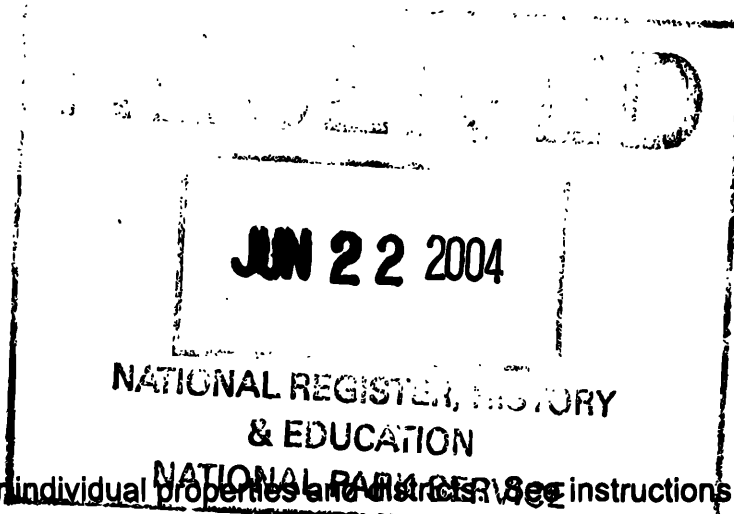


United States Department of the Interior
National Park Service

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 How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. 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. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Rhode Island Tool Company

other names/site number Providence Tool Company

2. Location

street & number 146-148 West River Street

not for publication

city or town Providence

vicinity

state Rhode Island

code RI

county Providence

code 007

zip code 02904

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this 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 meets does not meet the National Register Criteria. I recommend that this property be considered significant nationally statewide locally. (See continuation sheet for additional comments.)

Frederick C. Williamson

6/9/04

Signature of certifying official/Title Frederick C. Williamson, State Historic Preservation Officer
Rhode Island Historical Preservation and Heritage Commission

Date

State or Federal agency and bureau

In my opinion, the property meets does not meet the National Register criteria. (See continuation sheet for additional Comments.)

Signature of certifying official/Title

Date

State or Federal agency and bureau

4. National Park Service Certification

- I, hereby certify that this property is:
 - entered in the National Register
 - See continuation sheet.
 - determined eligible for the National Register
 - See continuation sheet.
 - determined not eligible for the National Register
 - removed from the National Register
 - other (explain):

Edson H. Beall
Signature of the Keeper

Date of Action/

8/4/04

5. Classification

Ownership of Property

(Check as many boxes as apply)

(Check only one box)

- private
- public-local
- public-State
- public-Federal

- building(s)
- district
- site
- structure
- object

Number of Resources within Property

(Do not include previously listed resources in the count.)

Contributing

Noncontributing

2 building

_____ sites

_____ structures

_____ objects

2 Total

Name of related multiple property listing

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

N/A

Number of contributing resources previously listed in the National Register

6. Function or Use

Historic Functions

(Enter categories from instructions)

INDUSTRY/PROCESSING/EXTRACTION:

manufacturing facility

Current Functions

(Enter categories from instructions)

VACANT: not in use

7. Description

Architectural Classification

(Enter categories from instructions)

No style

Materials

(Enter categories from instructions)

foundation BRICK

walls BRICK

roof SYNTHETIC: rubber

other STONE: granite

Narrative Description

(Describe the historic and current condition of the property on one or more continuation sheets.)

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DESCRIPTION

The Rhode Island Tool Company works is located at 146-148 West River Street in the northern part of Providence, Rhode Island. The flat, 5.14-acre property is flanked by the narrow, channeled West River to the north, West River Street and fenced vacant land to the east, a U.S. Postal Service employee parking lot to the south, and the Amtrak Northeast Corridor passenger rail line right-of-way to the west. The property is accessed via four paved driveways on the west edge of West River Street. The southernmost driveway leads to the south side of the property and Building 11. Two driveways lead to a road (a relict section of the pre-1958 West River Street alignment) and parking area east of Building 1. The north driveway leads to a parking and service area north of the main building, and continues west and south along the rear (west) side of the main building to Building 7. An abandoned railroad freight spur enters the property at the northwest corner and the track extends the length of the west side of the property.

The property contains two contributing buildings associated with the historical development of the tool works during its period of significance. Construction of the buildings began in 1853 and all major historical components were in place by 1921. The site is dominated by the sprawling main building, which consists of an agglomeration of attached, single and multistory buildings that occupy a single, complex-plan footprint. One small, freestanding building, the Electrical Substation (ca. 1910) is located immediately east of the main building. The main building incorporates six buildings dating from before the Civil War. All buildings are vacant, with the exception of Building 11 (1906), which belongs to J. Vingi & Son, an active fruit and vegetable wholesaler. The Rhode Island Tool Company was a light forging works and machine shop specializing in industrial hardware until it closed in early 2003. The interiors of the remaining buildings have been stripped of their metalworking machinery. The building functions as indicated on historic maps show changes in building functions over the life of the works.¹

All major historical components of the tool works share a general vocabulary of exterior materials and features. The only exceptions are two late-twentieth-century steel frame,

¹ The tool works buildings and their components are referred to in this document by the numbers appearing on three maps: the Sanborn Fire Insurance Map for 1956, published at the end of the period of significance, and 1957 and 1967 Rhode Island Tool Co. plant layout drawings. These drawings provide the most comprehensive numbering system for the final evolution of the complex. The designations appear on the works plan that accompanies this form.

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corrugated metal-sided additions (buildings 26 and 27) at the north end of the main building. Exterior and interior party walls are of brick masonry construction. The works includes a wide range of roof shapes and types with a variety of timber and steel support systems. Fenestration consists of tall, regularly spaced, rectangular or segmental arch windows with granite sills. The predominant window type is multiple pane, double-hung, wood sash. The exposed elevations of the buildings generally retain a high degree of integrity with the exception of varying degrees of window replacement and recent roof resurfacing. The long axes of the buildings are oriented north-northeast by south-southwest, however, for clarity of description, the West River Street elevation will be referred to as the east elevation, etc.

The main building consists of 15 attached numbered buildings: 1, 1A, 2, 3, 3A, 4, 5, 6, 6A, 7, 11, 12, 22, 26, and 27. This complex structure is visually dominated by the two-story West River Street (east) facade of buildings 1 (1853) and 1A (1853 et seq.), which include an attached four-story stair tower. These buildings, and the one-story buildings 2 (1855), 3 (1895), and 27 (post 1967) extending to the north conceal the remaining attached buildings lying to the west from view from West River Street. The freestanding Electrical Substation is located approximately 20 ft east of Building 1A. The following description is organized chronologically in the order of building construction and includes information about individual building evolution and function.

Building 1/Building 1A, Machine Shop/Offices/Storage (1853, 1853 et seq.): Building 1 and Building 1A, located at the southeast corner of the works, are described together as they now appear as one two-story building, although over time Building 1 was expanded to the south and Building 1A was created out of part of adjacent single-story Building 2 to the north. Building 1 and Building 1A form a long, narrow, two-story building with a flat, rubber membrane roof, brick walls, and a brick foundation. The 27 by 8 bay building measures 268 ft long north-south by 70 ft wide east-west. Building 1 is the longer of the two, occupying the southerly 208 ft of the building, and Building 1A occupies the remaining 59 ft to the north. Only the south and east elevations are completely visible as adjacent buildings are attached to the north and west elevations. The east elevation includes a prominent four-story stair tower. The cornice incorporates a wood gutter molding and plank fascia. Fenestration is regular and consists of horizontal rows of rectangular windows with thick lintels and narrow sills of rough hammered granite. The windows incorporate a variety of sash, including 24-over-24, 12-over-12, and 6-over-12 double-hung wood sash units, with randomly scattered openings containing glass block, metal louvers, or modern replacement sash. Ground floor windows are protected by heavy wire

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mesh screens. All piers include a diamond-shaped cast-iron beam anchor washer at the second story floor line.

Differences in the brickwork and window heights on the east elevation indicate alterations and additions to the building. The core of Building 1 consists of 16 bays, six standing north of the one-bay stair tower, and nine south of the tower. Second floor windows in this section are flush with the walls, and the taller first floor windows are recessed between narrow brick piers that end in a corbeled brick dentil motif below the lintels. These windows were raised to the ceiling in 1910 (Rhode Island Tool Company 1910). The five remaining bays of Building 1 south of this core section have shorter first floor window and window panels, with the dentil motif continuing horizontally from the core section across the tops of the lintels. The six bays of Building 1 north of the stair tower are similar to those immediately south of the tower. On the east facade of Building 1A to the north, the windows of both stories are recessed between full-height piers, and the dentil motif appears above the upper story windows below the cornice. The two northerly top story windows have been modified to accept a metal roll door and a covered conveyor belt housing. Historic views and maps indicate that the footprint now occupied by Building 1A was previously part of one-story Building 2 that was rebuilt in 1907 (Rhode Island Tool Company 1907). Fenestration on the exposed north second story of Building 1A is consistent with the second story of the rest of Building 1 and 1A, and brickwork details on the south elevation of Building 1 are the same as those on the south end of the east elevation of the building.

The four-story, 15-ft-square, brick stair tower has a shallow pyramidal hipped roof with an overhanging wood cornice with plank soffits and fascia, and curved wood brackets. The tower is divided into four stories with brick stringcourses between the first and second, and third and fourth floors. Each side of each story contains a Roman arch opening with a protruding brick arch and granite sill. The top story is a belfry with recessed panels and corner piers, and arched openings filled with horizontal metal louvers. The third story contains a doorway to the roof on the west elevation, multiple pane wood sash windows on the north and east elevations, and paneled wood double hoist bay doors surmounted by a block-and-tackle hoist beam on the south elevation. The tower is engaged with the east elevation of Building 1 on the second and first stories. The second story of the tower contains a hoist bay door on the south elevation, a multiple pane wood sash window on the north elevation, and a narrower arched window on the east elevation. The ground floor has an ornate, multiple pane, double-hung sash, double-arch-and-oriel window on the south elevation, a replacement aluminum and glass entrance door with

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an original wood sash fanlight on the east elevation, and a multiple pane wood sash window on the north elevation. The bell and pull rope are still in place and functional.

The interior structures of Buildings 1 and 1A are of fire resistant construction with multiple-layer wood planks forming the roof underlayment and second floor. The building has a poured concrete slab ground floor. Roof beams are of bolted laminated plank construction, and second floor beams are solid chamfered wood timbers. Posts are mostly tubular steel columns, with scattered square wood units. The Building 1 first and second floor areas immediately surrounding the main (stair tower) entrance are partitioned into modern office cubicles. Otherwise the interiors consist of open shop floor space divided longitudinally into four bays by three rows of posts. A brick party wall separates Building 1 from Building 1A, and the first floor spaces are connected via three large, dissimilarly sized segmental arch openings, one of them bricked over. The ground floor west wall contains numerous piers, the intervening spaces being former window openings that have been bricked in or cut down to the floor for doorways.

The configuration of the roof of Building 1 was changed several times. The building originally had a shallow pitch gable roof with a short, narrow, full-length ridge vent cap. The north and south walls of the building followed the gable profile and contained a row of five attic windows that increased in height from the ends to the middle. Historic illustrations showed that by 1867 a row of full-length glazed trapdoor monitors had been installed on both roof planes. At some point after the 1940s this configuration was altered and the roof and end walls lowered to their current flat configuration.

Building 1 and Building 1A were erected in 1853 by the Providence Forge & Nut Company, and later modified by the Providence Tool Company and the Rhode Island Tool Company. The functions of Building 1 are indicated on the 1889, 1900, and 1921 Sanborn fire insurance maps as a pressroom on the first floor, machine shop and offices on the second floor, and store room on the third floor. Functions for the first and second floors of Building 1A are similar, and in 1956 included a recreation room on the second floor.

Building 2, Blacksmith/Bolt Heading Shop (1854): Building 2 is located immediately north of Building 1A, with which it shares a party wall. It is a rectangular one-story building with a shallow-pitch, ridge-hip, asphalt-shingled roof, brick walls, and a brick foundation. It measures 96 ft north-south by 70 ft east-west. It shares party walls with adjacent buildings on all but its nine-bay east elevation. It incorporates the same decorative brickwork as Building 1, with protruding piers forming recessed window panels with a row of corbeled dentils above the

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lintels, and a continuous row of brick dentils below the simple wood cornice. Windows are original 12-over-12, double-hung, wood units with wire security screens. The third window from the south end has been replaced with a wide metal roll door. The roof shingles were recently replaced and the roof now has rows of copper snow stops.

The plank-and-joist roof is supported by transverse, parallel, bolted timber king post trusses with radial and vertical subtrusses, supported by three longitudinal rows of mixed tubular steel columns and timber posts. The floor is a poured concrete slab with two square upsetting machine pits and the remains of a circular bolt stock heating oven located in the west aisle. A brick party wall separates Building 2 from Building 4 to the west, and the floor spaces are connected via three large, dissimilarly sized segmental arch openings, one partially and one completely bricked over.

Building 2 was erected in 1853 by the Providence Forge & Nut Company, and later modified by the Rhode Island Tool Company. The function of Building 2 is indicated on the 1889, 1900, and 1921 Sanborn fire insurance maps as a blacksmith shop, and on the 1956 Sanborn map as a press shop. Rhode Island Tool Company works plans from 1957 indicate that this room contained a blacksmith shop as well as air compressor equipment, upsetting equipment, and bolt heading equipment.

Building 4, Main Drop Forge Shop (1854): Building 4 is located immediately west of Building 2, with which it shares a party wall. It is a rectangular, one-story building with a moderately pitched asphalt-shingled roof with a full-length box monitor; brick walls; and a brick foundation. It measures 106 ft east-west by 69 ft north-south. It shares party walls with adjacent buildings on all but its south elevation, which is not visible as it forms the north wall of a narrow alley blocked by a modern covered passageway. The most visible exterior element is the full-length box monitor. The monitor end walls are brick with drain tile coping at the parapet and contain rectangular ventilation louvers. A ladder leading to the roof is attached to the east wall. The sides, which originally contained multiple pane, steel sash windows, have been covered with vinyl clapboard and a horizontal row of small horizontal rectangular windows. Ten moveable weathervane-type sheet metal ventilator hoods are arranged in staggered pairs on the flat monitor roof.

The roof is supported by transverse, parallel bolted timber trusses with solid horizontal and vertical members, paired heavy plank diagonals, and wrought iron tensioning rods. This truss system provides a clear-span interior shop floor with no support posts. The trusses support

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a massive steel lineshaft system that runs the length of the south bay and includes a large main drive pulley and numerous smaller forge drive pulleys. The floor consists of areas of brick and poured concrete slabs. The floor area includes 11 cast steel Chambersburg (of Chambersburg, PA) drop forge bases arranged in two east-west-oriented parallel rows. The forge frames have been removed from the bases. Surviving peripheral equipment includes blowers, ductwork, vent hoods, fuel oil lines and temperature recorders for metal heating furnaces, as well as tool racks that hold a variety of forge tongs.

Building 4 was erected in 1854 by the Providence Forge & Nut Company. Historic maps indicate that Building 4 served as a drop forge shop for the life of the tool works.

Building 5, Die Sinking/Carpentry Shop (1854): Building 5 is located at the west edge of the works, immediately north of Building 4, with which it shares a party wall. It is a rectangular, 2½-story building with a moderately pitched, asphalt-shingled roof; brick walls; and a brick foundation. It measures 79 ft north-south by 31 ft east-west. It shares party walls with adjacent buildings on east and north elevations, and the eight-bay west elevation and three-bay south elevation are exposed. The roof overhangs the walls and includes simple wood molding with plank soffit and fascia. The roof shingles were recently replaced and rows of copper snow stops have been added. Fenestration is regular with tall rectangular windows on the first story and shorter rectangular windows on the second story. All windows have thick lintels and thin sills, all of hammered granite. The upper floor windows are covered with plywood, and the lower floor windows contain three pane, metal casement replacement units. One bay on the west elevation is a hoist bay with a diagonal plank door in the upper floor doorway with a horizontal block-and-tackle beam set into a small gable above the bay. The segmental arch attic windows in the gable ends contain original 15-over-10 pane, double-hung, wood sash units. A row of diamond-shaped cast-iron beam anchor washers is located at the second story floor line.

The plank and joist roof is supported by transverse, parallel bolted timber trusses that provide a clear span floor space in the attic. The ground floor consists of a poured concrete slab, and the room is divided into two bays by a longitudinal row of tubular steel columns. The floor shows evidence of at least 14 electrically powered machine tools having been mounted to it with threaded steel pins. A small milling machine is still mounted to the floor in the southeast corner, and a short section of overhead lineshafting overhangs the east bay.

Building 5 was erected in 1854 by the Providence Forge & Nut Company. The functions of Building 5 are indicated on the 1921 and 1956 Sanborn fire insurance maps as a machine shop

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on the ground floor and a carpentry shop on the second floor. Rhode Island Tool Company works plans from 1957 indicate that the ground floor of the building was a die sinking room.

Building 7, Boiler House (1853): Building 7 is located in the southwest part of the works, and shares a party wall with Building 6A to the east. The one-story building has a shallow-pitch, asphalt-shingled ridge gambrel roof, brick walls, and a brick foundation. The building consists of two attached rectangular rooms, a 47-ft by 45-ft south section containing the boilers, and a 40-ft by 33-ft storage room to the north. An L-shaped alley between Building 7 and Building 6 to the north and west has been filled with modern covered passageways, leaving only the south and west elevations of the south section exposed. The roof has a simple wood molding at the cornice, and a cylindrical metal vent at the peak. The exposed walls have brick corbeling and dentils below the cornice. The west elevation contains a steel roll door flanked by 16-pane, steel sash windows with moveable awning-type center sections, and a mix of cast stone and bluestone lintels and sills. The south elevation contains a wide service door filled with concrete block, and a paneled wood personnel door. A tapered, square, brick boiler chimney with a corbeled cap and iron banding rises from the northeast corner of the roof.

The plank and joist roof of the south, boiler room section is supported by a bolted timber queen rod truss system. The floor is constructed of poured concrete. The boiler room contains three Dillon Boiler Company (of Fitchburg, MA) horizontal firetube boilers in one massive steel-framed brick setting occupying the center of the room. These units were installed in 1907 (Rhode Island Tool Company 1907). They are no longer in service and have been supplanted by a smaller oil-fired Cleaver-Brooks unit on the floor west of the old boilers. Electrically driven feedwater pumps and a cannibalized Sullivan air compressor are located north of the old boilers. A concrete stairway on the north side of the room leads down to a shallow basement.

Building 7 was erected in 1853 by the Providence Forge & Nut Company. Building 7 was the main boiler room for the life of the tool works. Prior to the introduction of electrical drive motors for individual machines in 1910, power to the various departments of the works was supplied by a number of scattered stationary steam engines (Rhode Island Tool Company 1912). Building 7 continues to supply steam heat to the complex.

Building 3, Metal Storage (1895): Building 3 is located in the northeast corner of the works, north of Building 2, with which it partially shares a party wall. It is a rectangular one-story building with a shallow-pitch, ridge-hip asphalt-shingled roof, brick walls, and a brick foundation. It measures 142 ft long east-west by 70 ft wide north-south. It shares party walls

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with adjacent buildings on all but its five-bay east elevation, seven-bay west elevation, and the six exposed bays of its south elevation. The north elevation is obscured by late-twentieth-century steel frame additions. The walls incorporate the same decorative brickwork as adjacent Building 2, with protruding piers forming recessed window panels with a row of corbeled dentils above the lintels, and a continuous row of brick dentils below the simple wood cornice. The original 12-over-12, double-hung, wood sash windows are in place and covered with vinyl clapboard panels with 1-over-1 windows. The west window on the south elevation has been replaced with a metal roll door, and the two south windows on the east elevation have been bricked in. The roof shingles were recently replaced and now incorporate rows of copper snow stops. The long roof planes incorporate rows of rectangular raised skylights.

The plank and joist roof is supported by transverse, parallel, bolted timber king post trusses with diagonal subtruts and vertical wrought iron tensioning rods, supported by a single, central, longitudinal row of heavy timber posts. The floor is a poured concrete slab. A 5-ton Burlington Engineering traveling crane serves the full length of the south bay.

Building 3 was erected in 1895 by the Rhode Island Tool Company. The functions of Building 3 are indicated on the 1900, 1921, and 1956 Sanborn fire insurance maps and Rhode Island Tool Company works plans from 1957 indicate the functions as iron and steel storage.

Building 6, Bolt Threading/Machine Shop/Die Storage/Inspection/Shipping and Receiving (1896–1897): Building 6 is located on the west side of the works, south of Building 4 and Building 5, and north of Building 7. The one-story building has a combination of flat and sawtooth monitor roofs, brick walls, and a brick foundation. The building consists of two attached rectangular rooms, a large north section measuring 106 ft long east-west by 88 ft wide north-south, and a smaller 40 ft by 33 ft section at the west end of the south wall. Building 6 shares a party wall with Building 6A to the east. Alleys between it and Building 7 to the south and Building 4 and Building 5 to the north have been filled in with modern covered passageways, leaving only the west elevation of the large section and the west and south elevations of the small section exposed. The roof of the large section consists of three sawtooth monitors with the steep pitches facing west and a mix of brick and slate-clad endwalls. The windows in the west monitor faces have been blocked with vinyl clapboard siding, and the shallow east-facing planes are sheathed with rubber membrane. The small section of the building to the southwest has a flat, built-up roof with a cornice consisting of a simple wood molding. Fenestration consists of segmental arch windows with brick lintels and hammered granite sills, containing 12-over-12, double-hung, wood sash windows, with the bottom sash

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boarded up. A metal replacement personnel door is located in one bay, above a short flight of concrete steps. The west elevation of the smaller section to the southwest incorporates a full-length raised concrete rail and truck loading dock with a shed roof supported by steel poles. The south elevation of this section is four bays wide and contains three blocked windows and a steel roll door.

The timber roof frame of the main section is supported by three longitudinal rows of tubular steel columns dividing the poured concrete slab floor into four bays.

Building 6 was erected in 1897 by the Rhode Island Tool Company. The function of the large section of Building 6 is indicated on the 1900 Sanborn fire insurance map as a bolt room, and on the 1921 and 1956 maps as a threading room. Rhode Island Tool Company works plans from 1957 indicate that functions included die storage, machine shop, inspection, and shipping and receiving. The smaller section to the southwest was indicated as a shipping room.

Building 12, Forge Shop/Trimming Room (between 1900 and 1921): Building 12 is located at the north end of the works, immediately north of Building 4, with which it shares a party wall. It is a rectangular, one-story, seven bay by three bay building with a moderate pitch, asphalt-shingled gable roof, brick walls, and a brick foundation. It measures 70 ft long north-south by 39 ft east-west. The main entrance is in the north elevation and consists of a brick projection with a central steel roll door flanked by boarded over windows. Fenestration consists of segmental arch windows with brick lintels and hammered granite sills, containing a mix of 24-over-24 pane and 12-over-12 pane, double-hung, wood sash windows. A pair of 18-pane fixed wood sash windows are located in the north gable end. The roof has a simple molded wood cornice, and the asphalt shingles were recently replaced and incorporate rows of copper snow stops. A small concrete block shed addition with a shed roof is located on the center of the east wall, and a concrete block addition with a flat roof, corrugated metal siding and a sheet steel-clad roll door obscures the south half of the west elevation.

The plank and joist roof is supported by transverse, parallel, bolted modified king post timber trusses with diagonal subtruts and wrought iron tension rods, providing a clear-span, unobstructed shop floor space. The floor is a poured concrete slab.

Building 12 was erected between 1900 and 1921 by the Rhode Island Tool Company. Its construction is consistent with the generic, undecorated mill construction of late-nineteenth- and early-twentieth-century additions such as Building 3A and Building 6. The function of Building

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12 is indicated on the 1921 Sanborn fire insurance map as a forge shop. Rhode Island Tool Company works plans from 1957 indicate this room as a trimming room.

Building 11, Storage Loft (1906): Building 11 is located at the southwest corner of the works, and is attached to the west side of the south end of Building 1 by a three-story, 14-ft by 35-ft, rectangular brick freight elevator tower with a flat, built-up roof. It is a rectangular, three-story building with a flat, built-up roof, brick walls and a brick foundation. The 18-by-10-bay building measures 150 ft long east-west by 84 ft wide north-south. The building has a slightly overhanging roof with plank soffits and exposed beam ends. The fenestration pattern is regular, with segmental arch windows with brick lintels and quarry-faced granite sills. The first floor on the north and south elevations contains double-height window openings, which have been bricked in. The majority of the windows have been partially filled with concrete blocks and contain 1-over-1 sash, and some windows contain 9-over-15 pane metal sash. The south elevation incorporates a long, one-story, raised, concrete truck loading dock with vertical plank siding and multiple roll doors. The west bay contains a full-height hoist bay in the bay south of the centerline, with wood double freight doors and safety railings. The north elevation includes a multi-story steel fire escape. On the east elevation, three bays are exposed either side of the elevator tower.

The building incorporates fire-resistant construction with heavy wood posts and beams and multiple layer wood plank floors.

Building 11 was built in 1906 by the Rhode Island Tool Company. It is identified on the 1921 Sanborn fire insurance map as a storehouse on the first floor and manufacturing space on the second and third floors. The 1956 Sanborn map simply identifies the building as a loft. The 1967 Rhode Island Tool Company works plan indicates that the building was sold in 1950.

Building 22, Heat Treating and Forge Shop (1917): Building 22 is located at the northwest corner of the works, immediately north of Building 4 and Building 5, with which it shares a party wall. It is a rectangular one-story building with a flat, built-up roof and a full-length box monitor; brick-clad structural steel frame; and reinforced concrete slab foundation and floor. It measures 139 ft long north-south by 49 ft wide east-west. Originally a daylit factory-type building with wide, high, multiple pane, steel sash glazing in the walls and monitor, the majority of the wall surfaces are now sheathed in corrugated metal siding and the sides of the monitor are clad in vinyl clapboard. Exposed areas reveal that the building has 17-ft-wide window openings between narrow brick piers, with quarry-faced granite sills and brick corbeling at the cornice

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above the window panels. The window openings have been extensively modified, with the openings covered, shortened, and altered with the installation of metal roll doors on the north elevation and the northernmost openings on the east and west elevations. On the east elevation, the remaining window areas have been altered by installation of a metal roll door or obscured by recent construction in the space between the building and Building 12 to the east. On the west elevation, steel roll doors have been installed in the two southernmost bays. Two small rectangular concrete block-walled shed additions are attached to the west elevation. The north one has a wood shed roof with a large sheet metal ventilation hood and the south one has a wood frame superstructure with vertical plank siding and a side gable roof. On the north and south monitor ends, circular openings for ventilation fans have been blocked off with plywood discs.

The roof is supported by transverse bolted structural steel trusses, providing an unobstructed open shop floor space.

Building 22 was erected in 1917 by the Rhode Island Tool Company. Older Sanborn fire insurance maps show that a small building in this location was used for tempering. Building 22 has a history of housing drop forges as well as various heat treating functions and equipment. The 1921 and 1956 Sanborn maps indicate that Building 22 was used for case hardening, and the 1956 map also indicates the presence of two large portable furnaces. The 1957 works plans identified Building 22 as a heat treating room, and indicated that drop hammers 24 and 25 were located in the northeast corner of the building, each flanked by a heating furnace with vent hood. Electric furnaces and quenching tanks were located along the east wall, and the southwest corner contained unspecified Wheelabrator (of LaGrange, GA) equipment.

Building 6A, Storage Annex/Machine Shop/Locker Rooms and Lavatories (1917): Building 6A is located near the center of the works and consists of a long, narrow, formerly open, rectangular area that was roofed over and is entirely surrounded by earlier and later construction. It shares party walls with Building 1 and Building 1A to the east, Building 4 to the north, Building 6 and Building 7 to the south, and a modern shed-roofed addition to the south. It measures 186 ft long north-south by 40 ft wide east-west, and has a concrete slab floor. It houses employee washrooms with toilets, showers, and lockers at the north and south ends, and the area between is open and lit by a single long sawtooth monitor that retains functional windows in its steep west face. The building is one story high, with the exception of two transverse structures projecting above the roofline. There is a brick-walled men's toilet tower directly above the toilets in the southwest corner of the building, and a rectangular women's room with a flat roof and diamond-

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shaped asbestos shingles extending over the middle of the building. These two toilet rooms serve the second floor of Building 1.

Building 6A was erected by the Rhode Island Tool Company in 1917. Its function was indicated on the 1921 Sanborn fire insurance map as a store room and location for rattlers, and on the 1956 map it was indicated as a machine shop at the north end and locker room at the south end. The 1957 Rhode Island Tool Company works plans indicate the space as a storeroom annex.

Building 3A, Annex (after 1921): Building 3A is located immediately north of the center of Building 3, with which it shares a party wall. It is a one-story, rectangular building measuring 51 ft long east-west by 36 ft wide north-south. It has a built-up shed roof, brick walls, and a poured concrete slab foundation. The north elevation includes a metal roll door and a single window covered with planks. The west wall is blank. The roof is supported by a central longitudinal row of wood posts.

Building 3A was erected by the Rhode Island Tool Company at some point between 1921 and 1956. Although Building 3A is indicated as having been built in 1917 on the Rhode Island Tool Company 1957 works plans, it is not on the 1921 Sanborn fire insurance map and does not appear on that map until 1956. Its construction is consistent with the generic, undecorated mill construction of late-nineteenth- and early-twentieth-century additions such as Building 6 and Building 12.

Building 26, Drop Forge Shop (1957): Building 26 is located at the north end of the works, north of Building 3 and Building 12. It is a high, one-story, rectangular steel frame building measuring 60 ft long east-west by 40 ft wide north-south. It has a flat roof, steel frame, corrugated metal siding and poured concrete floor. A row of metal ventilation louvers is located high on each wall. The west elevation contains a large metal frame window, a steel personnel door, a ventilation louver, and a steel roll door. The south elevation contains similar windows, and the north elevation contains similar windows and a metal roll door.

Building 26 was erected by the Rhode Island Tool Company in 1957. It was built to house a Chambersburg drop forge, the base of which is still located in the northwest corner.

Building 27, Drop Forge Shop (after 1967): Building 27 is located in the northeast corner of the works, and extends north from the east end of Building 3. It is a high, one-story, rectangular steel frame building measuring 82 ft long north-south by 60 ft wide east-west. The roof has a

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slight peak for drainage, the walls are sheathed with corrugated metal siding, and the floor is a poured concrete slab. The building is windowless. The east wall is blank except for a small louvered vent. The north elevation contains a central steel personnel door flanked by large metal roll doors. A steel personnel door is located in the west elevation.

Building 27 was erected by the Rhode Island Tool Company after 1957. It recently housed a 40-6½ Minster Machine Co. (of Minster, OH) drop forge. The forge has been removed from its mounting base.

Electrical Substation (ca. 1910): The Electrical Substation is a freestanding building located at the east edge of the property, approximately 20 ft east of the junction of buildings 1 and 1A. It is an approximately 12-ft-square, windowless, building with a flat, built-up roof; brick walls with a corbeled cornice and plank fascia; and a concrete slab foundation. It has a hinged, metal-clad fireproof door in the east elevation, and a rectangular chain-link fence enclosure containing three electrical transformers on its west side. The Rhode Island Tool Company installed electricity in the works for lighting and individual motor drive for machinery in 1910, which suggests the construction date for this building (Rhode Island Tool Company 1910).

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Photographic Information

Photographer: Matthew A. Kierstead
Date of Photographs: December 2003

Address: Matthew A. Kierstead
PAL
210 Lonsdale Avenue
Pawtucket, RI 02860

Index to Photographs:

1. View looking north showing from left to right: Building 11 to rear, and Building 1/Building 1A with stair tower
2. View looking north showing from left to right: Building 1A, Building 2, Building 3, and Building 22
3. East elevation of Electrical Substation
4. View looking northeast showing east elevation of Building 2 at left and south elevation of Building 3 at right
5. View looking west showing from left to right: Building 1/Building 1A with stair tower, east elevation of Building 2, and southeast corner of Building 3
6. View looking southwest showing from left to right: Building 27, Building 26, and Building 22
7. View looking southwest showing from left to right: part of Building 26, Building 12, roof of Building 4, and part of Building 22
8. View looking south showing from left to right: Building 22, Building 5, Building 6, and Building 11

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9. View looking south showing from left to right: Building 6 and Building 11
 10. View looking northeast showing Building 22 at left, Building 5 at center, and part of Building 6 at right
 11. View looking northeast showing from left to right, Building 22, Building 5, Building 6 and part of Building 7
 12. View looking east showing Building 7 at center and Building 6A and Building 1 with stair tower in background
 13. View looking east showing from left to right: Building 5, Building 6, and Building 11
 14. Interior view of first floor of Building 1 stair tower looking southeast. Note bell pull rope at right
 15. Interior view of Building 1A looking southeast into Building 1. Note wide brick arches
 16. Interior view of Building 4 looking west showing Chambersburg drop forge bases and heating furnace vent hoods in background
 17. Interior view of Building 6A looking north, lit by functional sawtooth monitor
 18. Interior view of Building 12 looking south showing timber roof trusses

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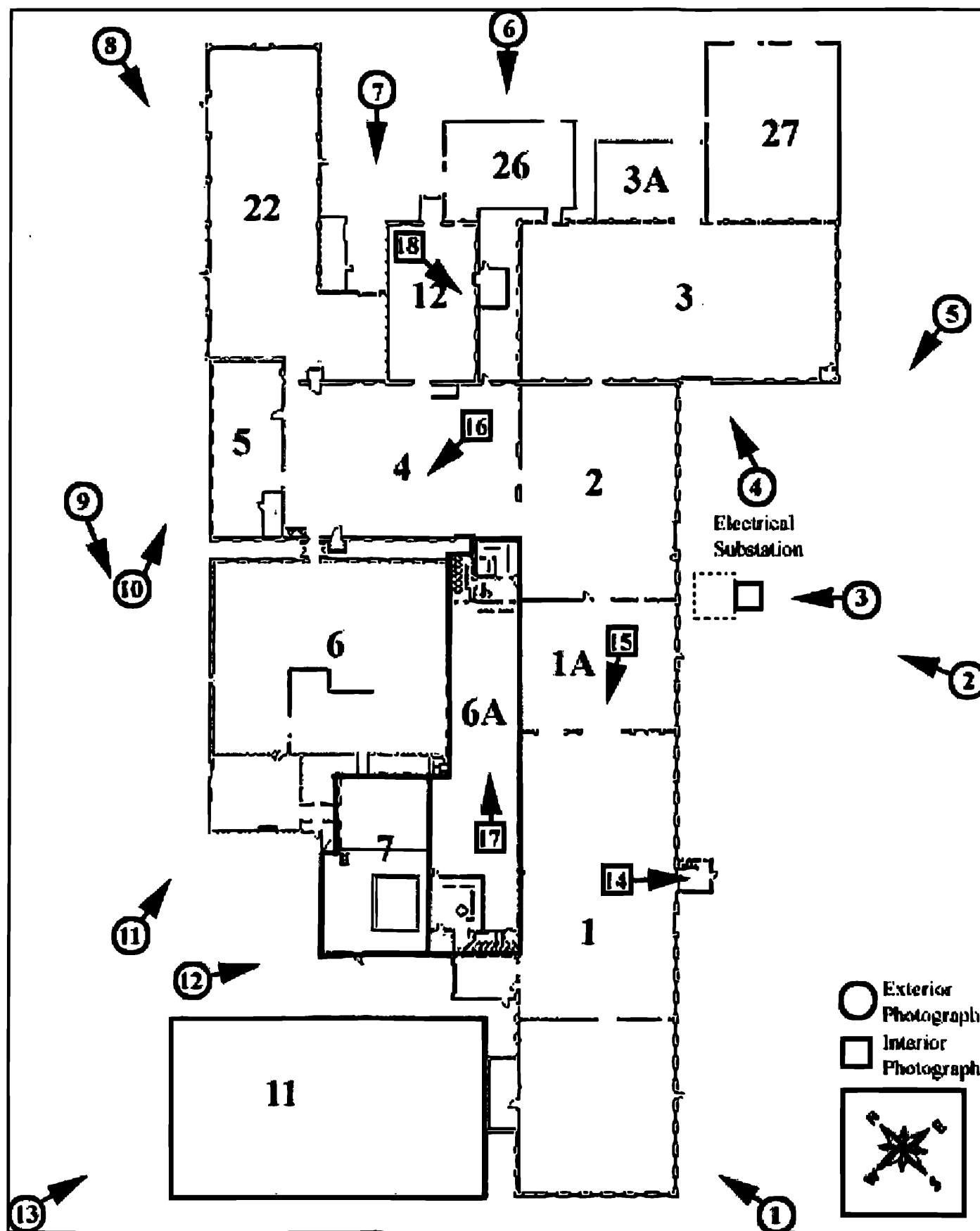
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Photograph Key



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.
X 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.)

Property is:

- A owned by 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 of age or achieved significance within the past 50 years.

Narrative Statement of Significance

(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- 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

Areas of Significance

(Enter categories from instructions)

INDUSTRY

ENGINEERING

ARCHITECTURE

Period of Significance

1853-1921

Significant Dates

1853: construction by Providence Forge & Nut Co.;

1861: acquired by Providence Tool Co.; 1883: Prov. Tool Co. reorganized as Rhode Island Tool Co.

Significant Person

(Complete if Criterion B is marked above)

Frederick W. Howe (1822-1891)

Cultural Affiliation

Architect/Builder

Primary location of additional data:

- State Historic Preservation Office
Other State agency
Federal agency
Local government
University
X Other

Name of repository: R.I. Historical Society, Providence Public Library

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STATEMENT OF SIGNIFICANCE

Summary

The Rhode Island Tool Company factory contains two contributing buildings associated with the construction of the complex commencing in 1853. The property is eligible for listing in the National Register of Historic Places at the state and local level under Criteria A, B and C. The period of significance begins in 1853, when the Providence Forge & Nut Company erected the first component buildings, and ends in 1921, when construction was completed. All of the major contributing component buildings were constructed between 1853 and 1921.

Under Criterion A, the property possesses important historical associations with Rhode Island's base metal industry during the nineteenth century. The tool works complex was begun by Providence Forge & Nut Company in 1853, and purchased by the Providence Tool Company in 1861. In the Civil War and postwar eras, Providence Tool became an important American rifle manufacturer. During the mid-1870s it was the largest single employer in Providence. The company was reorganized as the Rhode Island Tool Company in 1883, and was the only drop forging operation in Rhode Island when it closed in 2003. The complex is Providence's most intact surviving complex of pre-Civil War-era base metals industry buildings.

Under Criterion B, the property possesses significance for its association with Frederick W. Howe, an important figure in the history of the American machine tool industry who played a contributing role in the development of important machine tools, including the universal milling machine, and the "American System" of interchangeable parts. He is associated with the development of the nationally prominent machine tool manufacturer Brown & Sharpe, for whom he also worked.

Under Criterion C the property possesses significance as an intact collection of resources that reflect the distinctive characteristics of mid-nineteenth- to early-twentieth-century metalworking factory architecture and engineering, including a variety of industrial building types and methods of construction. Although all of the machinery has been removed, the existing buildings retain a high degree of their architectural integrity.

Development and Remains of Providence's Base Metals Industry

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Base metal industries are those concerned with the primary manufacture and secondary fabrication and manipulation of ferrous and non-ferrous metals. Base metal industries were important in Rhode Island in the eighteenth century, when iron ore was smelted in charcoal-fired cold-blast furnaces at Hope in Scituate and in the Blackstone River valley. In the late eighteenth and early nineteenth centuries, Pawtucket became an important center of metalworking, including the forge and anchor shops of Joseph Jenks, and early machine shops of the Wilkinson family, which turned out castings, forgings and machined parts for marine, military, textile, and other industrial applications.

These men trained the first generation of textile and machine tool makers. By the 1820s, "mechanics," including the Wilkinsons, Joseph Brown and Ira Gay, were supplying textile and precision measuring machinery for the entire country. In the years prior to 1840 this skilled base formed the nucleus of Rhode Island's capital goods industry, which included machine tools, steam engines, boilers, and precision instruments. Supporting base metals industries such as the nucleus of the Providence Tool Company, predecessor to the Rhode Island Tool Company, were formed during this period.

Between 1850 and 1860 the number of metalworking firms in Providence grew from 25 to 94. The city was optimally located for receiving and distributing raw materials, and close to many textile mills requiring machinery including steam engines and boilers. Building those machines required increasingly complex machine tools. Several other significant firms were created at this time. The Corliss Works established their West River Street steam engine works, located immediately south of Rhode Island Tool in 1848, and became the national leader in steam engine building. Brown & Sharpe, established in 1833, became Providence's major machine tool builder, and achieved a national reputation as inventor and creator of critical machine tools such as the Universal Miller, developed for and first used at the Providence Tool Company. Providence's Nicholson File Company, established in 1864, Gorham Manufacturing Company (silverware), founded 1818, and American Screw Company, incorporated in 1860, became world leaders in their respective specialties. Other important Providence base metals firms included the Rhode Island Locomotive Works (established 1865), Fuller Iron Works (established 1840), and Providence Tool. This diverse metals industry provided an economic cushion that enabled it to survive fluctuations in the textile industry and to maintain its industrial base after the decline of the textile industry (Kulick and Bonham 1978:3-15).

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Little remains of Providence's pre-Civil War-era base metals industrial architecture. Surviving buildings include the Phenix Iron Foundry Machine Shop (built 1848) on Imperial Place and Elm Street, the Barstow Stove building on Point Street (built 1850), and the Fall River Iron Works building on North Main Street (built ca. 1850). One building dating from 1845 remains at the Providence Steam Engine Company at South Main Street and Pike Street. A fragment of the New England Butt Company on Pearl, Rice, and Perkins streets may date to 1850 (Greenwood 2004). All other surviving buildings associated with base metals concerns established before the Civil War were built after 1865. This leaves the Rhode Island Tool Company complex, with its mid-1850s buildings as the most intact group of pre-Civil War base metals industry buildings standing in Providence.

The Providence Tool Company, 1847–1883

The Providence Tool Company, from which the Rhode Island Tool Company was organized in 1883, had its roots in early Lincoln and Pawtucket nut and bolt manufacturing. About 1834 Jeremiah and Joseph Arnold set up a nut press shop on the Moshassuck River in the vicinity of what later became the Sayles Bleachery. The business was soon transferred to Pawtucket, and bolts were added to the line. When Joseph Arnold retired, William Field took his place, and the new concern, William Field & Company, moved to Providence in 1846. They founded the Providence Tool Company, incorporated in June 1847, with Rufus Waterman, Freeman Foster, and Henry T. Cornet, "for the manufacture of tools and other articles" (*Providence Board of Trade Journal* 1889:18; Providence Tool Company 1873:3; Roe 1916:125).

The Providence Tool Company's first works were located in the mixed residential and industrial neighborhood of Providence's Fox Point, on an irregularly-shaped lot bounded by Wickenden Street, Cent Street, Farthing Street, and South Main Street. In 1847 the company employed 40 people and manufactured \$70,000 worth of products annually. In 1853 the Providence Forge & Nut Co. was organized by Rufus Waterman, Edwin J. and Samuel A. Nightingale, and George H. Corliss. That company built a new works at West River Street for the manufacture of punched nuts, washers, bolts, and ships chandlery. In 1856 Providence Tool absorbed Providence Forge, and moved their main operations to West River Street (Bayles 1891:628; Davis n.d.:2545–2546; Roe 1916:125).

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Frederick W. Howe

From the late 1850s to 1868, Providence Tool employed Frederick W. Howe, an important figure in the history of the development of American machine tools and the “American System” of interchangeable mechanical parts. Howe originally learned his trade in the “mechanics” shop of Ira Gay in Pawtucket beginning in 1824. He then became supervisor of the Robbins and Lawrence Armory, later known as the Windsor Machine Company, a machine shop and munitions manufacturer in Windsor, VT. Robbins & Lawrence, with the expertise of Howe and other machinists, profoundly influenced the development and design of machine tools in America, new technology driven primarily by the need for military rifles with interchangeable parts. Howe designed and built machines at Robbins and Lawrence including a profile miller in 1848, barrel rifling and drilling machines, and a prototype “universal” miller in 1852. A failed rifle order put the short-lived company out of business in the mid-1850s (Roe 1916:138, 143–144, 191, 217).

After the failure of Robbins & Lawrence, Frederick Howe became superintendent of the Providence Tool Company, where he developed a close working relationship with Joseph Brown of Brown & Sharpe, a Providence manufacturer of precision instruments. By mid-1861 Providence Tool was making Springfield muskets for the U.S. Government for the Civil War. Howe witnessed workers making rifle parts with handmade spear-point type drill bits made from painstakingly filed pieces of steel rod, a costly and inefficient process. Howe convinced Brown & Sharpe, who had not previously made machine tools, to help re-equip the Providence Tool Company’s West River Street works for precision arms manufacturing. Howe’s experience in machine design combined with Brown’s expertise as a precision instrument maker proved an important collaboration. Howe went to Brown & Sharpe and arranged for them to build a turret screw machine. He also impressed upon Joseph Brown the need for a machine that could cut spiral grooves, not just for drill bits, but for gears and other machine parts with compound curves usually made by hand. On March 14, 1862, Providence Tool became the first company to use Brown & Sharpe’s “Universal Miller” and later became one of the first firms to manufacture twist drills. In 1863 Howe designed for Providence Tool a prototype of his “Howe Miller” for milling the compound curves of musket lockplates. There was immediate demand for these new types of machine tools, which became a new and important product line for Brown & Sharpe. The Howe Miller eventually became known as Brown & Sharpe’s No. 12 Plain Milling Machine. Howe left Providence Tool and joined Brown & Sharpe in 1868 (Cross 1972; Kulick and Bonham 1978:196–197; Roe 1916:195–196, 207–209; Rolt 1965:170–171).

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Rifle Manufacturing

The Providence Tool Company was not originally formed as an arms producer, and the company charter was not amended to include arms manufacture until January 1863 (Providence Tool Company 1873:7). With the coming of the Civil War, the technical leadership and knowledge of Frederick Howe, and his collaborative relationship with Brown & Sharpe enabled Providence Tool to obtain the critical machines and tooling to get a head start on building a large armory rivaling that of the U.S. Government at Springfield, MA. Under Howe, Providence Tool installed more than \$300,000 dollars worth of up-to-date equipment at the West River Street works, including rifle barrel rolling machinery, barrel rifling machines, and Blanchard-type gunstock lathes. The Wickenden Street shops were retooled for making rifle bayonets and ramrods. In mid-1861 the Providence Tool Company commenced manufacture of light cavalry sabers and Model 1861 .58 caliber rifled muskets for the U.S. government. The first rifles were delivered in December 1862, and the new West River Street armory began producing the guns at a rate of 2,500 a month. The production run ended in 1865 with 70,000 units delivered. After the Civil War, Providence Tool obtained the manufacturing rights to the Peabody cartridge breechloader-type rifle. Between 1865 and 1871 the company made 120,000 of these rifles for Canada, Cuba, France, Romania, Spain and Switzerland. They also repaired and refurbished rifles and sold some to the Connecticut, Massachusetts, and North Carolina state militias. No large U.S. government contracts for this model of rifle were awarded, however, and Providence Tool ceased arms manufacturing in 1871 (Achtermeir 1979:12-21; Anon 1867:96; Hull 1978:3-5; Hoag, Wade & Co. 1878:260).

In 1873 the Providence Tool Company competed with several other large arms manufacturers for a massive \$10 million rifle contract for the Turkish government. The contract was awarded to Winchester Arms, which subsequently sold it to Providence Tool, as they had mistakenly underestimated on their bid and were unable to wrest away Providence Tool's patent rights. Providence Tool found themselves with several contracts for a total of 600,000 Martini-Henry improved Peabody-type breech loading rifles. The company made a \$2 million capital expenditure on upgrading their armory facilities at West River Street, which rapidly became one of largest armories in the world. The six-acre plant employed 1,800 workers, housed 1,700 machines, and eventually produced up to 600 rifles a day. The Wickenden Street works was also expanded for associated work. Spread thin from heavy capital expenditures, Providence Tool was depending on the Turkish payment schedules to meet their financial obligations. Production did not begin until March 1874, a year behind schedule, because of pattern delivery delays and

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patent right negotiations. The Turkish government delayed payments by months, and in some cases years, and the banks withdrew Providence Tool's credit in the wake of the Panic of 1873. By December 1879, Providence Tool had delivered 630,737 Martini-Henry rifles to Turkey. The rifles proved superior to the Russian rifles in the 1876–1878 Russo-Turkish War, which was, however, ultimately won by the better-organized Russian forces. The Turks placed a moratorium on public debt payments in the wake of the war, and Providence Tool was not fully paid for the rifle contract until 1882. The costs for associated interest, penalties, suits, and legal fees drained the company's operating capital to the point where they could not remain in business. The Providence Tool Company closed and declared bankruptcy in 1883, after having made more than 850,000 firearms, placing them in the top ranks of American rifle makers of the era. In 1880 an article in the *London Times* declared the rifles "the best in existence at this time" (Achtermeir 1979:12–21; Anon 1867:96; Cross 1972; Hoag, Wade & Co. 1878:260; Hull 1978:3, 20–22; Stewart 1972:5–7).

In 1875, Providence Tool had an annual product value of \$3.5 million, and with more than 1,500 workers, was the largest single employer in Providence. In addition to its firearms, the company made marine and industrial hardware, and railroad tools and supplies. The West River Street works grew to cover 6 acres, with 27 boilers and five steam engines providing 1,000 hp for "machine shops, forge shops, buildings for annealing, case hardening, galvanizing, and other special work." Another important product manufactured in the 1870s was sewing machines, another complex mechanical device that could be inexpensively mass-produced under the "American System" of interchangeable parts. In the 1870s Providence Tool made "Household" and "Keats" brand sewing machines, as well as machines under license for the Singer Sewing machine Company (Bayles 1891:628; Hull 1978:3; Rolt 1965:176).

The Rhode Island Tool Company, 1883 to 2003

The Rhode Island Tool Company was chartered in May 1883, by John B. Kilton, Charles H. Warren, John B. Anthony, Henry B. Newhall, and William B. Dart, "for the manufacturing of tools, machinery, hardware, and ship chandlery" (Rhode Island Tool Company 1904:3, 7). Rhode Island Tool occupied the former Providence Forge & Nut/Providence Tool "uptown" works on West River Street. The "lower works" on Wickenden Street was sold to the Household Sewing Machine Company (Bayles 1891:628; Davis n.d.:2545–2546). The Wickenden Street works is no longer extant.

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From its formation in 1883 to closing in 2003, the Rhode Island Tool Company was a producer of job-order machinery forgings as well as bolts, nuts, and assorted tools. The fortunes of the company, engaged in a typically highly competitive business of manufacturing a high volume of small, value-added items, followed the general cyclical vicissitudes of the U.S. iron and steel industry. After the turn of the twentieth century, business did not pick up until October of 1914, when World War I-associated orders began to appear. The company did not make any specialized war products, but enjoyed increased demands for their regular fastener, hardware and tool lines. By 1920, demand had slackened and the company had to make cuts in production and employment. Rhode Island Tool was hit hard by the Great Depression. By 1932 the plant was operating three days out of every two weeks, and in 1936 sales were 20 percent of average (Rhode Island Tool 1914, 1916, 1920, 1932, 1936).

Business improved rapidly by September of 1940, when World War II war orders started to come in. Rhode Island Tool was able to perform deferred maintenance and order new equipment. By this time Rhode Island Tool was the only drop forge shop in Rhode Island. In addition to its regular fastener line, the company contributed specialized items to the war effort, making parts for a 245mm howitzer used in the European invasion, as well as tools for servicing torpedoes and anti-aircraft guns, and parts for U.S. Army Air Corps Boeing B-17 heavy bombers and U.S. Navy Grumman Avenger dive bombers (Anon.1945:4-5; *Providence Journal* 1944:20; Rhode Island Tool 1940, 1942).

The property went through several changes in ownership during the last half of the twentieth century. It was purchased by textile industry entrepreneur Royal Little in 1944. In 1962 it was sold to machine tool maker L.S. Starrett Co. of Athol, MA in exchange for company stock. Under Starrett, who employed less than 100, the product line shifted to custom forgings, with fasteners representing only about 30 percent of the business. In 1972 L.S. Starrett sold the property to Andrew B. Sides, Jr. and family, who changed the name to the Sides Tool Co., and later changed the name back to Rhode Island Tool. The company further reduced the percentage of fasteners and concentrated on developing new products. In 1978 the company was making "drop forgings, upset forgings, and special industrial fasteners" (Cross 1972; Kulick and Bonham 1978:195-197; *Providence Journal* 31 December 1944:7, 13 March 1962:38, 3 October 1972:31).

Rhode Island Tool's last owner was The Greystone Group, a metalworking manufacturer with plants in Lincoln and North Providence, Rhode Island, and Virginia. The group is primarily

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involved in machining, heat treating and plating metal parts for Tier 1 automobile parts suppliers such as Siemens Automotive. Greystone acquired the Rhode Island Tool works in 1984 from the Sides family. In addition to automotive parts, Greystone's Rhode Island Tool works made hand tools for customers, including former owner L.S. Starrett. The company also made firearms parts for several major gun makers, continuing the tradition of firearms parts making begun during the Civil War. The Rhode Island Tool operations became unprofitable in the face of competition from India and China and Greystone sold the plant machinery and dies to DeKalb Forge of DeKalb, IL, and closed the plant in 2003 (Chartier 2004).

Light Forging Equipment and Processes

Forging refers to the art of forming of metals into shapes by heating them above their re-crystallization temperature so that they become plastic, and hammering or pressing between a pair of specifically shaped dies, resulting in a product with an unstrained, stress-free grain structure that withstands impact, torsion, and tension better than a casting. Simpler forms are wrought with open dies, and more complex shapes require one or more sets of increasingly specific dies conforming to the shape and size of the intended object, a process called drop forging. In this process hot plastic metal is made to flow into dies by application of sudden blows. The metal is placed in a two-part die block, with one half fixed to the anvil of the machine and the other on a moveable ram. The impression of the article to be formed is milled into the die blocks by a skilled machinist known as a die sinker, using a vertical milling machine also known as a die sinker, which forms a negative impression of the desired object in special alloy steel die blanks. Dies are expensive to produce, and must be replaced periodically as they become worn or deformed. In the case of complex-shape forgings, up to three sets of increasingly fine die blocks are used in the drop forge. The first set (the edging, fullering or bending die) imparts the overall shape; the second (blocking die) creates the approximate form, and the third (finishing die) produces a finished piece. Provision is made around the edges of the die for the excess metal to be forced out forming a thin fin, or flash, that is removed from the object by a shear press before finishing and machining (Camp and Francis 1951:1029; Clapp and Clark 1949:253, 261).

The most important type of forging machine was the board-hammer, which was typically used for large runs of small articles. This type of forge consists of a heavy cast steel base, or anvil, firmly embedded in a deep, massive concrete footing, with a tall, A-shaped hammer frame bolted to the top of it. The frame holds the heavy steel die hammer and the rolls and motor to raise and

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drop it. The hammer is attached to the bottom of a heavy vertical laminated wood board that is pulled up and down by a pair of motorized rotating steel rollers that grip the board at the top of the frame. The operator depresses a foot lever to bring the rolls together to grip and raise the board, and the mechanism automatically drops and raises the hammer unless interrupted by the operator. The steam- or air-operated-type drop hammer provides stronger blows augmented by a compressed steam or air cylinder (Clapp and Clark 1949:261–266). Rhode Island Tool had more than a dozen board hammers when it closed in 2003.

At a drop forge shop, raw material, metal stock, is received in the form of bars of proper diameter or cross-section, which are then cut to proper length to form a blank shape. A forge operative then heats the blank in a temperature-controlled gas- or oil-fired furnace, to a temperature of about 2,000°f, removes it with tongs, places it on the anvil, and operates the hammer to form the desired object. The object is then transferred to an adjacent shop for flashing removal by shears, scale removal by tumbling or sand-blasting, and on to additional machining, heat treating, and surface finishing as required. Manufacturing of nuts and bolts and small forgings is often carried out with manual or automatic upsetting or forging machines, which are more economical for production of large numbers of small articles (Clapp and Clark 1949:266, 272–273).

The general flow of work through the Rhode Island Tool Company buildings at the end of the period of significance followed this pattern: forging dies were sunk using the machine tools in the Die Sinking Room (Building 5). Raw metal stock was stored and cut to length in the Steel Room (Building 3), and then heated and formed as described above in the forge shops (Buildings 4, 22, 26, and 27). If required, stock and/or forgings were heated and upset in the Blacksmith Shop (Building 2). Upsetting is the process of forming a head on metal stock to form a blank for items such as bolts or rivets. Flash was trimmed from raw forgings in the Trimming Room (Building 12). If required, forged items were heat treated and/or surface treated in the Heat Treating Room (Building 22). Heat treatment processes included heating forgings to specific temperatures in small furnaces and allowing them to cool at controlled rates or quenching them in a variety of liquids, processes that imparted a controlled grain structure to the metal, giving it certain desired physical and mechanical characteristics. Surface treatments included imparting smoother surface finishes to raw forgings by grinding, bead blasting or using motorized wire brushes. If required, forgings were machined in the Machine Shops (Buildings 1/1A and 6). Machining imparts the precision shaping and tolerances required in forgings made for machinery

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components and hardware, including the variety of industrial fasteners made by the Rhode Island Tool Company.

Architectural/Engineering Significance

The Rhode Island Tool Company works is an intact representative example of a mid- to late-nineteenth-century metalworking facility. The works includes several pre-Civil War-era components. Providence Forge and Nut Company, which built the earliest buildings in the mid-1850s, chose an ideal site, adjacent to a railroad line for efficient handling of incoming raw materials and outgoing finished products, and bordered by a small river suitable for steam generation, process quenching and cooling, and waste disposal. At first the works consisted of a mix of connected and isolated buildings, but as it grew under ownership of Providence Tool and Rhode Island Tool, site constraints resulted in a dense, compact pattern of connected buildings.

The Rhode Island Tool Company followed an accretionary multishop growth plan typical of midsize nineteenth-century metalworking facilities, expanding from a complex dominated by a single large multipurpose building with numerous small outbuildings to one including over a dozen attached specialized structures on a single massive footprint. The works began with the 1853 construction of Building 1, a large, two-story loft-type building, with a Boiler House (Building 7) physically separated for fire safety and a cluster of freestanding buildings in a yard west of Building 1. The works expanded immediately in a linear fashion with Building 1A (1853) and the Blacksmith Shop (Building 2, 1855) to the north, and the Drop Forge Shop (Building 4, 1854) and Die Sinking Shop (Building 5, 1854) to the west, forming an L-shaped arrangement of connected buildings in a compact arrangement to facilitate materials handling and mechanical power distribution. The site was confined by the Corliss Steam Engine works to the south, the New York, New Haven & Hartford Railroad to the west, the West River to the north, and West River Street to the east. Subsequent additions through the early twentieth century required demolition of ancillary, peripheral buildings, but it also resulted in the retention of major mid-1850s components. This growth pattern resulted in dense development with all operations taking place under "one roof." This was a fairly efficient model for small to midsize operations (Bradley 1999:65–68). At Rhode Island Tool the production sequence flowed roughly from north to south from stock storage in the Steel Room (Building 3), with forgings moving out radially from the Drop Forge Shop to various secondary finishing operations, with shipping located at the southwest corner of the works at the rail siding.

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The component buildings include examples of the three primary period industrial building types including lofts, specialized production sheds (blacksmith/forge shops, machine shops), and a powerhouse (Bradley 1999:25).

Buildings 1, 1A, and 5 (mid-1850s), and 11 and 12 (between 1900 and 1921), are examples of the “industrial loft,” a specialized, yet adaptable type of building consisting of two or more stories in a rectangular configuration. This shape was developed in the nineteenth century to satisfy the combined needs for interior light and linear power transmission via lineshafting. Useable floor space was often maximized by concentrating vertical circulation in exterior towers. Large loft buildings were sometimes built first to accommodate all processes, and then later adapted for more specialized uses or even for offices. When built as machine shops, heavier machinery was concentrated on the ground floor, with lighter equipment housed on the floor above. These buildings often employed fire resistant, or “slow-burning” construction, with heavy, brick, self-supporting outer walls with narrow piers and wide window spandrels, and internal firebreak walls. The interior framing system, which supported the floor load, consisted of widely spaced, heavy timber (or sometimes cast iron) posts, timber or steel beams, and thick, multi-layer plank floors, providing limited surfaces for fire to take hold. Earlier examples were built with gable roofs, many, like that originally on Building 1, replaced with flat roofs because of fire insurance regulations (Bradley 1999:25, 29–34, 93, 117–121, 126–129, 155; Brooks 1906:50, 54–68). At Rhode Island Tool, all of the 1850s loft buildings incorporate rectangular windows, and some include gable roofs and pronounced decorative brickwork. Buildings 11 and 12, early-twentieth-century examples, incorporate the later conventions of segmental arch windows, flat roofs (Building 11), and relative freedom of decoration.

Buildings 2, 3, 4, 6/6A, 22, 26, and 27 are examples of “production sheds,” or “shops,” distinctive single story industrial buildings enclosing wide bays and high spaces. This type of building evolved to accommodate heavy machinery, high-temperature operations, and movement of large objects. Walls were built of heavy masonry construction to withstand vibration and carry the weight of traveling cranes, and have relatively small windows. The walls support heavy truss roofs providing unobstructed, clear-span interiors. The trusswork was often heavily reinforced to support the weight and vibration of overhead lineshafting for mechanical power transmission. In applications for high-temperature processes such as forging and other metalworking, production sheds incorporate a distinctive monitor roof that provides both ventilation and light. Forge shops, such as Building 4, are distinguished by numerous small chimneys over the forges within (Bradley 1999: 38–39, 42, 93). The large brick arch openings

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between Buildings 1A and 2, and 2 and 4, were incorporated for moving large objects or containers between buildings, and predate rectangular openings with heavy rolled structural steel lintels found in later production shed type buildings. Building 22 (1917) with its heavy, widely spaced brick piers with high, wide window openings, and a steel truss roof supporting a flat roof with a full-length box monitor, is typical of moderate size production sheds of the early twentieth century, when the walls and walls and roof became important sources of light and ventilation (Bradley 1999:146–147). Buildings 26 and 27 are modern examples of the “steel mill building” type production shed, with a full steel frame carrying thin metal siding (Bradley 1999:146–149).

Building 6 and Building 6A are examples of the “weave shed” type of single-story production shed, more widely adopted by the textile industry. This building type, with its distinctive multiple monitor saw tooth profile roof, was first known as the “British weave shed roof.” This form began to appear in the U.S. in the 1880s, but did not come into general use in New England until after 1900. This construction type allowed for more flexible arrangement of machinery with the advent of direct electrical drive using individual motors. The weave shed employed a 30-60-90-degree triangle monitor roof profile, glazed on the short north side to allow interior diffusion of indirect natural light over a wide enclosed space. The new building form allowed rationally arranged, well-lit production space (Bradley 1999:192–193; Kulick and Bonham 1978:22).

The Boiler House is an early example of the third type of industrial form to evolve during the nineteenth century. Although it does not exhibit the strong characteristics common to later examples, it does incorporate some aspects of the type. It was originally built as a freestanding structure to minimize damage from boiler explosions, and it is divided into separate rooms for boilers and steam engines to keep dust off the reciprocating machinery. Heavy timber trusses provide a clear-span interior over the boilers. The building has a tall chimney to provide draft for the boiler fireboxes and to carry away waste gases. Typical of older industrial chimneys it is square in plan, a shape that exposed it more to wind pressure and was less efficient in terms of interior pressure resistance than later round ones (Bradley 1999:49–52).

Buildings 1, 1A, 2, 3, and 4 are examples of the “American round-arched style” utilized in American brick industrial buildings beginning in the 1840s. This style was adopted from progressive German architectural trends through pattern books and the work of immigrant architects, and widely influenced American commercial and industrial architecture. The *Rundbogenstil* was a synthesis of classical and medieval architectural forms and details.

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Executed in available brick and stone, it allowed construction in repeatable masonry units of harmonious design, that emphasized structural elements, and employed simple ornamentation. The style was characterized by gridded facades formed by piers or pilasters and horizontal bands, elaborate brick corbeling, and molded window and door surrounds. Providence architect Thomas Alexander Tefft, was considered to be a master of the idiom, and his Union Depot in Providence (1847) was considered a landmark example of the style. Tefft incorporated the style in other Providence industrial and commercial buildings, including the first Howard Building (1847), and a merchandise warehouse near the Union Depot (1849) that incorporated a gridded facade of pilasters and corbel tables that expressed the pattern of interior framing. Tefft's second Howard Building (1853) utilized a variety of patterns of round-arched windows of medieval style (Bradley 1999:235–239). Buildings 1, 1A, 2, 3, and 4, with their tapering, double-course “drip castle” corbel dentils, and round-arched stair tower, were clearly influenced by the “American round-arched style” being established at the time, and notably in Providence through the influence of Thomas Tefft. By the 1860s the style began to incorporate segmentally arched windows as seen on the late nineteenth- and early-twentieth-century buildings 6, 11, and 12.

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Name of Property: Rhode Island Tool Company
Record # _____

County and State: Providence County, Rhode Island

10. Geographical Data

Acreage of Property 5 acres

UTM References See continuation sheet.

(Place additional UTM references on a continuation sheet)

A. 19 299457 4634991
Zone Easting Northing

C. 19
Zone Easting Northing

B. 19
Zone Easting Northing

D. 19
Zone Easting Northing

— See continuation sheet

Verbal Boundary Description

(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification

(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Matthew A. Kierstead and Stephen A. Olausen

organization PAL date December 2003

street & number 210 Lonsdale Avenue telephone (401) 728-8780

city or town Pawtucket state RI zip code 02860

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items (Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name Amaral Revite Corporation

street & number 161 Orms Street telephone (401) 454-6867

city or town Providence state RI zip code 02908

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GEOGRAPHICAL DATA

Boundary Description

Beginning at a point at the east corner of Map 100, Parcel 15 (100/15) in Providence
-southwest to the south corner of 100/15
-southwest to the south corner of 100/49
-northwest to the west corner of 100/49
-northeast to the west corner of 100/49
-northeast to the north corner of 100/15
-southeast to the east corner of 100/15, the point of beginning.

Boundary Justification

The boundaries include the full extent of contiguous historic and structural resources associated with the activity within the property during its period of significance. The boundaries follow legally recorded property lines.

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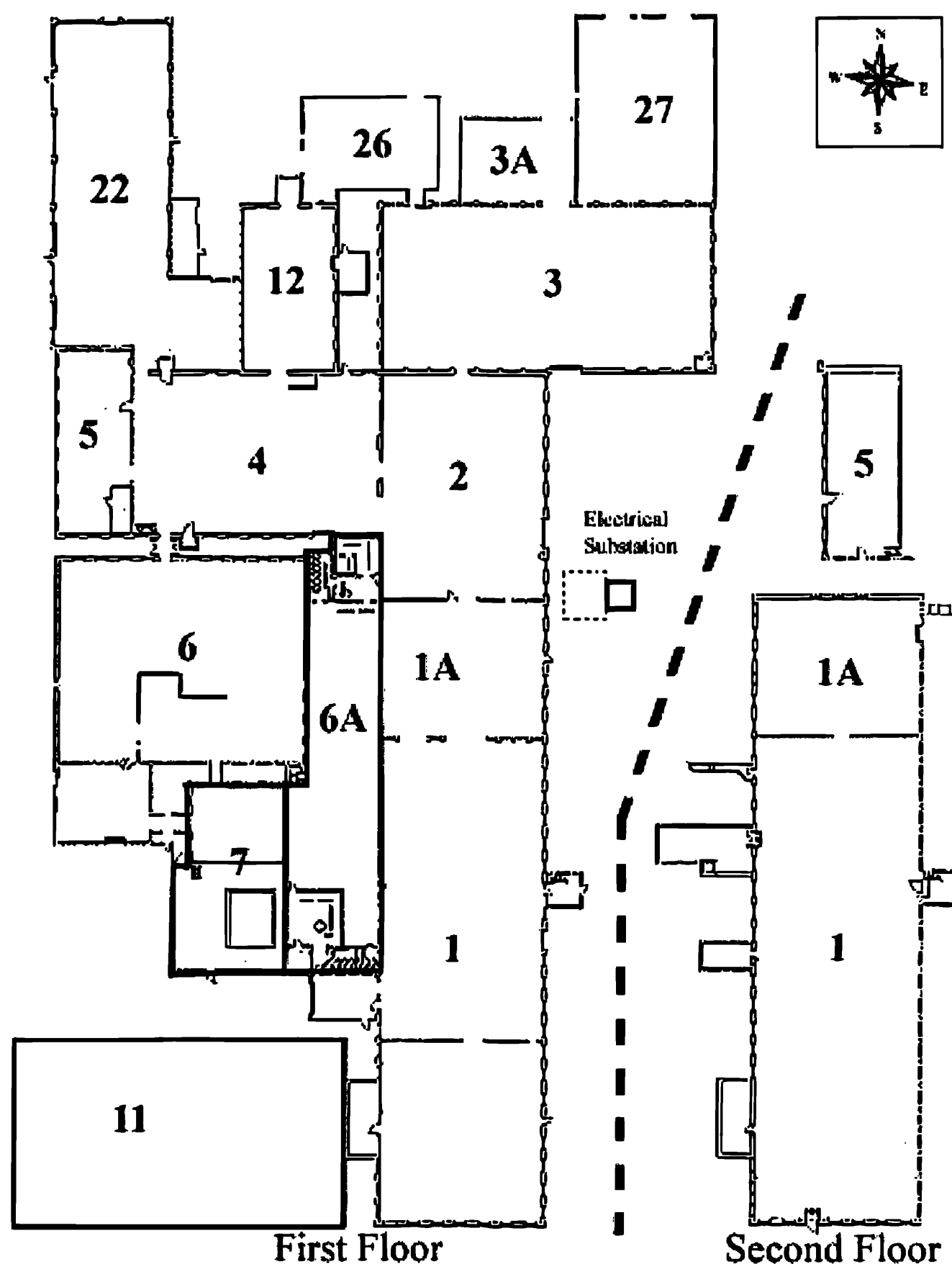
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Works Plan



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Assessors Map: Providence Map 100

