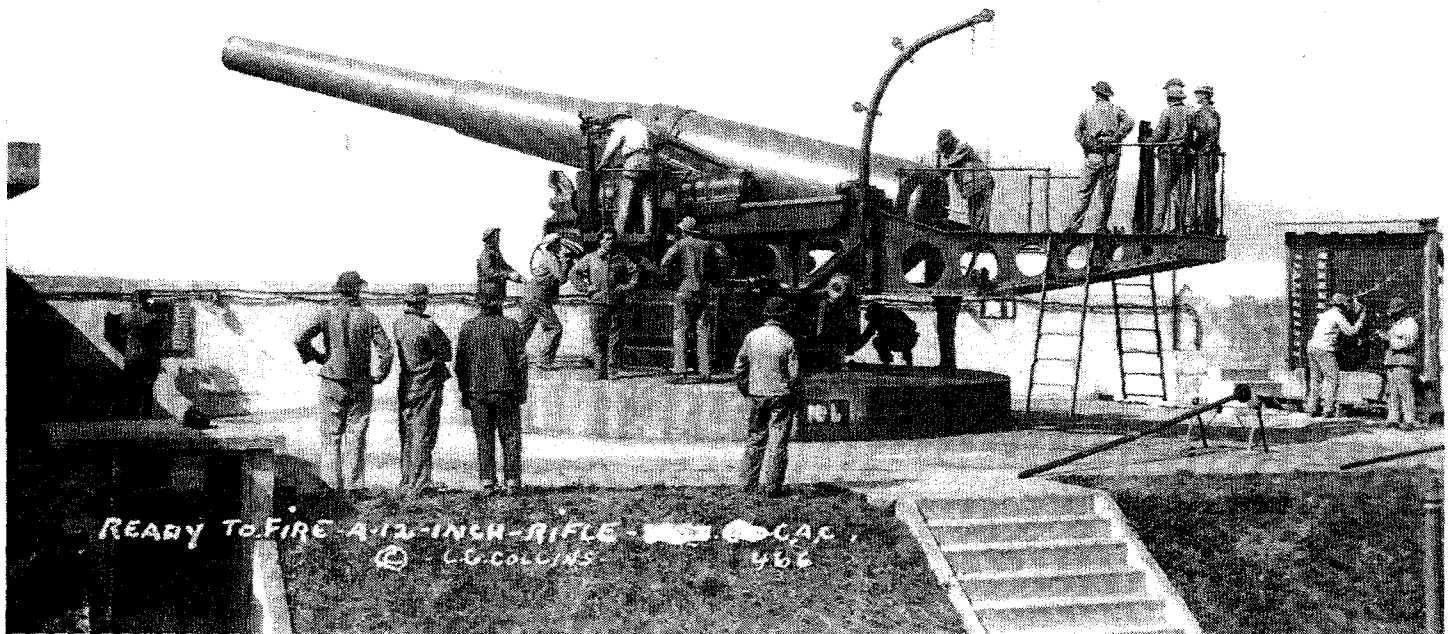


Seacoast Fortifications Preservation Manual

Golden Gate National Recreation Area
San Francisco, California



by

Joe C. Freeman, AIA
Stephen A. Haller
David M. Hansen
John A. Martini
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Golden Gate National Recreation Area
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GLOSSARY OF TERMS

Architecture, Fortifications, and Preservation

- active cracking** cracking showing recent movement
- adaptive reuse** contemporary reuse for an existing historic structure, often with an updating of infrastructure and added amenities, and, typically with few sustained ties to the original historic function
- adobe** sun-dried (unburnt), clay-soil brick; the clay was often mixed with chaff, straw, chopped weeds, tule reeds, or sometimes manure for historic adobe bricks in California, with the individual brick sizes approximately eleven by twenty-five inches and of two-to-five inches thickness; each brick weighed about sixty pounds; Spanish word derived from Arabic *atob* (mud)
- aggregate** a constituent in cementitious mixes, usually sand or gravel
- alkalinity** the presence of chemical base material such as hydroxides and carbonates of calcium, sodium, or potassium
- alligatoring** a surface cracking pattern resembling alligator skin
- ammunition hoist** a mechanical device for moving projectiles and powder from the magazine to the level of the gun
- ancillary** a dependent structure, often but not always small in scale; associated hierarchically with a primary structure; often found in clusters with other dependent structures
- angle iron** iron or steel cross section with two legs ninety degrees apart
- architectonic** resembling architecture in manner and organization
- area drain** a surface drainage inlet to convey and disperse water
- artificial stone** varieties of cement-based, man-made imitations of naturally occurring rock, the latter typically quarried for building
- asphalt (asphaltum)** various bituminous substances, both naturally occurring and resultant from petroleum processing; also a bituminous substance mixed with crushed rock for paving
- asphalt emulsion paint** a surface coating containing emulsified asphalt for moisture protection
- automatic cannon** rapid-fire, light-caliber guns in which the force of the recoil is used to load and fire the piece without the crew having to manually insert and fire each round
- backer rod** a foam, tubular-shaped rod placed in a joint that is to receive a sealant to provide a solid base to receive and hold sealant
- backfill** filling a previous excavation

- balanced pillar mount** a mount for smaller caliber coast artillery, which raises the gun above the parapet into the firing position and lowers it below the parapet for loading using a telescoping cylinder
- barbette carriage** a mount for seacoast artillery in which the gun remains above the parapet for loading and firing
- base line** a pre-surveyed horizontal line used for accurate position-finding and fire control, with observation posts called base-end stations at either end
- base-end station** observation station at either end of a base line, containing an azimuth instrument or depression position finder, used to supply position data for the indirect aiming of coast artillery weapons
- battery** a defensive structure containing all features and appliances necessary to support and serve a number of cannon
- battery parade** the area in the rear of a battery where troops take formation
- Beaux-Arts** French term [*Ecole Nationale et Spéciale des Beaux-Arts*, Paris] meaning fine arts; label for an architectural movement and training program, and for its associated architects, 1865-1915; loosely, architecture as fine art, characterized by an emphasis on classical tradition; Beaux-Arts was sometimes used as an alternative term for Classical or Colonial Revival design in the United States during the late nineteenth and early twentieth centuries
- benching** installing fill materials in lifts
- bentonite panel** an organic clay sheeting (compressed and rolled) to provide a waterproof membrane
- berm** a ledge, embankment, or shoulder, often man-made, and typically earthen; also, a narrow path between a fortification parapet and its surrounding ditch
- beton agglomeré** a French term for an artificial stone of cementitious materials in a matrix
- binder** cementitious materials which chemically bind aggregates in a matrix
- bitumen** rock largely consisting of hydrocarbons; naturally occurring asphalt
- blackboard rack** a metal frame extending from the side of the data booth in a mortar battery to support a set of blackboards upon which firing data could be written
- blast apron** a relatively thin paving of concrete in front of a gun emplacement that protects the ground from erosion, reduces dust, and helps control the possibility of fire
- blind drain** a hidden drain
- bombproof** a heavily built shelter, either a separate structure or a room within a battery, that can withstand the effects of bombardment

breast wall	a wall of breast height, typically used to provide a defensive position for infantry soldiers
breech-loading weapon	a weapon in which the round is loaded by opening a plug at the base of the gun tube
built environment	buildings, structures, and ancillaries comprising an inter-related man-made area, often architectural in character
bunker	an indistinct term that generally means a heavily built structure, usually a shelter against bombardment, that may or may not have provisions for defense; no specific meaning in coast defense; comes into popular use during WWI
butyl membrane	a rubberized sheet membrane utilizing butyl
caliber	the minimum diameter of the bore of a firearm, and therefore the diameter of the projectile it fires; also used to describe the length of a cannon, expressed as a multiple of its diameter
camouflage	the measures taken, or the material used, to conceal or misrepresent a military position
cantilever	to project horizontally with one end of the structure (beam or slab) anchored into a pier or wall; also, the term for such an extension or for a projecting bracket
caponier	a protrusion from the wall of a fortification, designed to allow grazing fire from within to sweep across the scarp walls adjacent to the parapet
carbonization	<i>formation of carbon from organic matter under heat and compression</i>
casemate	a chamber within a fortification built with overhead cover, and therefore resistant to bombs or high-angled shell fire
casement window	a window opening on hinges, which are generally attached to the sides of the window frame
castillo	the Spanish term for fortification
cast iron	a brittle iron cast from molten iron to a specific shape
ceiling trolley	a wheeled carriage running on, or in, tracks fastened to the ceiling, from which a projectile was suspended for movement
cement paint	a water-based paint containing Portland cement
cement-stabilization	to stay chemical activity in cement; to prevent further deterioration
chalking	<i>paint deterioration caused by loss of paint binder, leaving dried pigments</i>
chamfer	an oblique surface cut on the edge or corner of a board, usually sloping at forty-five degrees

character-defining / distinctive feature

features particular to a historic structure that distinguish and/or typify its character in terms of its original visual and structural design (and engineering), and in terms of its historic function or use

charette

a French term for a small, two-wheeled cart; at the *Ecole Nationale et Spéciale des Beaux-Arts* instructors collected students' drawings for assigned projects in a charette and the term came to be associated with the process of designing, and in particular with a work in progress by a group of architectural professionals

choke point

a constricted geographical area, easy to defend.

cold joint

a break in a construction installation; a stopping point

cold rolled steel

steel pressed and shaped without heat

columbiad

a large caliber, smoothbore, breech-loading cannon, designed to fire both shot and shell

common brick

utilitarian brick used for normal-load-bearing construction

compressive force

the tendency of a mass to bear on a surface by gravity

counter-scarp wall

in field fortification, the wall opposite the scarp; more directly, the side of a defensive ditch closest to the opposing force

crazing

random hairline surface cracking

cross fire

direct fire coming from two opposing directions at once

cultural landscape

the comprehensive (and linked) built and natural landscape defining a distinctive cultural-use area

curing

chemical process of dehydration by which cement and aggregate harden or set

cut and fill

efficient earthwork where cut materials are used to fill low spots adjacent to the cut

dado

the lower, broad part of an interior wall, finished in a painted or textured scheme different from that of the overall wall surface

damp course

a thru-wall membrane to resist rising damp

deflection

deformation of a structural element caused when loading exceeds resistance

deflector

a large stone placed within the mass of early concrete fortifications and intended to deflect a projectile that might strike it, thereby protecting interior spaces

delamination

deterioration in disconnected sheets or plates

dependent structure

ancillary structure

- design parameters** variables of function, need, or usage that directly affect the design of a building, structure, or object
- disappearing carriage** a gun mount designed to raise the gun to firing position above the parapet by means of a counterweight, and use the force of recoil to carry the gun back to its loading position below the parapet
- dog** a metal connector or strap
- dormant cracking** cracking that is not active
- double-hung window** a sash-type window with the lower framework typically moving up and down vertically, and the upper framework fixed; single-paned or multi-paned in type
- drip line** the line where water is shed from a surface
- dynamite battery** an experimental, and impractical, pneumatic gun that fired dynamite, using compressed air rather than gun powder to propel the dynamite to the target
- earthwork** a military construction formed chiefly of earth, used in both defensive and offensive operations
- efflorescence** soluble salts forming on a surface
- elastomeric membrane** a flexible sheet of rubberized material used for moisture protection
- elevation** a scale drawing representing a structure or building as projected geometrically on a vertical plane parallel to the chief dimension
- embrasure** a small opening in a fortification through which the weapon fires
- emplacement** a subdivision of a battery that refers to a single gun and the provision of services necessary to its functioning; compare with *pit*
- escutcheon plate** the door plate to which the handle is attached; or, the door plate protecting the keyhole or locking mechanism
- esplanade** a level area of a fortification
- Endicott** William C. Endicott, Secretary of War under the administration of President Grover Cleveland, associated with the program of modernization of American seacoast fortifications at the end of the nineteenth century
- epoxy** a polymer-based substance where oxygen and carbon atoms bond in a unique way; used in paints and adhesives; usually a two-component paint system where the components are mixed to achieve the chemical reaction that results in a hard and durable finish
- existing condition** the current condition, inclusive of advancing deterioration, of the physical fabric defining a site, structure, building, or object
- expansion joint** a joint used to compensate for or isolate structural movement

fatigue	natural deterioration or loss of strength in a material
feature mapping	the accurate recording of all features in a structure, including the observable imperfections of fabric, as a base for future preservation work or measuring the rate of change in physical condition
field artillery	the light and medium artillery pieces, and their units, whose function is to support the army in mobile battles and campaigns, not emplaced permanently in one area
field density	field-measure density used to determine degree of compaction; expressed as a percentage
field review (inspection / reconnaissance)	the on-site, physical observation and analysis required to ascertain the current conditions present at a historic property; here, when accompanied by maintenance actions, using the Action Log (Appendix C)
fire control station	a structure housing the equipment and personnel necessary to accurately determine the location of targets or to command the fire of several batteries
first system of American seacoast fortification	open fortification works of earthen construction, dating to the 1790s, which represent the first American attempt at a seacoast fortification network
flag	a flat slab of stone, or artificial stone, used for paving
flash rust	immediate corrosion of bare ferrous metals due to exposure to moisture in the air
flashing	a mechanical device used to prevent moisture infiltration
flat trajectory fire	high velocity direct fire, in which the projectile travels in a relatively straight line to the target
fog base	a base line system positioned at low elevation, to act as an alternate base line in case the view from the primary base-end stations was obscured by fog
footing	the perimeter base (or bottom) beam of a structure
formwork	the temporary mold of timber or metal boards, or sheets, that is used to give concrete its desired form, and, to give it support until it has hardened sufficiently
French drain	an underground linear drain designed to intercept and disperse water
gallery	a long room or passage, typically enclosed
garrison	the troops permanently assigned to a military post
general management plan	the official master plan for a park, approved after a period of public comment

- GPF gun** the U.S. 155mm gun, Model 1918 on field carriage, a large mobile artillery piece used to supplement the fixed seacoast defenses; GPF is the acronym for *Grand Puissance, Fillioux* or high-powered gun, named after its French designer
- granolithic finish** a cement-based surface (or floor) finish for concrete resembling granite; often applied when the concrete is fresh (green) and sometimes augmented by a surface hardener based on sodium silicate
- gravity / convection ventilation** ventilation using natural convection or air movement caused by differential pressure and air temperature
- grazing fire** flat trajectory fire placed low along the ground or water
- gritblast** high pressure air cleaning using sand or other grit
- groin vault** a vault formed by the intersection of two or more barrel vaults, with the omission of all of those parts that would lie below each of the uppermost vault forms
- groupment** an organization of firing batteries grouped together, irrespective of their permanent units, to provide the most effective command and control of an area's harbor defenses
- grout** a thin, coarse mortar poured into the joints of masonry and brickwork; to fill such joints
- gun** a cannon that fires a high velocity projectile on a flat trajectory
- gun platform** that portion of a permanent battery upon which the cannon is emplaced
- habitat** the kind of place where a particular animal or plant lives or grows naturally, or, thrives
- harmonic movement** coordinated movement due to the effects of wind loading
- historic architectural inventory** a systematic inventory recording the physical fabric and setting for historic properties; usually accompanied by photography; here, using the Coast Defense Resource Checklist (Appendix C)
- historic structure / resource** generally, with respect to American preservation efforts, a building, structure, or object meeting the requirements of eligibility for the National Register of Historic Places
- historic site** generally, with respect to American preservation efforts, a prehistoric or historic archeology site meeting the requirements of eligibility for the National Register of Historic Places
- hopper window** a window opening outwards at an angle and having a bin-like appearance when open

horizontal crest	a coastal fortification term that refers to the desire of the designers to keep the highest part of a gun battery, particularly those for guns mounted on the disappearing carriage, flat and unmarked by any object that could be used to identify the location of the battery from the sea
hydrostatic pressure	variation in air pressure that causes moisture to rise vertically in a wall
I beam	a metal structural shape designed to withstand deflection and twisting forces; consists of flanges and web
infrastructure	the structural skeleton beneath the outer skin of a building; also, the comprehensive system underlying a cohesive group of buildings and structures
integrity	with respect to American preservation actions, a reference to the seven points of integrity—location, design, setting, materials, workmanship, feeling, and association—defined within the criteria for eligibility to the National Register of Historic Places
interpretive plan	a document that describes the themes and objectives of a park's public education program, and the means for reaching those objectives
jack	a mechanical device to lift
jamb	a vertical piece forming the side of a doorway or window opening
jig	template
joist	a simple timber, steel, or precast-concrete beam supporting floor boards or ceiling lath
laitance	a condition occurring when concrete is mixed too wet, causing cementitious materials to concentrate and leaving portions of the mix cement-poor
lamellar tearing	stress-related metal deterioration
lampblack	a carbon byproduct of burning hydrocarbons; used as a pigment in paint
lime mortar	a mortar of one part lime and three parts sand
lime wash	a thin lime mortar used as a paint
lintel	a horizontal supporting member above an opening such as a window or door
loam	a loose soil composed of clay, sand, and organic matter, often highly fertile
louver	a slanted board or slat in an opening, overlapping with other boards or slats, and arranged to admit air but to exclude rain
magazine	a room within a battery or an emplacement where munitions are kept; often used more narrowly to indicate a room for the storage of powder
maintenance	the ongoing efforts to clean and repair a structure in order to prevent or slow its deterioration

Mandary flue cap a proprietary name for a type of clay flue cap manufactured by the Superior Clay Company in Ohio

maneuvering ring an iron ring set into the interior wall of a gun pit to aid in moving or adjusting the position of the heavy weapons

microclimate the distinctive climate of a restricted geographic area as defined within the more encompassing climate of a region

microcrystalline wax a fine wax with the ability to fill microscopic pores in materials; a sacrificial coating and protection

mine casemate a heavily protected room or building specially fitted out for the firing of submarine mines

moisture / damp-proof membrane
a surface coating that prevents moisture infiltration

monolithic of one material

mortar (architecture) a mixture, as of lime or cement, sand, and water, which hardens in the air and is used for binding together bricks or stones

mortar (fortification) a cannon designed to fire projectiles in a high, arched trajectory to reach over line-of-sight obstacles

mortar joint the area between individual bricks or stones, and between layers of such masonry, filled with binding material to create a compact mass

mortise a rectangular cavity of considerable depth in a piece of wood for receiving a corresponding projection (tenon) of another piece of wood

muntin a slender, vertical or horizontal, wood or metal piece separating individual window panes

muzzle-loading weapon
a weapon in which the projectile is loaded from the front, or muzzle, end of the gun tube

National Historic Landmark
nationally significant properties in American history and archeology; recognition established through the Historic Sites Act of 1935; official list maintained by the National Park Service on behalf of the U.S. Secretary of the Interior

National Historic Site
nationally significant sites in American history and archeology; program established through the Historic Sites Act of 1935; National Historic Sites are formally a part of the U.S. National Park system and are managed as physical property by the National Park Service

National Register of Historic Places

the official list of historically significant national, state, and local districts, sites, buildings, structures, and objects maintained by the National Park Service on behalf of the U.S. Secretary of the Interior; established through the National Historic Preservation Act of 1966

- native vegetation** vegetation indigenous to a geographic area
- neat cement** a mix of one part cement and one part sand without large aggregate
- open space** relatively undeveloped land set aside for its recreational, habitat, or resource values
- ordnance** artillery pieces and the equipment used to maintain and fire them
- Panama mount** a permanently fixed open gun platform upon which a mobile artillery piece can be quickly placed for accurate fire and ease of traverse
- parados** an earthen or concrete barrier that protects a battery from fire from the rear
- paraffin paint** a paint containing petroleum-based wax
- parapet** in coast defense, a wall of concrete or masonry that protects the cannon and those manning it
- paring** coating masonry with a cement-rich wash
- percolation** filtration of water through a material
- pintle** a pin or bolt, especially one on which something turns, as in a hinge
- pit** an emplacement containing two to four mortars and the provisions necessary for their service; compare with *emplacement*
- plan** a drawing made to scale to represent the top view or a horizontal cut of a structure or building
- planes of weakness** cold joints or planes susceptible to differential movement
- plasticity index** a scale of relative value indicating swelling or the expansive characteristics of soil
- plate** a thin, flat sheet of metal or other material of uniform thickness
- plotting room** a room containing the men and equipment required to develop the necessary data to accurately aim a gun or a group of mortars
- pneumatic gun** a gun that fires a projectile by the sudden release of highly compressed air
- point** to apply a final layer of mortar to a joint

point loading	structural loading concentrated on a small cross-sectional area, as in the load of a beam transferred to a column
poultice	a material applied to a surface that absorbs a previous coating and draws it out
Portland cement	a hydraulic cement made by burning limestone and clay
preservation	an effort to sustain the remaining physical fabric of an historic structure, with attention to the seven points of integrity—location, design, setting, materials, workmanship, feeling, and association—as defined by the criteria of the National Register of Historic Places
presidio	the Spanish term for a fortified garrison
primary structure	the key building or structure defining a cluster of buildings and / or structures; or, the key building or structure supported by a group of ancillary (dependent) buildings and / or structures
prime	the first coat of a series of coats, usually paint
projectile	a generic term for the destructive missile thrown from a firearm
protection	to provide an historic site or property with a defensive system intended to inhibit further loss or deterioration of the existing physical fabric
punching shear	a point load acting on a horizontal plane, as in a column resting on a slab
rail	a horizontal timber or piece in a window framework, wainscot, or door paneling; paired with <i>stile</i>
rapid-fire gun	a gun that can be loaded and fired with great rapidity because of a single-motion breech mechanism; such guns also usually employ fixed ammunition, avoiding the need to load the propellant and the projectile separately
rebar	reinforcing steel bars used to provide a tensile component to compressive cement; various shapes: billeted, deformed, smooth, and twisted
redan	a small fortification consisting of two parapets forming a salient angle, with the rear face of the fortification open
rehabilitation	an effort that minimally alters the remaining physical fabric of an historic property, while sometimes adding features to allow efficient contemporary use; executed with an emphasis on the seven points of integrity—location, design, setting, materials, workmanship, feeling, and association—defined by the criteria of the National Register of Historic Places
repoint	replacement of masonry joint mortar
resource management zone	geographical areas defined in a park's general management plan that are managed according to distinct legislative and administrative requirements, resource values, and public preference

restoration	an effort to retain, preserve, or restore the complete physical fabric of an historic property appropriate to a researched temporal period, with close attention to the seven points of integrity—location, design, setting, materials, workmanship, feeling, and association—defined by the criteria of the National Register of Historic Places
retaining wall	a wall built to hold back a mass of earth; a revetment
rifled artillery	a large caliber, long-range weapon, with helical grooves cut in the bore to impart spin, and therefore stability and accuracy, to the projectile
riser	the vertical face of a stair step
rising damp	moisture rising in a wall due to hydrostatic pressure
Rosendale cement	a Portland-type cement found in New York state; naturally occurring
saddle	a structural implement or connector
salients	the portion of a fortification that projects towards the enemy
sally port	the protected entry way of a fortification
sash	a moveable framework in which planes of glass are set, as in a window
scab	a new piece of wood attached to an existing, deteriorated, or weakened member
scarp wall	in field fortification, the wall closest to the defenders in a ditch built as an obstruction
seacoast fortification	the fortification network designed and emplaced to protect naval bases, seaports and other important coastal waters from the intrusion of hostile warships
second system of American seacoast fortification	open batteries and masonry-faced forts constructed by the United States to protect strategic points on the Atlantic seaboard; predominantly prior to the War of 1812
section	a cross-sectional drawing made to scale representing a vertical cut through a building or structure
Sewell building	a frame building clad with cement stucco applied over an expanded metal lath, and referred to by the name of the army engineer officer who developed the technique, John Sewell
sheepsfoot roller	a heavy steel roller with individual protruding cleats in a shape associated with that of the feet of sheep; used for soil compaction
sheet lead	flat sheets of lead used for flashing
sheet metal	flat, thin metal, usually steel or steel alloy

shell	a hollow projectile, filled with explosives, designed to exercise destructive force by explosive energy
shoring	supporting posts, beams, and auxiliary members placed against the side of a building or structure; especially supports placed obliquely
shot	a solid projectile of dense metal, designed to exercise destructive force through penetration and kinetic energy
shot room	a room within a battery or an emplacement for the storage of projectiles
sloughing (soil)	the movement or partial collapse of an earthen slope
shuttering	overlapping or sheet materials to shed water; shingling
sidewalk concrete	concrete with a granolithic finish or with a finish of small stones imbedded in cement
significance	generally in American preservation efforts, defined through the four criteria (A, B, C, and D) of the National Register of Historic Places; summarized as significance associated with key historic events (A), the lives of important persons (B), established architectural or engineering merit (C), and, the potential to yield worthy new information in history or prehistory (D).
sill	a horizontal timber, block, or the like, serving as the foundation for a wall; the horizontal piece beneath a window, door, or other opening
smoothbore artillery	large caliber weapons with smooth, unrifled bores, designed to fire spherical shot or shell ("cannonballs")
soil grouting	injection of lime or cement into soil for stability
sonic meter	a device using sound waves to determine relative density
sounding hammer	a hammer used to strike concrete to determine consistency by the characteristics of the sound
spall	the flaking off of a material caused by expansion and contraction, or by material decomposition
speaking tube	a metal tube, either imbedded in the body of concrete or suspended from the ceiling, through which voice communication could be had between various parts of an emplacement or battery
splinterproof	a heavy concrete roof designed to protect against shell fragments
stabilization	to reestablish the structural equilibrium of an historic building or structure, or, to arrest further deterioration to an historic property or site, generally
stanchion	an upright bar, beam, post, or support, as in a window, stall, or compartment
stewardship	the management of a property, site, or historic resource

- stile** a vertical member in a wainscot, window, paneled door, or other piece of framing; paired with *rail*
- strategic** military art and science applied on the large scale to the employment of nations, their resources, armies and fleets
- stud** a post or upright wood member in the wall of a building
- stirrup** a shaped piece of reinforcing steel designed to tie two (top and bottom) horizontal rows of reinforcing
- substrate** a raw, base material (wood substrate to paint); underlying layer
- suction spotting** inconsistent absorption by a porous substrate caused by inconsistent surface preparation; volatile solvents evaporate at different rates
- surface bonding** chemical or friction connection between a substrate and applied finish surface
- tactical** military art and science applied to the employment of small scale units and capabilities of particular weapons
- tamping** manipulation of concrete in a form to settle concrete and eliminate voids
- Taylor-Raymond hoist** the most successful of several ammunition hoist designs, developed by Harry Taylor through a series of improvements upon an earlier design by Robert Raymond; Taylor and Raymond were both army engineer officers
- telautograph booth** a free-standing concrete structure (but also a recess) that housed a telautograph, an electro-mechanical distance writing instrument
- tensile force** force which seeks to pull materials apart
- terreplein** a term that dates from much earlier fortification practice and meaning the area of a rampart where guns could be maneuvered; by the 1890s, it was used most often to indicate the ground level of a battery, but it soon fell out of use
- thermal expansion / contraction** differential movement due to change in size caused by changes in temperature
- third system of American seacoast fortification** a system of permanent masonry forts and supplementary batteries, designed between the War of 1812 and the Civil War, to improve upon the protection of strategic points along the Atlantic and Gulf coasts of the United States
- tongue-and-groove joint** a common joint consisting of a projecting strip along the edge of a board and a matching groove on the edge of the next board
- tramway** a light rail line upon which ammunition carts could be pushed or hauled by hand

- transfer drawing** a detailed drawing made by U.S. Army engineers when a completed battery was transferred to the artillery service; it provided instructions about the use and care of all the equipment and facilities furnished with the battery
- transit** an optical instrument used to set lines, grades, and elevations
- traverse** in fortifications, the structure on either side of an emplacement that provides protection from flanking fire; when referring to a cannon and its carriage, it can also mean movement to the left or the right
- treatment plan** a plan describing specific operations used in maintaining or preserving architectural properties
- trench drain** a linear drain designed to convey, intercept, or trap water
- turret mount** a weapon mounted in a rotating, armored enclosure
- variable-burning powder**
propellant charge consisting of various sized grains of powder, which will therefore burn at different rates; the effect will accelerate the projectile more gradually out the gun tube, providing increased ultimate velocity and less strain on the gun barrel
- viewshed** the panoramic, or otherwise fully encompassing, view *from* an historic site or property
- water battery** a gun battery placed to lay grazing fire across the water
- whitewash** a mix a hydrated white lime, alum, water used as a surface coating
- wythe** the width of a brick

LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
APA	American Plywood Association
APT	Association for Preservation Technology
ARADCOM	Army Air Defense Command
ARPA	Archeological Resource Protection Act
ASTM	American Society for Testing Materials
AWPBS	American Wood Preservers Bureau Standards
BC	battery commander
CFR (fort.)	coincidence range-finder [station]
CFR (pres.)	Code of Federal Regulations
CRSI	Concrete Reinforcing Steel Institute
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
GPF	<i>Grand Puissance, Fillioux</i> [a high-powered gun named after its French designer]
GRI	Geosynthetic Research Institute
ICBM	intercontinental ballistic missile
MC	mine casemate
NACE	National Association of Corrosion Engineers
NOMMA	National Ornamental and Miscellaneous Metals Association
OCE	Office of the Chief of Engineers
OSHA	Occupational Safety and Health Administration
psi	pounds per square inch
RCB	Report of Completed Batteries
RCW	Report of Completed Works
SCR	Signal Corps Radio [Army radar classification developed during World War II]
SPIB	Southern Pine Inspection Bureau
SWRI	Sealant, Waterproofing, and Restoration Institute
WCLIB	West Coast Lumber Inspection Bureau
WWPA	Western Wood Products Association

INTRODUCTION

The *Seacoast Fortifications Preservation Manual* for the Golden Gate National Recreation Area is a collaborative effort, drawing upon expertise across several disciplines. Five primary authors contributed to the manual, with other individuals crucial for their roles as discussants, question answerers, and sources of specialized information. The manual is divided into three parts, with appendices supporting the volume.

“Part I: History and Preservation for Coast Defenses” introduces the installations and the preservation process. The four chapters of Part I include an opening conversation with readers of the manual—why preserve coast defenses—and three background introductions to the broader topic of these fortifications and their maintenance. Historian Stephen A. Haller and architectural historian Dr. Karen J. Weitze, leaders for the National Park Service and KEA Environmental team, contributed chapter 1. Mr. Haller, as Park Historian for the Golden Gate National Recreation Area, wrote chapter 2, a look at the national context for the coast defense fortifications of the San Francisco Bay Area. Military historian and preservationist David M. Hansen authored chapter 3, defining the character-defining features of the fortifications and giving readers a basic vocabulary with which to interpret these specialized historic resources. Chapter 4, standards and guidelines for the preservation process, is the joint effort of Mr. Hansen, Mr. Haller, and Dr. Weitze.

“Part II: Engineering, Design, Construction and Maintenance Issues” focuses on historic architectural-engineering practices at the San Francisco batteries. Chapter 5 offers an introductory analysis of the materials used at the San Francisco batteries and at the Nike sites, 1870 to 1970, and is authored by Dr. Weitze. Several complementary paragraphs written by Mr. Freeman, and originally appearing in chapter 7, have been incorporated into chapter 5. Paired with chapter 5 is Mr. Hansen’s chapter 6, a discussion of American battery design, concentrated on the Endicott period.

The four chapters of “Part III: Treatments” develop maintenance treatments and procedures, with the individual pull-out sheets of chapter 10 typically addressing known concerns and challenges. Pull-out sheets are organized by historic materials and subtopics, such as “Brick Construction: Mortar and Repointing” and “Metals: Handrails and Guardrails,” with each sheet independently formatted. Historical architect Joe C. Freeman contributed chapter 10. Chapters 7, 8, and 9 support the treatments and procedures presented by Mr. Freeman. Chapter 8, discussing safety and security issues at the batteries and their ancillaries, is the joint contribution of Dr. Weitze, Mr. Hansen, and John A. Martini, Curator of Military History for the Golden Gate National Recreation Area. Chapters 7 and 9, contributed by architect Freeman, provide analyses of the elements of deterioration across the coast defense installations, as well as overviews of types of suggested treatment plans. The suggested plans are focused on a range of alternatives from stabilization to restoration.

The appendices offer further source material to the reader. Appendix A gives a list of the coast defense fortifications within the jurisdiction of the Golden Gate National Recreation Area, with a representative selection of ancillaries. The list is intended as a basic guideline for the reader, providing him with beginning and completion construction dates; and, with gun emplacement and removal dates. Installations visited during field work for the manual are so noted. Appendix B is a set of U.S. Army Form 7s, simple plans, elevations, and sections for the batteries. Although the Form 7s are not a complete set, they do offer useful information for future maintenance site work. A brief history of the Form 7, derived from the work of military historian Matthew L. Adams, opens the appendix. Appendices A and B are researched and written by military historian Martini. Appendix C provides the Coast Defense Resource Checklist, with an introductory discussion of its intended use in a future historic architectural inventory and in ongoing maintenance work. Mr. Hansen developed the resource form, with additional comments for its best use found in chapter 4. Also in Appendix C is an Action Log for use by the maintenance staff of the National Park Service. The Action Log can be reproduced in multiple.

Completing the concluding sections, Appendix D offers a summary of professional sources for treatment materials and techniques, while Appendix E provides professional cut-sheets discussing manufacturers' standards for items often required in the maintenance of historic structures—such as appropriate soil stabilization products, concrete pigments, coatings, and epoxy injection.

Over 100 illustrations accompany the *Seacoast Fortifications Preservation Manual* for the Golden Gate National Recreation Area, inclusive of historic photographs from the collections of the Park Archives of the Golden Gate National Recreation Area; contemporary photographs at the batteries taken by Mr. Hansen; and, sketches provided by architect Freeman. Together these illustrations offer the reader a close look at the range of challenges present at the coast defense sites of the San Francisco Bay.

Text and illustrations are offered to encourage thoughtful maintenance and preservation at the batteries and ancillaries of the Golden Gate National Recreation Area, and to further encourage such efforts for all coast defense fortification sites—American and international.