. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0021. Work bench at the front of the Front Shop, facing east.

Photograph 22. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0022. Hand operated elevator, facing east.

Photograph 23. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0023. East aisle way of the Front Shop and stairs to the Pattern Shop, facing northeast.

Photograph 24. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0024. Office and hardware store, facing west.

Photograph 25. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0025. Interior of the office and hardware store, facing east.

Photograph 26. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0026. South wall of the office and hardware store, facing southwest.

Photograph 27. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0027. Belt from the main horizontal line shaft and Pattern Shop line shaft, facing east. A portion of the water tank for the gravity fed cooling system is also visible.

Photograph 28. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0028. Patterns along the east wall of the Pattern Shop, facing southeast.

Photograph 29. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0029. Patterns along the south wall of the Pattern Shop and a grinder, facing southwest.

Photograph 30. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0030. Hydraulic wheel press and annealing furnace in the Back Shop, facing southeast.

Photograph 31. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0031. Planer and shop-built stove, facing northwest.

Photograph 32. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0032. Overview of the Forge from the second floor catwalk, facing south.

Photograph 33. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0033. Cupola loft, cupola furnace, ladle, tuyere, and casting tumbler, facing southwest.

Photograph 34. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0034. Patterns hanging on the west wall of the Foundry and the women's toilet, facing north. Note the wall's clapboard siding of the former exterior wall of the Front Shop.

Photograph 35. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0035. One of the tracks of the cupola crane, facing southwest.

Photograph 36. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0036. Skull cracker, facing southeast.

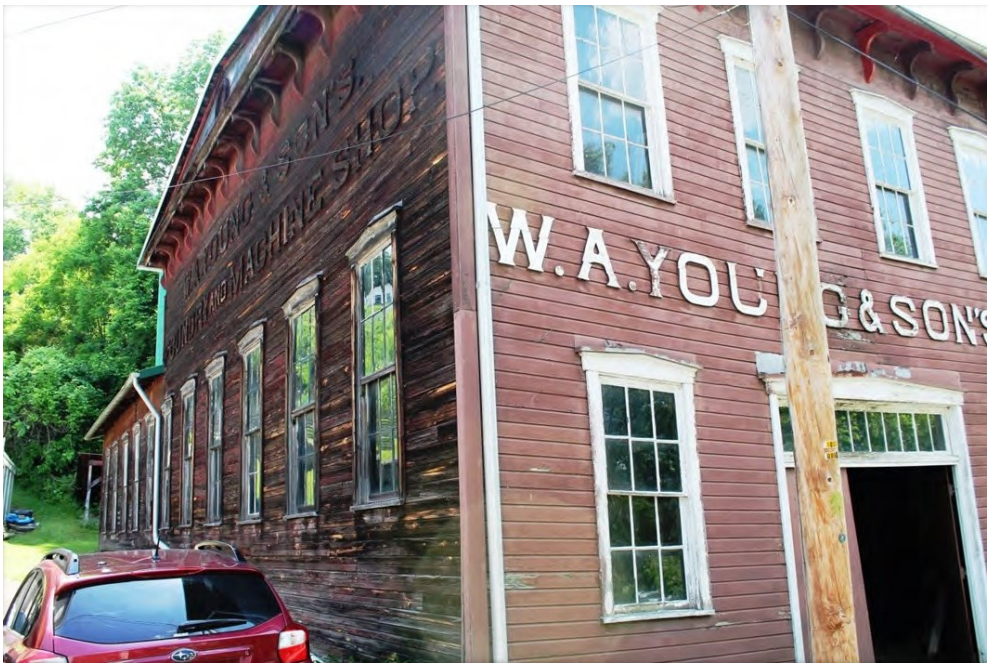
Photograph 37. PA_Greene County_W.A. Young & Sons Foundry and Machine Shop_0037. Oil house and storage shed, facing southeast.

Photograph 1. North (front) and east elevations, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 2. North (front) and west elevations, facing southwest.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 3. West elevation, facing south.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 4. North (front) elevation of the Foundry, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)



Photograph 5. East elevation of the Foundry, facing southwest.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 6. East elevation of the Foundry from the rear, facing north.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 7. Doors to cupola loft, facing northwest.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 8. Western elevation of the Back Shop, facing south.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 9. Rear (south) elevation of the Back Shop, facing east.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 10. Flat-belt pulley on exterior of the line shaft at the back of the Rear Shop, facing northeast.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 11. Hyphen between the Front Shop and the Back Shop, facing northwest.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 12. Horizontal line shaft in the Front Shop, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)

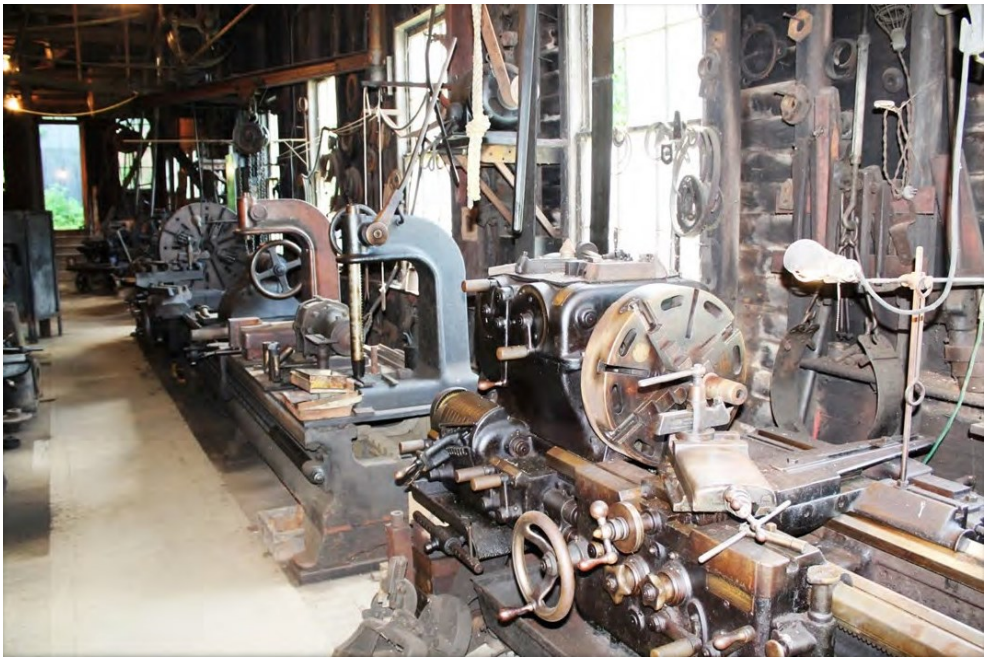
Photograph 13. Horizontal line shaft in the Back Shop, facing east. In the background is a hand forge.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 14. Former gasoline tractor engine and its transmission with main belt to the line shaft that powers the shop, facing south.
(Photograph by Gerald M. Kuncio, 2014)

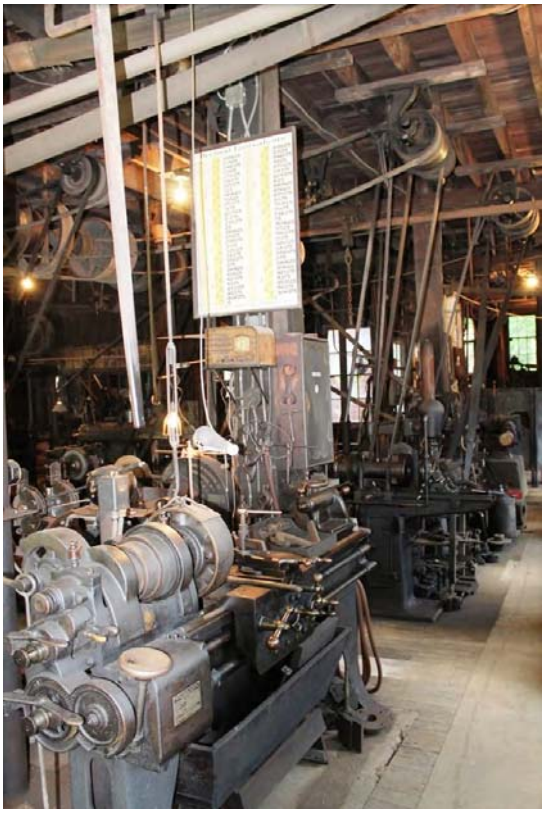
Photograph 15. Main belt driving the horizontal line shaft, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 16. West aisle between the Front Shop and Back Shop and machine tools, facing southwest. (Photograph by Gerald M. Kuncio, 2014)

Photograph 17. East aisle between the Front Shop and Back Shop, machine tools, and twist-drill cabinet. (Photograph by Gerald M. Kuncio, 2014)



Photograph 18. Engine lathes, shop-built broaching press, and electric grinder, facing southwest.
(Photograph by Gerald M. Kuncio, 2014)



Photograph 19. Machine tools in the Front Shop, facing south.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 20. Machine tools in the Front Shop, facing south.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 21. Work bench at the front of the Front Shop, facing east.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 22. Hand-operated elevator, facing east.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 23. East aisle of the Front Shop, and stairs to the Pattern Shop, facing northeast.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 24. Office and hardware store, facing west.
(Photograph by Gerald M. Kuncio, 2014)

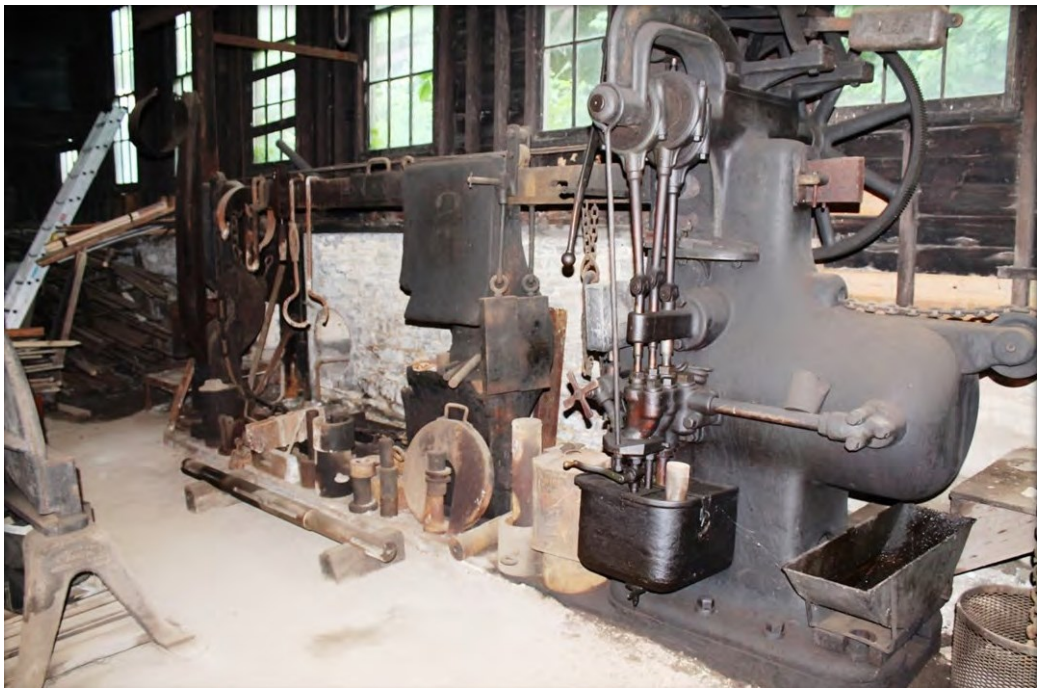
Photograph 25. Interior of the office and hardware store, facing east.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 26. South wall of the office and hardware store, facing southwest.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 27. Belt from the main line shaft and Pattern-Shop line shaft, facing east.
A portion of the water tank for the gravity-fed cooling system is also visible on the right.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 28. Patterns along the east wall of the Pattern Shop, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 29. Patterns along the south wall of the Pattern Shop, and a grinder, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)



Photograph 30. Hydraulic wheel press and annealing furnace in the Back Shop, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 31. Planer and shop-built stove, facing northwest.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 32. Overview of the Forge from the second-floor catwalk facing south.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 33. Cupola loft, cupola furnace, ladle, tuyere, and casting tumbler, facing southwest.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 34. Patterns hanging on the west wall of the Foundry and the women's toilet, facing north. Note the Front Shop's clapboard-sided, former exterior wall. (Photograph by Gerald M. Kuncio, 2014)

Photograph 35. One of the tracks of the cupola crane, facing southwest. (Photograph by Gerald M. Kuncio, 2014)

Photograph 36. Skull cracker, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)

Photograph 37. Oil house and storage shed, facing southeast.
(Photograph by Gerald M. Kuncio, 2014)

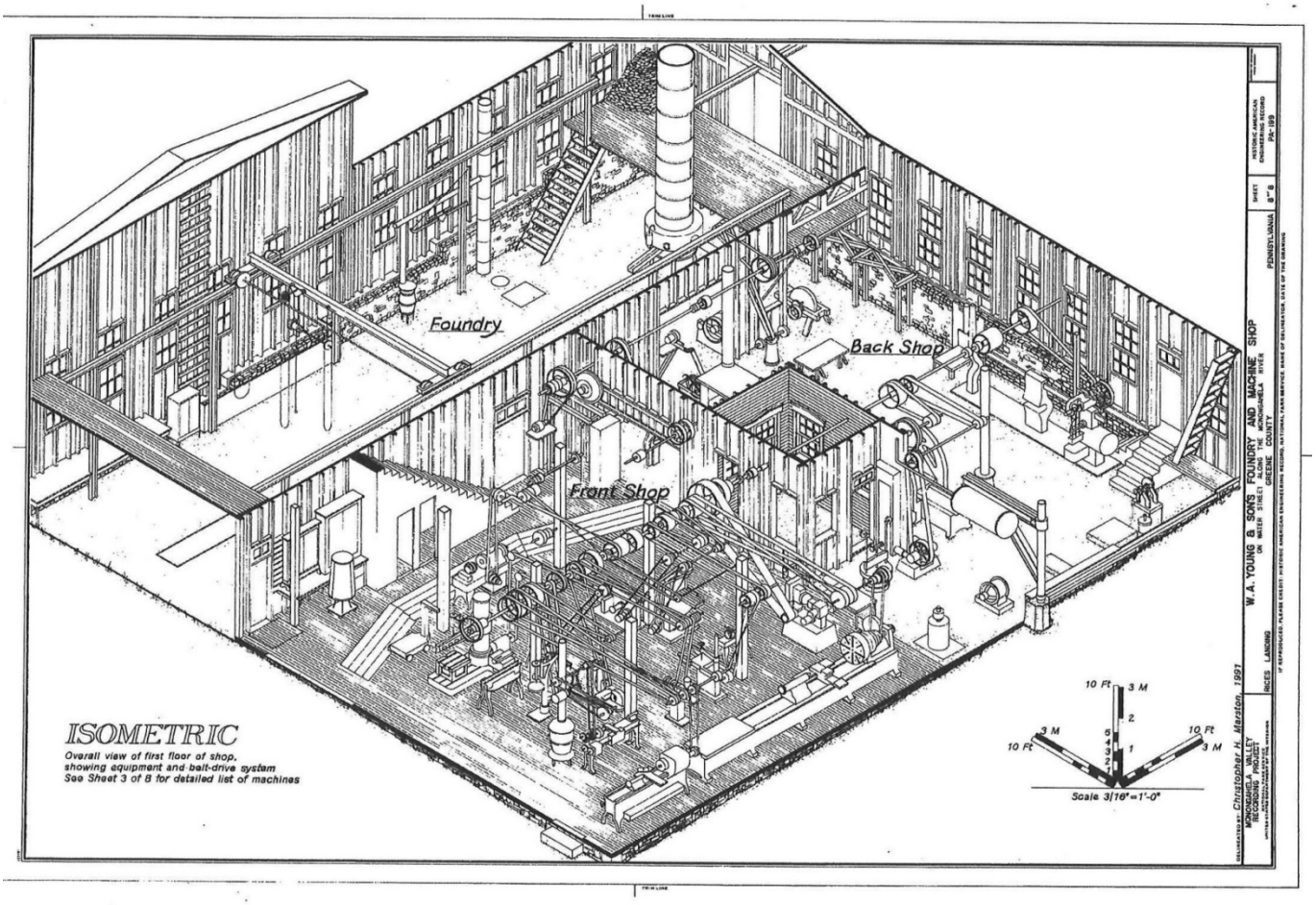

Foundry
Back Shop
Front Shop
ISOMETRIC
Overall view of first floor of shop, showing equipment and belt-drive system
See Sheet 3 of 8 for detailed list of machines
10 Ft
3 M
Scale 3/16"=1'-0"
W. A. YOUNG & SONS FOUNDRY AND MACHINE SHOP
Christopher H. Marston, 1991

Figure 1

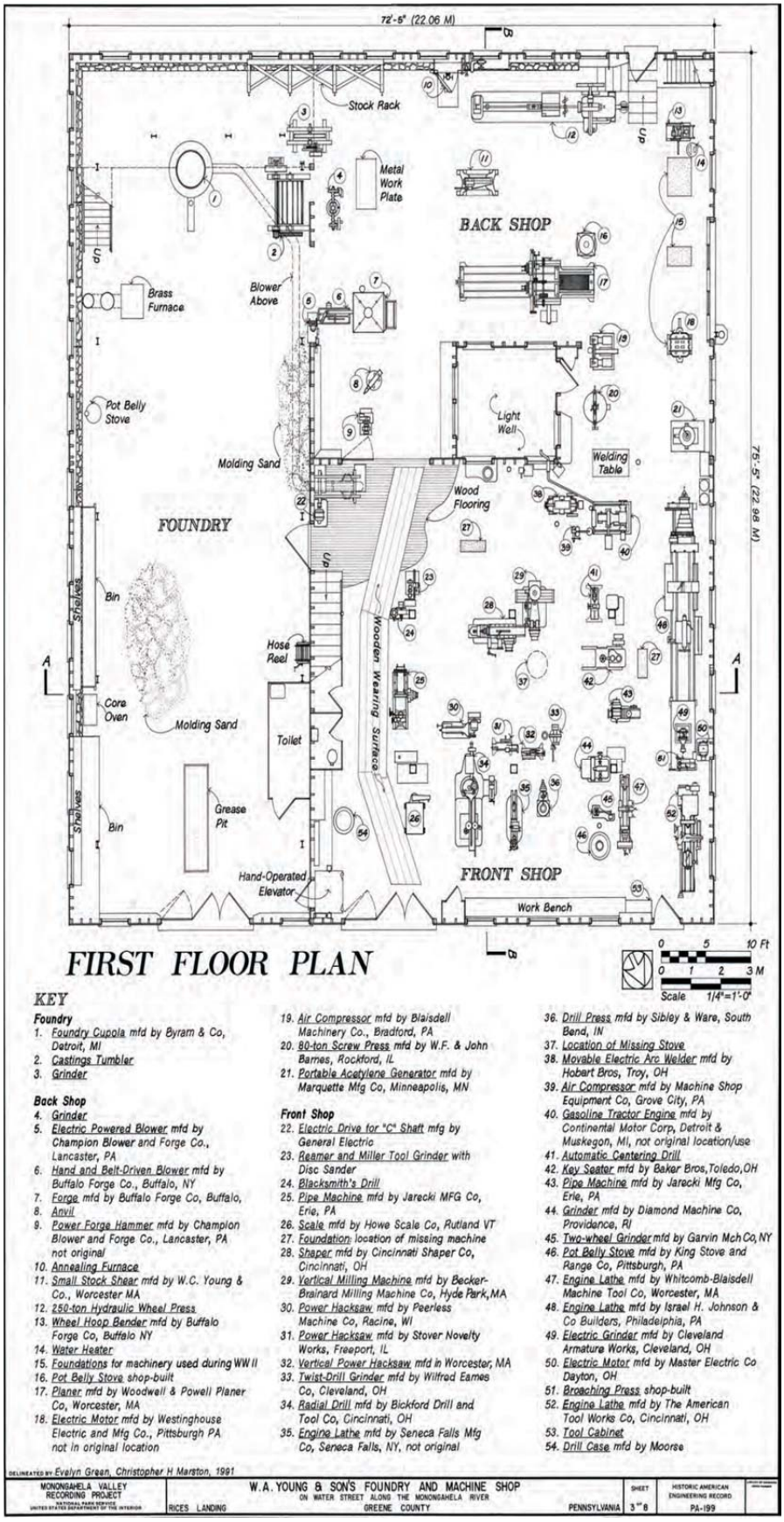

72'-5" (22.06 M)
75'-5" (22.98 M)
Stock Rack
Metal Work Plate
BACK SHOP
Brass Furnace
Blower Above
Pot Belly Stove
Light Well
Welding Table
Molding Sand
Wood Flooring
FOUNDRY
Bin
Shelves
Hose Reel
Wooden Wearing Surface
Core Oven
Molding Sand
Toilet
Grease Pit
Bin
Hand-Operated Elevator
FRONT SHOP
Work Bench
FIRST FLOOR PLAN
0 5 10 Ft
0 1 2 3 M
Scale 1/4"=1'-0"
KEY
Foundry
1. Foundry Cupola mfd by Byram & Co, Detroit, MI
2. Castings Tumbler
3. Grinder
Back Shop
4. Grinder
5. Electric Powered Blower mfd by Champion Blower and Forge Co., Lancaster, PA
6. Hand and Belt-Driven Blower mfd by Buffalo Forge Co., Buffalo, NY
7. Forge mfd by Buffalo Forge Co, Buffalo,
8. Anvil
9. Power Forge Hammer mfd by Champion Blower and Forge Co., Lancaster, PA not original
10. Annealing Furnace
11. Small Stock Shear mfd by W.C. Young & Co., Worcester MA
12. 250-ton Hydraulic Wheel Press
13. Wheel Hoop Bender mfd by Buffalo Forge Co, Buffalo NY
14. Water Heater
15. Foundations for machinery used during WW II
16. Pot Belly Stove shop-built
17. Planer mfd by Woodwell & Powell Planer Co, Worcester, MA
18. Electric Motor mfd by Westinghouse Electric and Mfg Co., Pittsburgh PA not in original location
19. Air Compressor mfd by Blaisdell Machinery Co., Bradford, PA
20. 80-ton Screw Press mfd by W.F. & John Barnes, Rockford, IL
21. Portable Acetylene Generator mfd by Marquette Mfg Co, Minneapolis, MN
Front Shop
22. Electric Drive for "C" Shaft mfg by General Electric
23. Reamer and Miller Tool Grinder with Disc Sander
24. Blacksmith's Drill
25. Pipe Machine mfd by Jarecki MFG Co, Erie, PA
26. Scale mfd by Howe Scale Co, Rutland VT
27. Foundation: location of missing machine
28. Shaper mfd by Cincinnati Shaper Co, Cincinnati, OH
29. Vertical Milling Machine mfd by Becker-Brainard Milling Machine Co, Hyde Park, MA
30. Power Hacksaw mfd by Peerless Machine Co, Racine, WI
31. Power Hacksaw mfd by Stover Novelty Works, Freeport, IL
32. Vertical Power Hacksaw mfd in Worcester, MA
33. Twist-Drill Grinder mfd by Wilfred Eames Co, Cleveland, OH
34. Radial Drill mfd by Bickford Drill and Tool Co, Cincinnati, OH
35. Engine Lathe mfd by Seneca Falls Mfg Co, Seneca Falls, NY, not original
36. Drill Press mfd by Sibley & Ware, South Bend, IN
37. Location of Missing Stove
38. Movable Electric Arc Welder mfd by Hobart Bros, Troy, OH
39. Air Compressor mfd by Machine Shop Equipment Co, Grove City, PA
40. Gasoline Tractor Engine mfd by Continental Motor Corp, Detroit & Muskegon, MI, not original location/use
41. Automatic Centering Drill
42. Key Seater mfd by Baker Bros, Toledo, OH
43. Pipe Machine mfd by Jarecki Mfg Co, Erie, PA
44. Grinder mfd by Diamond Machine Co, Providence, RI
45. Two-wheel Grinder mfd by Garvin Mch Co, NY
46. Pot Belly Stove mfd by King Stove and Range Co, Pittsburgh, PA
47. Engine Lathe mfd by Whitcomb-Blaisdell Machine Tool Co, Worcester, MA
48. Engine Lathe mfd by Israel H. Johnson & Co Builders, Philadelphia, PA
49. Electric Grinder mfd by Cleveland Armature Works, Cleveland, OH
50. Electric Motor mfd by Master Electric Co Dayton, OH
51. Broaching Press shop-built
52. Engine Lathe mfd by The American Tool Works Co, Cincinnati, OH
53. Tool Cabinet
54. Drill Case mfd by Moorse
DELINEATED BY Evelyn Green, Christopher H Marston, 1991
MONONGAHELA VALLEY RECORDING PROJECT
NATIONAL PARK SERVICE UNITED STATES DEPARTMENT OF THE INTERIOR
W. A. YOUNG & SON'S FOUNDRY AND MACHINE SHOP
ON WATER STREET ALONG THE MONONGAHELA RIVER
RICES LANDING GREENE COUNTY PENNSYLVANIA
SHEET 3 of 8
HISTORIC AMERICAN ENGINEERING RECORD
PA-199

Figure 2.

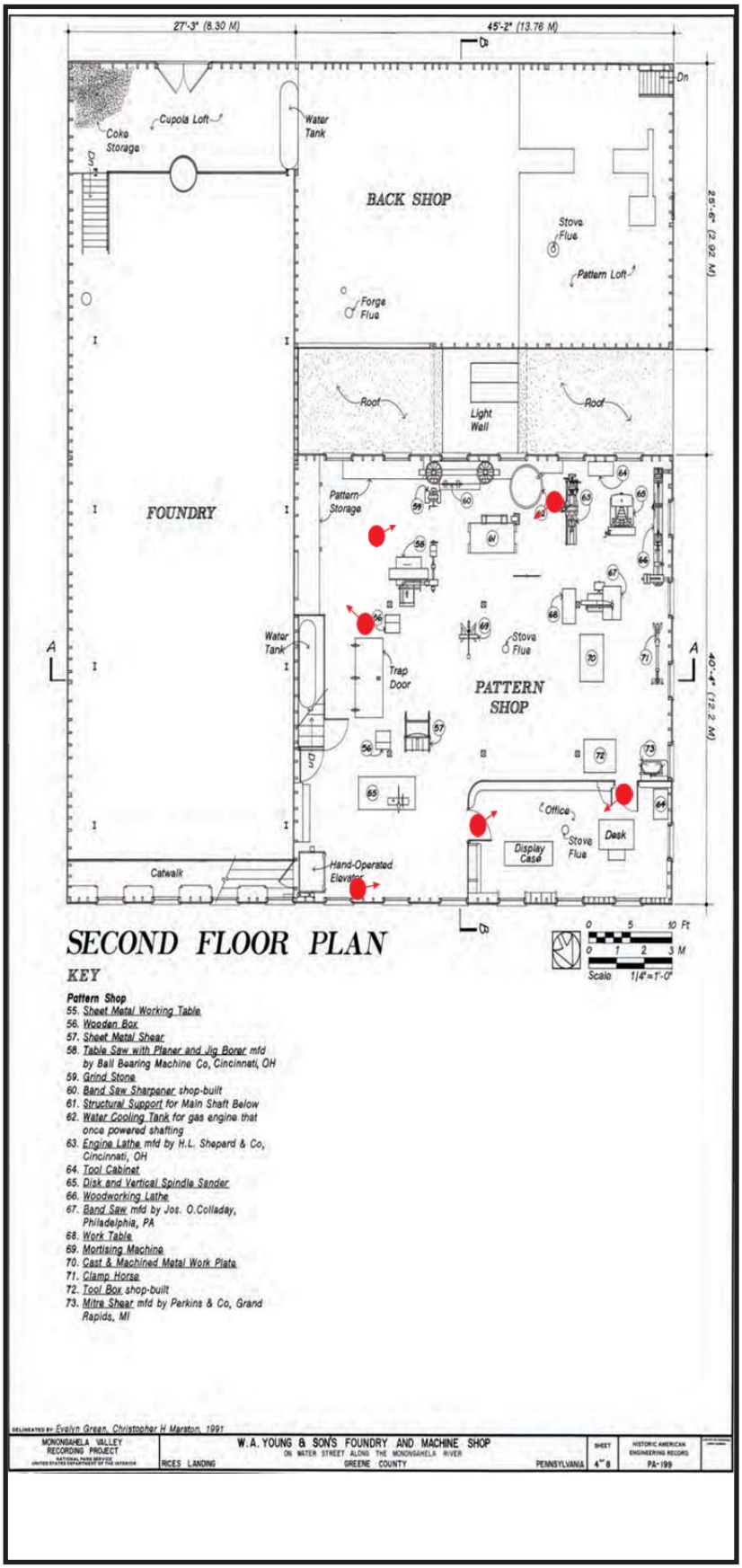
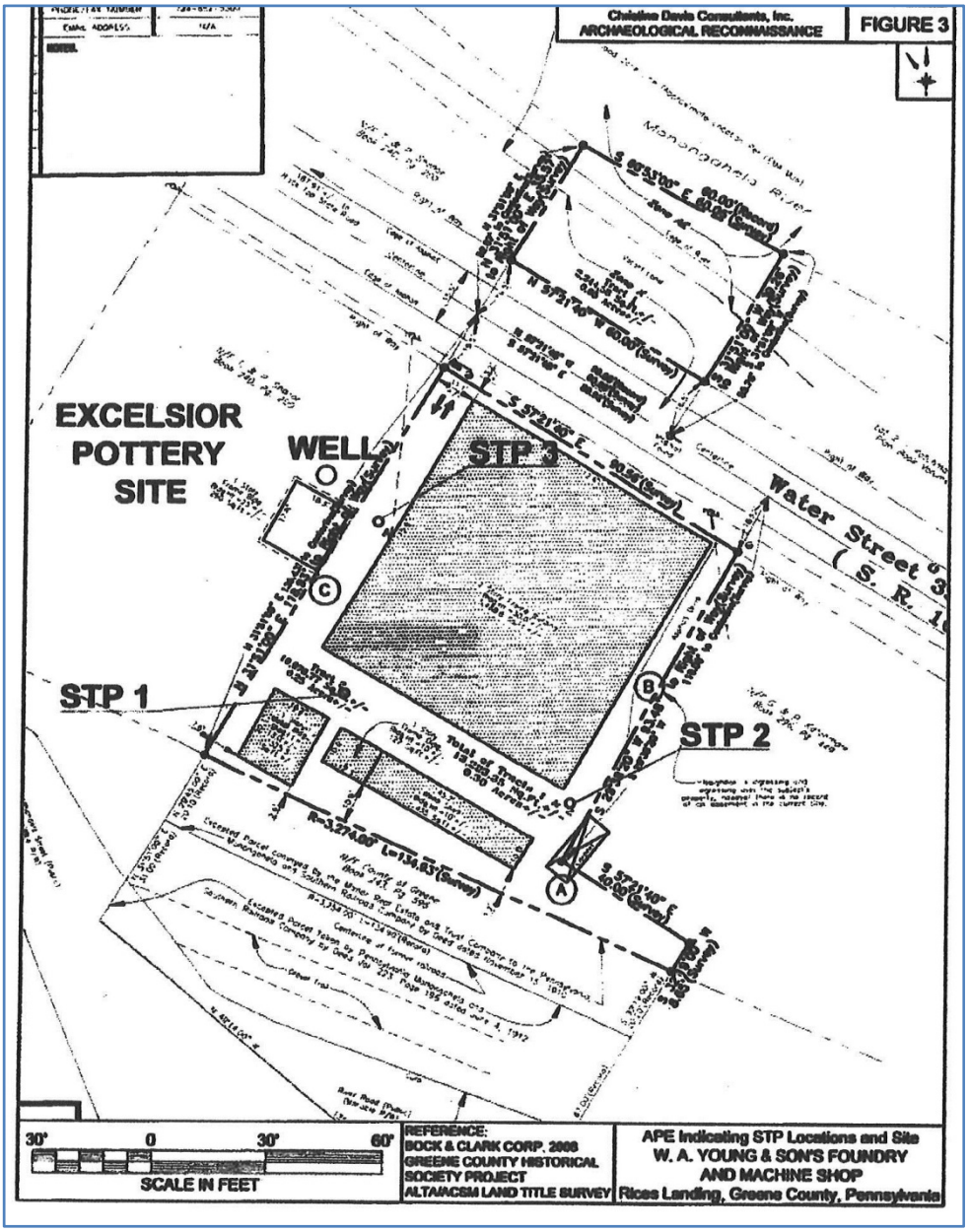

27'-3" (8.30 M)
45'-2" (13.76 M)
Coke Storage
Cupola Loft
Water Tank
BACK SHOP
Stove Flue
Pattern Loft
Forge Flue
Roof
Light Well
Roof
FOUNDRY
Pattern Storage
Water Tank
Trap Door
Stove Flue
PATTERN SHOP
Office
Display Case
Stove Flue
Desk
Catwalk
Hand-Operated Elevator
25'-6" (7.92 M)
40'-4" (12.2 M)
SECOND FLOOR PLAN
KEY
Pattern Shop
55. Sheet Metal Working Table
56. Wooden Box
57. Sheet Metal Shear
58. Table Saw with Planer and Jig Borer mfd by Ball Bearing Machine Co, Cincinnati, OH
59. Grind Stone
60. Band Saw Sharpener shop-built
61. Structural Support for Main Shaft Below
62. Water Cooling Tank for gas engine that once powered shafting
63. Engine Lathe mfd by H.L. Shepard & Co, Cincinnati, OH
64. Tool Cabinet
65. Disk and Vertical Spindle Sander
66. Woodworking Lathe
67. Band Saw mfd by Jos. O.Colladay, Philadelphia, PA
68. Work Table
69. Mortising Machine
70. Cast & Machined Metal Work Plate
71. Clamp Horse
72. Tool Box shop-built
73. Mitre Shear mfd by Perkins & Co, Grand Rapids, MI
Scale 1/4"=1'-0"
MONONGAHELA VALLEY RECORDING PROJECT
W.A. YOUNG & SON'S FOUNDRY AND MACHINE SHOP
ON WATER STREET ALONG THE MONONGAHELA RIVER
RICES LANDING
GREENE COUNTY
PENNSYLVANIA
HISTORIC AMERICAN ENGINEERING RECORD
PA-199

Figure 3.

Sketch Map Showing the Boundaries (—-----—-) of W. A. Young & Sons Foundry and Machine Shop Property, 116 Water Street, Rices Landing, PA



W. A. Young and Sons Foundry and Machine Shop

116 Water Street, Rices Landing, PA

Latitude/Longitude: 39.949235/-79998534

Datum: WGS84