4410

NPS Form 10-900 OMB No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions.

1. Name of Property

Historic name: Warner & Swasey Company Building
Other names/site number: N/A
Name of related multiple property listing:

(Enter "N/A" if property is not part of a multiple property listing

2. Location

Street & number: 5701 Carnegie Avenue
City or town: Cleveland State: OH County: Cuyahoga
Not For Publication: ☐ Vicinity: ☐

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this **x** nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property **x** meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

___national ___statewide x local

Applicable National Register Criteria:

x A x B ___C ___D

Barbara Power **DSHPO Inventory & Registration** August 1, 2019

Signature of certifying official/Title: **Date**

State Historic Preservation Office, Ohio History Connection

State or Federal agency/bureau or Tribal Government

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

Signature of commenting official: **Date**

Title : **State or Federal agency/bureau or Tribal Government**

4. National Park Service Certification

I hereby certify that this property is:

✓ entered in the National Register

___ determined eligible for the National Register

___ determined not eligible for the National Register

___ removed from the National Register

___ other (explain:) _____

Signature of the Keeper — Date of Action: 9/20/19

5. Classification

Ownership of Property

(Check as many boxes as apply.)

Private:	☐
Public – Local	x
Public – State	☐
Public – Federal	☐

Category of Property

(Check only **one** box.)

Building(s)	x
District	☐
Site	☐
Structure	☐
Object	☐

Number of Resources within Property
(Do not include previously listed resources in the count)

Contributing	Noncontributing	
2	0	buildings
		sites
		structures
		objects
2	0	Total

Number of contributing resources previously listed in the National Register 0

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6. Function or Use
Historic Functions
(Enter categories from instructions.)
INDUSTRY/PROCESSING/EXTRACTION: Manufacturing Facility

Current Functions
(Enter categories from instructions.)
VACANT

7. Description

Architectural Classification
(Enter categories from instructions.)
LATE 19th AND EARLY 20th REVIVALS: Second Renaissance Revival

Materials: (enter categories from instructions.)
Principal exterior materials of the property: Brick, Stone, Metal, Wood

Narrative Description
(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

The Warner & Swasey Company building is located at 5701 Carnegie Avenue, in the city of Cleveland, Cuyahoga County and retains a significant level of historic integrity (Photos 1 & 2). The 1905-1910, 1913-16 Second Renaissance Revival style five-story red brick building fronting Carnegie Avenue was constructed in phases to accomplish the larger building plan. The 1905-1908 western portion design is attributed to prominent New York architect Arnold Brunner. The 1910 eastern portion along with 1913-16 northeast addition was designed by the Cleveland firm of Osborn Engineering Co., likely executing Arnold Brunner's vision. The circa 1910 service building is a contributing building, built during the period of significance, and employing the same brick and stone elements of the main building.

Narrative Description

The Warner & Swasey Company building is situated on Cuyahoga County Parcel #118-11-017 and eastern portion of Parcel #118-11-016 encompassing 2.64 acres. The building resides within the Cleveland MidTown District along the north side of the main five-lane commercial corridor

of Carnegie Avenue to the east of East 55th Street and south of Euclid Avenue. By 1920, the Warner & Swasey Company factory had expanded to the south side of Carnegie Avenue with operations connected by a tunnel under the street. (Historic Images, Figures 4, 7) The south building was significantly altered in 1991 for use as the City of Cleveland Division of Waste Collection and Disposal at 5600 Carnegie Avenue and is not included in this nomination. In 1940-41, machine assembly space designed by Cleveland architect Joseph Ceruti was added to the west side of the north building continuing to East 55th Street.[1] This portion was significantly altered and detached from the main building in 1991 by the City of Cleveland, which re-utilized the site as a City vehicle garage, and is not included in this nomination.[2] The Cleveland Landmarks Prospect Avenue Historic District and the National Register Upper Prospect Multiple Resource Area (MRA NR #64000653) are located west of East 55th Street between Euclid and Carnegie Avenues, east of the Interstate 90. The MRA includes 25 individually listed National Register properties (demolished - Neff Apartments, 3603 Prospect Ave. & Montana Apartments, 2061 E. 36th St.).

The Warner & Swasey Company building abuts the city tree-lined sidewalk with contemporary streetlight poles and fire hydrants. A metal picket fence resting on a stone capped brick wall spans the central façade portion of the building protecting the exposed basement level window well. A grass strip separates the west and rear north elevations of the building from a concrete driveway leading to parking areas at the front and rear of the adjacent City garage property. The Pennsylvania Railroad tracks and a concrete trestle run along the east side of the property connecting with a riveted steel girder bridge over Carnegie Avenue. A brick drive to the east of the building leads from Carnegie Avenue to an interior truck loading dock. The drive is marked by a gated entry with brick fence and piers resting on stone plinths supporting a chain link gate. Sanborn Fire Insurance Maps and Historic Drawings reference numbered historic building portions which combine to make the contributing Warner & Swasey Company building included in this nomination. (See Additional Documentation–Location and Boundary Map) (Historic Images, Figures 1, 3, 8, 9). A one-story red brick triangular shaped ca. 1910 service building contributes and is situated inside the boundary, with a brick fence and the railroad trestle serving as south and east walls (Photos 1, 43) (Historic Images, Figure 8).

The Warner & Swasey Company building is further described as follows.

1

1905-1910 Second Renaissance Revival Style Building Portion (*Referenced on Sanborn Fire Insurance Maps & Historic Drawings as Historic Building #1)* (Photos 1-8, 13, 14, 16, 18, 20-22, 24, 26, 29-32, 36, 37) (Historic Images, Figures 10, 12, 14)

The 1905-1910 Second Renaissance Revival style red brick five-story portion of the building is reinforced concrete and steel construction with rectangular plan. (Photos 1, 2) The classic tripartite design is composed of first floor base defined by sandstone water table, banded running

[1] Sanborn Fire Insurance Map, 1952; Gaede, 13.4.
[2] City of Cleveland Department of Economic Development, Request for Proposals. *Warner and Swasey Redevelopment, 5701 Carnegie Avenue*, March 2018.

bond, and sandstone stringcourse at the towers; while the basement level lightwell replaces the water table between the two towers and a sandstone string course runs the length of the first-floor window sills. The main body is composed of second to fourth floor window openings separated at the fifth floor with a carved sandstone stringcourse at window sills and lintels. The building is capped with dentiled sandstone parapet and brick corbelled cornice. "THE WARNER & SWASEY COMPANY" is carved into projecting sandstone plaques at the cornice of each tower (Photos 3, 5).

Projecting 3 x 4 bay towers with applied brick quoining bookend 21 central segmental arched window bays of manufacturing space. Fourth floor windows are accented by a sandstone keystone and sandstone impost at the piers interrupting the brick corbelling that runs below the fourth/fifth floor sandstone stringcourse. End towers rest on a sandstone base with stairs leading to central recessed semi-arched entries with brick voussoirs and sandstone keystone. Double door entries with fanlight are boarded over. The prominent main west tower entry exhibits a molded sandstone surround below a bracketed stone entablature with sandstone and brick balconette. (Photo 3, 4, 30) (Historic Images, Figure 10) The secondary east entry mimics flanking semi-arched window openings at each entry with the extrados diminishing in size from the carved sandstone keystone to the springing line. (Photo 5) Tower upper floors are composed of paired window openings with sandstone sills and flat arch with a central sandstone keystone flanked by end sandstone voussoirs and roman brick infill from second to the fourth floors. Smaller fifth floor window openings are separated by brick panels. The window fenestration pattern continues onto the east and west elevations. (Photos 6-8) The north fenestration has stone sills and brick lintels. (Photos 13, 14, 36) Windows openings have been partially or completely boarded over with remnants of paired windows revealed demonstrating a combination of fanlights (Photo 31, 32) and 12/12 semi-arched double hung sash (Photo 29); no 1/1 double hung sash appear to remain.

The north elevation abuts the 1905 Machine Shop at the first and second floors. (Photo 36) To the east is the elevator and stair core, which are part of the 1913-16 Addition. A first-floor chamfered corner porte cochere supported by a brick pier with stone plinth at the east elevation allows for entry to an interior loading dock between the 1905-1910 Second Renaissance Revival portion and the 1913-1916 Addition (Photo 6).
The flat ballast roof is surrounded by stone capped parapet walls (Photo 37). Remnants of a billboard are mounted above the west tower (Historic Images, Figures 12, 14). The building exterior exhibits graffiti, masonry delamination and spalling.
Interior finishes have been removed as part of asbestos clean-up leaving exposed cinder concrete floors, concrete slab, red brick walls, and formed concrete ceilings supported by square columns; graffiti is rampant throughout the interior (Photos 16-18, 21, 22, 24-26). The first floor towers exhibit remnants of marble floors. Deteriorated steel pan stairs and adjacent single elevator shafts are centrally placed along the interior wall of each tower (Photo 20).

1905 Machine Shop (*Referenced on Sanborn Fire Insurance Maps & Historic Drawings as Historic Building #3-5)* and Blacksmith, Engine & Boiler Room *(Historic Building #6)* (Photos 9-14, 36, 38, 40-42) (Historic Images, Figures 8, 9, 13)

The one-story 1905 Machine Shop is connected to the north elevation of the 1905-1910 Second Renaissance Revival brick portion of the building and west elevation of the 1916 five-story brick addition. The three-bay Shop is steel and reinforced concrete construction rising 18' to vented sawtooth metal roof monitors. (Photos 9-14, 36) Historic images show the Shop with west brick wall and existing sawtooth roof line; the glass skylights have broken over the years since the building was vacated in 1985. (Historic Images, Figures, 8, 9, 13)

The one-story 1905 brick Blacksmith, Engine & Boiler room[3] is attached to the north of the Machine Shop and south side of the 1910 Shipping and Storage room. It continues the sawtooth roof pattern from the Machine Shop. (Photo 38) The west elevation is painted brick with three overhead entries at the first floor and paired window opening with stone lintel at the second floor. (Photos 9) CMU infill walls with window and door openings at the south elevation lead from the Machine Shop. North elevation bricked openings connected to the Shipping and Storage room to the north. The interior is separated by a brick demising wall. The west end served as the Blacksmith area and exhibits concrete floors, brick walls, and exposed steel roof supports throughout. Contemporary red tile floors, painted brick, and yellow glazed tile walls and electrical panel with abandoned machinery and duct work define the east end which housed the Boiler and Electric room (Photos 40-42).

1910 Shipping and Storage (Photos 15, 38, 39)
The two-story 1910 Shipping and Storage area[4] is red brick construction with metal flat roof monitor, situated at the northern most portion of the building. The building abuts the Pennsylvania railroad track trestle at the northeast corner where a railroad spur ran along the north elevation; black tar remnants demonstrate evidence of a canopy which is indicated on the historic Sanborn Fire Insurance maps.[5] (Photos 15, 39) Boarded up and garage door openings, and glass block windows remain. The west elevation with a single loading door opening exhibits sawtooth shaped ghost lines from the demolished portion of the 1940-41 addition (Photo 15). An elevator penthouse is located at the east elevation (Photo 38). The interior exhibits remnants of a wood floor, square concrete columns, and formed concrete ceiling.

1913-16 Addition (*Referenced on Sanborn Fire Insurance Maps & Historic Drawings as Historic Building* #2)(Photos 7, 10, 11, 19, 23, 28, 27, 33, 34)
The five-story red brick triangular shaped 1913-1916 Addition replaced an earlier 1910 storage area.[6] The Addition is steel and reinforced concrete construction. The Addition housed cleaning, shipping, and boxing on the first floor, machine shop on the third and fourth floors, and a restaurant and club on the fifth floor. The east elevation spans 18 bays of segmental arch paired window openings at floors one through four, with in-filled loading dock bays at the

[3] General Plan Works of The Warner & Swasey Co, Cleveland, 3 June 1905, City of Cleveland Archives.
[4] Sanborn Fire Insurance Map, 1913 "from plans", 1952.
[5] Sanborn Fire Insurance Map, 1952.
[6] Sanborn Fire Insurance Map 1913 shows 5-story addition "from plans"; City of Cleveland Permit #10225C dated 5 November 1915, 5809 Carnegie Ave., Warner & Swasey 5-story Manufacturing Sanborn Fire Insurance Map, 1952; Osborn Engineering Co. Plans for Warner & Swasey Building, 5701 Carnegie Avenue, revised 19 May 1913.

second floor facing the railroad trestle. The fifth floor is finished with paired rectangular window openings below a corbeled brick and stone cornice.[7] (Photo 7) The west elevation continues the window fenestration pattern, connecting to the Machine Ship at lower floors (Photos 10, 11). A brick-paved drive off Carnegie Avenue leads to the first-floor interior truck loading dock (Photos 33, 34). A stair and elevator corridor at the southwest corner connects the Addition to the five-story red brick 1905-1910 Second Renaissance Revival portion of the building (Photos 19, 27, 33). Interior finishes have been removed from the building leaving exposed cinder concrete floors, concrete slab, painted brick walls and formed concrete ceilings supported by square columns. Remnants of paired painted wood windows remain at upper floors (Photos 23, 28).

2

ca. 1910 Service Building (Photos 1, 43) (Historic Images, Figure 8)
A one-story red brick triangular shaped ca. 1910 service building with flat stone capped roof rests on a concrete slab. The brick fence along Carnegie Avenue composes the south wall. The CMU east wall abuts the railroad trestle. A central single door opening is flanked by window opening with stone sill and infilled door opening at the chamfered corner. The exterior and interior exhibit painted graffiti (Photos 1, 43).

INTEGRITY

The iconic red brick Second Renaissance Revival style Warner & Swasey Company architect designed manufacturing complex retains a significant level of historic integrity. Characteristics representative of the style include the tripartite classical design with rectangular massing, façade symmetry with tower bookends and window fenestration pattern, emphasis on the horizontal plane, differentiation of the first floor though brick pattern walls and semi-arched window openings with sandstone accents, keystone, brick quoining, and smaller window openings on the upper fifth floor. Additional classical details include a brick and bracketed sandstone balustrade above the recessed main entry with carved stone surround, stone keystones at window and door openings, and brick quoining. The building exhibits deterioration, fractional demolition, and painted graffiti accumulated over the last 30+ years that it has remained vacant while retaining a significant level of intact historic material representative of a manufacturing complex. Utilitarian areas at the rear of the building maintain their form demonstrated by the three-bay Machine Shop with vented sawtooth metal roof monitors, as well as by the ca. 1910 service building at the east entry off Carnegie Ave. The Blacksmith, Engine & Boiler room continues the sawtooth roof pattern from the Machine Shop, with the Shipping and Storage room retaining its functional characteristics. Interior finishes have been abated with the structural elements exposed to environmental conditions. Overall, the building demonstrates the retention of historic fabric, materials, and craftsmanship, representing the manufacturing aspects for factory use, such as the numerous large window openings and open plan for manufacturing equipment. The building remains in its historic location and the architectural language retains the historic feeling and association as noted in historic images of the building in its original historic setting. The location and setting of the property is the site associated with the Warner & Swasey Co. from its origins in the 1880s until the company ceased operations in the 1980s.

[7] Osborn Engineering Co. Plans for Warner & Swasey Building, 5701 Carnegie Avenue, 1905-1942

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- [x] A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [x] B. Property is associated with the lives of persons significant in our past.
- [ ] C. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] D. Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark “x” in all the boxes that apply.)

- [ ] A. Owned by a religious institution or used for religious purposes
- [ ] B. Removed from its original location
- [ ] C. A birthplace or grave
- [ ] D. A cemetery
- [ ] E. A reconstructed building, object, or structure
- [ ] F. A commemorative property
- [ ] G. Less than 50 years old or achieving significance within the past 50 years

Areas of Significance
(Enter categories from instructions.)
ENGINEERING
INDUSTRY

Period of Significance
1905-1970

Significant Dates
1905-1910
1913-1916

Significant Person
(Complete only if Criterion B is marked above.)
Warner, Worcester Reed
Swasey, Ambrose

Cultural Affiliation

Architect/Builder
Brunner, Arnold W.
Osborn Engineering Co.

Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

The Warner & Swasey Company building is being nominated under Criterion A in the areas of Engineering and Industry as representative of the impact of the Warner & Swasey Company as a world leader in the manufacturing of high quality craftsmanship of machine tools, telescopes, and precision instruments; and, under Criterion B for its association with partners Ambrose Swasey and Worcester Reed Warner representing their contribution to engineering and design through their manufacturing and office headquarters of the Warner & Swasey Company for 80 years. Company products and development reflected Warner's life-long interest in astronomical instruments and Swasey's engineering innovations. The company gained international fame in 1886 by building the largest and most technologically advanced telescope at the time for the Lick Observatory in California, and later completed large telescopes for the U.S. Naval Observatory and Yerkes Observatory in Wisconsin. This technology was further and more profitably applied to produce improved military precision instruments and weaponry during the Spanish American War, World War I and II.[8] In addition, Warner & Swasey became the top producer in the world of turret lathes for the production of machine tools by 1928. Their impact to the advancement of engineering through their overlapping of the craft of toolmaking and instrument-making, not only affected the success of their company, which continued more than fifty-years after their deaths, but recognized both men as major contributors in the advancements of the field of engineering.

The period of significance begins in 1905 with the beginning of construction of the Warner & Swasey Company headquarters building and continues to 1970 within the National Register 50-year guidelines. The end date represents the last phase of the company's history, the postwar period when the company continued to prosper, diversifying its products, and realizing record sales and profits. During this later period Warner & Swasey was named a Fortune 500 Company. The Warner & Swasey Company continued in business until 1985.

Narrative Statement of Significance (Provide at least **one** paragraph for each area of significance.)

The city of Cleveland, like much of Ohio, during the second half of the 19th century and first half of the 20th century prospered from an industrial economy able to take advantage of its location some 400-600 miles closer to the growing western markets than East coast rivals. Cleveland benefited by cutting transportation costs of shipping goods via the Lake Erie and the Great Lakes, the canal system, and the growing network of railroads and later highways. Historian George Knepper quotes an 1899 commenter: "Ohio…perceived the advantages of its location at

[8] Warner & Swasey, The Warner & Swasey Company, 1880-1920, Fortieth Anniversary Celebration, Cleveland Ohio. New York: Bartlett Orr Press, 1920; Van Tassel, David R. and Grabowski, John J. eds. "Warner & Swasey."

the gateway of the Middle West, and, adding industry to industry, became one vast resounding workshop."[9] The history of the Warner & Swasey Company reflects this advantageous location and industrial growth.

The city of Cleveland developed as one of the major machine tool manufacturing centers in the United States during the late 19th and early 20th centuries, in response to manufacturing demands for improved machine tooling equipment. The Warner & Swasey Company would become a world leader in the industry. Worcester Reed Warner and Ambrose Swasey met at the age of 19 years while working as machine shop apprentices in New England. By combining their savings, they moved to Chicago and shortly thereafter to Cleveland in search of skilled labor to start their machine tooling business. They commenced operation by constructing a plant on Carnegie Avenue in 1881 (demolished), at the same location as the nominated property. Founded in 1880, Warner & Swasey operated on Carnegie Avenue for over 100 years leaving behind a legacy of ingenuity in engineering with a multitude of machine tool, telescope, and advances in precision instruments that transformed the twentieth century.

Narrative Statement of Significance
Development of Machine Tool Manufacturing Industry

Machine tools are defined as power operated metal working machines by which other machines are built. The city of Cleveland developed as one of the major machine tool manufacturing centers in the United States by the turn of the twentieth century and beginning of the Progressive years. The city followed the earlier pattern in New England where the need for accurate cylinders for steam engines in the 1700s and later industrial growth of the textile and small firearms industries ignited development of the local machine tool industry. Eli Whitney popularized the use of interchangeable parts for mass production of firearms during the early nineteenth century which contributed to the surge of demand. After the Civil War, as American industry spread from the East Coast to the growing Midwest, machine tooling moved to Cleveland where it flourished from the 1880s to the 1940s.[10]

While New England's textile and firearms industries spurred the manufacture of machine tools during the Industrial era, metalworking industries formed the basis for the machine tool industry's growth in Cleveland. Well-developed transportation routes using the Great Lakes and the Ohio & Erie Canal were moving raw materials from the mines of Michigan and Pennsylvania into the city. The discovery of iron ore and the growing steel industry attracted a large pool of trained craftsmen, many of them from New England. At the same time, entrepreneurs in Cleveland founded companies that manufactured ships, hardware, sewing machines, and bicycles. These factors combined with wealth derived from the iron and steel industry nurtured

[9] Knepper, George. *Ohio and its People*. Kent, OH: Kent State University Press, 2003, p. 279.
[10] Van Tassel, David R. and Grabowski, John J. eds. "Machine Tool Industry"; Bluestone, Daniel M. *Cleveland An Inventory of Historic Engineering and Industial Sites*. Historic American Engineering record, Office of Archeology and Historic Preservaion, Heritage Conservaion and Recreation Service, U.S Department of the Interior, 1978, 47. This inventory was the first step to the HAER documentaion process.

some of the most enterprising and successful machine tool manufacturers in the United States. In the 1870's, the Cleveland Twist Drill Company pioneered machine tool manufacturing by designing and building machines to produce general machine tools and twist drills. The company expanded to Chicago and New York and established one of the earliest industrial laboratories in the city of Cleveland with trained metallurgists. Manufacturers benefited from sharing techniques of interchangeable parts and ability to create large volumes of identical parts.[11] The turret lathe is a type of metalworking lathe enabling multiple cutting operations to be performed in rapid succession to create duplicate and interchangeable parts for the production of items including machine tools. The lathe freed the operator from having to preform redundant and less efficient set ups for parts production (Historic Images, Figure 17).

Other eastern manufacturers followed the Cleveland Twist Drill Co. to Cleveland. The availability of capital attracted the National Acme Co. of Connecticut, which later merged with the National Screw & Tack Co. of Cleveland to create the National Acme Screw Manufacturing Co. In 1915, the company bought Connecticut machine tool manufacturer, Windsor Machine Co., combining Windsor and National Acme's technology to become one of the largest producers of multiple spindle bar machines[12] in the country. An eastern trained craftsman formerly employed by one of the largest machine tool companies in New England, A.W. Foote, moved to Cleveland to set up his business. The Foote-Burt Co. produced drilling machines and broaching machines.[13] Other successful companies appeared in the city at the turn of the century, many of them founded by Clevelanders trained on the floors of transplanted New England firms. Ohio, along with other east, north, and central states predominated the industry in 1900, producing nearly forty percent of American machine tools. The years 1890 to 1930 are considered the golden age of machine tool manufacturing in Cleveland and across the Midwest.[14]

The Warner & Swasey Company in Cleveland would rise above competing machine tool manufacturers to become a world leader in the production of turret lathes and telescopes. Warner & Swasey moved from Chicago to Cleveland in 1881, to take advantage of trained mechanics in the city. The company would grow to strongly influence the entire industry through the refinement of machine tool design and their interest in construction of equatorial drives and refraction telescopes. The unique combination of scientific instrumentation and machine tool design by Warner & Swasey gave the machine tool industry new prestige among engineering and scientific communities, placing the company at the vanguard position within the industry.[15]

[11] Ibid.
[12] A multi-spindle machine is a screw machine made to cut materials into small pieces in a simultaneous manner through the use of a number of tools. This machine possesses multiple spindles which are found on a drum which rotates in a horizontal manner.
[13] Broaching is a machining process using a toothed tool, called a broach, to remove material. There are two main types of broaching: linear and rotary. In linear broaching, which is the more common process, the broach is run linearly against a surface of the workpiece to make the cut.
[14]Van Tassel, David R. and Grabowski, John J. eds. "Machine Tool Industry."; Bluestone, 47.
[15] Ibid.

The Founders

Worcester R. Warner was born May 6, 1846, near Cummington, Massachusetts, and educated in the rural district school. (Historic Images, Figures 15a, 15b) At the age of 19 he was first employed as a draftsman at the American safety and Steam Engine Company of Boston. He was soon transferred to the company's shops in Exeter, New Hampshire, where he became friends with Ambrose Swasey. Upon completion of their apprenticeships in 1870, both men entered the employment of Pratt & Whitney in Hartford, Connecticut. Warner was placed in charge of one of the firm's largest departments and was entrusted with management of the company's exhibit at the 1876 Centennial Exposition, in Philadelphia. After working as a foreman, he undertook the building of machines under contract and drew attention to his ability to greatly reduce production time. In his youth, he greatly enjoyed astronomy and was encouraged by his mother to study the field inspiring him to building crude telescope models. He continued his research and experimentation through his apprenticeship making progress during his time in Hartford. A mounting for a portable telescope was so successful that he followed it by building a larger and more powerful instrument.

Warner married Cornelia Blakemore in June 1890 with whom he had one daughter, Helen Blakemore Warner. Mrs. Warner was co-principal of Miss Mittleberger's School and along with her husband devoted to Cleveland's cultural and educational affairs as well as world travel. In 1891-92, along with Ambrose Swasey, they commissioned side-by-side houses with a shared driveway on Euclid Avenue designed by New York architect Richard Morris Hunt (demolished). A private observatory for Messrs. Warner and Swasey was constructed between the two houses, at the end of the shared driveway (demolished). (Historic Images, Figures 16,16a) After 30 years in the city, the Warners built a country house with their daughter north of New York City in Tarrytown-on-the-Lake. Worcester Reed Warner passed away while on a trip to Eisenach, Germany, on June 25, 1929, at the age of 83 years and is buried in Tarrytown, New York. [16]

Warner's accomplishments and honors over the years included becoming a charter member of the American Society of Mechanical Engineers, serving as President in 1897. He was past president and honorary member of the Cleveland Engineering Society, a member of the British Astronomical Society, of the American Astronomical and Astrophysical Society, and of the American Association for the Advancement of Science. Among other honors he received a degree of Doctor of Mechanical Science from the University of Western Pennsylvania and Doctor of Engineering from Case School of Applied Science. His activity in business, financial, and general community life in Cleveland placed him in such positions as Vice President of the Society for Savings, Director of The Guardian Savings and Trust Company, member of the

[16] Warner & Swasey, The Warner & Swasey Company, 1880-1920, 11-12, 26; Van Tassel, David R. and Grabowski, John J. eds. "Worcester Reed Warner."; Cigliano, Jan. *Showplace of America Cleveland's Euclid Avenue, 1850-1910.* Kent: Kent State Univeristy Press, 1991, 187-190; Coates, William R. *A History of Cuyahoga County and the City of Cleveland*, Vol II., Chicago: The American Historical Society, 1924; Miller, Dayton C. *Biographical Memoir of Ambrose Swasey 1846-1937*. National Academy of Sciences, presented to the Academy at the Annual Meeting, 1940; *Plain Dealer*, 26 June 1929.

Advisory Board of The Citizens Savings and Trust Company, trustee of Case School of Applied Science, trustee of Adelbert College, of Western Reserve University, and of the Cleveland School of Art, member of the Advisory Board of the Cleveland Museum of Art, and as President of the Cleveland Chamber of Commerce. In addition, the Warner moon impact crater is named after him.[17]

The Worcester Reed Warner Medal was established by his bequest in 1930. The prestigious medal continues today and is awarded by the American Society of Mechanical Engineers to an individual for outstanding contribution to the permanent literature of engineering.[18] (Historic Images, Figure 21)

Ambrose Swasey (1846-1937)

Ambrose Swasey was born the same year as his future partner Worcester Warner on December 19, 1846, near Exeter, New Hampshire, and educated in the rural district school (Historic Images, Figures 15a, 15b). He developed an early interest in mechanical problems, experimenting with farm implements. In 1865, he entered his apprenticeship in the Exeter Machine Works and soon after found employment at Pratt & Whitney where he befriended Worchester Warner. While in charge of the Gear Cutting Department, he developed the Epicycloidal Milling Machine for production of true theoretical curves from which cutters for gear teeth are made. In addition, he invented a new gear cutting machine for generating and at the same time cutting the teeth of spur gears, the process being a solution to the difficult problem of an interchangeable system of gearing. Among his other contributions, was the design of the Warner & Swasey Automatic Dividing Engine and Swasey Depression Position Finder for seacoast defense fortifications.

Ambrose Swasey married Lavinia Marston of Exeter in 1871 and the couple had no children. They devoted themselves to the Euclid Avenue Baptist Church, educational institutions such as Case School of Applied Sciences, and to close friends. Swasey remained at his Euclid Avenue home after his wife's death in 1913, establishing the Lavinia Marston Swasey Memorial Fund of $300,000 for ministerial relief through the Northern Baptist Convention. He passed away at his summer home in Exeter in 1937 at the age of 90 years among accolades for his work. [19]

[17] Warner & Swasey Company 40th Anniversary Medal. Csillagászat érmeken Astronomy on Coins and Medals. Available at http://astrocoins.mrcollector.eu/index.php/english-menu-1/astronomers/19th-century/187-swasey-ambrose-1846-1937.

[18] American Society of Mechanical Engineers, Worcester Reed Warner Medal. Available at https://www.asme.org/about-asme/get-involved/honors-awards/literature-awards/worcester-reed-warner-medal.

[19] Warner & Swasey, The Warner & Swasey Company, 1880-1920, 13-14; Van Tassel, David R. and Grabowski, John J. eds. "Ambrose Swasey" *The Encyclopedia of Cleveland History;* Cigliano, 187-190; Coates, William R. *A History of Cuyahoga County and the City of Cleveland*, Vol II., Chicago: The American Historical Society, 1924.

In 1900, he received the decoration of Chevalier of the Legion of Honor from the French Government for his work on astronomical instruments. In 1905, Case School of Applied Science conferred upon him the degree of Doctor of Engineering. In 1909, Swasey provided the funds and telescope equipment to construct the Swasey Observatory and a year later in 1910 received the degree of Doctor of Science from Denison University. He was one of the founding members of the American Society of Mechanical Engineers serving as President in 1904 and honorary member in 1916.

Swasey served as a member of the Jury of Awards of the Nashville, Pan-American and St. Louis Expositions and as Vice President of the Jury of Award of the Jamestown Exposition. In 1914, he provided the initial fund to establish the Engineering Foundation of the United Engineering Society. The Society was the first known engineering foundation intended to promote the good of mankind through the work of the engineer. By 1931, he had donated $890,000 to the organization. In 1930 he was awarded the Cleveland Medal of Service from the Chamber of Commerce. [20]

When a new minor planet or "asteroid" is discovered, astronomers assign a serial number and allow the discoverer the privilege of choosing the name. As a tribute to Mr. Swasey on his eighty-eighth birthday, December 19, 1934, Dr. Otto Struve, Director of the Yerkes Observatory, who had discovered asteroid No. 922, gave it the name "Swaseya." The *a* was added to the name in accordance with the tradition that all names of asteroids shall end with a.[21]

In addition, he was a past President and honorary member of the Cleveland Engineering Society and a member of the National Research Council during World War I. His foreign engineering connections included membership in the Institution of Mechanical Engineering of Great Britain, the British Astronomical Association, and as a Fellow of the Royal Astronomical Society.[22] He received honors throughout his career; including The Washington Award - "In recognition of devoted, unselfish and pre-eminent service in advancing human progress"; the American Society of Mechanical Engineers A.S.M.E. Medal "for distinguished service in engineering and science"; and, The United Engineering Societies, John Fritz Gold Medal, "For his achievement as a designer and manufacturer of instruments and machines of precision, a builder of great telescopes, a benefactor of education, and the Founder of The Engineering Foundation." This medal is the most distinguished honor that can be awarded in the engineering profession.[23]

On December 19, 1936, at the age of 90, Swasey received the Hoover Medal of Engineering Societies of America. At the same time, he was presented with the Medal of Honor of the "Verein Deutscher Ingenieure" of Germany. The citation states: "Outstanding designer of machine tools, astronomical and optical instruments, the founder of an enterprise which has gained world-wide reputation, the great benefactor of engineering research." The "enterprise"

[20] Van Tassel, David R. and Grabowski, John J. eds. "Ambrose Swasey" *The Encyclopedia of Cleveland History.*
[21] Miller, 17.
[22] Warner & Swasey, The Warner & Swasey Company, 1880-1920, 13-14.
[23] Miller, 16-17.

referred to is The Engineering Foundation. The citation was accompanied by a letter from the President of the German Society, stating that the presentation is in celebration of Mr. Swasey's ninetieth birthday.[24]

His list of registered patents includes, but is not limited to:[25]

165,519. Protractor—July 13, 1875.
168,354. Water Meter—October 5, 1875.
306,197. Running gear for revolving domes—October 7, 1884. (Warner and Swasey).
585,894. Feed mechanism for screw-machines—July 6, 1897. (Swasey and Lucas).
632,905. Turret lathe—September 12, 1899. (Swasey and Lucas).
632,906. Turret operating mechanism—September 12, 1899.
633,925. Friction Clutch—September 26, 1899. (Swasey and Allen).
642,884. Roller-Feed for screw-machine—February 6, 1900. (Swasey and Lucas).
642,885. Roller-Feed for screw machine—February 6, 1900.
670,213. Lathe-Chuck—March 19, 1901.
677,288. Telescopic gun sight—June 25, 1901.
737,794. Depression range-finder—September 1, 1903.
812,464. Optical instrument—February 13, 1906. (Swasey and Fecker).
815,657. Panorama-Sight—March 20, 1906.
819,948. Optical instrument—May 8, 1906. (Swasey and Fecker).
820,998. Telescopic sight for firearms—May 22, 1906.
851,706. Depression range-finder—April 30, 1907.
861,331. Horizontal range-finder—July 30, 1907.
862,293. Telescope—August 6, 1907.
862,294. Range-Finder—August 6, 1907.
906,751. Sight device for firearms—December 15, 1908.
959,179. Telescope—May 24, 1910.
964,709. Sight for firearms—July 19, 1910.

Warner & Swasey – The Partnership

On May 5, 1880, founders Worcester R. Warner and Ambrose Swasey established the partnership of Warner & Swasey, with the initial investment of their combined savings. Four young men including William S. Lane, George C. Bardons, George D. Phelps, and Frank H. Woods came with Warner and Swasey from Connecticut to form the nucleus of the new organization. Warner served as the salesman and administrator, while Swasey's strength was founded in engineering. Their first venture was set up in Chicago, but shortly thereafter relocated to Cleveland due to few skilled mechanics being found so far distant from the industrial centers of New England. A factory building was constructed in 1881 in Cleveland (demolished) on the site of the present Warner & Swasey Company building, the subject of this nomination.

[24] Miller, 16-17.
[25] Miller, 28.

The first order for business was for ten hand lathes. Other orders for different types of machines soon followed until modest resources were taxed to the limit with a rapid increase in business. Labor saving machinery formed an important part of the product line. Machines related to sewing machine parts were a focus of the early years. Vertical milling machines for die sinking and similar work were made in considerable quantity with the later addition of the horizontal boring machine. The turret lathe became destined from the beginning to be the principal product of the firm with a standard line of turret lathes established of various sizes and styles, including screw machines with attention later given to brass-working machine tools. (Historic Images, Figure 17) The design and construction of special purpose machines with the ensuing demand for engineers resulted in further specialization of the product line. During these early years, turret lathes were also introduced into European countries in unprecedented quantities marking a further increase in specialization and increase in production.

The company product line did not remain confined to machine tools. The first telescope designed by the firm was a 9.5-inch Equatorial completed in 1881. The telescope venture was made possible by earnings from machine tool orders. This first Equatorial mount was donated to the Smithsonian Institute in Washington.[26] The engineering experience and innovation of Warner and Swasey resulted in marked improvements in the design and construction of telescopes up to that time with the success of the first telescope encouraging the company to continue with the line. One of the first telescopes designed was the 36-inch refracting telescope of the Lick Observatory, Mount Hamilton, California, constructed during the winter of 1886-87. (Historic Images, Figure 18) This was the largest refracting telescope constructed up to this date, and the first to be adapted to the triple purposes of visual, photographic, and spectroscopic work. The telescope was so successful that the U.S. government commissioned the firm to construct a similar design for the U.S. Naval Observatory, Washington. In 1897, the firm designed a 40-inch telescope, 90-foot dome, and 75-foot elevating floor for the Yerkes Observatory, Williams Bay, Wisconsin. (Historic Images, Figure 19) Transits, meridian circles, astronomical, and other instruments of extreme accuracy became a strong component of the firm's work. One of the most important achievements was construction of a Dividing Engine for automatically graduating circles of 40 inches or less in diameter, requiring the greatest accuracy necessary for astronomical and other instruments which became the most accurate in existence at the time.

The telescope was first patented in 1608 by a Dutch eyeglass maker Hans Lippershey, able to magnify an image up to three times. Galileo heard about the device and set upon his own design reaching magnification of 20 times and for the first time pointing skyward. Isaac Newton built the first refracting telescope which used a series of mirrors rather than lens. Minor technological improvements followed until 1729 when Englishman Charles Hall introduced a new form of lens, solving the color distortion issue. In 1789, the first giant 12-meter Newtonian based reflector telescope was built in the U.K. by William Herschel improving the reflective quality

[26] Warner & Swasey Company, Telescope Mount, 1881, Smithsonian The National Museum of American History, donated 1958. Available at http://americanhistory.si.edu/collections/search/object/nmah_1187384.

becoming known as the Herschelian telescope. The 1880s saw a rise in giant telescopes with the introduction of the Warner & Swasey 36-inch refracting telescope at the Lick Observatory, 1886-

87. This was followed by the Yerkes Observatory in Williams Bay Wisconsin, founded by George Ellery Hale and paid for by Charles Yerkes. It would house the largest refracting telescope at the time in 1897 with Warner and Swasey designing the telescope, dome and elevating floor. The design of the telescope and housing were recognized for the first time as a melding of science and arts – with the Yerkes Observatory calling itself "the birthplace of astrophysics." Yerkes marked the change in thinking around telescopes from amateur hobby to dedicated and serious scientific rigor. The telescope pushed the limits of the maximum size of refracting telescopes as it used the biggest lenses possible at 102 cm in diameter, before the entire apparatus would collapse under its own weight. [27]

Astronomy was well-established as a discipline by the 1890s, but not as a profession. Most astronomers were college level teachers and therefore focused on the teaching aspects. At the same time, there was great pressure to organize specialized sciences in America. The few research institutions which chose to focus on astronomy included the Lick Observatory, the U.S. Naval Observatory, the Astrophysical Observatory of the Smithsonian Institution established in 1890 which focused on solar research, and the Harvard College Observatory operating with an early 1840s German refractor. [28]

The American Astronomical Society was founded in 1889 through the efforts of George Ellery Hale, along with an executive council and 114 initial members. Members published scholarly astronomical abstracts in the Society's *Science* journal. [29]

Warner & Swasey remained at the forefront of astronomical instrument design. Warner & Swasey astronomical instruments and technology were installed in observatories throughout the United States. The company's 40th Anniversary book described the firm's telescope work as unprofitable overall and incidental to the manufacture of machine tools, but a labor of technological love.[30] Warner was a member of the British Astronomical Society, American Astronomical and Astrophysical Society, a Fellow of the Royal Astronomical Society and of the American Association for the Advancement of Science.[31]

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[27] McFadden, Christopher. "A Brief History of the Telescope: From 1608 to Gamma Rays." Available at https://interestingengineering.com/a-brief-history-of-the-telescope-from-1608-to-gamma-rays.
[28] Smithsonian Astrophysical Observatory. Available at https://siarchives.si.edu/history/smithsonian-astrophysical-observatory; Harvard College Observatory. Available at https://www.cfa.harvard.edu/hco/great-refractor; American Astronomical Society, Historical Astronomy Division. Available at https://had.aas.org/resources/aashistory/origin-of-aas.
[29] American Astronomical Society, Historical Astronomy Division. Available at https://had.aas.org/resources/aashistory/origin-of-aas.
[30] *The Warner & Swasey Company 1880-1930*. Cleveland: Warner & Swasey,1930; "Warner & Swasey Telescope for Argentina," *Iron Age.* Vol. 110. 19 October, 1922, 1019.
[31] *Warner & Swasey, The Warner & Swasey Company, 1880-1920, Fortieth Anniversary Celebration, Cleveland Ohio*, 12.

The list of observatories with Warner & Swasey telescopes includes, but is not limited to:

- Bosque Alegre Observatory, National University of Cordoba, ARG
- Burrell Memorial Observatory, Baldwin Wallace University, USA
- Crane Observatory, Washburn University, USA
- Chabot Space & Science Center, Oakland, California, USA
- Drake Municipal Observatory, Des Moines, Iowa, USA
- Dominion Astrophysical Observatory, NRC, Canada
- Dudley Observatory, Schenectady, NY, USA
- Durfee High School, Fall River, Massachusetts, USA
- Fuertes Observatory (Irving Porter Church Memorial Telescope), Cornell University, USA
- Hildene Astronomy Club (Robert Todd Lincoln Telescope), Manchester, Vermont, USA
- James Observatory, Millsaps College, Jackson, Mississippi, USA
- Kirkwood Observatory, Indiana University, USA
- Lee Observatory, American University of Beirut, Lebanon
- Lick Observatory, University of California, USA
- McDonald Observatory (Otto Struve Telescope), University of Texas at Austin, USA
- Moraine Farm Observatory (Col. Deeds 7" Refractor), Col. Deeds Homestead, currently owned by Kettering Health Network, Dayton OH, USA
- Painter Hall Observatory, University of Texas at Austin, USA
- Perkins Telescope, Lowell Observatory, USA
- McKim Observatory, DePauw University, USA
- Mueller Observatory, Cleveland Museum of Natural History, USA
- Ritter Observatory, University of Toledo, USA
- Spacewatch 0.9-meter Telescope, Kitt Peak, University of Arizona, USA
- Stephens Memorial Observatory (Cooley Telescope - 9-inch Refractor), Hiram College, USA
- Swasey Observatory, Denison University, USA
- Tate Laboratory, School of Physics and Astronomy, University of Minnesota, USA
- United States Naval Observatory (USNO), United States Navy, USA
- University of Illinois Observatory, Urbana, Illinois, USA
- Theodor Jacobsen Observatory, University of Washington, USA
- Warner and Swasey Observatory, Case Western Reserve University, USA
- Yerkes Observatory, University of Chicago, USA

Building on the company's expertise in astronomical technology and during the Spanish American War in 1898, the firm was asked to undertake the more profitable manufacture of military precision instruments. Work for the Army and Navy included range finders, gun sight telescopes, azimuth instruments, field telescopes, telescopic musket sights, and prism binoculars.

The firm of Warner & Swasey had established itself with a standardized line of machine tools and as designers and constructors of astronomical and precision instruments. The merit of machine tools and astronomical instruments produced during the time of the earlier partnership years from 1880-1900 is evidenced by the large number of medals and diplomas awarded to the firm for exhibits made in the Paris Exposition, 1889, and World's Columbian Exposition,

Chicago, 1893. In addition, an apprentice program was established to train the next generation of skilled workers which would remain a hallmark of the firm.[32]

Warner & Swasey - The Corporation

In 1900, the business which had been conducted as a partnership firm for the first 20 years was incorporated under the name "The Warner & Swasey Company." Recognizing the new era of machine development at the turn of the twentieth century, plans were made for complete reconstruction of the physical plant, evolving into the factory complex subject of this nomination. The facility was greatly enlarged and completely modernized,[33] designed by Swasey colleague and New York architect Arnold W. Brunner and the Cleveland firm of Osborn Engineering Co.[34] Construction of the west portion of the new factory and office building fronting Carnegie Avenue commenced in 1905 as an addition to the original 1881 factory building[35] which was located to the east along the railroad tracks. The new factory addition was completed in 1908[36] with west tower, Machine Shop and Blacksmith, Engine & Boiler room to allow for expansion of the turret lathe product line. A sales organization was established and constantly increased with branch offices in the leading industrial centers of the country. In 1910, the 1881 factory building was demolished to complete the eastern portion of the extant building with east tower and 1910 Shipping and Storage room with railroad spur.[37] At the same time, exports to foreign countries were increased and extended throughout the world. Notable contracts received included further development of military instruments for the government and design and construction of the 72-inch reflecting telescope for the Dominion Astrophysical Observatory of Canada, 1910-1918. Other important projects included the 60-inch reflecting telescope designed for the Observatorio Astronómico de Córdoba, Argentina, which was one of

[32] Warner & Swasey, The Warner & Swasey Company, 1880-1920, 19-26: The Civil Engineers' Club of Cleveland. *Visitors' Directory to the Engineering Works and Industries of Cleveland, Ohio*, Columbian Edition, 1893, 70-72.
[33] Warner & Swasey, The Warner & Swasey Company, 1880-1920, 27-55.
[34] Gaede, Robert. *Guide to Cleveland Architecture*. *Cleveland Chapter of the American Institute of Architects 1890-1990.* First Edition. Cleveland: Carpenter Reserve Printing, 1990. Attributes Arnold Brunner as architect for the "1905,1908" building. Donald Petit, Cleveland Landmarks, identified the source of this information as Joseph Ceruti, principal architect for Warner & Swasey from 1941-1945; Included in the Osborn Engineering Co. Plans for Warner & Swasey Building, 5701 Carnegie Avenue, 1905-1942, City of Cleveland Archives is a General Plan of the Works of Warner & Swasey dated 3 June 1905 with no architect attribution; Sanborn Fire Insurance Map, 1952 identifies construction date as 1908, which is likely the date the west portion of the building was completed.
[35] City of Cleveland Building Permit # 54647 dated 21 September 1905 for 5-story Warner & Swasey New Factory, City of Cleveland Building Department, Cleveland City Hall. Permit information has been recorded but original is not in record; Sanborn Fire Insurance Maps, 1913,1952; *Plain Dealer* 2 September 1905, 24 September 1905.
[36] Sanborn Fire Insurance Map, 1913, 1952.
[37] *Plain Dealer*, 24 April 1910: Osborn Engineering Co. Plans for Warner & Swasey Building, 5701 Carnegie Avenue, 1905-1942, City of Cleveland Archives; City of Cleveland Building Permit #32502 dated 14 July 1910, 5701 Carnegie Ave., Warner & Swasey 5-story brick Factory Addition, Architect Osborn Engineering Co.; Sanborn Fire Insurance Map, 1952.

the four largest telescopes in the world at the time of installation in 1922.[38] Awards received between 1900-1920 on exhibits of machine tools and astronomical instruments included: the Paris Exposition, 1900; Pan-American Exposition, Buffalo, 1901; Universal Exposition, St. Louis, 1904; and the Panama-Pacific International Exposition, San Francisco, 1915.

Cleveland as a leading manufacturing city for basic metals, heavy machinery, auto and truck assemblies, machine tools, and other products, was a major contributor to meeting the demand for wartime production.

The Warner & Swasey Company was among those industries increasing production to meet demands of the war effort during World War I. For two years preceding the start of World War I, the company "poured out a constant stream of machine tools and instruments" for use in munitions factories or on the battlefield. Within a few weeks after the start of World War I, machine tools were generally recognized as one of the limiting factors in war preparations, requiring the necessity of significantly increasing manufacture to correspond with the unprecedented war demand. Turret lathes made by the company were used for the manufacture of gun parts including parts for the Thompson submachine gun (better known as the "tommy gun"), rifle parts, pistol parts, fuses, shells, hand grenades, cartridges, gas containers, gas masks, and hundreds of similar parts. They were used to construct tanks, vehicle and airplane motors, as well as by practically every arsenal and navy yards with large volumes of machines supplied to munitions plants throughout England, France, Italy, and Russia.[39] Approximately 6,000 Warner & Swasey prism binoculars were manufactured before and during World War I. These telescopes and binoculars were made possible by the invention of the Swasey Dividing Engine housed in the Warner and Swasey Company building. Virtually every master circle used in optical devices for governments throughout the world until the 1930s were scribed by the Swasey Dividing Engine.[40] Beginning in the summer of 1917 the company devoted itself to government contracts for three instruments: naval gun sights, telescopic musket sights, and panoramic sights. The panoramic sight design and quantity of production was particularly challenging and earned the company a Certificate of Merit from the government.[41] (Historic Images, Figure 20)

In 1916, the company completed a triangular shaped 5-story addition to the rear at the east elevation to accommodate the demand, replacing a storage area. Historic drawings indicate plans for the building in 1913, likely delayed by the war.[42] The completed addition encompassed first floor cleaning and shipping, second floor boxing, third and fourth floor machine shop, and fifth floor restaurant and club.[43]

[38] "Warner & Swasey Telescope for Argentina," *Iron Age.* Vol. 110. 19 October, 1922, 1019.
[39] Warner & Swasey, The Warner & Swasey Company, 1880-1920, 53
[40] Warner & Swasey, The Warner & Swasey Company, 1880-1920,7.
[41] Warner & Swasey, The Warner & Swasey Company, 1880-1920, 53-55.
[42] Osborn Engineering Co. Plans for Warner & Swasey Building, 5701 Carnegie Avenue, revised 19 May 1913; Sanborn Fire Insurance Map, 1913 "from plans"; Sanborn Fire Insurance Map, 1952; City of Cleveland Permit #10225C dated 5 November 1915, 5809 Carnegie Ave., Warner & Swasey 5-story Manufacturing.
[43] Sanborn Fire Insurance Map, 1952.

The company celebrated 40 years of business in 1920 issuing a bronze commemorative medal designed by American sculptor and medalist Victor David Brenner, best known for his Lincoln one-cent coin design.[44] (Historic Images, Figure 21) By 1920, the Warner & Swasey Company factory had expanded to the south side of Carnegie Avenue with machine assembly shop operations connected by a tunnel under the street. (Historic Images, Figures 4, 5, 7) The company remained successful through the 1920s becoming the world's leading manufacturer of turret lathes by 1928.[45] Some competitors to Warner & Swasey in the turret lathe industry included: Jones & Lamson, Springfield VT, producing machine tools for gun and sewing machine production and known for the "Fay Automatic Lathe"[46]; Gisholt, Madison WI, producing the heavy turret lathe[47]; South Bend Lathe Co., South Bend, IN[48] and, Albert Herbert Ltd., Coventry UK.

Passing of Worcester R. Warner and Ambrose Swasey – the Later Years

The Depression brought not only the stock market crash, but the passing of Worcester Warner on June 25, 1929, in the same year, at the age of 83 years. In 1930, Philip Bliss was appointed president of Warner & Swasey. (Historic Images, Figure, 11) Ambrose Swasey died eight years later in 1937 at the age of 90 years. By 1940, the company transformed into a publicly-owned corporation prominently advertising "Warner & Swasey Turret Lathes" on the roof billboard facing Carnegie Avenue. (Historic Images, Figure 12)

By the beginning of World War II Ohio ranked as the nation's 4th largest producer of industrial products, especially iron and steel, heavy machinery, auto parts, and machine tools, all key industries for conversion to wartime production. Warner & Swasey contributed to Cleveland's distinction as Ohio's largest producer of World War II war goods with the city's manufacturers receiving contracts amounting to 5 billon.[49] During the World War II Warner & Swasey employed 7,000 people and produced half of the turret lathes manufactured in the United States. To meet demand, the factory was further expanded with a 1940-41 addition to the west for machine assembly space.[50] (Historic Images, Figure 6) Warner & Swasey heavily advertised during the war years, providing patriotic messages in support of the war effort not long after the bombing of Pearl Harbor on December 7, 1941 with the tag line "You Can Turn It Better, Faster, for Less…With A Warner & Swasey" Turret Lathe. (Historic Images, Figure 24) A March 1942 advertisement entitled "*How you can make the war end* 6 MONTHS SOONER" stated,

[44] Warner & Swasey Company 40th Anniversary Medal. Csillagászat érmeken Astronomy on Coins and Medals. Available at http://astrocoins.mrcollector.eu/index.php/english-menu-1/astronomers/19th-century/187-swasey-ambrose-1846-1937.
[45] Van Tassel, David R. and Grabowski, John J. eds. "Warner & Swasey."
[46] Jones, Lamson & Co. Available at http://vintagemachinery.org/mfgindex/detail.aspx?id=485
[47] Gisholt Machine Co. Available at http://vintagemachinery.org/mfgindex/detail.aspx?id=2847
[48] South Bend Lathe. Available at https://www.southbendlathe.com/.
[49] Knepper, p. 370.
[50] Sanborn Fire Insurance Map, 1952; Gaede, 13.4.

> "Did you ever face the sobering thought that your country may not win this war? Victory will go to the side with the most tanks, planes guns and shells – and so far the enemy has more than we. America can and will win if we make up that lack- *in time*. The weapons of war are made on machine tools, and tool production has been trebled. But tools can't make guns. Only the men who use the tools can do that. If there could be a 10% increase in the output of each man who makes machine tools, and each man who uses them to make war goods, both problems which threaten America (*quantity* and *time*) would be solved. More war goods more quickly from the tools we have…more tools…more war goods more quickly from them…it's enough to assure victory, and bring it at least 6 months, perhaps years, nearer."[51]

After World War II, the company continued to grow with expanded product lines in textiles, machinery, construction equipment, and electronics accomplished through internal growth and acquisitions. In 1946, the company acquired a license to manufacture the Gradall hydraulic earth mover with company president Charles J. Stilwell noting that "Machine tools will remain our principal business, but our plant was so greatly expanded during the war that we cannot utilize it all without new products."[52] By 1964, the company operated nine plants, including a 178,000 sf facility at 13100 St Clair Ave. to produce textile machines and more.[53] In 1965, the company reported record net sales and income manufacturing machine tools, textiles and construction equipment earning more than $9M in net profits. Machine tool production remained based in the main Carnegie Avenue plant with a diverse product offering. [54] (Historic Images, Figure 25). In the same year of 1965, Warner & Swasey began to move several operations to Solon. The company acquired the Haskell-Dawes Company to produce twister winders and in 1966 was recognized by *Fortune Magazine as a Fortune 500 company.* The Fortune 500 was created in 1955 to rank the top United States privately owned companies.[55] Warner & Swasey went on to acquire companies including the Cleveland-based Midwest Machine & Tool Company, Wiedemann Machine Company of King of Prussia, Pennsylvania, and expanded plants into Lima and New Philadelphia, Ohio, and Winona, Minnesota, to name a few. Revenues grew to more than $212 million in 1973. Warner & Swasey manufactured 60% of all U.S. turret lathes at their peak producing "the Tiffany of turret lathes."[56] By 1972, the rooftop billboard advertised "Warner & Swasey Precision Machinery." (Historic Images, Figure 14)

After 100 years of operation, the Warner & Swasey Company began its downward turn in the 1980s leaving the Cleveland factory for Solon in 1985.[57] The City of Cleveland acquired the Warner & Swasey Company building on Carnegie Avenue in 1991, shortly before the company

[51] Warner & Swasey Advertisement. *Newsweek*, 2 March 1942.
[52] *Plain Dealer*, 5 September 1946
[53] *Plain Dealer*, 3 February 1964, 21 October 1965
[54] *Plain Dealer,* 21 January 1965, 4 March 1965.
[55] *Fortune 500.* Available at https://money.cnn.com/magazines/fortune/fortune500_archive/snapshots/1966/3679.html.
[56] Swasey, Ambrose. NNNB. Available at http://www.nndb.com/people/248/000173726/.
[57] *Plain Dealer,* 25 June 1985.

closed down the following year in 1992.[58] The nominated building has remained vacant since 1985, with asbestos remediation completed in December 2012.

Architects

Arnold W. Brunner

Arnold W. Brunner (1857-1925) received his architectural training from the Massachusetts Institute of Technology. He first worked as a draftsman in the office of George B. Post in New York. In 1896 he and fellow architect Thomas Tyron began their partnership designing several buildings in New York City including the oldest Synagogue in New York, Congregation Shearith Israel and the Chemistry Building at the College of the City of New York. By 1898 Brunner was practicing independently in New York designing Mount Sinai Hospital, 1898; the Jewish Hospital in Brooklyn; the School of Mines at Columbia University, 1904; and the concrete stadium for the College of the City of New York among others. Outside of New York City he designed the Chapel and dormitories at Denison University, Granville, Ohio, and the Cadet Hospital at West Point, N.Y., 1924. Early in the century he was a member of the Group Plan Commission for the Cleveland Mall and appointed architect for several buildings, the first of which completed was the 1910 Second Renaissance Revival Federal Building and Post Office listed as a contributing resource to the Cleveland Mall National Register Historic District (NR#75001360). This was the start of his relationship with Ambrose Swasey, who served as president of the Cleveland Chamber of Commerce in 1905. Arnold Brunner is attributed with designing the 1905-1910 Warner & Swasey Company Building. Brunner devoted much of his work to city planning projects. He produced plans not only for the city of Cleveland, but also for Baltimore, Denver, Rochester, Trenton, Albany, and New York City.

Swasey had served as President of the Cleveland Chamber of Commerce beginning in 1905 during implementation of the 1903 Group Plan, working with Commission members Daniel Burnham, John M. Carrere, and Arnold W. Brunner.[59] Arnold W. Brunner would in the same year of 1905 be attributed with the design of the Warner & Swasey Company building, the subject of this nomination. A later partnership with Brunner included design of the 1924 Swasey Chapel at Denison University, where Swasey was a member of the Board of Trustees. The chapel is the first building constructed as part of the "Greater Denison" campus plan designed by the firms of Frederick Law Olmstead, Jr. and Arnold W. Brunner.[60] Swasey had earlier donated the Swasey Observatory designed by Cleveland architect J. Milton Dyer Milton in 1909.[61] Swasey Chapel and Swasey Observatory are listed on the National Register (NR #80003138).

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[58] Swasey, Ambrose. NNNB; Cuyahoga County Deed from C&T Subsidiary (The Warner and Swasey Company) to the City of Cleveland,11 July 1991; *Plain Dealer,*16 November 1991. City of Cleveland Department of Economic Development, Request for Proposals. *Warner and Swasey Redevelopment, 5701 Carnegie Avenue*, March 2018.

[59] Rarick, Holly M. *Progressive Vision The Planning of Downtown Cleveland 1903-1930.*

[60] Swasey Chapel, Denison University. Historic Campus Architecture Project, Council of Independent Colleges. Available at http://hcap.artstor.org/cgi-bin/library?a=d&d=p529.

[61] Swasey Chapel, Swasey Observatory, Denison University. History. Available at https://denison.edu/map/places/swasey-chapel.

Brunner was an active member and past-president of the New York Chapter of the A.I.A., a member of the Architectural League of New York, the National Institute of Arts and Letters, and was appointed to the National Council of Design by the late President, Theodore Roosevelt.[62]

Osborn Engineering

Cleveland's oldest engineering firm was founded in 1892 by Frank C. Osborn, formerly the chief engineer for Cleveland's King Bridge Company. The company diversified their services by offering a wide range of services including design, plans, estimates, and construction supervision for roofs, buildings, bridges, railways, and highways. The firm is best known for their national reputation as a stadium designer including but not limited to New York's Yankee Stadium (1921), Boston's Fenway Park (1912 – NR#12000069), Chicago's Comiskey Park (1910), Cleveland's League Park (1900), Cleveland Municipal Stadium (1936 - demolished), Cleveland's Jacobs/Progressive Field (1994) and Ohio Stadium (2014). The Cleveland firm remains in operation today.[63]

Conclusion

The Warner & Swasey Company headquarters building is significant under Criterion A in the areas of Engineering and Industry as representative of the impact of the Warner & Swasey Company as a world leader in the manufacture, innovative design and high-quality craftsmanship of machine tools, telescopes, and precision instruments led by partners Ambrose Swasey and Worcester Reed Warner. The lifelong friendship, business relationship and talents of Worcester Warner and Ambrose Swasey contributed to the transformation of American engineering technology. The unique combination of Company products reflected Warner's life-long interest in astronomical instruments and Swasey's engineering innovation.

The Warner & Swasey Company building is significant under Criterion B for its association with partners Worcester Warner and Ambrose Swasey representing their contribution to Cleveland's industrial history, and engineering and design as the manufacturing and office headquarters of the Warner & Swasey Company. Through determination they built a Cleveland based company that even after their deaths continued to thrive and grow for over fifty additional years. The apprenticeship program founded in 1883 continued into the 1970s, training some of Cleveland's greatest engineers. Founded in 1880, Warner & Swasey operated at the Carnegie Avenue facility for over 100 years leaving behind a legacy of ingenuity in engineering transforming the twentieth century. The nominated property is the only remaining and best representation of the significant contributions of Worcester Warner and Ambrose Swasey, as significant individuals contributing to the development and manufacturing of machine tools, precision instruments, and telescopes, as well as reflecting their roles in the founding and development of the Warner & Swasey Company. The Carnegie Avenue location is the only location associated with the company with the nominated complex of buildings serving as the headquarters for Warner & Swasey for eighty years of the company's history.

[62] Withey, Henry F. Elsie Rathborn Withey. *Biographical Dictionary of Architects (deceased).* Los Angeles: New Age Publishing Co., 1956, 85; Aitken, Robert I, *et al*. *Arnold W. Brunner and His Work.* New York: Press of the American Institute of Architects, Inc., 1926.
[63] Cleveland Architects Database. Cleveland Landmarks Commission. *Osborn Engineering Company*.

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National Register

Cleveland Mall, Cuyahoga County, OH (NR#75001360).
Granville Historic District- Multiple Resource Area, Licking County, OH (NR #80003138).
Upper Prospect Multiple Resource Area, Cuyahoga County, OH (NR # 64000653)

Previous documentation on file (NPS):

__X__ preliminary determination of individual listing (36 CFR 67) has been requested
____ previously listed in the National Register
____ previously determined eligible by the National Register
____ designated a National Historic Landmark
____ recorded by Historic American Buildings Survey #_____
____ recorded by Historic American Engineering Record # _____
____ recorded by Historic American Landscape Survey # _____

Primary location of additional data:

____ State Historic Preservation Office
____ Other State agency
____ Federal agency
____ Local government
____ University
__x__ Other
Name of repository: Cleveland Public Library; Western Reserve Historical Society _

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property _2.63 acres_____

Use either the UTM system or latitude/longitude coordinates

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

1. Latitude: 41.502129 Longitude: -81.650023
2. Latitude: Longitude:
3. Latitude: Longitude:
4. Latitude: Longitude:

Or
UTM References
Datum (indicated on USGS map):

[x] NAD 1927 or [ ] NAD 1983

1. Zone: 17	Easting: 445725	Northing: 4594490
2. Zone:	Easting:	Northing:
3. Zone:	Easting:	Northing:
4. Zone:	Easting :	Northing:

Verbal Boundary Description (Describe the boundaries of the property.)

The nominated property is situated in the City of Cleveland, Cuyahoga County, Ohio. The boundary of the historic Warner & Swasey Company building follows the boundary of Cuyahoga County Parcel #118-11-017 and continues beginning at the northwest corner of Parcel #118-11-017 following the perimeter of the northern most portion of the building situated on parcel 118-11-016; property address 5701 Carnegie Avenue.

Boundary Justification (Explain why the boundaries were selected.)

The nominated boundary includes the historically significant Warner & Swasey Company building constructed between 1910-1916 located on parcel 118-11-017 and portion of 118-11-016 as noted above.

---

11. Form Prepared By

name/title: _ Wendy Hoge Naylor, Diana Wellman _____
organization: __ Naylor Wellman, LLC _____
street & number: _92 East Washington Street _____
city or town: ___Chagrin Falls_____ state: ___OH_____ zip code: 44022_____
e-mail__naylor@naylorwellman.com; wellman@naylorwellman.com_____
telephone:_____440-247-8319_____
date:___ December 7, 2018_____

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** or equivalent (7.5 or 15 minute series) indicating the property's location.
- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.
- **Additional items:** (Check with the SHPO, TPO, or FPO for any additional items.)

Photographs

Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels (minimum), 3000x2000 preferred, at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map. Each photograph must be numbered and that number must correspond to

the photograph number on the photo log. For simplicity, the name of the photographer, photo date, etc. may be listed once on the photograph log and doesn't need to be labeled on every photograph.

Name of Property: Warner & Swasey Company Building

City or Vicinity: Cleveland

County: Cuyahoga State: Ohio

Photographer: Wendy Naylor, Diana Wellman

Date Photographed: November 2018

Description of Photograph(s) and number, include description of view indicating direction of camera:

1 of 43.

1. (OH_Cuyahoga_Warner&SwaseyCo._0001): South (Carnegie Ave.)and East Facade, camera direction NW.

2. (OH_Cuyahoga_Warner&SwaseyCo._0002): South (Carnegie Ave.)and West Facade, camera direction NE.

3. (OH_Cuyahoga_Warner&SwaseyCo._0003): South (Carnegie Ave.) Facade, West Tower and entrance, camera direction N.

4. (OH_Cuyahoga_Warner&SwaseyCo._0004): South (Carnegie Ave.) Facade, West Tower entrance, camera direction NE.

5. (OH_Cuyahoga_Warner&SwaseyCo._0005): South (Carnegie Ave.) Facade, East Tower and entrance, camera direction NW.

6. (OH_Cuyahoga_Warner&SwaseyCo._0006): East elevation, loading porte cochere, camera direction NW.

7. (OH_Cuyahoga_Warner&SwaseyCo._0007): East elevation and Conrail, camera direction NW.

8. (OH_Cuyahoga_Warner&SwaseyCo._0008): West elevation, camera direction E.

9. (OH_Cuyahoga_Warner&SwaseyCo._0009): West elevation, camera direction NE.

10. (OH_Cuyahoga_Warner&SwaseyCo._0010): view of Building 2, camera direction E.

11. (OH_Cuyahoga_Warner&SwaseyCo._0011): view of Building 2, camera direction NE.

12. (OH_Cuyahoga_Warner&SwaseyCo._0012): view roof & west elevation Building 2, camera direction NE.

13. (OH_Cuyahoga_Warner&SwaseyCo._0013): view roof & north elevation Building 1, camera direction W.

14. (OH_Cuyahoga_Warner&SwaseyCo._0014): view & north elevation Building 1, camera direction SE.

15. (OH_Cuyahoga_Warner&SwaseyCo._0015): North Shipping building & north elevation, camera direction SE.

16. (OH_Cuyahoga_Warner&SwaseyCo._0016):, East Tower, First Floor, camera direction SE.

17. (OH_Cuyahoga_Warner&SwaseyCo._0017):, First Floor, camera direction W.

18. (OH_Cuyahoga_Warner&SwaseyCo._0018):, Second Floor, camera direction NW.

19. (OH_Cuyahoga_Warner&SwaseyCo._0019): Stair/Elevator Core Connector, Second Floor, camera direction SW.

20. (OH_Cuyahoga_Warner&SwaseyCo._0020):, East Tower Stair, Third Floor, camera direction NW.

21. (OH_Cuyahoga_Warner&SwaseyCo._0021):, Third Floor, camera direction W.

22. (OH_Cuyahoga_Warner&SwaseyCo._0022):, Fourth Floor, camera direction E.

23. (OH_Cuyahoga_Warner&SwaseyCo._0023):, Fourth Floor, camera direction N.

24. (OH_Cuyahoga_Warner&SwaseyCo._0024):, Fifth Floor, East Tower, camera direction SW.

25. (OH_Cuyahoga_Warner&SwaseyCo._0025):, Fifth Floor, camera direction NW.

26. (OH_Cuyahoga_Warner&SwaseyCo._0026):, Fifth Floor, camera direction SW.

27. (OH_Cuyahoga_Warner&SwaseyCo._0027): Stair/Elevator Core Connector, Fifth Floor, camera direction N.

28. (OH_Cuyahoga_Warner&SwaseyCo._0028):, Fifth Floor, camera direction SW.

29. (OH_Cuyahoga_Warner&SwaseyCo._0029):, Second Floor, Window, camera direction N.

30. (OH_Cuyahoga_Warner&SwaseyCo._0030): Second Floor, Balustrade, camera direction S.

31. (OH_Cuyahoga_Warner&SwaseyCo._0031):, First Floor, East Tower, Window, camera direction S.

32. (OH_Cuyahoga_Warner&SwaseyCo._0032):, First Floor, West Tower, Window, camera direction S.

33. (OH_Cuyahoga_Warner&SwaseyCo._0033): Stair/Elevator Core Connector, Courtyard, camera direction NW.

34. (OH_Cuyahoga_Warner&SwaseyCo._0034):, South Elevation, camera direction N.

35. (OH_Cuyahoga_Warner&SwaseyCo._0035):, Fifth Floor, camera direction N.

36. (OH_Cuyahoga_Warner&SwaseyCo._0036):, North Elevation, camera direction SW.

37. (OH_Cuyahoga_Warner&SwaseyCo._0037):, Roof, camera direction W.

38. (OH_Cuyahoga_Warner&SwaseyCo._0038): & Shipping, Roof, camera direction NW.

39. (OH_Cuyahoga_Warner&SwaseyCo._0039): Shipping, North Elevation, camera direction S.

40. (OH_Cuyahoga_Warner&SwaseyCo._0040): Boiler Room, camera direction E.

41. (OH_Cuyahoga_Warner&SwaseyCo._0041): Blacksmith, camera direction NW.

42. (OH_Cuyahoga_Warner&SwaseyCo._0042):, Blacksmith, camera direction E.

43. (OH_Cuyahoga_Warner&SwaseyCo._0043): Service Building, camera direction E.

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).

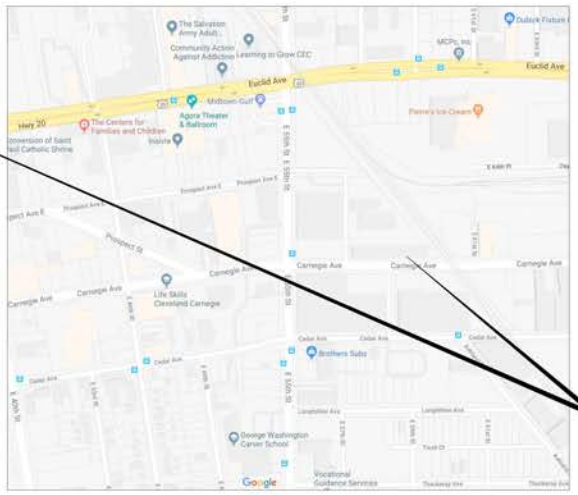
Estimated Burden Statement: Public reporting burden for this form is estimated to average 100 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Office of Planning and Performance Management. U.S. Dept. of the Interior, 1849 C. Street, NW, Washington, DC.

United States Department of the Interior
National Park Service

WARNER & SWASEY COMPANY BUILDING
Cuyahoga County, Ohio

National Register of Historic Places Continuation Sheet

Section number Additional Documentation - Location and Boundary Map Page 1



LEGEND
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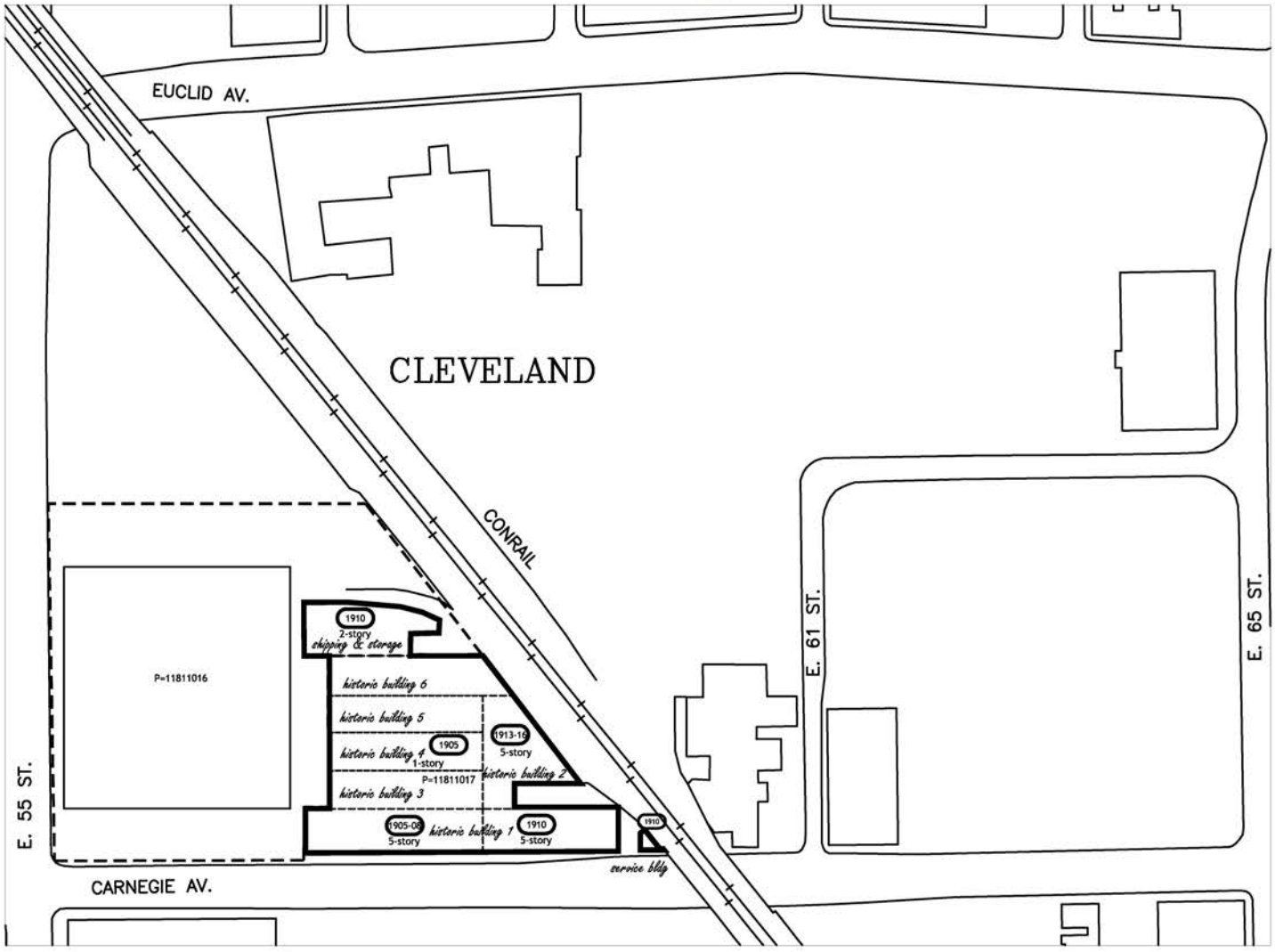
PARCEL 11811016 BOUNDARY
19xx DATE OF CONSTRUCTION
ADDITION BOUNDARY

LOCATION MAP N

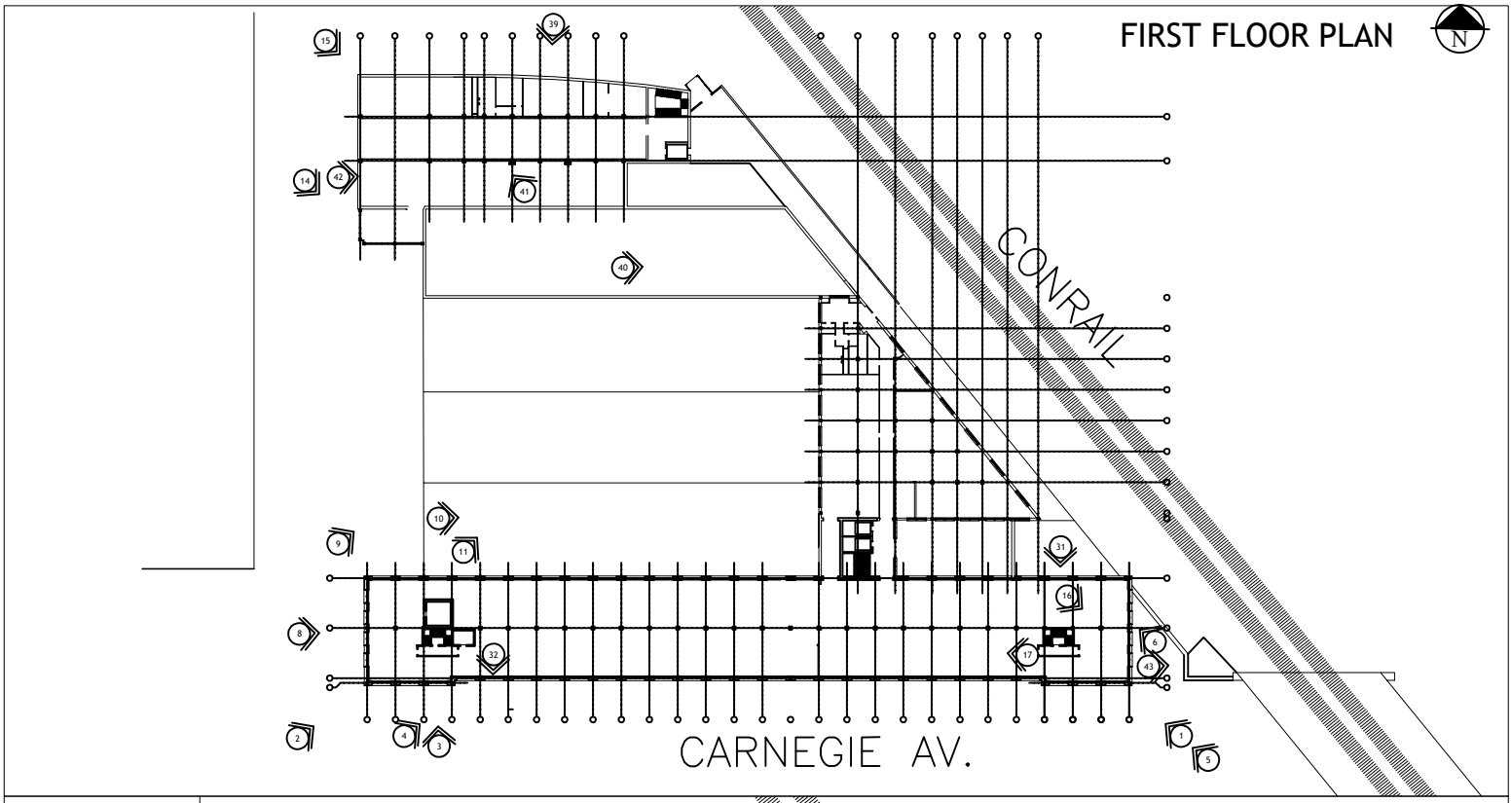


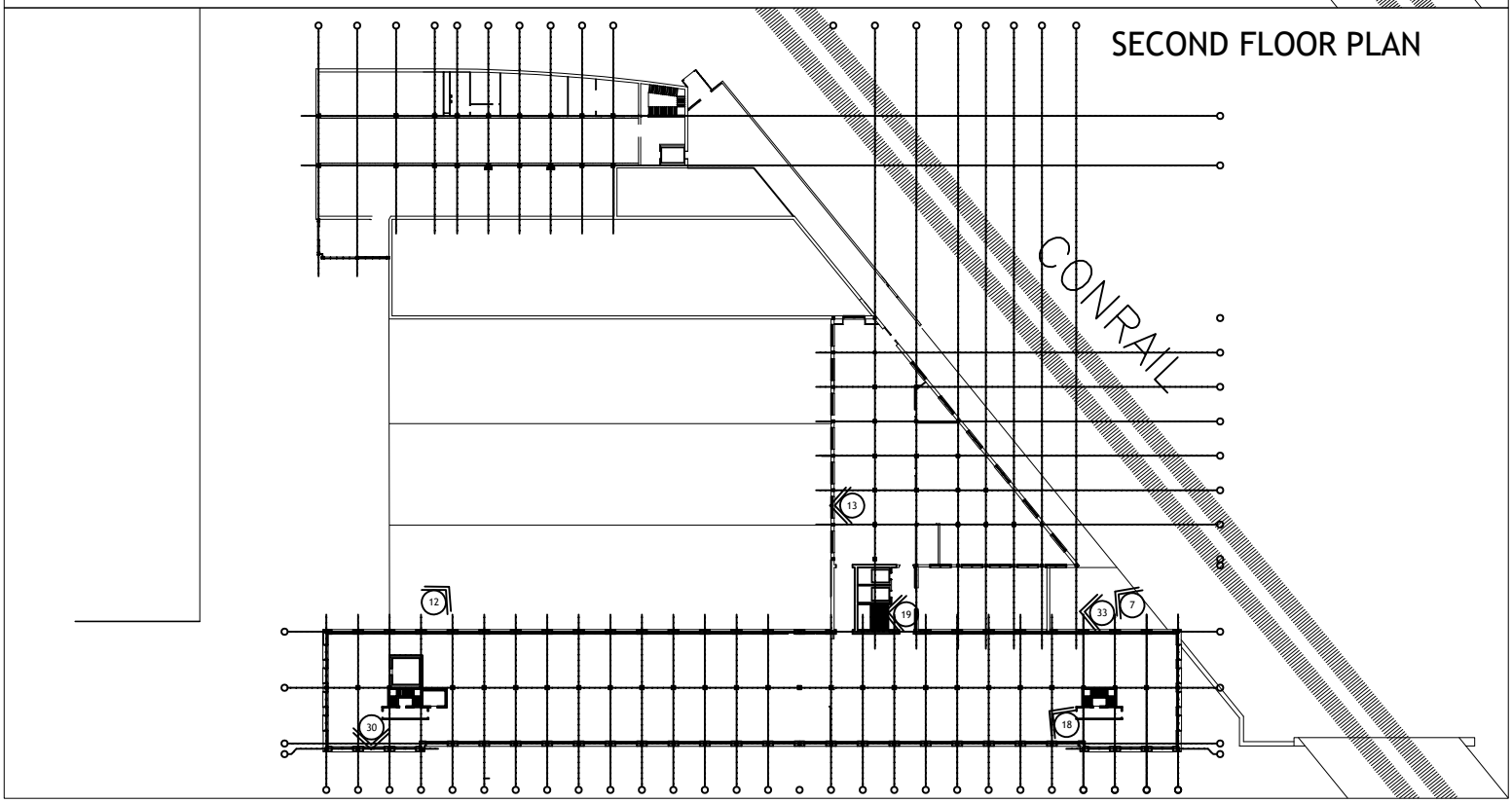
United States Department of the Interior
National Park Service

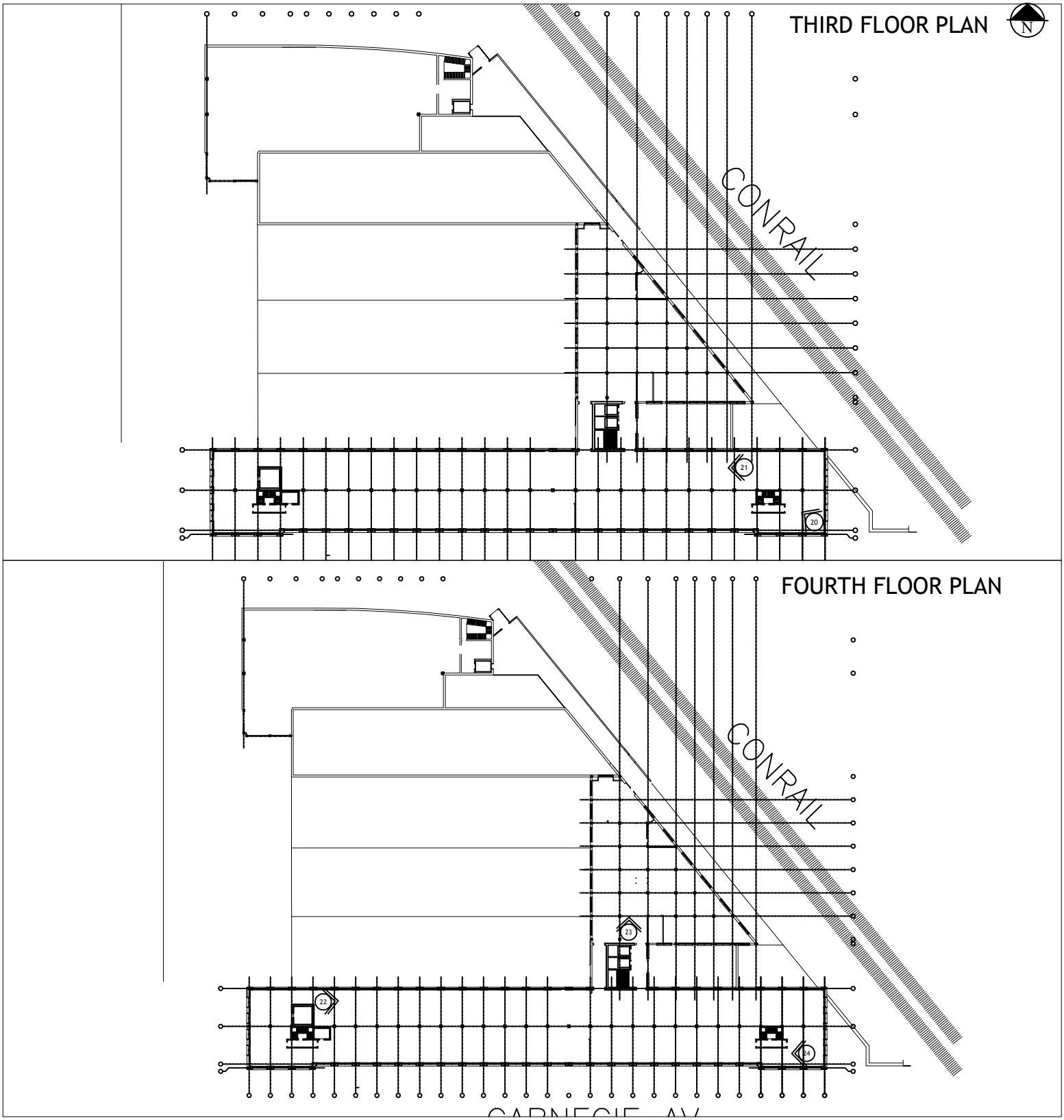
WARNER & SWASEY COMPANY BUILDING
Cuyahoga County, Ohio

National Register of Historic Places Continuation Sheet

Section number Additional Documentation - Photo-Key Page 2



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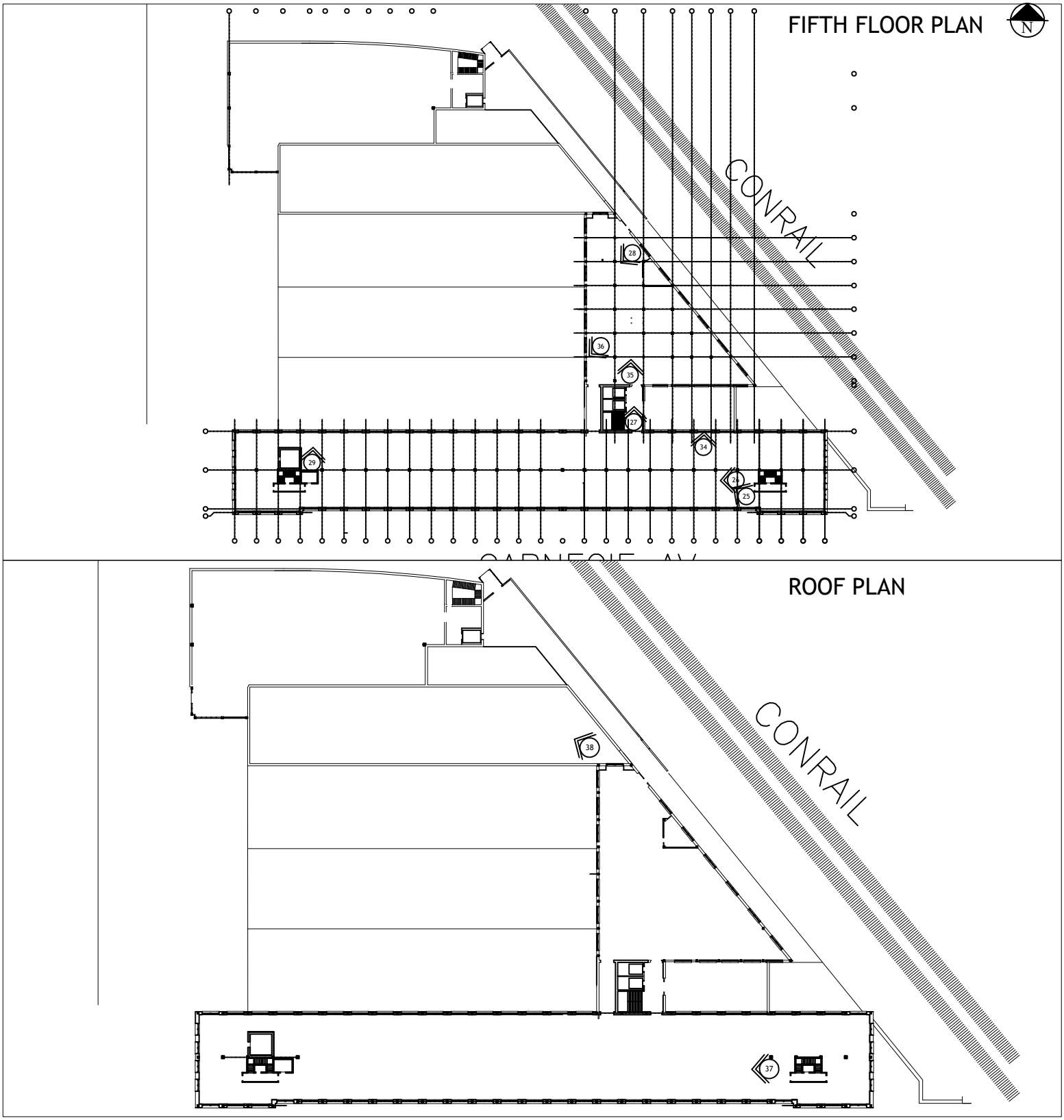
United States Department of the Interior
National Park Service

WARNER & SWASEY COMPANY BUILDING
Cuyahoga County, Ohio

National Register of Historic Places Continuation Sheet

Section number Additional Documentation - Photo-Key Page 4



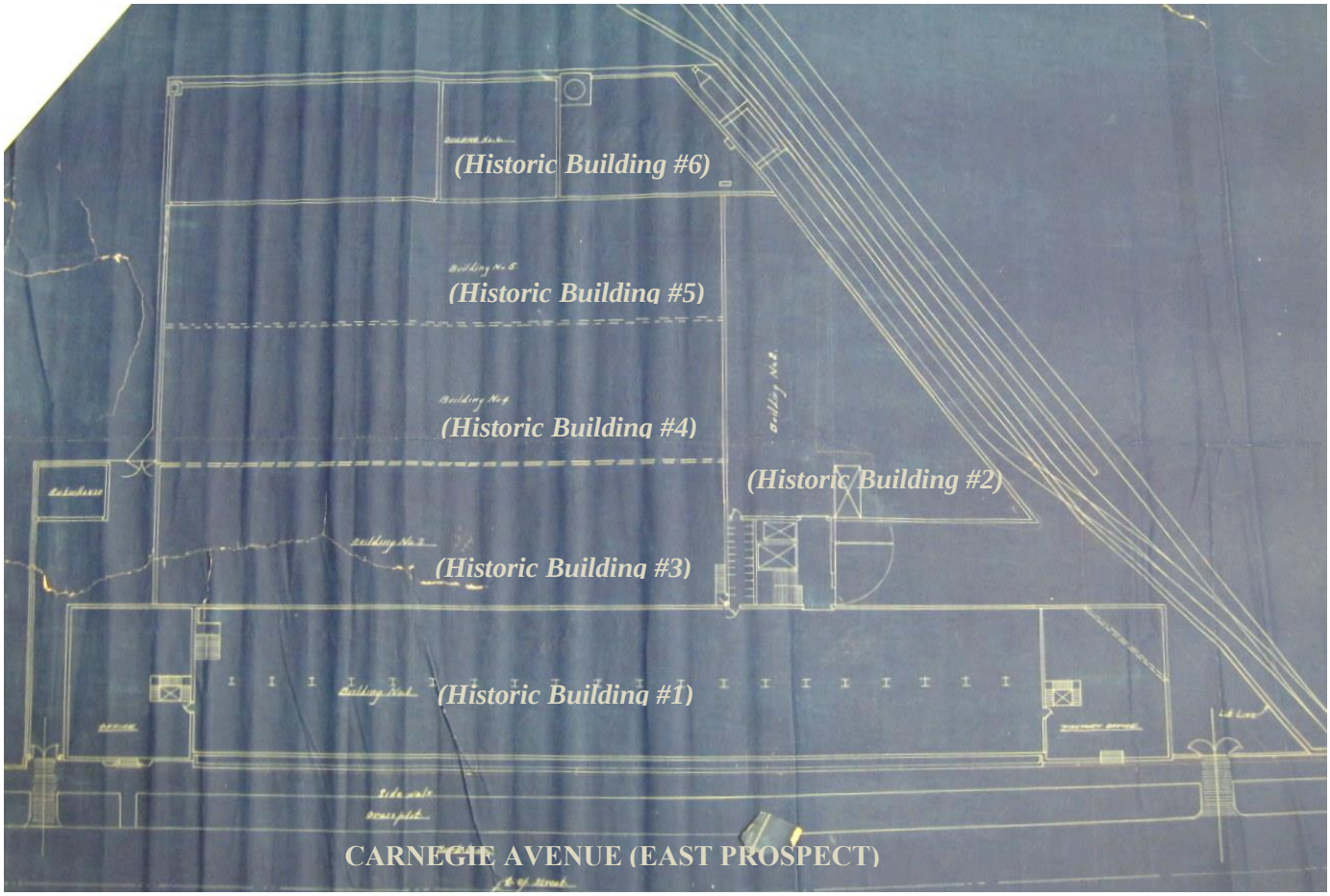


Figure 1. Warner & Swasey Building Plan, ca. 1907

Source: Warner & Swasey Building Plans, 5701 Carnegie Avenue, 1905-1942, City of Cleveland Archives. No architect attribution.

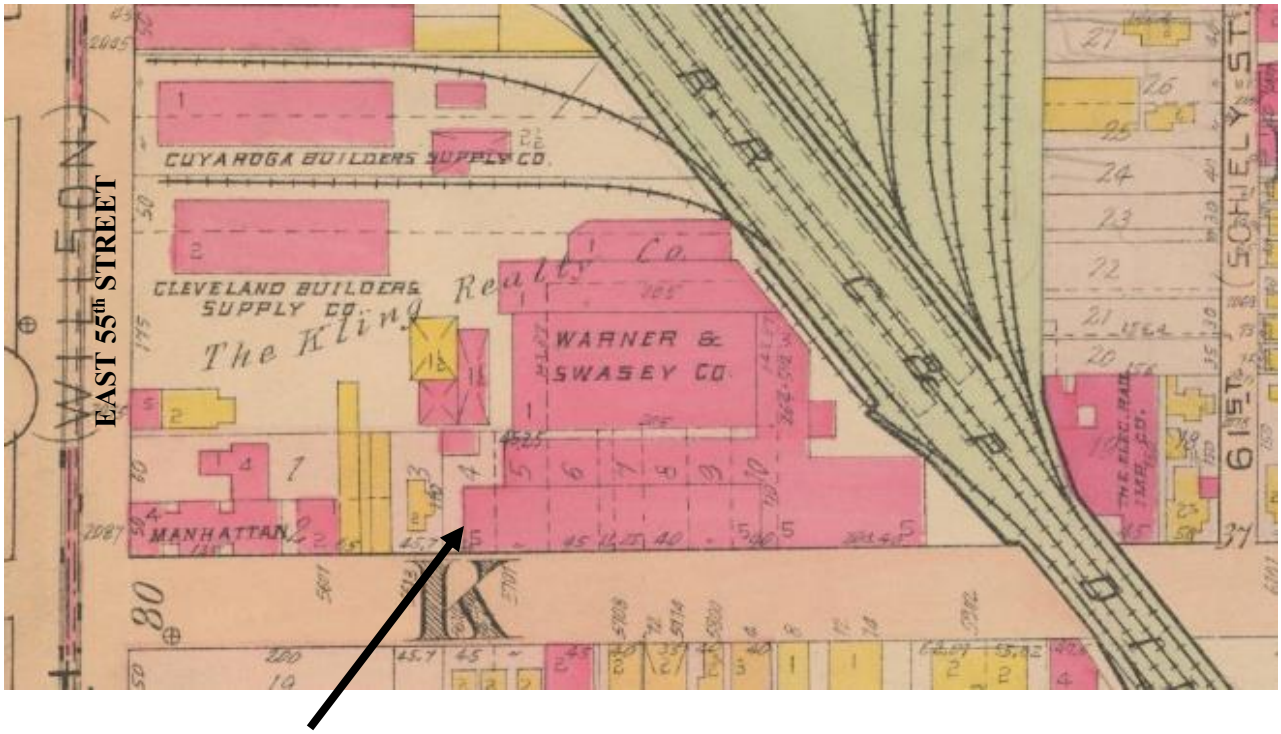


Figure 2. Warner & Swasey Company Building, 1912

Source: G.M. Hopkins Map 1912, Vol.1, Plate 11, Cleveland Public Library Map Collection.

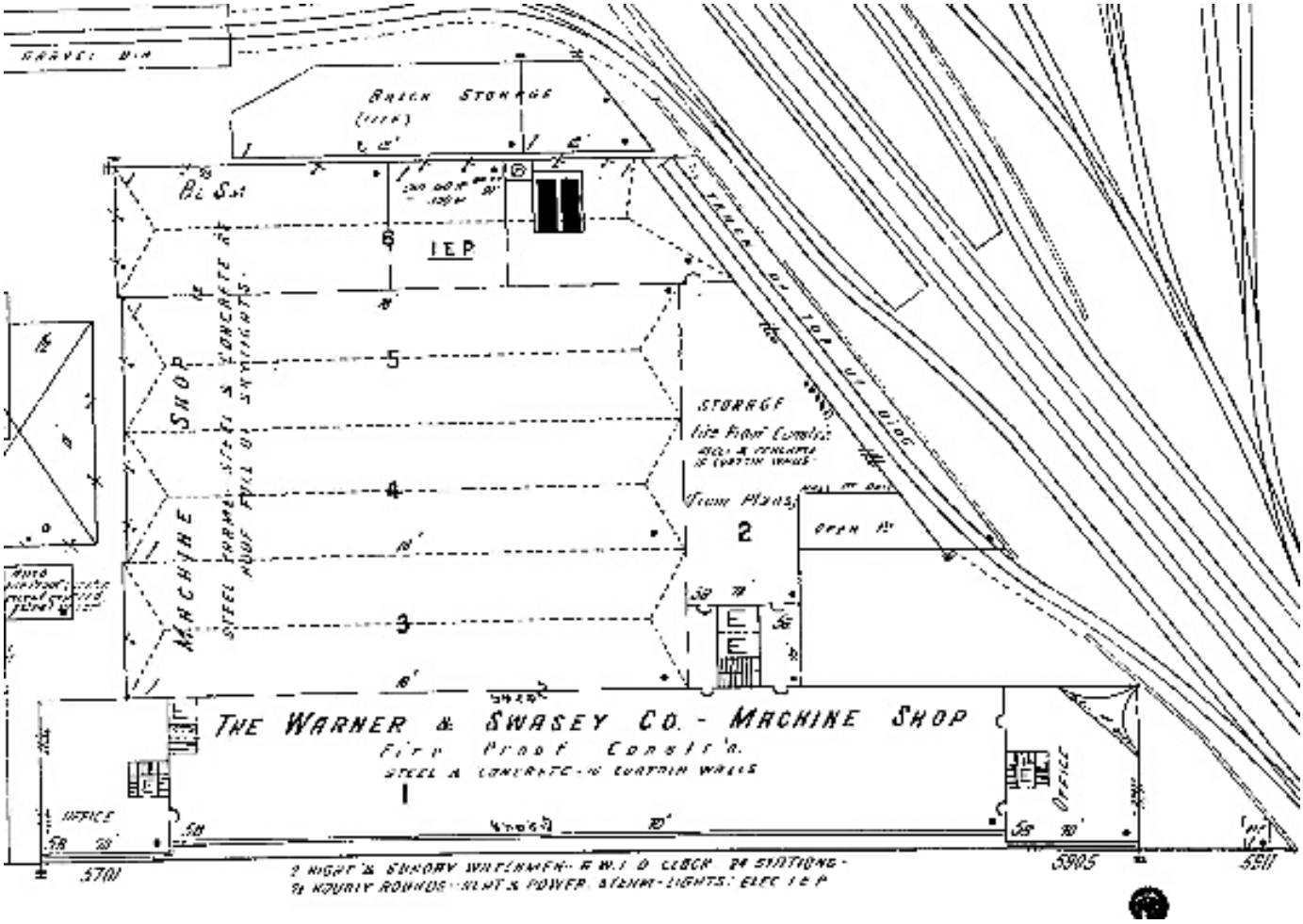


Figure 3. Warner & Swasey Company Building, 1913

Source: Sanborn Fire Insurance Co. Map, 1913, with Historic Buildings #1-6.

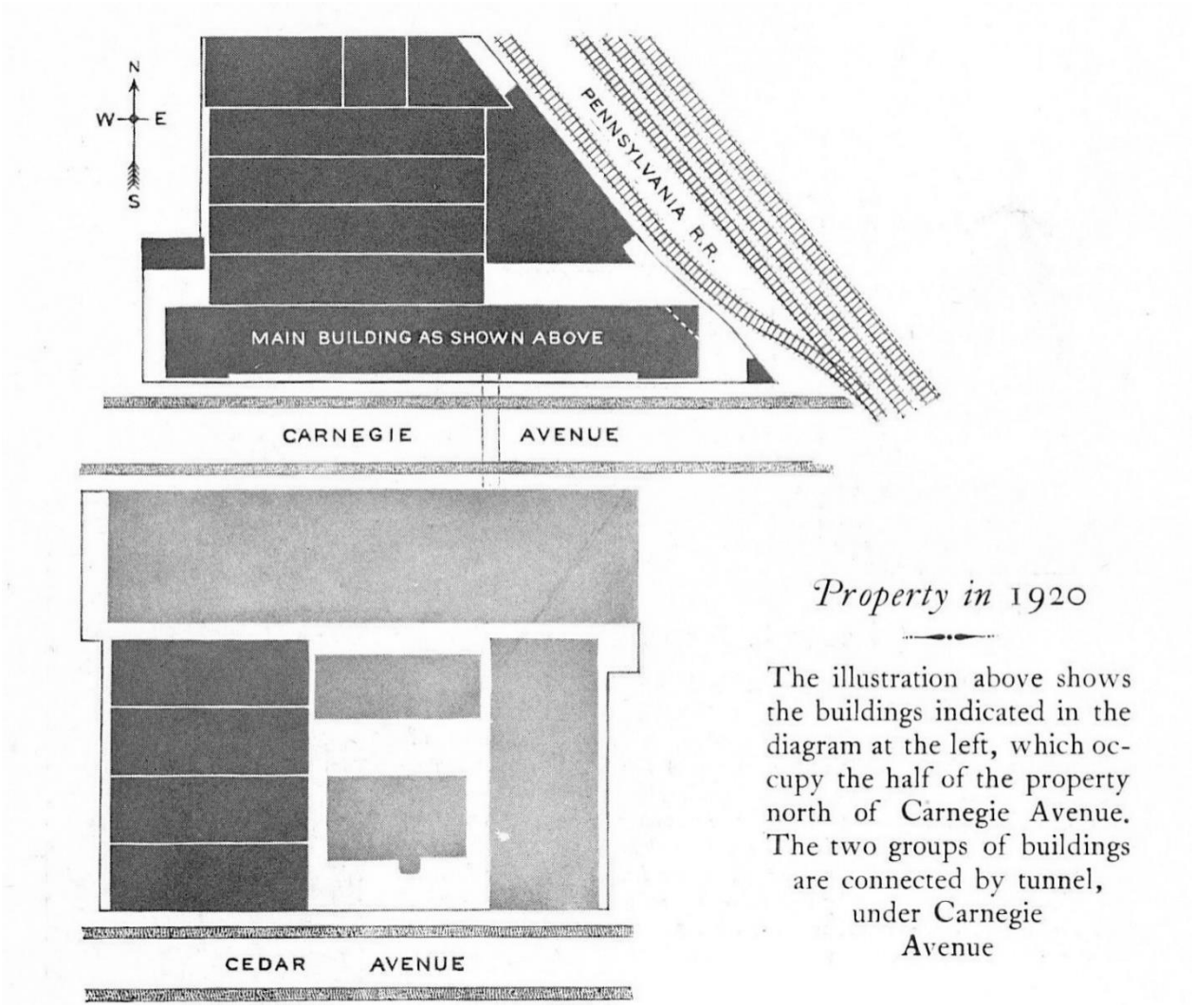


Figure 4. The Warner & Swasey Company Site Plan, 1920
Existing buildings on north side of Carnegie Avenue

Source: Warner & Swasey, The Warner & Swasey Company, 1880-1920, Fortieth Anniversary Celebration, Cleveland Ohio. New York: Bartlett Orr Press, 1920,23.

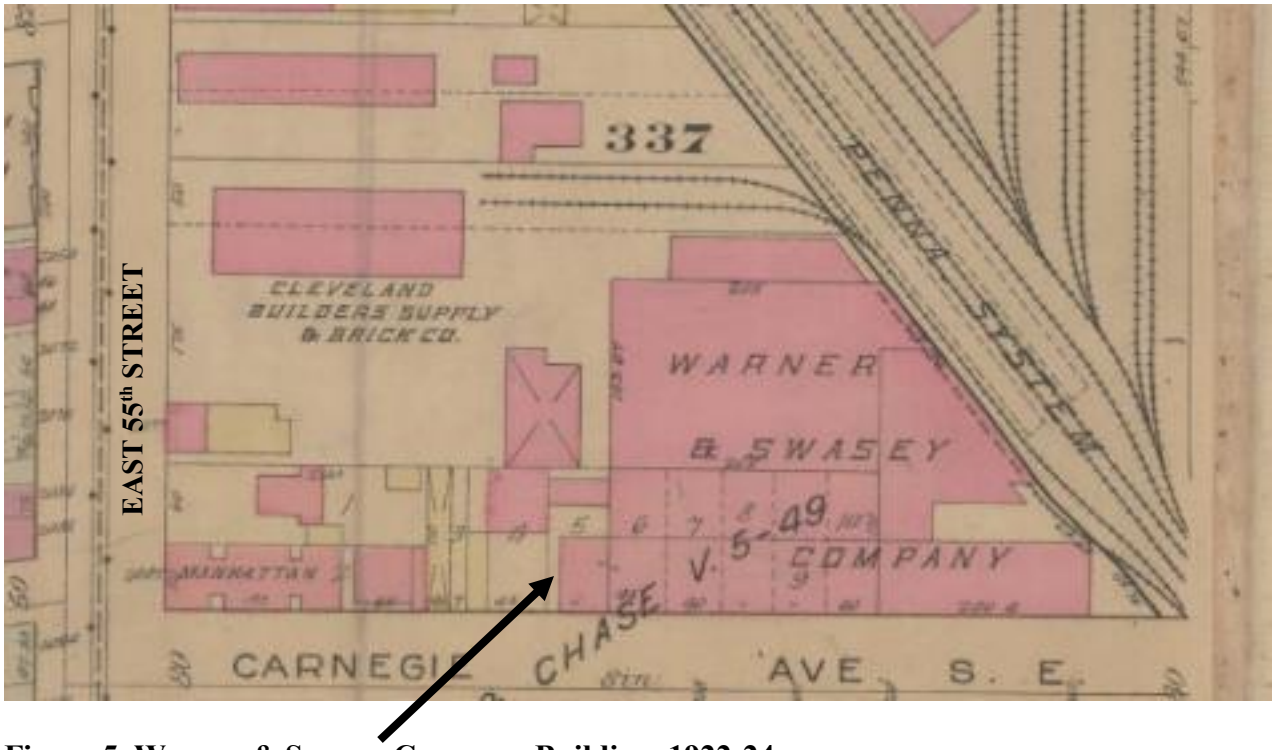


Figure 5. Warner & Swasey Company Building, 1922-24

Source: G.M. Hopkins Map 1922-24, Vol.4, Plate 5a, Cleveland Public Library Map Collection.

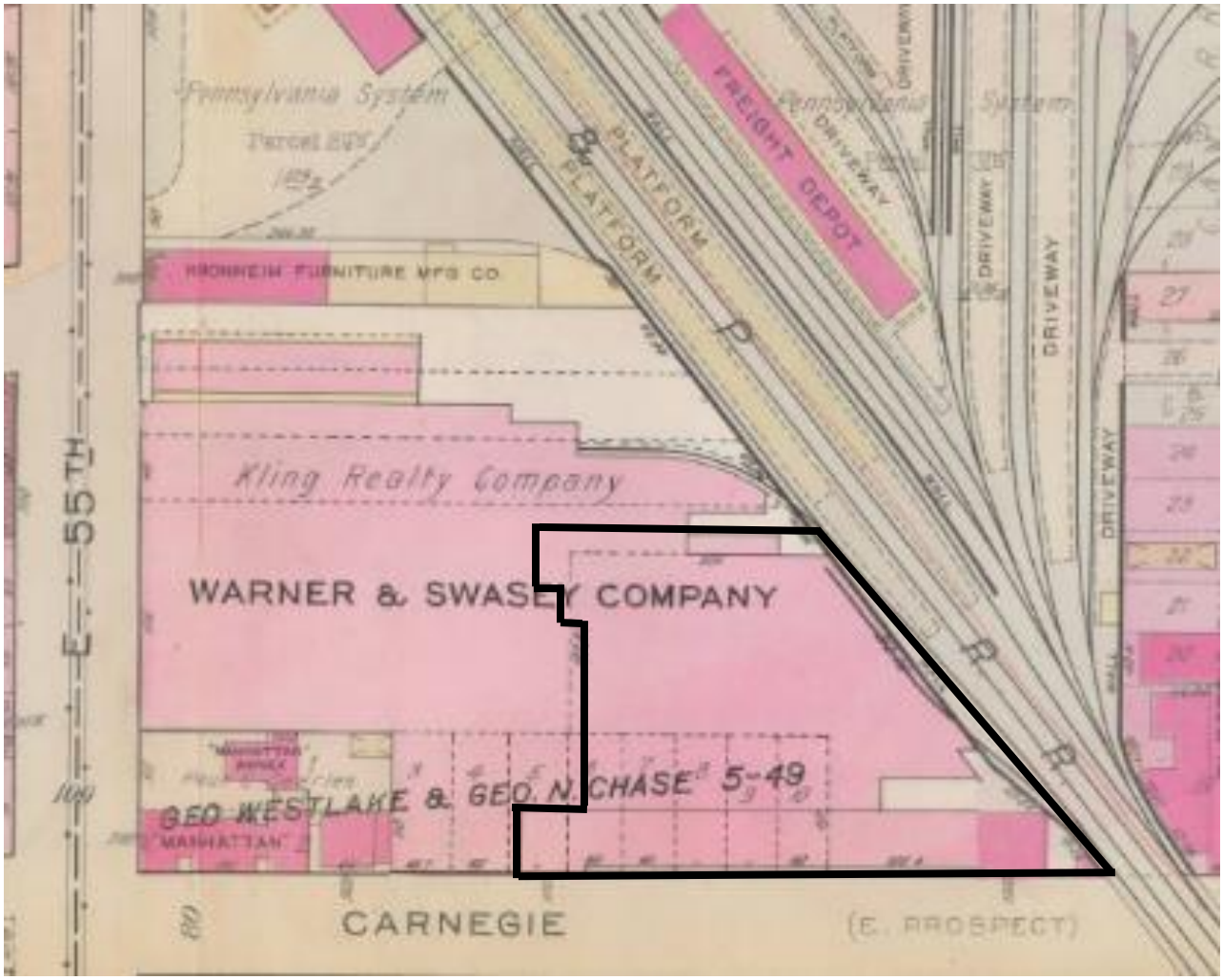


Figure 6. Warner & Swasey Company Building, 1932-41
Nominated buildings outlined in black

Source: G.M. Hopkins Map 1932-1941, Vol.1, Plate 8,28, Cleveland Public Library Map Collection.

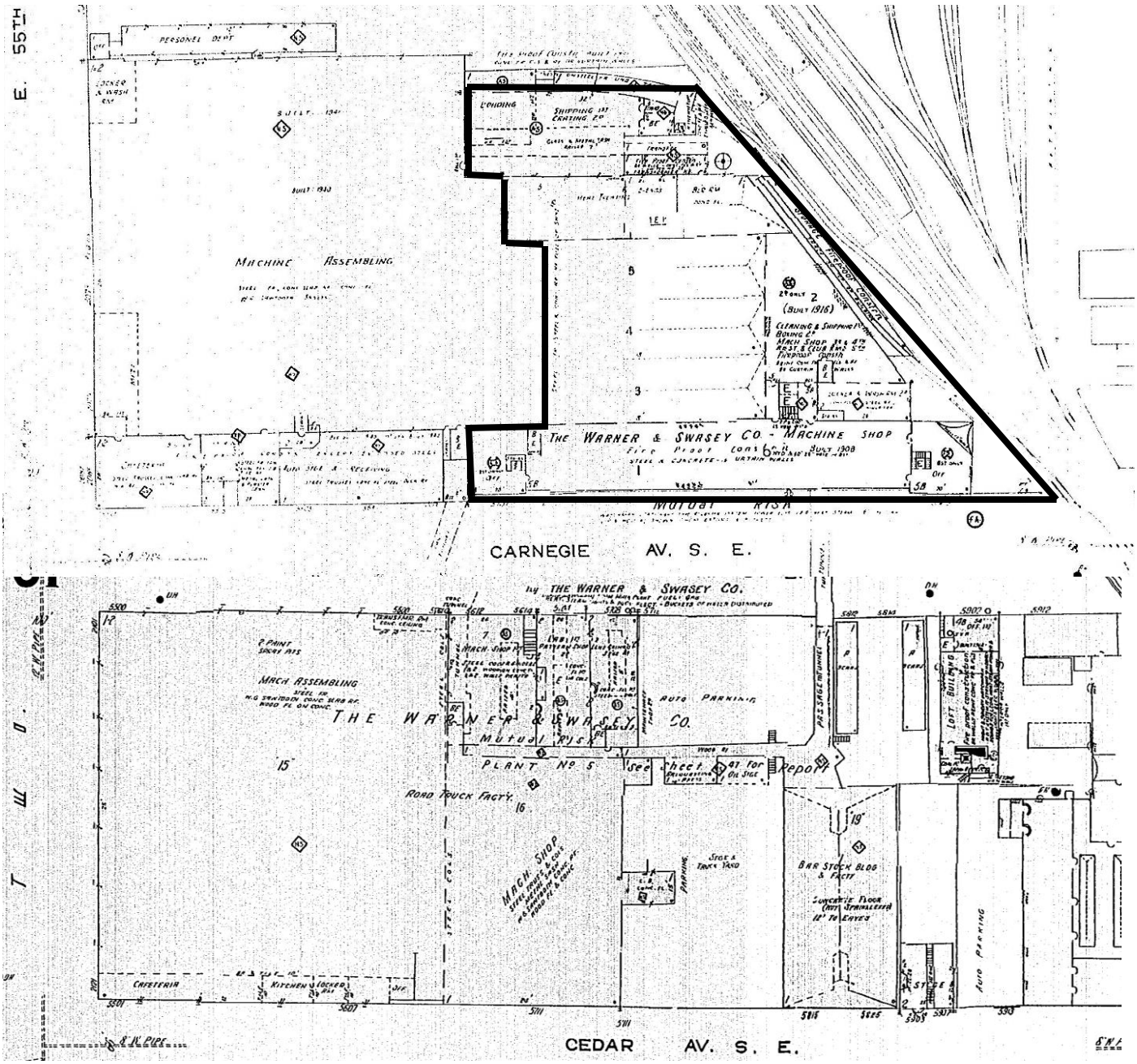


Figure 7. Warner & Swasey Company Building, 1952
Nominated buildings outlined in black, with tunnel conecting north and south buildings

Source: Sanborn Fire Insurance Co. Map, 1952 with Historic Buildings #1-6 .

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Figure 8. Warner & Swasey Company Building, Image, 1910

Source: Warner & Swasey, The Warner & Swasey Company, 1880-1920, Fortieth Anniversary Celebration, Cleveland Ohio. New York: Bartlett Orr Press, 1920,23.

Figure 9. Warner & Swasey Company Building, Image, ca. 1910

Source: Warner & Swasey Company Records 1883-1970, Western Reserve Historical Society.

Figure 10. Warner & Swasey Company Building, 5701 Carnegie Ave., Building Entry, Photo 1916
Prominent Cleveland engineers meeting at the building include:
First Row left to right: Edward P. Burrell, Leslie P. Stauffler, Dr. Charles S. Hastings, Alexander Duval, James P. McDowell, ? Pearce, Jr., Dr. John S. Plaskett, Ambrose Swasey, Worcester R. Warner, Dr. W.J. Hussey, Samuel T. Wellman, Charles F. Brush, Major P.S. Pond, Frank A. Scott
Rear Row left to right: Dr. R.H. Curtis, George A. Decker, E.D. Pearce, Dr. Hyde, Dr. John A. Prashear, Francis F. Prentiss, A.C. Cook, Elbert H. Baker, William D.P. Alexander, Lyman H. Treadway

Source: Cleveland Public Library Photo Collection.

Figure 11. Warner & Swasey Company Building, Photo 1939

Source: Warner & Swasey Company Records 1883-1970, Western Reserve Historical Society.

Figure 12. Warner & Swasey Company Building, Photo ca.1940

Source: Cleveland Public Library Photo Collection.

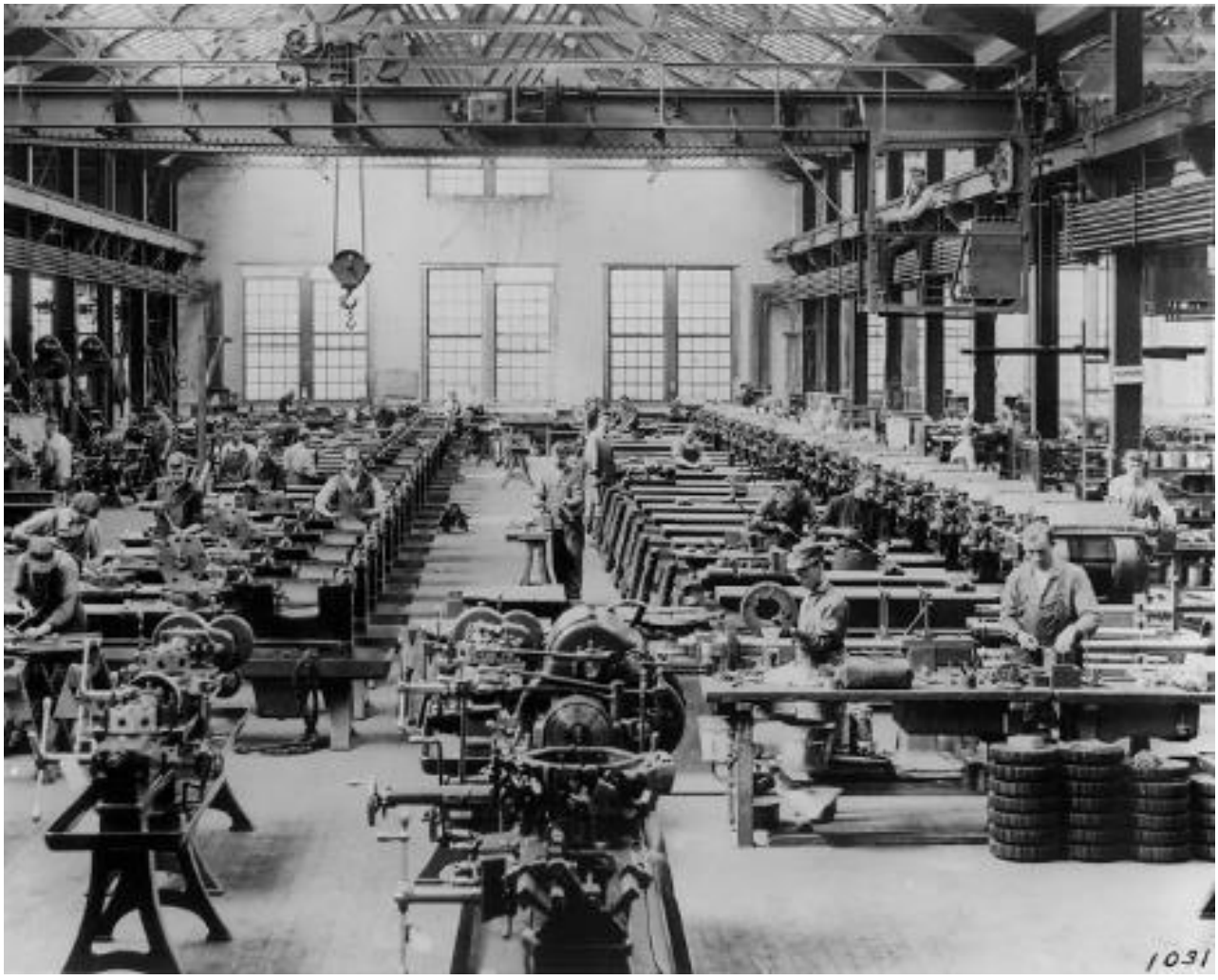


Figure 13. Warner & Swasey Company Building, Machine Shop, Interior view, ca. 1912

Source: Cleveland Memory Project, Michael Schwartz Library at Cleveland State University.

Figure 14. Warner & Swasey Company Building, Photo, 1972

Source: *Plain Dealer*, 1 October 1972. Cleveland Public Library Photo Collection.

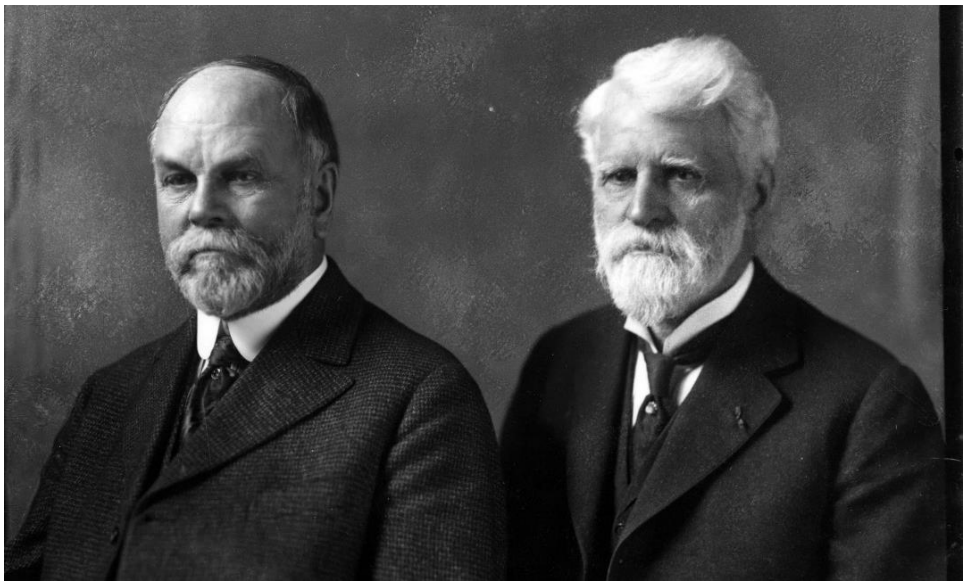


Figure 15a. Worcester Warner (L) and Ambrose Swasey (R) , Photo 1919

Figure 15b. Worcester Warner (R) and Ambrose Swasey (L), both age 80 years, Photo 1927

Source: Cleveland Public Library Photo Collection.

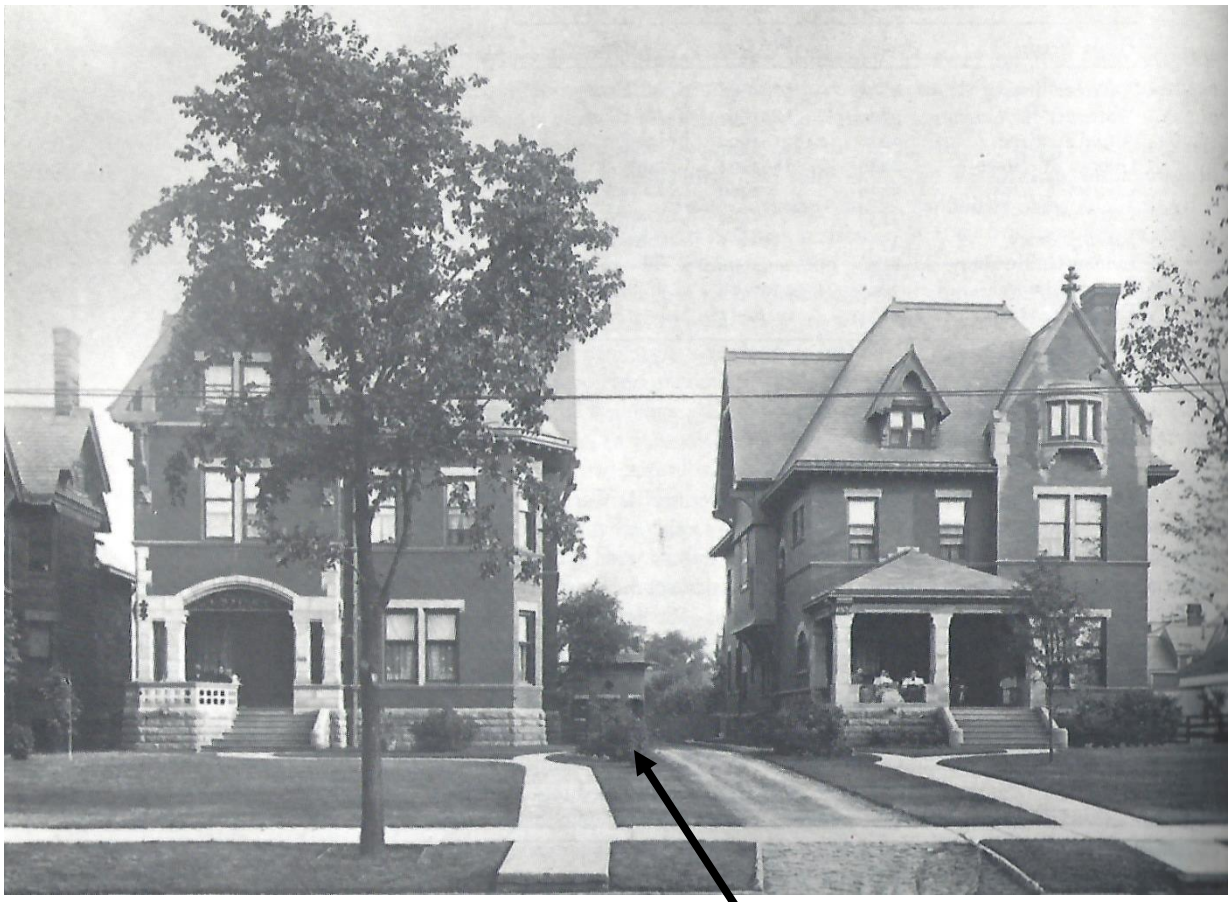


Figure 16a. Adjacent homes of Ambrose Swasey and Worcester R. Warner, 7808 and 7720 Euclid Ave. (demolished) designed by New York architect Richard Morris Hunt, with Private Observatory at the end of the shared driveway.

Source: Cigliano, Jan. *Showplace of America Cleveland's Euclid Avenue, 1850-1910.* Kent: Kent State University Press, 1991, 187-189; Warner & Swasey, The Warner & Swasey Company, 1880-1920, Fortieth Anniversary Celebration, Cleveland Ohio. New York: Bartlett Orr Press, 1920,26.

Figure 16b. Private Obervatory (demolished)

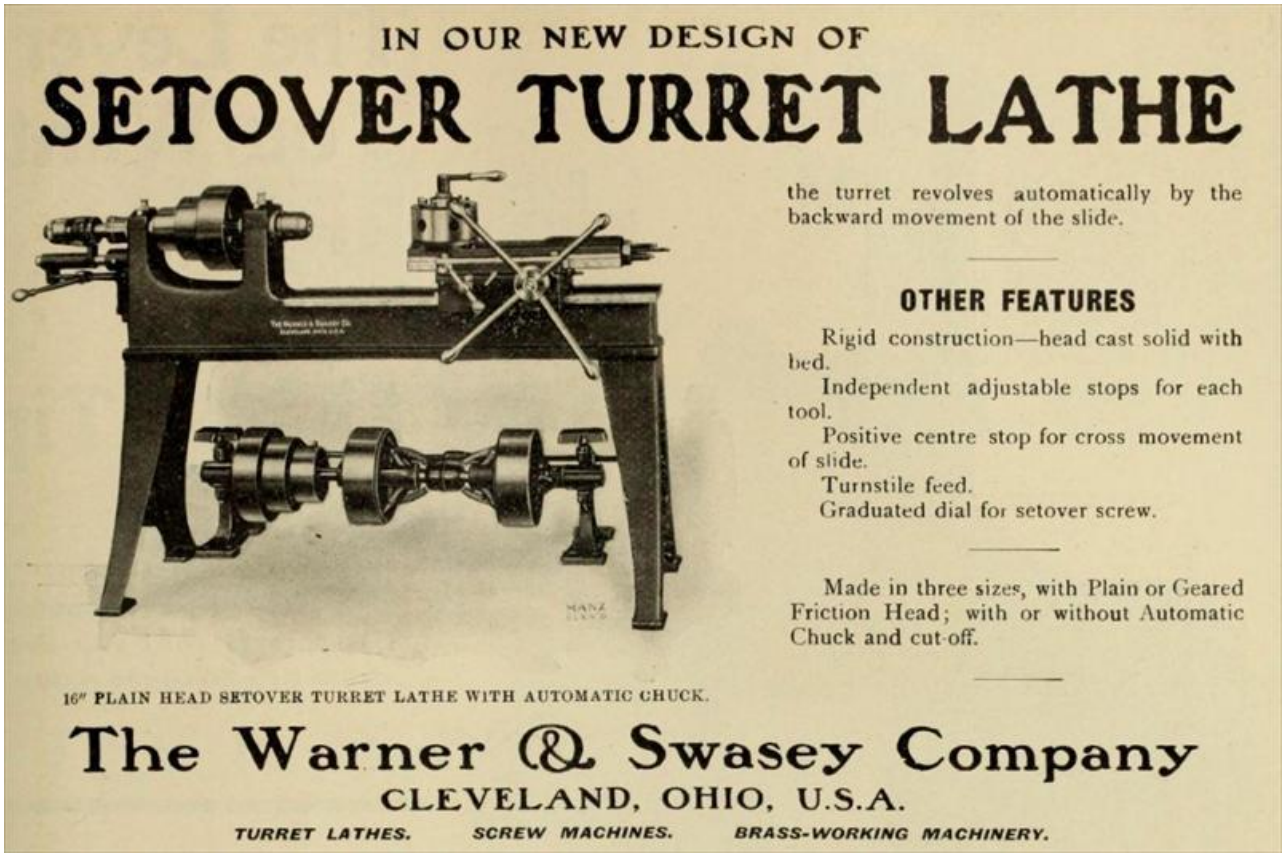


Figure 17. Warner & Swasey Company Turret Lathe Advertisement, 1906

Source: Warner & Swasey Turret Lathe Advertisement. *Canadian Machinery,* September 1906. Available at Warner & Swasey, www.vintage machinery.org.

Figure 18. 16-inch Lick Telescope, Mount Hamilton, California. Warner & Swasey (1886-87)

Source: Warner & Swasey. *A Few Astronomical Instruments from the Works of Warner & Swasey.* Cleveland: Warner & Swasey, 1900, Plate XXV.

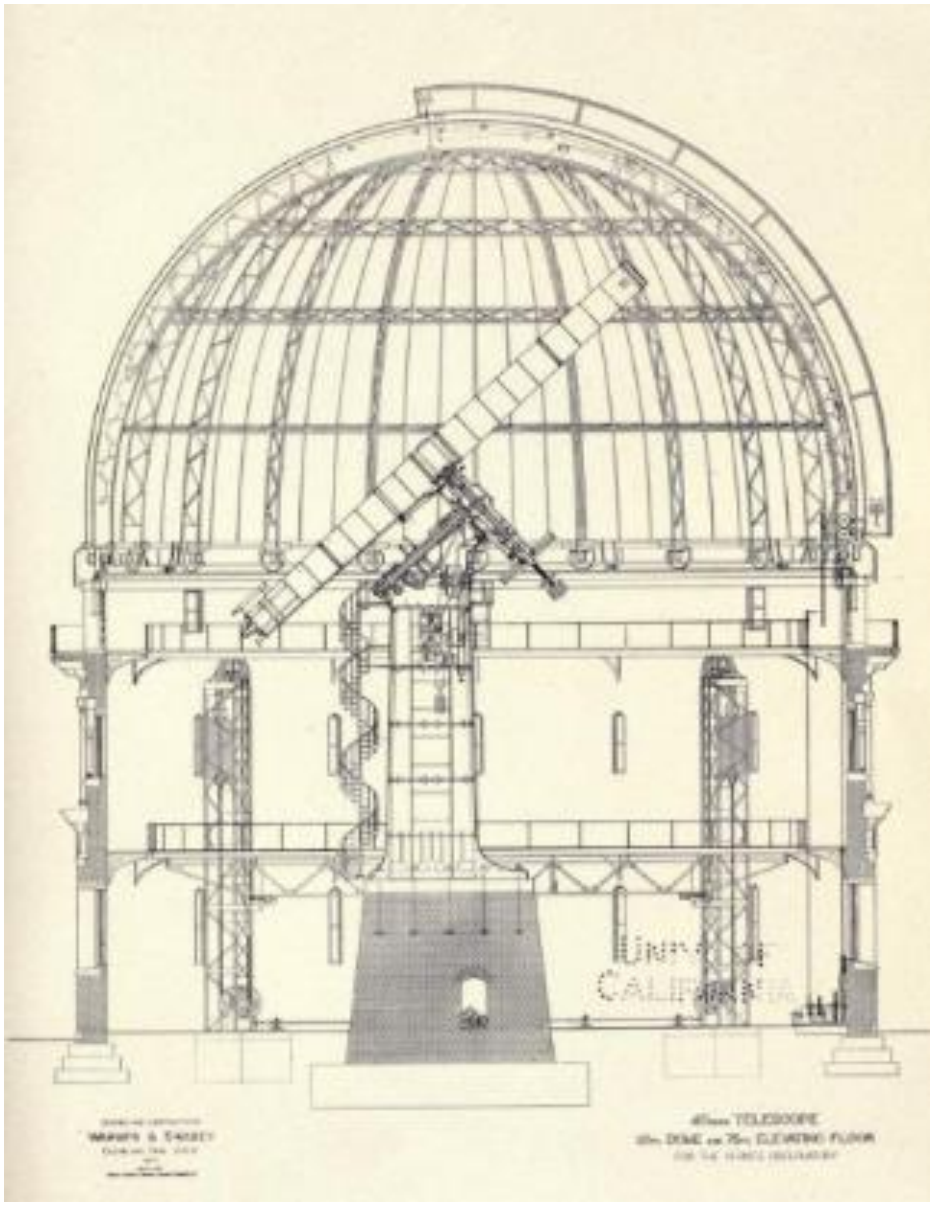
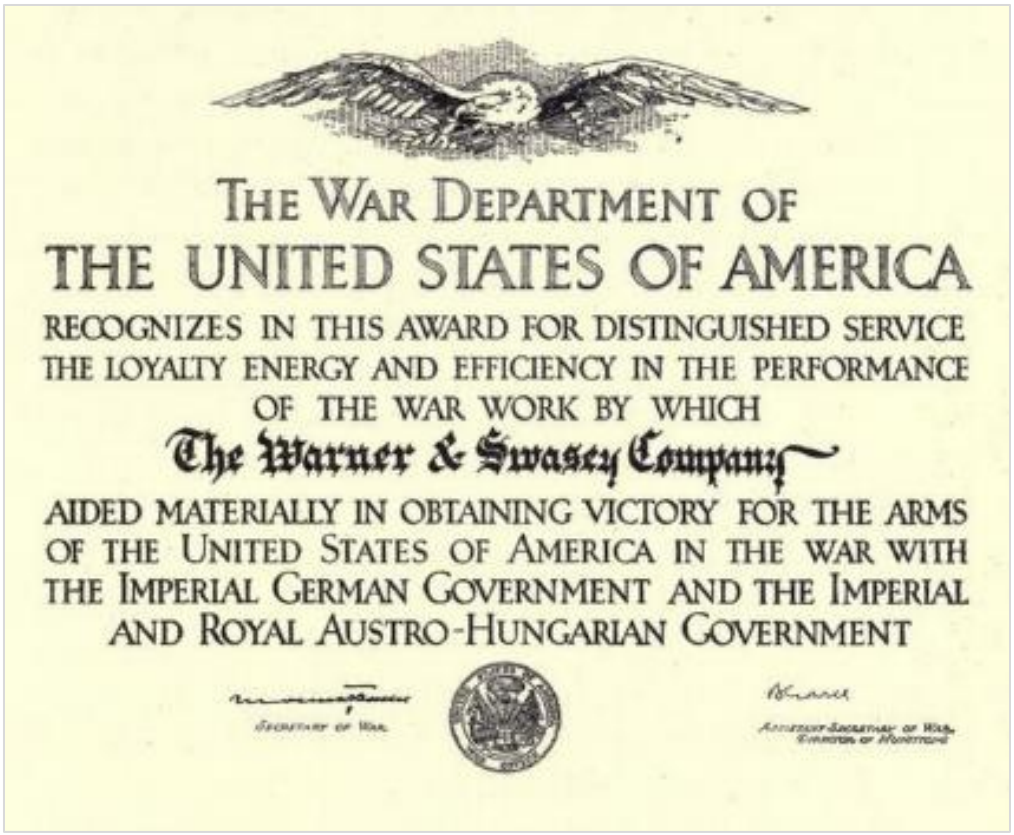


Figure 19. 40-inch Telescope, 90-foot Dome, and 75-foot Elevating Floor. Yerkes Observatory, Williams Bay, Wisconsin. Warner & Swasey. (1897)

Source: Warner & Swasey. *A Few Astronomical Instruments from the Works of Warner & Swasey.* Cleveland: Warner & Swasey, 1900, Plate XXXIV.



THE WAR DEPARTMENT OF
THE UNITED STATES OF AMERICA
RECOGNIZES IN THIS AWARD FOR DISTINGUISHED SERVICE
THE LOYALTY ENERGY AND EFFICIENCY IN THE PERFORMANCE
OF THE WAR WORK BY WHICH
The Warner & Swasey Company
AIDED MATERIALLY IN OBTAINING VICTORY FOR THE ARMS
OF THE UNITED STATES OF AMERICA IN THE WAR WITH
THE IMPERIAL GERMAN GOVERNMENT AND THE IMPERIAL
AND ROYAL AUSTRO-HUNGARIAN GOVERNMENT

Figure 20. Certificate of Merit - Recognition for Distinguished Service, World War I "For exceptionally rapid development of manufacturing methods and quantity production on a vast scale of Panoramic Sights."

Source: Warner & Swasey, The Warner & Swasey Company, 1880-1920, Fortieth Anniversary Celebration, Cleveland Ohio. New York: Bartlett Orr Press, 1920, 55.

Figure 21. Bronze Medal issued in Celebration of Warner & Swasey 40th Anniversary (1880-1920)
The medal was designed by American sculpter and medalist Victor David Brenner, best known for his Lincoln one-cent coin design.

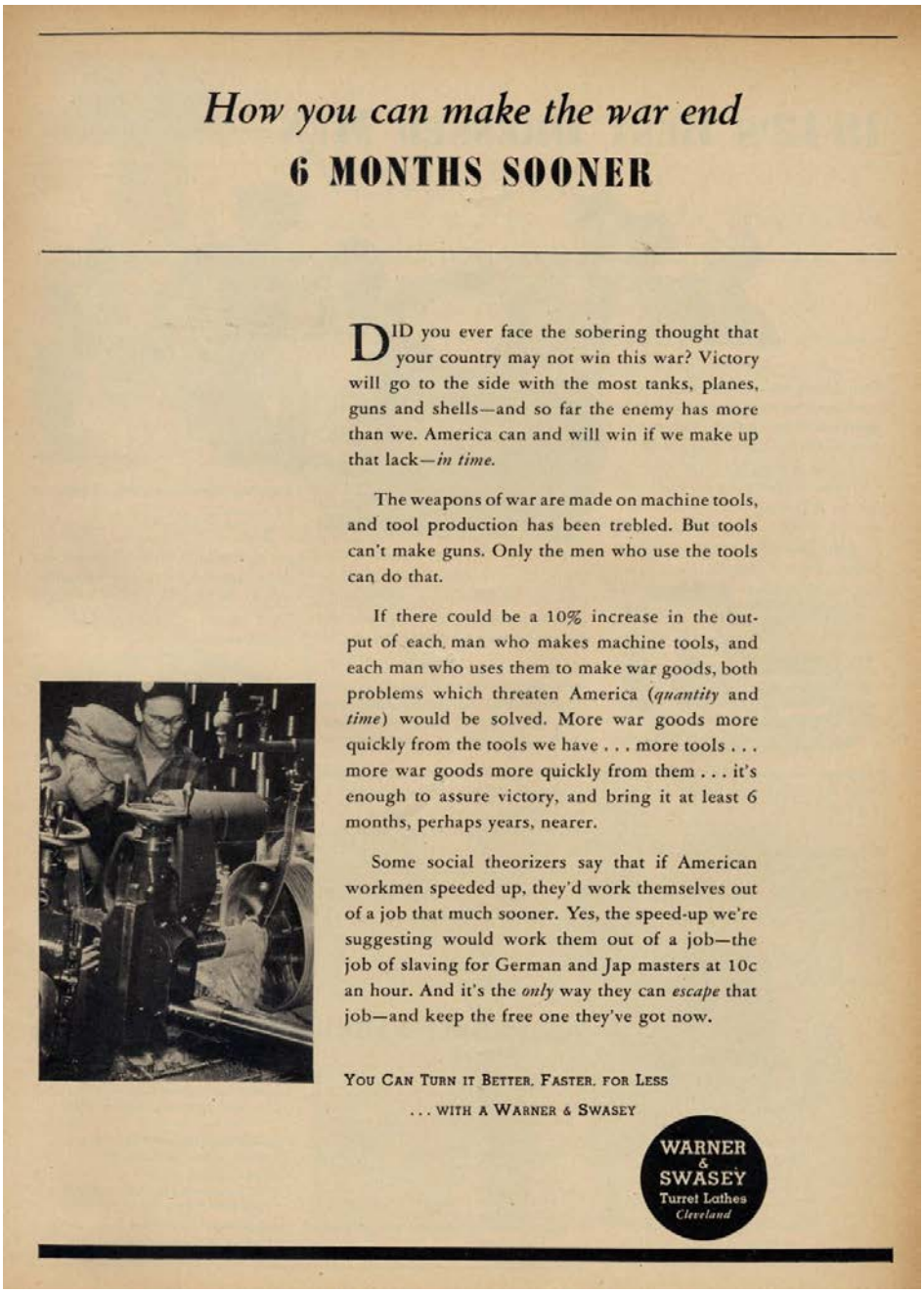
Source: Warner & Swasey Company 40th Anniversary Medal. Csillagászat érmeken Astronomy on Coins and Medals. Available at http://astrocoins.mrcollector.eu/index.php/english-menu-1/astronomers/19th-century/187-swasey-ambrose-1846-1937

Figure 22. Worcester Reed Warner Medal
Established by bequest of Worcester Reed Warner in 1930 and awarded by the American Society of Mechanical Engineers for outstanding contribution to the permanent literature of enginnering. The award is ongoing today.

Source: American Society of Mechanical Engineers, Worcester Reed Warner Medal. Available at https://www.asme.org/about-asme/get-involved/honors-awards/literature-awards/worcester-reed-warner-medal.

Figure 23. Swasey Chapel and Observatory, Denison Univerity, Granville Ohio, Photo ca. 1936-1943.

Source: Ohio History Connection, The Ohio Guide Collection, Denison University.



How you can make the war end

6 MONTHS SOONER

DID you ever face the sobering thought that your country may not win this war? Victory will go to the side with the most tanks, planes, guns and shells—and so far the enemy has more than we. America can and will win if we make up that lack—*in time.*

The weapons of war are made on machine tools, and tool production has been trebled. But tools can't make guns. Only the men who use the tools can do that.

If there could be a 10% increase in the output of each man who makes machine tools, and each man who uses them to make war goods, both problems which threaten America (*quantity* and *time*) would be solved. More war goods more quickly from the tools we have . . . more tools . . . more war goods more quickly from them . . . it's enough to assure victory, and bring it at least 6 months, perhaps years, nearer.

Some social theorizers say that if American workmen speeded up, they'd work themselves out of a job that much sooner. Yes, the speed-up we're suggesting would work them out of a job—the job of slaving for German and Jap masters at 10c an hour. And it's the *only* way they can *escape* that job—and keep the free one they've got now.

YOU CAN TURN IT BETTER, FASTER, FOR LESS

. . . WITH A WARNER & SWASEY

WARNER & SWASEY
Turret Lathes
Cleveland

Figure 24. Warner & Swasey Advertisement – World War II, 1942

Source: *Newsweek*, 2 March 1942.

What's new at Warner & Swasey

18 new product lines added by purchase or major change and improvement, in the last five years — to help industry do more things better, faster, at less cost — that is — *fight inflation* and increase profits.

Here they are —

Beller Steel Company of Canada — logging machinery.

Lima coil conversion equipment.

Balas collets and tools.

Hydraulic cranes.

Haskell-Dawes heavy duty twisters for cordage and wire.

Wiedemann tape controlled turret presses and mechanical testing machines.

Manchester cutoff and grooving tools.

New telescoping boom excavating machines.

Machines which cut, trim, de-bark trees for pulpwood industry.

New scientific instruments such as this Rapid Scanning Spectrometer.

Material handling loader and lift truck.

Electronic readout device which monitors a machine's operation during use.

Numerically controlled positioning table.

Lahr triple-spindle tape-controlled gun drill.

Three new sizes of automatic turret lathes.

Permanent tooling concept for numerically controlled turret lathes.

Higher production textile Pin Drafter.

Automatic machine cleaning system for textile Pin Drafter.

These 18 additions or major improvements are typical of what is going on at Warner & Swasey today. For more information about any of them, and what they signify, write Warner & Swasey, 5701 Carnegie Avenue, Cleveland, Ohio 44103.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

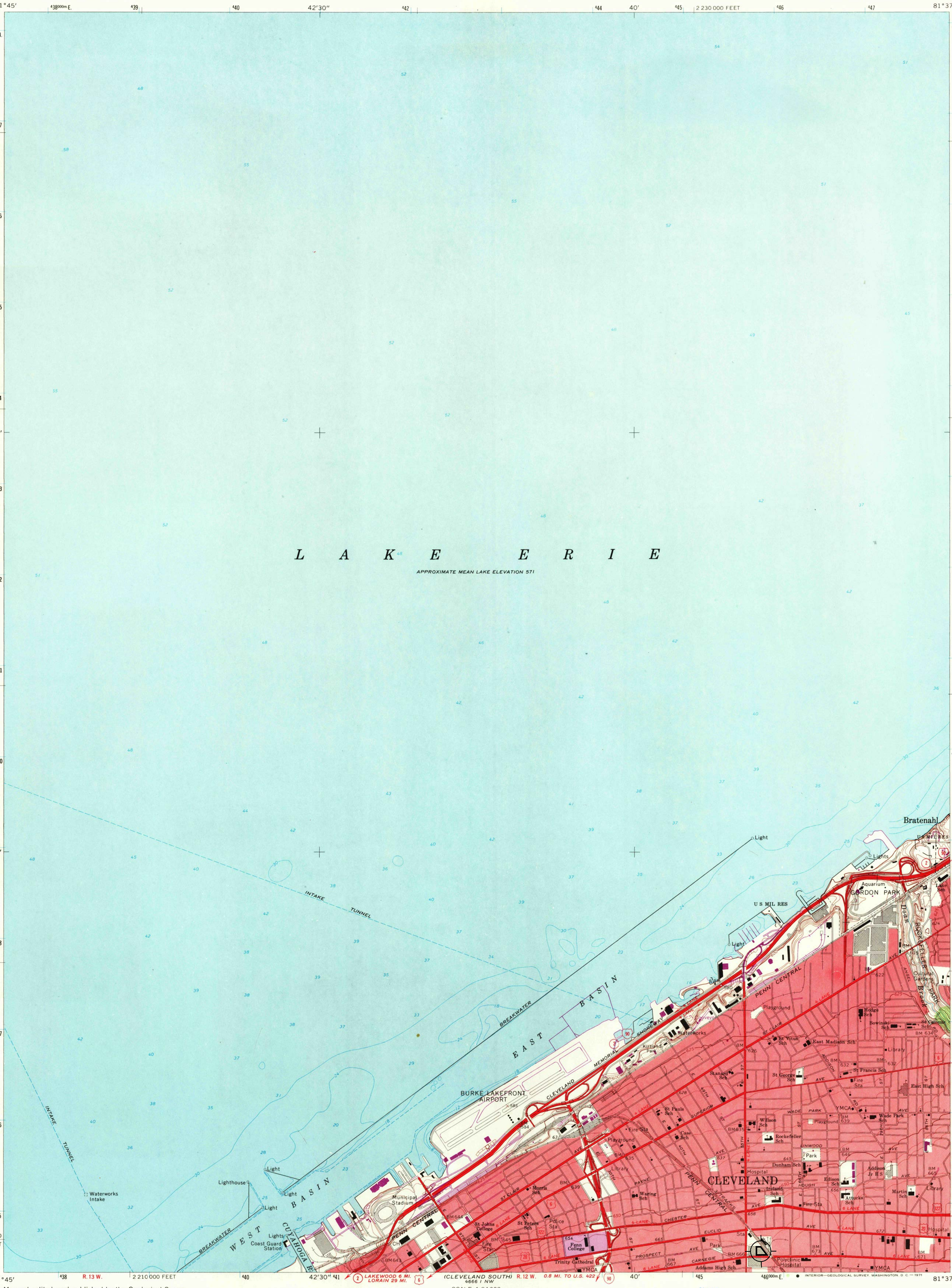
YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION EQUIPMENT

May 1968

Figure 25. Warner & Swasey Advertisement – May 1968
Source: Warner & Swasey 1968 Papers. Available at *https://history.fee.org/media/3141/878-the-warner-swasey-company-1968-papers.pdf*

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CLEVELAND NORTH QUADRANGLE
OHIO–CUYAHOGA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 EUCLID 15' QUADRANGLE



Warner & Swasey Company Building, Cleveland, Cuyahoga County, Ohio

Zone 17
East 445725
North 4594490

(LAKEWOOD) 4666 IV NE

Mapped, edited, and published by the Geological Survey
Revised in cooperation with State of Ohio agencies

Control by USGS, USC&GS, and Cleveland Regional Geodetic Survey

Planimetry by photogrammetric methods from aerial photographs taken 1952. Topography by planetable surveys 1953. Revised from aerial photographs taken 1962. Field checked 1963.

Selected hydrographic data compiled from U. S. Lake Survey Charts 35 (1959) and 354 (1962). This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum
10,000-foot grid based on Ohio coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Entire area lies within the Connecticut Western Reserve. Land lines established by private subdivision of the Connecticut Western Reserve

MN GN 4° 71 MILS 0°27' 8 MILS
UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000
1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS LOW WATER 570.5 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

OHIO
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty Light-duty
Interstate Route U. S. Route State Route

(SHAKER HEIGHTS) 4666 I NE

Revisions shown in purple compiled in cooperation with State of Ohio agencies from aerial photographs taken 1970. This information not field checked

Purple tint indicates extension of urban areas

CLEVELAND NORTH, OHIO
SW/4 EUCLID 15' QUADRANGLE
N4130—W8137.5/7.5

1963
PHOTOREVISED 1970
AMS 4667 II SW—SERIES V852


THE LAWRENCE-SWASEY COMPANY


THE WARNER & SWASEY COMPANY


THE WARNER & SWASEY COMPANY
MITIGATE!
MANGRE!


SKANK
NAIVE
TOP NOTCH


Rainbow Center for
Women & Children


James.
Own S
this


ALOTMILKTEMS


WHK


BLACK
LIVES
MATTER


420!
BRRH
2018!
tha
ice!


LOST IN MY HEAD


GRIMY
GANG
MIGAS
GRIMY
GANG


WOAH!


@sighpies


SUCCUMBING
DONT TELL ME HOW TO LIVE MY LIFE


TODAY


ATF


ZUFINJE


SKANK


SC: @FBATC


STK HTM
HOW MIGHTY
IS YOUR
GOD?

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

Requested Action:	Nomination
Property Name:	Warner & Swasey Company Building
Multiple Name:	
State & County:	OHIO, Cuyahoga

Date Received:	Date of Pending List:	Date of 16th Day:	Date of 45th Day:	Date of Weekly List:
8/6/2019	8/28/2019	9/12/2019	9/20/2019	

Reference number:	SG100004410
Nominator:	SHPO

Reason For Review:

__ Appeal	X PDIL	X Text/Data Issue
__ SHPO Request	__ Landscape	__ Photo
__ Waiver	__ National	__ Map/Boundary
__ Resubmission	__ Mobile Resource	__ Period
__ Other	__ TCP	__ Less than 50 years
	__ CLG	

__X__ Accept _____ Return _____ Reject __**9/20/2019**__ Date

Abstract/Summary Comments:	AOS: Engineering, Industry; POS: 1905-1970; LOS: local Significant persons: Ambrose Swasey and Worcester Reed Warner for their engineering and design work with astronomical instruments.
Recommendation/ Criteria	NR Criteria: A & B

Reviewer Lisa Deline Discipline Historian

Telephone (202)354-2239 Date 9/20/19

DOCUMENTATION: see attached comments : No see attached SLR : No

If a nomination is returned to the nomination authority, the nomination is no longer under consideration by the National Park Service.

NATIONAL REGISTER OF HISTORIC PLACES
NPS TRANSMITTAL CHECK LIST

OHIO HISTORIC PRESERVATION OFFICE
800 E. 17th Avenue
Columbus, OH 43211
(614)-298-2000

The following materials are submitted on August 1, 2019
For nomination of the Warner & Swasey Co. Building, Cuyahoga Co, OH to the National Register of Historic Places:

✓	Original National Register of Historic Places nomination form	
	___ Paper	✓ PDF
	Multiple Property Nomination Cover Document	
	___ Paper	___ PDF
	Multiple Property Nomination form	
	___ Paper	___ PDF
✓	Photographs	
	___ Prints	✓ TIFFs
✓	CD with electronic images	
✓	Original USGS map(s)	
	___ Paper	✓ Digital
✓	Sketch map(s)/Photograph view map(s)/Floor plan(s)	
	___ Paper	✓ PDF
	Piece(s) of correspondence	
	___ Paper	___ PDF
	Other _____	

COMMENTS:

	Please provide a substantive review of this nomination
X	This property has been certified under 36 CFR 67
	The enclosed owner objection(s) do _____ do not_____ Constitute a majority of property owners
	Other: _____

OHIO HISTORY CONNECTION

August 1, 2019

Julie Ernstein, Acting Chief, National Register of Historic Places
National Park Service
National Register of Historic Places
1849 C Street, NW, Mail Stop 7228
Washington, DC 20240

Dear Ms. Ernstein:

Enclosed please find one new National Register nomination for Ohio. All appropriate notification procedures have been followed for the new nomination submissions.

NEW NOMINATIONS	COUNTY
Warner & Swasey Company Buildings	Cuyahoga

The enclosed disks contain the true and correct copy of the information to the National Register of Historic Places nominations for Warner & Swasey Company Buildings.

If you have questions or comments about these documents, please contact the National Register staff in the Ohio Historic Preservation Office at (614) 298-2000.

Sincerely,

for Barbara Powell

Lox A. Logan, Jr.
Executive Director and CEO
State Historic Preservation Officer
Ohio History Connection

Enclosures