

Some Thoughts about Your Future
as a
Michigan Engineering Student



The Engineering Profession



What is engineering?

Engineering is the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, natural and man-made materials and the forces of nature for the benefit of humankind.

Engineers are persons who, by reason of their special knowledge and use of mathematical, physical, and engineering sciences and the principles and methods of engineering analysis and design, acquired by education and experience, are qualified to practice engineering.



Engineering

“Engineering is the integration of all knowledge to some purpose.”

-- Fumio Kodama



What are engineers?

In a more general sense, engineers are:

- ... problem solvers
- ... builders of devices, structures, and systems
- ... creators of ideas and concepts

They apply their knowledge of science and technology to meet the needs of society, to solve its problems, and to pave the way for its future progress.

The Fields of Engineering



»»» Civil

»»» Mechanical

»»» Chemical

»»» Electrical

● Aerospace

● Agricultural

● Architectural

● Atmospheric

● Automotive

● Bioengineering

● Computer

● Environmental

● Industrial

● Manufacturing

● Materials

● Metallurgical

● Marine

● Mining

● Nuclear

● Petroleum

● Sanitary

● Systems

● Transportation

● Water Resources



The Roles of Engineers

»»» Research

»»» Development

»»» Design

»»» Manufacturing

»»» Production

»»» Construction

»»» Project

»»» Operations (Plant)

»»» Testing

»»» Sales and Marketing

»»» Management

»»» Consulting

»»» Academe



Engineering is a learned profession

- »»» It requires certain skills, acquired through formal education and experience.
- »»» It is governed by a Code of Ethics.
- »»» Engineers must pass licensing examinations to call themselves “Professional Engineers”
- »»» Professional organizations:
 - »»» National Academy of Engineering
 - »»» National Society of Professional Engineers



How does one become a “Professional Engineer”?

Fundamentals of Engineering (FE) exam

Covers basic material from undergraduate studies

Can be taken senior year

Engineer-in-Training (EIT)

Principles and Practice of Engineering (PE) exam

After four years of professional practice

Professional Engineer



Evolution of Engineering Education

- »»» Guilds, apprenticeships
- »»» Colleges of Engineering
 - »»» Self-contained, practice-focused
- »»» Evolution of science-based curriculum
 - »»» WWII, Evil Empire, “research” university
- »»» Tomorrow?

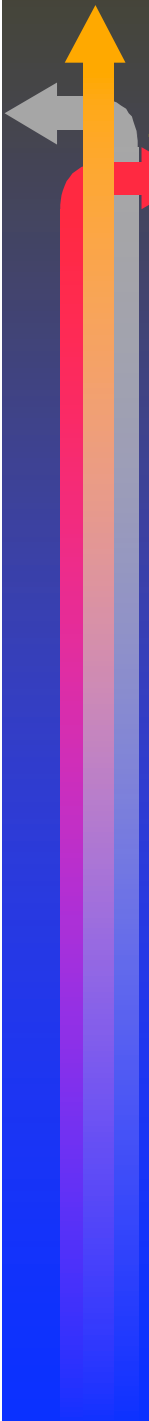


Evolution of Engineering Education in the USA

- 1749** “Mechaniks ... to be informed of the Principles of that Art by which weak Men perform such Wonders, Labour is saved, Manufactures expedited ...” “Balance useful knowledge with general knowledge to serve mankind.” Benjamin Franklin on curriculum for educating youth
- 1776** “Wealth of Nations” -- Making and Moving Things -- Adam Smith
- 1794** West Point Engineering School, New York -- George Washington
- 1817** First civil engineering curriculum at West Point modeled after Ecole Polytechnic
- 1821** First Civilian engineering course in U. S. at Norwich Academy, Vermont
- 1835** First engineering degrees, Rensselaer Polytechnic Institute. Based on
18th century focus on engineering as a blend of the arts, with creation of artifacts and systems to serve society. Laid foundation for liberality in engineering education that has blossomed in latter half of 20th century.

(continued)

Evolution of Engineering Education in the USA



| | |
|---------|--|
| 1840-60 | Fewer than 10 engineering schools established in U. S. |
| 1862 | Land Grant Act fostered school growth |
| 1860-80 | Civil, Agricultural, Mechanical |
| 1884 | Electrical |
| 1892 | Chemical |
| 1940s | Aero, Communications, Electronics, Industrial |
| 1950s | Astro, Materials, Systems |
| 1960s | Bioengineering |
| 1980s | Cognitive |
| 1990s | Intelligent Systems, Holism |

The UM College of Engineering





The UM College of Engineering

Founded in 1853 (one of the first in America)

Firsts:

Metallurgical engineering (1854)

Naval architecture and marine engineering (1881)

Electrical engineering (1890)

Chemical engineering (1898)

Aeronautical engineering (1914)

Nuclear engineering (1953)

Computer engineering (1965)



UM Engineering (continued)

Today's characteristics:

4,790 undergraduate students

2,275 graduate students

305 teaching faculty

82 research faculty

1,177 B.S. graduates a year

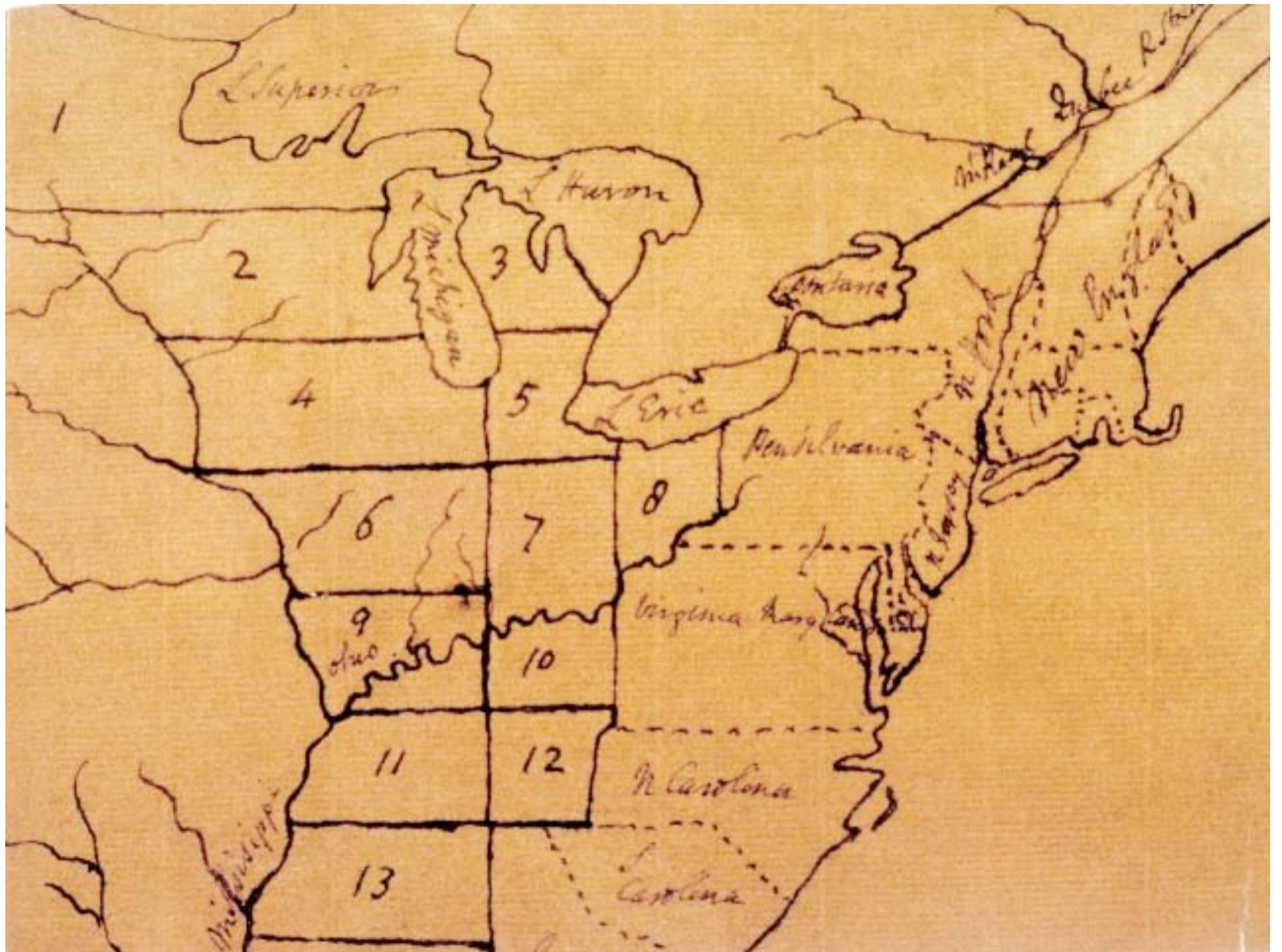
581 M.S. graduates a year

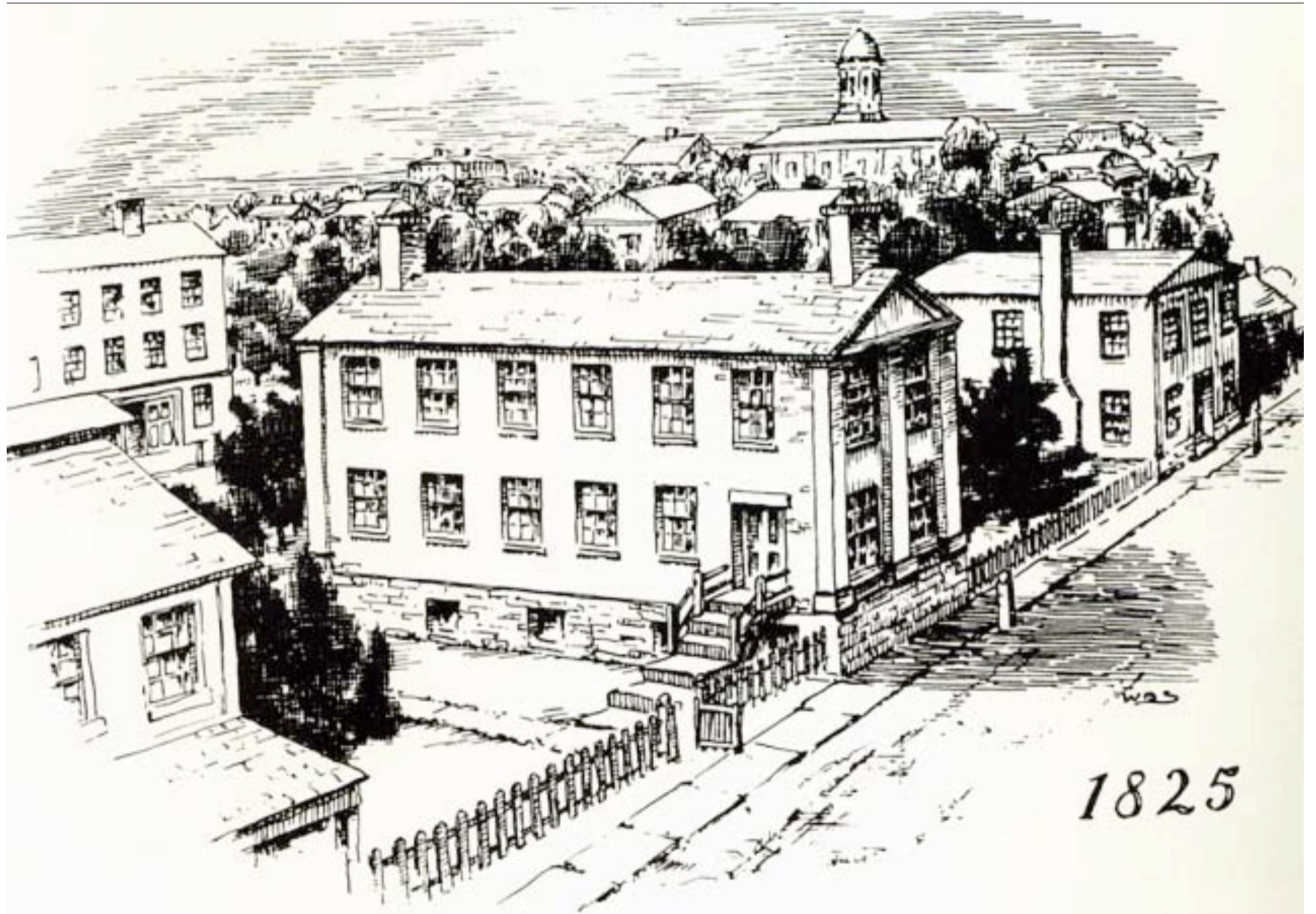
184 Ph.D. graduates a year

Note: Essentially all programs ranked in top ten.



In the Beginning





1825



- 1. Court House
- 2. City Hall
- 3. Post Office
- 4. U. S. A. Office
- 5. U. S. A. Office
- 6. U. S. A. Office

- 7. U. S. A. Office
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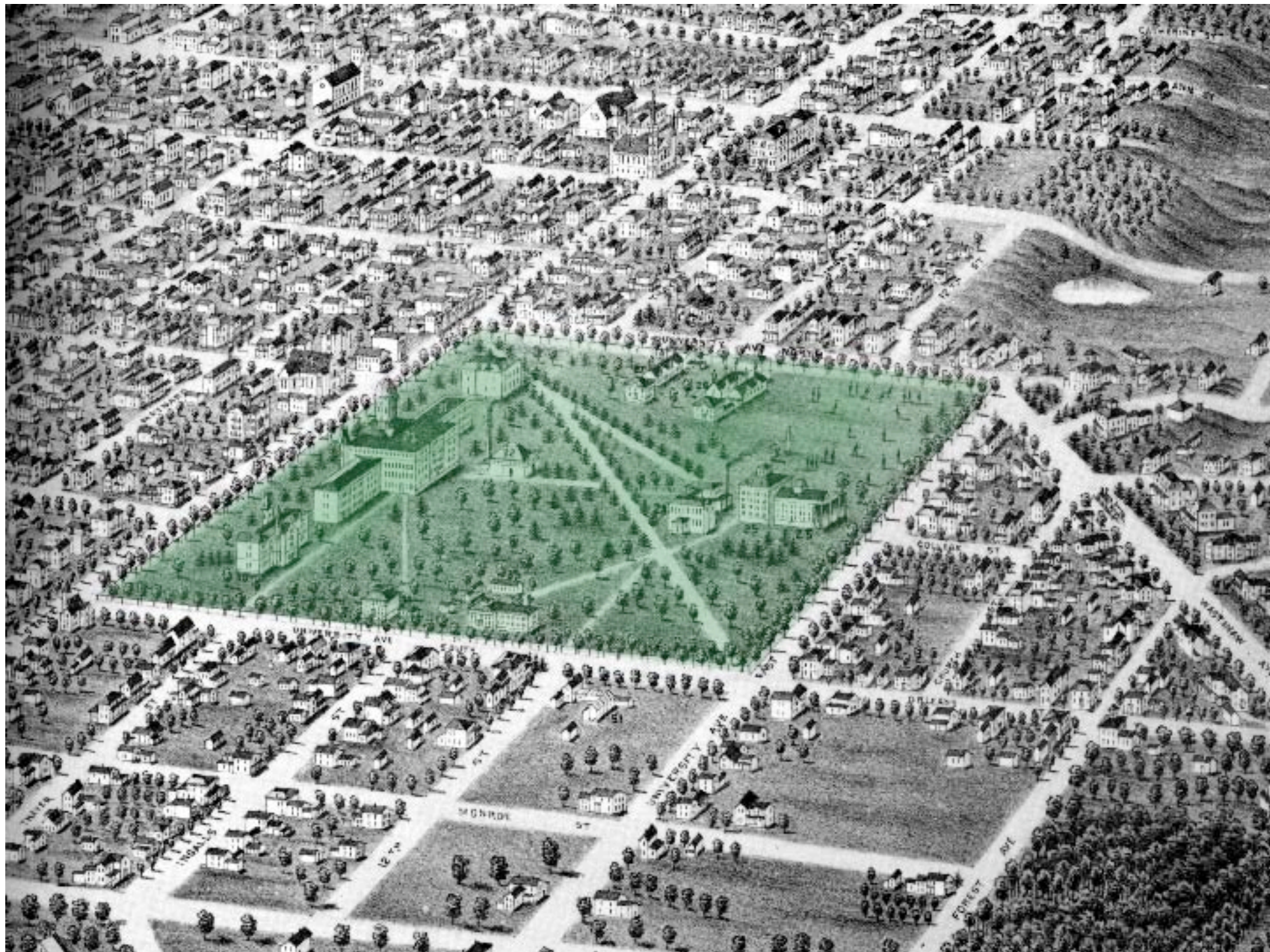
ANN ARBOR,

INCORPORATED IN 1827

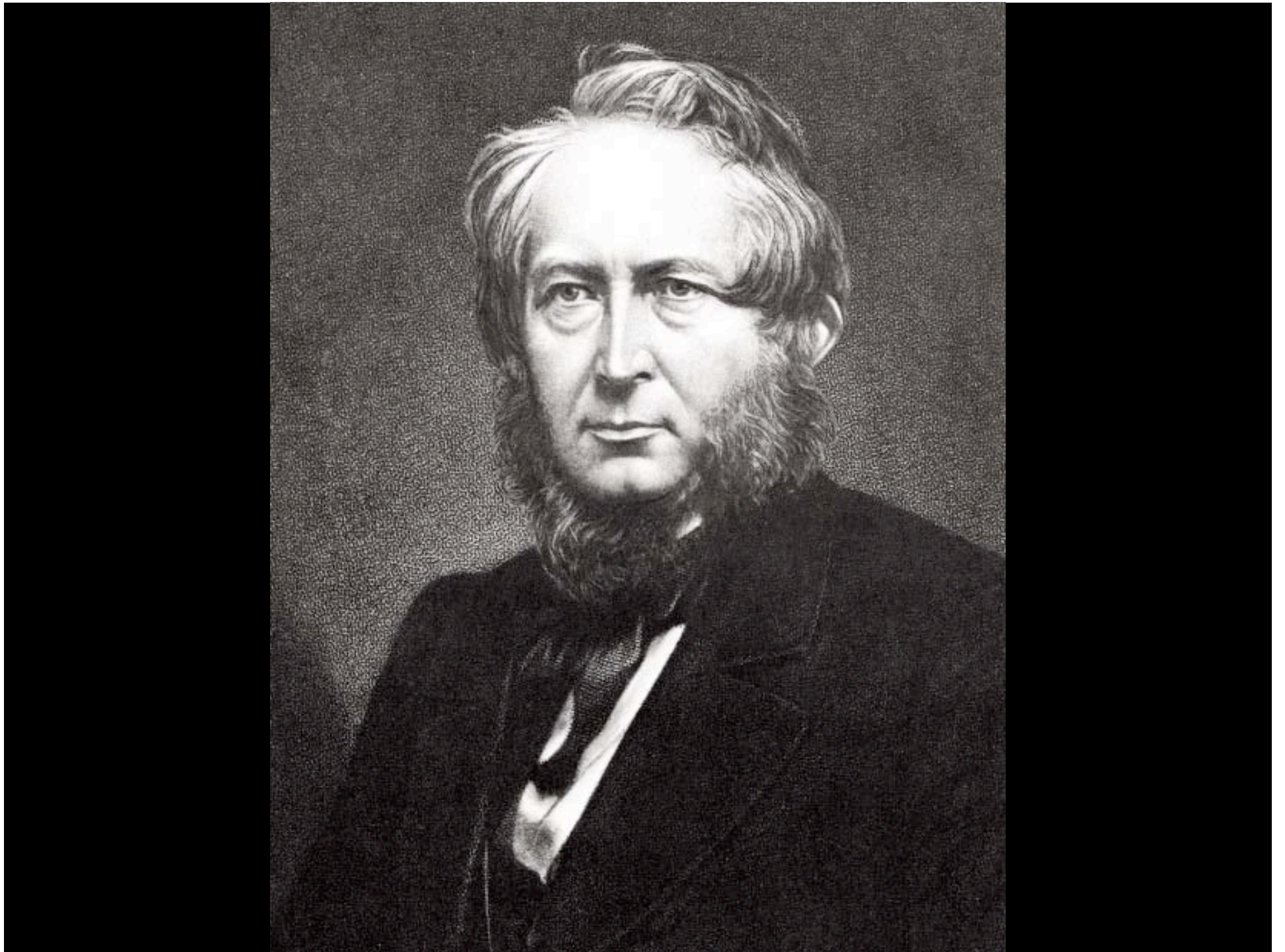
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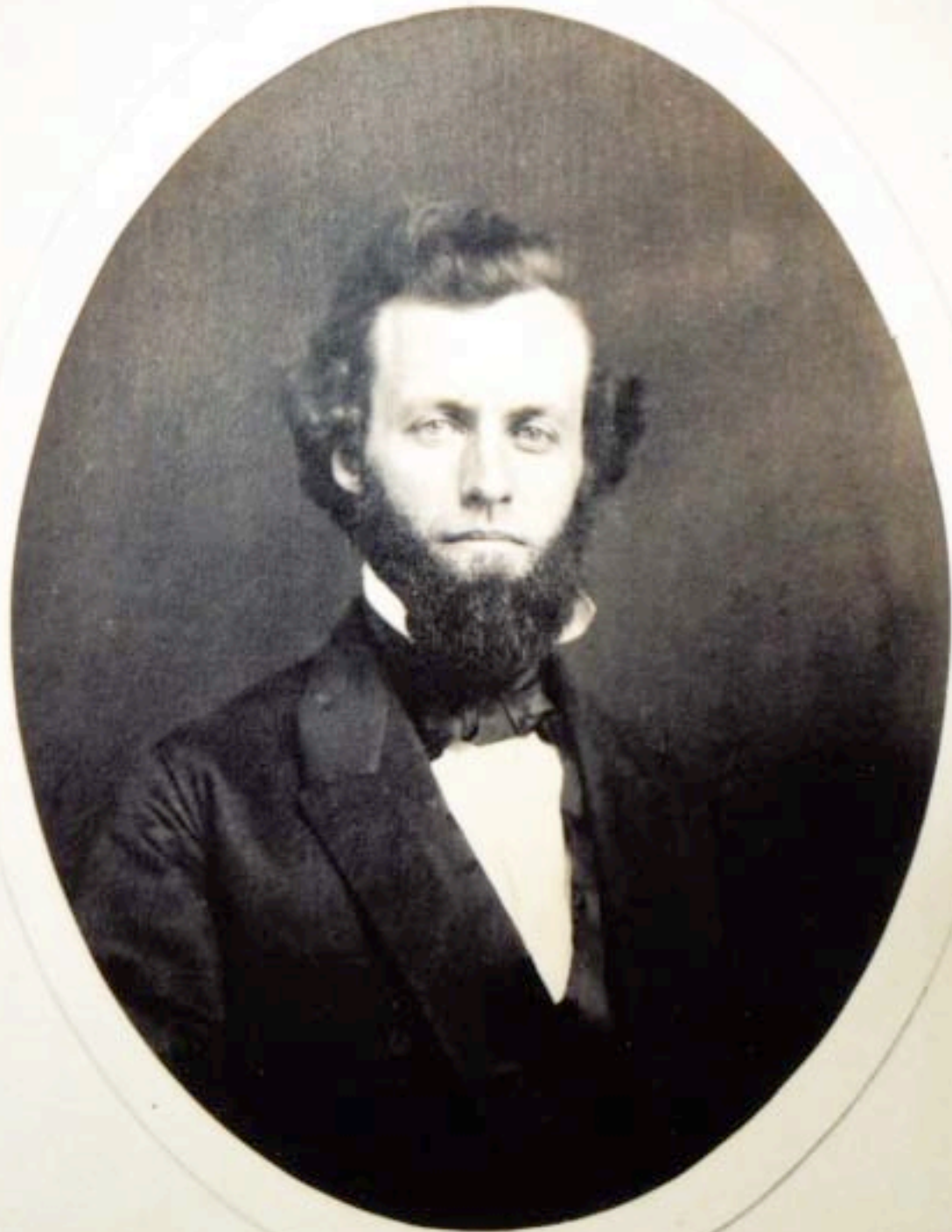
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Published by J. W. BROWN, 1851. No. 100 N. W. Corner of Chicago & Dearborn Streets, Chicago, Ill.













Lt. W. G. Peck -

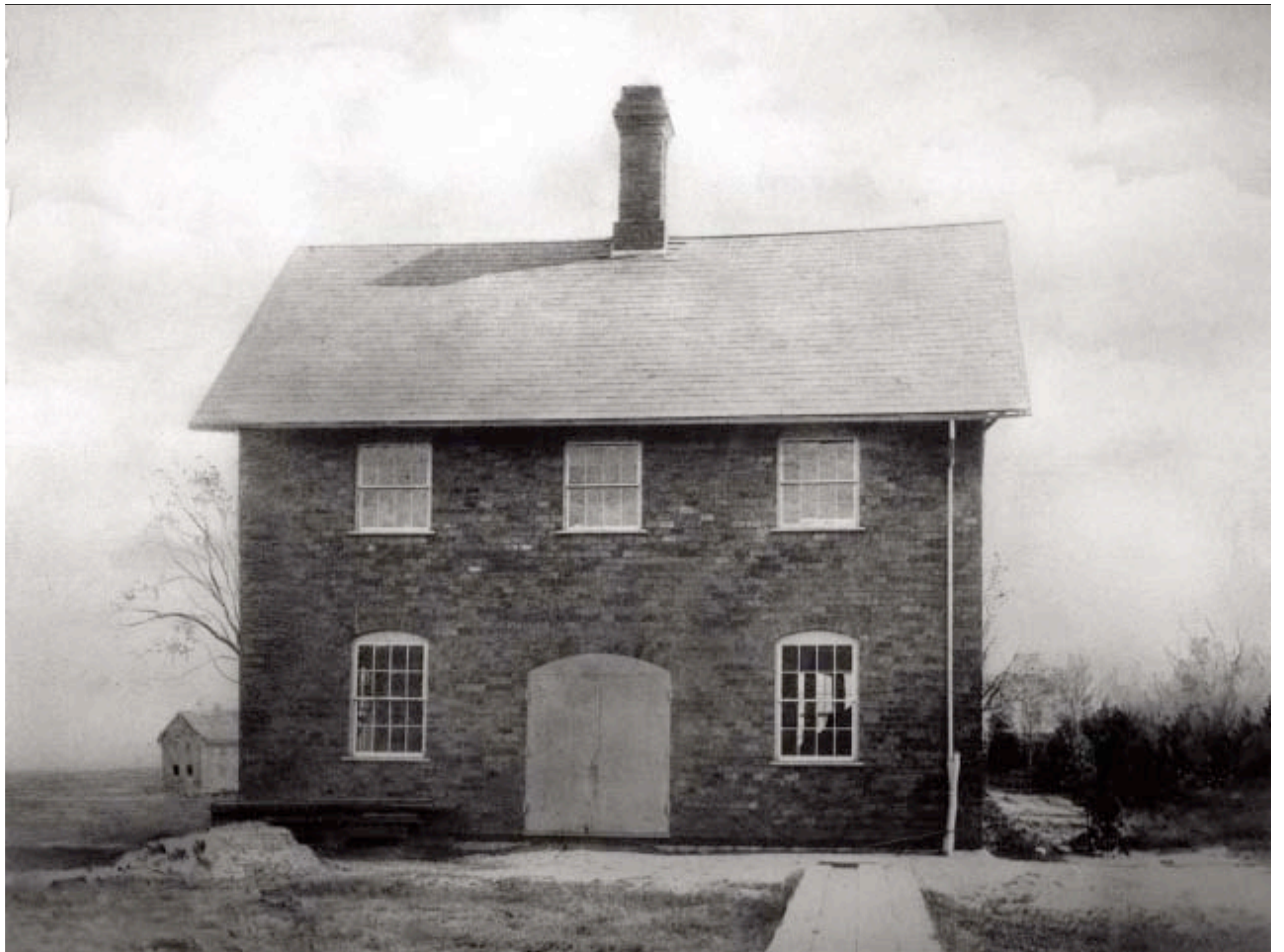
U.S. Army - 1845
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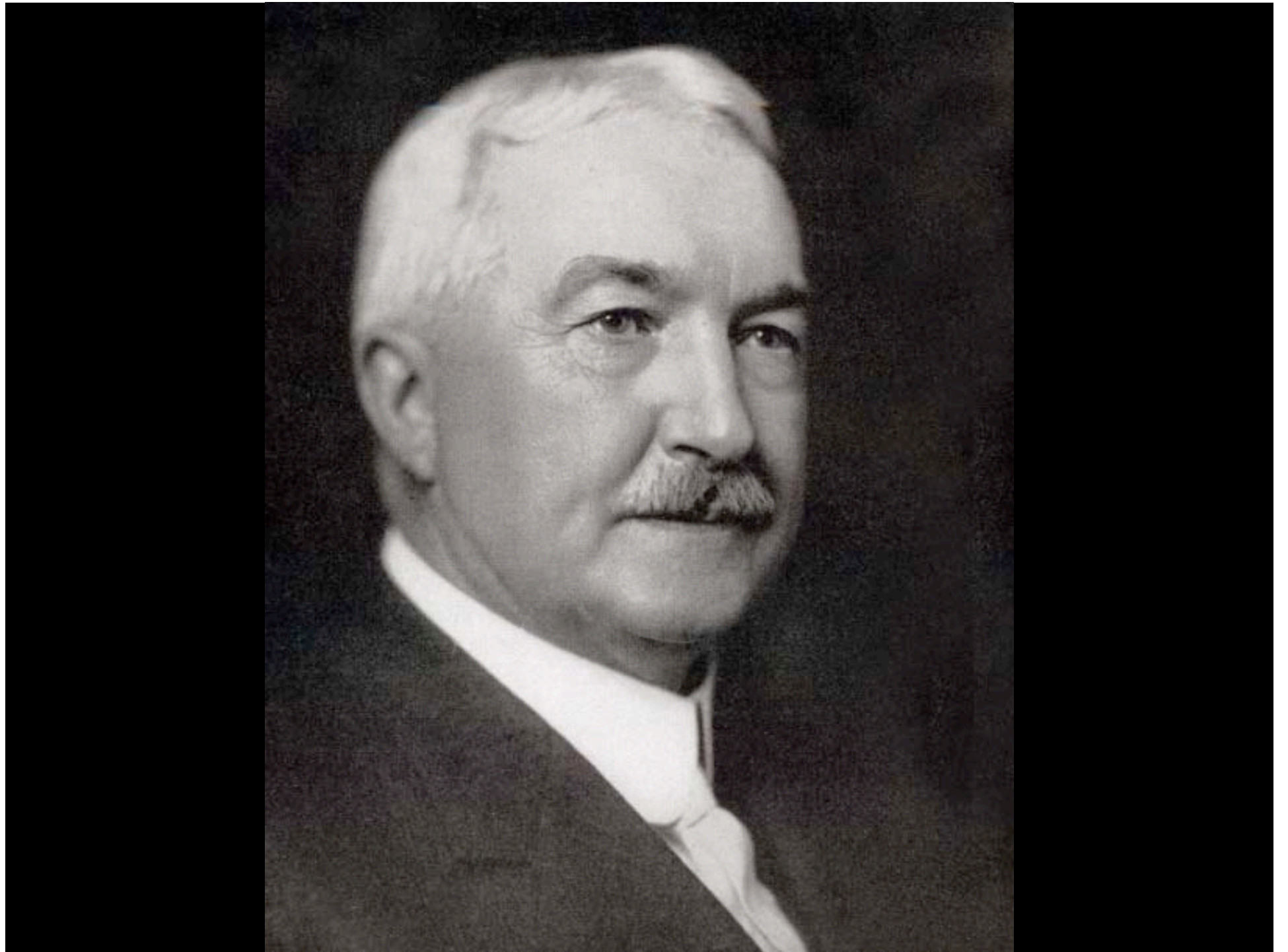
















The 20th Century

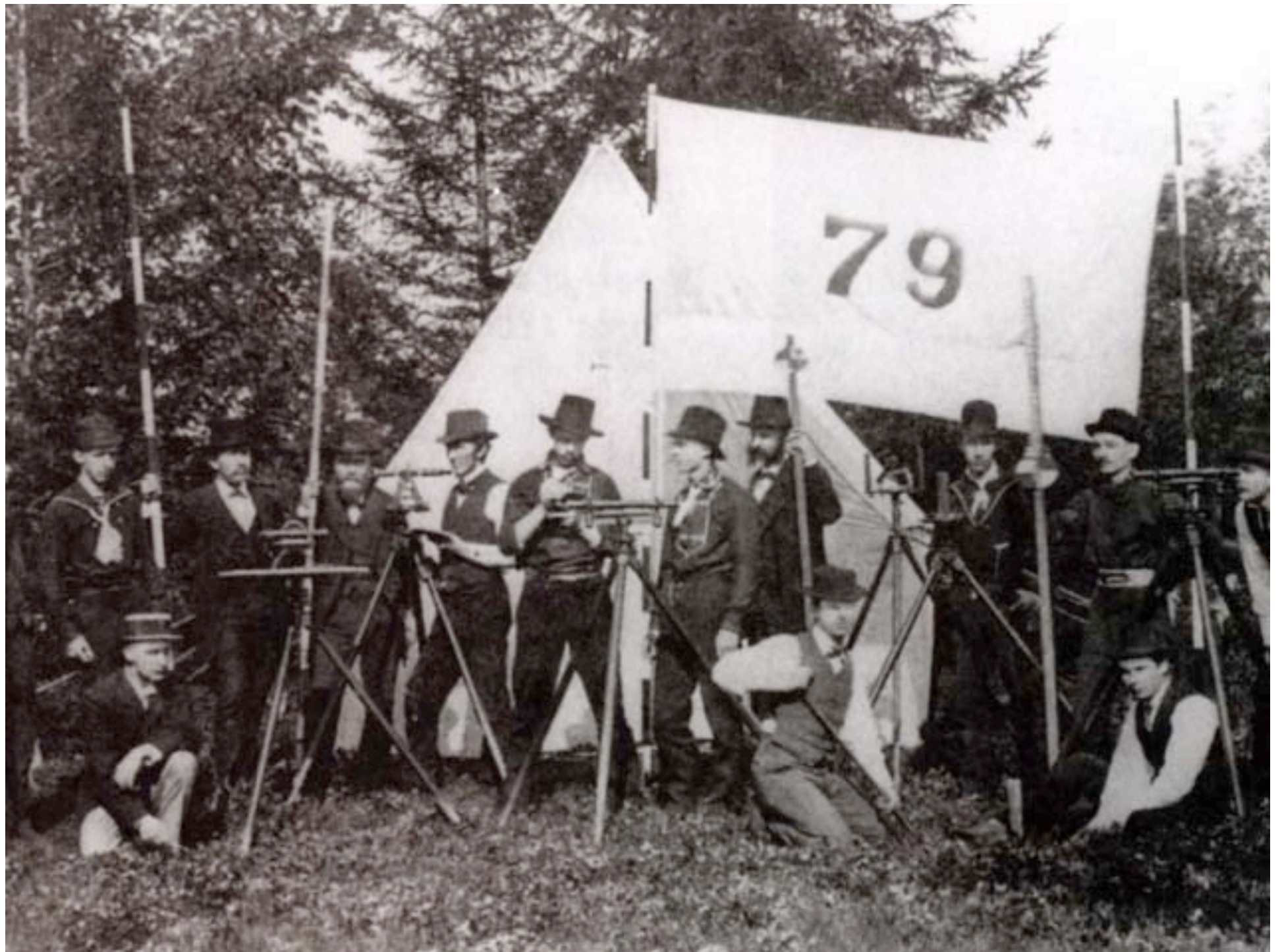












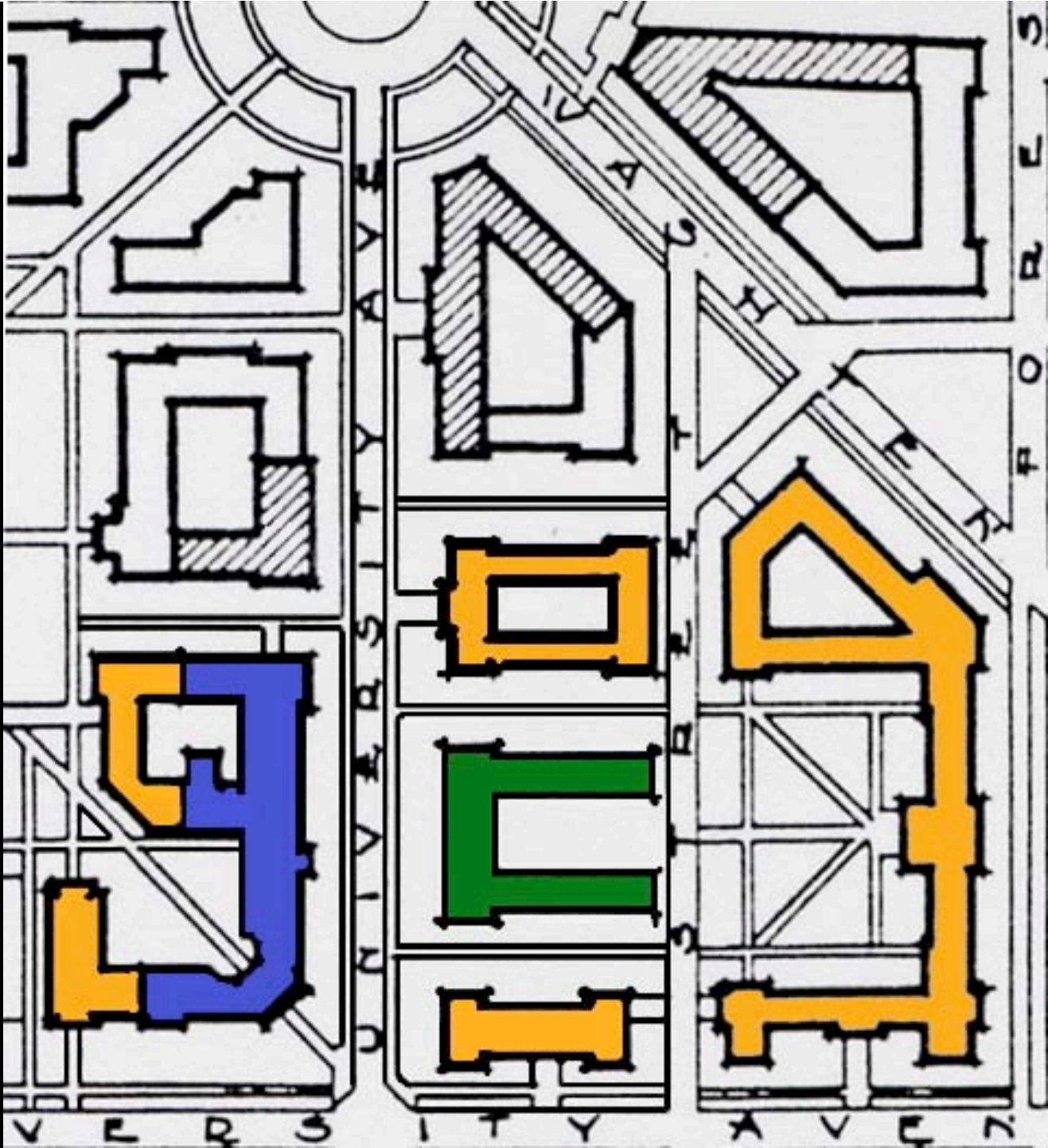
















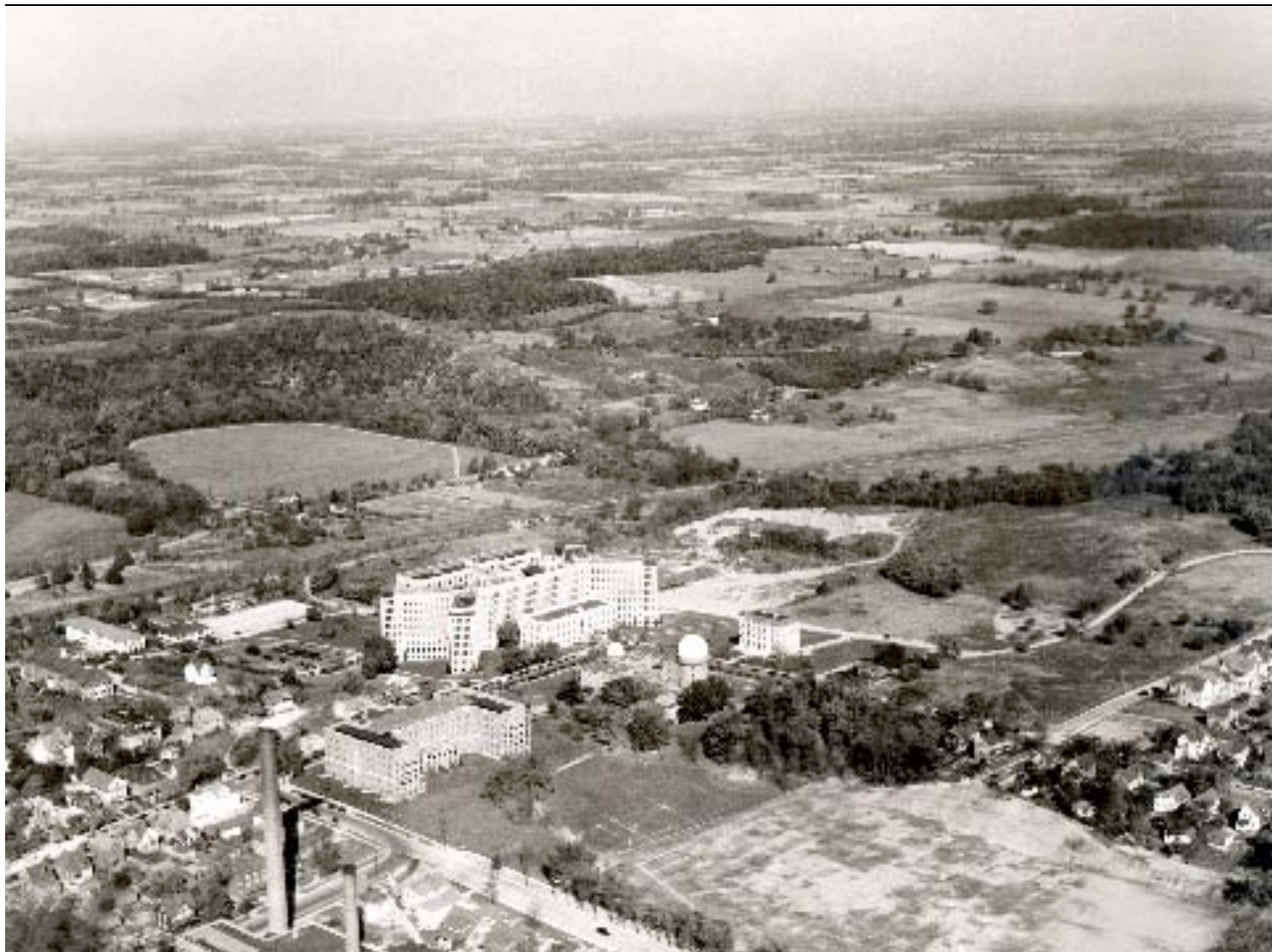


The North Campus

1950 - 1980



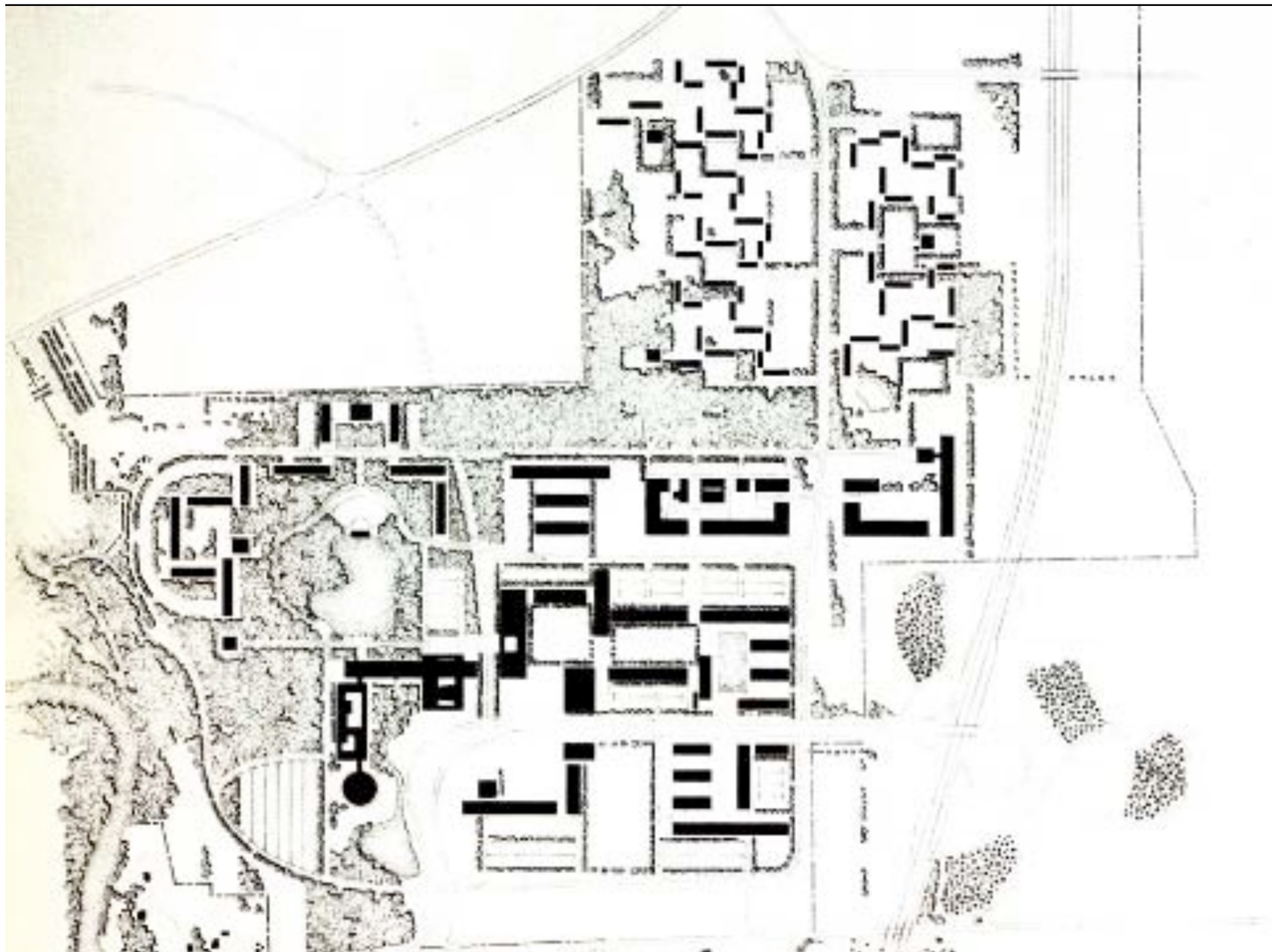


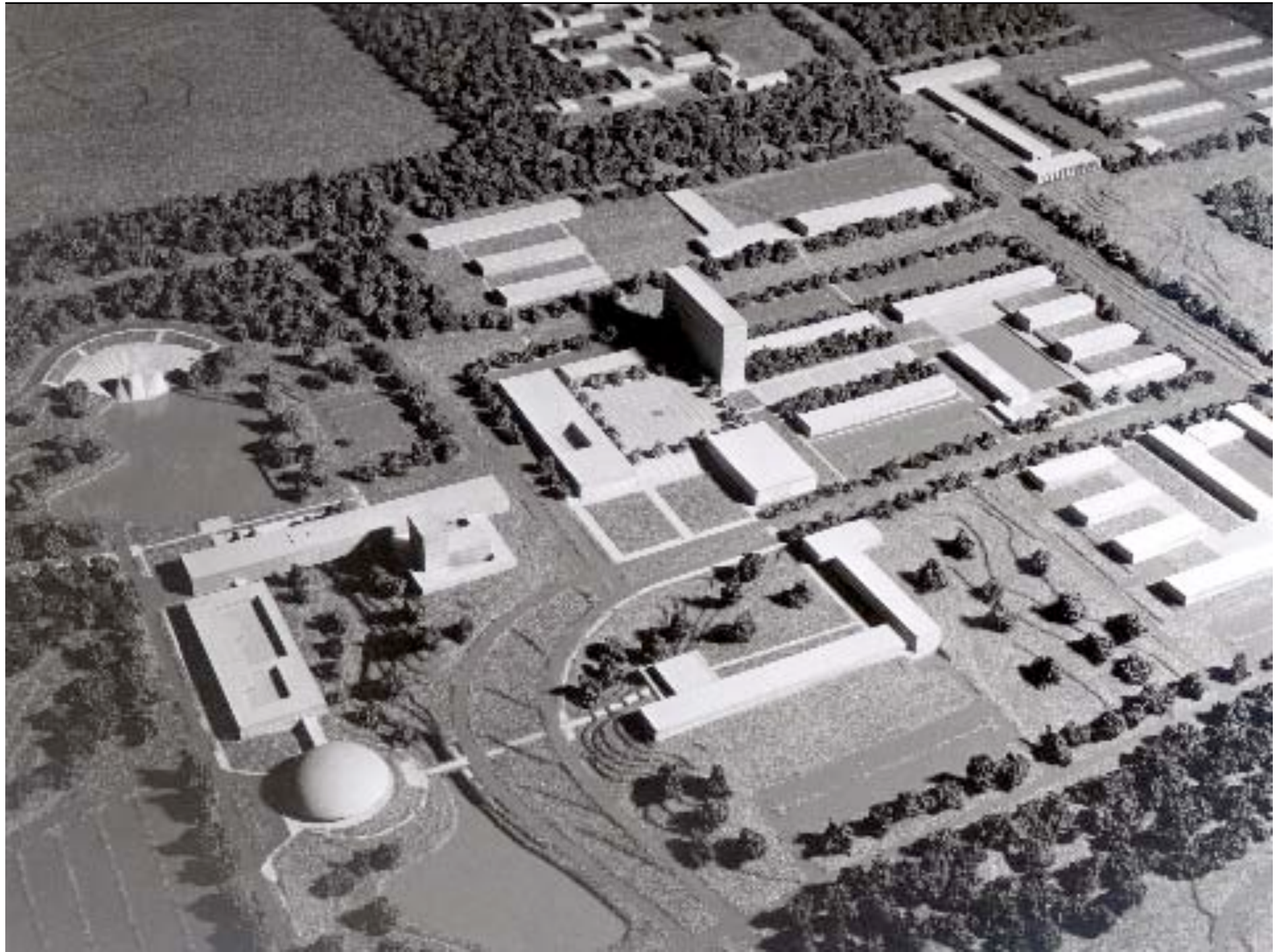








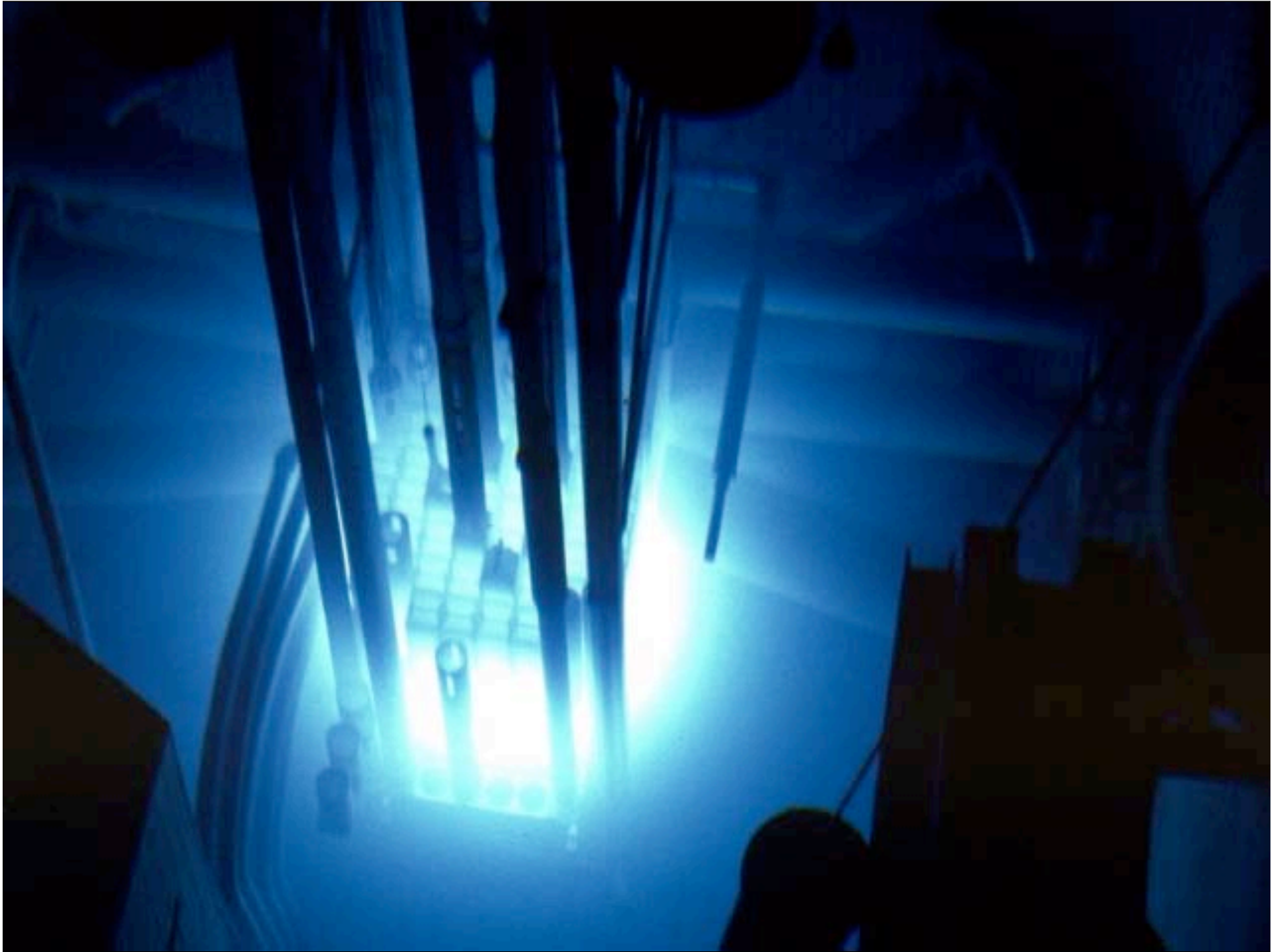






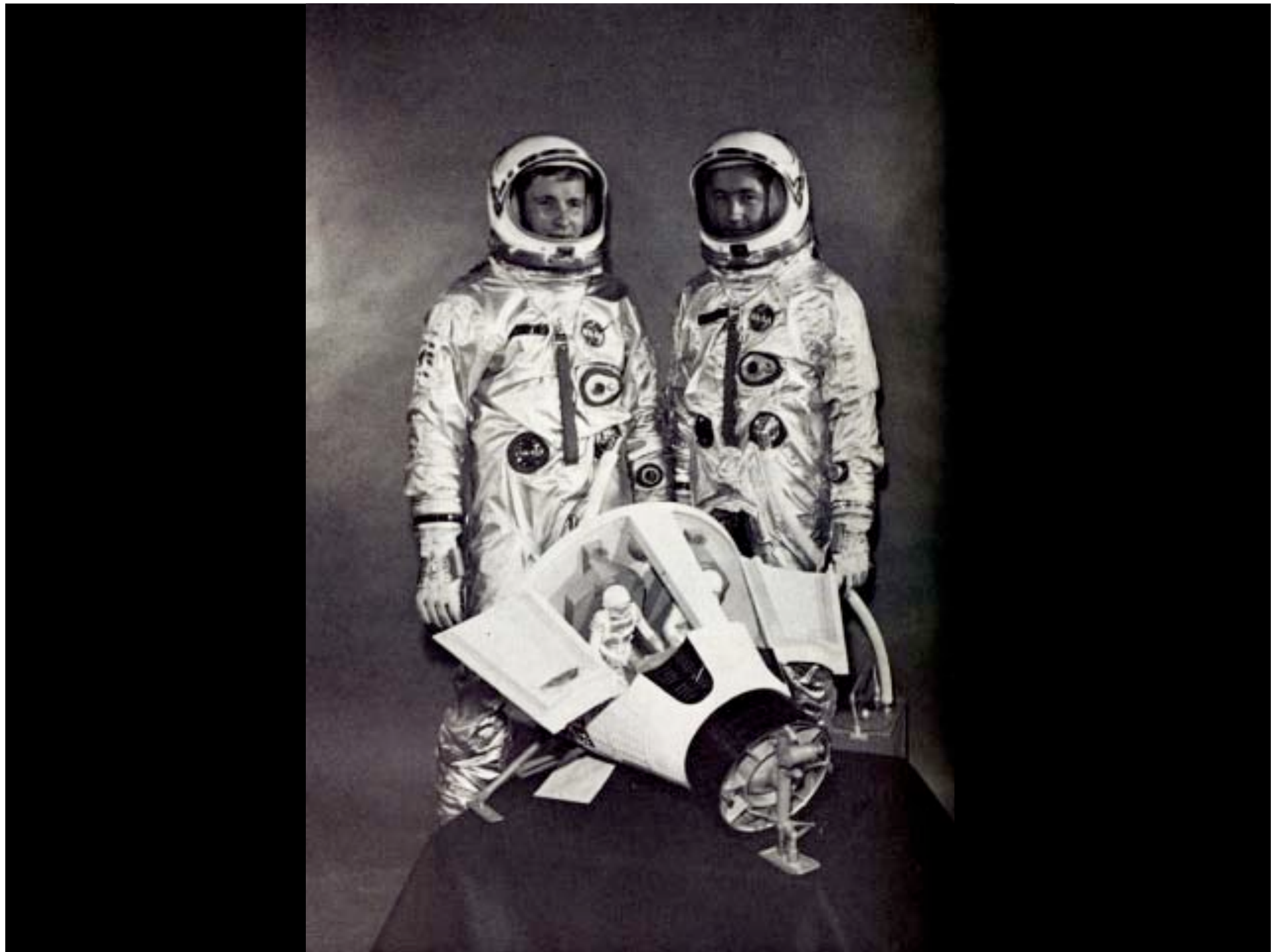














UNIVERSITY of



M I C H I G A N

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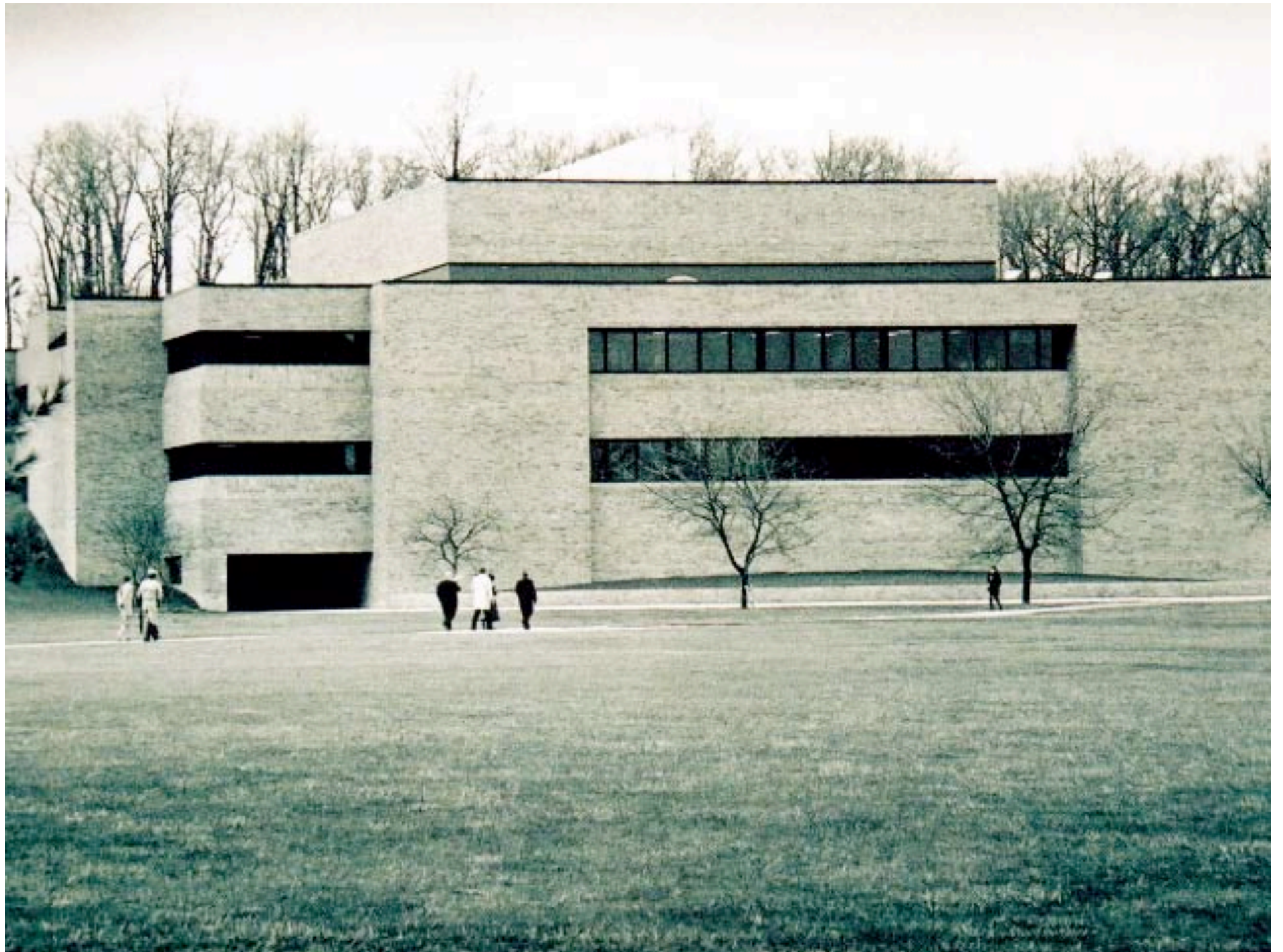














The 1980s & 1990s

























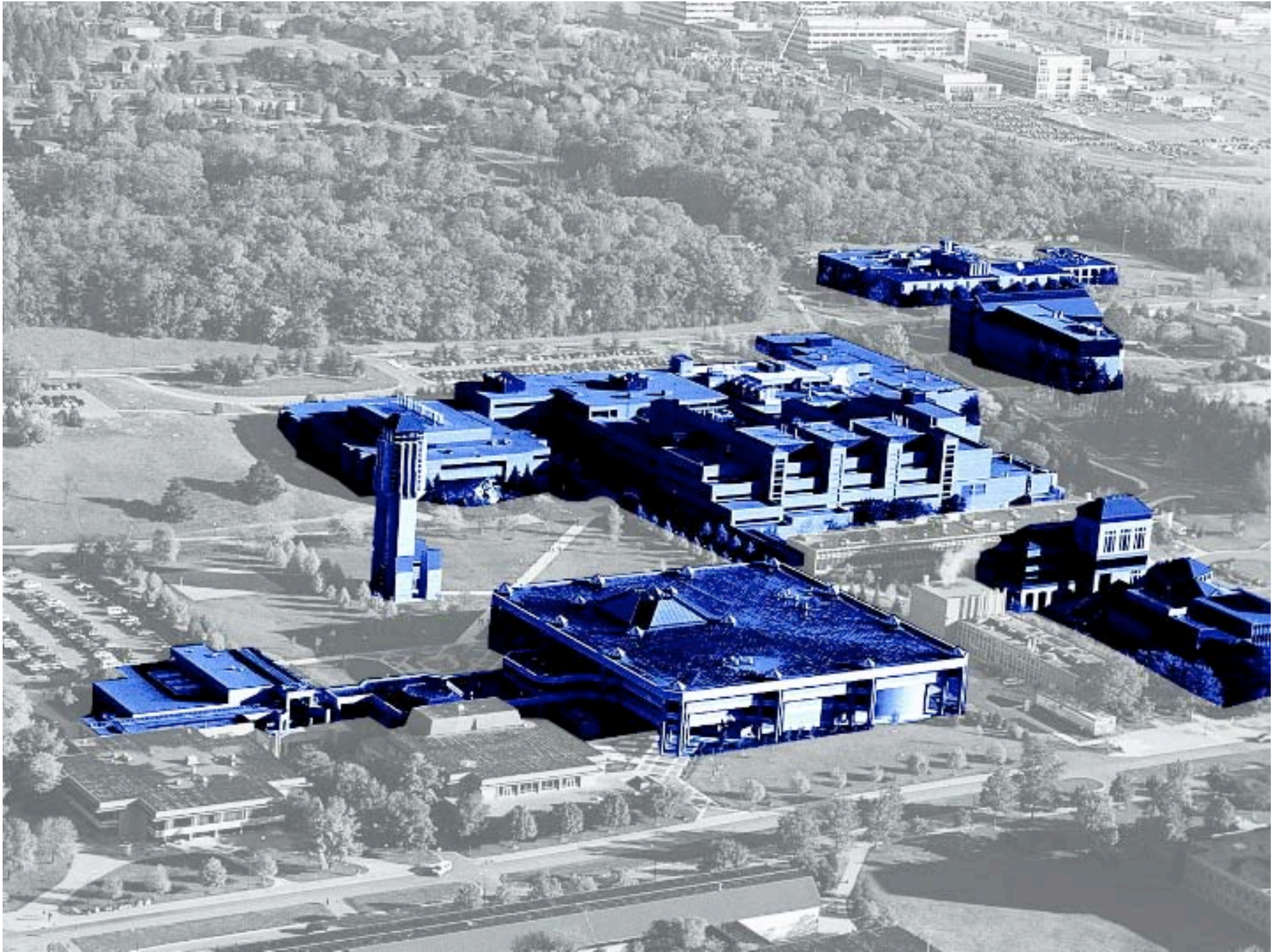


















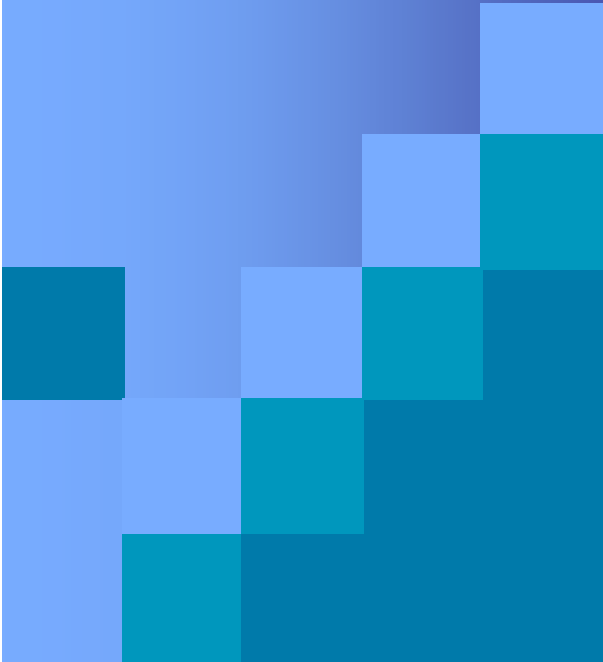
The New Century











**Meanwhile,
back in the classroom...**