

historic structure report

ARCHITECTURAL DATA
FORT WOOD

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STATUE OF LIBERTY

NATIONAL MONUMENT / NEW YORK



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10/26/2005

Historic Structure Report

FORT WOOD

Architectural Data Section

Statue of Liberty National Monument

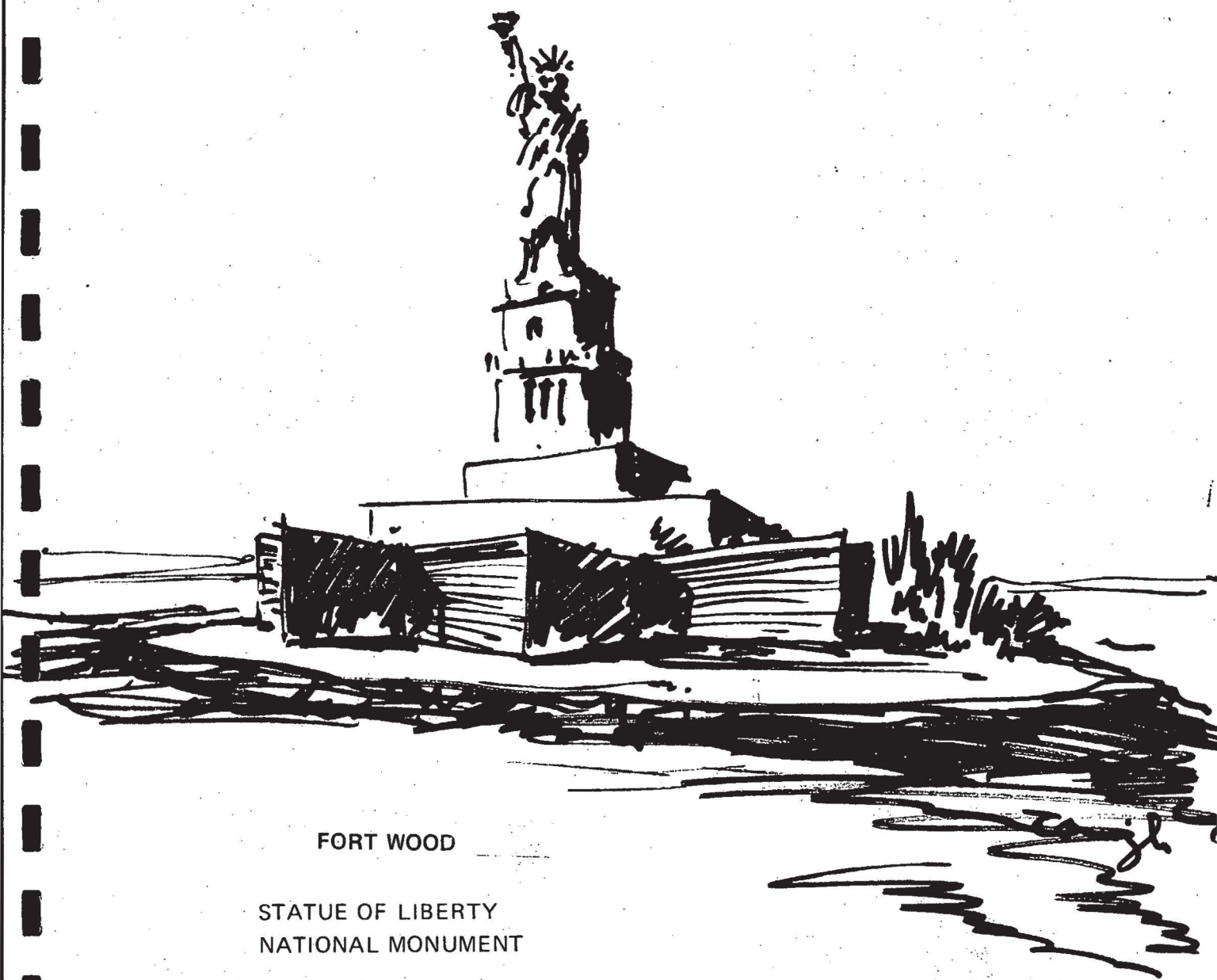
New York

by

Philip S. Romigh

DENVER SERVICE CENTER
HISTORIC PRESERVATION TEAM
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR
DENVER, COLORADO

OCTOBER 1973



FORT WOOD

STATUE OF LIBERTY
NATIONAL MONUMENT

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I. Introduction

This Historic Structure Report stems from a Development/ Study Package Proposal, Number 122, dated February 24, 1972, for the repair and repointing of the walls of Fort Wood, the historic structure surrounding the American Museum of Immigration and the Statue of Liberty. On the advice of Bicentennial Coordinator Burr Coryell, an inspection was made of the exterior fabric of the A. M. I. and a statement of findings is included in this report.

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

PACKAGE ESTIMATING DETAIL

REGION NORTHEAST	PARK STATUE OF LIBERTY - LIBERTY ISLAND
PACKAGE NUMBER 122	PACKAGE TITLE REPAIR AND POINTING OF FORT WOOD

(If more space is needed, use plain paper and attach)

ITEM	QUANTITY	COST
Cut and Point Granite Stone Joints @ \$1.50/L.F.	50,000 Lin. Ft.	\$75,000
Note: This Est. Good until 7/75. R. Campisi 9/22/72		

REMAINING PORTION FOR DEVELOPMENT PROJECTS ONLY:

SUMMARY OF CONSTRUCTION ESTIMATES		CLASS OF ESTIMATE		
STANDARD PERCENTAGE (<u>46</u> %)	% OF NET	☐ A Working Drawings	☐ B Preliminary Plans	☒ C Similar Facilities
NPS Layout and Supervision		TOTALS FROM ABOVE		
FHA Layout and Supervision				
Follow-through maintenance and as built drawings ..				
Contingencies				
Other				
TOTAL ADD ON (if other than standard percentage)		Net Construction	\$75,000	
		Working Drawings and Specifications (PP) 15%	\$11,250	
ESTIMATE PREPARED BY <i>Robert J. Stearns</i>		(title) Team Manager TNE		(date) 12/20/72

**NATIONAL PARK SERVICE
DEVELOPMENT/STUDY PACKAGE PROPOSAL**

Region (or Professional Office) NORTHEAST	Park (or Other Originator) Statue of Liberty National Mon.	Developed Area Liberty Island
Devel Area Code 22	PACKAGE TITLE REPAIR AND POINTING OF FORT WOOD	

22-22 REPAIR AND POINTING OF FORT WOOD

☒ New Package.

☐ Addition to an existing package.

☐ Revision to an existing package.

Complete for Development related Packages only						
CAPACITY	X of Coun. New/ Exist		CRIT- ERIA	State	CONG DIST	COUNTY
000006	5	E	2	3	6	New York

Will additional operating funds and or additional positions be required upon completion of this package?

YES ☐ NO ☒

If yes, make certain a Form 10-237, Detail of Program Requirements, is prepared for this package.

Package Description

Repair and point Fort Wood and related granite work on that level. The project would consist of repair and pointing of all joints on inside vertical Fort wall on main promenade level, top and outside wall which extends from main promenade to ground level. This project should repair, stabilize and point new granite wall enclosure for flower beds.

Package Justification

The Statue of Liberty now has over a million visitors annually from all over the world. When AMI is complete an increase in visitation is expected. The Fort walls at present need pointing badly particularly on the promenade level. To preserve the structure from further deterioration during the winter freezes. The present AMI contract only included 5% of needed repairs to the Fort. Minor leaking exists now and until this project is completed more will occur. Leaks may damage interior items or stain walls which is not an indication of a well kept facility.

Management's Requirements (See reverse for outline. Use blank sheets for additional space.)

- Class A estimate required ☐ I.Planning-Design-Construction
- Class B estimate required ☐
- Class C estimate required ☒ E. Buildings and Utilities - Repair and Point Stone work Fort Wood
- VI.Natural Science Resource Problems-not applicable
- VII.Water Resources - not applicable

3-05, 3-06, 4-07, 5-91

Originator Title James F. Batman, Superintendent	Date 1/20/72	Approving Signature (Super or other orig.) <i>[Signature]</i>	Date 1-27-72
☒ Approved for estimating by Professional officers)		Regional Director (Signature) (Sgt) Chester L. Brooks	
☐ Disapproved for reasons stated in transmittal memo and returned to originator		Date FEB 24 1972	

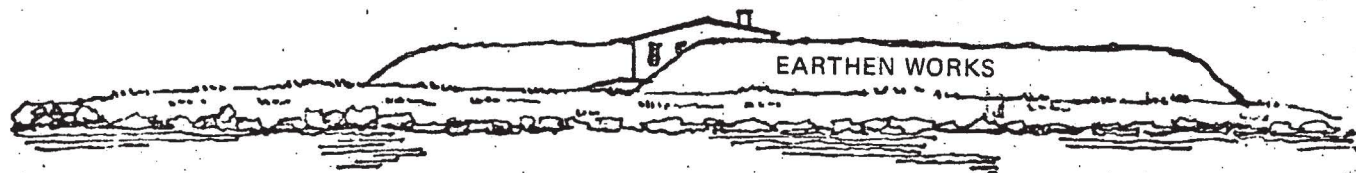
III. Historical Significance

At the conclusion of the French Revolution a series of wars broke out in Europe that threatened to involve the new United States. America was developing into a mercantile nation with a growing fleet of ships which were selling a variety of products to Europe. It was to her interest to remain neutral during the European conflicts.

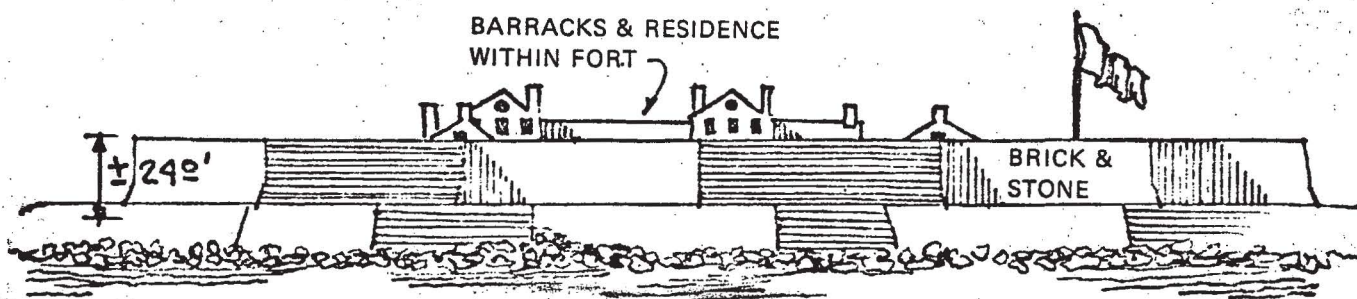
The shipping center of New York City was anxious to protect its harbor and sometime after 1794 an earthen work fort was built on Bedloe Island. It was soon realized that this would be insufficient in case of an attack.

Soon after the start of the nineteenth century, England blockaded the Atlantic seaboard to prevent the shipment of supplies to France. Those ships that slipped through the blockade, if caught by the British navy, were confiscated and many crew members were pressed into service on the British ships. This enraged the new nation and relations towards England deteriorated; the government of the United States was coming to the conclusion that war with Britain was inevitable.

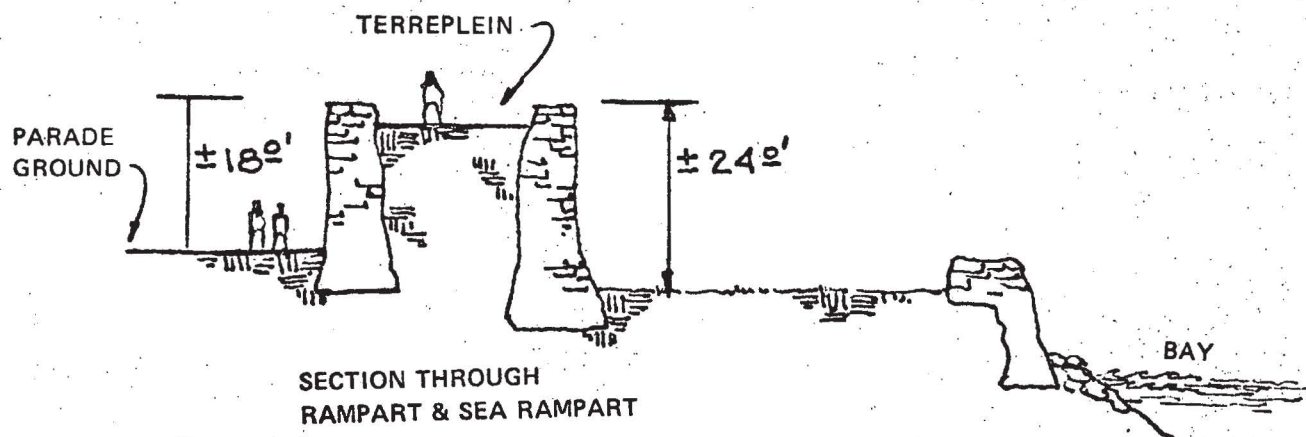
FORT WOOD



PROBABLY CIRCA 1794



CIRCA 1813 (HEAD ON VIEW)



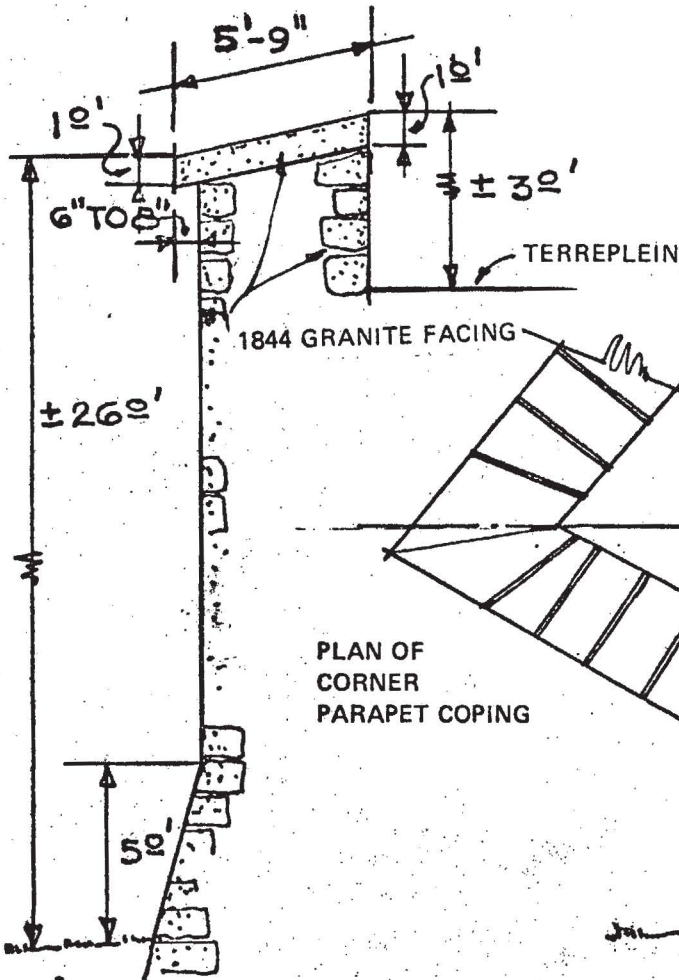
The coastal cities of America realized the threat to their harbors and their vulnerability if attacked by the British Navy. By 1805 New York City had initiated a study for the defence of her harbor. By 1811 three forts had been built--Fort Williams on Governor's Island, Castle Clinton on the low tip of Manhattan, and Fort Wood on Bedloe Island (much later renamed Liberty Island).

War did break out and some of the Atlantic ports were attacked. Although Washington, D. C., was burned, New York escaped damage. No gun was ever fired from these three forts at an enemy in the War of 1812.

An Army Engineer's report of 1820 describes Fort Wood as being in a ruined condition. The army had furnished three companies of men (approximately 150 persons total) who provided much of the labor force for the early fort. Perhaps the construction was crude and hasty in many respects.

In 1844 major repairs were made and some physical changes were introduced. The reconstruction included a new granite face of the scarp, a maximum of three feet in depth. The face is composed of alternate headers (up to 27½ inches long) and

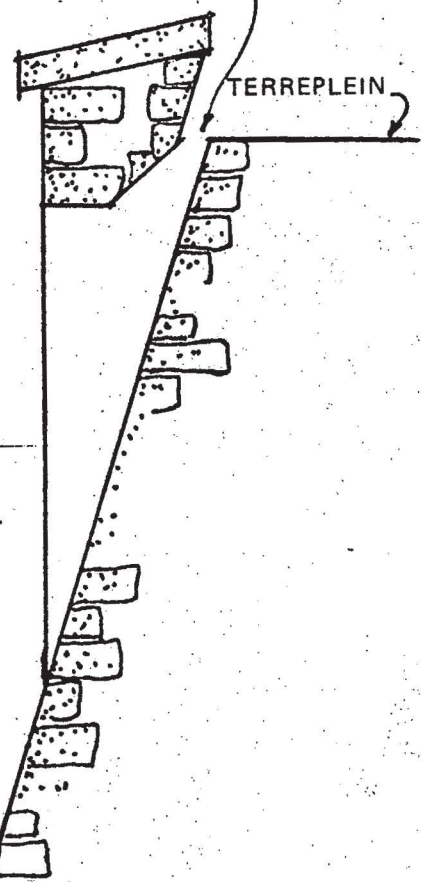
FORT WOOD



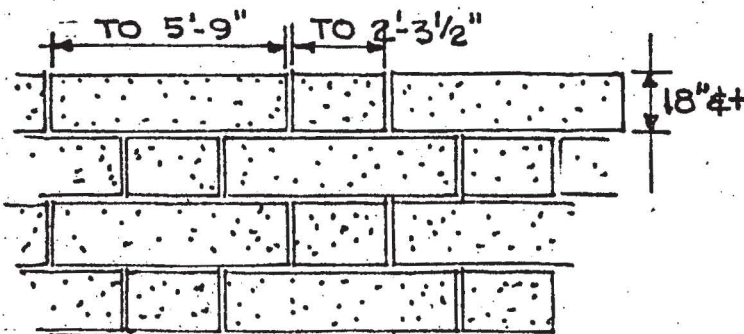
TYPICAL SECTION THROUGH RAMPART

PLAN OF CORNER PARAPET COPING

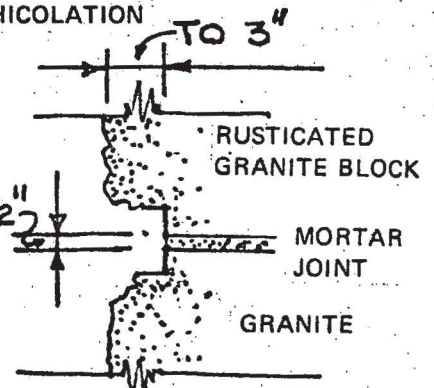
MACHICOLATION
ADDED IN 1844



TYPICAL SECTION THROUGH MACHICOLATION



TYPICAL GRANITE PATTERN



TYPICAL SECTION OF GRANITE BLOCKS AT JOINT

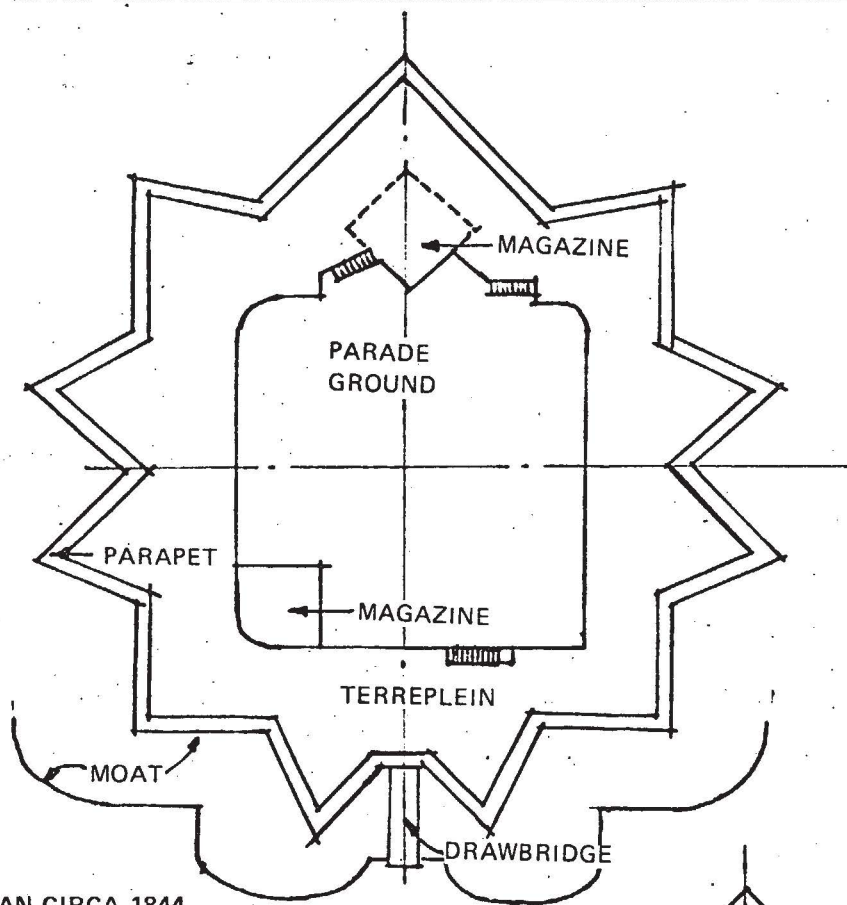
stretchers (up to 9 feet 8 inches long). The blocks are approximately 18 inches high. It was at this time that the machicolations (musketry slots from the lower portion and inside of the parapet with a tapering slope down the scarp) were added. The deep parapet coping was also added.

At this time repairs and changes to the main gate and sally port were made, but these were mostly obliterated during the construction of the Museum of American Immigration in 1960.

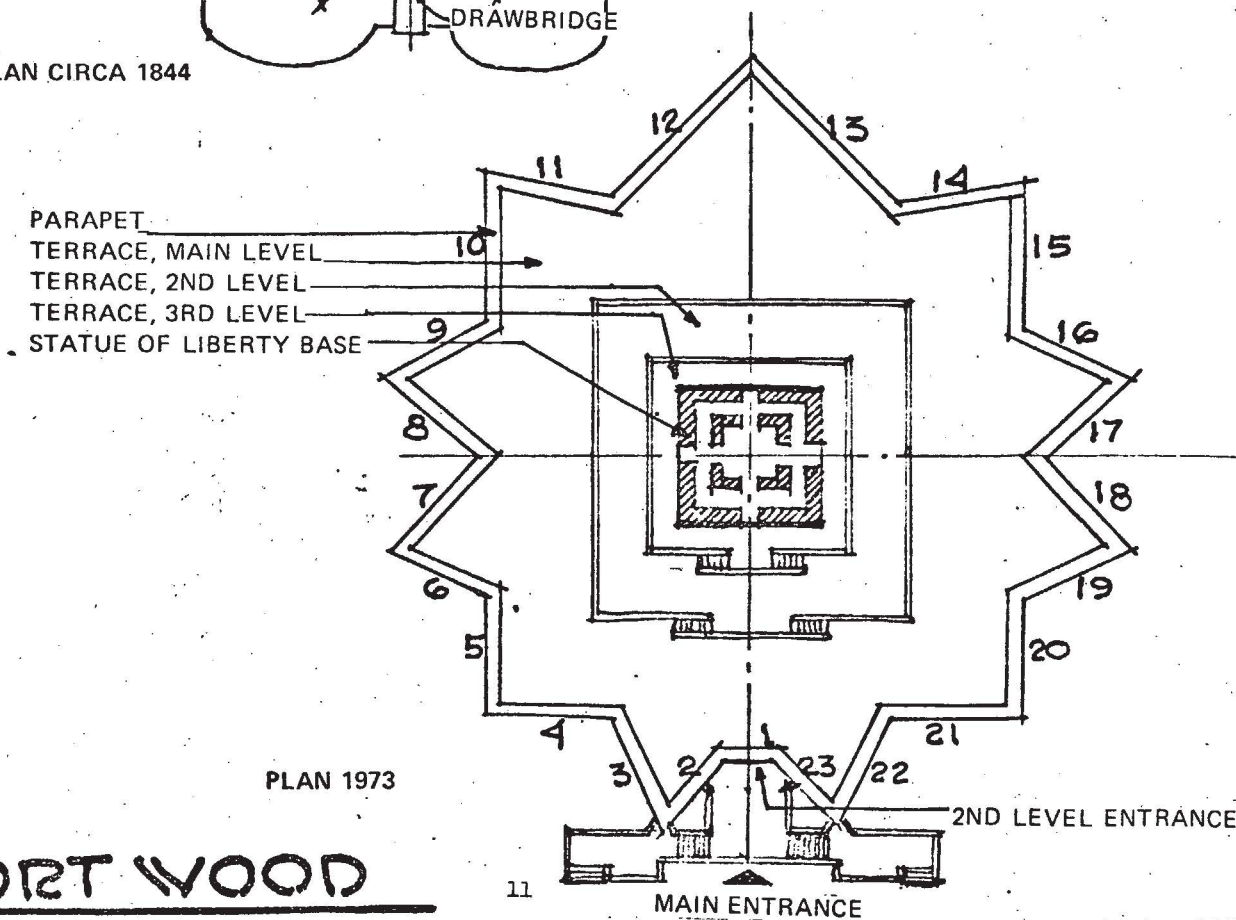
In 1851 Fort Wood became an Army Recruit Depot. Barracks, houses, and other buildings were added to the island so that little open space was left. In 1877 Fort Wood on Bedloe Island was selected as the site for the colossal figure of Liberty sculpted by Auguste Bartholdi. This statue was a gift from the people of France to the people of the United States commemorating the long standing friendship between the two countries. After government confirmation of the site selection, most of the army activities were removed from the Island. Although the statue itself was a gift from France, the government of the United States was slow in appropriating money for

construction of the base for the immense figure. It took five more years before the funds could be raised by public subscription. Finally in 1883 excavation for the base commenced. It was a sizable job, for the foundation was to be 90 feet square and 48 feet deep, with over 14,000 square yards of concrete. The fort was not breached for this activity, but it later was in order to bring in the granite facing for the pedestal. The pedestal was completed in 1886, the statue was erected on it and the dedication ceremony for the Statue of Liberty was held October 28, 1886. A citizens committee provided ferry service from New York and kept the statue open to the public. The Lighthouse Board had control over the exterior lighting system and limited control over the statue and pedestal; the army, which performed guard duty for the statue, controlled the military reservation (still known as Fort Wood) and occupied most of the island.

Visitation flow was arranged so that one docked at the island landing, walked to the main gate (now incorrectly called the sally port since the historical sally port is now the rear entrance), passed through the rampart, crossed the parade

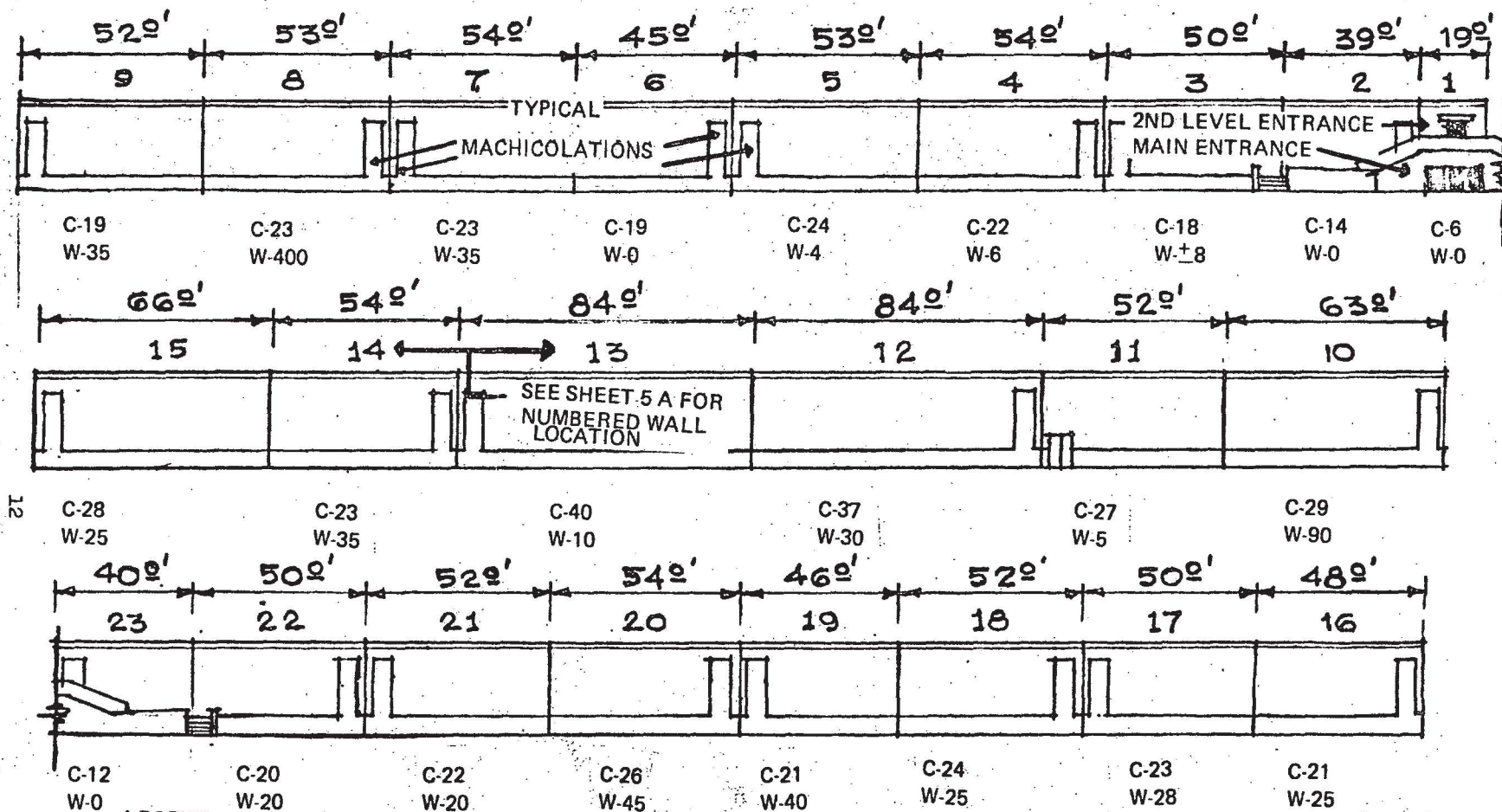


PLAN CIRCA 1844



PLAN 1973

FORT WOOD



LEGEND

C-19 = PARAPET COPING - 19 JOINTS TO REPLACE (±8' Lin. Ft. each joint)

W - ±25 = WALL - ± 25 Lin. Ft. Joints to replace

FOLDOUT OF WALL ELEVATIONS

FORT WOOD

ground, and was confronted with the entrance to the concrete foundation of the base of the statue.

The post commander's report of 1901 indicates that little maintenance was done after the dedication of the statue and that the rampart facing the parade ground was in bad shape--tumbling down in places. In 1907 repairs were made to the fort and the concrete tunnel connecting the main gate of the passage through the rampart to the foundation of the base of the statue was installed. The appropriation was insufficient for more than first priority projects. During the period of 1907 to 1912 the parade ground was filled (fill probably coming from the excavation of the subway in New York that was built at this period) to the level of the terreplein and sloped up to the top of the foundation of the base of the statue.

The next major repair to the fort was around 1930 when some replacements were made in the granite coping of the parapet and necessary repointing was done in the parapet and the vertical walls of the rampart.

Beginning in 1960 with the construction of the A. M. I., the fort saw many changes which would be questioned in 1973 since they involved major changes in the historic fabric of

the structure. The rampart, the main gate, the passage, and the rooms surrounding the passage were replaced with new construction relating to the new museum rather than to the old fort. The early 1900 fill that had been added over the parade ground was excavated to the parade ground level and magazines and other buildings within the fort were removed to make way for the new museum structure. The terreplein was covered with new granite and blue stone pavers.

As of 1973, only the interior vertical surface of the parapet, approximately 90% of its coping, and the exterior wall of the rampart (with considerable renovation at the main gate), remain of the 1844 repairs of the fort. Probably remnants of the 1811 fabric remain under the vertical granite facing added in 1844, but no 1811 fabric is exposed. During the excavation of the parade ground for the A. M. I., it was found that the interior walls of the rampart were a combination of brick and stone. No doubt this was true of the exterior face as well.

IV. General Description

Fort Wood is listed in "The National Register of Historic Places" under the Statue of Liberty National Monument. Although it was constructed as a protection for the harbor of New York City during the War of 1812, the harbor was not attacked and the fort became a preventive rather than an active force. In 1877 the fort was chosen as the site of the Statue of Liberty and the history of the fort was immediately eclipsed. To this day it continues to be in the shadow of Liberty. It is rather similar to the Mayan and Aztec ceremonial sites: it becomes the mound on which the temple sits.

The 1844 reconstruction of the 1811 fort has held up remarkably well. The sloping walls of the rampart, big, heavy rusticated granite blocks, are apparently on a firm foundation. Three cracks appear in the total area of the scarp but these are limited, extending neither down to the foundation nor up to the parapet, and they are old. On the weather side of the fort some of the joints need repointing, but even this is minor considering the total lineal feet of joints. On the non-weather faces there is only a small amount of repointing necessary. It

is possible that when repairs were made in the early 1930's some wall repointing was done, but if so, the mortar color was a good match of the existing one, and forty years time has weathered the building to the point that differentiation is impossible. The major area for necessary repair is the coping block of the parapet. This relatively flat plane, close to six feet wide, is exposed to all moisture of the area. It receives the brunt of winter freezing and thawing, and so joints have opened up in quantity. An added factor is that approximately 10% of the coping is an inferior granite. Probably all of the granite walls and parapet were from the same quarry but there must have been a difference in the strata of the formation. In this 10% we have a granular and stratified block rather than the solid mass of stone that we normally call granite, and this block is decomposing. Winter moisture has worked into the veining and cracks and freezing has opened the cracks up further so that it is easy to chip off hunks of these particular blocks.

During repair work in the early 1930's, approximately 10% of the coping blocks were replaced. These were principally the blocks that covered the corner angles of the parapet and some

adjoining blocks. No doubt an attempt was made in these replacement blocks to match the existing color, but there is a noticeable difference. The newer is a lighter, grayed down version of the original. The parapet coping blocks then represent three distinctly observable types of block: solid 1844 granite, decomposing 1844 inferior granite, and c. 1930 replacements. Ninety percent of the coping joints need repointing and it would seem reasonable to do all of them, since this would make for a uniform appearance and give a fresh solidarity to all joints.

V. Recommendations for Fort Wood

1. Repointing as necessary the mortar joints between the granite blocks on the exterior sloping wall of the rampart of the fort. See sheet 5b for 1973 evaluation of extent of work.
2. Repointing all of the mortar joints in the parapet coping (front edge, top, and back edge).
3. The Granite Association has no current recommendations for preservative to be applied to deteriorating granite. Plastic coatings would yellow with age and any other application would be highly experimental. It is recommended that we do nothing to the portions of coping that are giving way. When these blocks begin to slough away to the point where they are dangerous, replacements will have to be made. We will have little chance to match the old blocks, and replacements will be just as obvious as those added in c. 1930, a further injury to the historic integrity of the building.

Plans and Specifications:

At the time plans and specifications are funded, further studies will be made to determine:

1. The type of high content lime mortar to be used on the exterior sloping walls of the fort and its coloring, in order to match the existing mortar.
2. The type of calking or high content lime mortar (or combination of the two) to be used on the parapet coping and interior parapet wall to maintain historic integrity and prevent moisture penetration.

The Denver Service Center should prepare specifications that cover the total amount of work to be accomplished, giving approximate lineal feet of pointing necessary, method to be used, materials to be used as a standard for the grouting, and any other necessary information. Advertisements for bidding will be received and considered. After a bid is awarded, work can proceed.

Estimated Cost for Repair
Fort Wood, Statue of Liberty National Monument

Exterior Vertical Wall =	1,000 lin. ft. (approx.) of repointing
Parapet Coping	4,200 lin. ft. (approx.) of repointing
Parapet Interior Wall	<u>400</u> lin. ft. (approx.) of repointing
Total Repointing	5,600 lin. ft. (approx.)

5,600 lin. ft. @ \$4.00/lin. ft. = \$22,400

Contingencies	= <u>2,240</u>
	\$24,640

Profit & Overhead @ 25%	= <u>6,135</u>
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Total Estimated Construction Cost \$30,800

VI. American Museum of Immigration

Most of the fill that was added in the early 1900's to raise the parade ground of Fort Wood to the level of the terreplein, and which ramped up slightly to the base of the statue, was removed in 1960 in preparation for the new museum. Construction of the museum began in 1961, and the difficult job was completed in 1965. The building consists of three levels: one at the parade ground level of the fort, the second at the level of the terreplein, and the third against the base of the statue in a pyramoidal shape. The top two levels of construction are 12 inch and 10 inch-thick concrete walls respectively, faced with granite veneer approximately 8 feet wide, 2 feet high, and 4 inches in depth. The mortar joints are approximately one-half inch, and composed of a setting bed (1:1:4 plus Pozzololith) and point (1:4:3 plus Pozzololith and Omicron). The point was three-fourths of an inch deep and is now in bad shape. Some of it has fallen out and a great quantity has shrunk and cracked; freezing moisture in winter will dislodge more and more of it. The exposure of the setting bed subjects it to freezing moisture and it too will be subject to damage.

This could allow moisture to seep to the face of the concrete structure, and if there were concrete cracks, water seepage could result in leaks within the building that would be hard to trace and that would cause great damage.

Further injury is occurring to the building through efflorescence at many of the granite joints. It starts as a bead at both top and bottom of the joints and in many cases has built up and run down the granite veneer. Visually this is quite disturbing. Its cause is interior water seepage from above. The most likely place for the entrance of the water is the juncture of the inner face of the parapet and the promenade deck. The joint between the two is a mastic joint and unless there is complete adhesion of the mastic to the decking and parapet material there is a chance for water seepage. The water seeping down will come out of any possible opening and bring with it the calcium-like deposit that forms on the granite.

VII. Recommendations for American Museum of Immigration

At an early date a 10-238 should be submitted through proper channels for funds to accomplish the following:

1. Further research on:
 - a. The type of high content lime mortar to be used on all vertical surfaces and parapet copings.
 - b. The parapet wall joining the roof decking to determine the advisability of reinstalling the deteriorated flashing or totally replacing the joining by caulking.

2. Remove all joint mortar (probably up to 80% is loose on the entire surface of the exterior of the museum and parapets; therefore, it would seem reasonable to remove all) to a clean depth of three-fourths of an inch, probing the setting bed for soundness, removing any unsound portions; and replacing all necessary parts with new materials. Any setting bed removed should be replaced with compacted mortar in several layers to the minimum cutting depth. The cut depth should be repointed to a flush joint in the proper mortar as determined by the research.

Estimated Cost of Repair
American Museum of Immigration, Statue of Liberty NM

Main level	= 132'3" x 132'3"
Top level	= 84'3" x 84'3"
Parapet height	= 3'0" both levels

Repointing

Main level		
132'3" x 4 (sides) x 8 (Horiz. joints)		= 4,332'0"

21 (vert. joints) x 4 (sides) x 14'0" (height)		= <u>1,176'0"</u>
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TOTAL		5,508 lin. ft.
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Top level		
84'3" x 4 (sides) x 6 (horiz. joints)		= 2,022'0"

13 (vert. joints) x 4 (sides) x 12'0" (height)		= <u>624'0"</u>
--	--	-----------------

TOTAL		2,646 lin. ft.
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Main Parapet		
529 lin. ft. x 4 (ext. & int. horiz. joints)		= 2,116'0"

84 (joints) x 6'0" (vert. ht.)		= <u>504'0"</u>
--------------------------------	--	-----------------

TOTAL		2,620 lin. ft.
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Top Parapet		
337 lin. ft. x 4 (horiz. joints)		= 1,348'0"

52 (joints) x 6'0" (vert. ht.)		= <u>312'0"</u>
--------------------------------	--	-----------------

TOTAL		1,660 lin. ft.
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Wall face joints main and top levels = 8,154 lin. ft.

Parapet joints main and top levels = 4,280 lin. ft.

Planters - 342 lin. ft. x 3 joints - 1,026 line. ft.
horiz. joints

171 (vert. joints) x 2'8" (ht.) = 470 lin. ft.

1,026 + 470 = 1,496 lin. ft. planter joints

Walls = 8,154 lin. ft. x \$3.00/lin. ft.	= \$24,462
Parapets = 4,280 lin. ft. x. \$3.50/lin. ft.	= 14,980
Planter = 1,496 lin. ft. x \$3.50/lin. ft.	= 5,236
Cleaning of Efflorescences	= <u>4,000</u>
	\$48,678

Contingencies = 4,867

25% profit & overhead = 13,386

\$62,064

Construction cost = \$62,000

HISTORICAL BIBLIOGRAPHY

Greenstein, Rovert E., Summary Structural History of Fort Wood (Supplement), NPS report, July 1963.

Pitkin, Thomas M., Summary Structural History of Fort Wood, Statue of Liberty National Monument, NPS report, August 1956.

ILLUSTRATIONS

Illustration No. 1

Fort Wood: decomposing granite under 1930 parapet coping, interior face of parapet at corner.

Illustration No. 2

Fort Wood: similar to above on straight run.

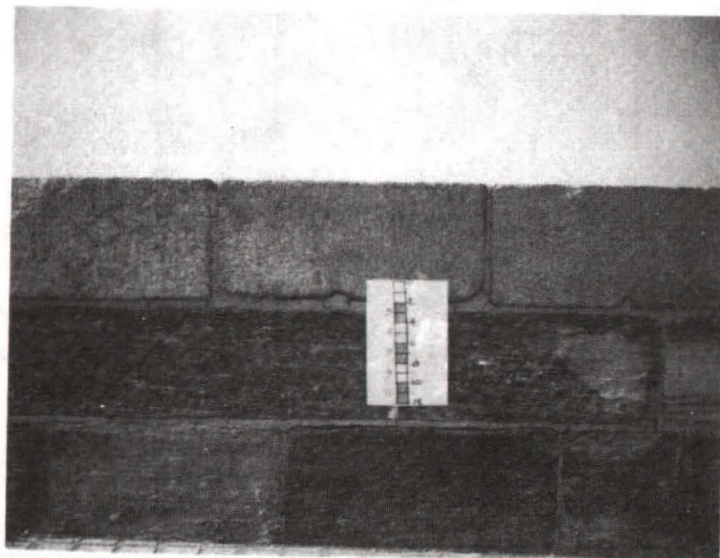
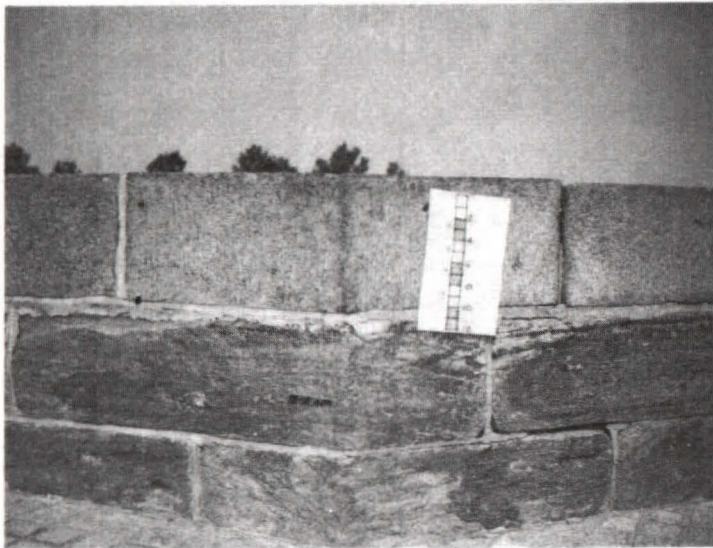


Illustration No. 3

Fort Wood: decomposing granite, inter face of
parapet.

Illustration No. 4

Fort Wood: 1930 replacements of parapet coping.

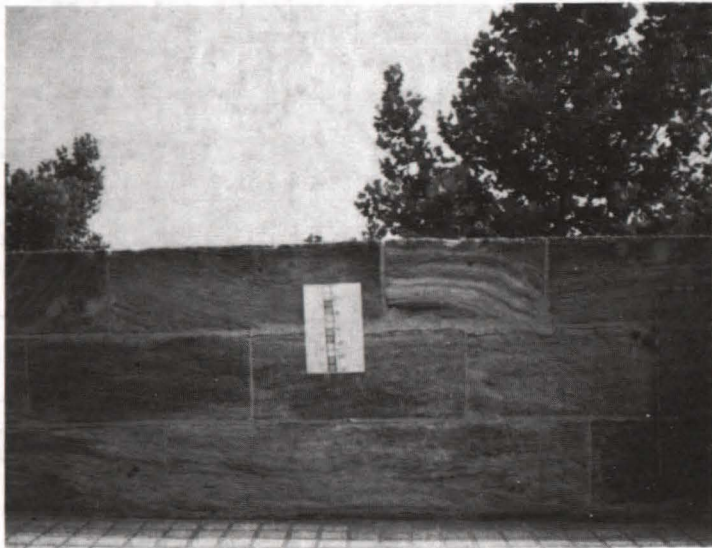


Illustration No. 5

Fort Wood: exterior wall, weather side.

Illustration No. 6

Fort Wood: parapet coping, weather side.

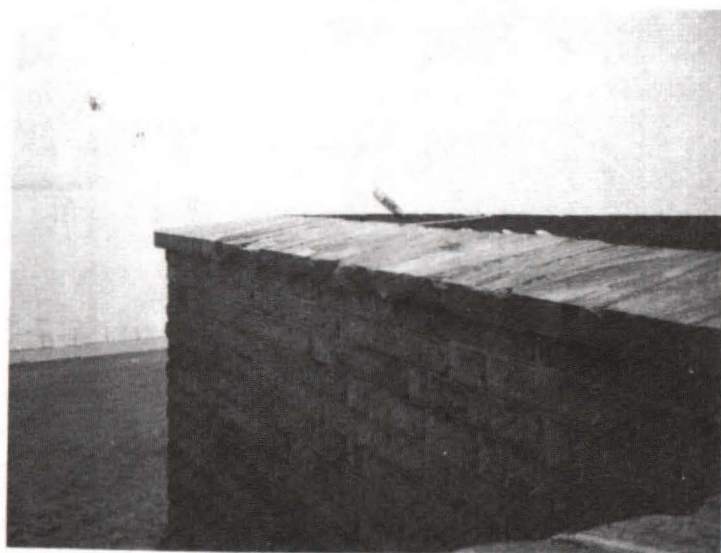
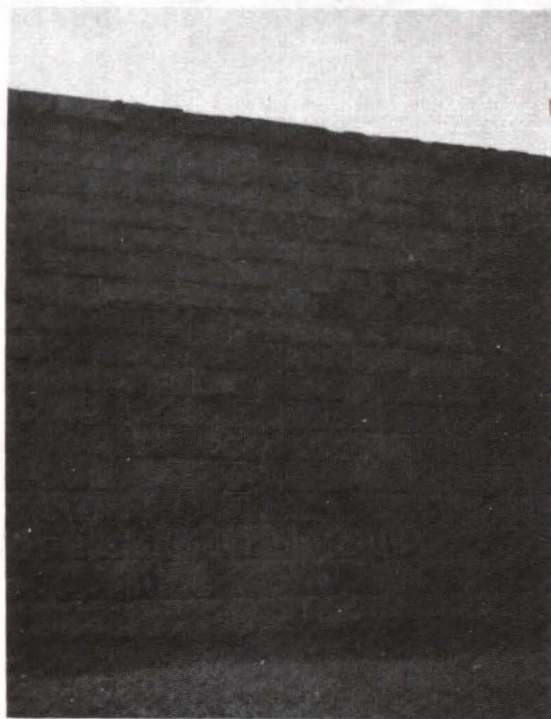


Illustration No. 7

Fort Wood: decomposed granite with tar squeezing
from joints.

Illustration No. 8

Fort Wood: 1930 granite parapet coping at corner.

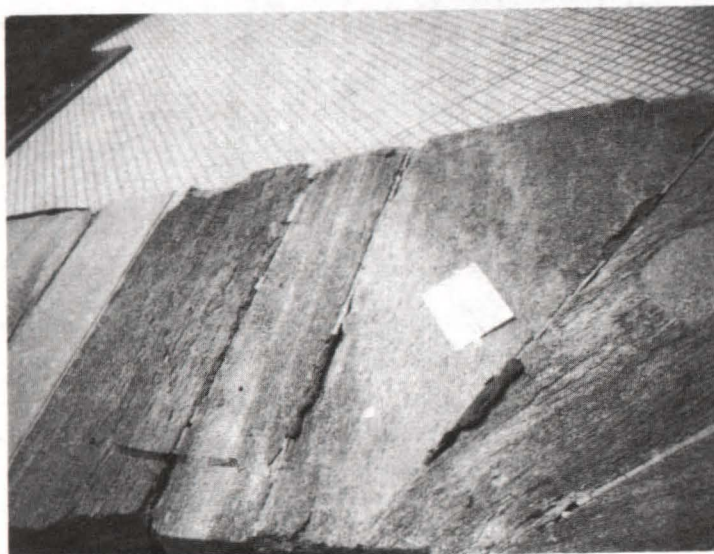


Illustration No. 9

American Museum of Immigration: faulty joints in
parapet.

Illustration No. 10

American Museum of Immigration: open corner, first
level.

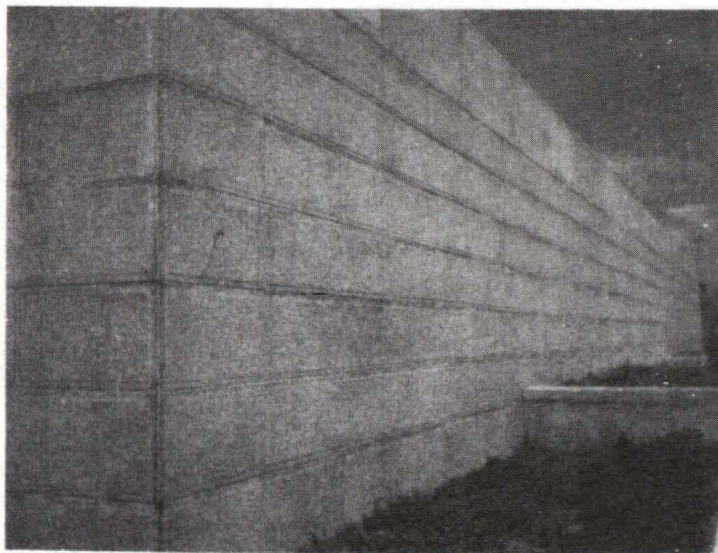


Illustration No. 11

American Museum Immigration: typical faulty
grouted joints.

Illustration No. 12

American Museum of Immigration: settling of planters
and lack of grouts.

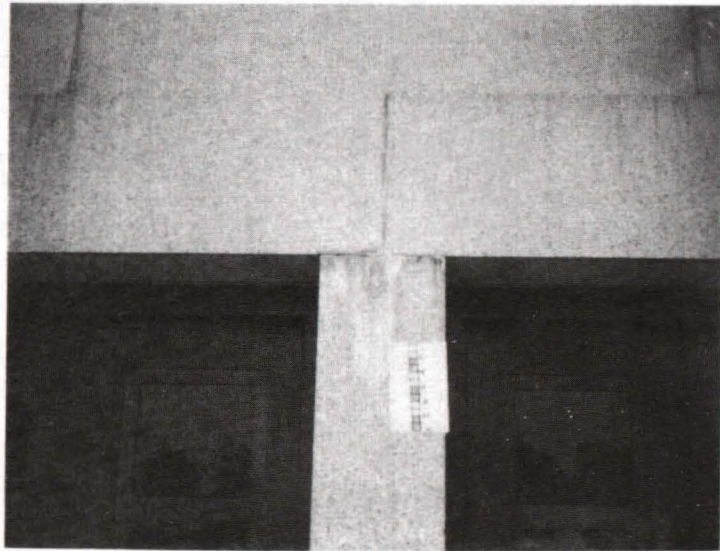


Illustration No. 13

American Museum of Immigration: efflorescence
at main entrance doors.

Illustration No. 14

American Museum of Immigration: typical efflorescence on exterior walls.



UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE/NPS 720

