8607

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NATIONAL REGISTER

NPS FORM 10-900 (Rev. 8-86) OMB No. 1024-0018 [SD-SHPO # ECA-OH-597-1/89]
[use paper with at least 25% cotton rag content, use NLQ or LQ printer]

United States Department of the Interior -- National Park Service
NATIONAL REGISTER OF HISTORIC PLACES -- REGISTRATION FORM

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. See instructions in Guidelines for Completing National Register Forms (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering "NA" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

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1. **Name of Property**
historic name: Experimental Rammed Earth Machine Shed
other name/ site number: SDSU Property No. 0606 / H.H. DeLong Rammed Earth Building

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2. **Location**
street & number: South Dakota State University Campus /NA/ not for publication
city, town: Brookings /NA/ vicinity
state: SOUTH DAKOTA code: SD county: Brookings code: SD 011 zip code: 57007

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3. **Classification**

Ownership of Property:	Category of Property	Number of Resources within Property: Contributing	Noncontributing	
/ / private	/XX/ building(s)	1		buildings
/ / public-local	/ / district			sites
/XX/ public-state	/ / site			structures
/ / public-federal	/ / structure			objects
	/ / object	1	0	Total

Name of related multiple property listing:
NA

Number of contributing resources previously listed in the National Register: 0

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11. **Form Prepared by**
name/title: Sherry DeBoer & Janet Gritzner, consultants; with T/A by J. Rau, SHPO staff
organization: Brookings Historic Preservation Commission date: January 15, 1991
street & number: P. O. Box 270 telephone: 605-692-7104 (DeBoer)
city or town: Brookings state: SOUTH DAKOTA zip code: 57006

4. **State/Federal Agency Certification**

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

[signature] 7/12/93
Signature of certifying official Date

South Dakota SHPO
State or Federal agency or bureau

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

Signature of commenting or other official Date

State or Federal agency or bureau

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5. **National Park Service Certification**

I, hereby, certify that this property is:

Entered in the National Register

✓ entered in the National Register — [signature] — 8/26/93
___ see continuation sheet
___ determined eligible for the National Register
___ see continuation sheet
___ determined not eligible for the National Register
___ removed from the National Register
___ other, (explain)_____

Signature of the Keeper Date

6. **Function or Use** (enter categories from instructions)

Historic functions:	Current Functions:
OTHER: Building Experiment Testing Facility	VACANT/NOT IN USE

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7. **Description**

Architectural Classification:
(enter categories from instructions)
OTHER: Rectangular Rammed Earth Building

Materials:
(enter categories from instructions)
foundation Concrete
walls Earth
Stucco
roof Asphalt
other Wood

Describe present and historic physical appearance: /XX/ see continuation sheet

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8. **Significance**

Certifying official has considered the significance of this property in relation to other properties: / / nationally / / statewide /XX/ locally

Applicable National Register Criteria / / A / /B /XX/C / /D

Criteria Considerations / /A / /B / /C / /D / /E / /F / /G

Areas of Significance (enter from instructions)
Engineering

Period of Significance
1935

Significant Dates
1935

Significant Person
NA

Cultural Affiliation
NA

Architect/Builder
Patty, Ralph L.
DeLong, Henry H.

State significance of property, and justify criteria, criteria considerations, and periods of significance noted above /XX/ see continuation sheet

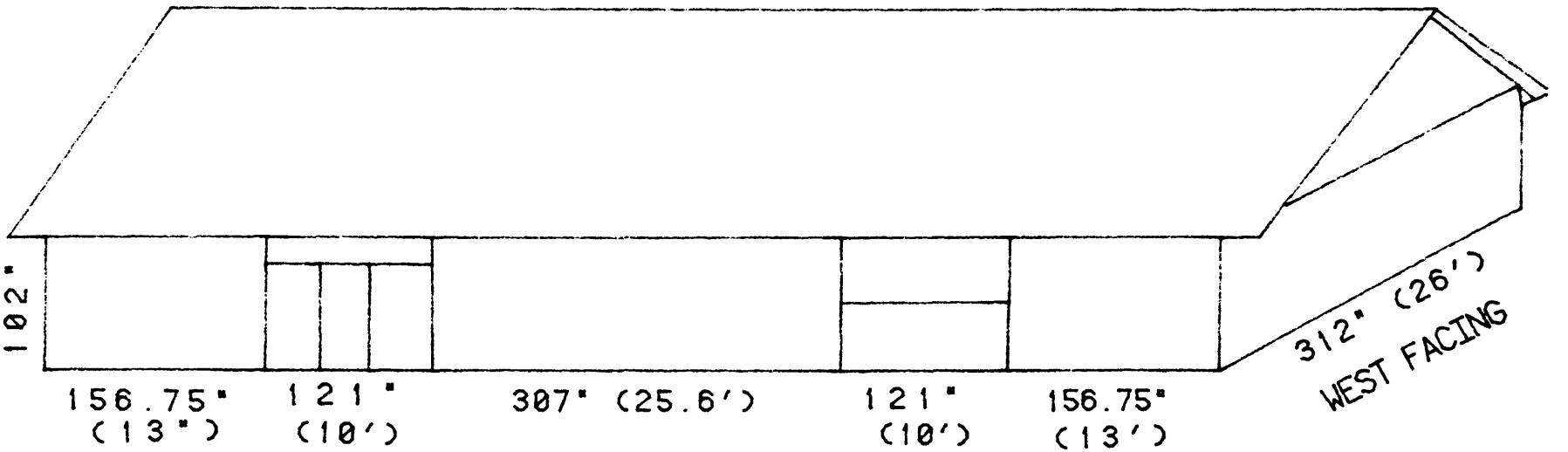
Situated in the northwest corner of the campus of South Dakota State University, the Experimental Rammed Earth Machine Shed (No. 0606) is a simple rectangular earthen building constructed in 1935 by professors and students of agricultural engineering in order to test rammed earth building techniques. Rising just over eight feet to the eaves from concrete footings, the building measures 26-feet in width by 72-feet in length. It is capped by a gable roof covered with asphalt shingles. The one-foot thick walls are constructed of ancient "rammed earth" or "pise' de terre" technology, in which damp raw soil is poured layer-after-layer into forms and then tamped with heavy rods until dry and hard. One section of the north facade is constructed of sun-dried earthen blocks (similar to adobe). Deteriorating stucco of various experimental materials covers the exterior surfaces of the walls. Wood frame gables are clad with clapboard siding.

Two 10-foot-wide wooden doors, each located 13 feet from its respective corner, punctuate the north axial facade of the building. Three evenly spaced 40-inch-wide multiple-pane windows and a single 10-foot-wide wooden door pierce the south facade. The gable ends of the building feature no fenestration.

The building was designed as a model machine shed; however, its real purpose was experimental in nature. Professors Ralph L. Patty and Henry H. DeLong used this facility to test rammed earth construction properties, protective coatings, and functional designs. After over fifty years, it survives in fair to good structural condition despite neglect in recent years. Some of the experimental stucco has failed causing slight damage to the earthen walls. Nevertheless, the building has stood up well to the varied environment of eastern South Dakota.

Elevation Sketch-- North & West Facades on reverse side

RAMMED EARTH MACHINE SHED

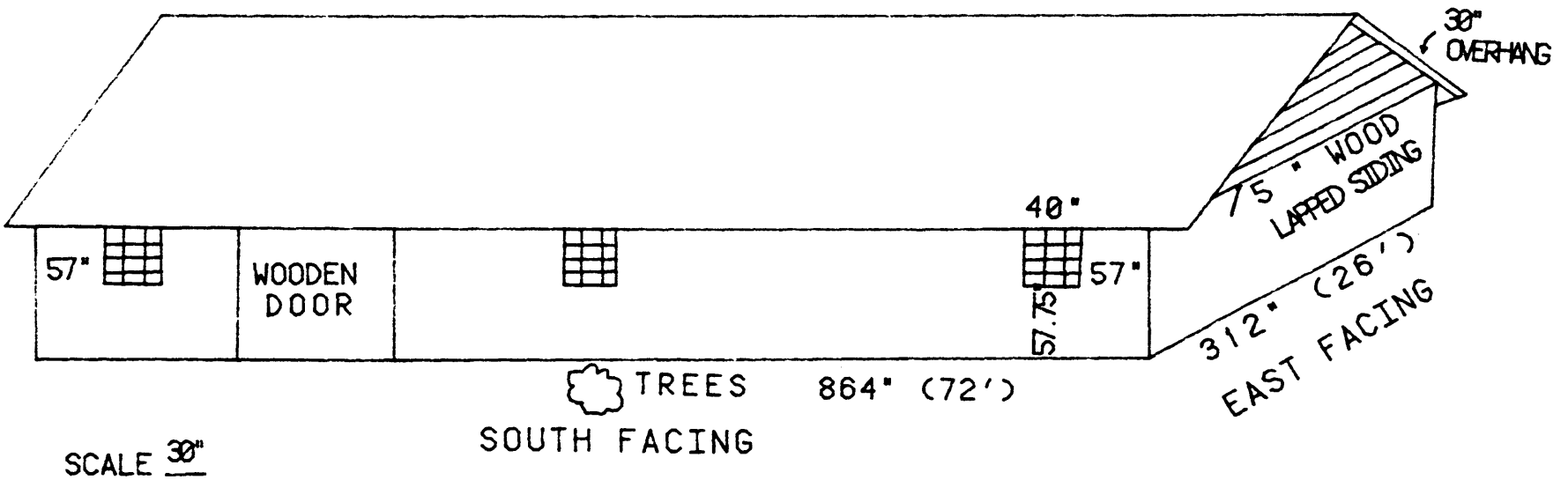


SCALE $\frac{}{30"}$

Elevation Sketch-- South & East Facades on reverse side

EXPERIMENTAL RAMMED EARTH

MACHINE SHED



Under Criterion C of the National Register Criteria, the Experimental Rammed Earth Machine Shed (No. 0606) is significant in the area of engineering, because it is one of only three remaining resources on the campus of South Dakota State University (formerly South Dakota State College) that were products of testing conducted during the 1930s by the agricultural engineering department. Directed by Professor Ralph L. Patty with the assistance of Professor Henry H. DeLong, students erected several rammed earth or pise' de terre buildings and walls with a variety of material compositions and tested their suitability for low cost agricultural use during the lean economic years of the Great Depression. Patty wrote numerous professional articles and reports based on these tests and drew national attention to the work of the department. Of the work on the campus, only this building and two nearby garden walls, which are nominated separately, remain extant. Under the South Dakota Historical Preservation Plan, the property relates to the following historic context: VI. The Great Depression.

Rammed earth construction, also called pise' construction or "pise' de terre," entails pouring or packing damp raw soil layer-after-layer into wooden forms and then tamping the material with heavy rods until dry and hard. The forms are then removed revealing a smooth freestanding wall. Often an exterior veneer is applied to protect the earthen walls from harmful environmental elements.

The technique can be traced to ancient times. Even the Roman natural historian Pliny (23-79 A.D.) described rammed earth towers reportedly erected by the Carthaginian general Hannibal (247-183 B.C.) during his campaign in Spain. Throughout the Middle Ages and early modern times, a variety of earthen construction technologies including puddled clay, unfired clay brick, and wattle-and-daub, as well as rammed earth developed in Europe and spread to the New World. By the 18th Century, several buildings in English Colonial America were of pise' construction. Furthermore, S. W. Johnson of New Brunswick, New Jersey, conducted detailed experiments with rammed earth and published his findings in 1806.

Earthen construction also saw early use in Dakota Territory. Fur traders and homesteaders were quick to build using native materials partly out of necessity and partly out of tradition. Certainly, the ubiquitous plains sod house is one prominent illustration. But, European immigrants, who had centuries of experience with well crafted earthen folk buildings in the old country, brought many of their traditional building arts with them. German-Russian and Czech pioneers, for example, used rammed earth as well as other sometimes less refined earthen techniques in building many of their first generation houses and barns.

Yet except for the tests by Johnson at the beginning of the 19th Century, serious scientific consideration of the technology as a model for modern America lagged until the 20th Century. T. A. H. Miller from the Division of Agricultural Engineering at the U. S. Department of Agriculture conducted some of the earliest of these tests on rammed earth buildings. In 1926, the owners of the Hill Crest Plantation in South Carolina stirred Miller's interest by asking for help repairing the rammed earth Church of the Holy Cross, which stood on their property. Numerous published tests by Miller and others ensured for the next two decades.

Dr. Ralph L. Patty, head of the agricultural engineering department at South Dakota State College, the state's only land grant institution, began his work with rammed earth building technology in January of 1930 in an attempt to respond to constituents' questions addressed to the Agricultural Experiment Station. Assisted by colleague Henry H. Delong and student labor, he first experimented with the construction of rammed earth livestock buildings. In the 1933 South Dakota Agricultural Experiment Station Bulletin No. 277 he published an article entitled "Rammed Earth Walls for Farm Buildings," in which he provided details of the methods used to construct a rammed earth poultry house (which is no longer extant). The group examined among other things the insulating properties of such walls in the control of frost deposit for housing livestock. Patty's second full-sized rammed earth building was the machine shed (No. 0606) nominated here. It was built in 1935 to experiment with different building techniques and to study protective coverings. Most of his later research was on paints, plasters, and different methods for bonding stucco to rammed earth, many of which he tested on the machine shed.

Patty received much national attention for the research. By 1936, all inquires about rammed earth received by the U. S. Department of Agriculture were referred to Dr. Patty. Scores of foreign and domestic visitors came to inspect his work first hand. In addition, he published numerous reports about his tests. The machine shed is the subject of several of these articles including a 1940 report entitled "Paints and Plasters for Rammed Earth Walls," South Dakota Agricultural Experiment Station Bulletin No. 336, in which Patty discussed testing on plaster panels. Evidence of these test panels is still visible on the building.

Promotion of the idea continued through the 1930s, in a large part due to the efforts of South Dakota publicist Leland Case and his brother Congressman Francis Case. Moreover, New Deal programs such as the Resettlement Administration and Works Progress Administration are known to have undertaken the construction of several rammed earth buildings. But, it was Patty's work and that of his colleague and students that proved the worthiness and economy

of rammed earth agricultural buildings. From 1930 to his death in 1941, he directed the construction of 2 full-sized buildings, a smaller building, 2 garden walls, and 29 smaller wall sections at South Dakota State College. Interest in rammed earth for agricultural building waned during World War II, due to improved commodity prices and scarcity of laborers, and the experiments were discontinued. Eventually all properties except the machine shed and the two garden walls were demolished. The Experimental Rammed Earth Machine Shed, thus, remains a rare and often overlooked testament to the ingenuity and skill of Patty and his fellow researchers. In a recent interview Henry DeLong (now deceased) said of durability of the machine shed: "The fact that it's been up there 50 years now writes its own story." (Brookings Register, September 27, 1988)

The period of significance of the nominated property does not extend beyond its date of construction in 1935.

9. **Major Bibliographical References** **/XX/ see continuation sheet**

Previous documentation by 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:
/XX/ State historic preservation office
/ / Other State agency
/ / Federal agency
/XX/ Local government
/ / University
/ / Other
Specify repository:
Brookings Historic Preservation Commission

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10. **Geographical Data**
Acreage of property: Less than one acre

UTM References:

	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
A =	/14/	/676-260/	/4909-640/	B =	/ /	/	/ / /
C =	/ /	/	/ / /	D =	/ /	/	/ / /

Quad: Brookings Scale: 1:24000

/ / see continuation sheet

Verbal Boundary Description:

/XX/ see continuation sheet

Boundary Justification:

/XX/ see continuation sheet

"Building with Rammed Earth." Northwest Farmer. XLV (January 1926).

Coffin, E. H. and H. B. Humphrey. Lower Cost Building: Handbook on Building Walls with Rammed Earth. New York: The Publicity Corporation. 1934.

_____. "Making Houses Out of Earth." Wallaces' Farmer. XLVIII (December 1923): 1723.

_____. "Rammed Earth Houses." Country Gentleman. LXXXIX (June 1924): 11.

Dacy, G. H. "Rammed Earth Lowers House Cost." Popular Mechanics. XLII (November 1924): 838-840.

"DeLong Recalls His Rammed Earth Research." Brookings (South Dakota) Register. September 27, 1988.

Ellington, Karl Johann. "More Mud Houses." Scientific American. CXXXIV (March 1926): 174-175.

"Experiments in Rammed Earth Construction Gains Attention." Brookings Register. November 5, 1936.

Johnson, S. W. Rural Economy: Containing a Treatise on Pise' Building as Recommended by the Board of Agriculture in Great Britain; with Improvements by the Author; On Buildings in General; Particularly on the Arrangement of These Belonging on Farms; On the Culture of the Vine and on Turnpike Roads. N. p. 1806.

Miller, T. A. H. "The Durability of Rammed Earth Walls." Agricultural Engineering. X (August 1929): 259-260.

_____. Report on the Condition of Rammed Earth Buildings Built 1820-1854, Sumter, South Carolina. Mimeographed: [Washington]: U. S. Department of Agriculture, Bureau of Agricultural Engineering. 1926.

_____. "Pise' de Terre Houses: An Ancient Style Revived." Country Gentleman. XCII (April 1927): 13-14.

_____. and M. C. Betts. "Rammed Earth Walls for Buildings." in Farmers Bulletin No. 1500. [Washington]: U. S. Department of Agriculture. 1927.

"North Dakota Men Inspect New Type of Building Material." Brookings Register. May 14, 1935.

Patty, Ralph L. "Determining Colloids in Soil for Rammed Earth Construction." Agricultural Engineering. XVI (July 1935).

_____. "Paints and Plasters for Rammed Earth Walls." in South Dakota Experiment Station Bulletin No. 336. [Brookings, SD: South Dakota State College]. 1940.

_____. "Protective Coatings for Rammed Earth Walls." Agricultural Engineering. XIV (March 1933).

_____. "Rammed Earth for Farm Building Walls." Agricultural Engineering. XV (January 1934).

_____. "Rammed Earth Walls for Farm Buildings." South Dakota Agricultural Experiment Station Bulletin No. 277. [Brookings, SD: South Dakota State College]. 1933.

_____. "The Relationship of Colloids in Soils to Its Favorable Use in Pise and Rammed Earth Walls." South Dakota Experiment Station Bulletin No. 298. [Brookings, SD: South Dakota State College]. 1936.

Porter, J. W. "Houses of Mud." Scientific American. CXXX (April 1924): 233.

"Rammed Earth Construction." Dakota Farmer XLV (November 1925): 989.

"South Dakota State College Agriculture and Mechanic Arts Building Survey." M.s.: [Pierre, SD]: South Dakota Temporary State Building and Planning Commission. July 1955.

"Suggests Rammed Earth for Building." Brookings Register. August 17, 1933.

Vivian, C. H. "Houses of Rammed Earth." Building Age. XLIX (September 1927): 102-104.

VERBAL BOUNDARY DESCRIPTION

The nominated property is bounded by a set of imaginary lines that intersect to form a rectangle around the rectangular rammed earth machine shed. The western boundary line lies 10 feet west of the west gable-end wall of the building and runs parallel to that wall. The northern boundary line lies 10 feet north of the north axial wall of the building and runs parallel to that wall. The eastern boundary line lies 10 feet east of the east gable-end wall of the building and runs parallel to that wall. The southern boundary line lies 10 feet south of the south axial wall of the building and runs parallel to that wall. The property is located in the Southeast Quarter of the Southeast Quarter of the Northeast Quarter of Section 23, Township 110 North, Range 50 West, 5th Principal Meridian, City of Brookings, Brookings County, South Dakota.

BOUNDARY JUSTIFICATION

The boundaries of the nominated property are set to include only the machine shed and to exclude any other buildings, structures, or roadways.

NPS Form 10-900-a
(8-86)

OMB Approval No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number photos Page 1

1.
Experimental Rammed Earth Machine Shed
Brookings, Brookings County, South Dakota
By: Howard Phillips
August 1989
Negative: Brookings Historic Preservation Commission
North (front) facade, camera facing south
Photograph #1

2.
Experimental Rammed Earth Machine Shed
Brookings, Brookings County, South Dakota
By: Howard Phillips
August 1989
Negative: Brookings Historic Preservation Commission
North facade surface disrepair (northwest corner),
camera facing south
Photograph #2

3.
Experimental Rammed Earth Machine Shed
Brookings, Brookings County, South Dakota
By: Howard Phillips
August 1989
Negative: Brookings Historic Preservation Commission
West and north facades, camera facing east-southeast
Photograph #3

4.
Experimental Rammed Earth Machine Shed
Brookings, Brookings County, South Dakota
By: Howard Phillips
August 1989
Negative: Brookings Historic Preservation Commission
West and south facades, camera facing east-northeast
Photograph #4

5.
Experimental Rammed Earth Machine Shed
Brookings, Brookings County, South Dakota
By: Howard Phillips
August 1989
Negative: Brookings Historic Preservation Commission
South facade, camera facing north
Photograph #5

6.
Experimental Rammed Earth Machine Shed
Brookings, Brookings County, South Dakota
By: Howard Phillips
August 1989
Negative: Brookings Historic Preservation Commission
East and north facades, camera facing west-southwest
Photograph #6