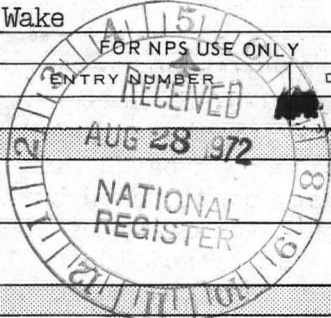


**NATIONAL REGISTER OF HISTORIC PLACES  
INVENTORY - NOMINATION FORM**

(Type all entries - complete applicable sections)

STATE:	North Carolina
COUNTY:	Wake
FOR NPS USE ONLY	
ENTRY NUMBER	DATE
1151	11 1972



**1. NAME**

COMMON:  
J. S. Dorton Arena

AND/OR HISTORIC:

**2. LOCATION**

STREET AND NUMBER:  
North Carolina State Fairgrounds, West Hillsborough Street

CITY OR TOWN:  
Raleigh (Fourth Congressional District, The Hon. Nick Galifianakis)

STATE	CODE	COUNTY:	CODE
North Carolina	37	Wake	183

**3. CLASSIFICATION**

CATEGORY (Check One)	OWNERSHIP	STATUS	ACCESSIBLE TO THE PUBLIC
<input type="checkbox"/> District <input type="checkbox"/> Site <input type="checkbox"/> Object <input checked="" type="checkbox"/> Building <input type="checkbox"/> Structure	<input checked="" type="checkbox"/> Public <input type="checkbox"/> Private <input type="checkbox"/> Both	<input checked="" type="checkbox"/> Occupied <input type="checkbox"/> Unoccupied <input type="checkbox"/> Preservation work in progress	Yes: <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Unrestricted <input type="checkbox"/> No

PRESENT USE (Check One or More as Appropriate)

<input checked="" type="checkbox"/> Agricultural	<input type="checkbox"/> Government	<input type="checkbox"/> Park	<input type="checkbox"/> Transportation	<input type="checkbox"/> Comments
<input checked="" type="checkbox"/> Commercial	<input type="checkbox"/> Industrial	<input type="checkbox"/> Private Residence	<input type="checkbox"/> Other (Specify)	_____
<input type="checkbox"/> Educational	<input type="checkbox"/> Military	<input type="checkbox"/> Religious	_____	_____
<input checked="" type="checkbox"/> Entertainment	<input type="checkbox"/> Museum	<input type="checkbox"/> Scientific	_____	_____

**4. OWNER OF PROPERTY**

OWNER'S NAME:  
State of North Carolina: State Department of Agriculture

STREET AND NUMBER:  
3 Edenton Street

CITY OR TOWN:  
Raleigh

STATE:  
North Carolina

CODE:  
37

**5. LOCATION OF LEGAL DESCRIPTION**

COURTHOUSE, REGISTRY OF DEEDS, ETC.:  
Wake County Courthouse

STREET AND NUMBER:

CITY OR TOWN:  
Raleigh

STATE:  
North Carolina

CODE:  
37

**6. REPRESENTATION IN EXISTING SURVEYS**

TITLE OF SURVEY:

DATE OF SURVEY:  Federal  State  County  Local

DEPOSITORY FOR SURVEY RECORDS:

STREET AND NUMBER:

CITY OR TOWN:

STATE:

CODE:

SEE INSTRUCTIONS

STATE: North Carolina

COUNTY: Wake

ENTRY NUMBER: 1151

DATE: 11 1972

FOR NPS USE ONLY

7. DESCRIPTION

CONDITION	(Check One)					
	<input checked="" type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Deteriorated	<input type="checkbox"/> Ruins	<input type="checkbox"/> Unexposed
	(Check One)			(Check One)		
	<input type="checkbox"/> Altered	<input checked="" type="checkbox"/> Unaltered		<input type="checkbox"/> Moved	<input checked="" type="checkbox"/> Original Site	

DESCRIBE THE PRESENT AND ORIGINAL (if known) PHYSICAL APPEARANCE

The J. S. Dorton Arena, located within the North Carolina State Fairgrounds on the outskirts of Raleigh, is a large covered public pavilion encircled by a paved drive and a well-kept lawn. The skeleton of the ingeniously constructed building, actually a paraboleum\* with a suspended roof, is built entirely of concrete and steel, and the light covering skin is composed of metal and glass. Two oblique-angled parabolic concrete arches in compression, their bases intersecting on the north and south ends slightly above the ground level, form the major structural element in the building. These wide flat arches rise to a height of ninety feet in the center and enclose a space which has a length and width of 300 feet at the widest points. Large steel hinges located within the arch intersections provide for expansion or contraction of the arches. (This passed the test of Hurricane Hazel in 1954: despite fourteen-inch waves in the roof surface, there was no leakage or damage.). At the arch terminals below the ground surface, prestressed steel cables hold the scissored arch-ends together. Steel cables span the opening in two mutually opposed directions to form a saddle-surface roof. The east-west cables, attached to the arches by flexible tension springs, supply the force of tension which balances the compression of the arches, resulting in a closed symmetrically loaded unit. The arches are supported by eight-inch vertical steel piers which extend unbroken from the ground level to the arches.

Lightweight wall and roof materials enclose but do not conceal this parabolic skeleton. The wall piers are infilled with glass panels to form a continuously glazed wall surface. Each panel contains light green tinted glass, and alternate panels of alternate bays are hinged at the top to open for natural ventilation. The cable roof network is covered with a bottom layer of lapped corrugated metal strips, a layer of rigid insulation board and a layer of standard bonded roofing. Rectangular acoustic baffles, included in the original plan but omitted then for lack of funds, were hung from the ceiling several years following completion of the structure. The wind stability cables which counteract the flutter of this light roof skin were also a later addition. These consist of internal steel cables which were attached to the roof at several points on both the north and south sides and tied to the exterior wall on each side. Roof drainage is accomplished by a V-shaped drainage spout, located at each point of intersection of the parabolic arches, which channels water into an open catch basin at either end.

The only horizontal accent in the sheer vertical rise of the wall is the wide concrete parabolic arched seating platform. The edge of this platform is visible on the exterior and bisects the wall surfaces, echoing the parabolic curve of the roof arches. The larger concrete wall piers and the smaller concrete glass panel muntins form a geometric grid pattern of contrasting scale which balances the long curve of the parabolic arches at the seating level and at the roof. The public entrances to the arena are

\* "Paraboleum" is a term coined by Dr. Lodwick Hartley of North Carolina State University specifically to describe the Dorton Arena and used by subsequent scholars.

SEE INSTRUCTIONS

**NATIONAL REGISTER OF HISTORIC PLACES  
INVENTORY - NOMINATION FORM**

(Continuation Sheet)

STATE	North Carolina	
COUNTY	Wake	
FOR NPS USE ONLY		
ENTRY NUMBER		DATE
		APR 11 1972

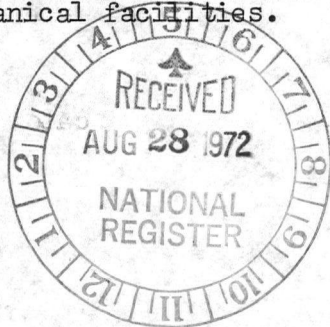
(Number all entries)

7.

located in the center of the east and west sides, each consisting of ten double metal doors protected by a flat, cantilevered concrete roof. Between the arch bases at the north end are two pairs of large doors which provide entrance directly to the central arena.

The ingenious and efficient interior division of space leaves the core of the building open and organizes activities at the perimeter. In the center of the building at the ground level is the nearly elliptical arena, with entrances and exits located beneath the intersection of the arches at the north end, and a raised stage (a later addition) at the south end. A concrete seating platform slopes upward from the arena on the east and west sides. Each platform is supported from beneath by steel beams which radiate from the arena to the exterior wall. These beams rest in turn on three rows of vertical steel columns on each side. Fifty-five hundred spectators can be accommodated in the seating stands, and 4,000 can be seated on the floor. Above the top row of seating on either side, six steel platforms for camera and lighting equipment are attached to the exterior wall columns. The lighting and sports scoring systems are suspended from the ceiling.

The ground level space at each side beneath the seating platforms serves as an entrance lobby. In front of the doors in each lobby, wide steps descend in two flights to the basement level, which contains a wide corridor which continues completely around the building. Each entrance lobby floor is open above the basement corridor, the resulting balconies protected by iron railings with red, blue, and yellow canvas railing covers. On each side four concrete walkways with identical railings serve as bridges across the basement corridor from the entrance lobby to the arena. Along the inner perimeter of the basement corridor are exhibit alcoves formed by the radiating steel beams which support the seating platforms. Exhibition compartments also line the outside corridor wall. The sub-basement contains dressing rooms, offices, and storage and mechanical facilities.



**8. SIGNIFICANCE**

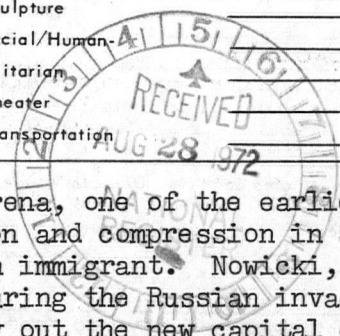
PERIOD (Check One or More as Appropriate)

- Pre-Columbian |  16th Century |  18th Century |  20th Century  
 15th Century |  17th Century |  19th Century

SPECIFIC DATE(S) (If Applicable and Known) 1953

AREAS OF SIGNIFICANCE (Check One or More as Appropriate)

- |  |   |  |  |
|--|---|--|--|
| <input type="checkbox"/> Aboriginal              | <input type="checkbox"/> Education              | <input type="checkbox"/> Political           | <input type="checkbox"/> Urban Planning        |
| <input type="checkbox"/> Prehistoric             | <input checked="" type="checkbox"/> Engineering | <input type="checkbox"/> Religion/Philosophy | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> Historic                | <input type="checkbox"/> Industry               | <input type="checkbox"/> Science             | _____  |
| <input type="checkbox"/> Agriculture             | <input type="checkbox"/> Invention              | <input type="checkbox"/> Sculpture           | _____  |
| <input checked="" type="checkbox"/> Architecture | <input type="checkbox"/> Landscape Architecture | <input type="checkbox"/> Social/Humanitarian | _____  |
| <input type="checkbox"/> Art                     | <input type="checkbox"/> Literature             | <input type="checkbox"/> Theater             | _____  |
| <input type="checkbox"/> Commerce                | <input type="checkbox"/> Military               | <input type="checkbox"/> Transportation      | _____  |
| <input type="checkbox"/> Communications          | <input type="checkbox"/> Music                  |  |  |
| <input type="checkbox"/> Conservation            |   |  |  |



STATEMENT OF SIGNIFICANCE

The revolutionary design of Dorton Arena, one of the earliest examples of the combination of the forces of tension and compression in architecture, was conceived by Matthew Nowicki, a Polish immigrant. Nowicki, who had been a member of the Allied Underground during the Russian invasion of Poland in the Second World War, helped lay out the new capital city of Warsaw. Following the war, the young architect was brought to the United States to aid in the design of the new United Nations complex. He then came to Raleigh to serve as the acting head of the School of Design at North Carolina State College. William H. Deitrick, a Raleigh architect, had been commissioned by the North Carolina Department of Agriculture to design the North Carolina State Fair complex, and it was Deitrick who engaged Nowicki as a consulting architect on this commission. In addition to being given a share in the design of the site and related buildings, Nowicki was given full charge of the preliminary design for the livestock judging pavilion. Nowicki executed approximately 100 conceptual drawings for the arena, and the building plans were essentially complete at the time of his death in a plane crash in India in 1950.

Deitrick's firm, aided by the consultant New York engineering firm of Severud, Elstad and Krueger, carried out Nowicki's plan. His design was followed closely, with several engineering refinements being made. In the final design, the side walls, which actually support the parabolic arches, are set vertically instead of at angles as they appeared in earlier sketches. Concrete structural arch supports were placed beneath the point of intersection of the arches on each side, although no support was indicated there in Nowicki's sketches. The arena, built by the William Muirhead Construction Company under a \$1,500,000 state appropriation, was dedicated in 1953. Originally called the Livestock Judging Pavilion, the name was changed in 1961 to honor long-time state fair manager J. S. Dorton.

Dorton Arena is an internationally famous prototype of a parabolic suspension structure. The revolutionary expanse of uninterrupted space inside the arena is the result of a rare integration of architecture and engineering. Since its completion the building has received world-wide recognition and numerous awards. Famous in Germany for the revolutionary construction of its hanging roof, it is known through numerous German periodicals and technical works simply as the "Raleigh-Arena." In 1953 the structure was given the First Honor Award from the American Institute of Architects. The Architectural League of New York awarded the building a "Gold Medal in Engineering." Photographs and a model of the arena were

SEE INSTRUCTIONS

**9. MAJOR BIBLIOGRAPHICAL REFERENCES**

Gutheim, Frederick. 1857-1957: One Hundred Years of Architecture in America. New York: Reinhold Publishing Co., 1957.  
 Personal interview with William H. Deitrick, F.A.I.A., June 13, 1972, in his Raleigh office.  
 The Dorton Arena Papers in the William Henley Deitrick Collection, Archives, State Department of Archives and History, Raleigh, North Carolina.  
 Otto, Frei. Das Hangende Dach. Berlin: Ullstein A.G., 1954.  
 Burton, Thomas E. Structure and Form in Modern Architecture. New York: Reinhold Publishing Co., 1962.

**10. GEOGRAPHICAL DATA**

LATITUDE AND LONGITUDE COORDINATES DEFINING A RECTANGLE LOCATING THE PROPERTY			OR	LATITUDE AND LONGITUDE COORDINATES DEFINING THE CENTER POINT OF A PROPERTY OF LESS THAN TEN ACRES		
CORNER	LATITUDE	LONGITUDE		LATITUDE	LONGITUDE	
	Degrees Minutes Seconds	Degrees Minutes Seconds		Degrees Minutes Seconds	Degrees Minutes Seconds	
NW	0 ' "	0 ' "		35° 47' 37"	78° 42' 36"	
NE	0 ' "	0 ' "				
SE	0 ' "	0 ' "				
SW	0 ' "	0 ' "				

NO  
UTM  
CD

APPROXIMATE ACREAGE OF NOMINATED PROPERTY: 1 1/4 acres

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE:	CODE	COUNTY	CODE

SEE INSTRUCTIONS

**11. FORM PREPARED BY**

NAME AND TITLE: Survey and Planning Unit Staff

ORGANIZATION: State Department of Archives and History DATE: 14 August 1972

STREET AND NUMBER: 109 East Jones Street

CITY OR TOWN: Raleigh STATE: North Carolina CODE: 37

**12. STATE LIAISON OFFICER CERTIFICATION NATIONAL REGISTER VERIFICATION**

As the designated State Liaison Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service. The recommended level of significance of this nomination is:

National  State  Local

Name H. G. Jones Title Director, State Department of Archives and History Date 14 August 1972

I hereby certify that this property is included in the National Register.

Robert M. Utley  
 Chief, Office of Archeology and Historic Preservation

Date 4/11/73

ATTEST: [Signature]  
 Keeper of The National Register

Date 4 4 73

**NATIONAL REGISTER OF HISTORIC PLACES  
INVENTORY - NOMINATION FORM**

(Continuation Sheet)

STATE	
North Carolina	
COUNTY	
Wake	
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ENTRY NUMBER	DATE
	APR 1 1973

(Number all entries)

8.

exhibited in the Milan International Exposition of Modern Decorative and Industrial Arts and Modern Architecture of 1957. It appeared in the 1957 centennial publication of the American Institute of Architects as one of ten twentieth century buildings expected to exert the most significant influence on future American architecture.

In addition to the international acclaim, the expansion of the intended function of Dorton Arena as a livestock judging pavilion to an exhibition and performance hall for a wide range of activities and events, and the large number of imitations which it has inspired are significant indications of the success of the building's design. Above all, the successful completion of Dorton Arena, a pioneering experiment in concrete parabolic construction, and its continued functionality make it one of the seminal buildings of twentieth century American architecture.



**NATIONAL REGISTER OF HISTORIC PLACES  
INVENTORY - NOMINATION FORM**

(Continuation Sheet)

STATE	North Carolina	
COUNTY	Wake	
FOR NPS USE ONLY		
ENTRY NUMBER		DATE
		APR 11 1973

(Number all entries)

9.

Joedicke, Jurgen. A History of Modern Architecture. New York: Frederick A. Praeger, 1959.

Eckardt, Wolf von, ed. Mid-Century Architecture in America. Baltimore: The Johns Hopkins Press, 1961.

Waugh, Elizabeth Culbertson. North Carolina's Capitol, Raleigh. Raleigh: Junior League of Raleigh, Inc., Raleigh Historic Sites Commission, Inc., 1967.

Wake County Records, Wake County Courthouse, Raleigh, North Carolina, Office of the Register of Deeds (Subgroups: Deeds).

Wake County Records, State Department of Archives and History, Raleigh, North Carolina (Subgroups: Deeds).

Research and architectural description by Ruth Little, survey specialist.



PROPERTY Worton, J.S. Arena STATE NC

73001375

Working number 8.28.72.1300

TECH REVIEW  
Photos 1  
Maps 1  
*wake*

*6/6/72*

REVIEW

*11/17-72*

HISTORIAN  
*only 20 yrs. old despite conference - HML 2/28/73*  
*being good example of type*  
*Nowicki was the original architect for Chandigarh, but was killed in a plane crash - then Le Corbusier got the job. DES HAER*

*Accept 3-8-73*

ARCHITECT  
Historic American Engineering Record  
ANTECEDENTS: Tents, wire cable suspension bridges, French Naval Storehouses (1837) by the French engineer Laureunt, project for the Crystal Palace at the New York Exposition of 1853 by James Bogardus, Travel & Transport Building at Chicago's Century of Progress Exposition (1933-4), numerous design proposals by the Constructivist School in Russia (1911)  
Nowicki probably gained his inspiration from the latter.....MORE

*Accept call 3-19-73*

*REJECT KH 3/5/73*

ARCHITECT

BRANCH CHIEF

EDITORIAL REVIEW

KEEPER  
*I've seen. Def. 20<sup>th</sup> c. monument.*

*Am 4/4*

Acknowledge 8/28/72

National Register write-up \_\_\_\_\_

Send-back \_\_\_\_\_

Federal Register entry 6-5-73

Re-submit \_\_\_\_\_

Register no. APR 11

The Dorton Arena is the 1st suspended roof construction in mature form in the world. The idea of suspended construction in buildings was originated by the French engineers in the early 1830s and demonstrated by Laureunt in his Naval Storehouses of 1837. The emancipation from conventional forms came with the construction of the Arena Building. in the sense that the roof is purely tensile and not a tent. This building is certainly a landmark of 20th Century structural engineering and pioneered such suspension structures as the one-way cable system supporting the roof of the Terminal at Dulles, the circular restaurant at O'Hare as well as ~~the~~ influencing Frei Otto's suspension structures in an indirect way.

END 7 March '73

RECEIVED  
14  
3/13



Wake Co.

NEGATIVE NUMBER N. 75-3-1654

PHOTOGRAPHER Jo Ann Sieburg

PHOTO DATE 4/9/75

SUBJECT J. S. Dorton Arena  
Raleigh

7/11/72 d.o.e.

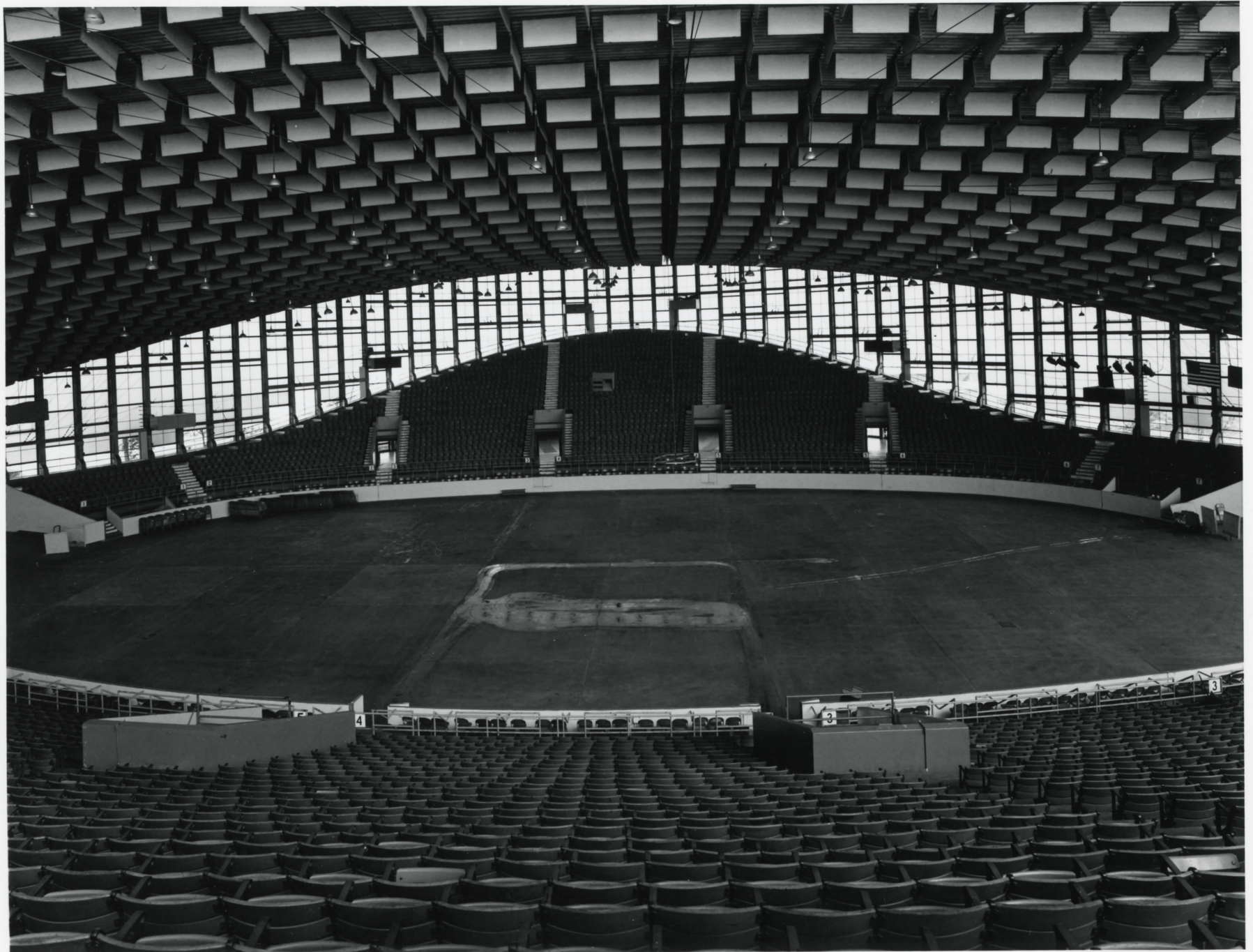
PROPERTY OF THE NATIONAL REGISTER

FROM STATE DEPARTMENT OF  
ARCHIVES AND HISTORY  
RALEIGH, N. C.

MAY 12 1975

PRINT BY NORTH CAROLINA  
MUSEUM OF HISTORY

9



Wake Co.

NEGATIVE NUMBER N. 75-3-1657

PHOTOGRAPHER JoAnn Sieburg

PHOTO DATE 4/9/75

SUBJECT J. S. Dorton Arena

Raleigh

FROM STATE DEPARTMENT OF  
ARCHIVES AND HISTORY  
RALEIGH, N. C.

MAY 12 1975

PRINT BY NORTH CAROLINA  
MUSEUM OF HISTORY

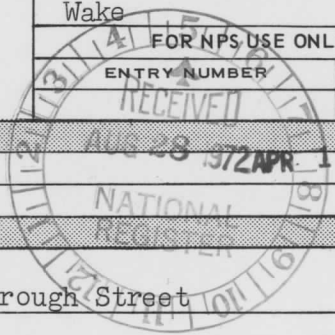
Form 10-301  
(July 1969)

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES  
PROPERTY MAP FORM

(Type all entries - attach to or enclose with map)

STATE	
North Carolina	
COUNTY	
Wake	
FOR NPS USE ONLY	
ENTRY NUMBER	DATE



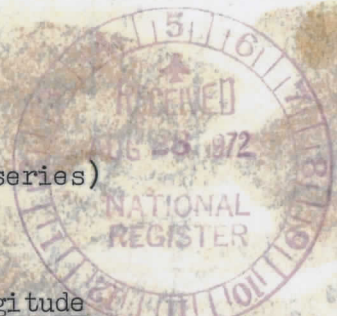
SEE INSTRUCTIONS

<b>1. NAME</b>			
COMMON: J.S. Dorton Arena			
AND/OR HISTORIC:			
<b>2. LOCATION</b>			
STREET AND NUMBER:			
North Carolina State Fairgrounds, West Hillsborough Street			
CITY OR TOWN:			
Raleigh			
STATE:	CODE	COUNTY:	CODE
North Carolina	37	Wake	183
<b>3. MAP REFERENCE</b>			
SOURCE:			
USGS Map, Raleigh Quadrangle (15 minute series)			
SCALE: 1: 62500			
DATE: 1951			
<b>4. REQUIREMENTS</b>			
TO BE INCLUDED ON ALL MAPS			
1. Property boundaries where required.			
2. North arrow.			
3. Latitude and longitude reference.			

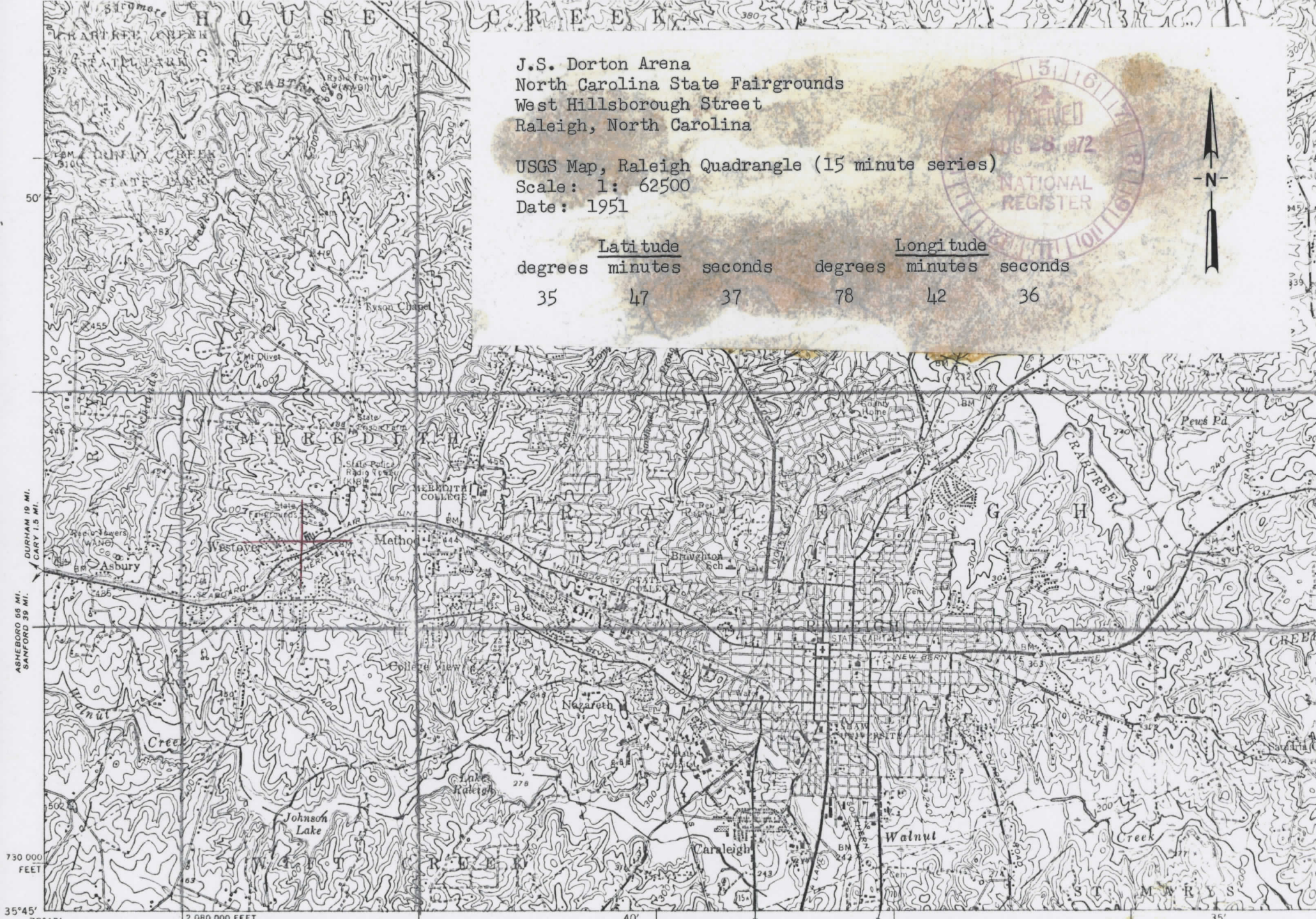
RALEIGH WEST 1:24000

J.S. Dorton Arena  
 North Carolina State Fairgrounds  
 West Hillsborough Street  
 Raleigh, North Carolina

USGS Map, Raleigh Quadrangle (15 minute series)  
 Scale: 1: 62500  
 Date: 1951



Latitude			Longitude		
degrees	minutes	seconds	degrees	minutes	seconds
35	47	37	78	42	36



ASHBORO 65 MI.  
 SANFORD 39 MI.  
 DURHAM 19 MI.  
 CARY 15 MI.

730 000  
 FEET  
 35°45'

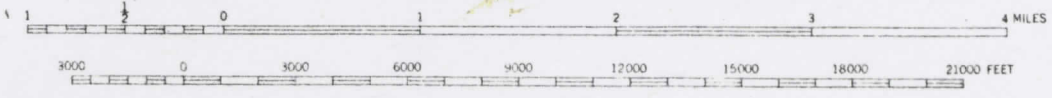
2 080 000 FEET

40' FUGUY SPRINGS 15 MI.  
 FAYETTEVILLE 66 MI.

GARNER 4 MI.  
 SCALE 1:62 500

35'

Mapped, edited, and published by the Geological Survey  
 Control by USGS, USC&GS, and NCGS  
 Topography by plane-table methods 1938 - 1940. Revised 1951  
 Polyconic projection. 1927 North American datum  
 10,000-foot grid based on North Carolina coordinate system



State of North Carolina  
Department of Archives and History

Raleigh 27602

H. G. JONES  
Director



14 August 1972

DIVISION ADMINISTRATORS:

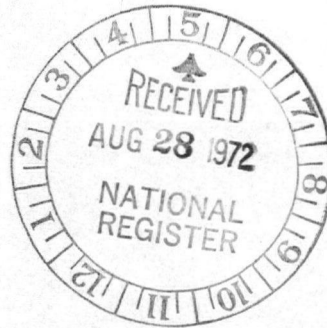
C. F. W. COKER  
Archives and Records

MRS. JOYE E. JORDAN  
Historic Sites and Museums

MRS. MEMORY F. MITCHELL  
Publications

FRED F. HARBIN  
Assistant Director

Dr. William J. Murtagh  
Keeper of the National Register  
Room 3209  
1100 L Street, N.W.  
Washington, D.C. 20005



Dear Dr. Murtagh:

We are enclosing a nomination for J. S. Dorton Arena in Wake County, North Carolina, to be entered in the National Register of Historic Places.

We trust you will find this nomination in order. If there are any questions, please call us.

Sincerely yours,

H. G. Jones  
State Liaison Officer

enclosures

Memorandum Board

50% COTTON FIBER

ENTRIES IN THE NATIONAL REGISTER

STATE NORTH CAROLINA

Date Entered APR 11 1973

<u>Name</u>	<u>Location</u>
Richmond Temperance and Literary Society Hall	Wagram vicinity Scotland County
Belmont Abbey Cathedral	Gaston County
Orton Plantation	Smithfield Township Brunswick County
Shell Castle	Enfield vicinity Halifax County
Dorton, J.S. Arena	Raleigh Wake County
Heartsease	Hillsborough Orange County
Victoria	Charlotte Mecklenburg County
Slover-Bradham House	New Bern Craven County
Jones-Jarvis House	New Bern Craven County
Hon. Sam J. Ervin, Jr. <u>Also Notified</u> Hon. J.A. Helms Hon. Earl B. Ruth Hon. James T. Broyhill Hon. Charles Rose Hon. L.H. Fountain Hon. Ike Andrews Hon. James Martin Hon. Walter B. Jones Director, Southeast Region	State Historic Preservation Officer Dr. H.G. Jones State Historian and Administrator Office of Archives and History Department of Art, Culture, and History 109 East Jones Street Raleigh, North Carolina 27611