NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

VLR- 7-2-97
NRHP- Pending

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 any 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 Thermo-Con House

other names/site number Building No. 172, Fort Belvoir
VDHR File No.029-5001

2. Location

street & number 9791 Gunston Road not for publication ___
city or town Fort Belvoir vicinity ___
state Virginia code VA county Fairfax code 059 zip code 22060

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, 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 ___ statewide ___ locally. (___ See continuation sheet for additional comments.)

Signature of certifying official

7/19/97
Date

Virginia Department of Historic Resources
State or Federal agency and bureau

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

_____ _____
Signature of commenting or other official Date

_____
State or Federal agency and bureau

4. 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): _____

_____ _____ _____
Signature of Keeper Date of Action

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

Contributing	Noncontributing	
1	0	buildings
0	0	sites
0	0	structures
0	0	objects
1	0	Total

Number of contributing resources previously listed in the National Register 0

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

6. Function or Use

Historic Functions (Enter categories from instructions)

Cat: Domestic Sub: Single Dwelling

Current Functions (Enter categories from instructions)

Cat: Work In Progress Sub:

Institutional Housing Military Quarters

7. Description

Architectural Classification (Enter categories from instructions)

Modern Movement: International

Materials (Enter categories from instructions)

foundation Concrete: Thermo-Con

roof Asphalt

walls Concrete: Thermo-Con

other

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 National Register listing)

____ 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 a grave.

____ D a cemetery.

____ E a reconstructed building, object, or structure.

____ F a commemorative property.

__X__ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance (Enter categories from instructions)
Architecture
Engineering

Period of Significance 1949

Significant Dates 1949

Significant Person (Complete if Criterion B is marked above)

Cultural Affiliation _____

Architect/Builder Albert Kahn Associates, Inc.

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

9. Major Bibliographical References

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

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
_X_ recorded by Historic American Buildings Survey Inventory Card
___ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data

___ State Historic Preservation Office
___ Other State agency
_X_ Federal agency
___ Local government
___ University
___ Other

Name of repository: U.S. Army Garrison Ft.Belvoir, Dep't of Public Works

10. Geographical Data

Acreage of Property Less than one acre

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

	Zone	Easting	Northing		Zone	Easting	Northing
1	18	313920	4283940	3	__	_____	_____
2	__	_____	_____	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 Douglas J. Harnsberger, AIA; Sandra F. Hubbard; Architectural Historian.; Janet G. Murphy, Architectural Historian
organization Harnsberger & Associates/Architects, P.C.
date: November 1995/March 1997
street & number 108 North First Street telephone (804) 648-5040
city or town Richmond state VA zip code 23219

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)

Property Owner

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

name U.S. Department of the Army, U.S. Army Garrison Fort Belvoir

street & number 9430 Jackson Loop telephone _____

city or town Fort Belvoir state VA zip code 22060

SUMMARY DESCRIPTION

The Thermo-Con House stands out as the only International style building constructed on The U.S. Army Garrison, Fort Belvoir. The flat-roofed, two-story cementitious structure stands apart in a wooded residential area of the installation, set back from the corner of 21st Street and Gunston Road. The building was designed by E. S. Henderson of the renowned industrial design firm of Albert Kahn Associates, Inc. of Detroit, Michigan.[1] The U.S. Army Corps of Engineers constructed the experimental structure in 1949 to test an innovative cementitious material known as "Thermo-Con". On the exterior the windows and doors are asymmetrically placed. The interior plan of the structure is also an asymmetrical arrangement. The Thermo-Con House is currently awaiting rehabilitation so that it can be returned to regular use as a Visiting Officers Quarters.

ARCHITECTURAL ANALYSIS

The "Thermo-Con" material used to construct the walls, floors, and roof system of the house was comprised of "ordinary cement, water, and a patented formula of mineral origin." The mixture was combined in a "Thermo-Con generator" and made into a thick paste called "Thermo-Con slurry."[2] It was then pumped into a standard building form for concrete through a flexible hose to a predetermined depth. This material was then left to set for forty-five minutes. During the setting period the mixture expanded a remarkable two and one-half times its original size. At the time it was noted that this house "rose like bread dough."[3] According to an article in a 1949 issue of the Fort Belvoir Castle, Thermo-Con was a new building material that was creating quite a stir in the construction field. The author stated, "Its qualities are almost legend - it floats, can be sawed with an ordinary carpenter's handsaw, drilled with a brace and bit; it holds nails and common wood screws, and its heat resistance and insulating qualities defy belief."[4] From its date of completion in late 1949, the house served as the unofficial residence of the Post Sergeant Major. It is currently unoccupied.

The house stands apart on a wooded lot in a residential area of the post. It is a two-story building with a full basement. The foundation, walls, and roof are poured-in place with "Thermo-Con" cement and protected with a flat built-up asphalt roof. The above ground form of the structure measures 29 feet wide, 28 feet deep and 21 feet tall. The walls have the articulated horizontal elements of a water table and belt course; all of "Thermo-Con" material. On the north facade is a brick chimney constructed of standard running bond.

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[1] Albert Kahn Associates, Inc. Thermo-Con House Original "As-Built Drawings A-1 through A-10, 1949.
[2] "New Building Material Arouses Keen Interest," Belvoir Castle 22 April 1949: 1.
[3] "New Building Material Arouses Keen Interest," 1.
[4] "New Building Material Arouses Keen Interest," 1.

All four walls of the dwelling have two asymmetrically placed bays of varying sizes. The original construction drawings indicate that single-light steel casement windows were specified, in keeping with the International Style of the residence. Currently, all windows are wood-framed, and most have eight-over-eight double-hung wood sash. Other window sizes include six-over-six double-hung wood sash, and a tripartite window on the east wall that is a single light flanked by two four-over-four double-hung wood sash. All of the double-hung sash windows were substituted for the casement design, perhaps at the time of construction. There are four entry doors, one per side. The recessed main entry on the south facade features a contemporary metal door that replaced the original wood-frame door. The current door has four raised panels topped by two glass lights. The west entry, located under a flat-roof canopy supported by steel pipe columns, features a small wood-frame door. It has a lower flush panel topped by six glass lights. The north entry features a small concrete porch with a flat-roof canopy overhang. Its entry has a double-leaf wood-frame door with each leaf containing ten lights. The east entry is reached by descending concrete steps and is the only exterior access for the basement. Its door is wood frame with a flush panel at the base topped by six lights.

The interior floor plans, like the exterior elevations, are asymmetrically arranged. The floors throughout the first and second stories are oak parquet. This flooring has buckled, apparently due to internal moisture problems. The parquet floor was not part of the original specifications. The interior wall trim, like the door frames and window frames, are custom radial moldings. There are four closets; one on the first floor and three on the second floor. The original sliding closet doors have been replaced with single-leaf hollow-core luan doors with ranch-style door casings. This is inconsistent with the original customized detailing.

According to original "As-Built" drawings of the house, the basement has an open plan with two small rooms.[5] The room in the southwest corner was the laundry room and the room in the northwest corner is described as a coal storage room. The first floor is divided into three main parts: 1) the entry hall with two staircases, 2) the kitchen, and 3) the combined living-dining room. The entry hall is flanked by the kitchen and staircases. The hall contains one of the four closets. The kitchen on the south end of the house is a narrow, galley type. The cabinets were added during a later renovation that occurred between 1970 and 1980. The integrity of the kitchen's floor plan remains. The combined living-dining room is a large open space on the north end of the floor plan. An original interior cabinet is found in this room. It is a built-in china cabinet with two flush-panel wood doors below, a drawer in the center, and a single-leaf door with four horizontal glass lights that opens to four china shelves above.

White pine staircases are located in the southeast corner of the house. A hall door closes off the basement staircase. The stair has six risers that descend to a landing onto which the east entry door

[5] Kahn Associates, Thermo-Con House Drawings, 1949.

opens. A second run with five risers descends to the basement floor. The staircase to the second floor also has two runs of stairs: the first run has five risers leading to a landing followed by a second run of seven risers to the second floor.

The second floor has a single bathroom and three bedrooms of varying sizes. The small bathroom, located in the southeast corner, contains a 1980s vintage sink and toilet. The cabinets are of the same period as those in the kitchen. The bathtub is the original porcelain type. In the hallway separating the bedrooms is a small linen closet. It features radial trim which matches that of the primary doors. This is distinctly different from the other modified closets. In the southwest corner is the smallest bedroom; the largest bedroom is in the northwest corner; and the middle-size bedroom is in the northeast corner. All bedrooms have two window walls and all have their original interior moldings.

STATEMENT OF SIGNIFICANCE

The Thermo-Con House is representative of the experimental approach to housing which characterized the post-World War II years. After the war, the optimistic view that industry and machine production would fulfill housing needs inspired much experimentation. The Thermo-Con House was a prototype constructed by the U.S. Army Corps of Engineers Company A, 410th Engineer Construction Battalion in 1949 to test the suitability of the innovative "Thermo-Con" building material in mass production of lightweight houses. It was also part of a larger effort to bring quality standardized housing to all Army bases. The house was designed in the International Style by E. S. Henderson of the renowned industrial design firm of Albert Kahn Associates, Inc. in conjunction with Higgins Resources, Inc. of New Orleans.[6] Though the house was never mass produced, it is indicative of the imaginative attempts by the public and private sectors to explore possibilities of quick and inexpensive housing.

The Thermo-Con House's distinct design characteristics, unusual method of construction, and its place in the history of postwar experimental housing deem it significant under National Register Criterion C in Architecture and Engineering, despite the building being just under fifty years old (48 years). Both its design and construction method significantly contribute to the architectural and engineering history of the United States Army and even today the house stands out from the surrounding Colonial Revival-style buildings as a striking example of the International style.

HISTORICAL BACKGROUND

The historic context in which the Thermo-Con House was designed and constructed is of primary importance to its significance. The World War II years, 1940-1945, brought considerable change in construction methods, materials and techniques. In a very short time the "housing industry was torn from its slow, handicraft ways into a fast-paced new world of industrialized production in huge, planned projects."[7] By 1948 World War II had ended and the Cold War had begun. For the first time in history the U.S. Army was adjusting to a large, standing peace-time force and the housing on Army bases proved wholly inadequate.[8] This housing crisis necessitated that the Army find a way to build an enormous number of houses quickly. At the same time, the U. S. Government was trying to cut the defense budget and thus was unwilling to pay for massive new housing projects. This situation prompted the Army to begin public-private ventures to develop alternative, experimental housing projects. In the case of the

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[6] Albert Kahn Associates, Inc., Files, Job # 2034.
[7] Joseph B. Mason, History of Housing in the U.S., 1930-1980 (Houston: Gulf Publishing Company, 1982) 31.
[8] Dr. William Baldwin, telephone interview, 11 March 1997. Dr Baldwin is the historian for the Office of History, Headquarters, U.S. Army Corps of Engineers.

Thermo-Con House, the U.S. Army Corps of Engineers hired Higgins Resources, Inc. of New Orleans, the developer of "Thermo-Con", and Albert Kahn Associates, Inc. to build a prototype house for the base at Fort Belvoir. According to notes in the files of Albert Kahn Associates, the firm, in conjunction with Higgins Resources, designed a "two story Thermo-Con double house for War Department at Fort Belvoir, Virginia, in 1942."[9] Architect E.S. Henderson produced the drawings, which included four architectural drawings, two structural drawings, two mechanical drawings and one electrical drawing.[10]

The hiring of Higgins Resources and Albert Kahn Associates is of particular interest to the historic significance of the Thermo-Con House project because it represents the government's continued commissioning of modern architects to design housing for the military as well as the teaming of large industrial companies with leading architectural firms. In 1941, the U.S. Division of Defense Housing commissioned modern architects to design war workers' housing. For a short, but significant period, independent, practicing architects were hired to solve the Department of Defense's acute housing shortage. The division's director, Clark Foreman, sought to make the program a contribution not only to defense but to architecture as well, convinced that by employing leading modern architects, the stigma attached to public housing in the United States might be eliminated.[11] Within seven months, eleven new housing projects were designed and built throughout the nation. Widely acclaimed in the architectural press, the program enlisted, among others, William W. Wurster, Walter Gropius, Marcel Breuer, George Howe, Louis I. Kahn, Alfred Kastner, Hugh Stubbins, Jr., Antoin Raymond, and Frank Lloyd Wright.[12]

The fact that "Thermo-Con" was a cement based material was likely an important factor in the selection of Albert Kahn Associates as architects for the project. During the war years the shortage of materials compelled architects and engineers to come up with ingenious designs and practical solutions. It also compelled manufacturers and suppliers to alter familiar habits of fabrication and devise suitable substitute materials. The need to stretch the capabilities of materials to their limits and to speed up construction encouraged the use of concrete in ways that had generally been avoided before the war.[13] A prime example took place in 1943 when, due to the need to conserve timber and steel, Albert Kahn Associated Architects and Engineers, Inc. designed the eighty-acre Dodge Chicago aircraft plant with an innovative vaulted concrete roof system rather than a roof of structural steel.[14] At the time of his death in 1942, Albert Kahn was head of the firm of Albert Kahn Associated Architects and Engineers, Inc. At its peak in the late 1930s, the office of Albert Kahn employed a staff of over 600, producing 19 percent of all

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[9] Albert Kahn Associates, Files, Job # 2034.
[10] Albetrt Kahn Associates, Files, Job # 2034.
[11] Donald Albrecht, ed., World War II and the American Dream (Cambridge: MIT Press, 1995) 11.
[12] Albrecht, 11-12.
[13] Albrecht, 59.
[14] Albrecht, 63.

architect-designed industrial buildings in the United States.[15] While his factories epitomized modernism, Kahn's institutional and residential buildings were classically inspired. According to Dieter Marcello, a German filmmaker who produced a documentary on Kahn, "Kahn split with the modernists over the design of the modern house, and in fact believed that it was devoid of architectural feeling."[16] The firm's residential work was generally for industrial clients, and was neither Modern nor experimental. After Kahn's death the firm remained intact and his architectural vision lived on through his many proteges. In this respect, the Thermo-Con House was a very unusual project for the firm, being Modern, experimental and residential.[17] It was not, however, the firm's only foray into experimental housing, for notes in the firm's files indicate that Albert Kahn Associates collaborated with Higgins Plastics, a division of Higgins Resources, on the "Investigation of Thermo-Namel Houses" in 1947.[18]

As noted previously, the Thermo-Con House was just one of a number of housing projects developed in the 1940s which involved large manufacturers teaming up with architects and designers to produce experimental housing. Some of the other more notable examples include Wallace Neff and his Airform Construction Company's "Bubble" house (1941), Beech Aircraft's production of R. Buckminster Fuller's Dymaxion Wichita House (1946) and a factory-built aluminum-panel house designed by Henry Dreyfus and Edward Larrabee Barnes in collaboration with Consolidated Vultee Aircraft Corporation (1947).[19] Like the Thermo-Con House, these experimental housing types could be produced both quickly and inexpensively. Also, like the Thermo-Con House, they were never mass-produced, and in the case of both the Dymaxion Wichita House and the aluminum panel house, only two prototypes were constructed.

What caused these projects to fail at a time when both the military and the nation faced a severe housing shortage is unclear. However, it was most likely due to the psychological resistance of consumers. Most Americans wanted a house that looked like the traditional house they grew up in. This became apparent in the private housing market with the enormous success of projects such as Levittown, where thousands of mass-produced "Cape Cod" houses were built according to traditional American taste. The International style had appealed to some consumers, but by 1949 its acceptance had begun to wane, and the style was called into question as meaningless and dispirited, devoid of emotion, texture and richness found in more traditional architecture.[20]

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[15] Macmillian Encyclopedia of Architects, 1982 ed.
[16] Joe Sherman, "Like the Factories he Designed, Albert Kahn Lived to Work," Smithsonian September 1994: 59.
[17] Sylvia Sanders, telephone interview, 12 March 1997. Sylvia Sanders is the librarian at Albert Kahn Associates, Inc.
[18] Albert Kahn Associates, Files, Job # 2005.
[19] Albrecht, xxx, 20, 27-28.
[20] Albrecht, 31, 35.

Major Bibliographic References:

Albert Kahn Associates, Inc., Files, Job # 2005 (1947) and Job # 2034 (1948).

Albert Kahn Associates, Inc. Thermo-Con House Original "As-Built" Drawings A-1 through A-10. Dated 1949.

Albrecht, Donald, ed. World War II and the American Dream. Cambridge, Mass.: MIT Press, 1995.

Baldwin, Dr. William. Telephone interview. 11 March 1997.

Mason, Joseph B. History of Housing in the U.S., 1930-1980. Houston: Gulf Publishing Company, 1982.

Macmillan Encyclopedia of Architects. Ed. Adolf K. Placzek. New York: The Free Press, 1982

"New Building Material Arouses Keen Interest." Belvoir Castle. (22 April 1949): 1-2.

"1949 Experiment: Unique House Rose Like Dough." Belvoir Castle. (March 1976): page unknown.

Sanders, Sylvia. Telephone interview. 12 March 1997.

Sherman, Joe. "Like the Factories he Designed, Albert Kahn Lived to Work." Smithsonian September 1994: 49-59.

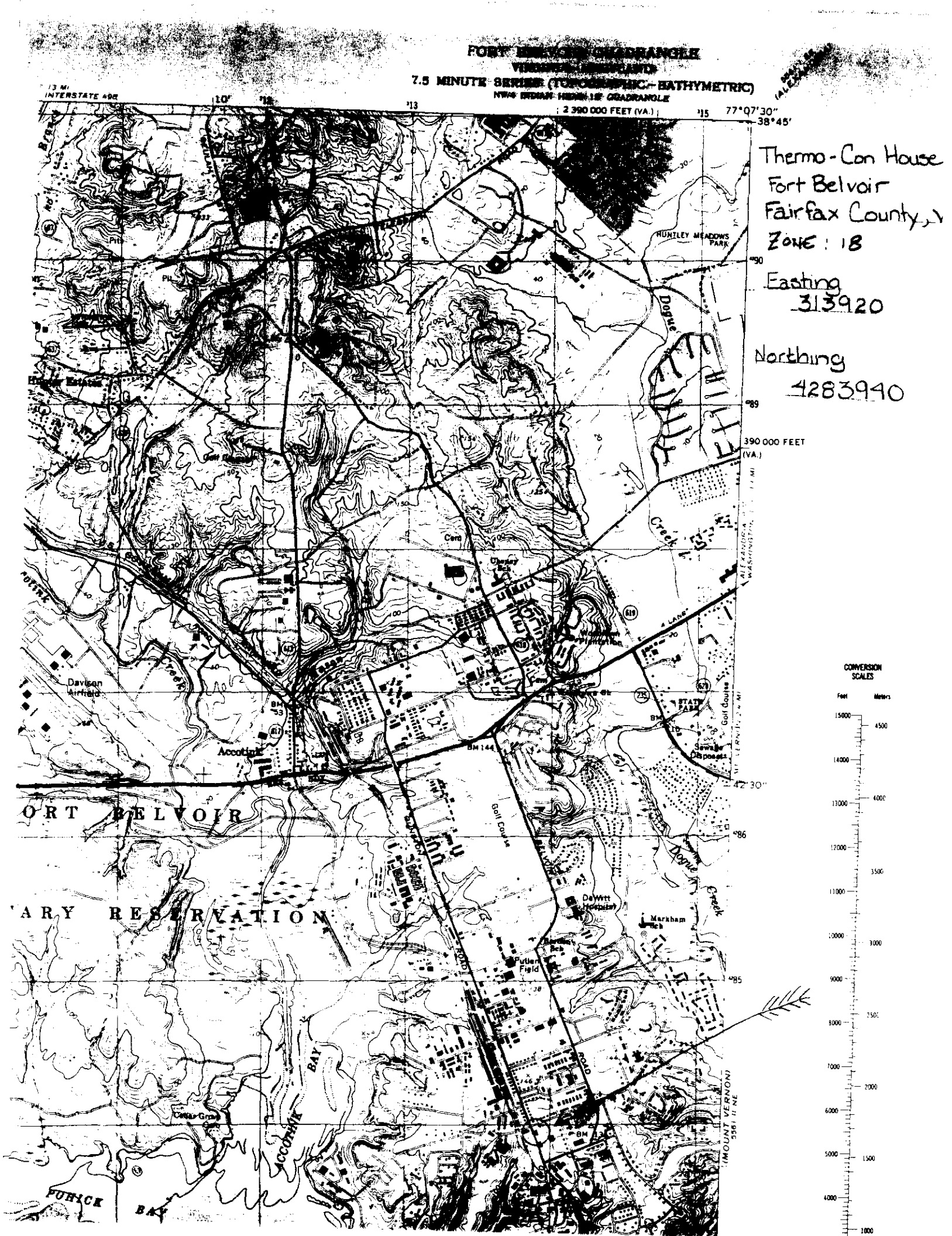
Section 10

Verbal Boundary Description:

The Thermo-Con House property is a triangular area. The boundaries of the property are Gunston Road on the south, intersecting with an unnamed access road on the west, then closing the triangle with a ravine just north of the structure. The ravine runs parallel to the east elevation of the house and meets Gunston Road to the south.

Boundary Justification:

The chosen boundaries describe the amount of property necessary to protect the integrity of the house's setting.


7.5 MINUTE SERIES (TOPOGRAPHIC-BATHYMETRIC)
77°07'30"
38°45'
Thermo-Con House
Fort Belvoir
Fairfax County, VA
Zone: 18
Easting
313920
Northing
4283940
390 000 FEET (VA.)
HUNTLEY MEADOWS PARK
Dogue Creek
Davison Airfield
Accotink
Golf Course
DeWitt Hospital
Markham
Fuller Field
Cedar Grove
ACCOTINK BAY
POHICK BAY
(MOUNT VERNON) 5561 II NE
CONVERSION SCALES
Feet
Meters