

STABILIZATION AND MAINTENANCE PLAN

WALBACH TOWER, BATTERY ELON FARNSWORTH AND ASSOCIATED STRUCTURES

FORT POINT NEW CASTLE, NEW HAMPSHIRE

MEMORANDUM OF AGREEMENT

between

University of New Hampshire

and

**New Hampshire State Historic Preservation Office,
Division of Historical Resources.**

Prepared by:

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August 2007

DESCRIPTION OF EXISTING CONDITIONS

Overview

This Stabilization and Maintenance plan has been developed for a number of historic military structures that are located on a 5.5 acre parcel owned by the University of New Hampshire (UNH) on Fort Point in New Castle, New Hampshire. The subject structures are as follows:

- Walbach Tower, an 1814 brick-casemated Martello-type tower;
- Battery Elon Farnsworth, an 1897-1899 Endicott-era concrete battery, originally equipped with two 8-inch breech-loading rifles on disappearing carriages;
- a first generation mining casemate built in 1901, flanking Battery Farnsworth;
- a second generation mining casemate built in 1920 with 1941-42 improvements;
- a power plant built in 1921, immediately adjacent to Battery Farnsworth; and
- a 1943 observation tower, which sits on top of Battery Farnsworth's Gun Emplacement #1.

Also located on Fort Point are:

- Fort Constitution, a state park owned and managed by the State of New Hampshire;
- New Castle Town Landing, two acres of recreational property owned and managed by the Town of New Castle; and
- U. S. Coast Guard Station Portsmouth Harbor.

Purpose

This document proposes stabilization actions intended to meet property deed requirements associated with the June 2001 transfer of the 5.5 acre parcel from the United States Coast Guard to the University of New Hampshire (ref. Rockingham County Registry of Deeds Book 3625, Pages 515-522). The recommended stabilization measures are based primarily on a Historic Structures Report (HSR) prepared for the University of New Hampshire by the National Park Service relative to the subject structures. The HSR and associated HABS photography provide detailed documentation of these historic structures and Part 2 of the HSR provides recommendations for stabilization, preservation and restoration of the structures, some of which are beyond the scope of the deed stipulations. Those recommendations specifically addressing stabilization actions associated with the deed requirements are addressed below. Other non-stabilization improvements (safety, access control, etc.) may be implemented by further development plans.

Principal Findings

The historic structures on this site are in varying states of degradation/disrepair as a result of their age, primary construction materials, past alterations and poor maintenance over the years. In all cases, the primary goal of stabilization efforts should be to slow the rate of degradation for future interpretive opportunities; however, it is understood that future degradation of these structures is inevitable.

The Walbach Tower is in an advanced state of degradation and is considered a historical ruin.

The structural condition of the remaining subject structures is directly, and inextricably, linked to the physical and chemical makeup of the predominant building material, concrete. Inherent properties of the constituent materials of the Rosendale natural cement concrete used extensively in the late 19th century construction program (Battery Farnsworth and the 1901 mining casemate), combined with a variety of environmental factors, are responsible for a condition known as Alkali-Silica Reaction (ASR) which causes expansive forces resulting in large scale

structural movement, and massive internal cracking on both a micro and macro scale. Because these findings are a strong predictor of future structural failure, they are the critical forces to be considered when defining a stabilization plan.

The large scale structural movement in Gun Emplacement #1 and portions of Gun Emplacement #2 has resulted in the threat of major structural failure of these key building components and are the subject of our stabilization actions. With the exception of the noted areas of the two Gun Emplacements, the remaining structures have significantly fewer potential problems.

Options for mitigating ASR in existing concrete structures are limited even in contemporary structures. Given the difficulty of injecting mitigating compounds into the mass pours, the conclusion of the HSR is that the ASR cannot realistically be stopped. Minimization of water infiltration and allowance for the expansive forces of the continuing ASR are seen as the best methods for stabilization.

TREATMENT RECOMMENDATIONS FOR STABILIZATION

Walbach Tower

The Walbach Tower is a ruin, or fragmentary structure in an advanced state of deterioration. Stabilization objectives for Walbach Tower are to retard further deterioration and retain the pieces of the structure which help interpret the construction and origin of the tower. The following stabilization actions will be implemented:

- Install three wooden (pressure-treated) arch supports to stabilize the interior brick arch without specifically taking load from the existing structure;
- Re-point the open exterior mortar joints of the existing vertical wall and construct a mortar wash at the top of the remaining face brick to more effectively shed water; and
- Remove loose brick around the surviving exterior brickwork to a secure place of storage, to be identified. Remove vegetation and dirt from the wall.

Battery Farnsworth

Battery Farnsworth is essentially a single massive, unreinforced concrete structure. Its structural properties and behavior are dependent on the on the qualities of its major constituent material in relation to the environment.

The semicircular exterior of Gun Emplacement #1 - consisting of the slab of the gun loading platform and the exterior wall of the battery, guard, and shot rooms below it - is severely bowed outward as a result of expansive ASR degradation. The platform slab is restrained on three sides by the rest of the massive structure, and so has bowed/bulged in an outward/radial direction. The outward displacement increases along the length of the guard room and shot room to the maximum point of displacement near the center where the slab has moved approximately 14" away from its original position on the back wall. The outward movement of the loading platform slab has pushed the underlying exterior support walls with it, causing the walls to tilt distressingly. Gun Emplacement #1 is in substantially worse condition with regard to the ASR deterioration and associated expansion/movement than is Gun Emplacement #2, which shows a similar but less pronounced pattern of structural movement.

The objective of the stabilization actions is to prevent collapse of the existing structures, retain the visual value where ever possible and incorporate concepts to address continued expansion due to ASR. As a result, stabilization actions for Gun Emplacement #1 will differ from Gun Emplacement #2 to allow study of possible solutions. These actions are deemed the best engineering solution; future stabilization actions are expected to only include observation and monitoring of the two different solutions employed. The stabilization actions include:

Gun Emplacement #1:

- Stabilize the two center wall sections of Battery #1 with two concrete buttresses per wall section. The buttresses will be thick, reinforced concrete structures that shall express their contemporary methods and materials of construction.
- The buttresses will be separated from the Battery walls with a rubber membrane (or equivalent), allowing for future removal of the buttresses with no damage to the historic structure.
- The buttresses will be set on a continuous footing of sufficient depth to provide significant resisting force to the walls.
- Analog monitoring devices will be attached throughout the platform and wall sections to allow for monitoring of movement over time.
- This approach will avoid any damage to the original structure, provide an opportunity to monitor changes over time, and may serve as a long-term solution for stabilization of the outer walls and platform of Battery #1.

Gun Emplacement #2:

- Analog monitoring devices will be attached throughout the platform and wall sections to allow for monitoring of movement over time.
- This is also viewed as a long-term solution and again provides an opportunity to monitor changes over time.

1901 Mining Casemate

No major stabilization treatments are recommended. Non-stabilization improvements (safety and access control) may be implemented by further development plans.

1920 Mining Casemate

No major stabilization treatments are recommended. Non-stabilization improvements may be implemented by further development plans.

1921 Power Plant

Objective of stabilization actions is to shed the majority of rainwater thereby extending the life of the overall structure. The stabilization actions include:

- Repair spalling concrete at the Northwest roof edge.
- Re-roof with tar and gravel roof to match original.

1943 Observation Tower

No major stabilization treatment is required to stabilize this structure. However, patching of concrete around exposed rebar will be completed.

Fort Point Site (General)

Additional general stabilization measures should include limiting unauthorized access to the site and minimizing the encroachment of vegetation to the structures. Stabilization actions include:

- Repair existing security fencing to limit access to unsafe areas.
- Vegetation control efforts on the site will be accomplished by installation of a geo-tech matting within approximately 3 foot of the primary structures with application of rock ballast.

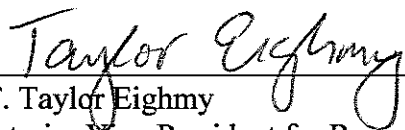
RECOMMENDATIONS FOR ONGOING MAINTENANCE

The stabilization treatments above are intended to stabilize the structures subject to impending structural failure due to the slow and irreversible process of deterioration associated with the ASR-affected concrete. Although the stabilization actions can not fully stop the eventual degradation of the structures, the actions recommended, combined with effective periodic inspections and routine and cyclic maintenance do provide a long-term preservation of the site.

Biannual inspections by a facility maintenance specialist and historical architect or engineer should be conducted concentrating on identifying any new condition requiring treatment or structural intervention and evaluating the effectiveness of the prior treatments. Continued efforts to seal water from the structure will pay the largest benefits in delaying ASR and these inspections should help identify opportunities to make small repairs before larger scale problems develop.


Routine maintenance activities will consist of vegetation control, maintaining security fences, walkways and stairways in the complex. Cyclic maintenance will involve repairs to the roofs, building enclosures and monitoring of the slab analog devices.

Signed:



T. Taylor Eighmy
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8/2/07
Date



James McConaha
State Historic Preservation Officer
New Hampshire Division of Historical Resources

8/8/07
Date