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NPS Form 10-900
(January 1992)

OMB No. 10024-0018

United States Department of Interior
National Park Service

National Register of Historic Places
Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900A). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Forest Products Laboratory

other names/site number Forest Service Forest Products Laboratory

2. Location

street & number One Gifford Pinchot Drive N/A not for publication

city or town Madison N/A vicinity

state Wisconsin code WI county Dane code 025 zip code 53705

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 X nationally X statewide __ locally. (__ See continuation sheet for additional comments.)

Evan L. DeBloois 6-9-95
Signature of certifying official/Title Date

Forest Service
State or Federal agency and bureau

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

4/7/95
Signature of certifying official/Title Date

State of Federal agency and bureau

Name of Property | County and State

4. National Park Service Certification

I hereby certify that the 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.
__ See continuation sheet.
__ removed from the National Register.
__ other, (explain:)

for Signature of the Keeper: Edson H. Beall
Date of Action: 8·25·95

Entered in the National Register

5. Classification

Ownership of Property (check as many boxes as apply)
__ private
__ public-local
__ public-state
x 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		buildings
		sites
		structures
1		objects
	0	Total

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

N/A

Number of contributing resources previously listed in the National Register

None

6. Function or Use

Historic Functions
(Enter categories from instructions)
GOVERNMENT/Government Office

Current Functions
(Enter categories from instructions)
GOVERNMENT/Government Office

7. Description

Architectural Classification
(Enter categories from instructions)
International Style

Materials
(Enter categories from instructions)
foundation CONCRETE
walls Limestone
roof ASPHALT
other WOOD

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

8. Statement of Significance

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

_x_ 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.)

___ 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 of age achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)
ARCHITECTURE
SCIENCE

Period of Significance

1931-1944 (1)

Significant Dates

1931-1932 (1)

Significant Person
(Complete if Criterion B is marked above)

N/A

Cultural Affiliation

N/A

Architect/Builder

Holabird and Root (2)
Fritz, C.B., Contractor (3)

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

9. Major Bibliographic References

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

Forest Products Laboratory
Name of Property

Dane County, Wisconsin
County and State

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:
_x_ State Historic Preservation Office
___ Other State Agency
_x_ Federal Agency
___ Local government
___ University
___ Other
Name of repository:
Forest Products Laboratory

10. Geographical Data

Acreage of Property 2.5 acres

UTM References (Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1	1/6	3/0/2/3/3/0	4/7/7/1/7/3/0
2	/	/ / / / /	/ / / / / /
3	/	/ / / / /	/ / / / / /
4	/	/ / / / /	/ / / / / /

___ see continuation sheet

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet)

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

11. Form Prepared By

name/title E. Gail Throop, edited by Joyce McKay
organization Forest Service, Pacific NW Region date 1/31/1994
street & number 319 SW Pine - Box 3623 telephone 503-326-3644
city or town Portland state Oregon zip code 97208

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps A USGS map (7.5 or 15 minute series) indicating the property's location.
A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs Representative black and white photographs of the property.

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

Forest Products Laboratory
Name of Property

Dane County, Wisconsin
County and State

Property Owner

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

name USDA Forest Service Forest Products Laboratory
street & number One Gifford Pinchot Drive telephone 608-231-9322
city or town Madison state Wisconsin zip code 53705

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects, (1024-0018), Washington, DC 20503.

NPS Form 10-900-a
(Rev. 8-86)
Wisconsin Word Processing Format
(Approved 1/92)

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Forest Products Laboratory
Madison, Dane County, Wisconsin

Section ___ Page ___

7. Description

Location and Setting

The USDA Forest Service Forest Products Laboratory is located on a low rise at the west edge of the University of Wisconsin-Madison campus in Madison, Wisconsin. The grounds of the Forest Products Laboratory complex are bounded on the west by Highland Avenue, on the north by Observatory Drive, on the east by Walnut Street, and on the south by the Milwaukee Railroad right-of-way and Campus Drive. The Laboratory (#1) occupies the center of the Forest Products Laboratory campus. Because of alterations in the ten associated buildings or building complexes which flank the main laboratory to the north and south, only the main Forest Products Laboratory Building is being nominated as an individually eligible property. The long entrance road named Gifford Pinchot Drive approaches the east facade of the Laboratory. As it approaches as a central avenue, it branches to form a circular drive in front of this building, the major focus of the complex. Encompassed within the wide oval are three landscaped terraces punctuated by two concrete retaining walls and perforated by a central walk with straight, concrete stairs. The adjacent south parking lot, circular drive and landscaping were built in the fall of 1934 and/or the spring of 1935 by the Madison Paving Company (Madison Paving Company 1934). Funds from the National Industrial Recovery Administration and the Federal Emergency Relief Administration supported labor during construction (Nelson 1971: 108). The landscape view is intended to draw the visitor toward the main building. A paved parking lot lies immediately north and south of the building and a drives leads around to the rear courtyard of the Laboratory. The boundary for the nomination extends east-west between east curb of Highland Avenue and the west end of Gifford Pinchot Drive. East of the building, it follows the outer curbing of the drive and east parking lot toward the facade of the building. The boundary arbitrarily reaches 20 feet north of the laboratory to exclude recently constructed buildings and about 70 feet south of the laboratory, the approximate width of the original south parking lot constructed in 1934-1935 (USDA Forest Service 1934).

Forest Products Laboratory Building (#1): Contributing

The firm of Holabird and Root designed the original 1931-1932 Forest Laboratory Building (Bruegmann 1991 (3): 188-90; Architectural Forum 1933: 95-102; Holabird and Root 1931a; USDA Forest Service 1931b; 1931-32; 1932) which is an amalgam of Modernistic and International styles. It combines the vertical window orientation of the Art Deco with the horizontal ribbon and corner windows of the International Style. The austerity of the building's concrete construction and the absence of ornamentation reflect the International Style.

The approximately 287 by 270 foot, Laboratory has a U-shaped plan and is symmetrically massed. It reaches six stories with a basement. The ground floor is placed at grade along three sides, and the first floor is at grade in the courtyard only. The first and second stories form a series of stepped setbacks with the fourth and fifth stories extending upward in an additional setback. At the top of this vertically massed building is a setback penthouse housing the building's mechanical system. The asphalt, concrete slab roof is flat and surrounded by a plain parapet without cornice decoration. Reinforced concrete and clay tile cover the building's steel frame. Its exterior curtain walls which are backed by sand-lime brick are faced with smoothly dressed, white Indiana limestone blocks (Architectural

Forum 1933: 99). The space contained at the rear of the building forms a service court. The interior exterior elevations of the Laboratory which were unclad brick masonry are now covered with a stucco finish.

The wall design along the main, east-facing facade and the north and south elevations is pier and spandrel emphasized with contrasting colors and textures. Spanning the piers, the windows in the building are massed in groupings of four. They display one-over-one, double hung sash divisions with flat surrounds and plain trim so that they appear flush to the wall. All windows are aligned vertically and horizontally. Horizontally, they are divided by dark, enameled metal spandrels faced with glass. Cypress wood fins running the height of the vertical faces flank each window and add a decorative and functional detail to the building. The fins shade the glass in the window during part of the day and reduce solar gain.

The main entrance is centered on the east facade. The structural opening is flat with plainly trimmed surround. The architrave is plain with no embrasure. The double-leaf door with a single glass panel in each leaf is flanked by flush sided panels containing single lights. A short flight of concrete stairs rises to an open, ground floor platform. Divided by wood muntins and accentuated by wood fins, a large, vertical window mass surmounts the main entry. A series of four, angular flutes etch the face of the first story on either side of the door. Two bronze shields are laterally placed at the entrance. Each shield is engraved with a centrally placed tree symbol which is flanked by the initials U. and S. This motif identifies the building with the USDA Forest Service.

Except for the main lobby area, much of the interior of the Forest Products Laboratory is divided into office and laboratory space. A small number of offices remain finished in lath and plaster. A majority of the offices and the remaining laboratories include concrete block or brick walls or dry wall and exposed structural components. Floors are concrete, and many ceilings are covered with tile. In both areas, the trim including the windows and door frames, transoms, and baseboard are wood. Except for the entrance, lobby, and exhibit room, the wood used on the first floor is western hemlock, Douglas fir or any species of pine under a painted finish. Wood trim along the ground floor is painted. The type of wood on the other floors which is stained and varnished varies by floor. It includes clear, plain, sawed red or white oak on the second; clear chestnut on the third; clear, selected birch on the fourth; and clear, red gum but not sap gum on the fifth floor. In the restroom, some of the partitions remain the original, clear, selected birch. Several of the small number of surviving laboratories contain the built-in wood cabinets while the laboratory director's office features a marble fireplace.

The main entrance in the center of the east facade leads through a wood-paneled vestibule with inset wood grilles and up a flight of straight, marble stairs with wood handrails to each side and along the center. The stairwell is wood-paneled and its lobby level opening is defined by a curvilinear railing. Bisected by the stairwell, the lobby is a large room finished in lath and plaster. All but the center portion of the ceiling which is recently replastered is covered with ceiling tile. It is sparingly but richly decorated with stained and varnished wood door and window casings and baseboards. The lobby floor is finished in terrazzo. All doors and other wood trim in the public spaces on the first floor are stained and varnished, American walnut.

The building has undergone some alterations on both the exterior and the interior. Citing photographic documentation, Bruegmann notes a 1935 addition of two, U-shaped wings designed by Holabird and Root which currently remain unidentified (Bruegmann 1991: 188). A one story annex was added to the west end of the north wing in about three stages prior 1959. These single story, two level additions include concrete block, balloon frame and weatherboard, and poured concrete sections all covered with the stucco placed on the interior of the adjacent courtyard. The additions stand on concrete slabs, and their roofs are multi-pitched. All windows and doors along the outside three faces of the building were replaced in 1981. Although the dimensions of the structural openings and the window type and movement remain the same, the frames are now built of dark anodized metal rather than wood. The construction material was modified so that the essential character and appearance of this important design feature was retained. The exposed fire escape stairs in the courtyard were removed in the early 1980s and replaced by enclosed stairwells. Also maintaining the overall character through similar dimension, type, and movement, the windows and doors in the courtyard were replaced in 1990. The most visible change to the building's exterior occurred in 1990 when the courtyard walls were covered with insulating board and a stucco finish. The location of the change along the interior walls of the courtyard at the rear of the building minimizes the visual effect of this alteration. Also, the color of the stucco approximates the color of limestone, the cladding material along the exterior three walls. The incidental placement of window-seated air conditions occasionally disrupts the vertical lines of the windows. However, these small units are not permanent installations and can be removed without impairment to the building. Additionally, a new, detached steam plant replaced the original boiler in 1959. The steam plant stands outside the district boundaries. The smoke stack on the exterior of the building was removed (Baker 1991; USDA Forest Service 1960).

Since the interior partitions are not load bearing, walls and door were added and removed during occupancy. Some floors are now carpeted, others are covered with linoleum, tile or wood parquet. Suspended and/or tile ceilings and fluorescent light were installed to conserve energy in about two-thirds of the office area. Although covered but retrievable with little impairment to appearance, the original concrete floors and high ceilings remain as built. The experimental pulping and paper equipment was removed from the south wing and floors were installed at several levels (Baker 1991).

The Forest Products Laboratory Buildings Outside the District

Although collectively involved in the growth and development of Forest Products Laboratory, the ten supporting buildings and building complexes which compose the remainder of the campus were excluded from the nomination because they either post-date 1943, are moved or are considerably altered. These buildings include the 1934 Packaging Research Building (#2), the 1934 Fire Test Building (#4), ca. 1932 Glued Products Research Building (#6), 1940s Lumber Storage Building (#22), the 1940s Ground Maintenance Building (#9), the 1959 Steam Plant (#5), the 1960s Composite Products or South Office (#19), the 1930s or 1940s Storage Building (#41), a second undated Storage Building (#42), the 1950s Service Shop (#15), the 1967 Fiber Building (#33), the 1969 Chemistry Building (#34), and the 1967 Pulp and Paper Pilot Plant (#29). Additional subsidiary, late 1960s buildings, a garage and metal shop and a Fiber-Chemical-Pilot Plant complex stand to the north of the Laboratory (#1). Four buildings utilized for storage and offices purchased from the University of Wisconsin in the late 1970s are located on a block abutting the original Forest Products Laboratory property. Several pre-1943 support buildings associated with the complex and within the district were moved. They include two, 1937, prefabricated dwellings with stressed-skin construction designed by Holabird and Root (Bruegmann 1991: 307-08). The demonstration buildings once stood adjacent to the northeast corner of the Laboratory (#1). Moved in the late 1960s, they now stand one block to the north of the Forest Products Laboratory Complex. Also, two laboratory buildings, a garage, and three storage buildings were erected between 1940 and 1960 adjacent to and north of these houses. However, they were removed in the late 1960s (USDA Forest Service 1960: 57-59; Baker 1991; Nelson 1971; Freas 1991).

Conclusion: Property Integrity

The Forest Products Laboratory Building retains much of its interior and exterior architectural design, materials, and workmanship except within the interior courtyard which is not visible from the primary facade. The striking original design qualities of this modern, International Style building remain. It retains its integrity of location and immediate setting along the facade. However, the setting has been modified modified by the addition and modification of buildings which lie to the north and south outside the property boundaries. Integrity of feeling and association continue to convey the original function for which the building was constructed, forest products research by the National Forest Service.

The landscape features within the circular drive have recently undergone limited modification. The single, center flight of stairs is replaced with two slightly narrower stairways with handrails. They are separated by a terraced, grass median. The scale and proportion of the concrete, pedestrian approach is little changed, and the inviting effect of the landscaping is undiminished. Smaller shrubs replace the original juniper plantings behind the retaining walls. They had grown quite large and distorted the original scale of the landscaping (Baker 1991).

The Laboratory (#1), the focal building of the campus, remains an excellent example of the International Style designed by the noted firm of Holabird and Root. Much of the landscaping along the facade and the entrance drive is also intact.

8. Significance

Significance Statement

The Forest Products Laboratory Building gains significance under criteria A and C in the areas of science and architecture. The building contributes historically to the area of science as a government, industrial research facility whose scientific research of forest products lead to the diversification of industrial uses for wood. Because of the nation-wide impact of the research facility by an agency of the national government, the property possesses national significance in this area. And, the Laboratory possesses significance in the area of architecture as an intact example of the International Style. It displays the horizontal ribbon and corner windows, the set back construction, austerity of concrete construction, and absence of ornamentation common to this style. Its vertical window arrangement common to the Art Deco Style slightly diminishes the horizontal feeling of the International Style. Its design by the noted firm of Holabird and Root of Chicago at the end of the company's most productive period provides added significance in this area (Architectural Forum 1933: 95-102; Bruegmann 1991 (3): 188-90; Holabird and Root 1931a; USDA Forest Service 1931b; 1931-32; 1932). Although International Style buildings exist elsewhere in Madison, the Forest Products Laboratory Building (#1) is most comparable in its function, style, date, and design firm to the A.O. Smith Research facility in Milwaukee. In the area of architecture, it therefore gains significance at the state level. The period of significance occurs between the Laboratory's construction in 1931-1932 (Bruegmann 1991 (3): 188-90; Holabird and Root 1931a; USDA Forest Service 1931a; 1931b; 1931-32; 1932) to 1944, a period during which the facility made numerous contributions to the development and use of forest products. The significant date of 1931-1932 recognizes the building's date of construction.

Background

A knowledge of the properties of many different woods is fundamental to the economic utilization and conservation of forest resources. The National Forest Service founded the Forest Product Laboratory to assist private industries practice the wise use of wood resources. It achieves this goal through scientific research in many areas: the efficient use of commercially valuable wood species, the improvement of processes to increase production and reduce waste, the development of products with extended service life, the development of ways to utilize wood residues and low-value trees, the identification of alterative species of wood to replace depleted species, and the location of markets for new wood and wood-based products. The critical tie between the development of forest products and the silvicultural management of forestry practices explains the involvement of the National Forest Service in scientific research (USDA Forest Service 1950).

In the report of the Division of Forestry for the year 1887, B.E. Fernow, Chief of the newly created Division of Forestry in the Department of Agriculture (Williams 1989: 401) further explained this link between conservation and forest products research and pointed to the wasteful uses of the nation's wood resources (Fernow quoted in USDA Forest Service 1921: 5-6):

> The properties upon which the use of wood, its technology, are based, should be

> well known to the forest manager if he wishes to produce a crop of given quality useful for definite purposes. Our ignorance in this direction has been most fruitful in fostering a wasteful use of our natural forests, and the same ignorance misleads even the forest planter of today in choosing the timber he plants and the locality to which he adapts it. How the Black Walnut has been sacrificed for fence material, how the valuable Chestnut Oak has rotted in the forests unused, how the Hemlock has been despised and passed by when it might have been successfully used to lengthen the duration of White Pine supplies, how timbers are now used in unnecessarily large sizes and applied to uses for which they are not adapted, while other timbers are neglected for uses for which they are adapted---all these unfortunate misapplications are or have been due to lack of knowledge of the technological properties of our timbers.
>
> Every day, almost, brings to light a new use for this or that timber, every now and then lumber papers are weighing the serviceability of this or that wood. Instead of proceeding on a sure and scientific basis in recommending the application of any wood to a particular use, opinions pro and con are brought to bear, and the proper development of our resources is thereby retarded. Yesterday it was Redwood that needed commendation in the market, today it is Cypress that must be praised in order to receive due appreciation. Our timbers have never been fairly tested, or if they have their qualities are not duly appreciated. Many kinds have their use and value still hardly recognized; woods of exceptional value for manufacturing purposes are consumed for fuel; valuable and scarce varieties are used for coarse work, while cheaper and more abundant sorts are available. Still less knowledge exists in regard to the conditions of growth which influence the quality of woods. Crude "experience" has been our guide, and "crude" has remained our "knowledge."

In the midst of abundant timber resources, the work of early pioneers to advance the cause of forestry conservation in this country resulted in few changes. But, in the years that followed, the rapidly growing spectacle of forest devastation accompanied by increasing scarcity and rising prices of wood no longer left in doubt the accuracy of their vision. At the turn of the century, the problem of forest conservation stood out as one of the most vital economic issues of the nation. Leaders in the field of forestry suggested that the solution lay along two main strategies. The first was to halt further forest devastation through measures which adequately protected and regulated the remaining forest and placed forest lands on a permanent timber producing basis. The second called for the curtailment of the annual drain on the remaining forests by more complete and scientific use of the trees cut. Their use was to be directed by an accurate knowledge of the properties of the various woods and their economic use. Forest Products Laboratory greatly contributed to the second mandate (USDA Forest Service 1921: 7).

America's economic progress ultimately depended on the efficient use of its natural resources. President Theodore Roosevelt with the aid of his Chief Forester, Gifford Pinchot, placed this view of national resource conservation in American public thought and policy. To more efficiently utilize resources, Pinchot and his associates foresaw that the knowledge of forest use must progress hand-in-hand with the national movement to assure a sufficient supply of this essential raw material. It was not sufficient to create national forests in which the federal government engaged in the business of timber production and assisted private land owners maintain the productivity of their woodlands. It was equally necessary to build up a practical science of wood use.

The realization that the nation needed to conserve its forest began to gain momentum as early as the 1870s. Bernhard Fernow of the Bureau of Forestry until 1898 served as an early spokesperson for the movement which resulted in the 1891 Forest Reserve Act. The act authorized the president to create and manage timber reserves previously held in the public domain. These natural resources were to be managed for the benefit of the people. When approximately 40 million acres had been set aside as reserves by 1897, Congress finally defined the purpose of the 1891 act as watershed protection and a source of timber supply for the nation. The 1897 federal legislation specifically permitted the Secretary of the Interior to regulate the use of these lands including the sale of timber. In 1891, Fernow developed a model for management of the forest reserves which was not effected until 1905. At this date, Congress transferred the jurisdiction of the national forests from the Department of the Interior's General Land Office to the Department of Agriculture's Bureau of Forestry led by Gifford Pinchot. This bureau became the National Forest Service in 1905, and the federal forest reserves became the national forests in 1907. Pinchot then established the guiding policy for land use on the national forests by 1905 which restricted the use of all resources to ensure their permanence. The notions of sustained yield or the preservation of a perpetual timber supply for industries and the recognition of multiple uses within the forests including lumbering, mining, and grazing developed from this policy (West 1992: 29; 30-32; 37-39).

In addition to the National Forest Service, industry, particularly the paper industry, also began to realize the need for timber management. The use of pulp wood in the paper industry was introduced in 1872. New processing techniques which were developed to convert wood chips to pulp rapidly led to the rise in paper production in primary paper producing areas such as Wisconsin's Fox, Wisconsin, and Chippewa river valleys by the 1880s. By 1890s, the industry underwent considerable consolidation permitting more centralized management of forest lands and the diversification of paper production. This rapid industrial expansion which consumed 350,000 cords of Wisconsin's hemlock, balsam and fir per year by 1910 led to the realization that the state's timber resources could not sustain the high level of harvest for paper production. Other sections of the nation also soon reached this conclusion. The cutting of pine lumber in Wisconsin had already peaked and begun a rapid decline at the turn of the century. Wisconsin's mills first sought new sources of supply such as Oregon, Washington, Montana, and Minnesota. They soon developed means to use native hardwoods which had once appeared unsuitable for paper production as well as other uses. As early as the first several decades of the twentieth century, several Wisconsin paper companies developed the concept of reforestation. Such a policy required long-term planning to replant the denuded forest lands. Nekoosa-Edwards became the first company to establish experimental tree farms and reforest large tracts. Formed in 1925, its Woodland Department became the first program created by private industry to scientifically manage forest lands. Many other private companies as well as the national government began reforestation programs in the 1930s and 1940s (Lusignan 1986: 7).

As industry and the national government realized the need to conserve forest resources through timber management and reforestation, both parties also recognized the parallel need to develop ways in which to utilize the available timber supply more effectively in forest products. The scanty appropriations of the first several decades of American governmental forestry provided little money for such research. Between 1890 and 1910, the federal government accomplished much of this research through cooperative agreements with universities at which laboratory facilities were located or buildings became available to house the testing equipment (USDA Forest Service 1950: 18-19; 1921: 9; Nelson 1971: 12-24).

In 1905, the Forest Service centered its testing work on the mechanical properties of the more important woods at Purdue University but similar research was also underway at Yale and the universities of Washington, California, Oregon, and Colorado. Some preservation and kiln drying studies occurred at Yale, research in naval stores was initiated in the South, and a small experimental pulp mill was erected in Boston. A limited amount of research in wood chemistry and the chemistry of wood preservatives also occurred at Boston in 1907 (USDA Forest Service ca. 1950: 18-19). During 1908 to 1909, it became increasingly evident that larger facilities for forest products research were necessary. Allowing the development of standard, dependable methods of testing and uniform interpretation of test results, centralization of these scattered functions was essential to the success of the work (Nelson 1971: 24).

In 1908, two pioneer forest products researchers, McGarvey Cline and Howard Weiss, proposed to Chief Forester Gifford Pinchot the development of a national laboratory in cooperation with a university. Pinchot accepted the idea. A canvass of the Washington, D.C. area failed to identify suitable rental space for the small sum available. A survey of potential university facilities followed. An unexpectedly large number including the universities of Michigan, Minnesota, Illinois, and Wisconsin and Purdue, Cornell, and Yale responded with keen interest, and some included generous offers of support. The National Forest Service chose the University of Wisconsin which proposed the construction of a suitable building furnished with heat, light, and power. The Forest Service awarded the laboratory to Wisconsin because Madison provided easy access to railroad lines and timber resources to the north and possessed a noted reputation in scientific research. In 1909, temporary quarters for the laboratory were initially placed at 1610 Adams Street. Construction of the new facility at 1509 University Avenue began in 1909 and reached completion in 1910. Installation of the equipment began in the fall of 1909 shortly after the nucleus of the organization arrived from Washington, D.C. to establish its temporary quarters. These quarters served the Forest Products Laboratory until the completion of the present complex at One Gifford Pinchot Drive in 1932. By that time, temporary expansion had occurred into part or all of up to ten university buildings. This first laboratory became the Metallurgical and Mineral Engineering Building in 1932 and was listed in the National Register of Historic Places in 1985 (Miller 1985; Bruegmann 1991: 188; USDA Forest Service ca. 1950: 20; Nelson 1973: 25-38, 102).

At the time of the formal opening on June 4, 1910, the laboratory employed a staff of forty-five researchers (USDA Forest Service 1921: 10). As the first and for a while the only institution devoted to the investigation of wood and wood products and their diverse applications, this institution set the precedents for future research (USDA Forest Service 1921: 78). As a national laboratory, it received a broad mandate: the exploration in the field wood utilization for the benefit of the people and for the perpetuation of forest resources. The threefold approach called for the increase in the serviceability of wood products; the development of new uses of wood and the improvement of existing ones; and the augmentation of the usefulness and quality of all wood species. To fill this mandate, the building brought together eight divisions which had been scattered across the country: the divisions of Timber Physics, Timber Testing, Pulp and Paper, Wood Preservation, Wood Chemistry, Wood Distillation, Wood Engineering, and Pathology. As the laboratory's many divisions indicate, research in forest products cut across many fields of basic and applied sciences including chemistry, physics, mathematics, forestry, pathology, and engineering. All areas were incorporated into the new laboratory. The central location also permitted the essential exchange of information between the Forest Service and private industry (Miller 1985; Lusignan 1986: 7; Nelson 1971: 38-53).

Between 1910 and 1920, the technical industrial research problems remained broadly defined as pathology, derived products, pulp and paper research, wood preservation, timber mechanics, industrial investigations, and timber physics. Derived products included such areas as wood distillation, wood preservative, ethyl alcohol, and cellulose chemistry. Pulp and paper research problems focused on the soda and sulphate process, the sulphite process, and the chemistry of pulp. Preservation encompassed specific studies in moisture proofing and humidity control; wood preservation including the protection of wood structures from decay, the durability of treated and untreated wood, and the efficiency of various wood preservatives; gluing problems including glue strength and durability tests; plywood manufacturing; and glue laminated products problems. This research also studied water resistent glues. Timber mechanics examined the comparison of species, the effect of treatments on strength, manufactured articles, plywood, structural timber grading rules, aircraft studies, and containers. Industrial investigations incorporated specifications and grades, industrial utilization of wood, and dimension stock and spark arrester studies. A separate problem became the fundamental laws of drying wood which examined wood behavior as it shrank and swelled during moisture changes. Timber physics dealt with wood technology including determination and description of species, the relation of structure to properties, and kiln drying including the study of commercial processes and research in kiln drying and air seasoning various species. All aspects of research possessed nation-wide relevance in industrial application and ultimately benefitted the public as individual home and business owners. Better knowledge of wood's mechanical and physical properties permitted more appropriate use of both low and high demand tree species, thereby benefitting the conservation of the resource as a whole (Nelson 1971: 54-66).

Although the more efficient use of forest products remained a focus of the laboratory throughout the decade, emphasis in these broad areas over the first two decades shifted in response to industrial needs. Under its first directors, McGarvey Cline and then Howard F. Weiss, Forest Products Laboratories focused on wood preservation and the means through which to improve the wood preservation process. Forest Products Laboratory researc determined that contemporary wood preserving treatments used twenty times the necessary cresote. Harry Tiemann patented the humidity regulated dry kiln in 1911. Just prior to World War I, the laboratory began to develop closer ties with wood-using industries. After Carlile Winslow became its director in 1917, the research then quickly shifted to the development of glues and plywood which assisted the rapidly growing aircraft industry during World War I. After the war, although plywood research continued, Forest Products Laboratory considerably expanded its research areas. It began to make significant research contributions to the understanding of the semi-chemical process in the field of pulp and paper research. This process permitted the use of hardwoods in the pulping industry. And, it perhaps helped relieve the pressure on softwood stocks. During the 1920s, the laboratory also developed many different kinds of paper, fiber board, new adhesives, and plastics (Miller 1985).

During these first two decades prior to 1930, the Laboratory attacked these technical industrial research problems with a variety of testing equipment much of which was designed by the laboratory's engineers. The wood preservation section was equipped with a large pressure treating plant and pressure cylinders. Handling the glue and laminated wood studies, the preservation section used glue mixing and spreading machines, hot and cold presses, strength test machines, an aircraft propeller manufacturing plant, and a series of temperature and humidity controlled conditioning rooms. The timber mechanics section was equipped to test the strength of several species of American woods and built-up beams, trusses and girders. The laboratory's six commercial size dry kilns permitted the drying of wood by almost any variation in temperature, humidity, and circulation within practical limits. Conditioning apparatus allowed fundamental research in the conditioning and treatment of wood under pressures or gases. The pulp and paper section was completely equipped to make wood pulp by any commercial chemical or mechanical process and convert the pulp into paper by the cylinder or Fourdrinier process. The derived products section contained much special as well as standard chemical laboratory equipment including instruments for accurately measuring the various physical and chemical properties of oils, sugars, and solutions. Initially, pathological work was largely the study of fungi and their effect on wood in many fields of use. The laboratory carried on this work cooperatively with the Bureau of Plant Industry. This enumeration of the laboratory's extensive equipment illustrates the capacity of the institution to handle its research areas (USDA Forest Service 1921: 16-19).

Area of Significance: Science

As early as 1919, Forest Products Laboratory proposed the construction of a new facility to contain its expanding research. This facility was to possess "...building and grounds conveniently arranged and designed particularly for laboratory work" (USDA Forest Service 1919). This prospectus included preliminary plans and total cost estimates of $818,815.00. The federal government failed to fund the new facility at that time (USDA Forest Service 1919). Recognizing research as an integral part of the Forest Service's program, the McSweeney-McNary Act of 1928 provided funding for continued research in 1928 (Davis 1983: 232). In 1931, the Forest Service and the University reached an agreement that permitted the permanent expansion of its physical plant which had periodically spread over part or all of ten buildings. The university donated a ten acre parcel of land at the west edge of campus, and the Forest Service constructed the new laboratory. The university received the original laboratory for its own use. Construction of the new facility at One Gifford Pinchot Drive occurred during 1931 and 1932 (Nelson 1971: 102; Bruegmann 1991 (3): 188-90; Holabird and Root 1931a; USDA Forest Service 1931a; 1931b; 1931-32; 1932). In 1935, Holabird and Root placed an unidentified addition along the building (Bruegmann 1991: 188 [reference to photograph]). Periodic expansion of this facility primarily through the addition of new buildings continued into the 1970s (USDA Forest Service 1960; Baker 1991).

During the 1930s and early 1940s while Forest Products Laboratory occupied its new facility, the laboratory expanded its field of work to encompass additional technical industrial research problems. In the Depression Era, director C.P. Winslow addressed four main goals of Forest Products Laboratory: (1) the lower cost of forest products for the consumer, (2) the improvement of wood properties and qualities to raise consumer satisfaction, (3) the development of new or modified wood products to meet the needs of the era, and (4) the promotion of the use of wood products as a cost effective and satisfactory solution to modern needs (Nelson 1971: 105). Between 1933 and 1937, Forest Products Laboratory received over 1,300,000 in relief funds from Emergency Conservation Work (ECW), later known as the Civilian Conservation Corps; the Federal Emergency Relief Administration (FERA); and the National

Industrial Recovery Administration (NIRA). In 1934, NIRA funds assisted the purchase of laboratory equipment and machinery and allowed the improvement of the grounds, the building of several storage sheds, and the addition of wood floors in the original building. FERA funds permitted the supported 150 to 160 local men in construction jobs on the grounds. They also supported ten to fifteen of the regular staff. The ECW funds were used for research dealing with the growth of forests, and local ECW men housed at a Madison camp worked on the grounds of Forest Products Laboratory (Nelson 1971: 105, 108).

By 1932, the research responsibilities of the laboratory's eight different divisions were somewhat redefined into seven divisions. The scientific accomplishments in the new laboratory for the twelve year period of significance between 1932 and 1944 are summarized by research division.

Research on glues and glued products such as plywood, laminated wood, particle board, assemblies of wood, and composite products occurred in the Division of Timber Processing. This division conducted investigations involving wood finishes and the fire properties of wood as well as the means of modifying those properties. The chemistry of glues, fire retardants, and finishes involved both basic and applied research, while the production and evaluation of veneer, glued products, and fire-retardant-treated products required technical investigations into wood practices, treatment characteristics, durability studies, and fabrication techniques. The research involving adhesives established the properties and best uses of the various types of glues and yielded reliable, rapid methods of evaluating quality and serviceability of glue joints. The characteristics of different woods which affect gluing were also studied.

Forest Products Laboratory had refined plywood through the discovery of moisture resistant glues to fulfill the needs created by the World War I era. During World War II, the laboratory again responded to the war effort by the developing the ability to adhere lightweight, stiff cores of wood or paper honeycomb to faces of veneer, paper or other tough, thin materials. These early sandwich constructions formed the basis of a technology that eventually pervaded other areas of wood research, especially housing components.

The protection of wood from decay and staining fungi became the principle function of the Division of Wood Preservation. This research broadly involved fungi and their detection and control and the development of preservatives and treating processes which protected wood from fungi. In cooperation with the University and other Forest Service groups, this division also conducted some studies involving insects and marine organisms which attack wood. This division engaged in pathological studies to establish the natural decay resistance of wood. The factors affecting fungi in relation to preservatives and other methods of wood treatment to protect wood from decay were also evaluated. Fundamental and applied chemical problems connected to the preservation treatment of wood were investigated through research on the chemistry of wood preservatives. The composition and properties of preservatives were examined, and new toxic chemicals as well as nontoxic treatments were sought.

The Division of Physics and Engineering conducted research involving the properties of wood as affected by use conditions, design considerations, and other factors such as density, loading conditions, growth characteristics, structure, moisture content, chemical composition, temperature, and chemicals such as fire retardants. A large part of physical research on wood involved the removal of moisture from the wood by both natural drying and accelerated seasoning at controlled temperatures and humidities. Engineering research provided information on the strength properties of woods and design data for efficient engineering utilization of structural timbers, glued laminated members that use species and grades of wood most efficiently, and sandwich and stressed-skin construction for rigid, lightweight structures such as prefabricated houses.

Within the Division of Physics and Engineering, large scale construction research was successful in the testing of the laminated arch in the 1930s. Prior to this decade, the decline of wide diameter, old growth timber stocks had reduced the availability of large, solid wood members. Forest Products Laboratory pioneered in the scientific testing of the lamination (glue lam) of smaller sections of lumber into structural members such as arches and beams of almost unlimited size thus reducing the demand on large wood members. These developments meant the revival of a traditional construction material in large built-up members for use as a primary structural element in wide-span buildings and structures. The arch permitted the reintroduction of wood as a construction material in some forms of commercial buildings. The reduced cost of construction for some types of buildings and its ability to replace metal structural elements became a significant factor in the eventual adoption of the arch during the depression of the 1930s and the metal shortages of World War II. Forest Products Laboratory tested arches developed by Unit Structures, Inc of Pestigo, Wisconsin in the construction of the Packaging Research Building. The broad public need for information on the engineering properties of wood was fulfilled in the publication of the first edition of the <u>Wood Handbook</u> in 1935 (USDA Forest Service 1935). The development of the "stressed-skin principle, prefabricated wall units, and improved moisture barriers were also part of the laboratory's contribution to the Depression Era (Condit 1968: 284-87; Nelson 1971: 113-14; Wilson 1939).

The work of the Division of Timber Growth and Utilization involved wood identification, the relation of environmental and genetic factors to the quality of wood produced by trees, machining properties of wood and wood-based materials such as fiberboard and particle board, fundamental cutting actions of saws and other cutting tools, engineering and economic studies of timber harvesting methods and devices, and related studies of primary timber processing operations. The detection of superior strains of trees of a given species from the standpoint of wood quality guided the selection of seeds for future reforestation work and basic improvement of timber quality. The silvicultural significance of soil, rainfall, and overall climatic conditions to tree growth and wood quality constituted an important phase of the division's botanical research.

The Division of Wood Chemistry conducted a broad program of research involving the fundamental chemistry of wood and its constituents and developed chemical and microbiological processes for the conversion of wood into useful chemicals. Within this division occurred the basic studies of the chemistry of wood cellulose, lignin, bark, and extractives. Investigation of such processes as hydrolysis, hydrogenation, fermentation, and distillation enabled the development of new or less expensive chemical products and the chemical modification of wood to alter or improve its physical properties, notably dimensional stabilization. Researchers in this division examined the persistent problem of threatened fuel shortages during World War II. They developed the process which converted energy from wood to alcohol which continues to be known as the Madison Process.

The Division of Pulp and Paper sought to improve the utilization of wood through research involving the pulping characteristics of different types of woods and the identification of the pulps and papers obtainable from these wood types. Development of new and improved pulping processes and the establishment of processing requirements were basic aspects of this research. Research enabled the development of a combined chemical and mechanical procedure which reduced wood to fiber. This knowledge permitted the use of hardwoods in pulp and paper, greatly broadening the number of tree species used for this purpose. New high-yield, neutral sulfite semi-chemical and cold soda processes developed at the Forest Products Laboratory greatly increased the pulp tonnage from a given wood supply. Also, research involving bleaching and other refining processes as well as studies of the fundamental properties of pulp fibers improved pulp quality. The investigation of paper machine processing conditions such as drainage rates, stuff temperature and consistence, and roll pressure improved the production and the qualities of the paper.

The Division of Packaging Research worked to develop more efficient containers and packaging methods from wood, paper, and fiberboard. Projects included design and fabrication of wood and fiber containers and pallets, container fastenings, and cushioning materials. Current packaging regulations, specifications, and trade standards resulted from the findings from this research. These findings helped to establish the professional status of packaging as a branch of engineering. Research in this division also created the basic design principles for wood and fiberboard boxes and wood crates capable of withstanding known stresses and loads. Research involving container fastenings included work in the areas of rubbers, plastics, and adhesives as well as such mechanical fasteners as nails, staples, screws, and bolts. Cushioning design required the development of ways to measure the level of impact sustained by cushioning materials. Packaging research addressed major concerns involving the protection of war materials, the conservation of materials and cargo space, and less costly construction of packaging during World War II.

The Forest Products Laboratory was the research arm of the National Fores Service (Steen 1976: 132-35; Robbins 1985: 112; Clepper 1971: 68). Thus, Forest Products Laboratory was not only the first research facility to study wood and wood products, but it made numerous contributions to their scientific study from its founding in 1910 through the 1930s and 1940s during the period of significance for the current Laboratory at One Gifford Pinchot Drive. And, its contributions were national in scope through the 1930s and early 1940s. The numerous divisions within Forest Products Laboratory indicate the complexity of interrelated problems encountered in the study of wood. As a product of a living tree, wood is a complex array of discrete chemical structures bound in ways which both enhance and complicate its usefulness. To fully understand and exploit these properties, Forest Products Laboratory scientists followed an interdisciplinary approach. The research directions of its divisions have shifted their roles over the years to benefit from advancing technologies. The nation's changing needs from peacetime to wartime and from prosperity to depression have also shaped the direction of research. The thousands of publications ranging from highly complex treatises and definitive handbooks to how-to brochures compose the tangible products of the research at Forest Products Laboratory. The intangible products are the advancement of science in the basic understanding of wood. These successes benefitted individuals through personal responses to questions and problems, the general public through publications on better and safer uses of wood, and industry through information to ensure the efficient and economic use of forest resources (Nelson 1971: 104-42).

Area of Significance: Architecture

As an example of the International Style designed in 1931-32 by the noted firm of Holabird and Root of Chicago (Architectural Forum 1933: 95-102; Bruegmann 1991 (3): 188-90; Holabird and Root 1931a; 1931-32; 1932; USDA Forest Service 1931a; 1931b; 1931-32; 1932; Nelson 1971: 102) and comparable in function, style, and designer to the A.O. Smith Corporation Research and Engineering building in Milwaukee, the Forest Products Laboratory building gains significance in the area of architecture at the state level. During its design, Gilbert Hall prepared four perspectives of the building. The government contracted the construction of the building to the C.B. Fritz Company of Madison, Wisconsin at a final cost of $803,815.00 to be completed within 365 calendar days (Bruegmann 1991 (3): 188; Architectural Forum 1933: 95-96; USDA Forest Service 1931a). The building gained recognition as an example of the modern style which aptly embodied its function in the Architectural Forum (1933: 95-102). A portion of the grounds were completed with Depression Era funds. In 1934, National Industrial Recovery Administration (NIRA) funds supported the construction of parking lots and the addition of wood floors in the original building. Federal Emergency Relief Administration (FERA) grants allowed the supported 150 to 160 local men in construction jobs including the terracing of the east lawn and the construction of the circular drive (Nelson 1971: 105, 108; USDA Forest Service 1934). Most of the buildings erected by the National Forest Service are small in scale and rustic in character, suited to a rural or forested environment. From this perspective, the Forest Products Laboratory is unusual an example for the National Forest Service architecture in both its styling and scale.

In 1932, Henry Russell Hitchcock and Philip Johnson provided a contemporary interpretation of the International or Modern Style of architecture which appeared in America only a decade before. Devoid of at least overt associations with past styles, particularly its decorative ornament, the International Style was intended to be a truly modern architecture. Its elements were to express completely the function of the building. As a modern architecture, its design represented the "...lifestyle and needs of the time" (Banham 1986: 199).

The International Style embodied three basic principles. As a volume rather than a mass, the thin, smooth and continuous, non-supporting exterior skin or planes of the building enveloped a skeleton or structural system of horizontal and vertical members. The flat roof plane existed as a bounding surface of this volume. Favored structural materials included reinforced concrete or steel. Such surface materials as smooth stucco, granite or marble or metal plates provided the continuity of surface. Generally, the style favored horizontal as opposed to vertical composition to permit the exposure of broad, smooth, glazed window surfaces. Second, the exterior was to reflect the structure through its regularity or orderliness of design. The use of standard parts was not only a move of economy but ensured such orderliness of design. Thus, this regularity was not to be the axial symmetry of earlier styles which forced functions into a decorative frame but one of regularity reflecting the interior framework and the use of standard, economic parts. The style then permitted overall asymmetrical design schemes. Such an approach allowed a clearer expression of function. Thirdly, the style avoided applied decoration. The overall propositions, quality of the materials, and technical perfection of design of the building created the decoration. Rather than an applied ornament, parapets along the building represented a continuation of the wall surface which added interest to the design. The building's color reflected the natural color of its materials. Hitchcock advocated the retention of the natural surroundings of the building rather than formal landscaping. This approach emphasized the artificial construction of the building. Any plantings were to be done in a linear fashion to avoid imitation of natural vegetation. The placement of walks and roads were to facilitate efficient communication (Hitchcock 1932).

The International Style was conceived as an expression of the modernity which not only rejected references to past styles but embodied the new era of science and technology emerging in the 1920s. Although developed by Walter Gropius of Germany and Le Corbusier of France, the International Style was inspired by photographs of vernacular, American industrial building known as the daylight factory and granary whose forms matured during the first decade of the twentieth century. These European architects then reintroduced the style to Americans by the early 1930s. To the European, it appeared that science and technology had transformed America into a "modern" society. In its original form, the style resulted from the strict application of modern engineering principles. Thus, exteriors were to be a honest reflection of the structure within, and its design was to symbolically express the needs which the building fulfilled. The style's Euclidean geometric composition celebrated the exacting calculations of the engineer.

The prototypes for the International Style, the daylight factory and the granary, developed from American industrial forms which began to emerge as early as the eighteenth century. By 1910, the usually massive daylight factory had become a multi-story form supported by narrow, exposed, reinforced concrete frames. The intermediate spaces within this structure were filled with steel sash windows and spandrel walls. Flat roofs elaborated with a slight cornice covered the building. It was the orderly, rectangular grid of the vertical and horizontal structural members, the piers or columns and beams, which attracted emulation. Developed at the turn of the century, reinforced concrete provided an economical material in which to cast the structural members. The massive, cylindrical, American grain elevators provided inspiration through their contrast against the flat Midwest landscape where they were developed and through the silhouettes which their forms created. And, these building forms remained unsullied by the architect who tended to add the rejected applied ornament. The designs of the factory, on the other hand, were based on the mathematical calculations of the engineer and hence represented the modern age of science (Banham 1986: 3-9, 16, 20-28, 43-56, 105-106, 109, 123, 135, 215-216, 224-25, 235).

The identifying features of the style, then, included its rather boxy appearance; its smooth, continuous curtain walls and flat roof; regular design without the use of axial symmetry; an emphasis on horizontal composition which often relied on a series of architectural setbacks; broad window expanses in metal frames spanning between structural elements or piers and the use of spandrel walls; placement of windows in horizontal or vertical ribbons and constructed with limited exterior reveals and fins to reduce glare; the placement of windows in groups which often turned the corners of the building; construction with smooth surface materials such as reinforced concrete, metal, and stone plats over a concrete or steel frame; use of the natural color of the surfacing materials; and the use of parapets (Godfrey 1986: 36; Banham 1986: 56, 106; Hitchcock 1932).

The Forest Products Laboratory reflected many of these distinguishing elements of the International Style. Significantly, Holabird and Root chose a style or form intended to represent the modern age of science for the National Forest Service's new forest products research facility. In a sense, the choice of the very style itself represents the function within. The Architectural Forum of 1933 (1933: 96) thus addressed Holabird and Root's choice of design:

> U-shaped, five stories high, the building expresses its clear-cut character in the practical application of scientific methods, thus creating a motif harmonious with the research activities carried on by the laboratory "to aid in protecting

and enhancing the value and marketability of forest products."

The article noted that the style not only expressed the purpose of the building but that its use of woods in the floors and window frames and sash and the exterior fins was an appropriate expression for a scientific facility participating in wood research.

As designed, the Forest Products Laboratory appeared as a massive composition resting on a slight rise within the undeveloped parcel. The overall composition of the building is regular. However, it is designed with an axial symmetry rather than the asymmetrical juxtaposition of mass favored by the style. Its gridded framework composed of regularly placed, narrow, almost invisible vertical uprights or piers are spanned by broad expanses of windows without reveals. The massive, wood fins tend to conceal the uprights. The strong horizontal component, the concrete spandrels marking the divisions between floors, along with the five stepped-setbacks are characteristic of the style. Although the interior block with its tall series of vertically aligned windows and fins provides a strong upward thrust uncommon to the style, it is juxtaposed to the strongly horizontal movement of the first two floors and the aligned windows. Also, the verticality of wall space is not continued by a cornice or parapet. The corner windows continue this sense of horizontal space. The limestone cladding over its steel frame fireproofed with concrete and gypsum tile and flat roof provide a smooth but not so thin appearance to the outside shell. The limestone finish contrasts in color and texture with its wood fins. Thus, the building has a rather massive rather than a volumetric quality. The centered, rather stark main entrance placed in a series of narrow setbacks is often associated with the style. Then, while its general composition and lack of ornamentation place the building within the International style, its sense of verticality and mass provide a reference to the Art Deco Style. The building's carefully and symmetrically landscaped entrance area with curving drive and terraced oval divided by centrally located steps are also uncommon to a style which was to feature natural landscapes.

The firm of Holabird and Root designed the Forest Products Laboratory in 1931 (Architectural Forum 1933: 95-102; Bruegmann 1991 (3): 188-90; Holabird and Root 1931a; USDA Forest Service 1931b; 1931-32; 1932). The architectural firm gained considerable recognition in the second two decades of the twentieth century for its new technical design innovations displayed in major commercial and public buildings but especially in office buildings. Rather than being avant-garde modernists like their European contemporaries, the firm displayed a "...rather pragmatic and flexible approach to style" (Bruegmann 1991 (1): ix). The North Dakota State Capitol, the Technical Institute at Northwestern University, the east wing of the Art Institute of Chicago, and the A.O. Smith Corporation headquarters, all of the 1930s era, display these tendencies (Bruegmann 1991 (1): ix).

Founded in 1880 as Holabird and Simonds, the firm's designs are recognized as contributions to the Chicago School of Architecture. Emerging after the 1871 Chicago fire, the Chicago School was a loosely defined architectural movement noted for its rejection of European and eastern American architectural precedents. The school sought a new, ahistorical, unornamented, and structurally logical style.

William Holabird (1854-1923) received training in engineering at the West Point Military Academy between 1873 and 1875. He then resigned from the army and moved with his family to Chicago. There, he filled a position at the Chicago Army Quartermaster General's Office. He also received training as a draftsman in the office of William Le Baron Jenney. He was accepted as a fellow of the American Institute of Architects in 1889. His first associate, Ossian C. Simonds, studied engineering at the University of Michigan and came to Chicago in 1878. He had gained prior experience as a landscape architect. Martin Roche became a third partner one year after the founding of Holabird and Simons forming Holabird, Simons, and Roche in 1881. Trained as a carpenter, Roche also worked in Jenney's firm. He gained a reputation in the firm for his designs work, particularly for the decorative detailing. In 1883, Simons left the partnership, and the firm became Holabird and Roche. William Holabird generally acquired the firm's commissions while Roche supervised the firm's design work. Joining the firm in 1882 and finally becoming a partner in 1932, Edward Renwick oversaw the preparation of specifications and contracts. Except for design of the Graceland Cemetery in Chicago, Holabird and Roche's commissions remained rather small until 1885.

Holabird and Roche's design work at Fort Sheridan beginning in 1884 followed by the preparation of plans for Tacoma Building in 1887 secured the company's status as a leading architectural firm. In the Tacoma Building, a twelve story office building, Holabird and Roche introduced the first example of the innovative riveted steel, skeletal construction. The firm succeeded in removing almost all the load from the enclosing walls of the building. Although William LeBaron Jenney developed an internal, multi-story iron and steel structure and curtain wall in the 1884-1885 Home Insurance Building, the frame was bolted rather than riveted and a small part of the load continued to rest on masonry elements (Condit 1968: 123-36). Holabird and Roche utilized the steel structural system in other office buildings such as the Venetian, Pontiac, Marquette, and Old Colony buildings erected between 1891 and 1894 in Chicago. During this period, their subtle stylistic references altered from Richardsonian Romanesque to Classical Revival. They also designed large commercial buildings as well as public buildings, churches, clubs, and dwellings primarily in middle class neighborhood. Even though work declined slightly during the depression years of the 1890s, the firm employed as many as forty draftsmen. Commercial building composed much of their work in the 1890s. Their 1892 design for the sixteen story Monadnock Building included a steel frame with large glass expanses placed in a series of bays. By the mid to late 1890s, the firm's work expanded rapidly in response to urban growth. At the turn of the century, Holabird and Roche continued its design of large loft type office buildings with steel skeletal frame, curtain wall, open floor plan, and floor to ceiling windows between the framing elements. For example, it engaged in such noted commissions as the headquarters for the Chicago Tribune, the Chicago Savings Bank, and the Otis and McCormick buildings in 1910 and 1911, all in Chicago. Its technically innovative work of this period included the use of concrete. The firm also began the design of office buildings outside Chicago, for example the City National Bank and Woodmen of the World building in Omaha and the 1916 and 1924 J. Plankinton Arcade and the 1913 Hotel Wisconsin in Milwaukee. During this period, Holabird and Roche also established its reputation for commercial building design primarily using a structural frame cladded in such materials as glazed terra cotta. They also began design work for electrical and utility companies and completed hotel designs which again took them outside the Chicago area. Their first public commissions included the Cook County Courthouse and the Chicago City Hall in 1906-1907 and 1910 respectively.

Although demand declined during the World War I era, the number of commissions rose rapidly during the building boom of the 1920s. Employees in the firm reached 200 by the mid-1920s. Both William Holabird and Martin Roche continued to contribute to the firm until their deaths in 1923 and 1927 respectively. The son of William Holabird, John Auger Holabird (1886-1945) also attended West Point between 1903 and 1907. However, unlike his father, he continued his architectural training at the Ecoles des Beaux Arts between 1909 and 1913. Here, he associated with John W. Root, Jr. who attended the school during the same period. Root had previously attended Cornell University. Both returned to Chicago in 1914 and served in World War I from which they returned in 1919. They then became partners in the firm in which they gained considerable responsibility. By 1926, John Holabird became a fellow in the American Institute of Architects. During the 1920s, Gilbert Hall, skilled in the preparation of atmospheric perspective studies, became a leading designer in the firm. He produced such a study of Forest Products Laboratory. Like their predecessors, John Holabird managed the commissions while Root oversaw the design work. Their office building designs continued to utilize the structural frame enclosed in minimally decorated curtain walls. Most of the firm's hotels and utility, commercial, institutional, and office buildings were designed with restrained Classical Revival motifs. Such detailing diminished in the period between the construction of the Illinois Life Insurance Building of 1921-1923 and the Michigan Square Building of 1928.

Following the death of Martin Roche in 1927, the firm reorganized as Holabird and Root in 1928. The firm's prodigious output of the 1920s ended with the 1929 stock market crash. During the early 1930s, the Holabird and Root completed contracts signed before that date, and then business began a rapid decline. Because of John Holabird and John Root's training, by the late 1920s the design work of the firm began to shift toward a less ornamental, modern style. For example, the 1928 office building at 333 North Michigan Avenue in Chicago represented a new skyscraper design in which their more squat or bulky massing of the 1920s altered to the more stark, less massive form composed of series of setbacks. Similar designs appeared in the 1928-1929 Dain Tower of Minneapolis; the Central National Bank of Battle Creek; the Chicago Motor Club, the Palmolive, Chicago Daily News, and Chicago Board of Trade buildings in Chicago. Designed in 1928-1929, the Chicago Daily News Building included a cantilevered frame which assisted the building's suspension over the air space of the adjacent railroad facilities (Condit 1968: 189). In 1930, the firm received a gold metal from the Architectural League of New York for the last three buildings.

However, in the early 1930s, Holabird and Root designed only a few skyscrapers and additional office and technical buildings before their commissions declined. These buildings included three in Wisconsin: the 1930 A.O. Smith Corporation Research and Engineering Building in Milwaukee (determined eligible), the Racine County Courthouse in 1930-1931 (NRHP, 1980), and the Forest Products Laboratory in 1931-1932. These buildings continued to display the skeletal design, broad window expanses, a complex massing with set backs, and open interior planning. While most of the firm's building such as 1934 Chicago Institute used abstract, low relief, historically derived ornament, its laboratory designs did not. The Forest Products Laboratory became its first experiment with a stream-line design elaborated with a long series of fins. For the A.O. Smith Corporation headquarters and laboratory, the company designed an innovative, faceted, glass and aluminum curtain wall for the seven story building. The floor plan exhibited forty-five foot spans of space uninterrupted by structural columns. Like the Forest Products Laboratory, it displayed axial symmetry. In 1933 and 1934, John Holabird participated in the Century of Progress Exposition in which he with two other architects designed the Travel and Transportation Building with its suspension structure which supported the domed roof (Condit 1968: 208).

Although the number of commissions severely declined in the mid-1930s, the company retained a high reputation for its work. The firm's business failed to return to its pre-depression volume. John Holabird died in 1945. After re-organization, Holabird and Root regained much of its former size in the 1980s, and remains a substantial, Chicago architectural firm

(Bruegmann 1991 (1): ix-xvii, (2): 201, 400, (3): 47, 75; Blaser 1992: 8-9; 17, 29, 49, 68-69, 89, 111; Wisconsin Historic Preservation Division n.d.; Withey and Rathburn 1956: 292-94).

The Forest Products Laboratory gains significance at the state level. The only other identified building erected by Holabird and Root in Madison was the Manchester Department Store (not extant) designed by both Law, Law, and Potter and Holabird and Root and erected in 1927-1929 (Bruegmann 1991 (3): 11). While constructed using a similar method and elaborated with very limited applied detailing, the building was not comparable in scale, statement of style or in function to the Forest Products Laboratory. The most comparable work to the laboratory is the A.O. Smith Corporation Research and Engineering Building in Milwaukee. Also designed by Holabird and Root, this building was constructed in the same period, 1930; was designed to serve a similar function, scientific research; and represents a similar style, the modernistic International Style. During the 1920s and early 1930s, Holabird and Root became a major architectural firm in the upper Midwest in construction of technical buildings. In this period, the firm designed such buildings in a modernistic style with almost no architectural ornamentation using the steel or reinforced concrete frame covered with a thin surface cladding. Regularly positioned windows spanned the spaces between the piers, and the placement of internal divisions were more dependent on function than structural divisions. Despite its use of this structural form and lack of added applied detailing, the company retained the use of axial symmetry even on technological buildings.

Although not nominated to the National Register of Historic Places, the A.O. Smith building at 3533 North 27th Street was determined eligible for the Register in 1987 (Howard, Needles, Tammen, and Bergendorf 1987). Noted for the development of the steel automobile frame, the A.O. Smith Corporation erected the building to house its research in machine design and engineering functions. The building displays elements common to the International Style. Aluminum, black Benedict stone, and limestone form the outer covering of the seven story, flat roof, steel frame, 174 by 209 foot, building. Except for the first two stories, the building is U-shaped. The space between the wings of the first two floors is closed by an arched roof protecting a low craneway. The fixed windows which span between the structural elements are designed in a saw-tooth configuration so that bays project outward six feet along its three exposed sides. This design was intended to gain as much natural light into the building as possible. The smooth exterior surfaces displays an array of contrasting colors and textures including the aluminum and glass and stone surfaces which occur along the corners, entrance, and base. A limited amount of carving along the parapet forms the only applied ornamentation. The entrance is emphasized by black Benedict stone and centered along the facade. Much of the interior is divided by moveable partitions (Bruegmann 1991 (3): 121-23; Godfrey 1986: 36; Wisconsin Historic Preservation Site Inventory 1980 [7/3]; Vader 1931: 459, 462; Maier 1974: 92). Like the Forest Products Laboratory, the building gained considerable architectural recognition in both the Architectural Record (Vader 1931: 459-62) and the Architectural Forum (1931: 525-35).

The A.O. Smith building was also described as an expression of its functions. The Architectural Forum noted that (1931: 525):

> It is an example of a structure in which three influences of design, engineering and business have been combined to produce an unusual solution to the architectural problem. An architectural design has been formulated that is remarkable for its simplicity and for it obvious fusion with the requirements of

engineering and business, and it is evidence of this fusion which stamps the building as being worthy of more than passing notice....

To meet the needs of the engineering group and research laboratories, Holabird and Root planned an open building without structural interruptions and with moveable partitions so that space might be rearranged to meet new research needs. The innovative V-shaped, plate glass bays of the building provided the needed, additional light as well as adding interest to the design composition. The U-shaped building surrounds a two story, arch-roofed court utilized as a craneway to test mechanical products (Architectural Forum 1931: 525-527).

The Forest Products Laboratory, then, possesses strong parallels in style, construction date, design firm, and function to the A.O. Smith Corporation Research and Engineering building in Milwaukee. Similar examples with parallel research or technological function and design were not identified locally.

The Forest Products Laboratory achieves significance between 1931-1932 and 1944. Indicating the laboratory's significance in the area of architecture, the period begins with the construction date of the building. The following twelve years of this period to 1944 recognize the contributions made by Forest Products Laboratory to scientific research in the field of wood and wood products research.

Conclusion

The Forest Products Laboratory gains significance in the area of architecture as an outstanding example of an International Style, technical building designed by Holabird and Root in 1931-1932. Its state level of comparison draw functional and stylistic parallels with the A.O. Smith building. Because of the contributions to scientific research by the National Forest Service in wood and wood products which occurred in the building between 1932 and 1944, the laboratory also achieves significance in the area of science. Since the federal facility possessed national-level impact, the building has significance at the national level. Its construction date and period of function place the period of significance between 1931-1932 and 1944.

(1) Bruegmann 1991 (3): 188-90; Holabird and Root 1931a; USDA Forest Service 1931a; 1931b; 1931-32; 1932; Nelson 1971: 102.

(2) Architectural Forum 1933: 95-102; Bruegmann 1991 (3): 188-90; Holabird and Root 1931a; USDA Forest Service 1931b; 1931-32; 1932.

(3) Architectural Forum 1933: 95-96; Bruegmann 1991 (3): 188; USDA Forest Service 1931a.

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10. Geographical Data

Verbal Boundary Description

The east-west boundary of the Forest Products Laboratory Building spans between the north end of Gifford Pinchot Drive and the east curb of Highland Avenue. The north-south boundary follows the exterior curb of the landscaped area and east parking lot east of the laboratory between the north end of Gifford Pinchot Drive and the laboratory. As this boundary extends west toward the north and south elevations of the Laboratory, it follows an arbitrary line twenty feet north of the building and 70 feet south of the building. The north and south sections of the boundary then extend west to the east curb of Highland Avenue which forms the west boundary of the property (see enclosed map of the Forest Products Laboratory Complex).

Boundary Justification

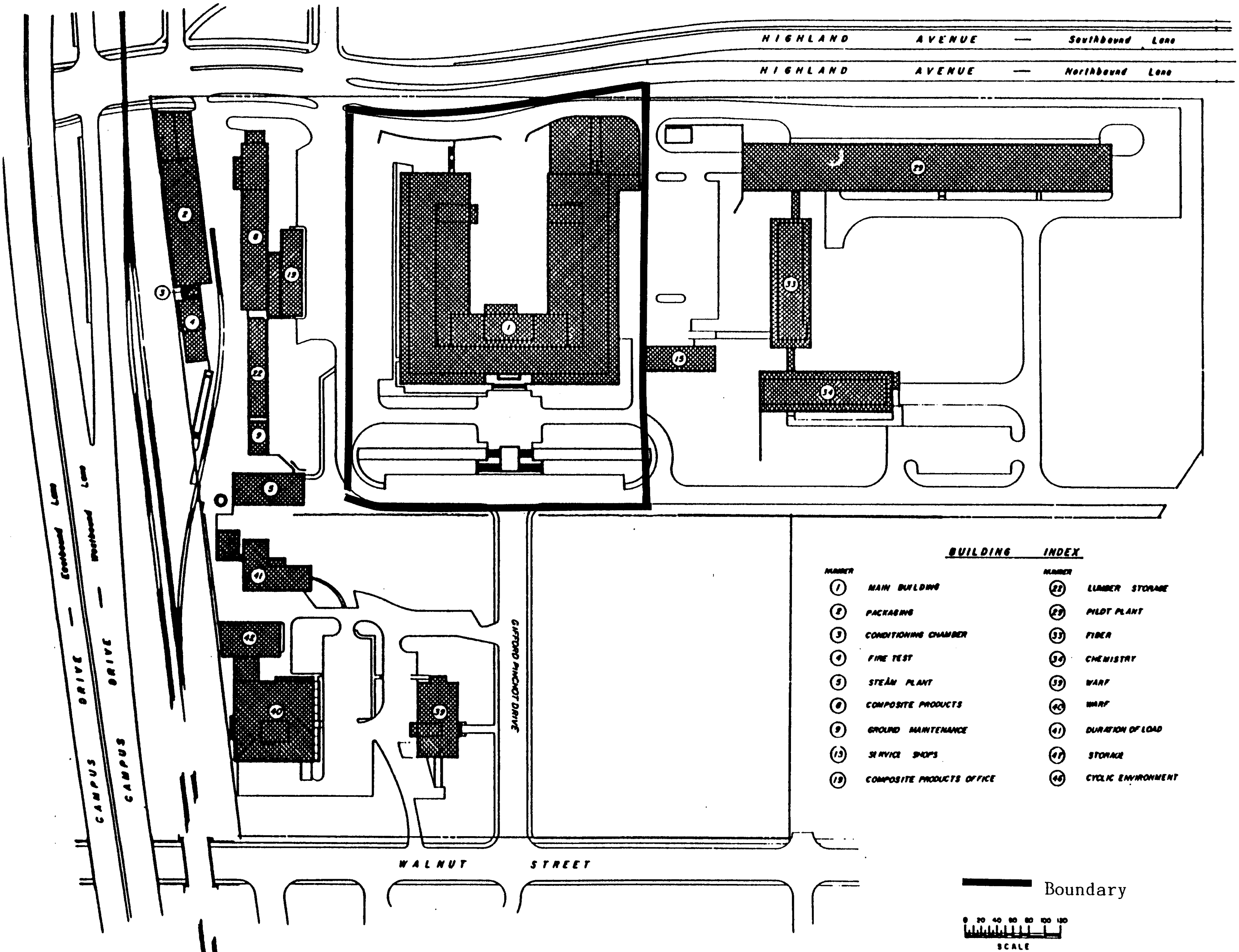
The buildings in the Forest Products Laboratory complex contiguous with the main Forest Products Laboratory Building are not eligible for the National Register because of construction in the modern era after 1944 or because of significant building alteration. Thus, the boundaries exclude buildings not eligible for the National Register and enclose the main building and much of the 1934-1935 landscaping associated with it (Madison Paving Company 1934). This landscaping included part of the current south parking lot, the east parking lot, and the associated terraced landscaping but not the north parking lot.

Photographic Documentation

Property Name: Forest Products Laboratory
Location: Madison, Dane County, Wisconsin
Photographer: Forest Products Laboratory staff
Date: February, 1994
Location of Negatives: State Historical Society of Wisconsin

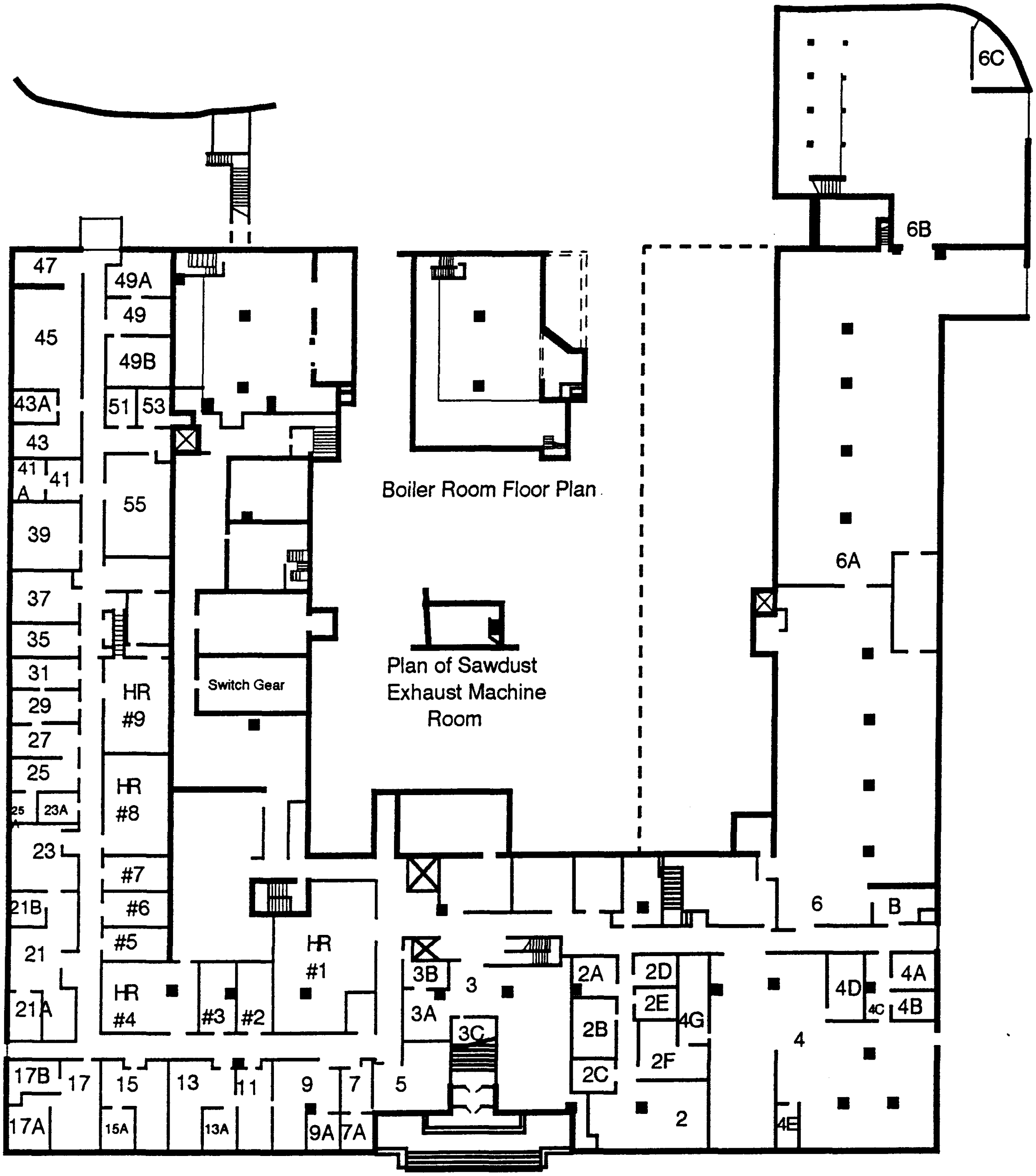
Description and Direction of View:

1. The east facade facing west.
2. The south elevation taken from the south boundary of the nominated property facing northwest.
3. The interior courtyard facing east.
4. The single story additions at the west elevation of the north wing facing northeast.
5. The north elevation with the single story additions to west elevation of the north wing to the far right, facing southwest.
6. The north elevation facing southwest.
7. The east facade including the terraces and circle drive facing northwest.
8. View of the main, first floor entrance lobby facing east toward the front entrance doors from the elevator lobby.



FOREST PRODUCTS LABORATORY

Madison Dane County Wisconsin

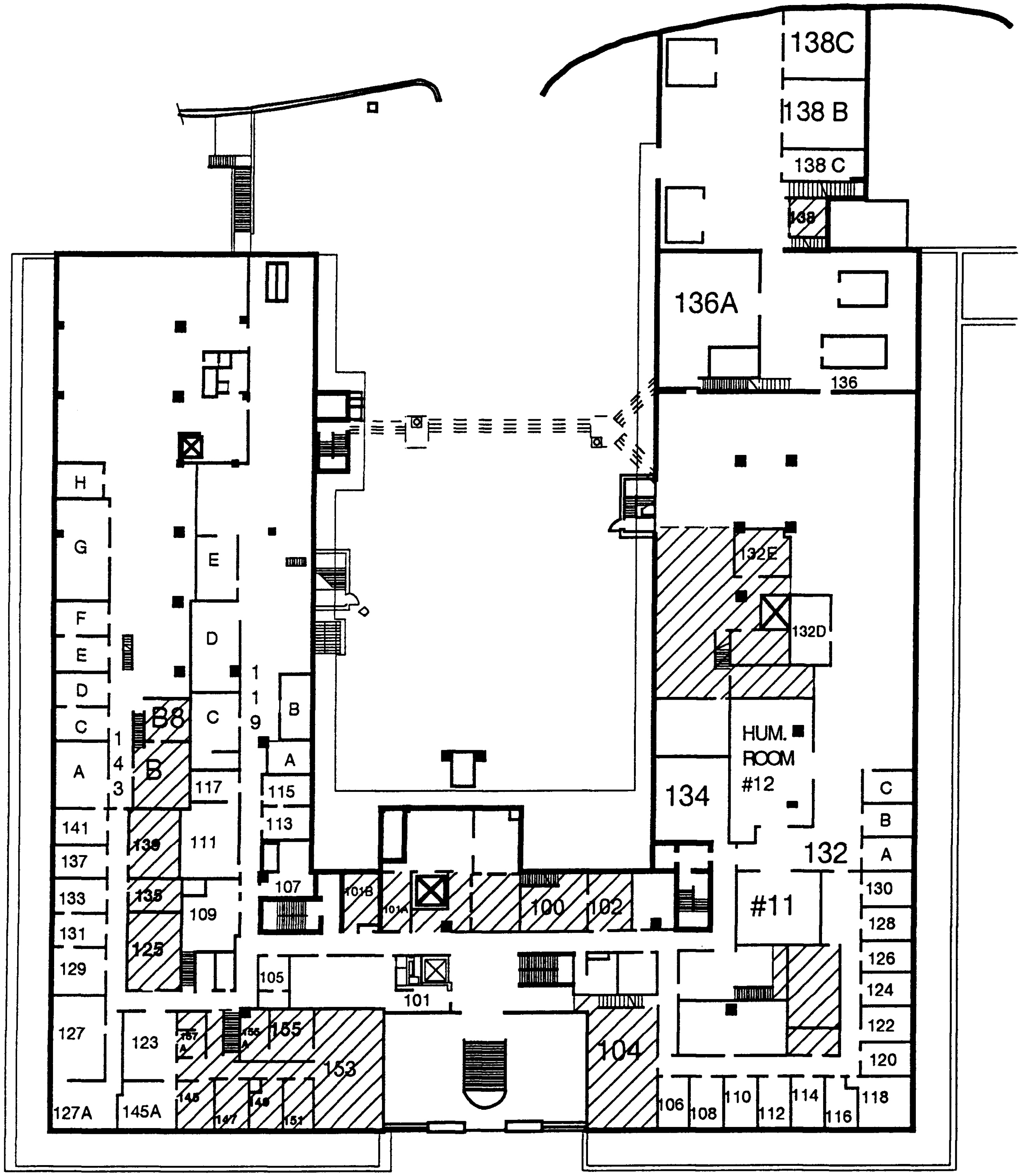


BUILDING 1
GROUND FLOOR

FOREST PRODUCTS LABORATORY
MADISON, DANE COUNTY, WISCONSIN

SCALE

0 16 32 feet



BUILDING 1

FIRST FLOOR

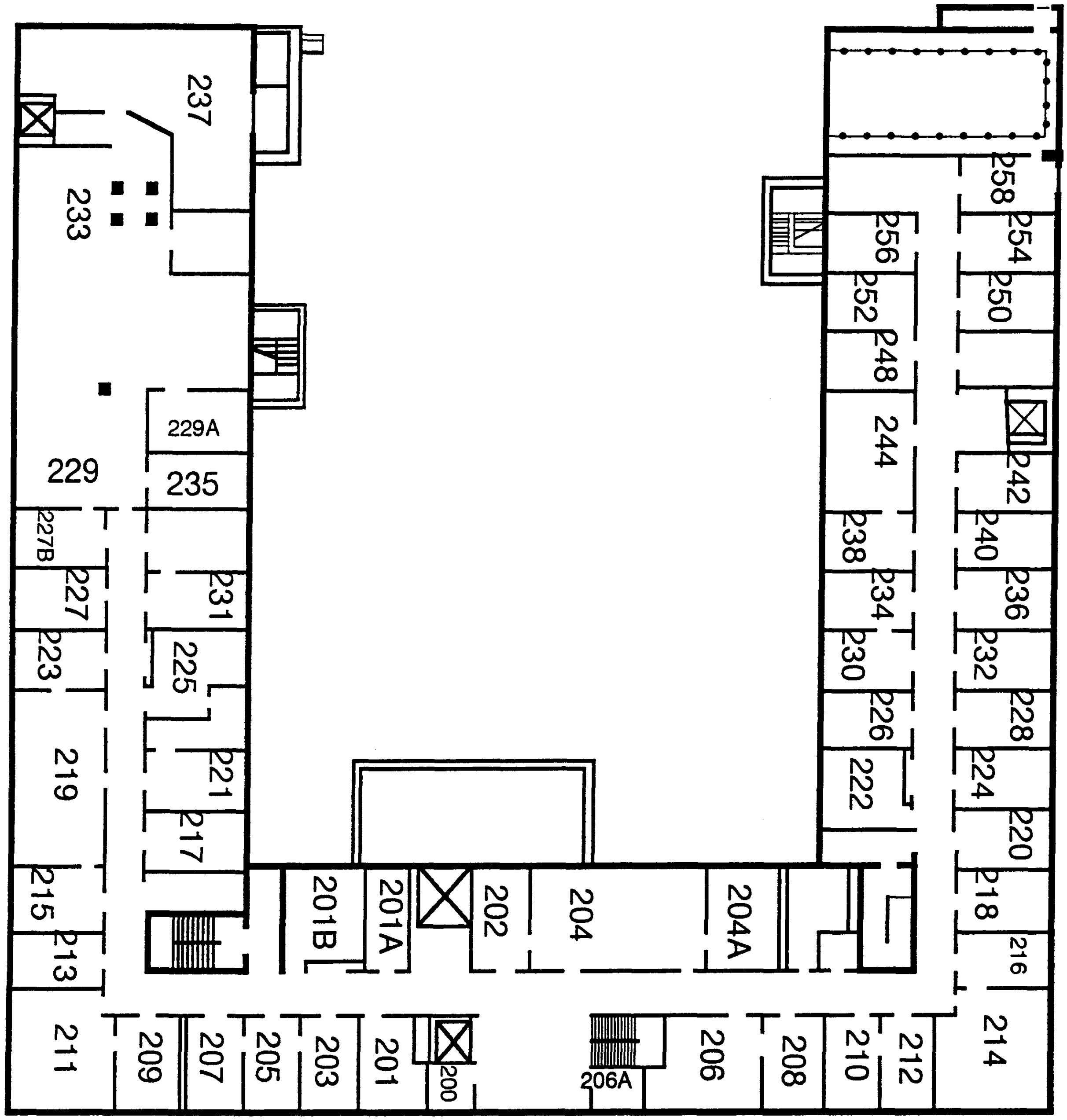
NORTH →

FOREST PRODUCTS LABORATORY
MADISON, DANE COUNTY, WISCONSIN

SCALE

0 16 32 feet

INDICATES MEZZANINE FLOOR



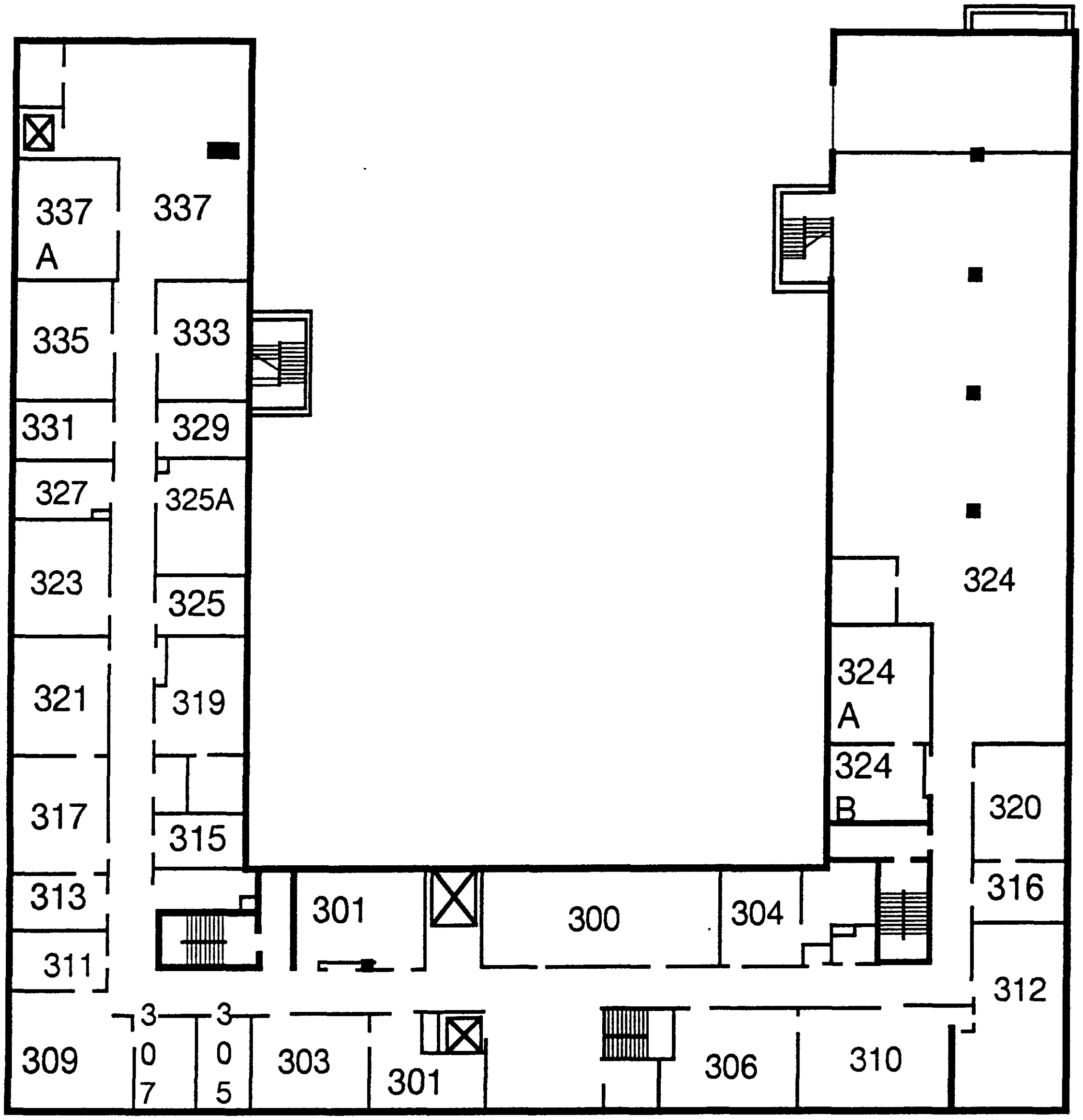
BUILDING 1
SECOND FLOOR

NORTH

FOREST PRODUCTS LABORATORY
MADISON, DANE COUNTY, WISCONSIN

SCALE

0 16 32 feet



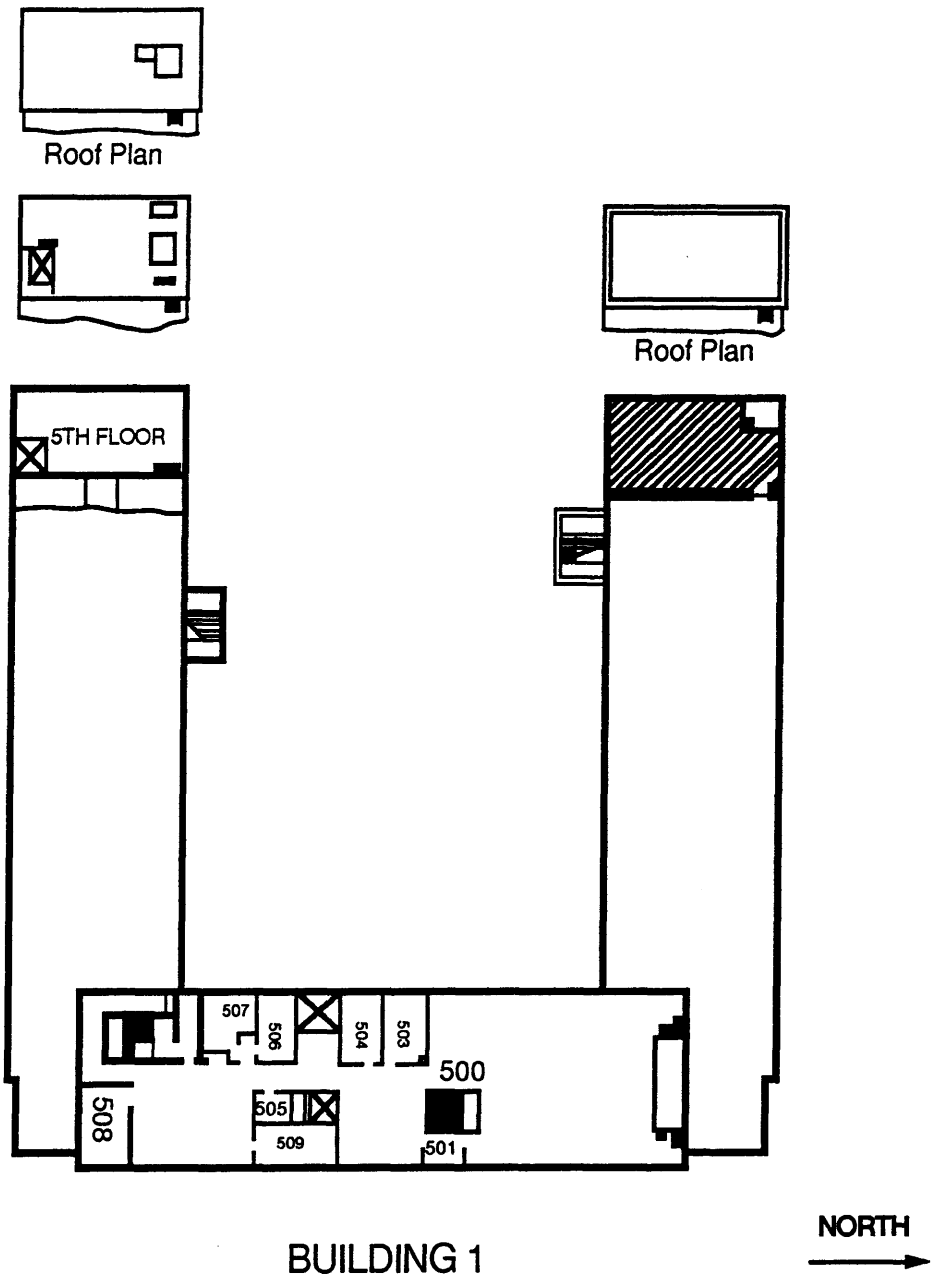
BUILDING 1
THIRD FLOOR

NORTH

FOREST PRODUCTS LABORATORY
MADISON, DANE COUNTY, WISCONSIN

SCALE

0 32 FEET

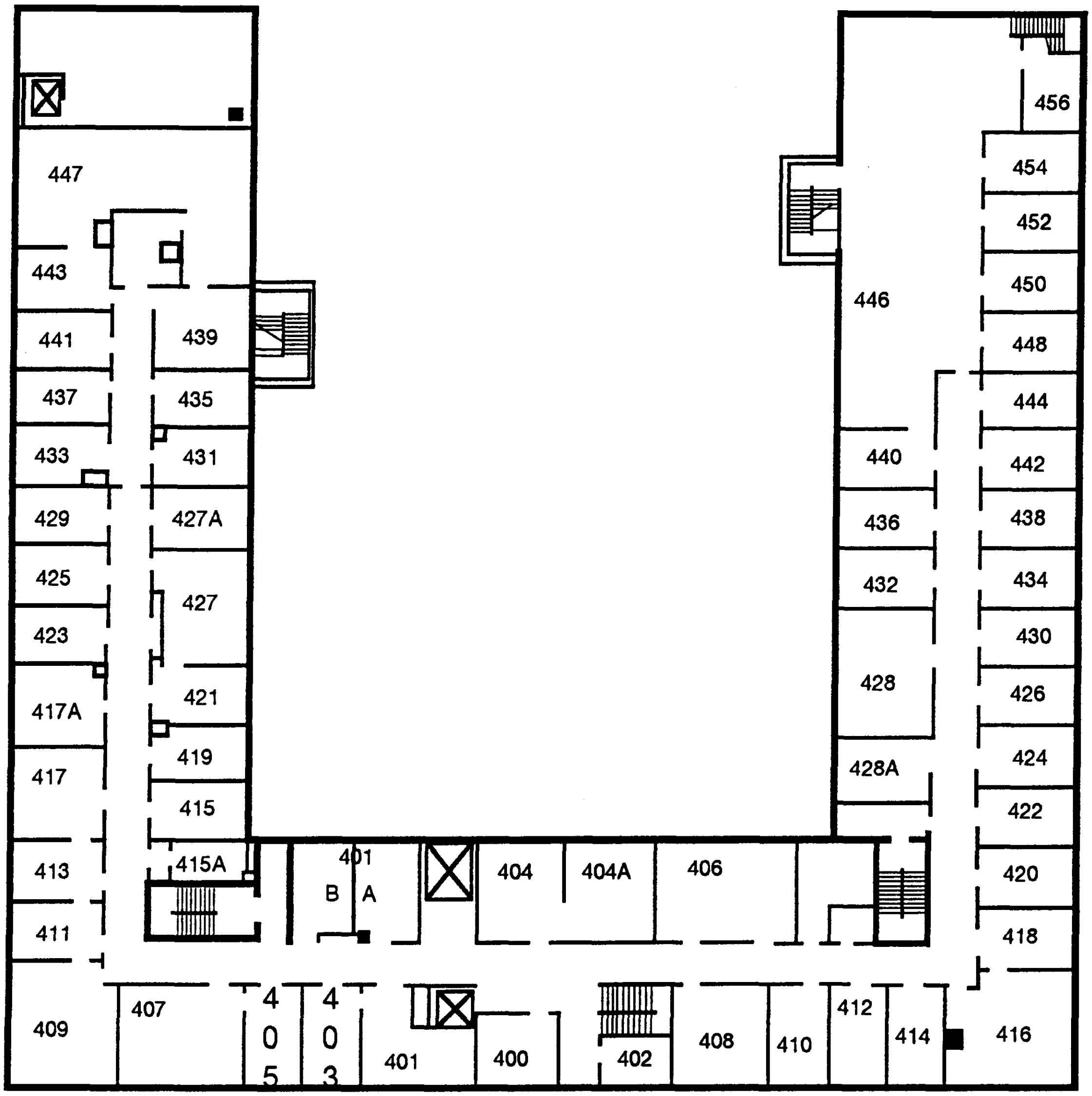


BUILDING 1
FIFTH FLOOR

FOREST PRODUCTS LABORATORY
MADISON, DANE COUNTY, WISCONSIN

SCALE

0 16 32 feet

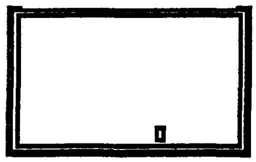


BUILDING 1
FOURTH FLOOR

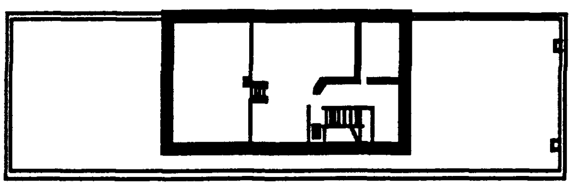
FOREST PRODUCTS LABORATORY
MADISON, DANE COUNTY, WISCONSIN

SCALE

0 16 32 feet



PENT HOUSE ROOF PLAN



BUILDING 1

PENT HOUSE FLOOR PLAN

NORTH →

FOREST PRODUCTS LABORATORY
MADISON, DANE COUNTY, WISCONSIN

SCALE

0 16 32 feet