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 of eligibility for individual properties or districts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name University of Illinois Observatory

other names/site number

2. Location

street & number 901 South Mathews Avenue ☐ not for publication

city, town Urbana ☐ vicinity

state Illinois code IL county Champaign code 019 zip code 61801

3. Classification

Ownership of Property	Category of Property
☐ private	☒ building(s)
☐ public-local	☐ district
☒ public-State	☐ site
☐ public-Federal	☐ structure
	☐ object

Number of Resources within Property

Contributing	Noncontributing	
		buildings
		sites
		structures
		objects
1		Total

Name of related multiple property listing:

Number of contributing resources previously listed in the National Register 0

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ☐ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of certifying official — Date

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of commenting or other official — Date

State or Federal agency and bureau

5. National Park Service Certification

I, hereby, certify that this property is:

☐ entered in the National Register.
☐ See continuation sheet.

☐ determined eligible for the National Register. ☐ See continuation sheet.

☐ determined not eligible for the National Register.

☐ removed from the National Register.

☐ other, (explain:) _____

Signature of the Keeper — Date of Action

6. Function or Use

Historic Functions (enter categories from instructions)

Education
Research Facility

Current Functions (enter categories from instructions)

Education
Research Facility

7. Description

Architectural Classification (enter categories from instructions)

No style

Materials (enter categories from instructions)

foundation concrete
walls brick
roof copper
other

Describe present and historic physical appearance.

The history of the University of Illinois Observatory dates to 1895 when the Illinois state legislature voted the sum of fifteen thousand dollars for the construction of a new observatory on the grassy knoll between Matthews Avenue and Burrill Avenue in Urbana, Illinois. The site is just north of the 1876 Morrow Plots, the nation's oldest experimental field, and a National Historic Landmark. The structure was built to replace a smaller observatory located farther north and west, closer to the heart of campus.[1]

Contracts were let in the early spring of 1896 and ground was broken in April of that year. The architect was Charles A. Gunn; Bevis and Company of Urbana was the general contractor. Ira Baker, a professor of civil engineering, served as the supervisor of construction while George Meyers, first director of the observatory, was in Europe.

The building was constructed on a one-story T plan, facing north. It is of buff-colored Roman brick (manufactured in Indiana), with limestone lintels and sills. The bar of the T is 75 feet long east to west and 25 feet deep. The stem of the T is located to the south, centered along the the east-west axis and is 26 feet deep by 25 feet wide. The octagonal observation tower rises to a height of 25 feet at the intersection of the T and then becomes round, continuing to a total height of 35 feet. At the floor level of the second equatorial room, a balustrade circles around the exterior of the tower on the north, east, and west.

The tower is capped by a great hand-tooled, circular, limestone plate which carries the dome track. The internal diameter of the dome is 24.5 feet and at its apex is 24 feet above the equatorial room floor. The operable slit has a clear opening of 44 inches and is opened and closed by hand in a matter of seconds. The dome tower and equatorial room are original with the exception of a motor drive which replaced the rope and sheave method of rotating the dome on its metal track.

☐ See continuation sheet

8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:

[X] nationally [ ] statewide [ ] locally

Applicable National Register Criteria [X] A [ ] B [ ] C [ ] D NHL Criteria 1

Criteria Considerations (Exceptions) [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F [ ] G

Areas of Significance (enter categories from instructions)
National Register
Education, Engineering, Science

National Historic Landmark:
Science, Subtheme: Physical Science,
Facet: Astronomy

Period of Significance
1907-1922

Significant Dates

Cultural Affiliation

Significant Person
Joel Stebbins

Architect/Builder
Charles Gunn

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

Summary

The University of Illinois Observatory is significant because of its association with the development of the selenium photoelectric cell which revolutionized the science of astronomical photoelectric photometry--the measurement of celestial magnitudes. The research was conducted on the 12-inch Warner and Swasey refractor telescope located in the second story equatorial room of the 1896 brick observatory. The development of the selenium cell was done by Joel Stebbins (1878-1966), in the years from 1907 to 1922, while he was the director of the University of Illinois Observatory. As a result of Stebbins' work at Illinois with the photoelectric cell, photoelectric photometry became the standard technique in determining stellar magnitudes. The determination of stellar magnitudes is one of the most fundamental measurements in the field of astronomy.

History

Prior to 1907 all measurements of the magnitude of stars were obtained by visual comparison of relative brightness--a slow, cumbersome and inexact process at best. Later, photographic methods used starlight to make a representation on a photographic plate. Neither method was adequate for quantitative measurements, as they provided only the most rudimentary comparisons. Because of these drawbacks, the use of electricity for empirically gathering astronomical data revolutionized the field of astronomy. The man responsible for this development is Joel Stebbins who did his pioneering research in the field of astronomical photometry during the period from 1907 to 1922 while he was director at the Illinois Observatory.[2]

Stebbins arrived as director of the observatory after completing his Ph.D. at the University of California, Berkeley, in 1903. For the next few years he conducted research into the relative brightness of binary stars, using visual and photographic techniques. Stebbins was assisted in his efforts by his wife, May, who frequently acted as recorder. In a speech

[ ] See continuation sheet

9. Major Bibliographical References

See Continuation Sheet

☐ See continuation sheet

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 # _____

Primary location of additional data:
- ☐ State historic preservation office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☐ Other

Specify repository: _____

10. Geographical Data

Acreage of property .92

UTM References

	Zone	Easting	Northing
A	16	395490	4439920
B			
C			
D			

☐ See continuation sheet

Verbal Boundary Description

The boundary follows to the outside of the building.

☐ See continuation sheet

Boundary Justification

The boundary includes only the observatory building since it alone encompasses the site and facilities contributing to the national significance of the resource.

☐ See continuation sheet

11. Form Prepared By

name/title Harry Butowsky
organization National Park Service date May 1, 1989
street & number 1100 L Street, NW telephone (202) 343-8155
city or town Washington state DC zip code 20013

★U.S.GPO:1988-0-223-918

At the center of the equatorial room is located the 1896, 12-inch refractor telescope. The telescope was made by the firm of Warner and Swasey of Cleveland, Ohio. For maximum stability it is mounted on a brick pier which extends down to bedrock and is not attached to the building in any way. The telescope was obtained at a cost of $4,500. Also original is the observer's chair; it was included in the original contract for the building and equipment and was built by Bevis and Company at a cost of $25.

The octagonal entrance hall below the equatorial room is centered around the massive brick pier. The interiors of the load-bearing brick walls are painted white. Other non-bearing walls are of four-inch tongue and groove bead board. This room continues to be used for its original purpose--storage of portable equipment, books, etc. The original stairs, newel posts, balustrades and wood floors are extant.

Originally, there were two transit rooms in each of the east and west wings. Each room had a permanently mounted transit telescope on a brick pier. The windows drop into pockets in the basement wall to allow for unobstructed observing from these locations. The transit rooms have since been converted to office space, as has the southern classroom wing. The brick piers are still visible in the basement beneath the transit rooms.

The exterior is ornamented by a brick cornice, stone sills and lintels, stone water course, ornamental gutters, and original copper downspouts. Most windows are original wood, double hung. The central front entrance door with transom and concrete stoop is original. While the original front balustrade has been replaced, the western stoop and ornamental iron balustrade is intact.

Although the transit rooms are no longer used for their original purpose, the primary alteration to the building has been two single story additions, one located in the southwest corner and the other being the large wing on the east.

The first addition was of light cream-colored brick and was nestled into the southwest corner of the building to provide additional classroom and office space in 1956. The addition replicates the original structure in scale, rhythm, detail, and materials in essentially every way except color. Care was taken to match the cornice lines, gutters, stone lintels, sills, and watercourse. The brick is of the same size, and its configuration attempts to match the narrow mortar joints of the earlier building. Likewise, the large east wing, constructed in 1966, is of the same light cream-colored brick and replicates the aforementioned detail. The scale of this later addition is much larger than either of the two previous components. This addition provided more office space, a new dark room and a radio telescope laboratory.

The basement of the observatory and the dome housing the 12-inch refractor are still used by the astronomy department of the University of Illinois. The remaining rooms are now used to house various administrative offices of the University.

before the American Astronomical Society in 1957 Stebbins recalled the events which led up to the electric cells:

> She (May Stebbins) wrote down the numbers as the observer called them, but after some nights of recording a hundred readings just to get one magnitude, she said it was pretty slow business. I responded that someday we would do all this by electricity. That was a fatal remark. Thereafter she would often prod me with the question, "When are you going to change to electricity?" It happened that within two or three months, the Department of Physics gave an open house, and one of the exhibits was in charge of a young instructor, F.C. Brown. He showed how, when he turned on a lamp to illuminate a selenium cell, a bell would ring, when the lamp was off, the bell would stop. Here was the idea: Why not turn on a star to a cell on a telescope and measure a current?[3]

Stebbins soon made friends with Brown and in due time they had a selenium cell positioned on the 12-inch refractor telescope. In the fall of 1907 after some trial and error, the two achieved a light curve for the moon.

This successful use of photoelectric technology was a quantum leap in the field of astronomy. Stebbins later discovered that cooling the cell to zero degrees Fahrenheit doubled the sensitivity and diminished the irregularities in the circuit tenfold. Likewise, by reducing the size of the cell, irregularities were again reduced. Brown and Stebbins went on to detect stellar intensity and activity that were previously unrecorded.

Stebbins continued to do pioneering work with the selenium cell until 1913 when he became associated with Jacob Kunz. Kunz was a University of Illinois physics professor who had been doing experimentation on an improved photoelectric cell which was based on the alakali metals. This cell was the predecessor of the modern-day "electric eye." Its applications in science and industry have been widespread, including early uses in talking motion pictures, television, and aviation. The improved technology of the photoelectric cells over the selenium type had the advantage of greater sensitivity and faster operation. Stebbins explained it in this way:

> Only recently we managed to produce a cell which is twice as sensitive as anything we had before, and this amounts to the same thing as though some good fairy had suddenly doubled the light gathering power of our telescope.[4]

The results were precise light curves of eclipsing double stars, which permitted the determination of the diameters and masses of stars with a higher accuracy than previously attained, and the discovery of previously undetected eclipses in several stars such as Beta Aurigae and Delta Orionis.[5]

Through his work with Stebbins, Kunz continued to refine his cells. This owed largely to the fact that starlight is one of the faintest of all light sources. Kunz's cells were the most sought after in the country, being more that a million times more sensitive than cells commercially available.[6] This dedication earned him recognition as the "father of the photoelectric cell."[7] Because of his close collaboration with Kunz, Stebbins usually got the best cells for himself, leaving those of second best quality to other observatories.

Stebbins left the Univeristy of Illinois in 1922 to take over the directorship of the Washburn Observatory at the University of Wisconsin. Stebbins replaced his mentor, George C. Comstock, with whom he had studied as a graduate student some 25 years before. Stebbins went on to apply the techniques he had developed while at Illinois. Constant experimentation led to consistently improved technology for the study of astronomy.

The early research done at the University of Illinois Astronomical Observatory was vitally important in the field of astronomy. It transformed the measurement of astronomical radiation from imprecise visual and photographic methods, to a linear quantifiable science. Without this research, modern photoelectric astronomy would not have been possible.

Footnotes

1. Most of the material in this form was adapted from the following source:

   Shauna J. Francissen, "National Register of Historic Places Inventory-Nomination Form-University of Illinois Astronomical Observatory" (Urbana, Illinois: Preservation and Conservation Association, 1986).

2. Otto Struve and Velta Zebergs, Astronomy of the Twentieth Century (New York: Macmillan, 1962), p. 80.

3. Joel Stebbins, "Early Photometry at Illinois," Publications of the Astronomical Society of the Pacific, December 1957, p. 506.

4. Joel Stebbins, "The Electrical Photometry of Stars," Science June 14, 1915, p. 811.

5. A.E. Whitford, "American Pioneer in Photoelectric Astronomy," Sky and Telescope May 1966, p. 266.

6. Joel Stebbins, "Jacob Kunz, 1874-1938," Popular Astronomy March 1939, p. 15.

7. "Jacob Kunz, on U. of I. Faculty 29 Years, Dies," The Evening Courier (Urbana, IL.), July 19, 1938, n.p.

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Stebbins, Joel, and F.C. Brown. "Determination of the Moon's Light with a Selenium Photometer," Astronomical Journal December 1907.

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_____. "The Brightness of Halley's Comet as Measured With a Selenium Photometer," Astrophysical Journal, July 1910.

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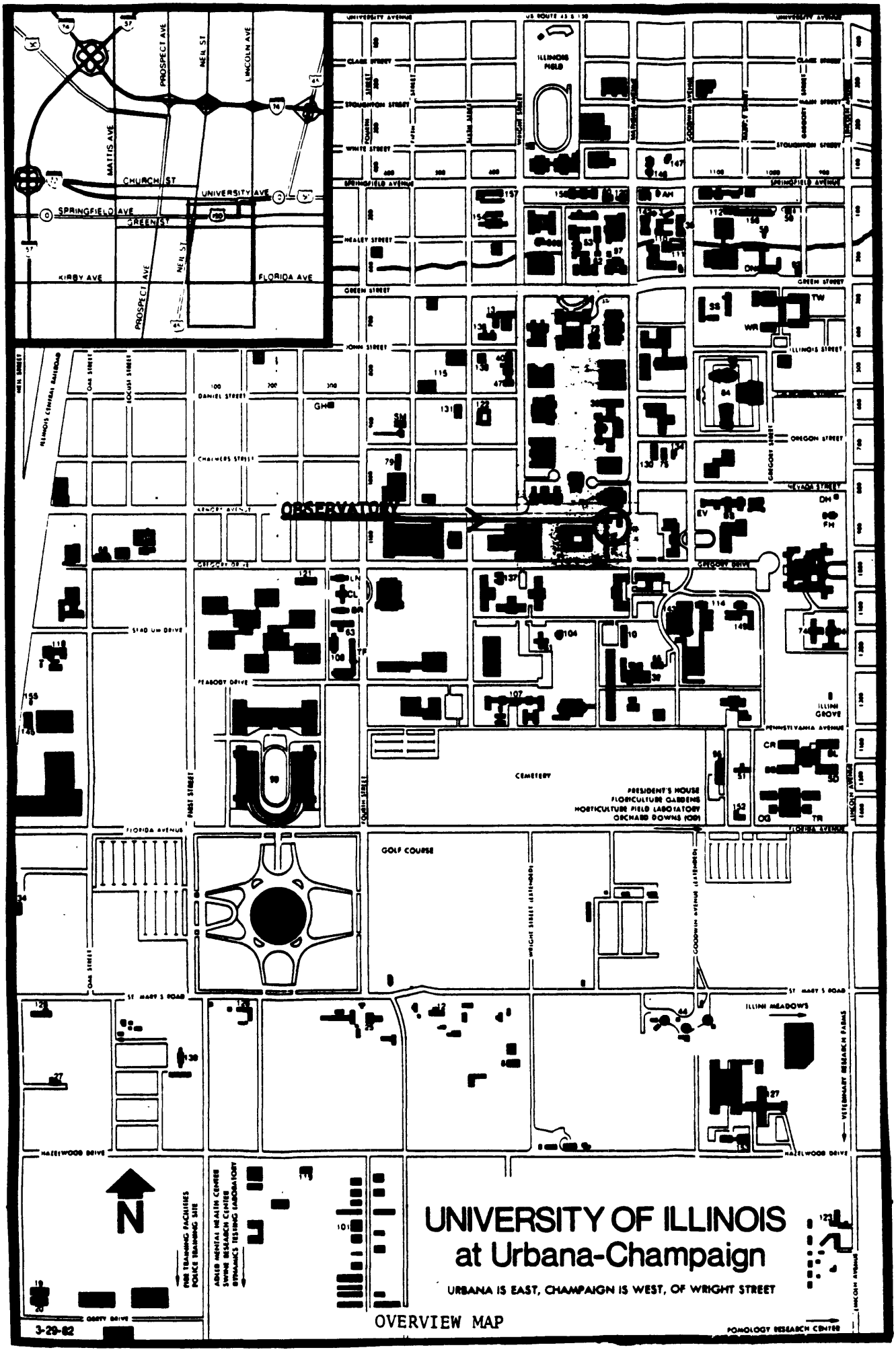
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FLORICULTURE GARDENS
HORTICULTURE FIELD LABORATORY
ORCHARD DOWNS (OD)
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ILLINI MEADOWS
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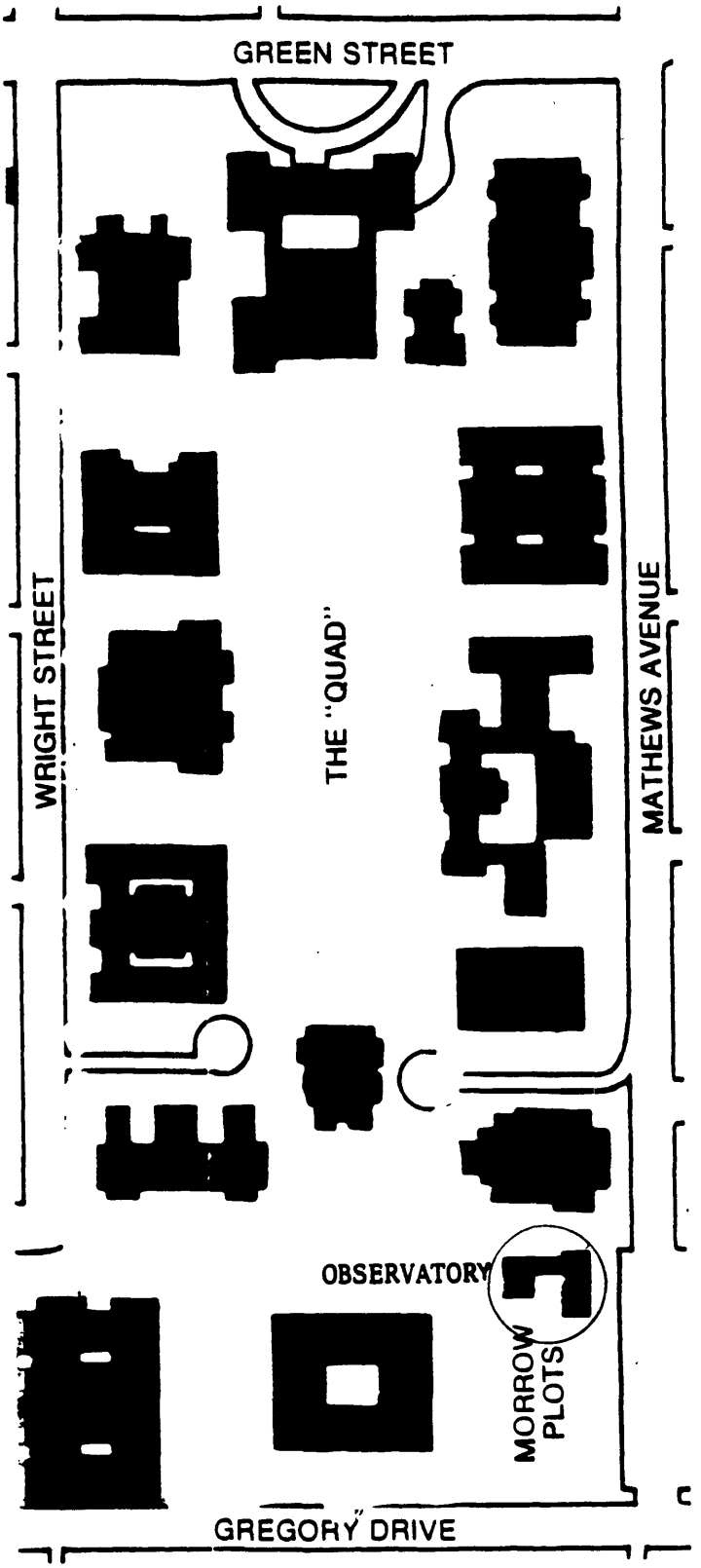
UNIVERSITY OF ILLINOIS
at Urbana-Champaign
URBANA IS EAST, CHAMPAIGN IS WEST, OF WRIGHT STREET
OVERVIEW MAP
3-29-82



PROPERTY IN RELATIONSHIP
TO THE UNIVERSITY QUADRANGLE