

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.

1. Name of Property

historic name: Experimental Rammed Earth Wall
other name/ site number: Dean's Residence Rammed Earth Wall

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street & number: South Dakota State University Campus /NA/ not for publication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

3. Classification

Table with 3 columns: Ownership of Property, Category of Property, and Number of Resources within Property (Contributing, Noncontributing). Includes rows for private, public-local, public-state, and public-federal ownership, and building(s), district, site, structure, object categories. Total contributing resources: 1, noncontributing: 0.

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 24, 1991
street & number: P. O. Box 270 telephone: 605-692-7104 (DeBoer)
city or town: Brookings state: SOUTH DAKOTA zip code: 57006

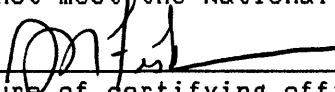
page 2: Experimental Rammed Earth Wall  
property name

, Brookings  
county

, SOUTH DAKOTA  
state

4. State/Federal Agency Certification

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

  
Signature of certifying official

5/25/91  
Date

SHPO South Dakota  
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

5. National Park Service Certification

I, hereby, certify that this property is:

entered in the National Register

see continuation sheet

determined eligible for the National Register

see continuation sheet

determined not eligible for the National Register

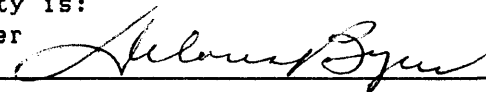
removed from the National Register

other, (explain) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Entered in the  
National Register



6/28/91

Signature of the Keeper

Date

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property name

, Brookings  
county

, SOUTH DAKOTA  
state

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

Historic functions:  
OTHER: Building Experiment  
Testing Facility

Current Functions:  
OTHER: Garden Wall

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**7. Description**

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

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

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**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: / / / / /XX/  
nationally statewide 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  
1932-1933

Significant Dates  
1932-1933

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

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Continuation Sheet**

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Situated in the northwest corner of the campus of South Dakota State University just north of the official residence of the Dean of Agricultural and Biological Sciences, the Experimental Rammed Earth Wall (Dean's Residence Rammed Earth Wall) is an earthen garden wall constructed in 1932 and 1933 by professors and students of agricultural engineering in order to test rammed earth building techniques. Roughly in the shape of a "T," the 14.75-inch-thick wall rises from concrete footings. It is constructed of ancient "rammed earth" or "pisé 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. Stucco of various experimental materials covers the wall surfaces. A twenty-inch-high wood-shingled hipped roof, with a 9.75-inch overhang, runs the entire length of the structure.

The wall can be divided into three main sections. Section "A" runs west from Medary Street 750.5 inches (62.54 feet) and is 64 inches high to the eave. Forming the leg of the T-shaped figure, Section "B" extends 1394.13 inches (116.18 feet) south from the western end of Section "A" and can be divided into subsections. At a point 966.63 inches (80.55 feet) south from its point of origin, Section "B" jogs east for 90 inches (7.5 feet). It then continues south for another 427.5 inches (35.63 feet). Heights from grade along Section "B" vary from 50 inches to 64 inches to the eave. Section "C" runs west from the intersection of Sections "A" and "B" 726.75 inches (60.56 feet) and is 52 inches high to the eave. Extending from each of the three ends of the T-shaped figure is a 100-inch diagonal wing.

Professors Ralph L. Patty and Henry H. DeLong and their students used the garden wall to conduct carefully controlled experiments of rammed earth technology and publicized the results. Today, it survives in generally good condition. However, a small area of stucco has fallen off the northwest-facing wing at the end of section "C", exposing the inner rammed earth wall.

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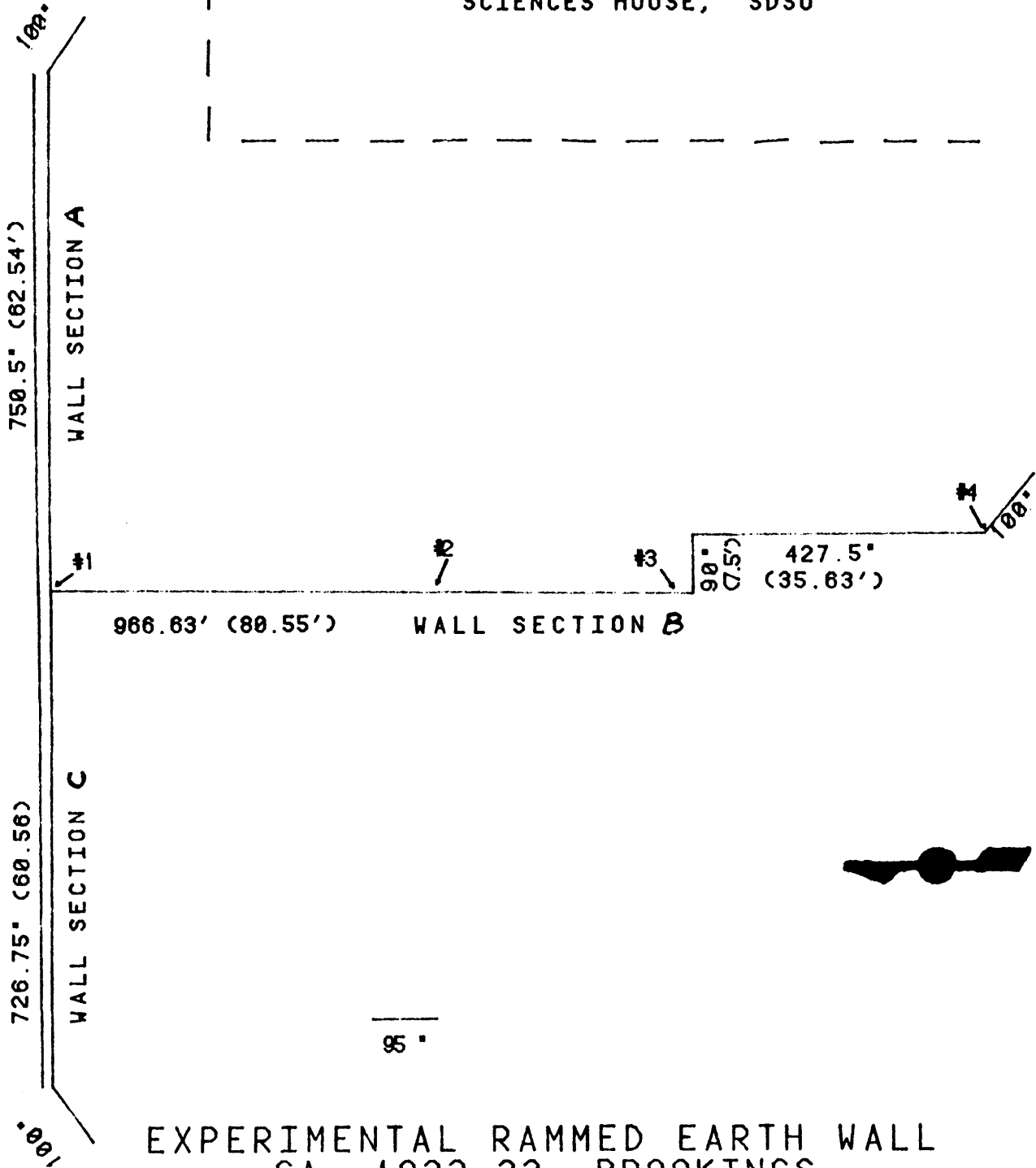
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Experimental Rammed Earth Wall (Dean's Residence Rammed Earth Wall)

Sketch Map on Reverse Side

MEDARY AVE.

DEAN OF AGRICULTURAL AND BIOLOGICAL  
SCIENCES HOUSE, SDSU



EXPERIMENTAL RAMMED EARTH WALL  
CA 1932-33 BROOKINGS

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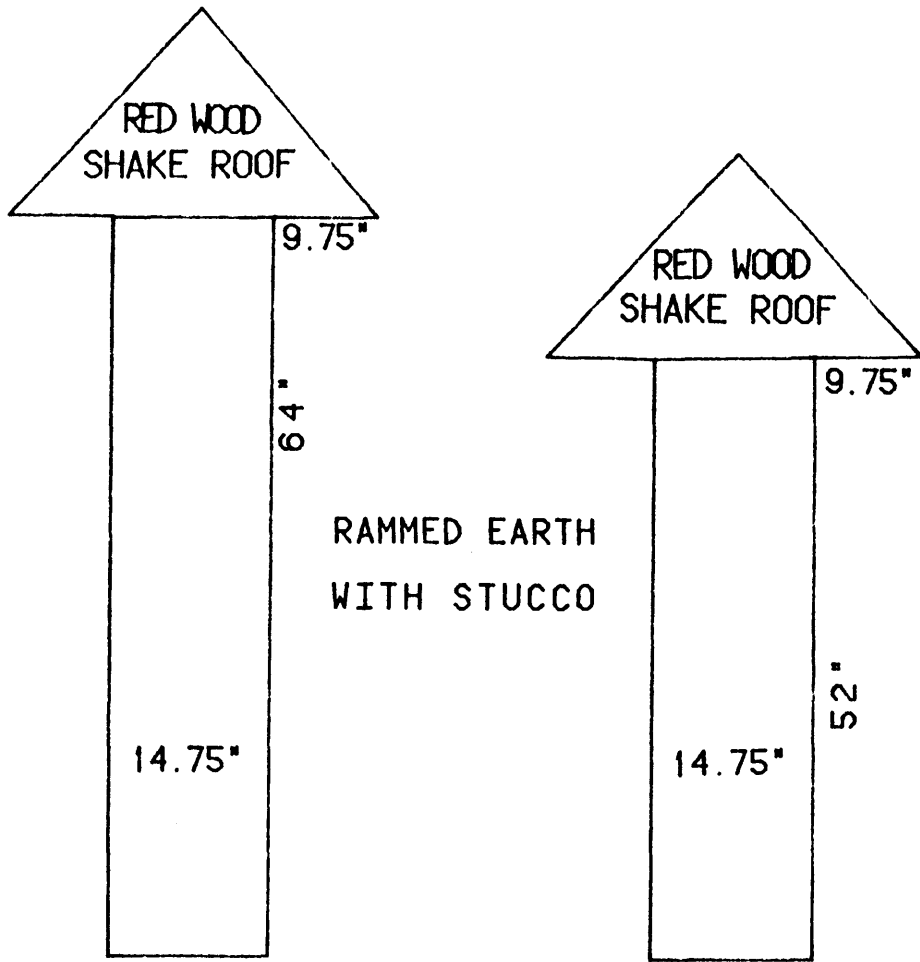
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Experimental Rammed Earth Wall (Dean's Residence Rammed Earth Wall)

Elevation Sketches on Reverse Side



WALL SECTION A

WALL SECTION C

SCALE  $\frac{\quad}{10''}$

WALL SECTION B: HEIGHT OF RAMMED EARTH PORTION OF WALL - # 1 = 52", # 2 = 64", # 3 = 52", # 4 = 50"



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Under Criterion C of the National Register Criteria, the Experimental Rammed Earth Wall (Dean's Residence Rammed Earth Wall) 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 pisé 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 two garden walls and a small machine shed remain extant. (The other wall is being nominated separately, and the shed is not being nominated at this time.) Constructed in 1932 and 1933, the wall nominated here is the oldest of the three remaining rammed earth test facilities. Under the South Dakota Historical Preservation Plan, the property relates to the following historic context: VI. The Great Depression.

Rammed earth construction, also called pisé construction or "pisé 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 pisé 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, more refined earthen buildings also dotted the early Dakota landscape. 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

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Czech pioneers, for example, used rammed earth as well as other 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. 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 wall nominated here.

Patty received much national attention for the research. By 1936, all inquiries 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. This particular wall is pictured on pages 11 and 22 of Patty's 1940 article entitled "Paints and Plasters for Rammed Earth Walls," South Dakota Agricultural Experiment Station Bulletin No. 336. Divided into a series of panels, the wall was used to test stuccoing treatments and various weights of priming paints. Most of these tests were conducted between 1932 and 1933. Details of the experiments are included in the publication.

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

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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 Wall (Dean's Residence Rammed Earth Wall), thus, remains a rare testament to the ingenuity and skill of Patty and his fellow researchers.

The period of significance of the nominated property does not extend beyond its dates of construction from 1932 and 1933.

page 4: Experimental Rammed Earth Wall  
property name

, Brookings  
county

SOUTH DAKOTA  
state

**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:

A = /14/	/676-370/	/4909-710/	B = / /	/ /	/ /	/ /
C = / /	/ /	/ /	D = / /	/ /	/ /	/ /
ZONE	EASTING	NORTHING	ZONE	EASTING	NORTHING	

Quad: Brookings

Scale: 1:24000

**/ / see continuation sheet**

Verbal Boundary Description:

**/XX/ see continuation sheet**

Boundary Justification:

**/XX/ see continuation sheet**

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"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. XLIII (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.

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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." Ms.: [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.

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**VERBAL BOUNDARY DESCRIPTION**

The nominated property is bounded by a set of imaginary lines that intersect to form a loop around the irregular roughly T-shaped rammed earth wall. That loop traces the exact shape of the wall (as diagrammed in the figure shown on continuation sheet 7.2) and lies 10 feet from the outermost surface of the wall on all facades. The property is located in the Northeast 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 rammed earth wall and to exclude any other structures, buildings, or roadways.

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1.

Experimental Rammed Earth Wall  
Brookings, Brookings County, South Dakota  
By: Howard Phillips  
August 1989  
Negative: Brookings Historic Preservation Commission  
South and west (interior yard) facades, Sections "C" and "B,"  
camera facing northeast  
Photograph #1

2.

Experimental Rammed Earth Wall  
Brookings, Brookings County, South Dakota  
By: Howard Phillips  
August 1989  
Negative: Brookings Historic Preservation Commission  
West facade (interior yard), Section "B,"  
camera facing southeast  
Photograph #2

3.

Experimental Rammed Earth Wall  
Brookings, Brookings County, South Dakota  
By: Howard Phillips  
August 1989  
Negative: Brookings Historic Preservation Commission  
North facade, Sections "A" and "C," camera facing southeast  
Photograph #3

4.

Experimental Rammed Earth Wall  
Brookings, Brookings County, South Dakota  
By: Howard Phillips  
August 1989  
Negative: Brookings Historic Preservation Commission  
North facade, Sections "A" and "C," camera facing southwest  
Photograph #4