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. **Place additional certification comments, entries, and narrative items on continuation sheets if needed (NPS Form 10-900a).**

1. Name of Property

Historic name Woodward & Tiernan Printing Company Building

Other names/site number Universal Match Corporation; Gusdorf & Sons; Suburban Industrial Packaging

Name of related Multiple Property Listing n/a

2. Location

Street & number 1519 Tower Grove Avenue | n/a | not for publication

City or town St. Louis | n/a | vicinity

State Missouri Code MO County St. Louis [Independent City] Code 510 Zip code 63110

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: ___ A ___ B _X_ C ___ D

Mark A. Miles MARCH 9, 2015

Signature of certifying official/Title Mark A. Miles, Deputy SHPO Date

Missouri Department of Natural Resources
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

5. Classification

Ownership of Property
(Check as many boxes as apply.)

X	private
	public - Local
	public - State
	public - Federal

Category of Property
(Check only **one** box.)

X	building(s)
	district
	site
	structure
	object

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

Contributing	Noncontributing	
1	0	buildings
0	0	sites
0	0	structures
0	0	objects
1	0	**Total**

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions.)

Industry: Manufacturing Facility
Industry: Communications Facility
Commerce/Trade: Business
Commerce/Trade: Warehouse

Current Functions
(Enter categories from instructions.)

Commerce/Trade: Business
Commerce/Trade: Warehouse

7. Description

Architectural Classification
(Enter categories from instructions.)

Late 19th and 20th Century Revivals: Classical Revival

Materials
(Enter categories from instructions.)

foundation: concrete
walls: concrete
brick
roof: composite
other: terra cotta
granite

X **NARRATIVE DESCRIPTION ON CONTINUTATION PAGES**

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.)

- [ ] A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [ ] 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 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.

[X] **STATEMENT OF SIGNIFICANCE ON CONTINUTATION PAGES**

Areas of Significance
(Enter categories from instructions.)

Architecture

Period of Significance

1926

Significant Dates

1926

Significant Person
(Complete only if Criterion B is marked above.)

N/A

Cultural Affiliation

N/A

Architect/Builder

Klipstein & Rathmann/architect

Bowen, F.W. /construction engineer

Fruin-Colnon/contractor

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form.)

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 Record # _____
- ____ recorded by Historic American Landscape Survey # _____

Primary location of additional data:

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

Name of repository: **Preservation Research Office**

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property 4.3

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

1	38.622820 (Latitude:)	-90.255429 (Longitude:)	3	(Latitude:)	(Longitude:)
2	(Latitude:)	(Longitude:)	4	(Latitude:)	(Longitude:)

UTM References
(Place additional UTM references on a continuation sheet.)
_____ NAD 1927 or _____ NAD 1983

1	Zone	Easting	Northing	3	Zone	Easting	Northing
2	Zone	Easting	Northing	4	Zone	Easting	Northing

Verbal Boundary Description (On continuation sheet)

Boundary Justification (On continuation sheet)

11. Form Prepared By

name/title Lindsey Derrington and Michael R. Allen, Architectural Historians
organization Preservation Research Office date REV February 16, 2015
street & number 2653 Locust Street, Suite 201 telephone (314) 920-5680
city or town St. Louis state MO zip code 63103
e-mail michael@preservationresearch.com

Additional Documentation

Submit the following items with the completed form:

- **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. Key all photographs to this map.
- **Continuation Sheets**
- **Photographs**
- **Owner Name and Contact Information**
- **Additional items:** (Check with the SHPO 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.

Photo Log:

Name of Property: **Woodward & Tiernan Printing Company Building**

City or Vicinity: **St. Louis**

County: **St. Louis [Independent City]** State: **MO**

Photographer: **Lindsey Derrington**

Date Photographed: **January 2014**

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

1. Exterior view of the main (east) facade from the northeast.
2. Exterior detail of the main (east) façade from the east.
3. Exterior view of the south façade from the southeast.
4. Exterior view of the north façade from the northeast.
5. Exterior view of the west (rear) façade from the west.
6. Interior view of second story main entrance lobby from the west.
7. Interior view of second story main entrance lobby, vestibule, and grand staircase from the east.
8. Interior view of second story north entrance lobby from the south.
9. Interior view of third story executive offices from the northeast.
10. Interior view of first story warehouse space from the northwest.
11. Interior view of second story production space and loading dock from the southeast.
12. Interior view of third story production space from the northwest.
13. Interior view of third story production space with partitions from the northwest.

Figure Log:

1. Woodward & Tiernan Printing Company Building, first floor plan keyed to photograph log (base plan provided by UIC/Urban Improvement Company).
2. Woodward & Tiernan Printing Company Building, second floor plan keyed to photograph log (base plan provided by UIC/Urban Improvement Company).
3. Woodward & Tiernan Printing Company Building, third floor plan keyed to photograph log (base plan provided by UIC/Urban Improvement Company).
4. Woodward & Tiernan Printing Company Building, dedication stone (Derrington).
5. Woodward & Tiernan Printing Company Building, sections (Louis B. Woodward, "Modern Building for Efficient Production," *Manufacturing Industries*, April 1927).
6. Woodward & Tiernan Printing Company, 309-325 North Third Street Location (source unknown).
7. Woodward & Tiernan Printing Company Advertisement (*St. Louis Post Dispatch*, 31 July 1915).
8. Woodward & Tiernan Printing Company Advertisement (*Gould's Red-Blue Book*, 1919).
9. Woodward & Tiernan Printing Company, 309-325 North Third Street Location (Sanborn Map, 1909)
10. Woodward & Tiernan Printing Company Building site (Sanborn Map, 1909).
11. Typical daylight factory interior (John R. Nichols, "Choice of Type of Construction," *Architectural Forum*, September 1923).
12. Ford Highland Park Plant (Joe Babiasz, "Old Factories: Ford Highland Park Plant," AutoTraderClassics.com).
13. Henry Wallace Clark, portrait (Walter P. Reuther Library, Wayne State University).
14. Woodward & Tiernan Printing Company Building, Rendering ("Woodward Tiernan Printing Co. to Build New Plant on Tower Grove Avenue at Cost of $1,000,000," *St. Louis Post-Dispatch*, 26 June 1921).
15. Woodward & Tiernan Printing Company Building (Missouri History Museum Library and Collections).
16. Woodward & Tiernan Printing Company Building, plans (Louis B. Woodward, "Modern Building for Efficient Production," *Manufacturing Industries*, April 1927).
17. Woodward & Tiernan Printing Company Building (Missouri History Museum Library and Collections).
18. Woodward & Tiernan Printing Company Building (Missouri History Museum Library and Collections).
19. Woodward & Tiernan Printing Company Building (Missouri History Museum Library and Collections).
20. Woodward & Tiernan Printing Company Building (Missouri History Museum Library and Collections).
21. Northwest Industrial District, bird's-eye view ("New Industrial Tract As It Will Appear with Completed Plants," *St. Louis Post-Dispatch*, 30 November 1919).
22. General Motors Plant (source unknown).
23. Bridge & Beach Manufacturing, bird's-eye view (*Who's Who in North St. Louis*, 1925).
24. Garrett and Company Winery Building (Derrington).
25. Google Earth Locator Map

Summary

The Woodward & Tiernan Printing Company Building is located at 1519 Tower Grove Avenue in the Forest Park Southeast neighborhood of St. Louis [Independent City], Missouri. Designed by Klipstein & Rathmann with engineer consulting from Wallace Clark (born Henry Wallace Clark), this reinforced concrete daylight factory stands two and three stories tall with a flat roof. It measures roughly 202 feet in width and 522 feet in length with a 250,000 square foot interior and was completed in 1926. [1] The Classical Revival style main (east) façade is brick with terra cotta ornamentation, including a double cornice and decorated entrance surround. Remaining facades are exposed concrete with large steel sash windows, most of which are intact. Loading docks line the north and west facades, and the south façade cantilevers outward to follow adjacent rail lines. At the building's eastern end a decorated entrance lobby with grand staircase leads to offices with extensive oak paneling and historic wooden features. The rest of interior, originally dedicated to production and warehouse uses, is largely open in plan with exposed roof structures and steel and reinforced concrete columns. The Woodward & Tiernan Printing Company Building retains integrity of location, design, materials, workmanship, feeling, and association.

Setting

The Woodward & Tiernan Printing Company Building stands at the southern end of the otherwise residential Forest Park Southeast neighborhood within the Mill Creek Valley industrial district. This district runs to the south of the city's Central Corridor along rail lines which bisect the city from east to west. The building occupies most of the south side of City Block 3985, bounded by Tower Grove Avenue to the east, Newstead Avenue to the west, Hunt Avenue to the north, and the former Missouri Pacific Railroad tracks to the south. A surface parking lot and loading area dating to 1925 occupies the block's southwest corner at the building's rear. A surface parking lot and paved earthen loading ramp added in 1968-1969 occupy the block's northeast corner.[2] The only portion of the block unrelated to the building is its northwest corner, home to roughly a dozen single and multi-family residential units facing Hunt Avenue. Tower Grove Avenue rises dramatically as it runs south to a viaduct over the rail lines, giving the building's three-story main (east) façade the appearance of being two stories tall as seen from the street.

Exterior: Main (East) Facade

The two stories of the main (east) façade are clad in brick with a symmetrical Classical Revival composition (Photograph 1). Its flat parapet is capped in terra cotta coping above molded upper and lower terra cotta cornices and the foundation is faced in limestone except where noted. All windows have flat-arched brick lintels; all of those on the first story are covered with corrugated fiberglass panels and all of those on the second story are contemporary metal double hung windows with 6/6 simulated muntins. Pairs of squared brick pilasters with molded terra cotta capitals and bases divide the façade into five bays; these pilasters are laid in the running bond, while the rest of the façade is laid in the Flemish bond. The central bay is framed by two pairs of brick pilasters supporting a terra cotta entablature

[1] Louis B. Woodward, "Modern Building for Efficient Production," *Manufacturing Industries.* (April 1927), p. 265.
[2] Sanborn Maps; Building Permits.

engraved with "WOODWARD & TIERNAN PRINTING CO." (Photograph 2), and the foundation is faced in polished grey granite.[3]

This bay's first story contains the main entrance flanked by a single window to each side. The entrance has a molded, round-arched terra cotta surround with rosettes capped by a terra cotta shield bearing the company's initials. The central bay's second story has five windows framed by small brick pilasters above running terra cotta sills. The outer bays have six windows above running brick sills on both stories. The outermost bays have secondary entrances with brick surrounds and terra cotta keystones on the first story below two windows with running brick sills on the second story. The northern secondary entrance has a contemporary metal-framed, round-arched fabric awning. Additional terra cotta details include inset panels above the outermost bays' pilasters, dentils lining the upper cornice, and a central scrolled plinth atop the parapet wall which originally supported a flagpole. A polished grey granite dedication stone at the building's northeast corner reads "WOODWARD AND TIERNAN PRINTING COMPANY/ESTABLISHED 1865/INCORPORATED 1887/THIS BUILDING ERECTED 1925" and features the company's insignia (Figure 4). The façade's first story, built for warehousing and shipping/receiving, is largely hidden from view.

Exterior: South Facade

The south façade bows outward to follow the curve of the adjacent rail lines (Photograph 3). It is twenty-six bays wide and the first story is visible for its entirety. The building is three stories tall across the façade's ten eastern bays and two stories tall along its sixteen western bays. The easternmost bay follows the same brick and terra cotta design vocabulary as on the main façade. It has two windows on each of its three stories; those on the first and second stories retain their historic 6/6 wooden sashes, and those on the third story have contemporary metal double hung 1/1 sashes. The remainder of the façade is exposed concrete with historic three-part steel sash windows with concrete sills in each of its twenty-five bays. The first story windows have a 20-25-20 sash configuration, the second story windows have a 24-30-24 sash configuration, and the third story windows have a 16-20-16 sash configuration. Only the easternmost third story bay on this portion of the façade has had its historic steel sash window removed and replaced with a ribbon of five contemporary metal double-hung 1/1 windows. A shaped concrete plinth engraved with "WOODWARD & TIERNAN PRTG CO." stands over, from west to east, the façade's eighth and ninth bays.

Exterior: North Facade

The north façade's bay arrangement is more complex and the site, which slopes downwards from east to west, obscures part of the building's first story (Photograph 4). The building is three stories tall across the façade's ten eastern bays and two stories tall along its sixteen western bays. The easternmost bay follows the same brick and terra cotta design vocabulary as on the main façade, and the second and third stories each have one contemporary metal double-hung window with 6/6 simulated muntins. The remainder of the façade is exposed concrete framing and all historic steel sash windows are covered in corrugated fiberglass panels with concrete sills. On the second story, an eight-station loading dock built

[3] The entablature is currently obscured by a painted wooden sign reading "WOODWARD PRINTING INC." which appears to be superficially affixed to the terra cotta. Original drawings show "WOODWARD & TIERNAN PRINTING CO.," and an engraved "CO." is still visible.

from 1968-1969 is accessed by a paved ramp with first story passage beneath; it occupies five bays near the façade's center, straddling the building's transition from three to two stories.

The nine concrete bays of the façade's eastern three-story portion are asymmetrically arranged, from east to west, as follows: On the first story, the first bay has an 8-10-8 historic steel sash window; the second through fourth bays have 12-15-12 historic steel sash windows; and the fifth through ninth bays have 20-25-20 historic steel sash windows, the last of which is obscured by the loading dock. On the second story, the first through third bays have 24-30-24 historic steel sash windows; the fourth bay has a 24-24 historic steel sash window and a door leading to a metal fire escape; the fifth bay has two 30-paned historic steel sash windows; the sixth through eighth bays have 24-30-24 windows; and the ninth bay has a 24-24 historic steel sash window obscured by the loading dock. On the third story, the first and second bays have ribbons of five contemporary double-hung 1/1 windows; the third bay has a ribbon of three contemporary double-hung 1/1 windows and a door leading to a metal fire escape; the fourth through seventh bays have 16-20-16 historic steel sash windows; the eighth bay has a 5x5 glass block window and a door leading to another metal fire escape; and the ninth bay has two 5x5 glass block windows.

The sixteen concrete bays of the north façade's western two story portion are symmetrically arranged, from east to west, as follows: On the first story, the first four bays are obscured by the loading dock; the first bay has a 20-25-20 historic steel sash window; the second bay has 20-paned historic steel sash window flanking a pair of doors with an 8-paned steel sash transom; the third through seventh bays have 20-25-20 historic steel sash windows; the eighth bay has a 15-15 historic steel sash window; the ninth bay has a 15-paned historic steel sash window; the tenth through twelfth bays have 20-25-20 historic steel sash windows; the thirteenth bay has a 20-20 historic steel sash window and door; and the fourteenth through sixteenth bays have 20-25-20 historic steel sash windows. On the second story, five light monitors rise six and a half feet above the primary roof line flush with the façade; these have ribbons of east- and west-facing 12-paned steel sash windows and run north-south across most of the roof. The monitors are two bays wide with double height windows and are spaced by single bays, producing a 1-2-1-2-1-2-1-2-1-2-1 configuration. The loading dock occupies the first four bays and has altered their original appearance; the windows from the first and fourth bays have been removed, though the second and third monitor bays retain the 24-30-24 historic steel sash windows which formed the upper reaches of their double height windows and now serve as clerestories. The fifth and sixth bays have 40-50-40 historic steel sash windows; the seventh bay has a 24-30 historic steel sash window; the eighth and ninth bays have 40-50-40 historic steel sash windows; the tenth bay has a 24-30-24 40 historic steel sash window; the eleventh and twelfth bays have 40-50-40 historic steel sash windows; the thirteenth bay has a 24-30-24 historic steel sash window; the fourteenth and fifteenth bays have 40-50-40 historic steel sash windows; and the sixteenth bay has a 24-30-24 historic steel sash window.

Exterior: West Facade

The primary two-story concrete west façade is ten bays wide (Photograph 5). All windows, including those on its wings, are covered in corrugated fiberglass. Two flat-roofed concrete wings project from the first story. The northern wing encompasses the leftmost two bays and supports a truncated smokestack. Its west façade is blind and its south façade is six bays wide with a sectional garage door in one bay and single windows in the five remaining bays. Its north façade is three bays wide with single windows in each bay. The southern wing encompasses the fourth and fifth bays; its west façade is four bays wide, with one window in each of its three leftmost bays and an integral porch with a squared corner pier in its

rightmost bay. Its south façade is three bays wide with single windows in each bay. The façade's five remaining bays have a one-story, seven station loading dock. The second story bays are arranged, from north to south, as follows: The first bay has a 12-12 historic steel sash window and a 9-paned historic steel sash window; the second through fourth bays have 24-30-24 historic steel sash windows; the fifth bay has an 18-18 historic steel sash window; the sixth through ninth bays have 24-30-24 historic steel sash windows; and the tenth bay has an 18-18 historic steel sash window.

The west façade of the building's eastern three story portion overlooks the roof of the western second story portion. It is ten bays wide, with 16-20-16 historic steel sash windows in each bay.

Interior: Public Entry and Offices

The building's public entry and office spaces, comprising 12,000 square feet of the building's 250,000 square foot interior, are arranged along its east façade on the second and third stories. [4] On the second story, the main entrance off of Tower Grove Avenue opens onto a narrow lobby with tall ceilings, crown molding, paneled wooden wainscoting, and a wrought iron chandelier (Photograph 6). Four steps lead up to a pair of historic single-light wooden doors beneath a wood-framed semicircular fanlight. These lead to a wide two-story vestibule, also with crown molding and paneled wooden wainscoting. A wide west-facing grand staircase rises to a landing before branching into two narrower east-facing staircases leading to the third story offices (Photograph 7). The staircase features decorated iron balusters and turned iron brackets below a polished wooden handrail. The landing has wood paneling and a bronze plaque dedicated to Woodward & Tiernan employees who fought in World War I. The south entrance leads directly to the second story. The north entrance leads to a small lobby with paneled wooden wainscoting. The lobby's north wall has an historic single light wooden door with transom next to an historic service door with single-light wood framed awning sashes above and below a shallow wooden shelf (Photograph 8). These lead to a west-facing corner staircase with paneled wooden wainscoting rising to the third story.

The third story office areas occupy the east end of the building and are accessed from Tower Grove Avenue via the main and north entrances. All of these spaces have paneled oak wainscoting on walls and around squared supports, wooden door surrounds, and historic wooden doors. Executive offices line the east façade's entirety, defined by historic oak-paneled partitions with opaque multi-light windows (now covered) (Photograph 9). West of these is formerly open office space, now divided into north and south areas by a contemporary drywall office leaving a narrow corridor in between (Figure 17). The southern end contains the grand staircase and is completely open in plan. The northern end contains the north entrance and has additional historic oak-paneled partitions with opaque multi-light windows (now covered) enclosing offices along its south and west walls. A contemporary drop ceiling obscures light from two six-foot-tall monitors, still intact; one is square-shaped and positioned above the space's northern end, and one is an elongated rectangle positioned above the grand staircase at its southern end.

[4] Louis B. Woodward, "Modern Building for Efficient Production," *Manufacturing Industries*. (April 1927), p. 266.

Interior: Industrial Production and Warehouse Spaces

Industrial production and warehouse space comprise the remaining 238,000 square feet of the building's interior. [5] The first story is almost entirely open in plan with thick concrete mushroom columns spaced on a 20 foot by 20 foot grid with thirteen foot ceilings (Photograph 10, Figure 5). The second story is open in plan as well, with fourteen foot ceilings at the building's eastern three-story end and ceilings ranging from 15 to 15 foot 10 inch ceilings at its western two-story end. It has thick concrete mushroom columns spaced on a 20 foot by 20 foot grid at its eastern end and wide-flange steel columns beneath extensive steel roof trusses at its western end (Photograph 11). The floor's few additional features include the sparing use of paneled steel sash partitions to define small spaces throughout, including a bathroom which hugs the north façade's seventh bay, and a brown enameled brick bathroom aligned with the west façade's fourth bay.

The third story's plan west of its office areas is more complex. Ceilings are twelve feet in height. Locker rooms tiled in white enameled brick are arranged linearly from north to south along the office area and are accessed from the same. The rest of the floor is open industrial space accessed at various points from the locker rooms and offices. It has squared concrete columns and an additional five monitors of varying size, all of which retain their steel sashes covered on the exterior by corrugated fiberglass panels. Full-height paneled steel sash partitions delineate large workspaces at the floor's northern and southern ends; these feature historic single-light wooden doors throughout (Photograph 13). These workspaces are further defined by concrete partition walls to the east and west faced in enameled brick, as well as one at the building's east end which features steel sash clerestories (Photograph 12).

Integrity

The Woodward & Tiernan Printing Company Building appears much as it did upon completion, with the vast majority of its historic features and largely open floor plan intact. Most interior alterations are superficial, including drop ceilings and a contemporary, free-standing drywall office on the third story. The manufacturing areas historically had few permanent masonry partitions, with impermanent glazed steel partitions used instead to divide production areas. Today, some of these partitions remain although most are gone. However, these partitions were intended for relocation or removal to accommodate changes in production, so their absence is compatible with the open planning in the original design. Exterior alterations are primarily focused on the main (east) façade where historic doors and windows have been replaced, though contemporary replacement windows retain the originals' pane configuration and counter weights. Fiberglass window coverings are easily removable, and are not considered a major impact upon integrity. For a building of this size, remarkable proportions of original features remain in excellent condition, including historic steel sash windows and interior partitions as well as extensive wood paneling and details. The Woodward & Tiernan Printing Company Building retains integrity of location, design, materials, workmanship, feeling, and association.

[5] Louis B. Woodward, "Modern Building for Efficient Production," *Manufacturing Industries*. (April 1927), p. 266.

Summary

The Woodward & Tiernan Printing Company Building stands at 1519 Tower Grove Avenue in the Forest Park Southeast neighborhood of St. Louis [Independent City], Missouri. Designed by the prominent St. Louis firm Klipstein & Rathmann based on plans by internationally prominent industrial engineer Wallace Clark, the building is locally significant under Criterion C for Architecture. The Woodward and Tiernan Printing Company Building is an excellent example of the designed elevation sub-type of the daylight factory type, of which relatively few comparable examples exist in St. Louis. Generally the flat-slab reinforced concrete factory is an excellent example of early 20th century industrial architecture which combines the technological advances of daylight factory design with the planning tenets of rationalized industrial engineering. Woodward & Tiernan, established in 1865 and the city's leading commercial printing firm, commissioned the building in the early 1920s to accommodate its growing business of providing fully-integrated branding campaigns for major industrial clients nationwide. Designed around straight-line production workflows on adaptable open floor plates, the building embodies industrial engineering's ideal of the rational factory quantified and analyzed to eliminate waste and increase production. The period of significance is 1926, the date of the building's completion.

Woodward & Tiernan Printing Company and Commercial Printing in St. Louis

Much information is available about Woodward & Tiernan's history prior to the construction of the Woodward & Tiernan Printing Company Building but little is available for the years following. A review of the firm's early business practices and printing plants, however, serves to put the importance of the 1926 factory's design into context. In 1865 English-born William Henry Woodward (1834-1904), then foreman at St. Louis' *Daily Missouri Republican*, purchased a small commercial print shop at Third and Pine Streets (demolished) and three years later invited the *Republican*'s James Tiernan (1838-1886) to join him as partner.[6] Woodward & Tiernan's success prompted a move to larger quarters at Second and Locust Streets (demolished) in 1872, and by 1885 this shop was the largest of ninety printing plants in the city.[7] The firm specialized in lithography while offering print and design services that ranged from map engraving, to binding, to large scale posters and show work.[8] The following year Woodward & Tiernan partnered with real estate magnate Gerard B. Allen to build and then lease a full-scale plant at 309-315 North Third Street (demolished; Figure 6). Designed by prominent architect Isaac Taylor, the

[6] Woodward immigrated to the United States as a child in 1845. His father, an Episcopal minister, settled the family first in Philadelphia and later in Madison, Wisconsin. There Woodward entered the printing trade as apprentice to the weekly *Wisconsin Express* before the family relocated again to St. Louis in 1852. Woodward found employment with the *Daily Missouri Republican* and had risen from apprentice to foreman by the end of the Civil War. By the late 19th century he figured prominently amongst industry leaders nationwide, serving as founding member and seventh president of the United Typothetae of America. In St. Louis he played a significant role in numerous business organizations and civic endeavors, including serving as a director of 1904's Louisiana Purchase Exposition.; "From Printer's 'Devil,' He Rose to Prominence," *St. Louis Post-Dispatch*. 1 December 1904; "Obituary: William H. Woodward," *The Inland Printer*, (October 1904-March 1905), p. 592; "Died Suddenly: Mr. James Tiernan, the Well-Known Printer, Found Dead in Bed," *St. Louis Post-Dispatch*. 16 September 1886.
[7] The firm was known as Woodward, Tiernan & Hale between 1872 and 1882.; "From Printer's 'Devil,' He Rose to Prominence," *St. Louis Post-Dispatch*; Advertisement, *St. Louis Post-Dispatch*, 18 May 1885.
[8] *The Book of St. Louisans: A Biographical Dictionary of Leading Living Men of the City of St. Louis*. John W. Leonard, ed. 1906., p. 621; Advertisement, *St. Louis Post-Dispatch*, 18 May 1885; 29 June 1885.

six-story brick building at the heart of the city's commercial district solidified the firm's position amongst St. Louis' large-scale industrial concerns. Rapid growth necessitated additions in 1889 and in 1898, after which the firm encompassed the entire corner of Third and Locust Streets to the tune of 133,000 square feet. [9] At the time Woodward & Tiernan ranked as the largest establishment of its kind in the region and one of the largest of its kind in the country with 650 employees.[10]

Edgar B. Woodward (1864-1911), Louis B. Woodward (1834-1937), and Walter B. Woodward (1869-1924) assumed the company's leadership for more than thirty years after their father's death in 1904.[11] Woodward & Tiernan began to shift a significant portion of its business to providing fully-integrated branding campaigns for major industrial clients nationwide, which entailed the design and production of "labels, wrappers, calendars, circulars, inserts, advertising material and other printed matter for the distribution of their products" (Figure 7). [12] Doing so put the firm at the forefront of its field but required a large and diverse labor force fueling increasingly specialized departments; the firm's litany of services now included "printing of all kinds; stationary and office supplies; steel die embossing; commercial art designing and printing; general bank and commercial printing; book, catalogue, and magazine printing; chemigraph and bas relief advertising; art work; advertising calendars and show cards; lithographing" (Figure 8).[13] That city and industrial directories listed entire subsets of printers solely dedicated to each of these methods illustrated the breadth and dominance of Woodward & Tiernan's enterprise. But while the firm boasted "The Largest and Most Complete Printing Plant in the United States," its aging complex had long-since become an obstacle to the firm's growth. [14]

Woodward & Tiernan had purchased its Third Street complex in 1905 but the following year announced its plan to "immediately" construct a new eight story factory at 23rd and Locust Streets at the western edge of downtown. [15] This plan never materialized, though, leaving the firm struggling to arrange its proliferating departments between three buildings with only two sets of doors between them at each story. The 1909 Sanborn fire insurance map illustrates Woodward & Tiernan's concerns, showing office and retail space, warehouse space, and shipping and embossing departments on the plant's first floor; composing and printing departments on the second floor; additional printing departments on the third floor; binding on the fourth floor; lithography, printing and engraving, and printing and composing departments on the fifth floor; and art and photography, die-sinking and carpentry, and electrotyping and photoengraving departments on the sixth floor. A box factory in a newly-leased building at 316 Locust

[9] "From Printer's 'Devil,' He Rose to Prominence," *St. Louis Post-Dispatch*, 1 December 1904; William Hyde and Howard Conard, *Encyclopedia of the History of St. Louis*, p. 2543-2544; "Building was Liable to Fall," *St. Louis Post-Dispatch*, 16 September 1895.
[10] "Obituary: William H. Woodward," *The Inland Printer*, (October 1904-March 1905), p. 592; "Building was Liable to Fall," *St. Louis Post-Dispatch*, 16 September 1895; "St. Louis Honored," *St. Louis Post-Dispatch*, 21 August 1892.
[11] *Gould's St. Louis City Directory*.; *The Book of St. Louisans: A Biographical Dictionary of Leading Living Men of the City of St. Louis*, John W. Leonard, ed. (1906), p. 621; Death Records.
[12] Gordon Weaver, "A Huge Commercial Printing Plant in St. Louis," *Wire and Pipe* (September 1927), p. 3; Advertisement, *St. Louis Post-Dispatch*, 31 July 1915, 4 September 1915; "The Woodward & Tiernan Battle Toward Perfection," *Printers Ink Monthly* (1928), p. 111.
[13] *Gould's St. Louis Red-Blue Book*.
[14] Advertisement, *St. Louis Post-Dispatch*, 4 September 1915.
[15] "Rented Flats in Big Demand All Over City," *St. Louis Post-Dispatch*, 10 September 1905; "Property on Olive Street Is Advancing," *St. Louis Post-Dispatch*, 23 December 1906.

Street connected to the main plant via a diagonal frame addition through the alley that likely sheltered a dock (Figure 9). [16] These cramped quarters necessitated the leasing of yet another building at 310-312 Locust Street in December 1911, to which the firm had added a sixth building by 1920.[17] By this time the firm had begun again to search for a new location.

Primary concerns from the outset were expansion, streamlining production, and enhanced access to shipping channels for exporting goods. The firm narrowed its search to two of the city's primary industrial districts, both far from downtown and which provided ample space and direct access to rail lines. The Northwest Industrial District, centered on the intersection of Natural Bridge Road and Union Avenue, was rapidly developing into the city's industrial showplace (Figure 21). Yet Woodward & Tiernan found that the district's dozens of new factories had already occupied the best sites relative to the railroads. Its second option was a large vacant site on the south side's Mill Creek Valley which afforded with direct access to the Missouri-Pacific Railroad, and the firm purchased the 140,000 square foot plot at Tower Grove and Hunt Avenues in June 1921 (Figure 10). [18] A week later, Woodward & Tiernan announced plans for the construction of a modern daylight factory which would elevate its status as one of the city's most technologically-advanced manufacturers.[19]

Daylight Factories and the Rise of Industrial Engineering

The daylight factory building type had rapidly evolved during the first part of the 20th century as new materials enabled architects and engineers to revolutionize factory design. Throughout the 1800s factory owners had struggled to improve the efficiency and fire-resistance of their plants using available materials such as wood, brick, and cast iron with varying degrees of success. [20] Two primary types of factories had emerged by the turn of the 20th century. Mill construction, also known as slow-burning construction, consisted of masonry buildings framed with large, specially hewn beams spaced at wide distances and layers of thick wooden planks inserted between each floor.[21] The former were proven to take longer to burn and subsequently fail, and the latter helped to prevent fires from spreading across stories. This method was immensely successful across a wide range of industries, and mill construction factories, often decorated with Revival style ornamentation, became ubiquitous in cities throughout the United States.[22] Steel-framed factories were popular for their strength, simplicity of construction and maintenance, and the thin profile of their columns. Depending on use, however, steel members had to be sheathed in more costly fireproofing materials, and such factories tended to be adopted for specific uses alone.[23]

[16] Sanborn Fire Insurance Map, 1909.
[17] "Big Real Estate Holdings Change Hands in the Week," *St. Louis Post-Dispatch*, 17 December 1911; Gordon Weaver, "A Huge Commercial Printing Plant in St. Louis," *Wire and Pipe* (September 1927), p. 3.
[18] Woodward, p. 265; "New Industrial Tract As It Will Appear with Completed Plants," *St. Louis Post-Dispatch*, 30 November 1919.
[19] "Woodward Tiernan Printing Co. to Build New Plant on Tower Grove Avenue at Cost of $1,000,000," *St. Louis Post-Dispatch*, 26 June 1921.
[20] Lindy Biggs, *The Rational Factory*, p. 81; Betsy Hunter Bradley, *The Works: The Industrial Architecture of the United States*, p. 129.
[21] John R. Nichols, "Choice of Type of Construction," *Architectural Forum* (September 1923), p. 99.
[22] Bradley, p. 129, 265; Biggs, p. 81.
[23] Nichols, p. 102; Bradley, p. 145-147.

Advances in reinforced concrete technology soon transformed factory architecture and led to the development of the daylight factory. Poured-in-place concrete had been used as a primary building material during the late 19th century but never achieved widespread popularity. Requiring large amounts of concrete poured simultaneously into a series of unique handcrafted forms, the expensive method was considered too impractical for most. [24] Minneapolis civil engineer C.A.P. Turner's "Mushroom System," developed in 1905, relieved these issues by making concrete stronger and far more affordable. Standardized reinforced concrete slabs poured into rectangular, reusable forms were then combined to construct floors and roofs. These in turn were tied to reinforced concrete columns by diagonal reinforced bracings, the mushroom-like appearance of which lent the system its name (Figure 11). [25] Compressive concrete reinforced with tensile steel was stronger, more fire-resistant, and more vibration-resistant. [26]

Turner's method produced larger spans and transferred building loads to interior columns so that factories required thinner exterior walls and fewer interior columns. More spacious floor plans and significantly wider window bays were the result; as concluded by Boston engineer John R. Nichols in 1923, "When floors are of the flat slab type, ceilings unbroken by beams and windows carried to the ceiling, the light distribution is unequalled." [27] Industrial steel sash windows with standardized panes and thinner, more fire-resistant frames were developed to accommodate these "pier-to-pier window openings," manufactured first in Europe and then in the United States around 1910. [28] Interiors were often painted white to further reflect this unprecedented amount of natural light.[29] Daylight factories spoke directly to factory owners' longstanding goals: stronger floors could sustain larger machinery, open floor plans allowed workers and goods to circulate more efficiently, and more natural light improved production and worker morale.

These developments gave rise to the daylight factory as a distinct building type, one in which the hallmark combination of flat slab construction with massive steel sash window bays produced open, seemingly transparent industrial lofts. [30] This transparency minimized architectural intrusions that had previously inhibited production and allowed for groundbreaking advances in manufacturing systems. Albert and Julius Kahn's Highland Park Plant for the Ford Motor Company, completed outside of Detroit in 1910, was a widely influential national example of a daylight factory (Figure 12). The Kahn brothers' design featured low-rise, brick-clad reinforced concrete structures with expansive steel sash windows. The complex brought all materials and manufacturing components to a single site, while open floor plans allowed for efficient division of labor and machinery to increase production. Henry Ford used the design of the plant to shape the revolutionary assembly line of production for the Model T. [31]

The term "daylight factory," previously used to describe traditional factories with favorable working conditions, became popularized in association with such factories in the years following Highland Park's

[24] Biggs, p. 83-84.
[25] Ibid, p. 85; Bradley, p. 158.
[26] Biggs, p. 81; Nichols, p. 103.
[27] Biggs, p. 81-82; Bradley, p. 158; Nichols, p. 103.
[28] Biggs, p. 81-82, 96; Bradley, p. 158-9, 166.
[29] Nichols, p. 103.
[30] Bradley, p. 261; Nichols, p. 103.
[31] Biggs, p. 102-103, 109, 117.

construction.[32] More importantly, Ford's success illustrated daylight factories' immense possibilities at the very time that industrial engineering, or the scientific management of production, was rising to prominence. The emergence of the daylight factory, therefore, marks a distinct separation from both mill construction and steel frame construction. New structural technologies allowed for daylight factories to perform in accordance with and in support of modern manufacturing ideals such as efficient production; more than simply being a warehouse or a manufacturing plant, this type of building was equated -- by both workers and clients -- with successful business and moral working conditions.

Industrial engineering emerged as both a profession and field of study during the early 20th century in response to the increasingly complex nature of industrial production. Longstanding concerns of waste and inefficiency caused by workers executing largely self-directed tasks on rapidly evolving machinery inspired its earliest practitioners; typically classically trained engineers, they sought to turn a clinical eye on all facets of production to rationally organize factories.[33] As stated by historian Lindy Biggs,

> These men applied their engineering perspective and skills to every element of the factory: building design, shop floor layout, machines, materials handling, lighting and ventilation, and management of workers. As they engineered the factory, they redefined it. Once merely buildings in which men and women labored to produce goods, the factories run by industrial engineers became something more … the factory as machine. Their success in realizing that vision paved the way for modern mass production. [34]

Industrial engineers championed the detailed study, analysis, and planning of the ideal factory to maximize profits, a concept readily embraced by American manufacturers. The movement rapidly grew during the first decade of the 20th century; by the 1910s elite universities offered classes and degrees in the field, the preeminent American Society of Mechanical Engineers recognized the profession in 1912, and the Society of Industrial Engineers was established in 1917.[35] Often working as consultants, its practitioners revolutionized industrial architecture by designing factories from the inside out based on carefully-planned, case-specific production plans instead of convention. Daylight factories, open and versatile, provided an ideal medium for this practice, but boasting cutting-edge facilities was not enough to ensure success. Harold Moore noted in his book *Mechanical Engineering* that even factories with modern equipment "had an unbalanced distribution of floor space with some departments badly congested and others misplaced." [36]

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[32] St. Louis' Ferguson-McKinney Dry Goods Company advertised its "new daylight factory" at Broadway and Hickory (demolished) in 1903, seeking to attract workers to its four-story brick and iron shirt works: "Why work in an unhealthy workroom when you can earn more money in our modern and well-equipped factory?" Schmitz & Shroder, makers of men's clothes, routinely advertised that its good were produced in the company's "immense sanitary, daylight factory on the premises," a description applied to its six story brick and stone-fronted factory with skylights at 6th and St. Charles Streets (demolished).; Advertisement, *St. Louis Post-Dispatch*, 28 April 1904, 26 October 1906, 13 September 1907; Advertisement, *St. Louis Post-Dispatch*, 22 February 1903; Sanborn Fire Insurance Map, 1909; Bradley, p. 261.
[33] Biggs, p. 36-40.
[34] Ibid, p. 36-37.
[35] Ibid, p. 40-43, 45.
[36] Ibid, p. 49.

Still, industrial engineers did not entirely supplant the role of architects. *Architectural Forum* dedicated its entire September 1923 issue to factory design, with experts penning essays on specialized topics including site location, facilities planning, construction types, fire prevention, roof types and surfaces, flooring options, natural lighting, plumbing, heat and ventilation, artificial lighting, steam power, electrical power, and accident prevention. Featuring charts, plans, the latest products, and ideal case studies, the issue reflected the increasingly complex and scientific nature of industrial architecture. Only one essay by nationally-renowned architect Cass Gilbert dealt with style, in which he extolled simplicity of form in concrete construction and denounced the cloaking of such factories.[37]

While the *Architectural Forum* editorial board stepped back from Gilbert's strong stance, it similarly mused on factory design's potential. This relatively new type of building, born of the Industrial Revolution, was uniquely suited to represent American ideals as the nation's industrial prowess surged. If properly harnessed, "its great outstanding promise … [was] the opportunity of creating a style of architecture that [would] truly interpret modern conditions … [and] lead to the long-sought American style." [38] Short of this ultimate goal, factory owners still relied on architects' expertise in drawing plans and selecting materials, not to mention their ability to fit-out public spaces for white-collar employees and clients. Thus factory design in the 1920s became a joint operation between industrial engineers and architects, both working to push factory design into a new era.

Woodward & Tiernan Printing Company Building: Design

Woodward & Tiernan sought to build the most advanced printing plant possible and selected the finest talent to plan and design it. The firm first enlisted Wallace Clark (1880-1948; born Henry Wallace Clark, but publicly listed as Wallace Clark), one of the nation's foremost industrial engineers, to work with its executives in planning the factory's interior. [39] Clark was born in Cincinnati, Ohio and graduated from the University of Cincinnati in 1902 (Figure 13). He worked for the Remington Typewriter Company from 1907 to 1917 and then as staff engineer for Henry L. Gantt (1861-1919) from 1917 to 1920. Gantt was a nationally influential industrial engineer who had studied under Frederick W. Taylor (1856-1915), considered the father of the industrial engineering movement; his production-scheduling Gantt Chart remains in use to this day.[40] After his mentor's death Clark established his own consulting firm, Wallace Clark & Co., in New York City and ascended to international prominence with additional offices in London and Paris.

In 1926 Clark was selected by Princeton Professor Edwin W. Kemmerer to study and advise Poland's government on its industrial practices and was named a Commander of the Cross of Poland Restored for his efforts. In 1933 he led a commission charged with studying and reorganizing government monopolies in Turkey, and later served as the American representative on industrial engineering to the International Labor Office in Switzerland. Considered "one of the pioneers in scientific management," Clark was a Fellow of the American Society of Mechanical Engineers and received its prestigious Henry L. Gantt Gold Medal "for distinguished achievement in industrial management as a service to the community" in

[37] Cass Gilbert, "Industrial Architecture in Concrete. *Architectural Forum*, (September 1923), p. 84.
[38] "Editorial Comment: Architecture and Industry," *Architectural Forum*, (September 1923), p. 152.
[39] Louis B. Woodward, "Modern Building for Efficient Production," *Manufacturing Industries* (April 1927), p. 269.
[40] Biggs, p. 40-41; "Wallace Clark, Engineer, Was 67," *The New York Times*, 5 July 1948.

1934.[41] The scientific management movement had originated with Frederick W. Taylor's 1911 book *Scientific Management*, in which Taylor argued for the application of physical engineering principles to the organization of manufacturing companies.[42] Clark became one the movement's more prolific exponents. Clark wrote several books over the course of his career, including *The Gantt Chart: A Working Tool of Management* (1922), *Shop Office and Forms: Their Design and Use* (1925), and *The Foreman and His Job* (1926). [43] After his death, Clark's widow established the American Society of Mechanical Engineers' Wallace Clark Award and the Wallace Clark Center of International Management at New York University.[44]

For the building's architects Woodward & Tiernan selected Klipstein & Rathmann, a prominent local firm. Klipstein & Rathmann had established extensive experience designing factories for some of the city's largest industries, many of which, like Woodward & Tiernan, were expanding and building new facilities in concentrated parts of the city. Both native St. Louisans, Ernest C. Klipstein, FAIA (1866-1931) and Walter L. Rathmann, FAIA (1880-1954) established their firm in 1908 and practiced together until the former's death in 1931.[45] Klipstein attended Washington University's Manual Training School before studying architecture at the Massachusetts Institute of Technology, followed by studies at the Polytechnische Hohenschule in Munich and Atelier Godfroy-Freynet in Paris.[46] He was then selected by the Manual Training School to institute its methods of instruction in Springfield, Massachusetts' public schools for three years before teaching design at the University of Illinois, Champaign-Urbana.[47] By 1897 Klipstein had returned to St. Louis and established his own firm.[48] Rathmann attended the Manual Training School before receiving his degree in architecture from the University of Pennsylvania in 1907 and returning to St. Louis.[49] Both men served as president of the St. Louis Chapter of the American Institute of Architects, with Klipstein's tenure spanning 1911 and 1912 and Rathmann's 1921 and 1922. Klipstein received the prestigious honor of AIA Fellow in 1914 and Rathmann followed in 1925. [50] Together, they built a firm that ranked among St. Louis' most successful and highly-regarded during the first part of the 20th century.

Klipstein & Rathmann's elite Beaux Arts training is evidenced by the breadth of their work in both style and form. The architects designed the Tudor Revival Stork Inn (1910, 4527 Virginia Avenue - NR 5/5/00), Feasting Fox (1913, 4200 South Grand Avenue – St. Louis City Landmark), Grant's Farm Bauernhof (1913-1914 - St. Louis County Landmark), and Bevo Mill (1917, 4749 Gravois Avenue - NR 7/31/13) restaurants for Anheuser-Busch in the years prior to Prohibition. Residential commissions include nine houses in the affluent Parkview (NR 3/14/1986) and Brentmoor (NR 9/23/82) subdivisions

[41] "Wallace Clark, Engineer, Was 67," *The New York Times*, 5 July 1948.
[42] Biggs, p. 39.
[43] Ibid.
[44] "Mrs. Wallace Clark, Retired Consultant," *The New York Times*, 21 February 1962.
[45] Rathmann maintained the Klipstein & Rathmann name after his partner's death but joined Arthur E. Koelle and Daniel J. Carroll to form Rathmann, Koelle & Carroll in 1944.
[46] *Who's Who in St. Louis*, 1928, p. 60.
[47] *Who's Who in the Central States*, 1929.
[48] *The Book of St. Louisans: A Biographical Dictionary of Leading Living Men of the City of St. Louis*. John W. Leonard (1912), p. 340.
[49] Ibid, p. 490.
[50] Carolyn Hewes Toft, Esley Hamilton, and Mary Henderson Gass, *The Way We Came: A Century of the AIA in St. Louis*, p. 146-147.

in St. Louis City and County.[51] Extant works downtown include the Art Deco Eastman Kodak Building (1928, 1009 Olive Street - NR 5/9/02) and Union Electric 15th Street Substation (1930, 710 N. 15th Street – NR 2/12/1987). The full-block St. Louis Garage, designed in reinforced concrete and clad in brick with spare ornamentation, was the largest and most expensive of its kind in the region at completion (Chestnut and 18th Streets, 1919-1920). That same year Klipstein & Rathmann was one of eight major firms, including Tom P. Barnett, Preston J. Bradshaw, William B. Ittner, and Mauran, Russell & Crowell, selected to participate on the Memorial Plaza Commission. Funded by a 1923 bond issue, the commission was tasked with designing a City Beautiful-inspired civic plaza at the heart of downtown. Klipstein & Rathmann's monumental, neoclassical Civil Courts Building (1928-1930) and Main Post Office (1935-1937) remain two of the city's most notable civic landmarks.[52]

Aside from more visible and better-known commissions, Klipstein & Rathmann's factory designs comprise a significant portion of the firm's work. In the new era of factory design, the Woodward & Tiernan Building was a significant and distinctive project within a group of clients that included nationally-prominent concerns such as the Bridge & Beach Manufacturing Company, Anheuser-Busch Brewery, Century Electric, and National Candy Company. The following is a short list of known manufacturing and warehouse facilities which the firm designed in St. Louis between 1908 and 1931.[53] Of the thirteen, eight have been demolished and three have been given historic designation:

1. Beck & Corbitt Iron Company Building, northeast corner of 1st and Ashley Streets (1911 – extant, North Riverfront Industrial Historic District, NR 5/1/2003)

2. Ludlow-Saylor Wire Company Machine Shop, 634 S. Newstead Avenue (1911 – demolished)

3. Anheuser-Busch Bevo Bottling Plant [with Widman & Walsh], southwest corner of Arsenal and Broadway Streets (1917 – extant, NHL 11/13/66)

4. Ely-Walker Dry Goods Company Trunk Factory, 1408-1412 N. 16th Street (1919 – demolished)

5. Bridge & Beach Manufacturing Company Building, 4204 Union Avenue (1919-1921 – extant; Figure 23)

6. Garrett and Company Winery Building, 4116 Union Avenue (1920 – extant; Figure 24)

7. Electric Storage Battery Company Building, 1058 S. Vandeventer (1924 – extant)

[51] Klipstein & Rathmann designed five houses in the Parkview Historic District (6223, 6235, 6244, and 6248 Washington and 6225 Westminster, all in 1908) and four in the Brentmoor Park Historic District (1, 20, 22, and 23 Brentmoor Park between 1912 and 1926).
[52] Toft, Hamilton and Gass, p. 58-59.
[53] This list is compiled from references in the *St. Louis Post-Dispatch*, the Missouri State Historic Preservation Office's list of National Register-listed buildings, Landmarks Association of St. Louis' architects file, and blueprints archived at the National Building Arts Center in Sauget, IL. Locations have been cross-listed using Sanborn Fire Insurance Maps and the Industrial Club of St. Louis' 1929 *Directory of Manufacturers*, and current conditions have been determined through BING Maps and site visits.

8. Fred Medart Manufacturing Company Building, 3535 DeKalb Street (1924 – demolished)

9. More-Jones Brass & Metal Company, Manchester Avenue & Kingshighway Boulevard (1925 – demolished)

10. Woodward & Tiernan Printing Company Building, 1519 Tower Grove Avenue (1925 – extant)

11. William Wurdack Electric Manufacturing Company Building, 4444 Clayton Avenue (1926 – demolished)

12. Century Electric Box Factory, 19th and Pine Streets (1927 – demolished)

13. National Candy Company Factory, 4230 Gravois Avenue (1927 – extant, NR 11/5/09)

Klipstein & Rathmann designed several manufacturing facilities that embody the daylight factory type. These factories were products of a new era of thinking about manufacturing production, one in which technological advances allowed the physical design of the building to heighten and advance the efficiency of production. The design of the Woodward & Tiernan Building is an architectural example of the era's conception of modernity and order. Klipstein & Rathmann joined other prominent local firms and designers, including Mauran, Russell & Garden (later Crowell), Albert B. Groves, Isaac Taylor, Tom P. Barnett and Preston J. Bradshaw in designing industrial buildings alongside a wide scope of other commissions.

While the date of Klipstein & Rathmann's engagement on the Woodward & Tiernan is unknown, the building's blueprints are dated October 1924.[54] The firm's recent designs for the Bridge & Beach Manufacturing Company (1921), maker of stoves and furnaces, and Garrett & Company (1920), a wine manufacturer then dedicated to "dealchoholizing" the substance, likely played a role in the selection (Figures 23 and 24). These massive, $1 million daylight factories were considered showpieces of the Northwest Industrial District and the former was featured in *Architectural Forum's* issue on factory design.[55] These buildings, much like the Woodward & Tiernan Building a few years later, needed to be highly functional manufacturing facilities as well as demonstrative of the company's success to visiting clients. Woodward and Tiernan represented the firm's only known direct collaboration with a nationally-known engineer, Wallace Clark.

A 1921 rendering of the Woodward & Tiernan Printing Company Building showed an elongated, impressive daylight factory with nine bays overlooking Tower Grove Avenue backed by thirty-seven industrial bays stretching along the Missouri-Pacific Railroad. The building would stand three stories tall to the east and two stories tall to the west, though its eastern main façade would appear to be only two stories because of the street's steep upwards slope over the rail lines to the south (Figure 14). [56] While

[54] Klipstein & Rathmann, Woodward & Tiernan Printing Company Building, Blueprints (1924).
[55] "Plant To Go Up Here to Dealcoholize Wine," *St. Louis Post-Dispatch*, 9 January 1920; *Architectural Forum* (September 1923), Plate 94; "Investment in New Northwest Factory District Estimated at More than $20,000,000," *St. Louis Post-Dispatch*, 24 September 1920.
[56] Construction of the Tower Grove Avenue Viaduct in 1915 had elevated the street's intersection with Vandeventer Avenue by 13 feet and depressed the tracks below by 12 feet, meaning that the factory's first story could only be

Klipstein & Rathmann's involvement in the project at this stage is unknown, the building's massing was determined by Wallace Clark's analysis of Woodward & Tiernan's production practices. However, in an article about the factory, company president Louis B. Woodward attributed the actual layout design to engineer F.W. Bowen (Figure 16).[57] Such a division of labor was common in industrial design, where architects and consulting engineers delegated much of the layout and structural design to construction engineers.

Woodward, the firm's president after the deaths of his brothers, penned an in-depth article on the factory's design for the journal *Manufacturing Industries* in April 1927. In it, he described the industrial engineer's process as follows:

> Previous to the drawing up of plans for the new building, the manufacturing processes were thoroughly studied by Wallace Clark, who, with the company's executives, worked out a comprehensive scheme of plant layout. This layout was most carefully designed to locate all departments in the most convenient arrangement with reference to each other and to the entire system of manufacturing. A plan of straight-line production was followed, so that each material, from the time it was received until it was shipped in finished state, would travel the least amount of distance and require the minimum amount of handling. The number of floors to build and the location of all equipment, partitions, storerooms, etc., were entirely based upon this study. [58]

Straight-line production entailed the linear arrangement of departments so that products flowed smoothly and sequentially through each stage of assembly to prevent waste of both labor and materials. Adapted to Woodward & Tiernan's unique manufacturing needs, Clark's recommendations produced a rational factory in which production flowed east to west and from the top down.[59] Such attention to the relationship between building form and the material production inside is a fundamental component of daylight factory design.

Construction began in 1925 and the Woodward & Tiernan Printing Company Building was put into operation the following year (Figure 15). [60] The factory, built at a slightly smaller scale than originally projected, nonetheless cost $500,000 with hundreds of thousands of dollars more in machinery and mechanical systems.[61] It nearly doubled the firm's square footage to a total of 238,000 square feet of shop space and 12,000 square feet of office space.[62] The reinforced concrete flat slab design maximized the daylight factory's features, with expansive floor plans and striking south, north, and west facades composed almost entirely of concrete and steel sash windows. The building's partial third floor allowed

visible from the south.; "Completion of Tower Grove Viaduct Will Be Celebrated Next Saturday," *St. Louis Republic*, 25 July 1915.; "Woodward Tiernan Printing Co. to Build New Plant on Tower Grove Avenue at Cost of $1,000,000," *St. Louis Post-Dispatch*, 26 June 1921.

[57] Woodward, p. 269.

[58] Ibid.

[59] Ibid.

[60] Ibid, p. 265; Building Permit.

[61] *St. Louis Daily Record*, 4 April 1925.

[62] Woodward, p. 270.

for monitor lighting on the second floor, which complemented ample fenestration to provide that floor – the busy printing floor – with the greatest natural light possible.

The building's interior was arranged as follows (Figure 16): The third floor was functionally divided between administration and specialized production. Executive offices for the company's president, secretary, general manager, support staff, and accounting department lined the east façade, in addition to a board room. West of these were the sales, purchasing, cashier, accounting, filing, and publicity departments, all arranged in an open office area that ran the building's width from north to south (Figure 17). The remainder of the third floor was shop space for the firm's highly-skilled production departments, including art and design, photography, coating and printing, litho-engraving, litho-transfer, and litho-negative plating (Figure 18). The second floor housed the firm's printing departments, with massive press rooms arranged along the north and south facades beneath massive monitors to maximize natural light.

Clark's straight-line production plan is expressed most clearly in the printing areas: the printing process began in the tiny composing room at the floor's east end, after which materials would go to the adjacent electrotype foundry and travel west to either the flat bed press, lithographic press, or job press departments. Pieces were then sent to the finishing and cutting departments for completion (Figure 19). From there products were sent to the first floor for storage or distribution. The first floor's southwest corner housed shipping and receiving departments, and the northwest corner contained the machine and carpentry shop as well as the varnishing room. The remaining three-quarters of the floor contained stock storage along the south facade with finished goods warehoused along the north facade. Goods were loaded onto freight trains by means of two spur lines passing through the west façade. [63]

The interior planning was based on both highly defined production layouts and a lack of permanent interior partitions (Figures 16 and 19). Most partitions were full-height glazed steel walls, designed for relocation or removal to accommodate changes in production layout (Figure 20). Despite the removal of production lines and most non-permanent partitions, the open interior reflects this planning today (Figure 3; Photograph 11). Some non-permanent partitions even remain on the second and third floors today (Photograph 13), providing a sense of the transparency of the divisions. The factory's tightly-structured plan organized Woodward & Tiernan's operations from both the managerial and production perspectives. Hierarchies between executives, administrative departments, designers, printers, and warehouse and shipping labor were codified between descending floors and allowed directives to clearly circulate between departments. Printed goods were assembled in a methodical, ordered fashion, passing from one department to the next with little waste of time or labor.

The factory's ancillary facilities and elaborate mechanical systems allowed it to function as a self-contained world unto itself, the intricately-planned industrial engineer's "master machine."[64]
One-story wings projecting from the western façade contained the firm's box factory, boiler room, and garage. Natural and forced-air ventilation were installed according to department use, humidity and static electricity were carefully monitored and controlled. Hood fans removed gases caused by noxious

[63] Ibid, p. 266; Klipstein & Rathmann, Woodward & Tiernan Printing Company Building, Blueprints (1924); Swan, John J. "Cutting Your Inventory Costs." *Manufacturing Industries* (July 1927), p. 35.
[64] Biggs, p. 49.

processes and vacuum systems removed waste. [65] One electric truck and twenty-five hand operated lifts transferred materials across floors and elevators located at the building's east and west end transported materials between floors.[66] The firm's 400 employees were provided lockers in four dressing rooms, "one for the office men, one of for the shop men, one for the office girls, and one for the shop girls."[67] A large third-floor cafeteria, used for breaks and gatherings, was run by the firm's Employees Association with food provided at-cost. Drinking fountains and bathrooms were situated throughout, and two handball courts on the garage's west facade featured their own showers. [68] Today, none of the equipment or fixtures remain although the layout is nearly fully intact.

Klipstein & Rathmann designed the factory's Classical Revival style main façade, with its interior contributions likely limited to the building's public spaces. Woodward & Tiernan had selected this site because of the public presence it afforded the company, yet the building's industrial floor plate created somewhat problematic conditions for crafting hospitable spaces for workers and clients. Clark's plan involved shielding clients from the building's industrial functions by channeling them through an entrance vestibule off of Tower Grove Avenue and on to the third story. This vestibule's dimensions were dictated by the industrial functions surrounding it, leaving the remaining space narrow and somewhat claustrophobic. The third story offices, while functional, presented design challenges as well. This expansive area had space for the firm's many administrative departments but its deep, open floor plan meant that many of these would have to be centrally arranged away from exterior windows.

The 1921 rendering, likely generated from Wallace Clark's consultation, shows monitors lining the third story roof to alleviate this lack of natural light, but Klipstein & Rathmann modified these to achieve greater effect. Instead of standard monitors running north-south, the architects selectively arranged smaller monitors according to interior use. A large monitor was placed over a grand staircase facing Tower Grove Avenue so that visitors would be faced with a dramatic shaft of light upon entering the building instead of a cramped, artificially-lit hallway. Monitors were similarly placed over central offices areas and the cafeteria, flooding both with additional natural light. Executive offices which otherwise would have blocked windows along the factory's east façade were lined with multi-light oak partitions featuring large operable transoms. While many industrial buildings were designed without such needs or considerations, the semi-commercial nature of Woodward & Tiernan's plant required an architect's expertise.

Woodward & Tiernan Printing Company Building in Context

In St. Louis, the daylight factory emerged as a prevalent industrial building type in the first two decades of the twentieth century. According to Betsy H. Bradley, the term "daylight factory" came to denote manufacturing buildings with reinforced concrete or steel fireproof structures and nearly full-height windows.[69] Industrial expansion in St. Louis seized upon the new form, and by the 1920 several major examples existed as well as a clear distinction between two types. Factories on major thoroughfares, such as Klipstein & Rathmann's Bevo Plant (1919), had designed elevations clad in masonry with stylistic

[65] Woodward, p. 266-267.
[66] Weaver, p. 4.
[67] Woodward, p. 269-270.
[68] Ibid.
[69] Bradley, p. 161.

details of revival or classical styles. Other factories, such as the main building at the Alligator Oil Clothing Company factory (1918; NR 1/29/13) featured exposed concrete structures and were utilitarian in nature.

Daylight factories fomented the wave of industrial reconstruction and modernization that swept St. Louis in the wake of World War I. The city had been an industrial powerhouse since the 19th century and by the 1920s was the seventh largest manufacturing center nationwide. Nine industrial districts throughout the region fueled highly-diversified industries such as electrical manufacturing, brewing, automobile assembly, and clothing and shoe production. [70] The postwar "reconstruction period" brought about an industrial building boom as the city's manufacturers began reinvesting in existing plants and relocating to new ones. Between 1918 and 1920 alone these firms constructed 8 million square feet of new factory space, to which another 7 million square feet were added by the roughly one hundred new firms moving to St. Louis from elsewhere.[71] This growth continued throughout the decade and by 1929 the region produced $1.5 billion of products, 66 percent of which was produced within the city's limits. [72]

Manufacturing production therefore was a hugely important business for city of St. Louis, and the construction of modern factories was necessary to maintain growth and progress in this sector. Companies persistently sought to move from smaller, older factories downtown into larger, modern buildings with access to rail transit (such as the location of the Woodward & Tiernan Building along the Missouri Pacific Railroad). As engineers and architects realized that daylight factories were best suited to the city's heavy industries and were definitely "in vogue," this building type proliferated throughout St. Louis.[73] By 1930, enough examples of daylight factories stood in St. Louis for the type to be a recognizable and prevalent local architectural form.

Significant examples of designed-elevation daylight factories in St. Louis include the aforementioned Bevo plant, Ford Motor Company Building (1914; 4100 Forest Park Parkway – NR 3/6/02), the Pedigo-Weber Shoe Factory (1919; 3427-3441 Locust Street - NR 9/6/06), the Emerson Electric Company Building (1920; 2020 Washington Avenue; NR 11/6/86), the Pevely Dairy Company Building (1916; 1001 S. Grand Boulevard; NR 11/18/09), the Ramsey Accessories Manufacturing Company Building (1923; 3693 Forest Park Boulevard; NR 4/16/08), the United Drug Company Factory (1920; 3901 N. Kingshighway) and the National Candy Company Factory (1927; 4230 Gravois Avenue; NR 11/5/09). Utilitarian examples in addition to the Alligator Oil Clothing Company building are the last building at the Crunden-Martin Manufacturing Company complex (104 Cedar Street; 1920 NR 2/9/05) and the Steelcoat Paint Company Building (1922; 801 Edwin Avenue; NR 6/27/2007). None of the National-Register-listed buildings are listed for significant association with the daylight factory building type. The Northwest Industrial District, which Woodward & Tiernan had considered as a location for its own factory, offered the most striking collection of post-war factories (Figure 21), with both subtypes represented. Some thirty-seven companies had announced intentions to relocate there by November 1919 with plans to invest over $20 million in new factories and related buildings. Seven, including Klipstein & Rathmann's abovementioned Garrett & Company and the Bridge & Beach Manufacturing Co., were

[70] James Neal Primm, *Lion of the Valley*, p. 463-465; "More Than 100 Industries Came Here in Two Years," *St. Louis Post-Dispatch*, 9 May 1920.
[71] "More Than 100 Industries Came Here in Two Years," *St. Louis Post-Dispatch*, 9 May 1920.
[72] Primm, p. 463, 465.
[73] Nichols, p. 103.

ultimately constructed for $1 million while a massive daylight factory for General Motors cost $10 million (Figures 22-24).[74]

Since Woodward and Tiernan selected a site with frontage on a prominent street corner, where Tower Grove Avenue intersects Vandeventer Avenue (then recently raised over railroad tracks on a new viaduct), a utilitarian factory was not fitting. The company and its designers produced a factory with a designed elevation fronting Tower Grove Avenue and wrapping the sides of the front office block, leaving the manufacturing center as a discernible utilitarian mass. This concealing of the front section fits with other partially-designed daylight factory designs, such as the Garrett and Company Winery Building (1920), where the most visible end and tower sections had brick cladding, and the second building at the Alligator Oil Clothing Company factory (1919), which placed a Classical Revival façade on the front of its utilitarian mass.

The designed front section of Woodward & Tiernan's new factory also was fitting the need to project a strong corporate identity. The company was the unquestioned leader of St. Louis' commercial printing industry, which in 1923 was the fifth largest printing market nationwide and employed over 5,100 with sales topping $18 million.[75] The firm's patchwork, antiquated facility downtown reflected poorly on the company's stature, particularly since many of its own clients were in the process of rebuilding their own facilities. The "advertising value of a well-designed manufacturing plant" had long-since been accepted as signs of technological advancement and success, and Woodward & Tiernan actively sought to portray itself as state-of-the-art manufacturer.[76] Branch offices in New York, Chicago, Philadelphia, and Omaha marketed the firm's branding efforts as modern, groundbreaking methods scientifically crafted and enabled by the latest advances in machinery.[77] The Woodward and Tiernan Printing Company Building outwardly conveyed both the company's dedication to efficient production and production capacity, while inwardly fulfilling the needs of modernized printing.

Information on Woodward & Tiernan's history becomes scarce after 1926 although the family did retain the company's leadership into the 1950s.[78] Because the company's stature during the years it used this facility seems to have declined, an argument for significance under Criterion A is impossible to support. By that time the firm was one of six major printers in St. Louis, each which employed between 250 and 499, out of 287 largely small-scale printers citywide. Industrial listings categorized its goods as "Printed/lithographed wrappers, labels, and calendars," which is consistent with the firm's earlier business model. [79] In 1959, however, just a few years shy of its hundredth anniversary, Woodward & Tiernan was purchased by the Universal Match Corporation and joined with the Simmon-Sisler Printing Company.[80] Universal Match, which had purchased nine companies in the previous year in a period of

[74] "New Industrial Tract As It Will Appear with Completed Plants," *St. Louis Post-Dispatch*, 30 November 1919; "Investment in New Northwest Factory District Estimated at More than $20,000,000," *St. Louis Post-Dispatch*, 24 September 1920.
[75] St. Louis Chamber of Commerce, "Survey Shows Great Growth of Printing Industry in St. Louis," *Greater St. Louis* (August 1923), p. 14.
[76] "Editorial Comment: Architecture and Industry," *Architectural Forum*, (September 1923), p. 152.
[77] "The Woodward & Tiernan Battle Toward Perfection," *Printers Ink Monthly* (1928), p. 111-112.
[78] *Gould's St. Louis City Directory*.
[79] Chamber of Commerce of Metropolitan St. Louis, *Directory of Manufacturers in Metropolitan St. Louis*, 1953.
[80] "Other Sales, Mergers," *New York Times*, 16 December 1959.

exponential growth, selected Woodward & Tiernan for expansion specifically for its "modern plant," illustrating the conceptual impact that early daylight factories would have on industrial architecture throughout the 20th century.

Conclusion

The Woodward & Tiernan Printing Company Building was conceived and designed by engineers and architects working in a specific period of history, and its importance lies in the clarity with which its design reflects this period. The building embodies the characteristics of a specific type of construction, the daylight factory. The daylight factory is a significant type in the historic development of industrial architecture in both St. Louis and in the United States that embodies economic growth and advances in both corporate management and factory engineering. The Woodward & Tiernan Printing Company Building remains an excellent example of early 20th century industrial architecture, fusing industrial engineering and architecture at a time when modern, scientific factory design defined American architecture in its golden age of industrialism. Today, the building's open floor plans testify to a successful design based around straight line production, and the scale and size of the building reflect the architectural expression of the company's need to modernize. The factory building retains elements that defined it as a modern daylight factory: lighting from large windows and roof lighting, regular column spacing and avoidance of permanent partitions. When company president L.B. Woodward deemed the new factory "an ultimate economy" in 1927, is statement referred to the qualities that make the building exemplify an industrial building type that advanced the production of his and many other companies nationwide.[81]

[81] Woodward, p. 265.

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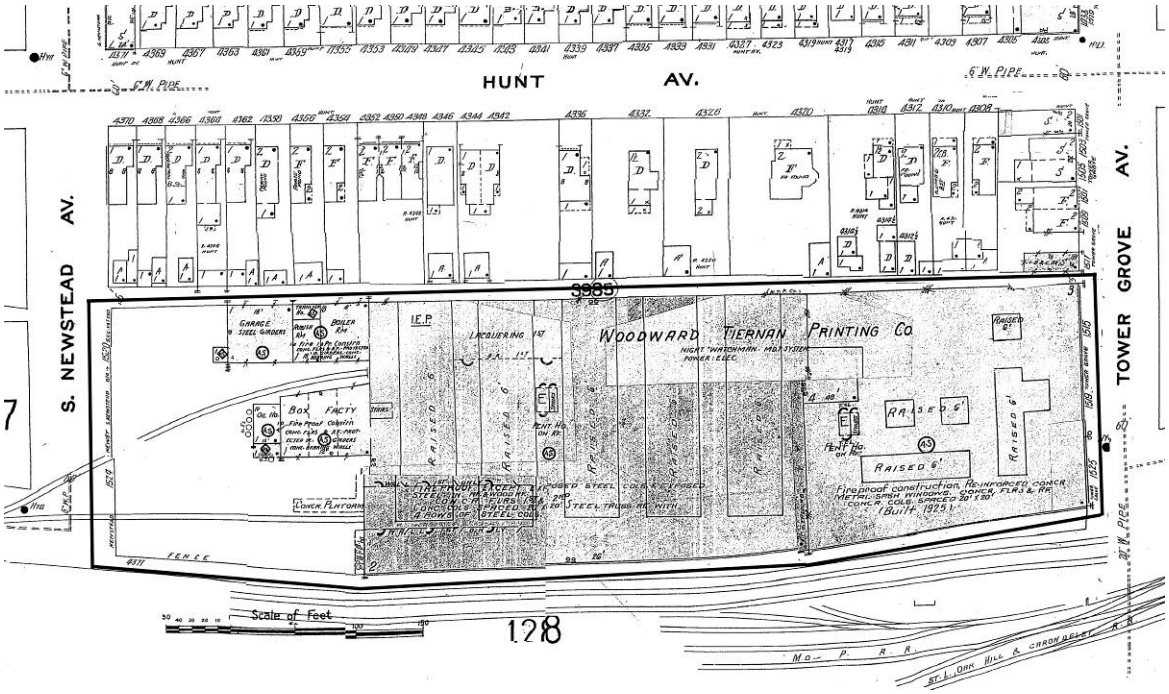
Boundary Description

The nominated property stands at 1519 Tower Grove Avenue in the Forest Park Southeast neighborhood of St. Louis (Independent City), Missouri. The building and its associated land occupy the south side of City Block 3985 of the Laclede Race Course Addition. They are bounded by Tower Grove Avenue to the east, S. Newstead Avenue to the west, an alley to the north, and the former Missouri Pacific Railroad tracks to the south. The parking lot and loading dock on the northeast corner of the block, now associated with the building, were constructed outside of the period of significance and are not included in the proposed boundaries. The property is legally identified by the city Assessor's Office as parcel number 39850001500. The nominated property is indicated by a solid line on the accompanying map titled "Woodward & Tiernan Printing Company Building Boundary Map".

Boundary Justification

The current boundaries encompass all of the land historically associated with the Woodward & Tiernan Printing Company Building.

Woodward & Tiernan Printing Company Building Boundary Map. Source: Sanborn Fire Insurance Map, 1951.



Figures

Figure 1: Woodward & Tiernan Printing Company Building, First Floor Plan. Source: Base plan provided by UIC/Urban Improvement Company.

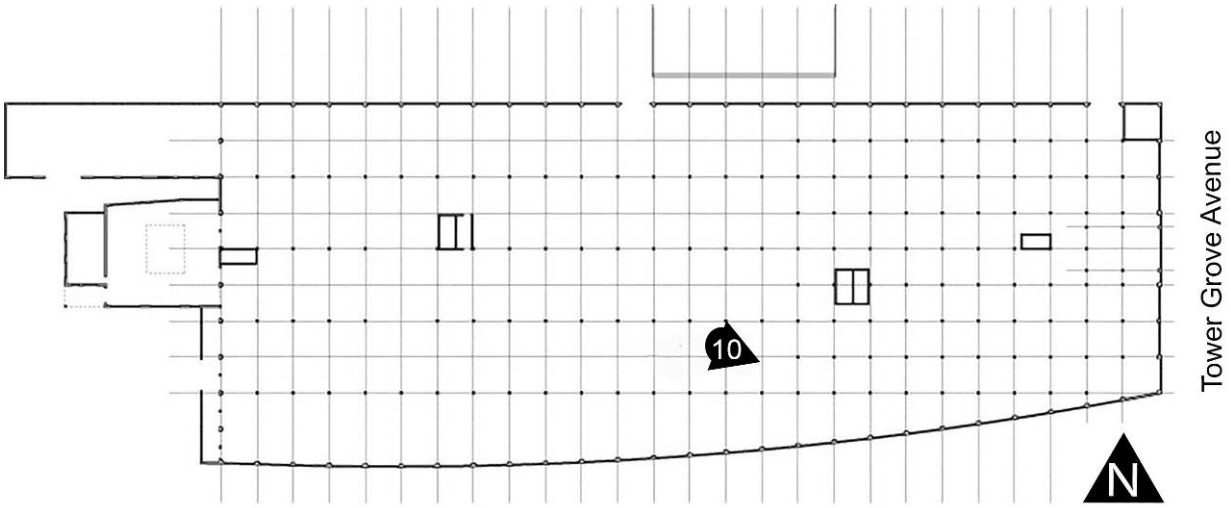


Figure 2: Woodward & Tiernan Printing Company Building, second floor plan. Source: Base plan provided by UIC/Urban Improvement Company.

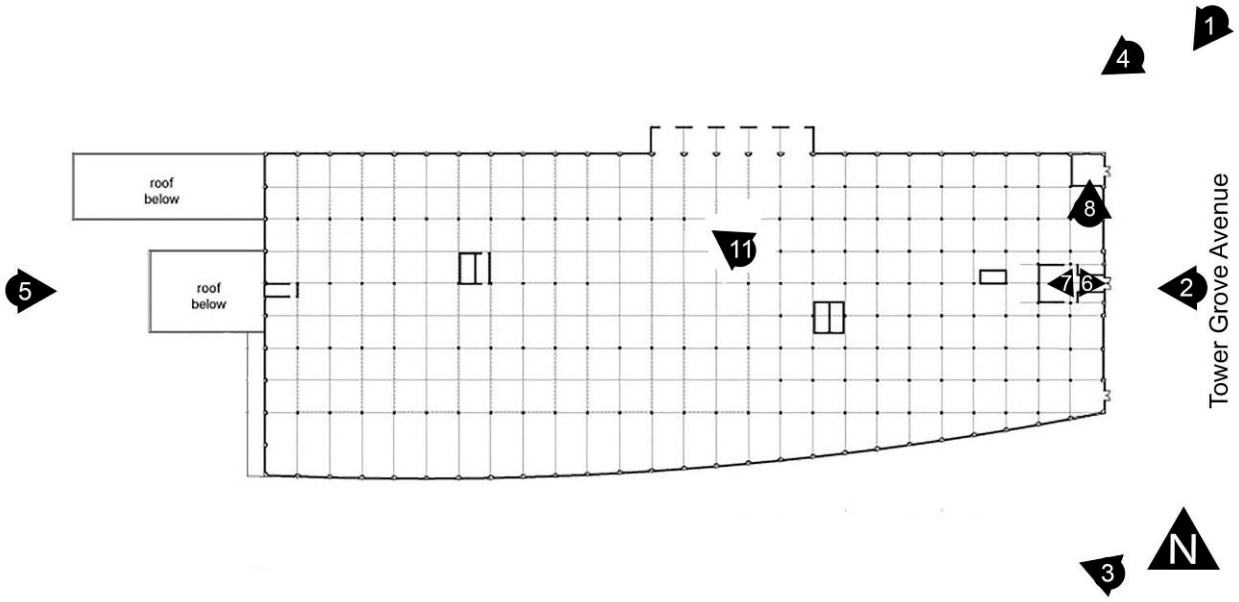


Figure 3: Woodward & Tiernan Printing Company Building, third floor plan. Source: Base plan provided by UIC/Urban Improvement Company.

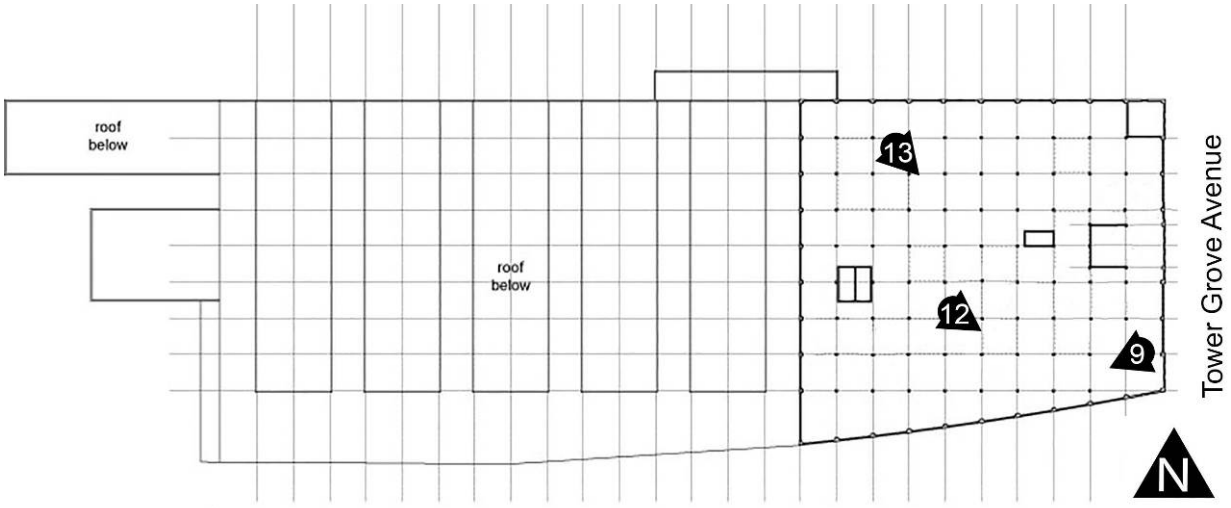


Figure 4: Woodward & Tiernan Printing Company Building dedication stone with company insignia at the bottom left and right corners. Source: Lindsey Derrington for Preservation Research Office, 2014.

Figure 5: Woodward & Tiernan Printing Company Building, sections. Source: Louis B. Woodward, "Modern Building for Efficient Production," *Manufacturing Industries*, April 1927.

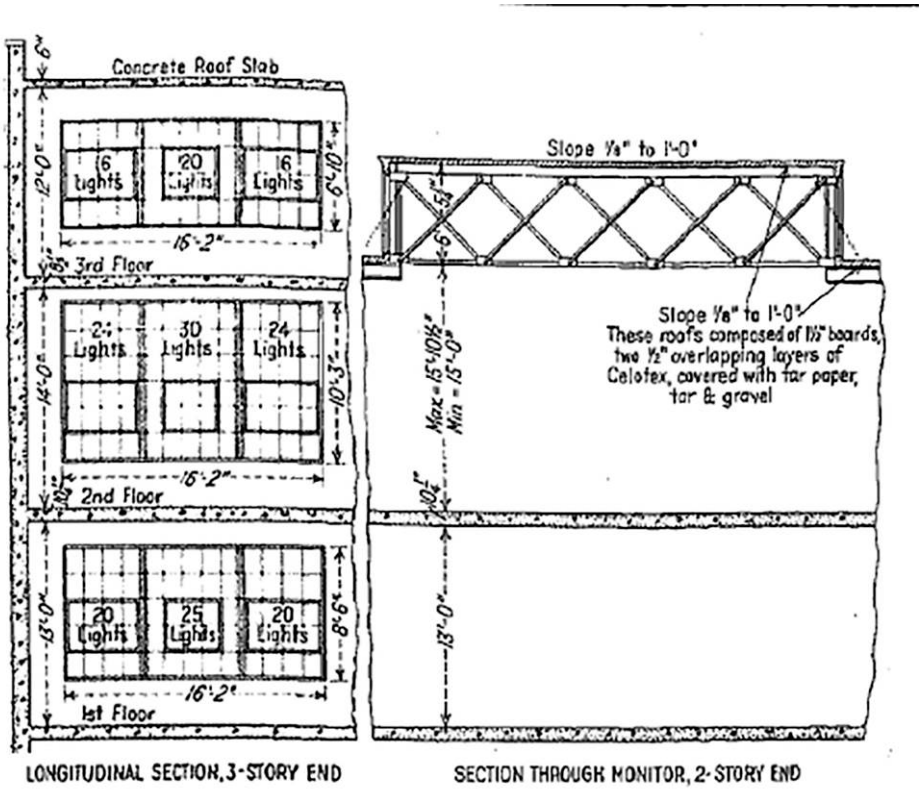


FIG. 4 SECTIONS SHOWING CONSTRUCTION DETAILS

Figure 6: Woodward & Tiernan Printing Company (1886-1898) at 309-325 North Third Street circa 1900. Source: Unknown.

Figures 7 and 8: Woodward & Tiernan Printing Company advertisements from 1915 and 1919. Sources: *St. Louis Post Dispatch*, 31 July 1915; *Gould's Red-Blue Book*, 1919.

Figure 9: Woodward & Tiernan Printing Company (1886-1898) at 309-325 North Third Street in 1909; its buildings comprise the southwest corner of Third and Locust Streets at upper right. Source: Sanborn Fire Insurance Map, 1909.

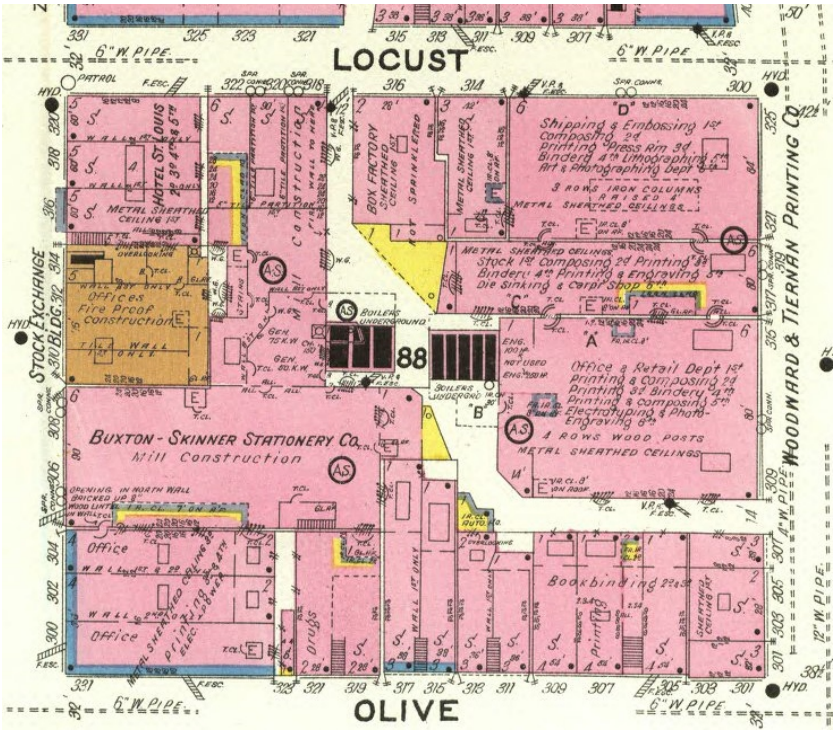


Figure 10: Future site of the Woodward & Tiernan Printing Company Building in 1909. Source: Sanborn Fire Insurance Map, 1909.

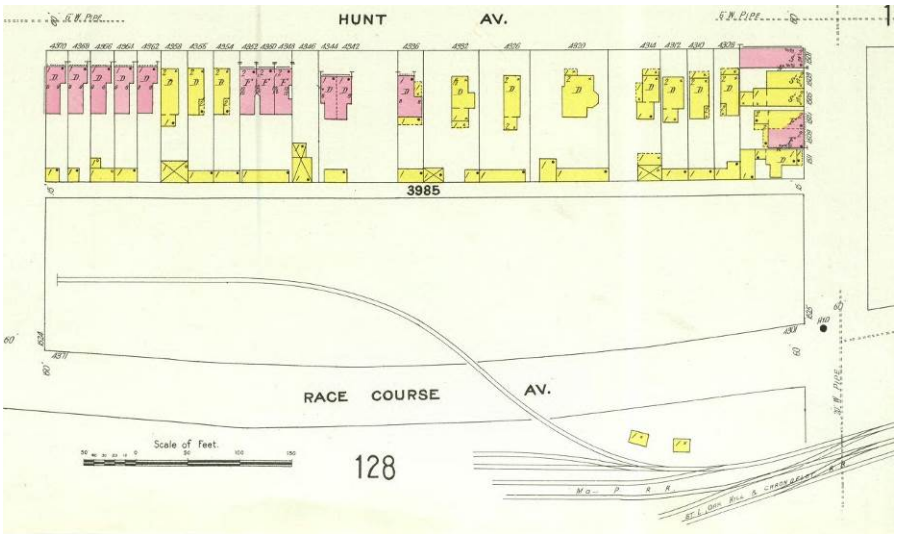
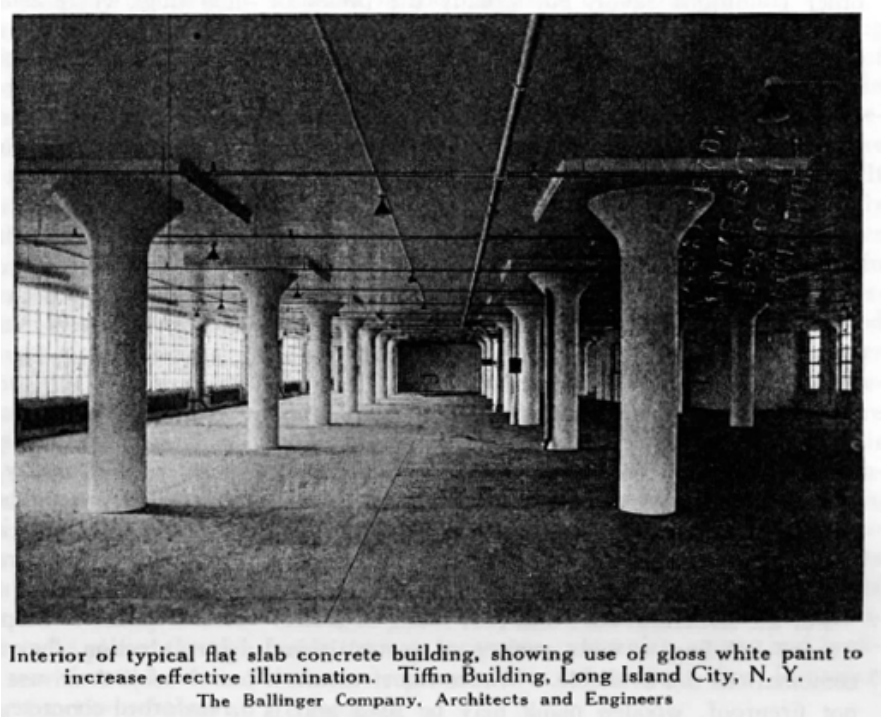


Figure 11: A typical daylight factory interior. Source: John R. Nichols, "Choice of Type of Construction," *Architectural Forum*, September 1923.



Interior of typical flat slab concrete building, showing use of gloss white paint to increase effective illumination. Tiffin Building, Long Island City, N. Y.
The Ballinger Company, Architects and Engineers

Figure 12: Ford Highland Park Plant, Albert and Julius Kahn, 1910. Source: Joe Babiasz, "Old Factories: Ford Highland Park Plant," AutoTraderClassics.com.

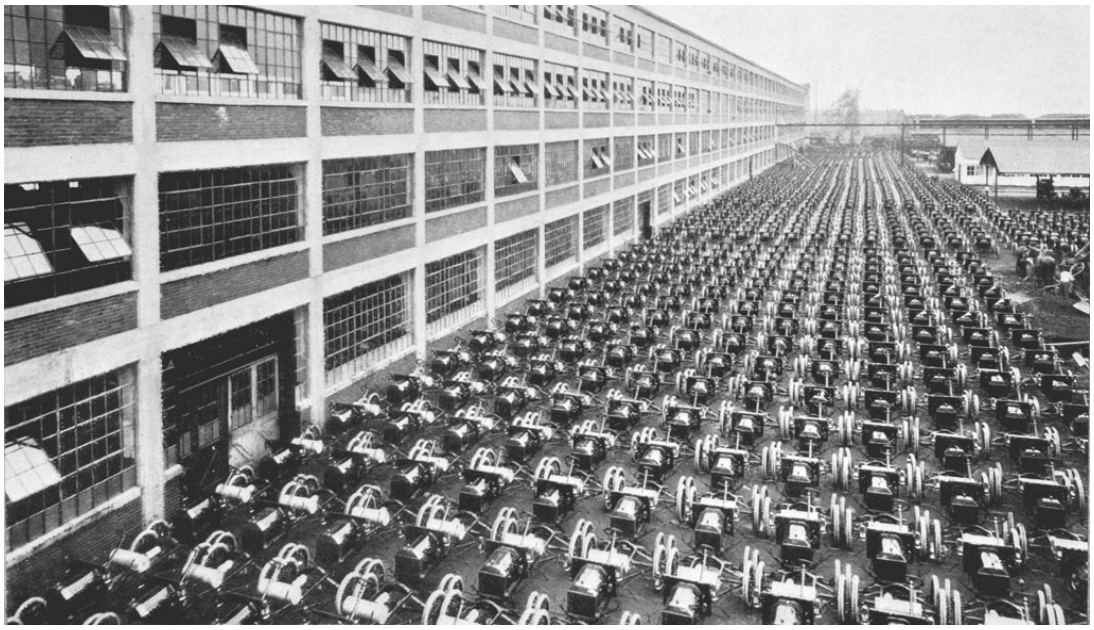


Figure 13: Portrait of industrial engineer Wallace Clark. Source: Walter P. Reuther Library, Wayne State University.

Figure 14: Woodward & Tiernan Printing Company Building, early rendering from 1921. The building is shown here larger than built, with eleven additional bays at its western end. Note the prominence given to the building's relationship to the Missouri Pacific Railroad to its immediate south. Source: Woodward Tiernan Printing Co. to Build New Plant on Tower Grove Avenue at Cost of $1,000,000," *St. Louis Post-Dispatch*, 26 June 1921.

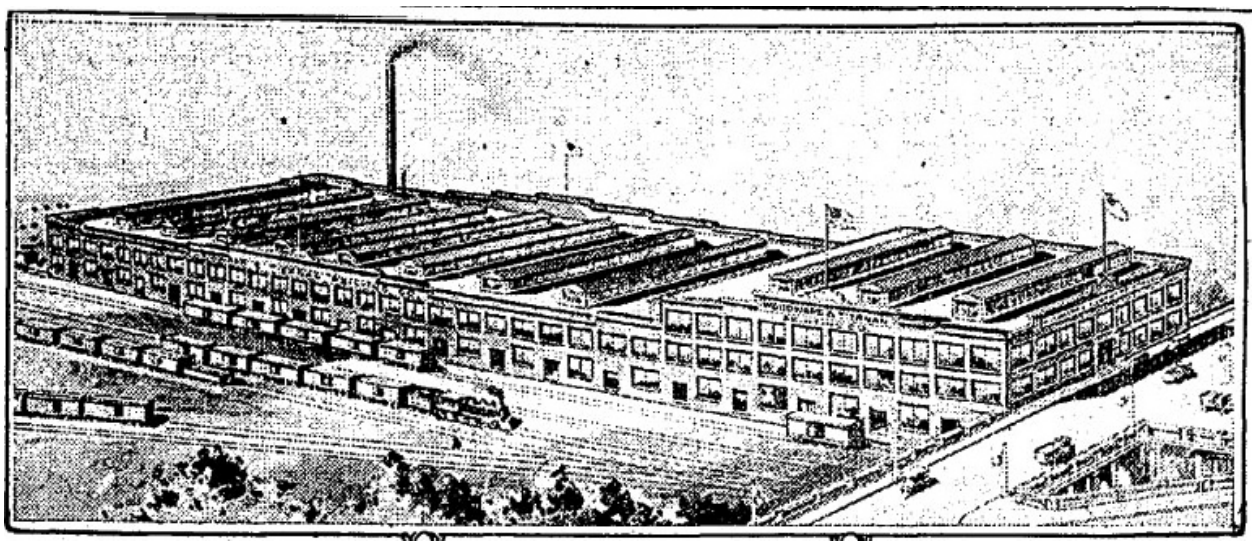


Figure 15: Woodward & Tiernan Printing Company Building, view from the southeast circa 1926. Source: Missouri History Museum Library and Collections..

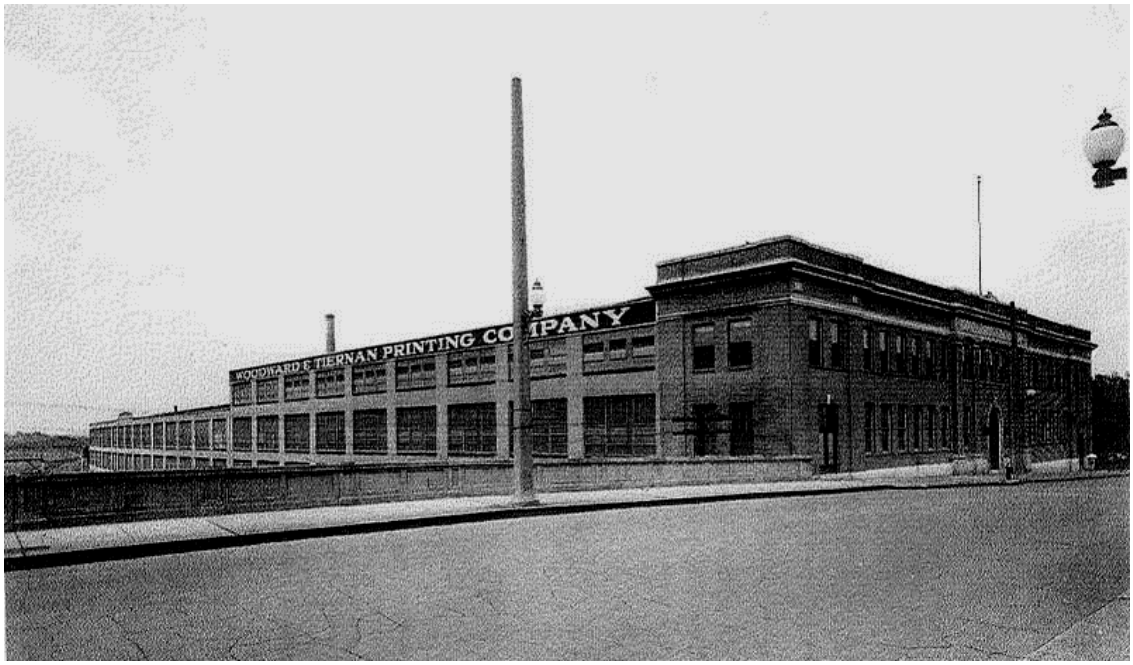


Figure 16: Woodward & Tiernan Printing Company Building, floor plans showing various departments. Source: Louis B. Woodward, "Modern Building for Efficient Production," *Manufacturing Industries*, April 1927.

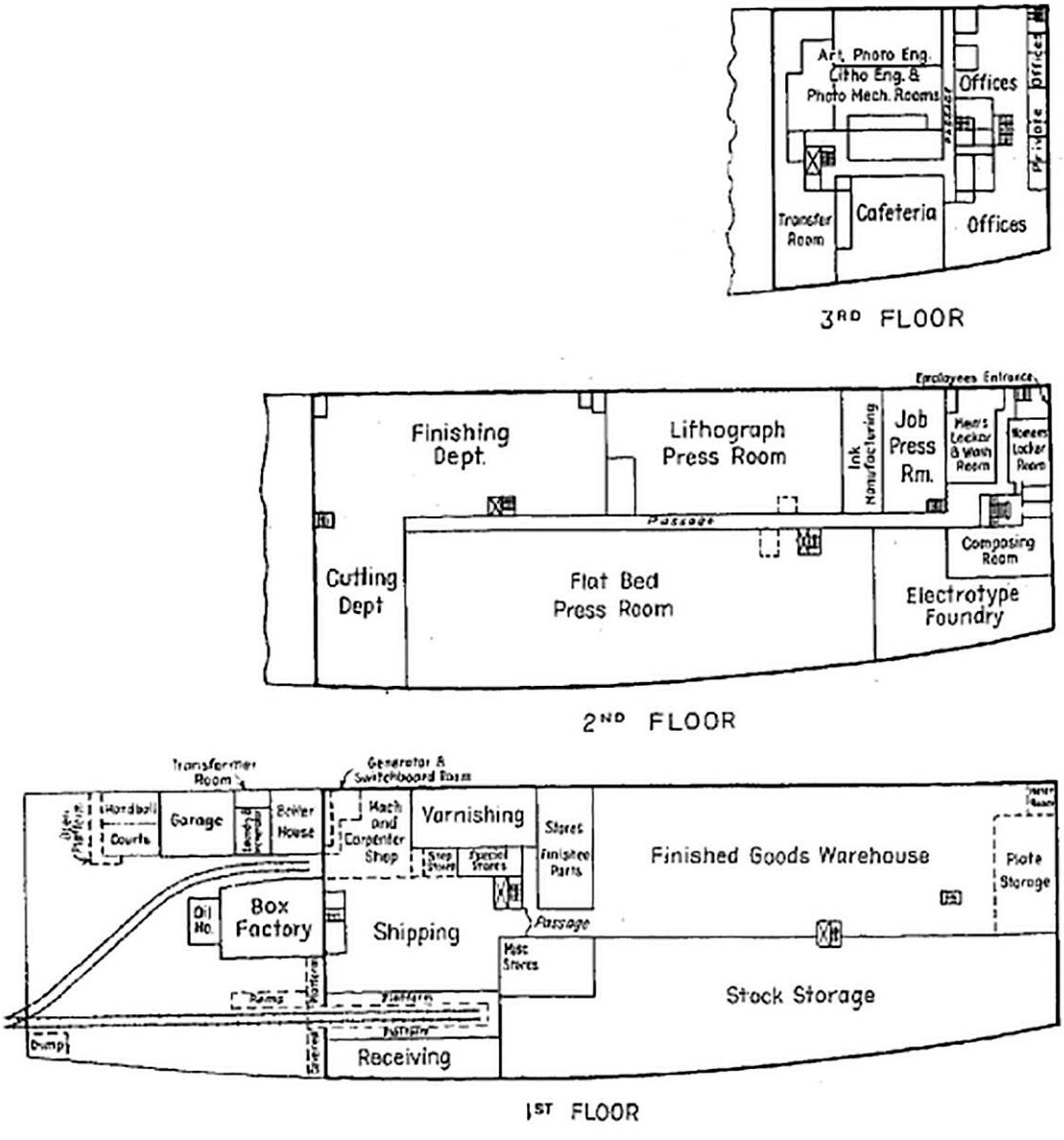


FIG. 3 GENERAL LAYOUT OF PLANT

Figure 17: Woodward & Tiernan Printing Company Building, third story offices, view from the northeast circa 1926. Source: Missouri History Museum Library and Collections.

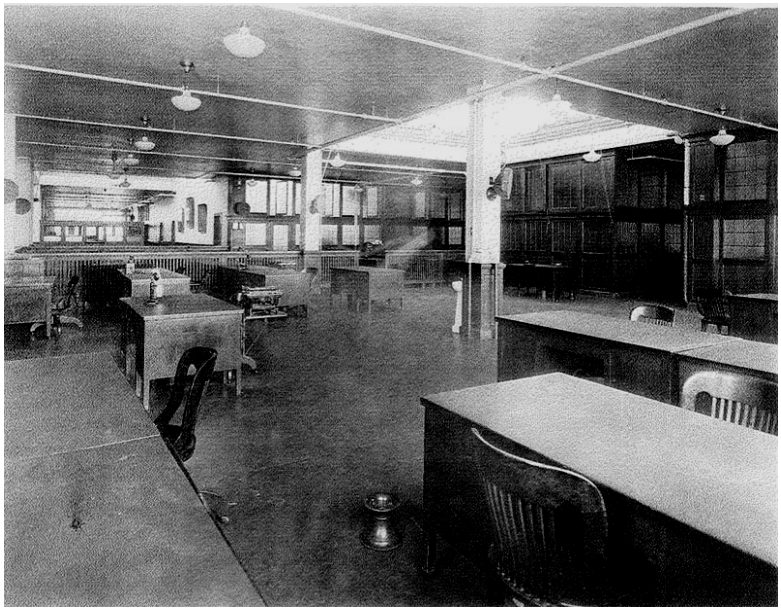


Figure 18: Woodward & Tiernan Printing Company Building, third story lithographic retouching department, view from the south circa 1926. Source: Missouri History Museum Library and Collections.

Figure 19: Woodward & Tiernan Printing Company Building, second story finishing department, view from the southeast circa 1926. Source: Missouri History Museum Library and Collections.

Figure 20: Woodward & Tiernan Printing Company Building, production space, circa 1926. Source: Missouri History Museum Library and Collections.

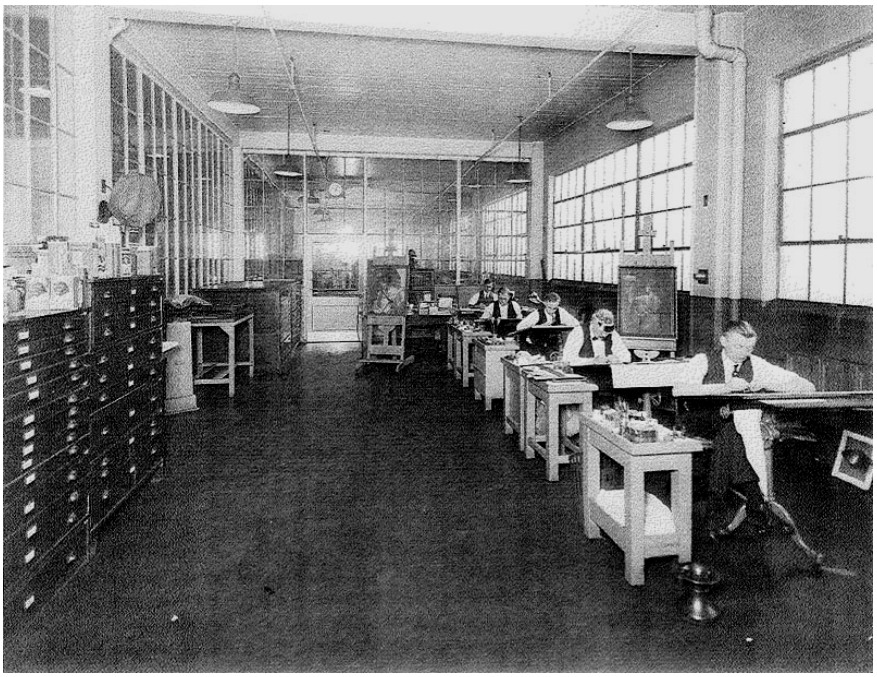


Figure 21: Northwest Industrial District, rendering. Source: "New Industrial Tract As It Will Appear with Completed Plants," *St. Louis Post-Dispatch*, 30 November 1919.

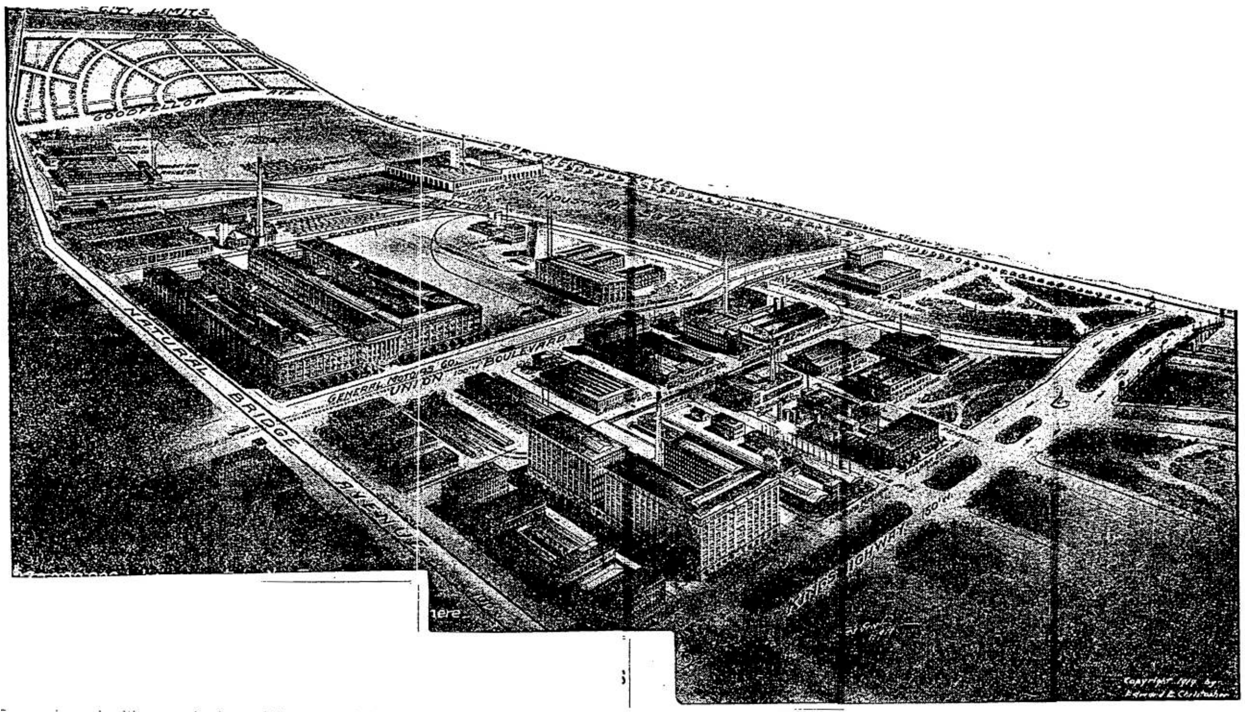


Figure 22: General Motors Plant at Union and Natural Bridge Roads, completed in 1920. Source: Unknown.

Figure 23: Rendering of Bridge & Beach Manufacturing Company Building after completion. Source: *Who's Who in North St. Louis*, 1925.

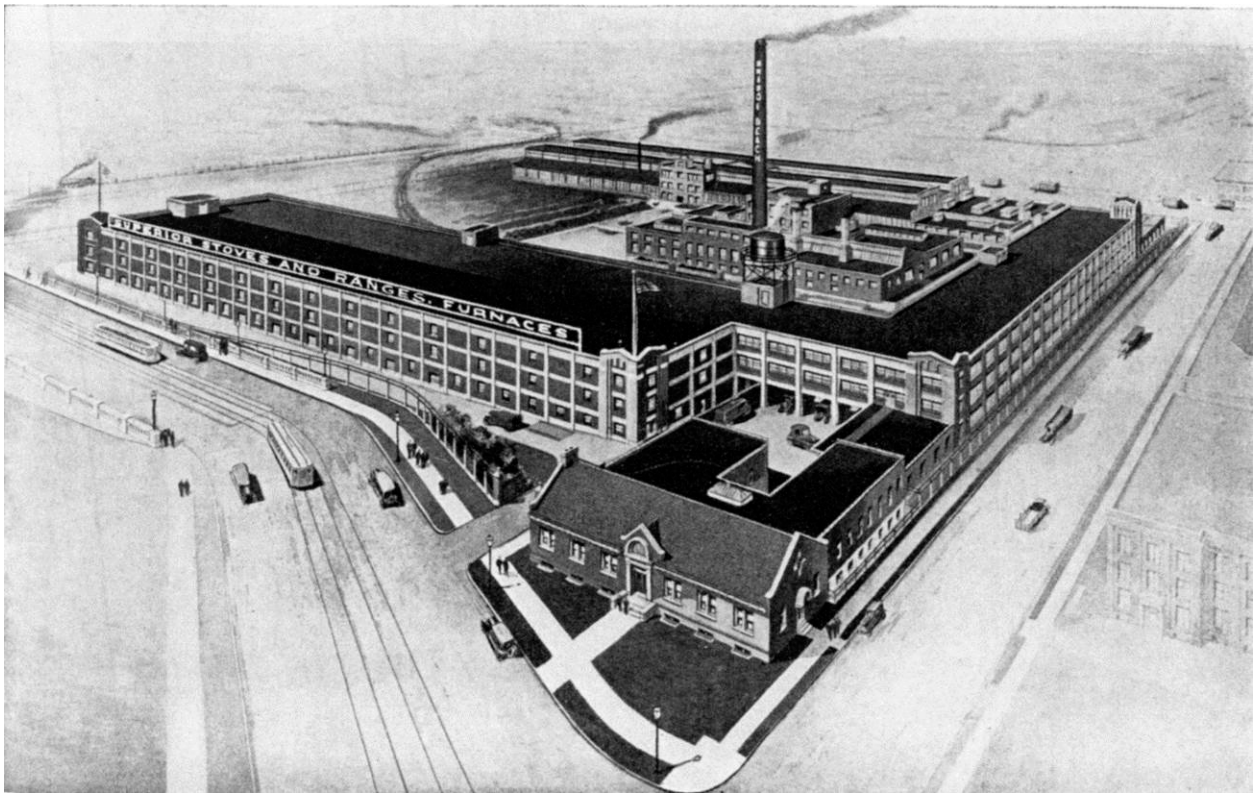
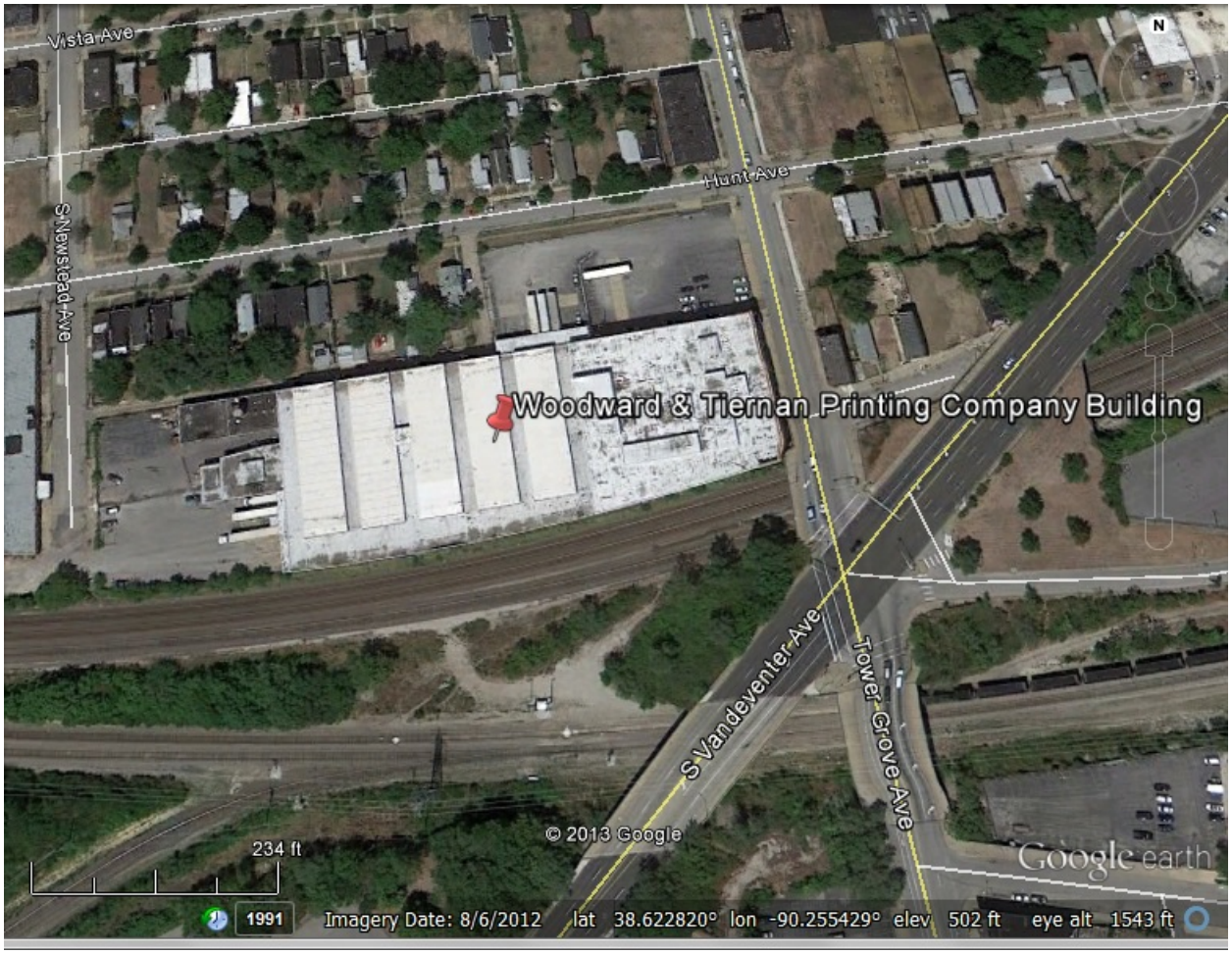


Figure 24: Garrett and Company Winery Building, 1920. Source: Lindsey Derrington for Preservation Research Office, 2014.

25. Google Earth Locator Map

Woodward and Tiernan Printing Company Building
1519 Tower Grove Avenue
St. Louis (Ind. City), MO
Latitude: 38.622820
Longitude: -90.255429




SUBURBAN INDUSTRIAL PACKAGING
EVERYTHING...FOR YOUR PACKAGING NEEDS
SUBURBAN INDUSTRIAL PACKAGING
1519


WOODWARD


SIP
SUBURBAN INDUST
EVERYTHING...FOR YOU


SUBURBAN INDUSTRIAL PACKAGING
EVERYTHING...FOR YOUR PACKAGING NEEDS
PHOTO ENFORCED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