

A CIVIL WAR MUSEUM DESIGN: AT FREDERICKSBURG, VIRGINIA

by:

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Thesis submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of
MASTER OF ARCHITECTURE

APPROVED:

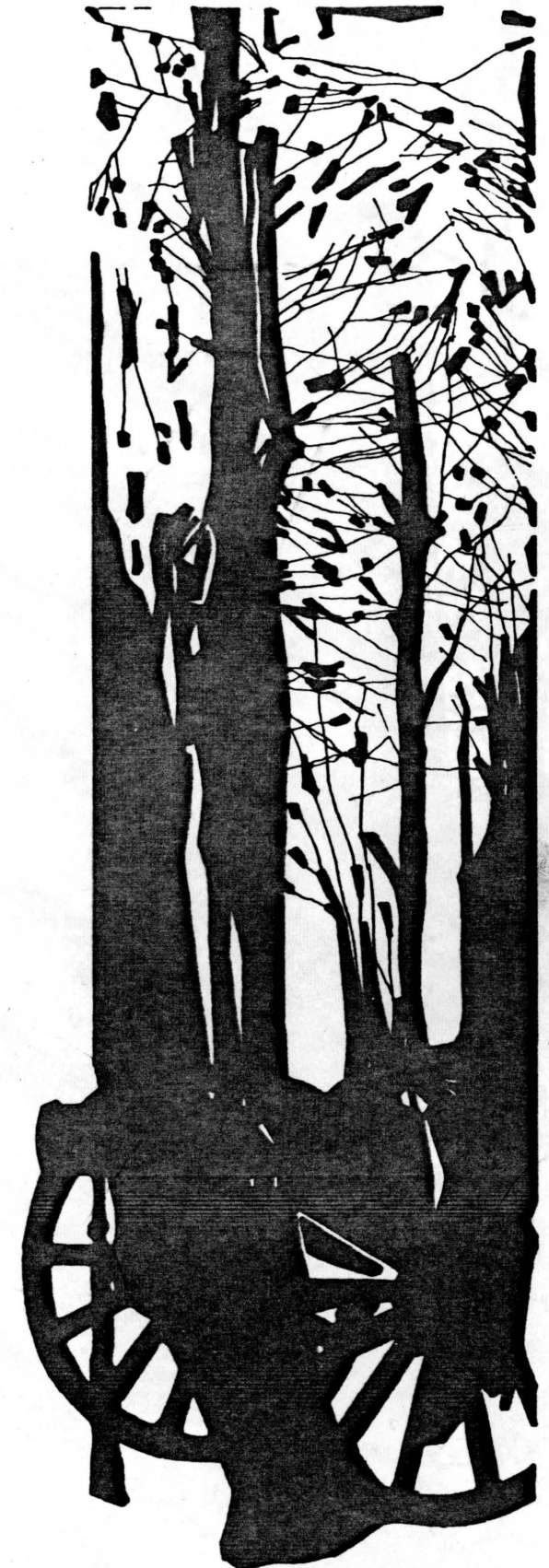
Gary E. Day, Chairman

Myron K. Bircher

Guenter Lehmann

December, 1982

Blacksburg, Virginia





11/25/83 DE

AT THE FOOT OF

ACKNOWLEDGEMENTS:

This thesis would not be complete without expressing appreciation to the members of my committee, Gary Day, Mike Bircher, and Guenter Lehmann. It has been a real pleasure to work with them, and I thank them for their enthusiasm and interest in this thesis.

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I would also like to thank _____, and _____ for encouraging me throughout to the completion of this degree.

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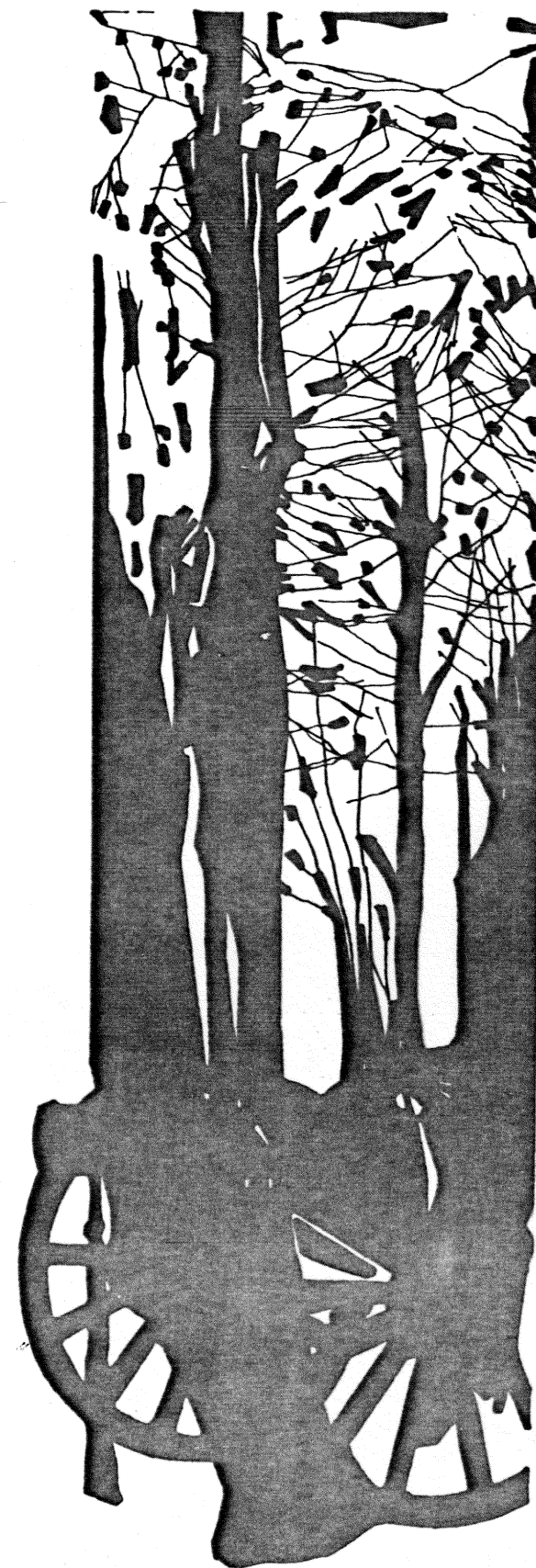
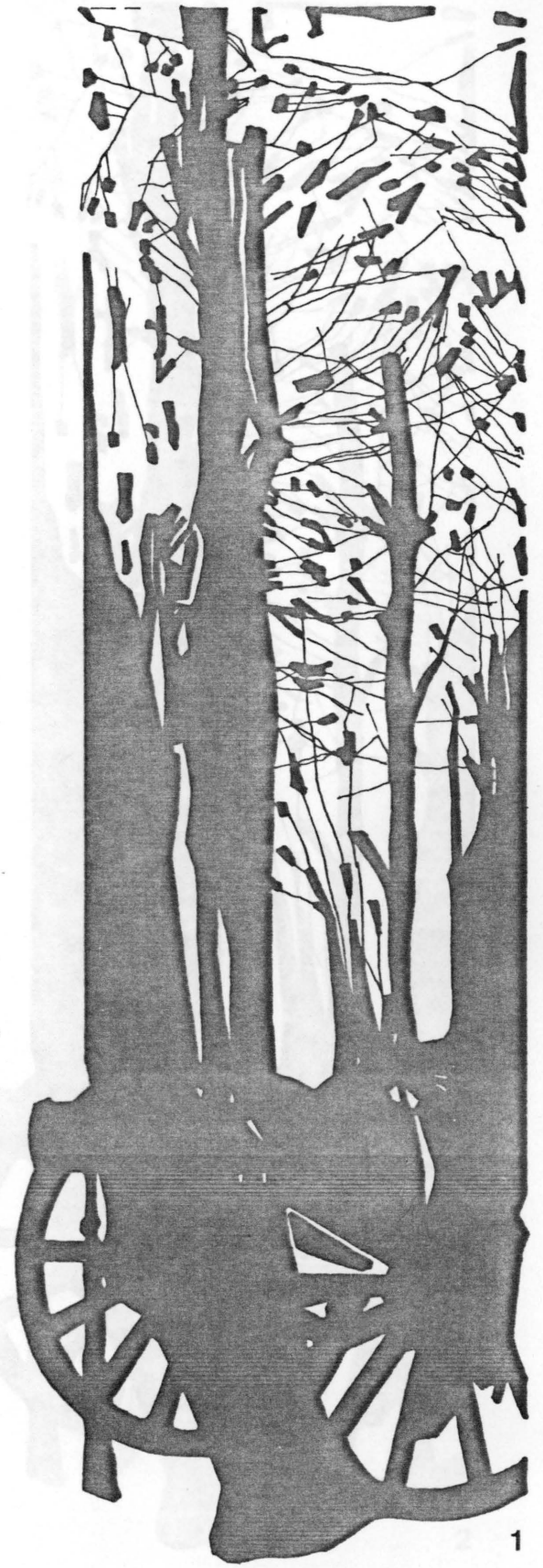
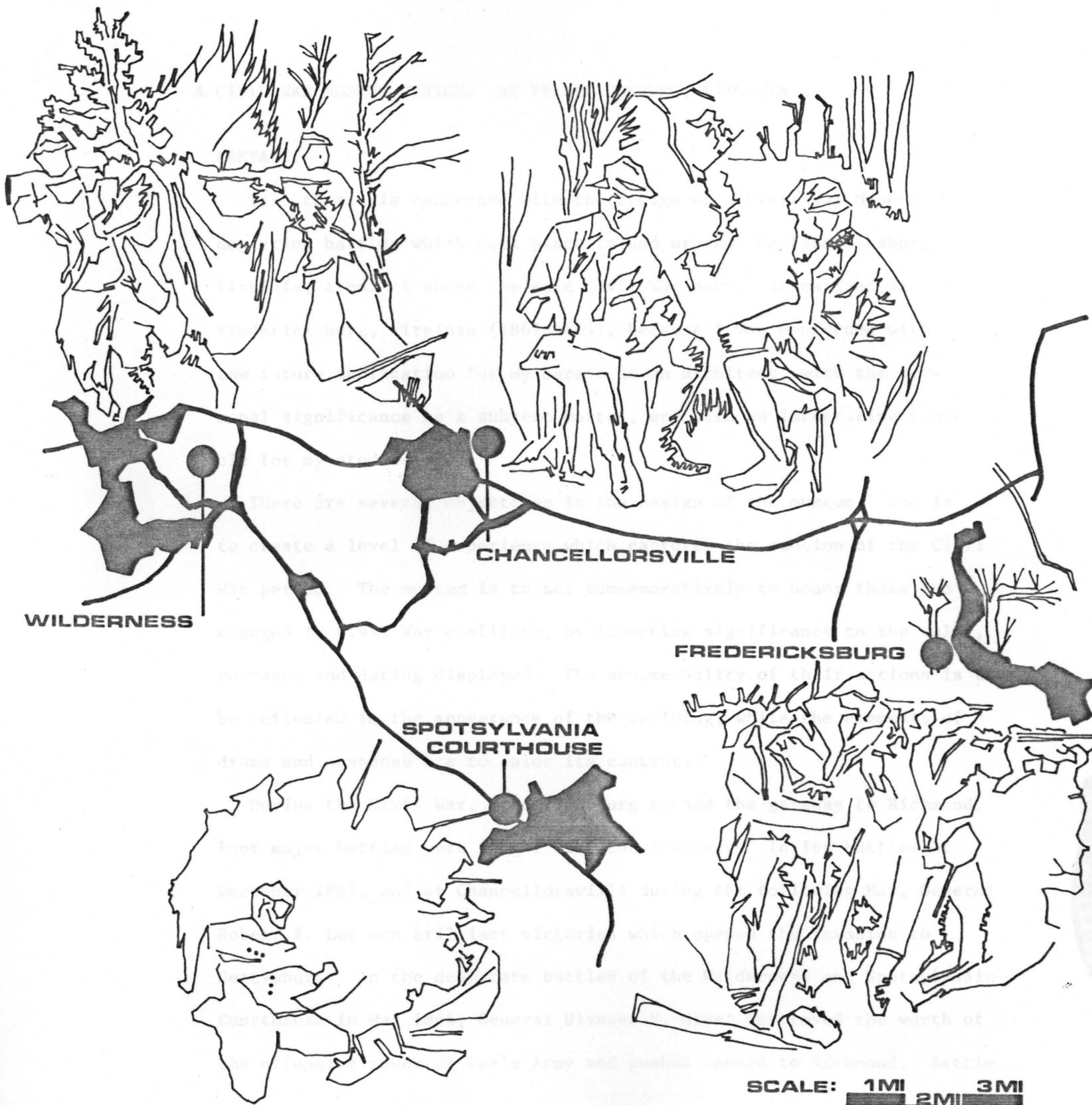




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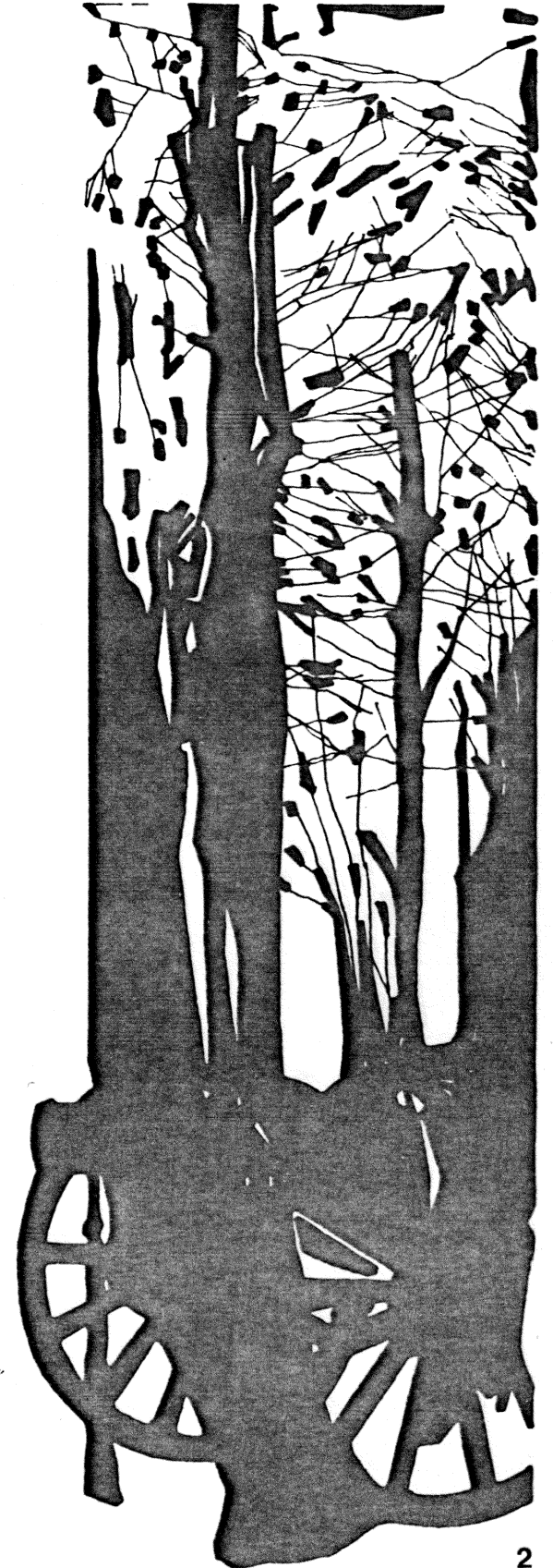
A CIVIL WAR MUSEUM DESIGN: AT FREDERICKSBURG, VIRGINIA

PREFACE:

This thesis is concerned with the design of a Civil War Museum depicting battles which took place in and around the Fredericksburg, Virginia, area. I chose the epic Civil War action dramatized at Fredericksburg, Virginia (1862-1864), because I was concerned with the future application for my career as an architect, with the personal significance as a subject matter, and with an integrative vehicle for my studies.

There are several objectives in the design of the museum. One is to create a level of experience which captures the emotion of the Civil War period. The museum is to act commemoratively to honor those who engaged in Civil War conflicts, by imparting significance to the valor, courage, and daring displayed. The monumentality of their actions is to be reflected in the appearance of the building, while the elements of drama and suspense are to color its content.

During the Civil War, Fredericksburg became the gateway to Richmond. Four major battles were fought at Fredericksburg. In its battles of December 1862, and at Chancellorsville during the following May, General Robert E. Lee won brilliant victories which opened the invasion to Gettysburg. In the desperate battles of the Wilderness and Spotsylvania Courthouse in May 1864, General Ulysses S. Grant destroyed the worth of the offensive power of Lee's Army and pushed onward to Richmond. Battle



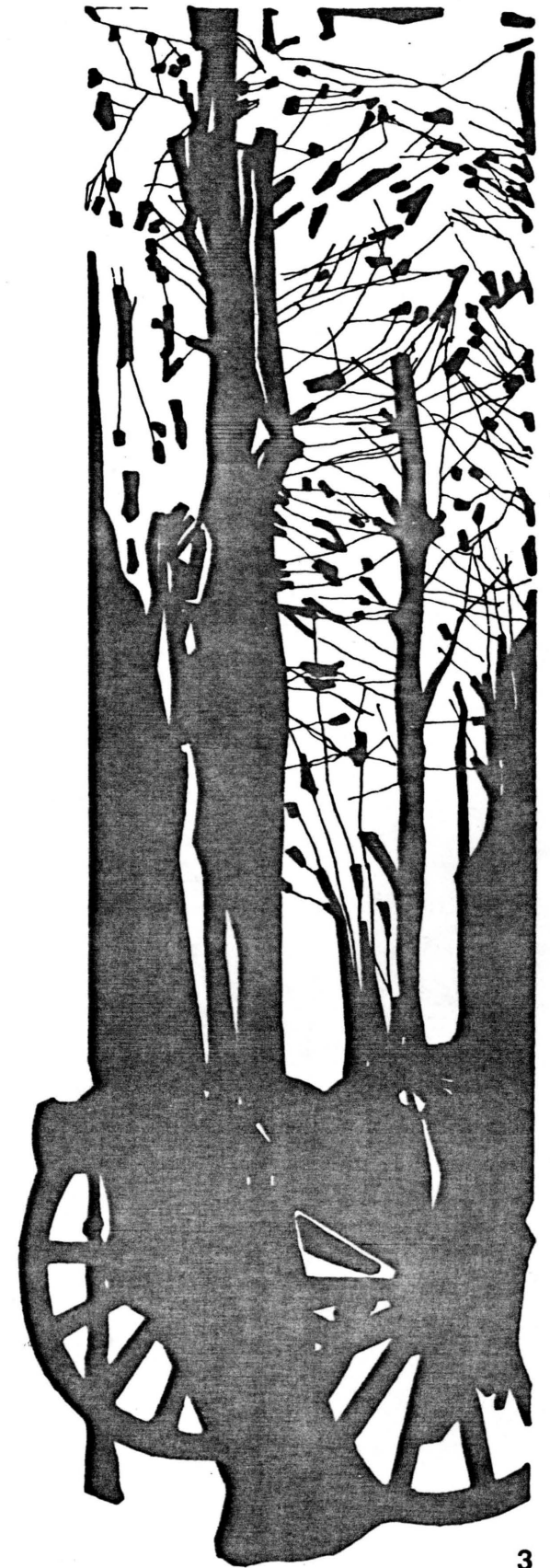
scars are still visible in the streets and on the buildings of Fredericksburg. In its cemeteries lie 17,000 soldiers who fell in the Fredericksburg campaigns. Indeed, because of its role in the Civil War, perhaps no other American town has suffered the physical and economic devastation as Fredericksburg did in the battle of 1862.

HISTORICAL BACKGROUND:

The countryside in and around Fredericksburg provided the setting for four major battles of the Civil War resulting in over 100,000 casualties.

In the battle of Fredericksburg, the Federal Army commanded by General Ambrose E. Burnside arrived on the Stafford Heights overlooking Fredericksburg in mid-November 1862. However, it was not until December 11, that the Federals crossed the Rappahannock River to attack. By this time Confederate forces were firmly positioned on the high ground west of the city. On December 13 Burnside ordered two attacks. The assault at Prospect Hill against Jackson's corps achieved temporary success before being driven back. The second attack concentrated against the heart of Lee's defenses on Marye's Heights directly behind Fredericksburg. Federal soldiers were slaughtered in masses by fire from artillery on the heights and infantry behind a stone wall.

Following the Fredericksburg debacle, President Lincoln replaced Burnside with Joseph Hooker. On April 27, 1863, the new commander marched his army upstream, crossed the rivers at shallow fords, and within three days was at the Chancellorsville crossroads. General Robert E. Lee discovered this threat to his position and rushed westward. This



THE BATTLE OF FREDERICKSBURG

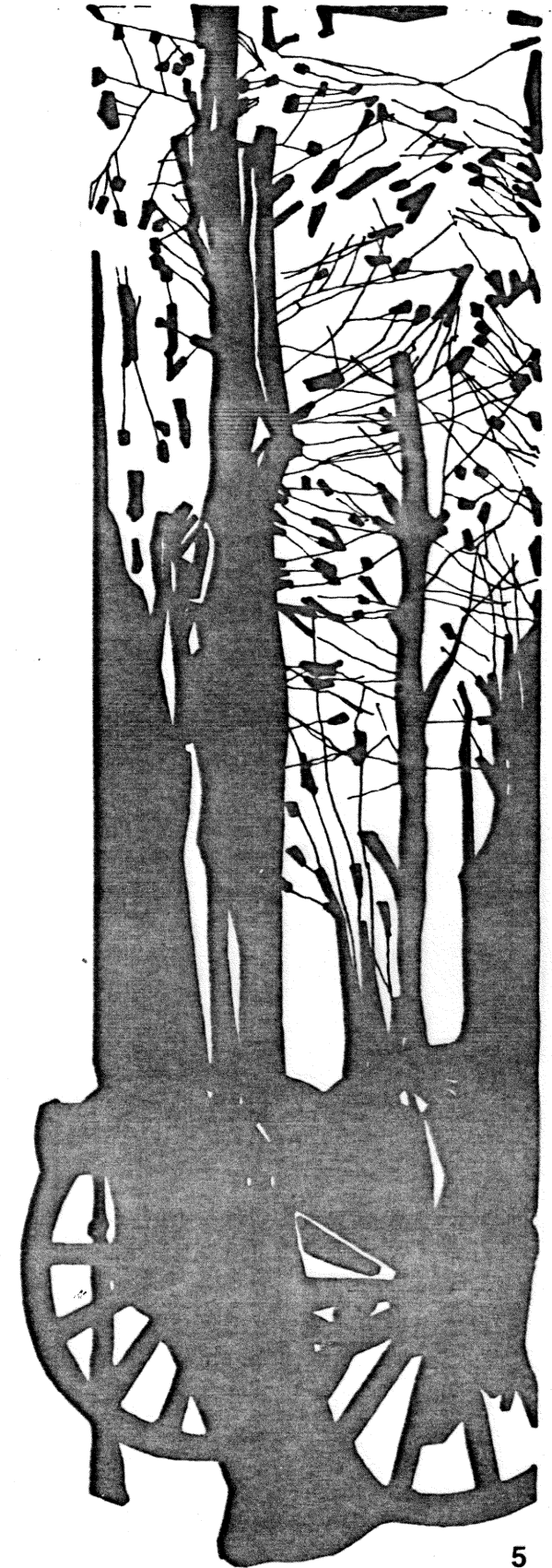


action prompted Hooker to abandon the initiative and establish a defensive line which was vulnerable on the right flank. Stonewall Jackson exploited this weakness on May 2 by leading his corps on a risky 12 mile march around the Federal army and destroying Hooker's right in a spectacular surprise attack. Lee pressed his advantage for three more days and eventually drove the Federals back across the river.

The first of the classic encounters between Lee and Grant took place in the dense thickets and tangled over-growth of the Wilderness on May 5-6, 1864. The Wilderness at this time was a dense forest of second growth pine and scrub oak, with numerous creeks, gullies, swamps, heavy tanglefoot underbrush, with few farms or open spaces, and most of the roads mere winding trails. The Wilderness comprised an area of about 200 square miles. Today it is still much the same as it existed in 1864.

In this battle, the two armies sparred indecisively for two days along the Orange turnpike. On the Plank Road to the south, the Federals almost crushed A. P. Hill's troops on May 5, only to be thrown back by a dramatic Confederate counterattack the next day. The battle was tactically a draw. Grant broke the stalemate by marching his army south toward Spotsylvania Courthouse.

On May 7, 1864, both armies raced for the vital intersection at Spotsylvania Courthouse which controlled the shortest route to Richmond. Lee arrived first, entrenched, and successfully withstood a series of small scale Federal attacks. On the morning of May 12, two Federal



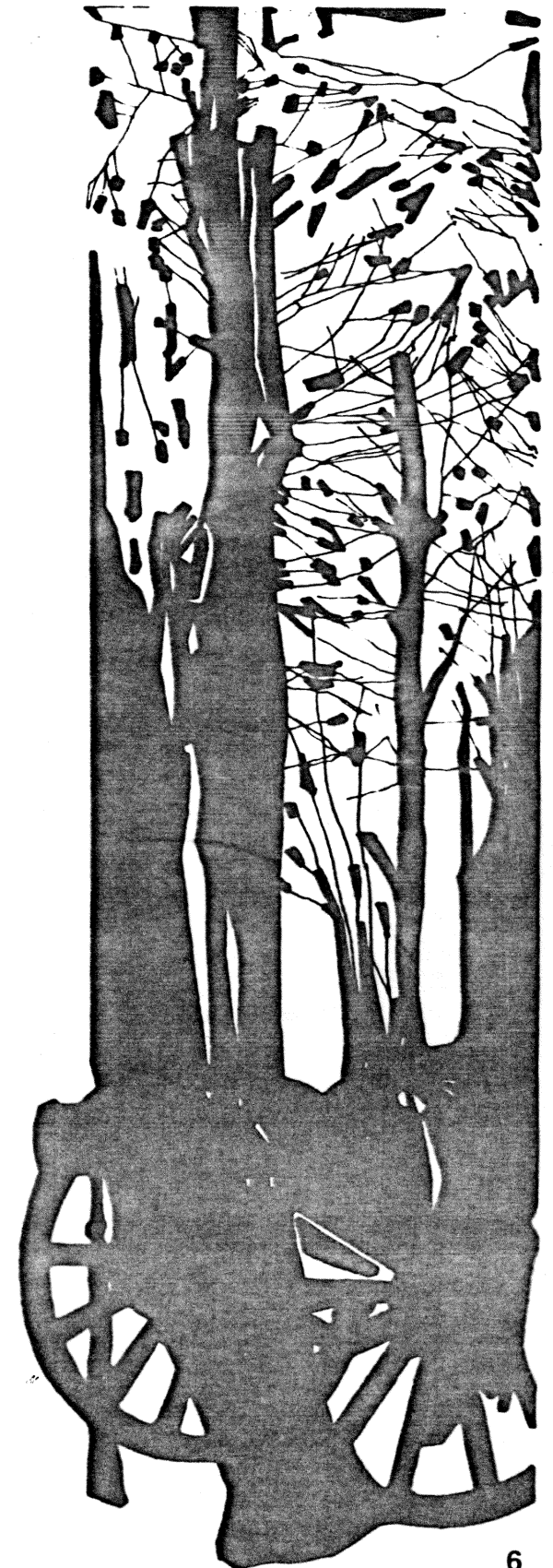
corps charged from the woods opposite a vulnerable section of the Confederate line known as the mule-shoe salient. Because of a thick fog and wet Confederate gunpowder, the initial Federal advance overwhelmed the Southerners. As another assault reached the Confederate line, Lee's reinforcements crashed into the oncoming Federals and for the next twenty hours the men in this sector engaged in the most intense hand to hand combat of the war. This desperate fighting at the "Bloody Angle" earned Lee enough time to build new earthworks which he defended until Grant abandoned the field on May 21.

BUILDING PROGRAM:

The design of the museum traces the four Fredericksburg battles. Four major exhibition galleries define the organizational core for the building's functional relationship. The adjacent Fredericksburg and Chancellorsville galleries reflect the time sequence of both battles. Likewise, the adjacent Wilderness and Spotsylvania Courthouse galleries reflect their historical sequence. Space between each of these two galleries marks the time that elapsed between the battles, during which the battle of Gettysburg was fought.

Visitors would approach the building from a major highway with direct access to the interstate highway which runs north and south through the area. The design of the approach drive and parking areas serve as attractive introductions for the building.

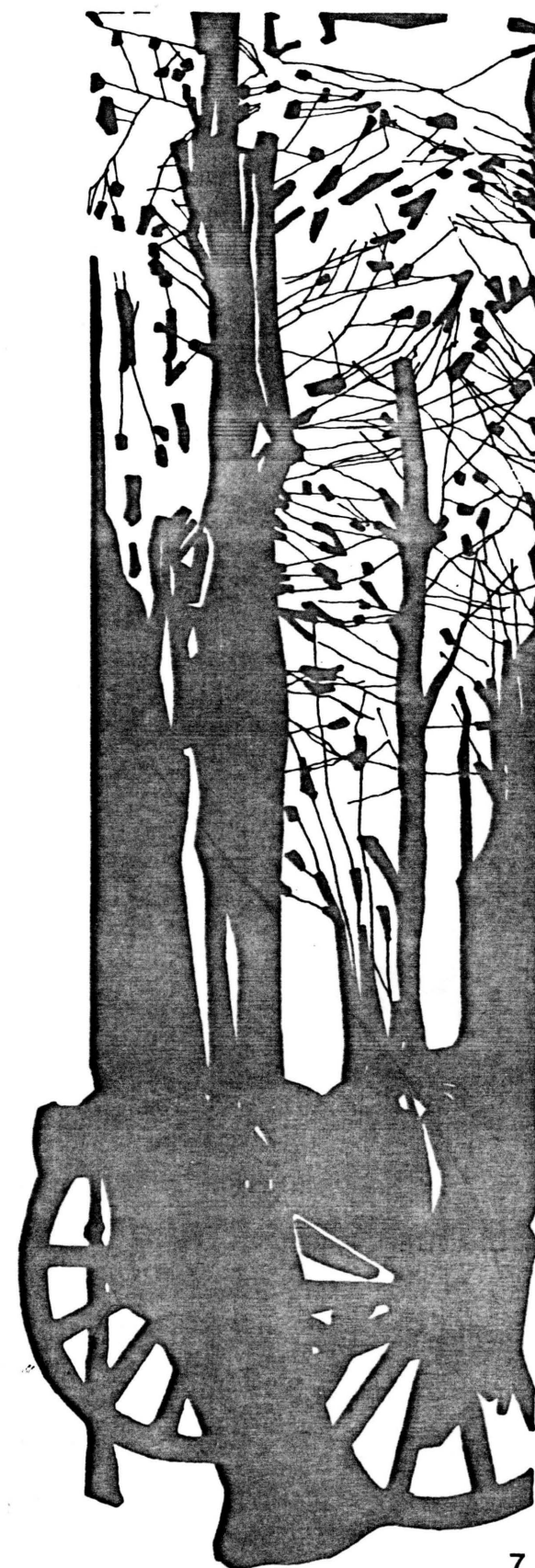
The location for the museum is situated on a bluff overlooking the town on the site from which Union General Ambrose E. Burnside planned

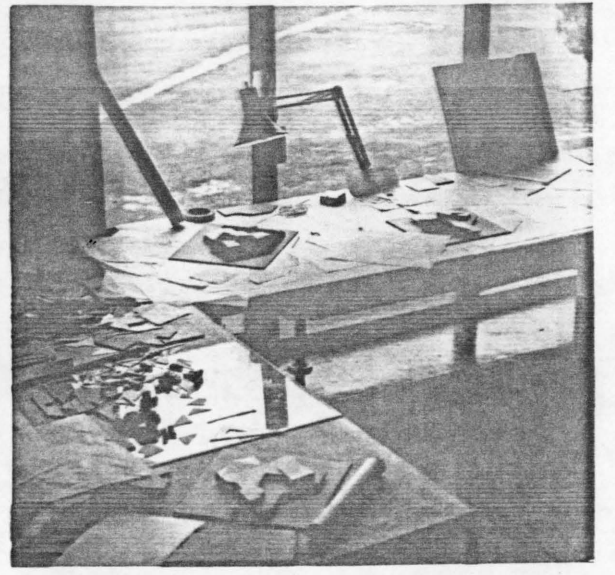
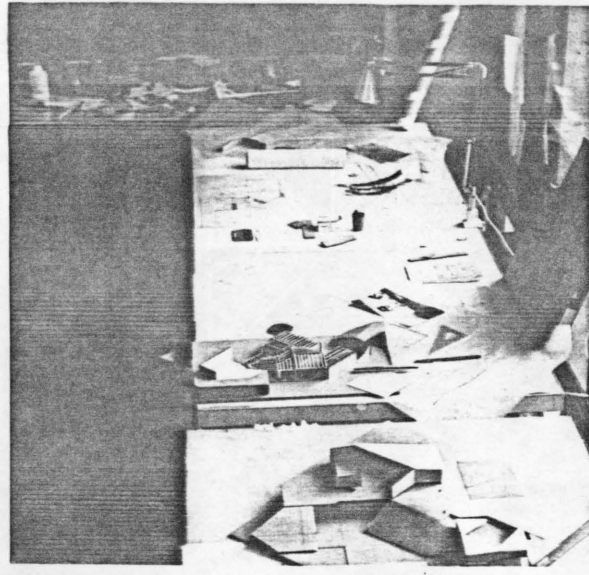
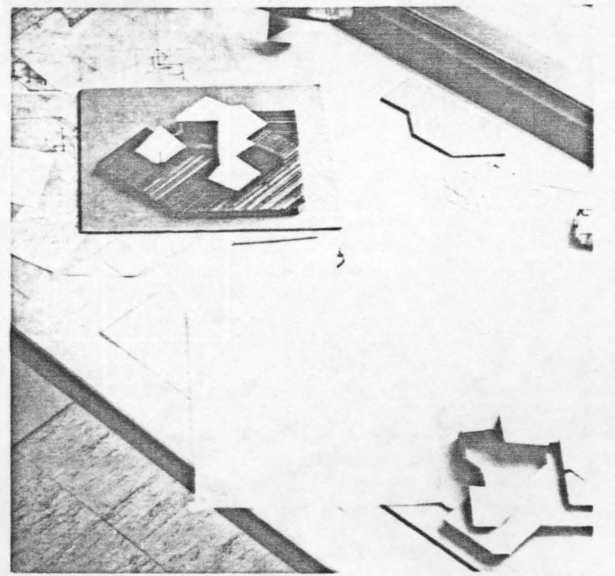
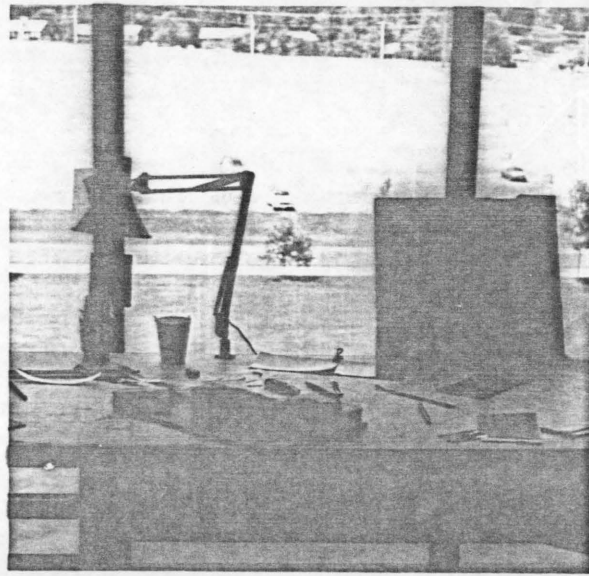
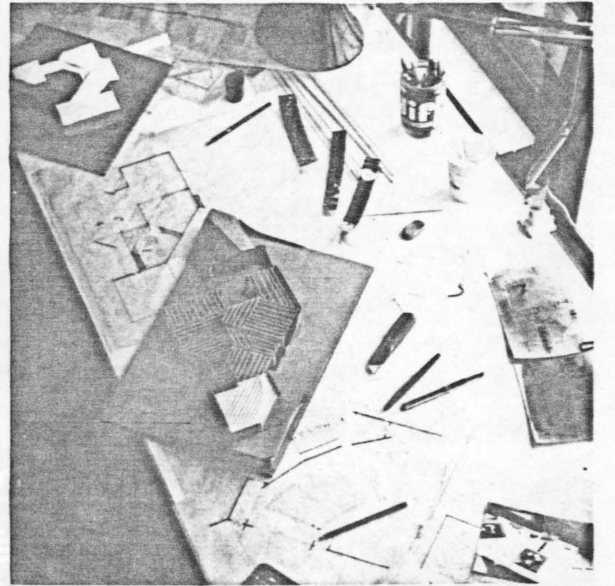
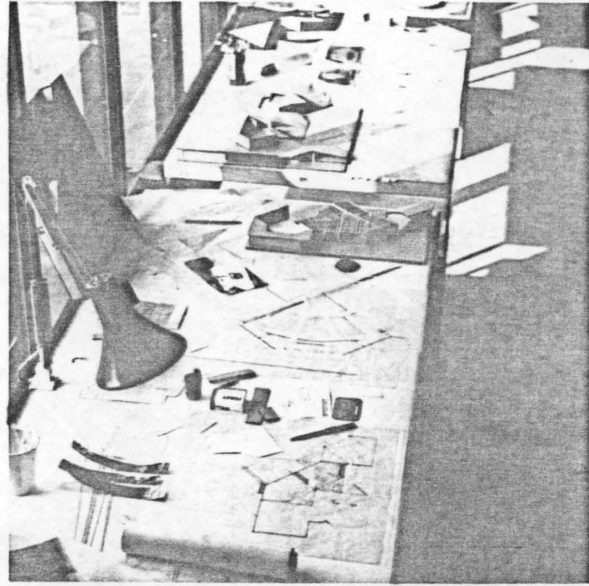


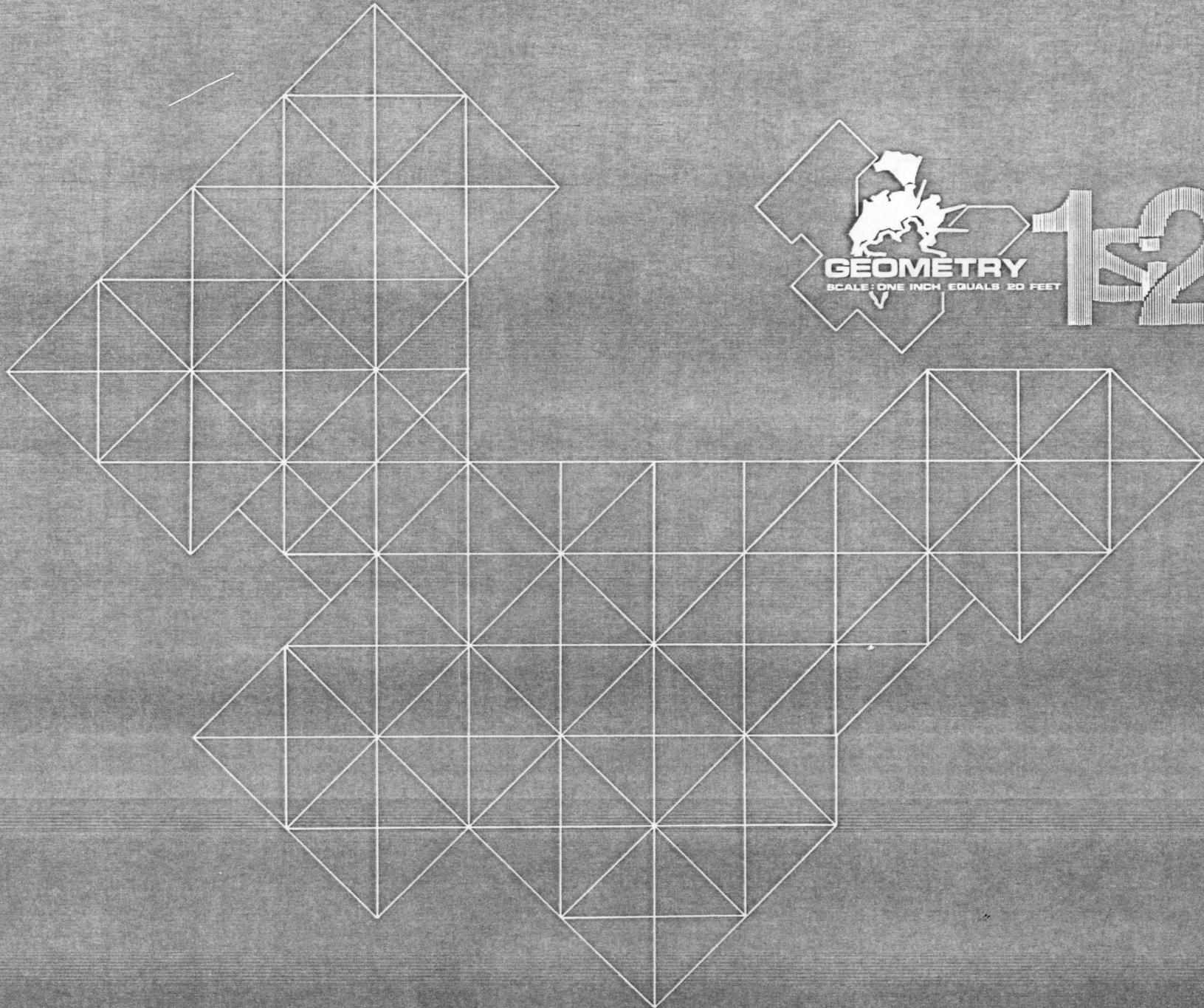
and launched his attack in the battle of Fredericksburg on December 12-13, 1862. Adjacent to the museum site is the Chatham Mansion, a building structure in the Georgian style which served as a headquarters for the Federal Command during the battle. I chose this site because I determined that it would be accessible to the major highway (I-95).

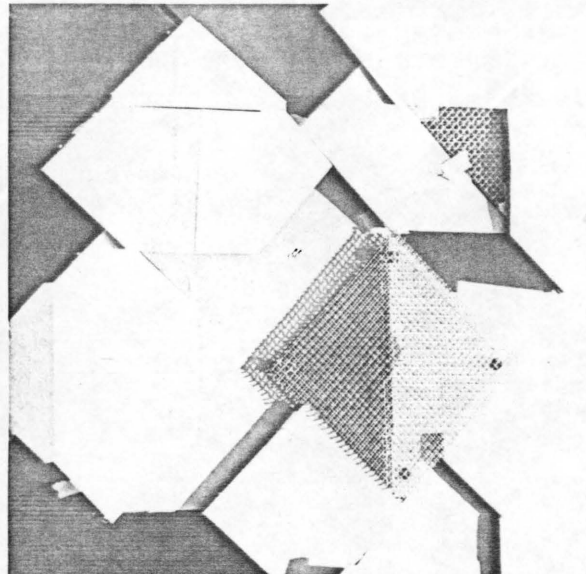
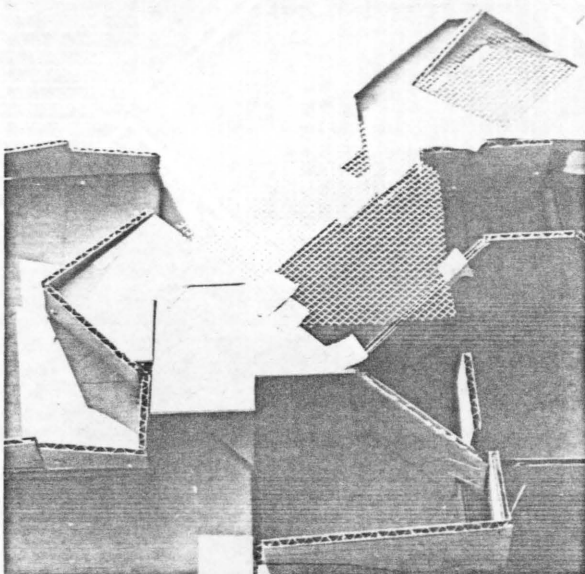
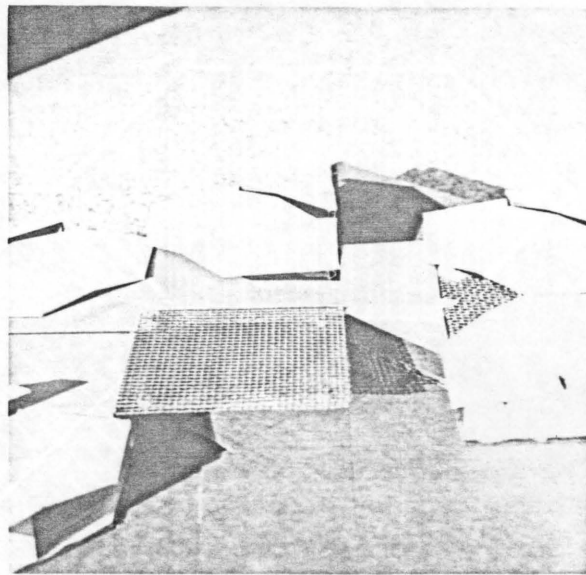
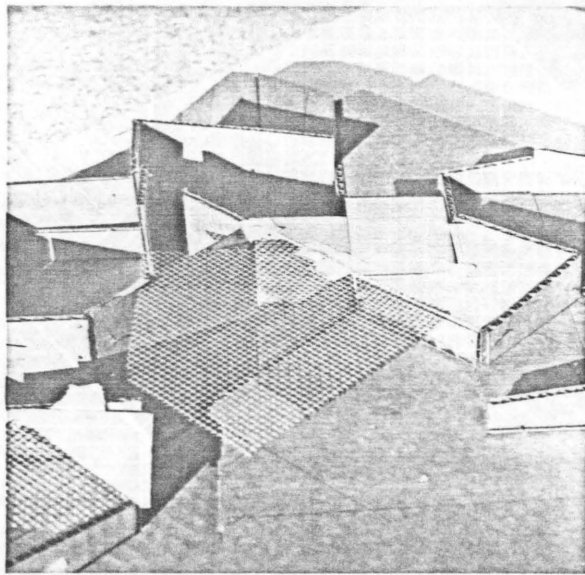
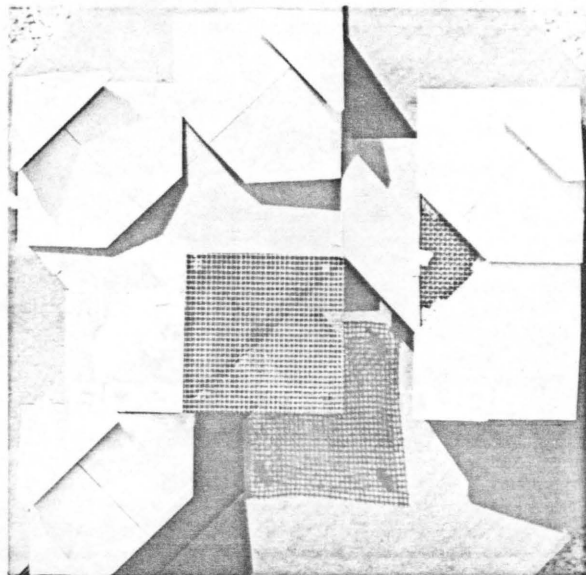
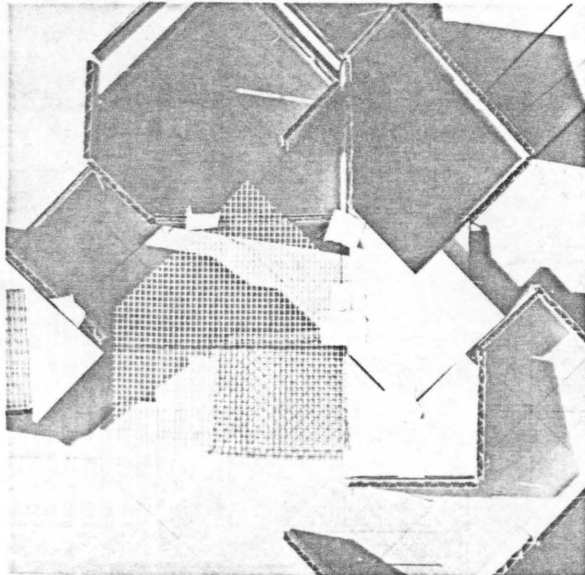
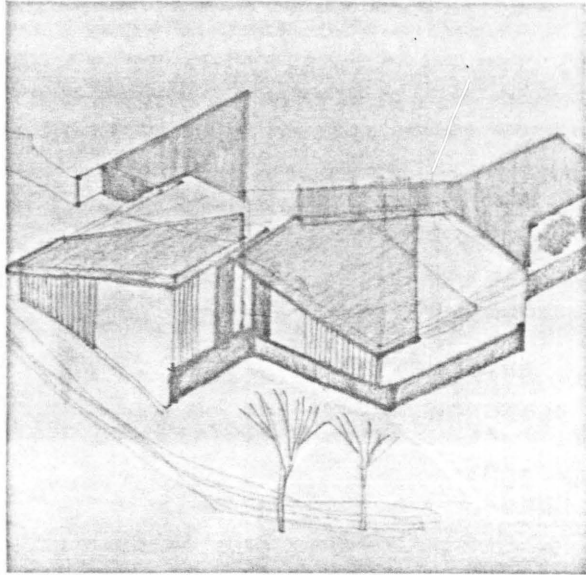
The museum building has two levels. The upper level contains the galleries, lobby, auditorium, and orientation spaces. Each of the four galleries has 6400 sq. ft. of floor area. The lobby and orientation areas together comprise 5000 sq. ft. The auditorium can seat 200 people and could be expanded to a larger capacity at some future time.

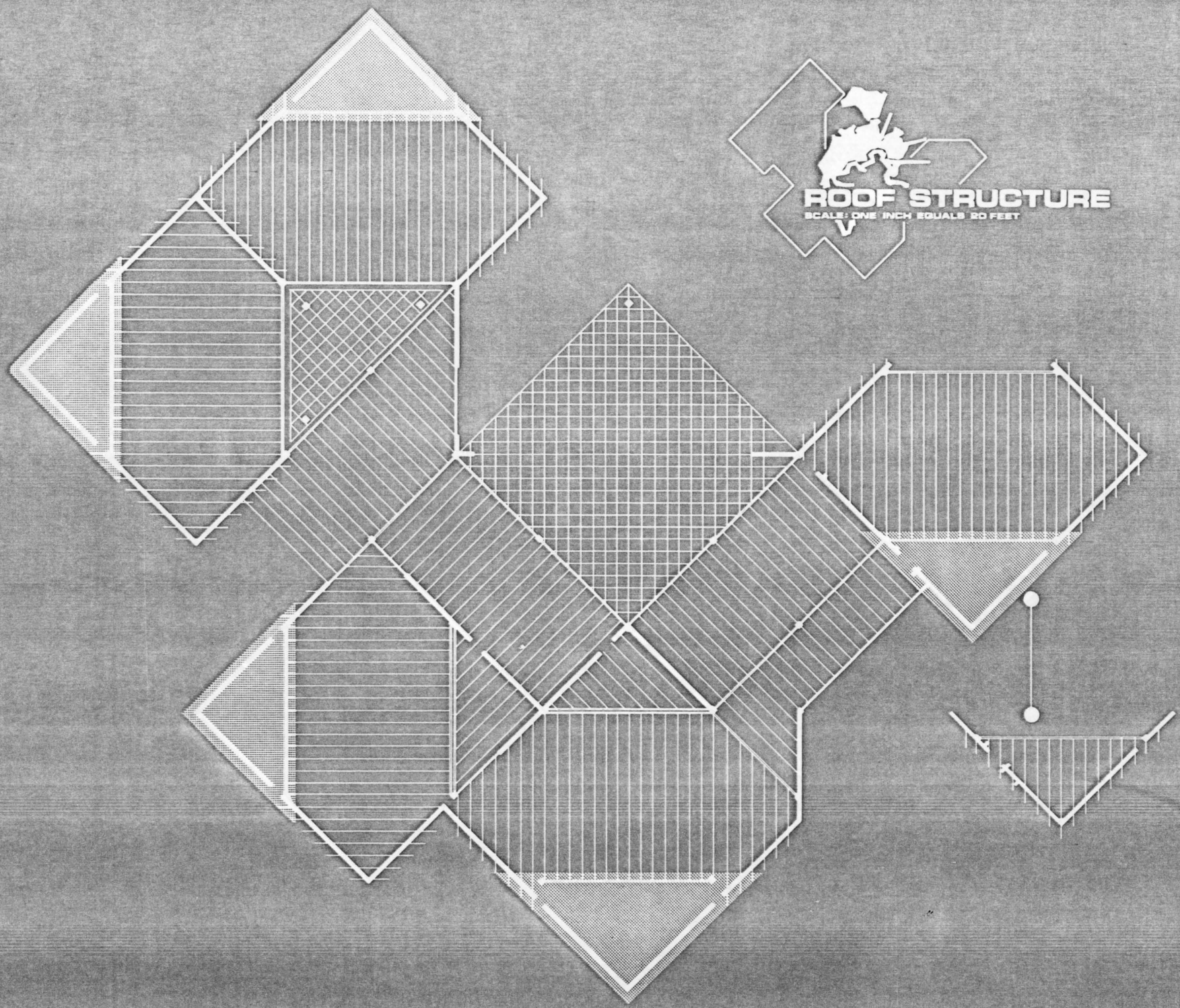
The lower level of the museum building contains the library, administrative suite, restrooms, storage area, and mechanical rooms. The administrative suite is designed for those who manage the museum. The library is designed for special collections. It contains 6400 sq. ft. of floor area and has space for 12,000 volumes. The storage area has 6400 sq. ft. of floor area and convenient access to the upper level by freight elevator. Outside access to the storage is available through the loading dock which joins the service drive. The mechanical rooms function independently of each other to heat and cool the various parts of the building.



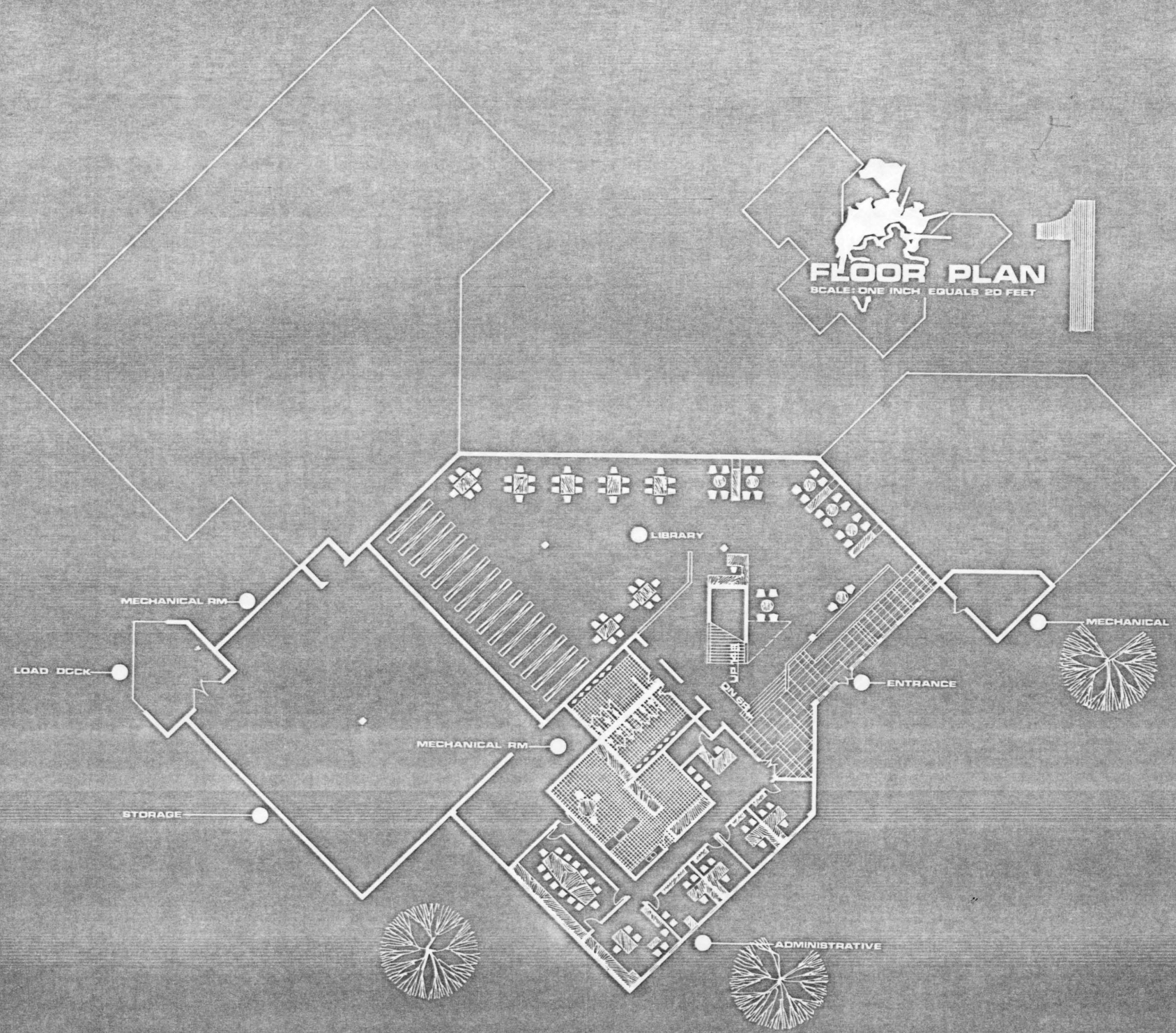






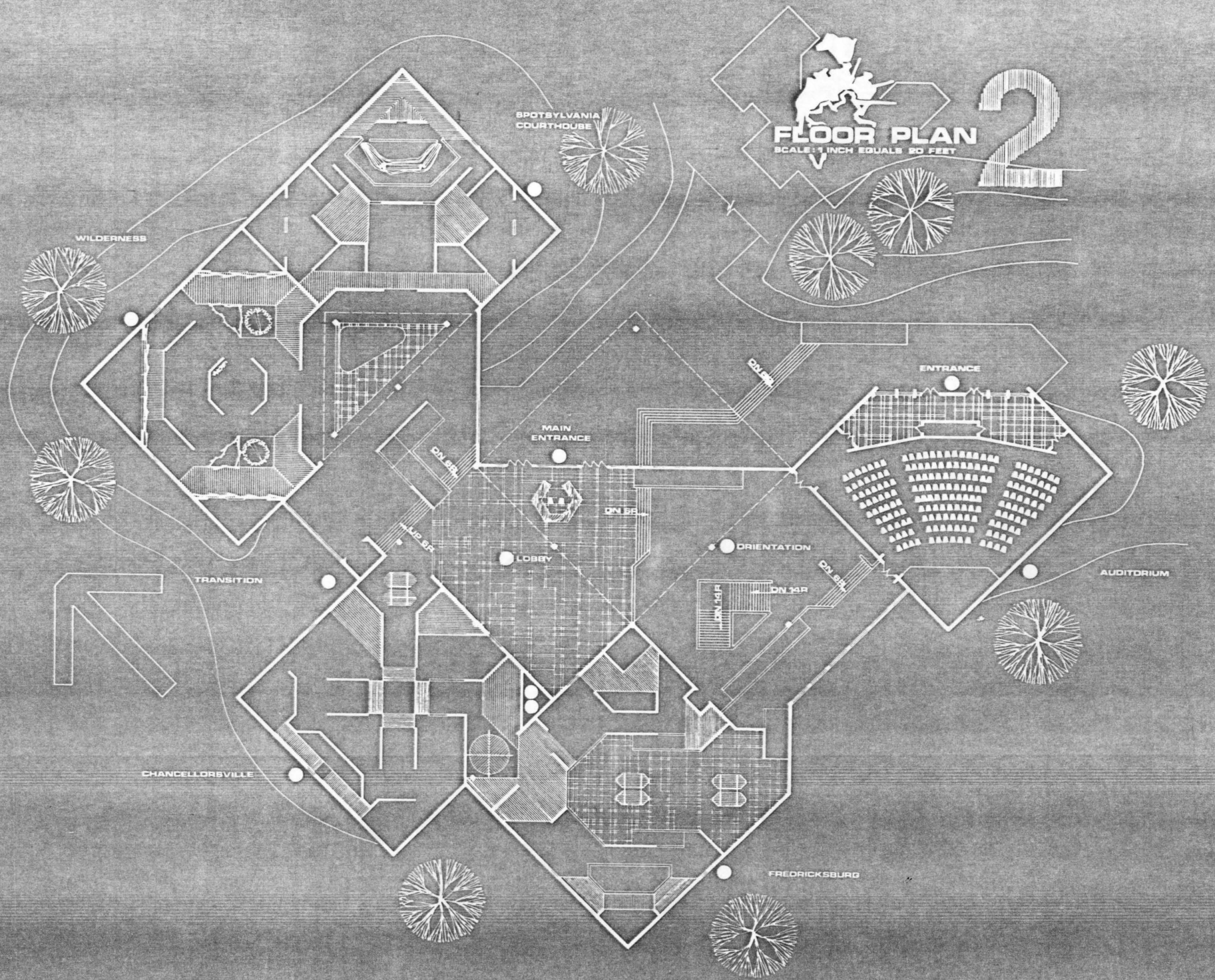


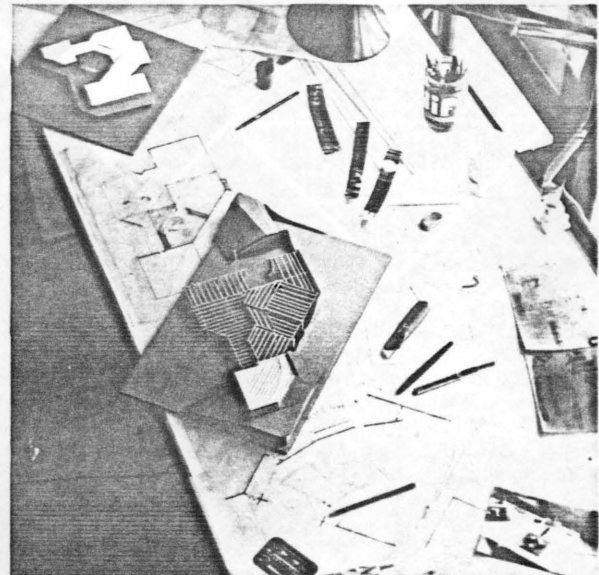
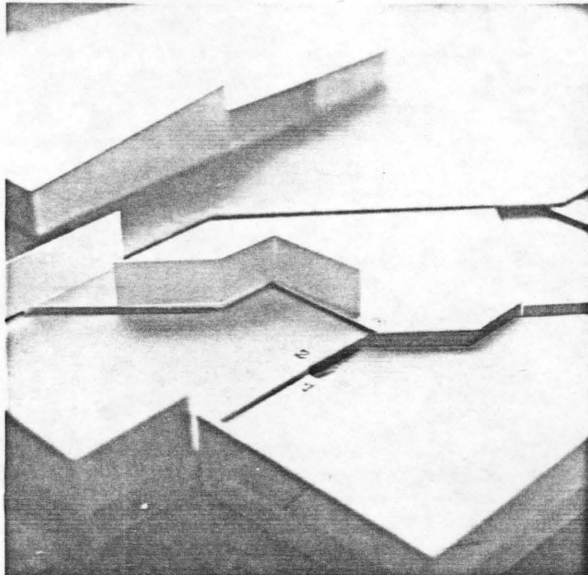
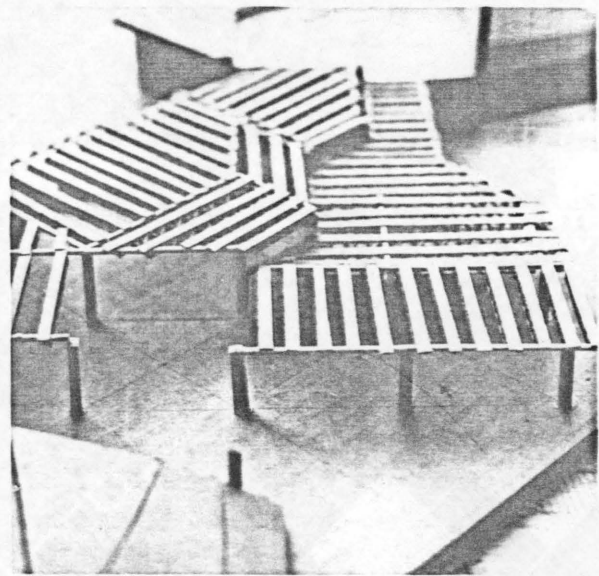
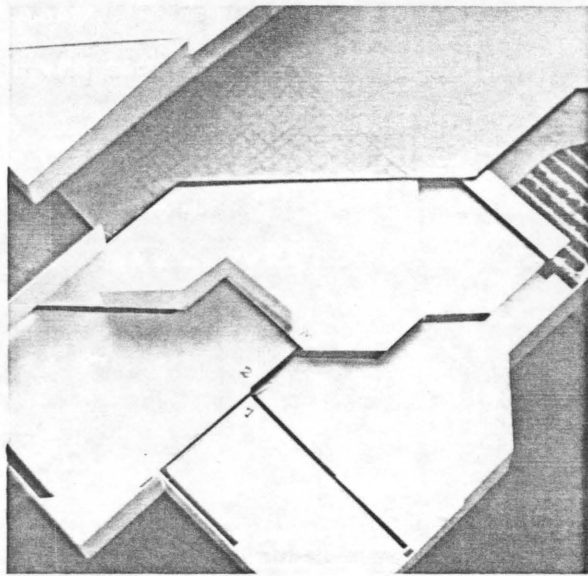
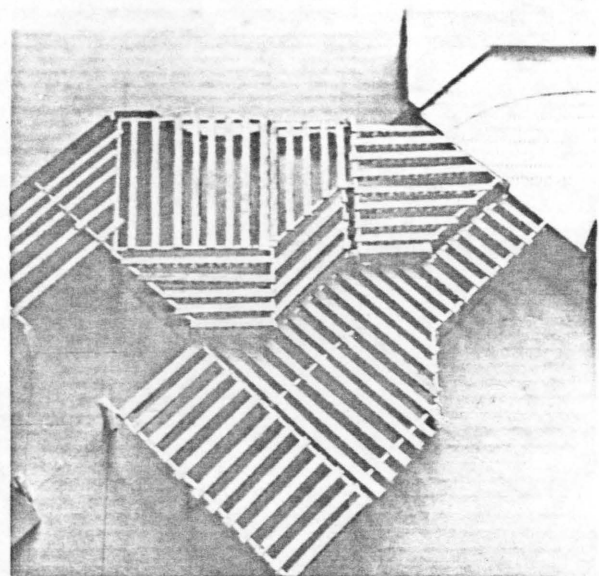
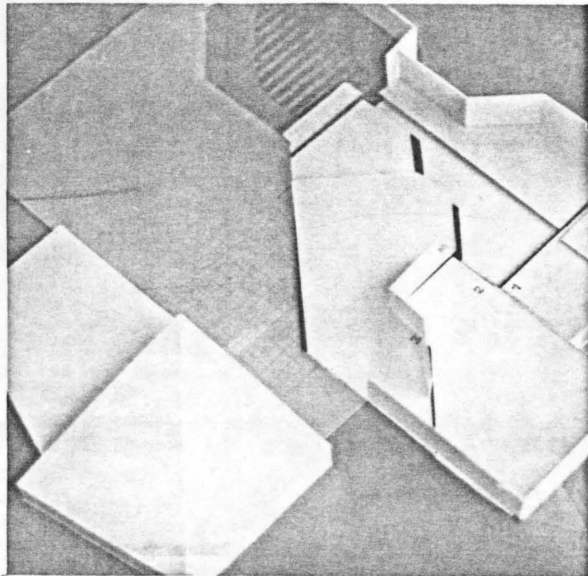
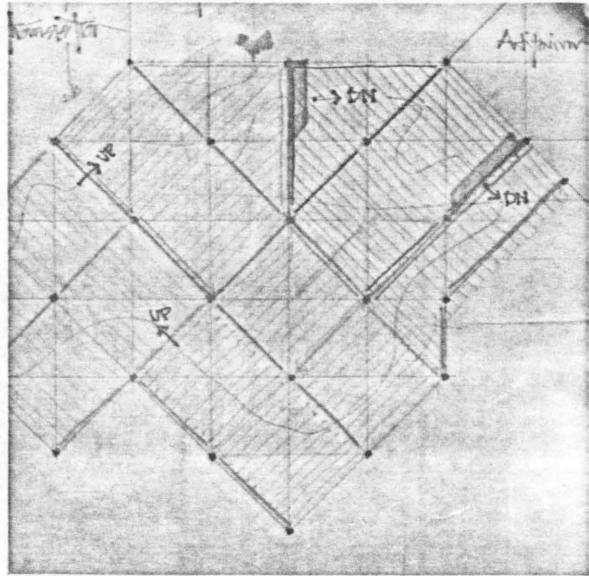
ROOF STRUCTURE
SCALE: ONE INCH EQUALS 20 FEET



FLOOR PLAN
SCALE: ONE INCH EQUALS 20 FEET

1





1" FINISHED FLOORING 3 lbs./sf
 - SUSPENDED PLASTER CEILING 10 lbs./sf
 LIVE LOAD 80 lbs./sf
 total floor load (93 lbs./sf ~ 100 lbs.)

joist spacing - 4' o.c. $4 \cdot 100 \text{ lbs} = 400 \text{ lbs. plf joist}$
 $400 \text{ lbs.} \times 40' = 16,000 \text{ lbs. plf (exclusive wt. of joist)}$, see
 (page 5-278 AISI & CD. - 2x10g - supts. 4x4 lbs. plf.)
 wt. of joist = 2x lbs. plf. $42x < 46x \checkmark$
 (distributive area - 9 joists)

Beam Design: $16,000 \text{ lbs.} \cdot 9 = 144,000 = \text{TOTAL UNIFORMELY DISTRIBUTED LOAD.}$

use w/b

$$144,000 (40) / 8 = 720,000 \times 12 = 8,640,000 \times 2x \text{ ksi}$$

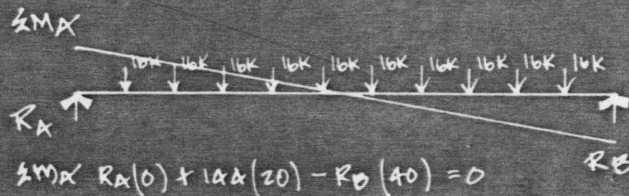
$$360,000 - 360,000$$

Sx	shape	depth	xw	lc	lv
4x4	W30 x 135	36"	0.598	12.3	13.2

(see pg. 2-29 AISI & CD.) (supts. 170K 1x4x4 < 170K)
 (wt. of beam = 135 lbs./plf.)

shear: V maximum web shear, kips 14.5 psi

$$x_v = v/dx + w$$



$$\Sigma M_A: R_A(0) + 16k(20) - R_B(40) = 0$$

$$72k / 30 \times (.598)$$

$$72k / 21.928 = 3.28k$$

$$3.28k < 14.5 \checkmark$$

$$2000 - 40 R_B$$

$$2000 = 40 R_B$$

$$72k = R_B$$

$$72k = R_A$$

Column Design: wt./ft. area x-x y-y

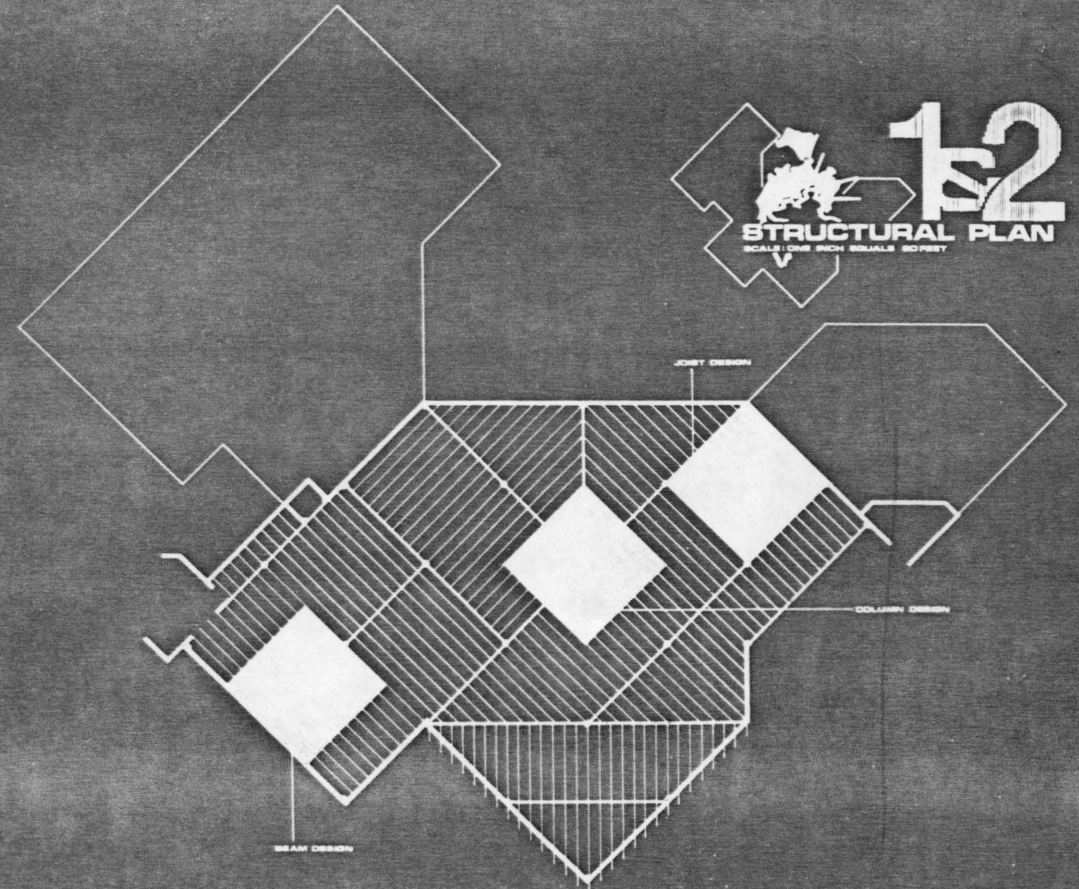
$$12 \times 12 \quad 65 \quad 19.1 \quad 5.28 \quad 3.02$$

$$K_{1r} = 15' \times 12" = 180" / 3.02 = 59.60 < 200$$

$$K_{1r} = 59.60 - 4x \quad 17.43$$

$$P = 4x \cdot A = 17.43 \times 19.1 = 332.913$$

$$200k < 332.913 \checkmark \quad (72k \cdot 4 = 288,000 \text{ lbs})$$



TYPICAL CALCULATIONS - HVAC SYSTEMS

$21,375 \times .0394 \times 10$ Area roof 91,558.0 (btuh)
 $10,822 \times .0197 \times 10$ Wall 39,558.0
 $9,000 \times .38 \times 10$ glass 132,192.0

Volume:
 $607,000 \times .018 \times 10$ 792,600.0
 $607,000 \times 19.5 \times .004$ 209,900.0
 HL (1,221,808.0)

Heat gains:
 $3 \text{ watts} \times 2/3 \text{ area} \times 3 \text{ air}$
 $(10,000 \times .90) \times .68 \times 3 \times 3 \text{ air} = 203,210.0$
 btus - people: $900 \times 100 \text{ btus} = 200,000$

$1,221,808.0 - (203,210.68 + 200,000) = 718,527.32$
 40R CFM: $HL / 1.08 \times \Delta T$
 $718,527.32 / 1.08 \times 30 = 22,020.67$

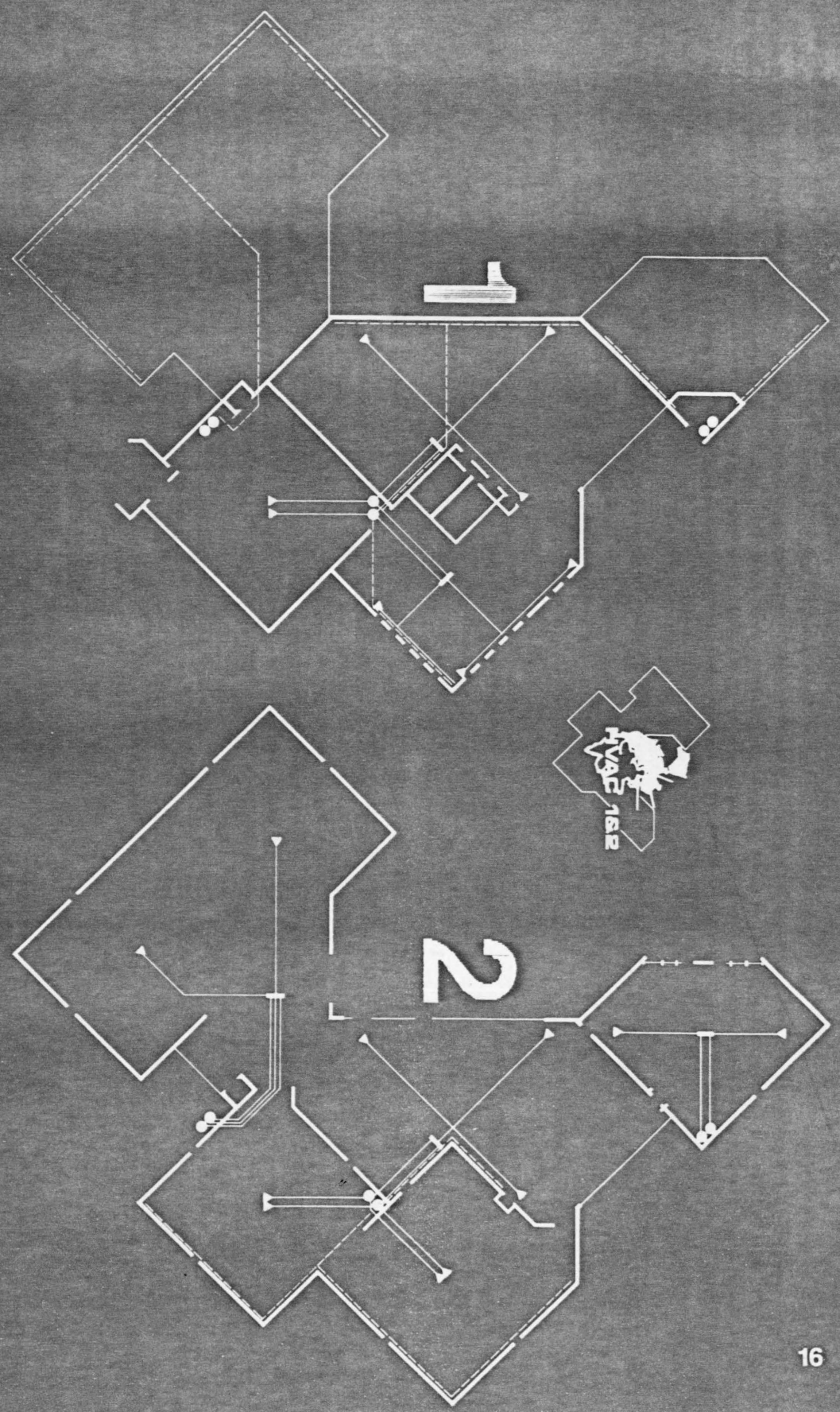
$21,375 \times .01 \times 15$ KR 12,825.0 (btuh)
 $10,822 \times .0197 \times 15$ AW 1440.99
 $9,000 \times .38 \times 15$ Ag 28,350.0
 CL (686,830)

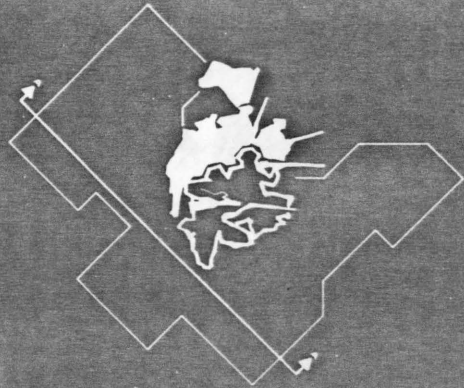
Volume: $607,000 \times .018 \times 15.0 = 172,872.0$
 $607,000 \times 19.5 \times .009 = 103,391.0$

Heat gains: $(10,000 \times .90) \times .68 \times 3 \times 3 \text{ air} = 203,210.68$
 btus - people: $900 \times 100 \text{ btus} = 200,000.0$

$686,830 + (203,210.68 + 200,000) = 1,008,873.0$
 40R CFM: $1,008,873.0 / 1.08 \times 15 = 42,291.00$

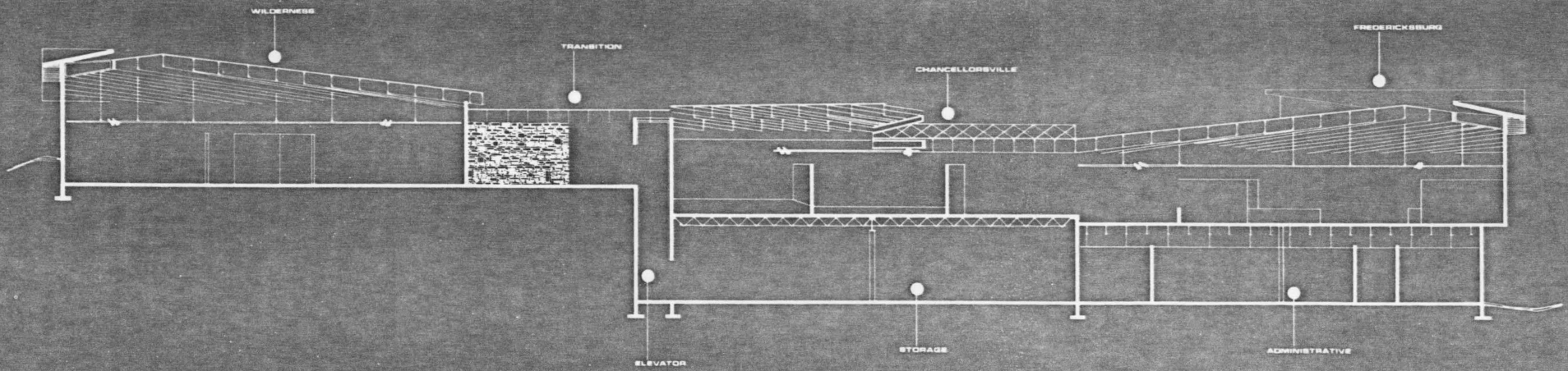
LOAD H btus	4-CFM	V-CFM	DUCT(DIA)	rectang. eq.
718,527.0	22,020	2400	10"	2 (30" x 12")
1,008,873.0	42,291	2400	90"	3 (50" x 17")

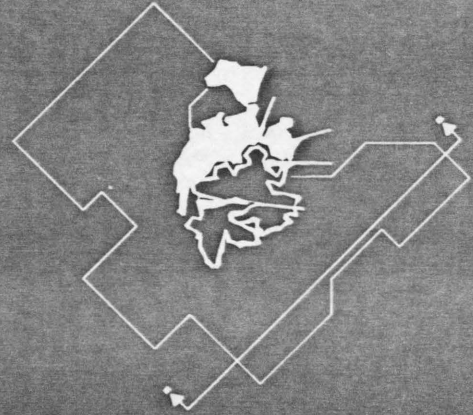




section A-A

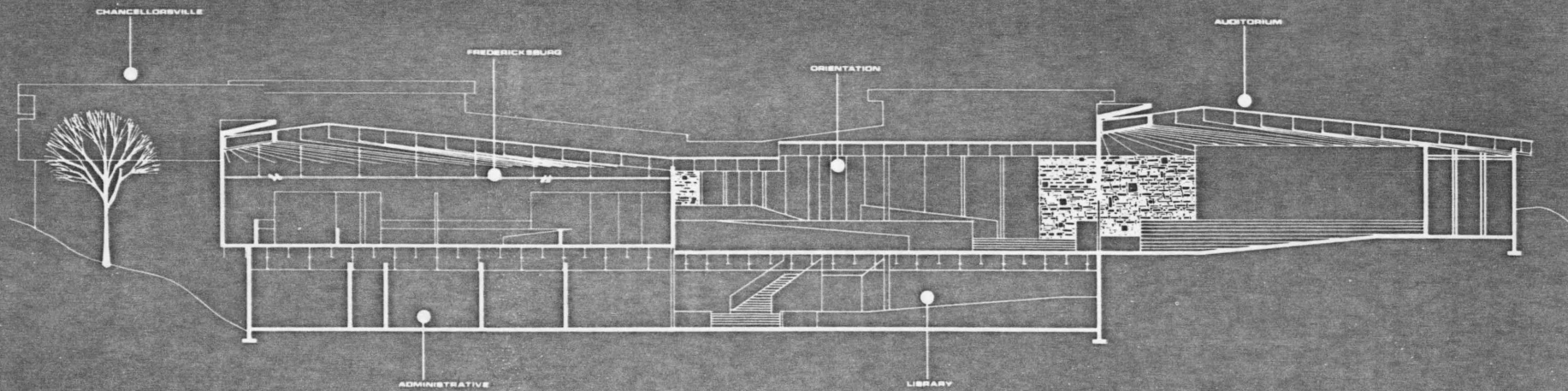
SCALE: ONE INCH = 10 FEET

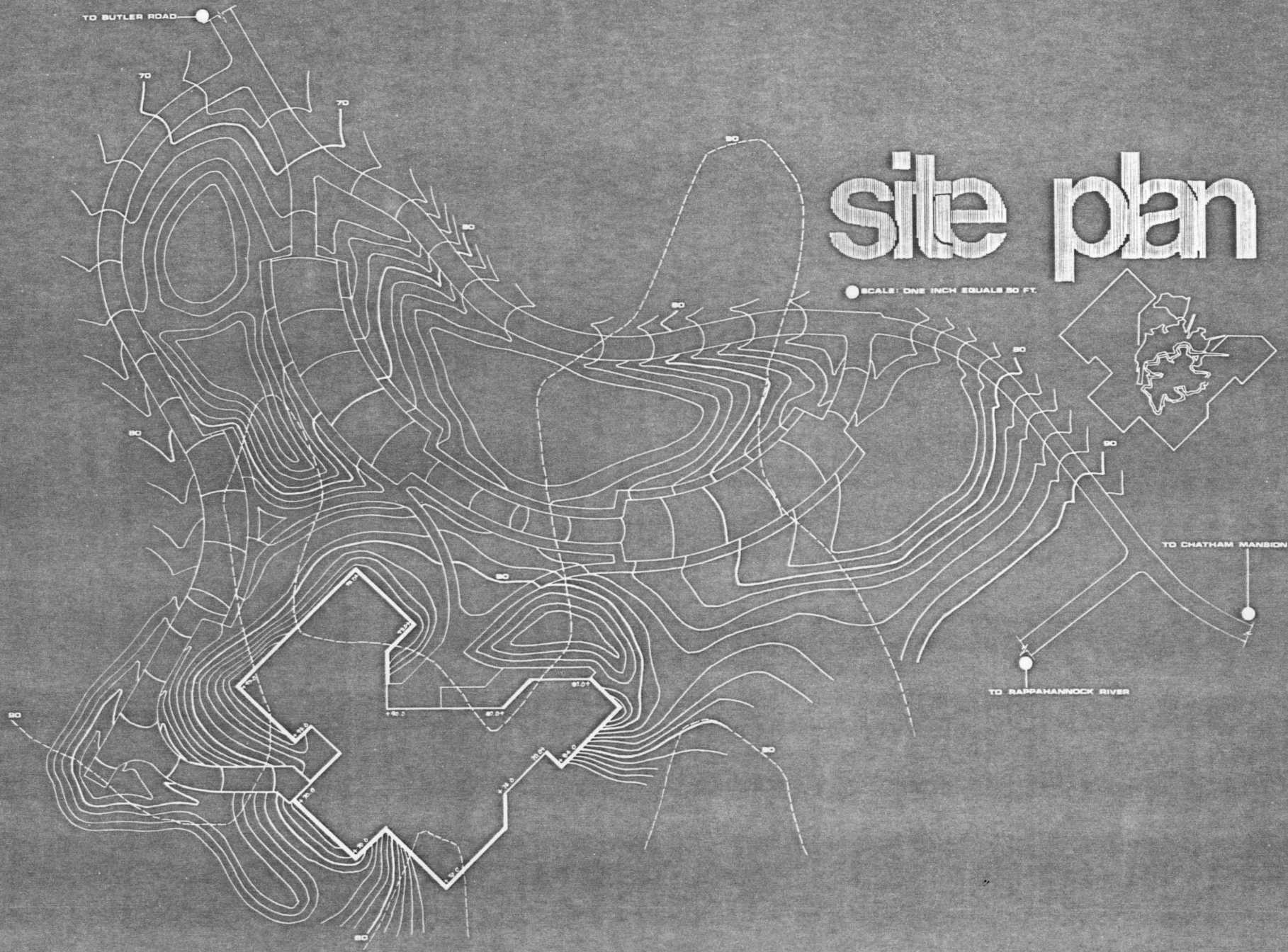




section B-B

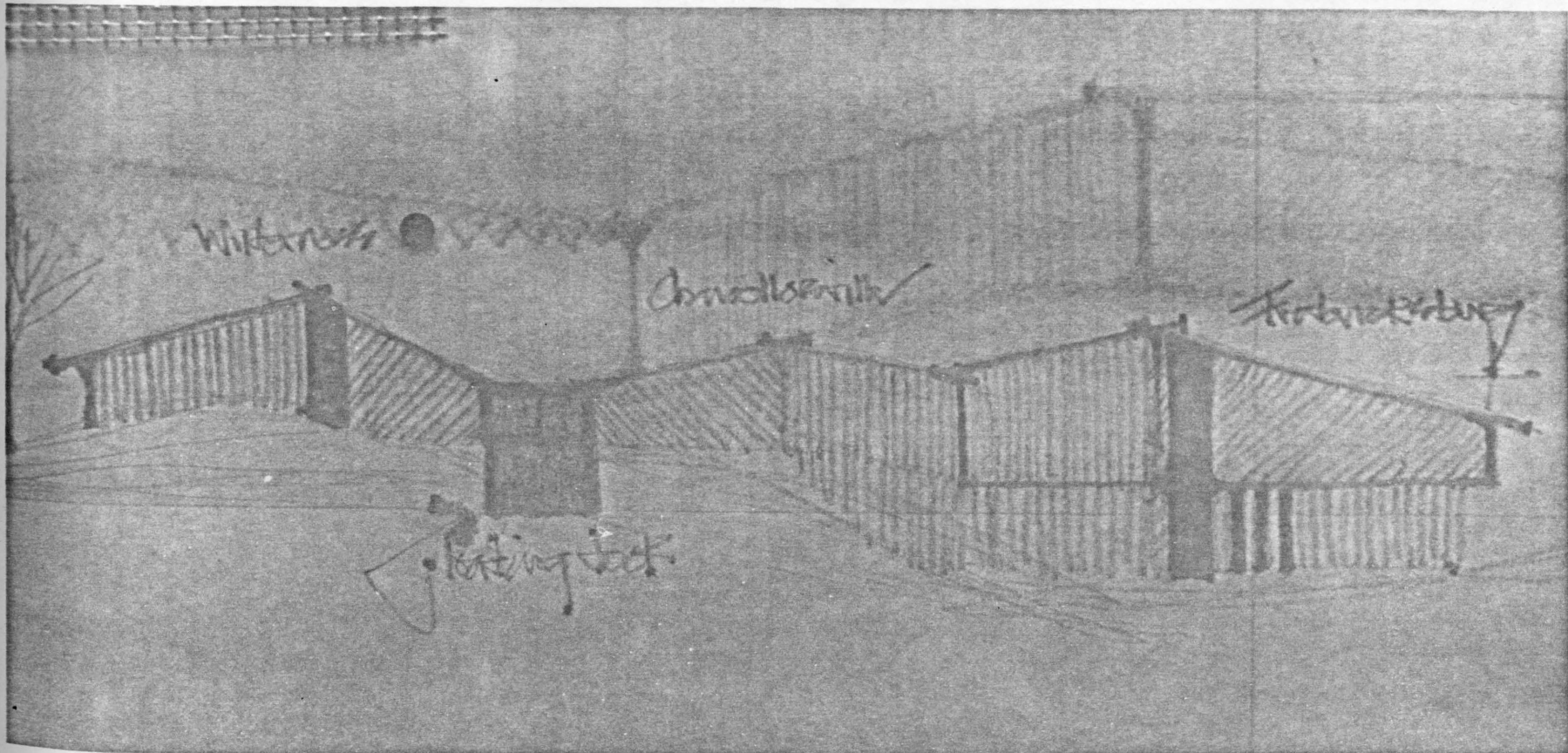
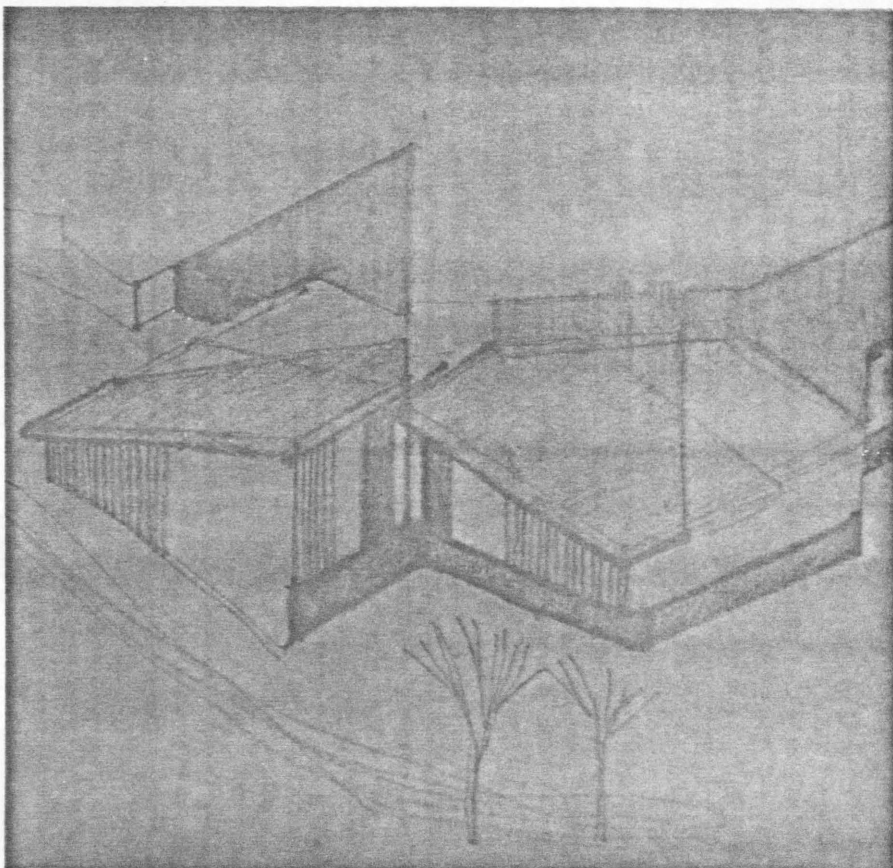
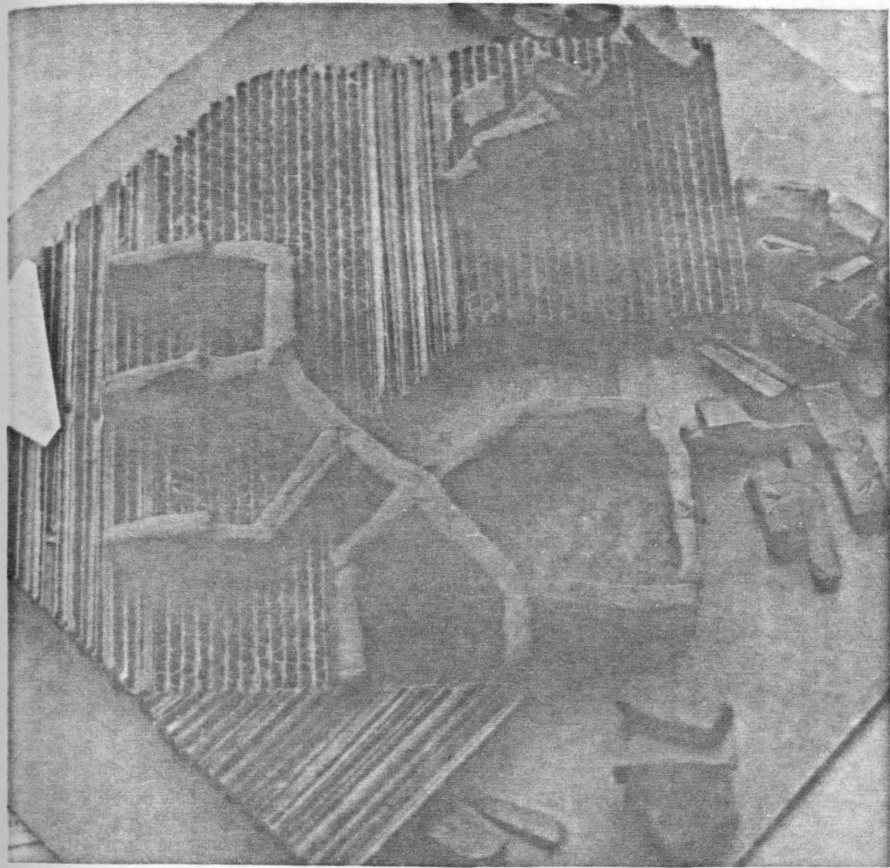
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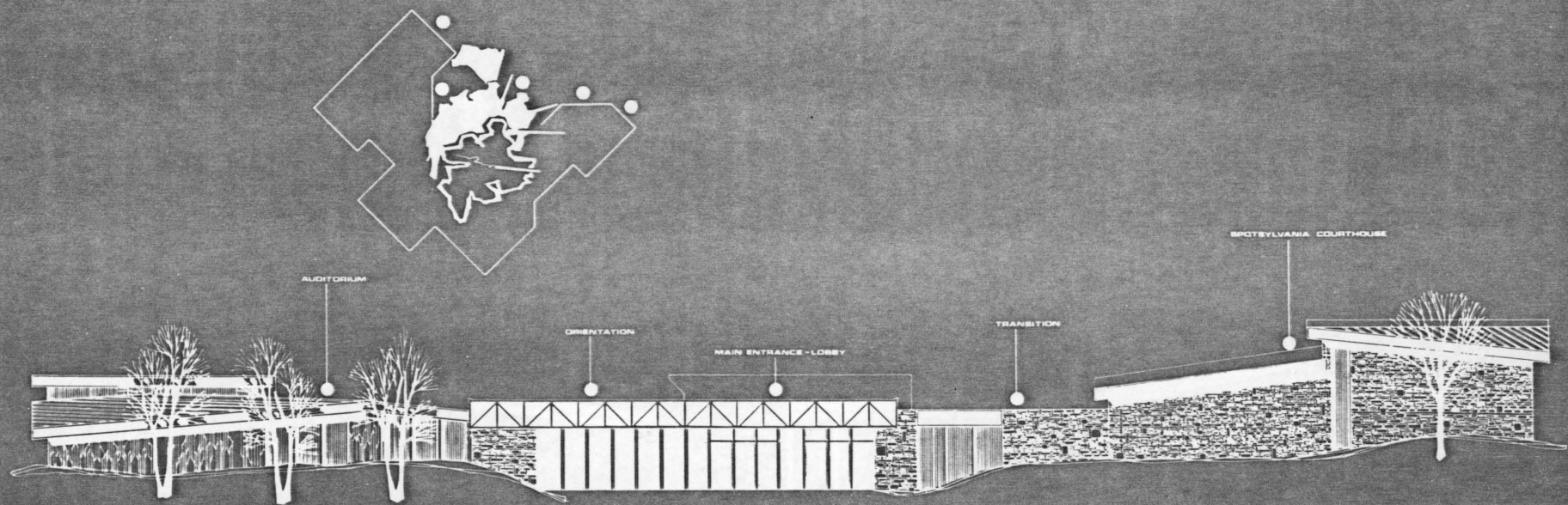


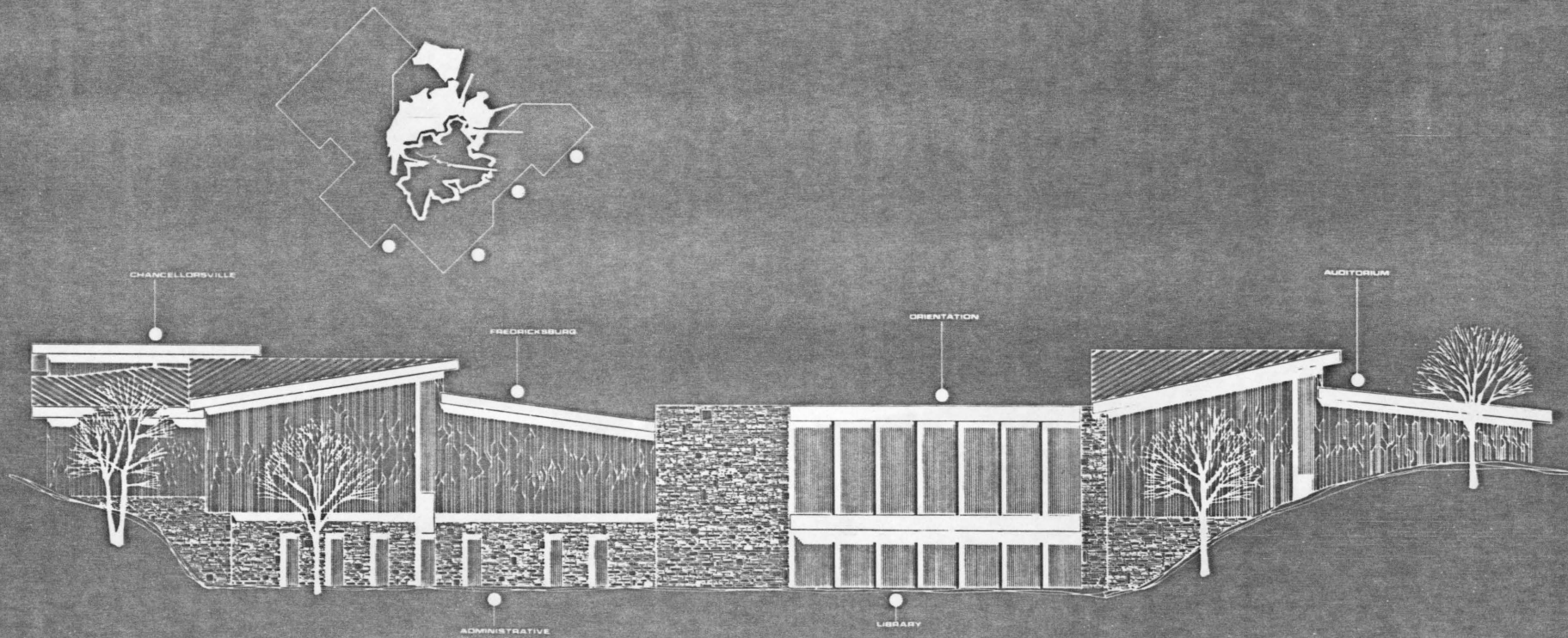


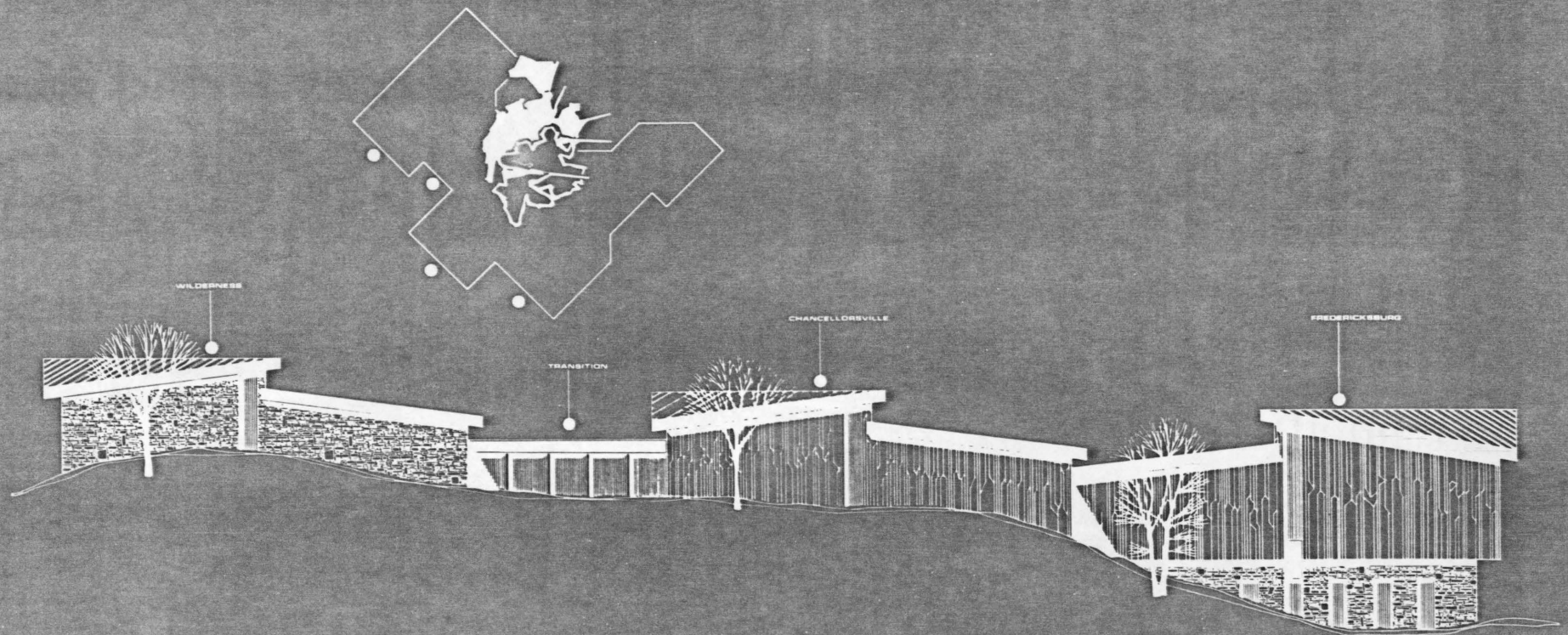
site plan

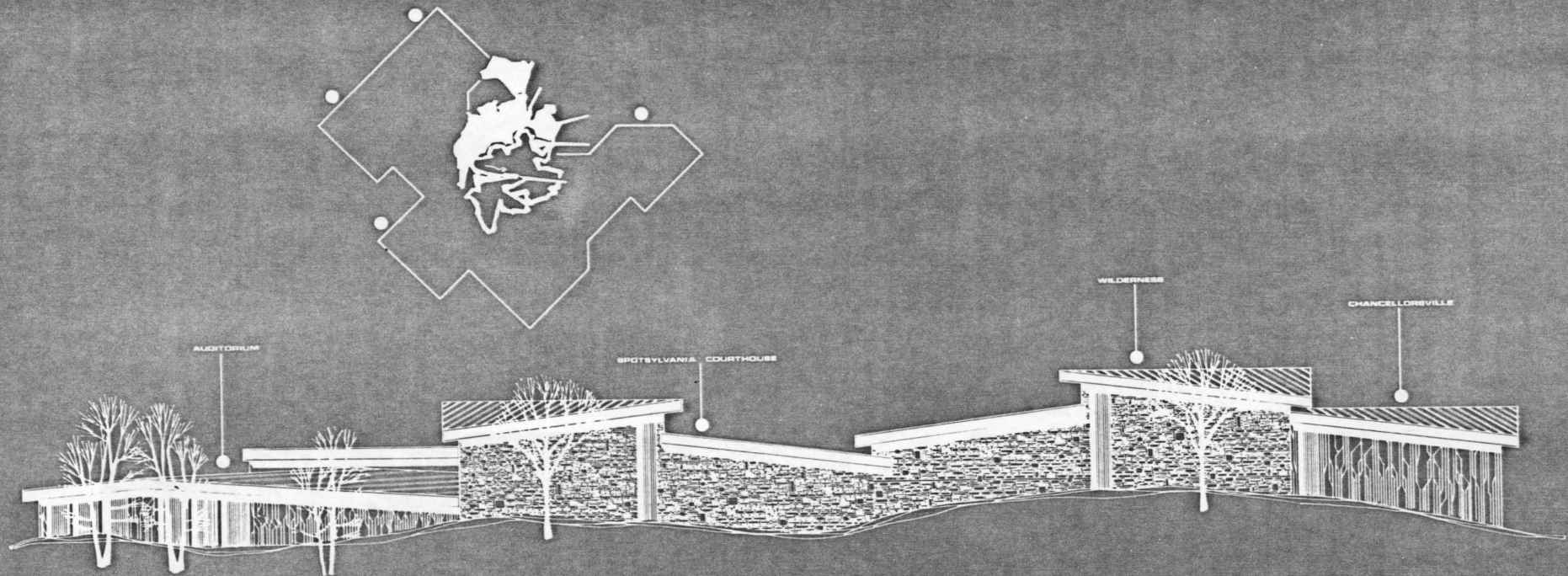
SCALE: ONE INCH EQUALS 50 FT.

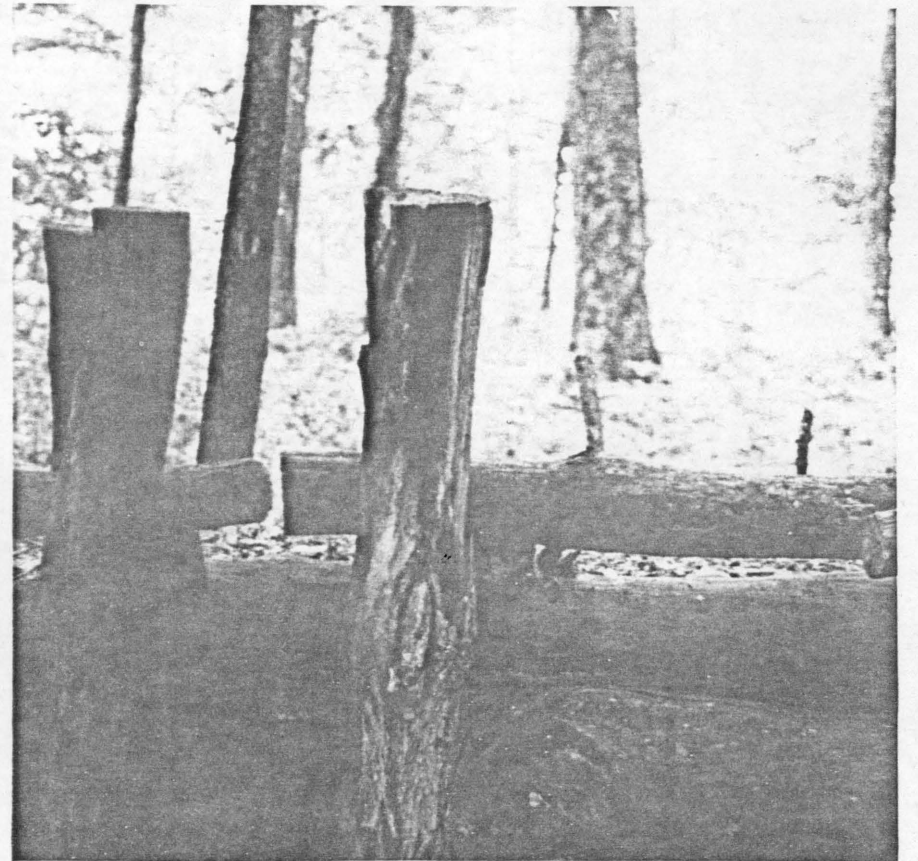
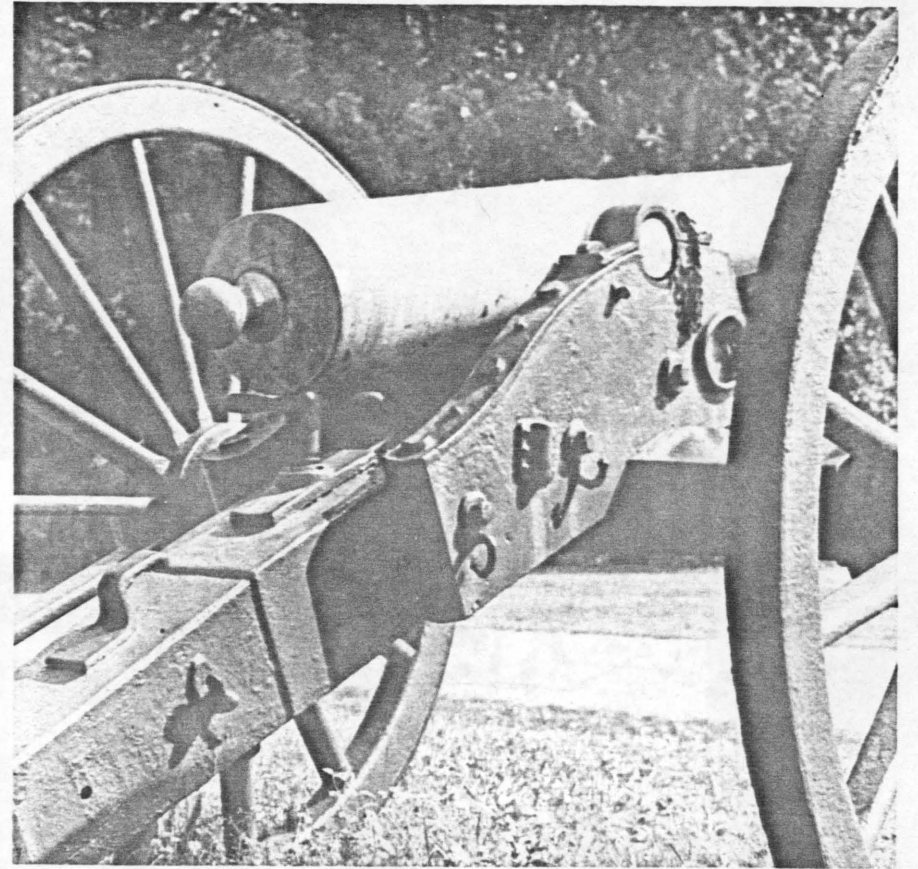
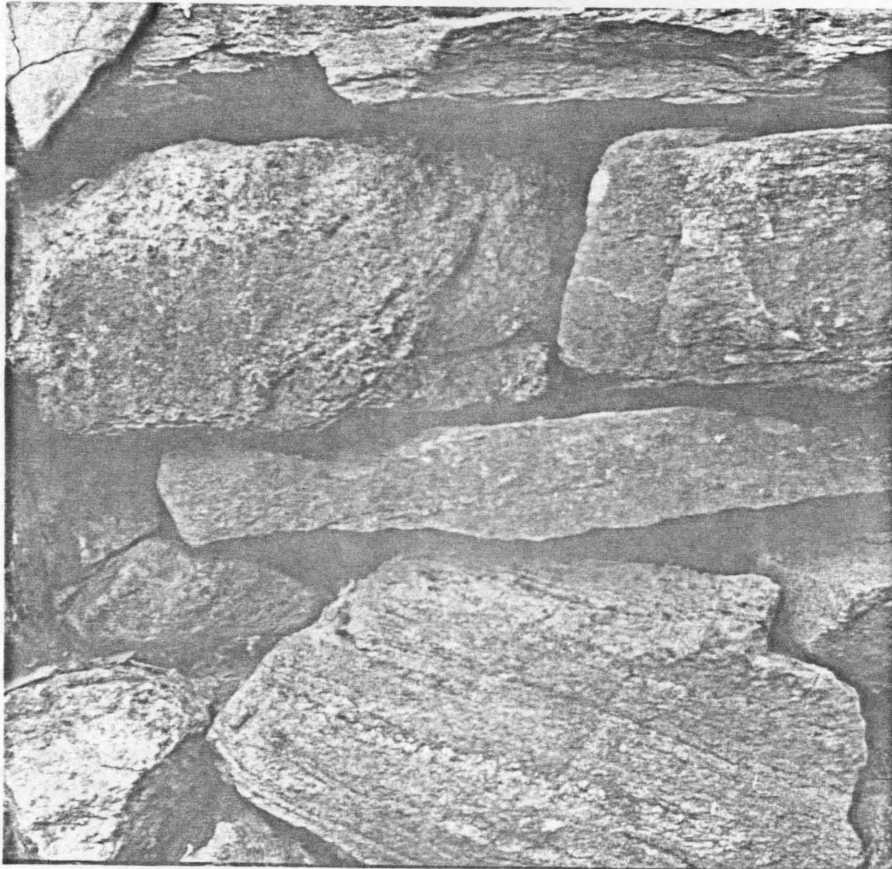


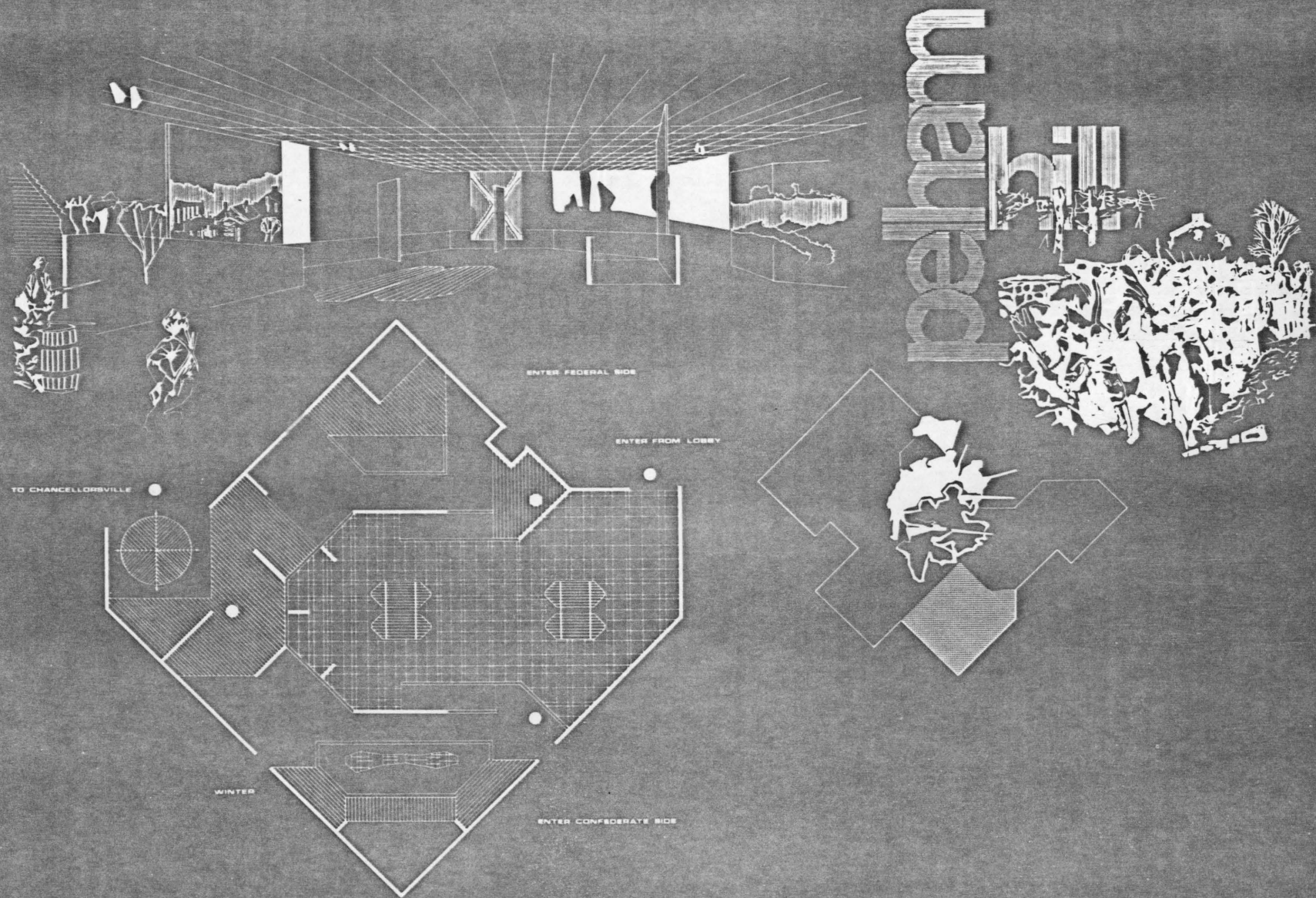


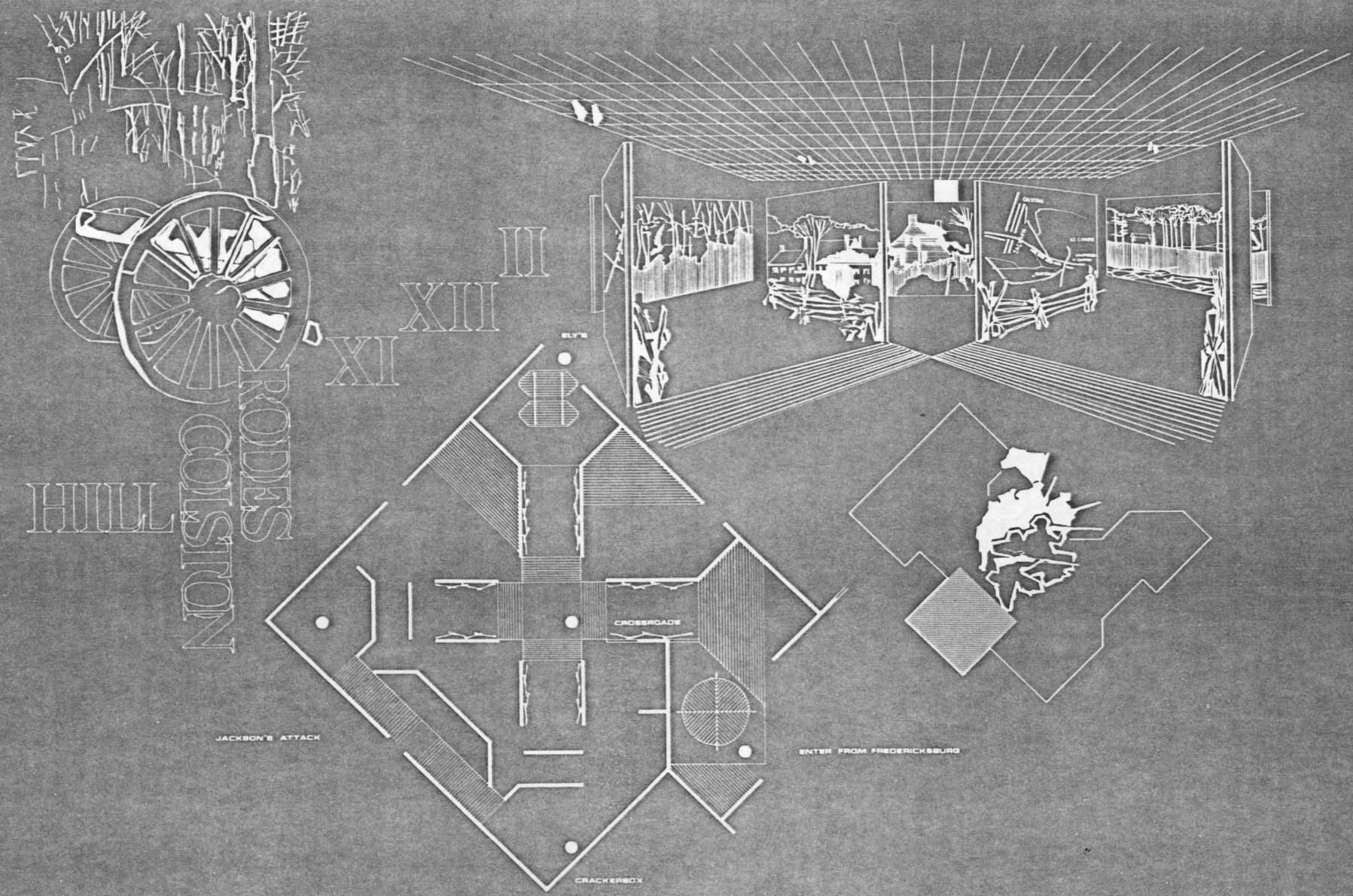




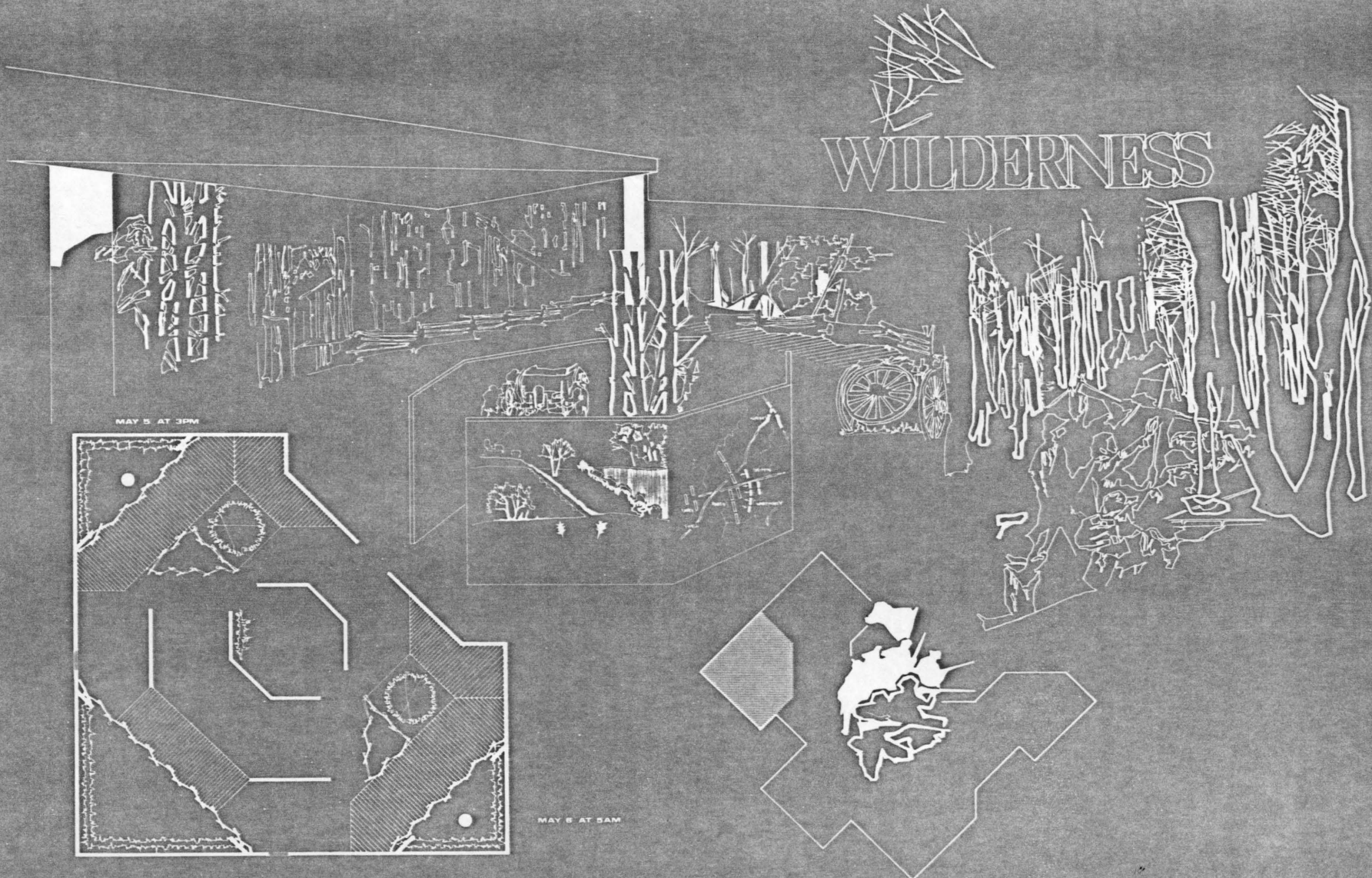






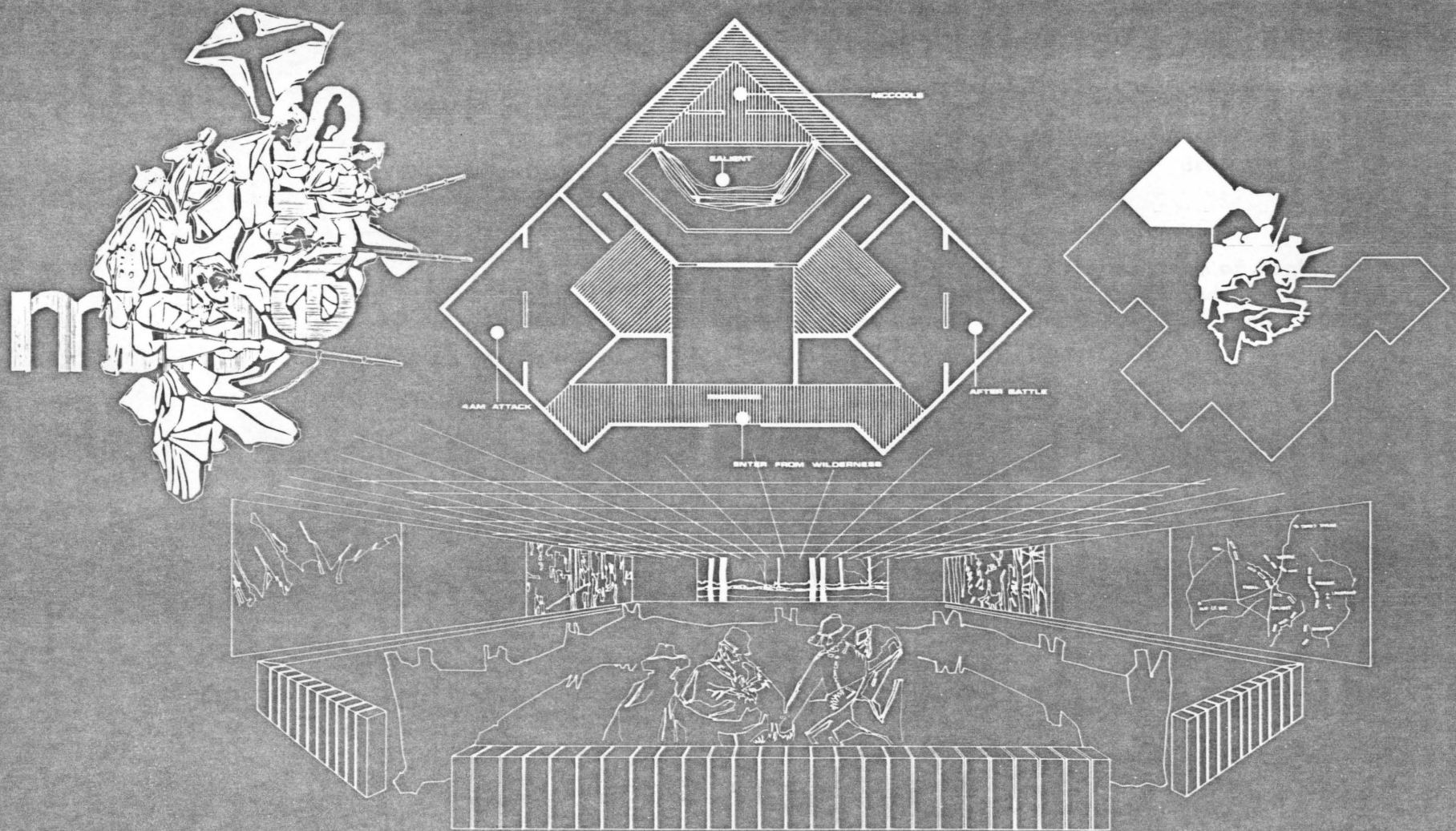


WILDERNESS



MAY 5 AT 3PM

MAY 6 AT 5AM



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A CIVIL WAR MUSEUM DESIGN AT FREDERICKSBURG, VIRGINIA: By
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(ABSTRACT)

For many people Fredericksburg is synonymous with the fierce battles of the Civil War, four of which were waged in or near the city. Between 1862 and 1864 nearly three quarters of a million men in two opposing armies fought over the territory near Fredericksburg. The town's strategic location fifty miles either way north and south from the two rival capitals made the entire area a battlefield.

In December 1862, the quiet of this picturesque small town was ended by one of the bloodiest conflicts of the war. The simple stone wall on Sunken Road at the base of Marye's heights became immortalized on those cold winter days of 1862 as 13,000 Federal soldiers were killed or wounded trying, in wave after wave, to capture the impregnable Confederate position behind and above the wall.

Later at the battles of Chancellorsville (1863), the Wilderness (1864) and Spotsylvania Courthouse (1864) the destruction of war continued within earshot of the citizens of Fredericksburg. During these later battles, when the town was under Federal occupation, weary Federal soldiers relaxed on the lawn at Brompton on the same heights for which so many had died in vain in 1862. The combined Federal and Confederate casualties in the four battles near Fredericksburg were over 100,000.

The face of Fredericksburg was changed with the battles of the war. Shell damaged buildings were pulled down and replaced by new structures in the latest styles. Other public and private places were repaired and renovated. Kenmore, the Presbyterian church, and the James Monroe museum are among the many prominent buildings with cannon balls still embedded in their walls. The post civil war years were leaner and growth was much slower. It was this lack of prosperity in the late nineteenth and early twentieth centuries which made possible the survival of so many historical sites. Today's Fredericksburg is blessed with a large storehouse of museum houses, historical artifacts, and a long long memory of the making of the nation.





AT THE HOUSE